

Quick Start Guide



Signal Generator

R&S[®] SMF100A

1167.0000.02



Dear Customer,

throughout this manual, the Signal Generator R&S® SMF100A is abbreviated as R&S SMF.

The firmware of the instrument makes use of the operating system LINUX® and other valuable open source software packages. The most important of them are listed below together with their corresponding open source license. The verbatim license texts are provided on the user documentation CD-ROM (included in delivery).

Package	Link	License
LINUX® Kernel	http://www.linux.org/	GPL 2
gLibc	http://www.gnu.org/software/libc/	LGPL
busybox	http://www.busybox.net/	GPL 2
OpenSSL	http://www.openssl.org/	OpenSSL / SSLeay
XFree86	http://www.xfree86.org/	XFree86
Xitami	http://www.xitami.com	NetSnmp-5.0.8
PHP	http://www.php.net	2.5b6
OpenSSL	http://www.openssl.org	BSD
BOOST Library	http://www.boost.org	Artistic
zlib	http://www.zlib.net	Boost Software, v.1
PC/SC-Lite	http://www.linuxnet.com/	ACE_TAO

The OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>), includes cryptographic software written by Eric Young (eay@cryptsoft.com) and software written by Tim Hudson (tjh@cryptsoft.com).

LINUX® is a trademark of Linus Torvalds.

Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.
Trade names are trademarks of the owners.

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Spare Fuse F1/F2, IEC127-T4H/250V

Data Sheet

**Safety Instructions
Certificate of Quality
EU Certificate of Conformity
Support-Center Address
List of R&S Representatives**

User documentation for Signal Generator R&S SMF100A

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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 attached 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 intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

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.





Symbols and safety labels

							
Notice, general danger location Observe product documentation	Caution when handling heavy equipment	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Be careful when handling electrostatic sensitive devices

					
ON/OFF supply voltage	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double (reinforced) insulation

Tags 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 the possibility of incorrect operation which can result in damage to the product. In the product documentation, the word ATTENTION is used synonymously.

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

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, pollution severity 2, overvoltage category 2, 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.
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 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 death.

Electrical safety

If the information on electrical safety is not observed either at all 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 AC 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 an earthing contact and protective earth connection.
3. Intentionally breaking the protective earth connection 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 the product does not have a power switch for disconnection from the AC supply network, the plug of the connecting cable is regarded as the disconnecting device. In such cases, always ensure that the power plug is easily reachable and accessible at all times (corresponding to the length of connecting cable, approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, a disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.
6. The product may be operated only from TN/TT supply networks fused with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. 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 $V_{\text{rms}} > 30 \text{ V}$, suitable measures (e.g. appropriate measuring equipment, fusing, 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 IEC60950-1/EN60950-1 or IEC61010-1/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 PE terminal on site and the product's PE 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 fused 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.

Basic Safety Instructions

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.
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", 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. 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).

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.
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, PE 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. Keep cells and batteries out of the hands of children. If a cell or a battery has been swallowed, seek medical aid immediately.
5. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
6. 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.
7. 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.
8. 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.

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.
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

1. 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.
2. 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.

Informaciones elementales de seguridad

Es imprescindible leer y observar las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. 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 adjunto 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.

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.







Informaciones elementales de seguridad

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.

Símbolos y definiciones de seguridad

							
Aviso: punto de peligro general Observar la documentación del producto	Atención en el manejo de dispositivos de peso elevado	Peligro de choque eléctrico	Advertencia: superficie caliente	Conexión a conductor de protección	Conexión a tierra	Conexión a masa	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)

					
Tensión de alimentación de PUESTA EN MARCHA / PARADA	Indicación de estado de espera (Standby)	Corriente continua (DC)	Corriente alterna (AC)	Corriente continua / Corriente alterna (DC/AC)	El aparato está protegido en su totalidad por un aislamiento doble (reforzado)

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.



PELIGRO identifica un peligro inminente con riesgo elevado que provocará muerte o lesiones graves si no se evita.



ADVERTENCIA identifica un posible peligro con riesgo medio de provocar muerte o lesiones (graves) si no se evita.



ATENCIÓN identifica un peligro con riesgo reducido de provocar lesiones leves o moderadas si no se evita.



AVISO indica la posibilidad de utilizar mal el producto y, como consecuencia, dañarlo.

En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación 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.

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, grado de suciedad 2, categoría de sobrecarga eléctrica 2, 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.
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, pueden causarse lesiones o 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, se deberá considerar el enchufe del cable de conexión como interruptor. En estos casos se deberá asegurar que el enchufe siempre sea de fácil acceso (de acuerdo con la longitud del cable de conexión, aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en bastidores o instalaciones, se deberá 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.
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", 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 señalar 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. 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).

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. Mantener baterías y celdas fuera del alcance de los niños. En caso de ingestión de una celda o batería, avisar inmediatamente a un médico.
5. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.

Informaciones elementales de seguridad

6. 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.
7. 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).
8. 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.

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

1. 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.
2. 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.

Kundeninformation zur Batterieverordnung (BattV)

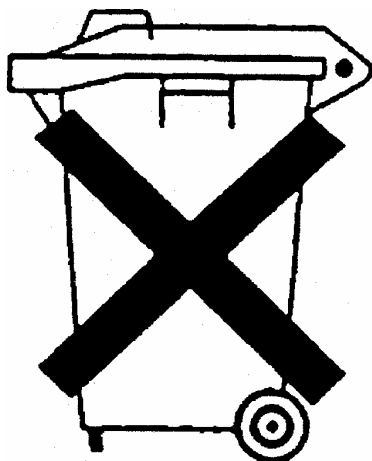
Dieses Gerät enthält eine schadstoffhaltige Batterie. Diese darf nicht mit dem Hausmüll entsorgt werden.

Nach Ende der Lebensdauer darf die Entsorgung nur über eine Rohde&Schwarz-Kundendienststelle oder eine geeignete Sammelstelle erfolgen.

Safety Regulations for Batteries (according to BattV)

This equipment houses a battery containing harmful substances that must not be disposed of as normal household waste.

After its useful life, the battery may only be disposed of at a Rohde & Schwarz service center or at a suitable depot.



Normas de Seguridad para Baterías (Según BattV)

Este equipo lleva una batería que contiene sustancias perjudiciales, que no se debe desechar en los contenedores de basura domésticos.

Después de la vida útil, la batería sólo se podrá eliminar en un centro de servicio de Rohde & Schwarz o en un depósito apropiado.

Consignes de sécurité pour batteries (selon BattV)

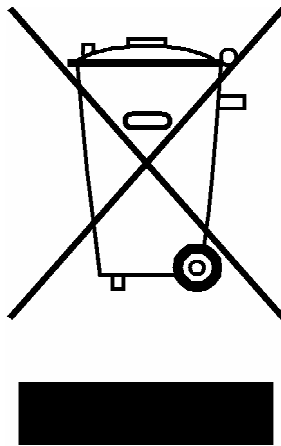
Cet appareil est équipé d'une pile comprenant des substances nocives. Ne jamais la jeter dans une poubelle pour ordures ménagères.

Une pile usagée doit uniquement être éliminée par un centre de service client de Rohde & Schwarz ou peut être collectée pour être traitée spécialement comme déchets dangereux.

Customer Information Regarding Product Disposal

The German Electrical and Electronic Equipment (ElektroG) Act is an implementation of the following EC directives:

- 2002/96/EC on waste electrical and electronic equipment (WEEE) and
- 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



Product labeling in accordance with EN 50419

Once the lifetime of a product has ended, this product must not be disposed of in the standard domestic refuse. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Rohde & Schwarz GmbH & Co. KG has developed a disposal concept for the environmental-friendly disposal or recycling of waste material and fully assumes its obligation as a producer to take back and dispose of electrical and electronic waste in accordance with the ElektroG Act.

Please contact your local service representative to dispose of the product.



Qualitätszertifikat

Certificate of quality

Certificat de qualité

Certified Quality System
ISO 9001

Certified Environmental System
ISO 14001

Sehr geehrter Kunde,

Sie haben sich für den Kauf eines Rohde&Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Qualitätsmanagementsystems entwickelt, gefertigt und geprüft. Das Rohde&Schwarz-Qualitätsmanagementsystem ist u.a. nach ISO9001 und ISO14001 zertifiziert.

Der Umwelt verpflichtet

- ▮ Energie-effiziente, RoHS-konforme Produkte
- ▮ Kontinuierliche Weiterentwicklung nachhaltiger Umweltkonzepte
- ▮ ISO 14001-zertifiziertes Umweltmanagementsystem

Dear Customer,

You have decided to buy a Rohde&Schwarz product. You are thus assured of receiving a product that is manufactured using the most modern methods available. This product was developed, manufactured and tested in compliance with our quality management system standards. The Rohde&Schwarz quality management system is certified according to standards such as ISO9001 and ISO14001.

Environmental commitment

- ▮ Energy-efficient products
- ▮ Continuous improvement in environmental sustainability
- ▮ ISO 14001-certified environmental management system

Cher client,

Vous avez choisi d'acheter un produit Rohde&Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité. Le système de gestion qualité de Rohde&Schwarz a été homologué, entre autres, conformément aux normes ISO9001 et ISO14001.

Engagement écologique

- ▮ Produits à efficience énergétique
- ▮ Amélioration continue de la durabilité environnementale
- ▮ Système de gestion de l'environnement certifié selon ISO 14001



ROHDE & SCHWARZ

EC Certificate of Conformity



Certificate No.: 2006-101

This is to certify that:

Equipment type	Stock No.	Designation
SMF100A	1167.0000.02	Signal Generator Basic Unit
SMF-B122	1167.7004.03	Frequency Range 1 GHz to 22 GHz
SMF-B144	1167.7204.03	Frequency Range 1 GHz to 43.5 GHz
SMF-B1	1167.9159.02	Reference Oscillator OCXO
SMF-B2	1167.4005.02	Frequency Extension 100 kHz to 1 GHz
SMF-B20	1167.9594.02	AM/FM/Scan Modulator
SMF-B22	1415.2204.02	Enhanced Phase Noise Performance
SMF-B26	1167.5553.02	Step Attenuator 100 kHz bis 22 GHz
SMF-B27	1167.5776.02	Step Attenuator 100 kHz bis 43,5 GHz
SMF-B31	1167.7404.02	High-Output-Power 1 GHz bis 22 GHz
SMF-B32	1415.2304.02/ .03	High Output Power
SMF-B34	1415.2424.02	High-Output-Power
SMF-B81	1167.5999.02	Rear Connectors for RF to 22 GHz, AF
SMF-B82	1167.6208.02	Rear Connectors for RF to 43,5 GHz, AF
SMF-B83	1167.6408.02	Removable GPIB
SMF-B84	1167.6608.02	Removable USB
SMF-B85	1167.6808.02	Removable Flash-Card

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits (2006/95/EC)
- relating to electromagnetic compatibility (2004/108/EC)

Conformity is proven by compliance with the following standards:

EN 61010-1 : 2001
EN 61326-1 : 2006
EN 61326-2-1 : 2006
EN 55011 : 1998 + A1 : 1999 + A2 : 2002, class A
EN 61000-3-2 : 2006
EN 61000-3-3 : 1995 + A1 : 2001 + A2 : 2005

For the assessment of electromagnetic compatibility, the limits of radio interference for Class A equipment as well as the immunity to interference for operation in industry have been used as a basis.

Affixing the EC conformity mark as from 2006

Munich, 2009-03-17

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München
Central Quality Management MF-QZ / Radde

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.

USA & Canada

Monday to Friday (except US public holidays)
8:00 AM – 8:00 PM Eastern Standard Time (EST)

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From outside USA +1 410 910 7800 (opt 2)
Fax +1 410 910 7801

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Rest of the World

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- ◆ Sales Locations
- ◆ Service Locations
- ◆ National Websites

Contents of User Documentation for Signal Generator R&S SMF100A

The user documentation describes the Signal Generator R&S SMF and all options. It includes a printed Quick Start Guide and a CD-ROM with the complete operating and service manual in printable pdf-format.

The R&S SMF is equipped with a context-sensitive online help that offers a help page for each instrument function.

Quick Start Guide



The present quick start guide describes everything that is needed to put the instrument into operation and to get familiar with the generator. The quick start guide gives an introduction to remote control and manual control via external monitor, mouse and keyboard.

The quick start guide is subdivided into the data sheet plus 4 chapters plus index:

The data sheet informs about specifications and characteristics of the instrument.

Chapter 1 Describes the control elements and connectors on the front and rear panel as well as all procedures required for putting the instrument into operation.

Chapter 2 Gives an introduction the operating concept and typical applications of the R&S SMF.

Chapter 3 Describes key operating modes, the structure of the graphical interface and the principles of manual control.

Annex Contains an index for the quick start guide.

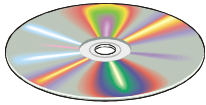
Help System



The help system is embedded in the instrument, offering quick, context-sensitive reference to the information needed for operation and programming. The help contains the complete user documentation for the Signal Generator including the contents of the present quick start guide.

The help files (*.chm) are also available on the CD-ROM and can be used as a standalone help.

Documentation CD-ROM

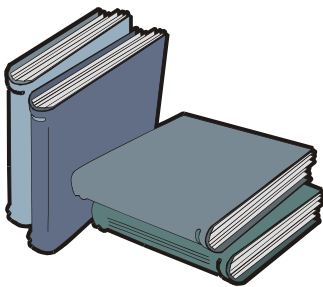


The CD-ROM provides the complete user documentation for the Signal Generator:

- The online help system (*.chm).
- The complete operating manual and service manual in printable form (*.pdf).
- The data sheet (brochure and specifications) in printable form.
- Links to different useful sites in the R&S internet.

Note: Please use the ADOBE® Acrobat® Reader for PDF files and the browser Internet Explorer® ≥ 4.0 for the HTML help.

Optional Documentation



The printed version of the operating and service manual provides the contents of the quick start manual plus the complete reference and the service information for the Signal Generator. This manual can be ordered as an option (stock no. 1167.2302.62 (English - A4 format) or 1167.2302.62 (English - letter format)); see ordering information in the data sheet.

Note: The CD-ROM contains the *.pdf version of the manuals.

Manual Control

The operating manual contains comprehensive information about the instrument functions and remote control, in addition to the chapters of the quick start guide. It includes information about maintenance of the instrument and about error detection listing the error messages which may be output by the instrument. It is subdivided into 10 chapters:

- | | |
|-----------------------|---|
| The data sheet | informs about specifications and characteristics of the instrument. |
| Chapter 1 | describes the control elements and connectors on the front and rear panel as well as all procedures required for putting the instrument into operation. |
| Chapter 2 | gives an introduction to the operating concept and typical applications of the R&S SMF. |
| Chapter 3 | describes key operating modes, the structure of the graphical interface and the principles of manual control. |

- Chapter 4** forms a reference for manual control of the R&S SMF and contains a detailed description of all instrument functions and their application. The chapter also lists the remote control command corresponding to each instrument function.
- Chapter 10** contains an index for the operating manual.

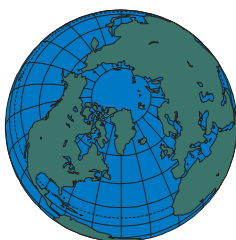
Remote Control

- Chapter 5** describes the basics for programming the R&S SMF, command processing and the status reporting system.
- Chapter 6** lists all the remote-control commands defined for the instrument.
- Chapter 7** -
- Chapter 8** describes preventive maintenance and the characteristics of the instrument's interfaces.
- Chapter 9** gives the status messages and a list of error messages that the R&S SMF may generate.
- Chapter 10** contains an index for the operating manual.

Service Manual Instrument

The service manual - instrument informs on how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for the maintenance of R&S SMF by exchanging modules. In addition it describes how to perform a firmware update and how to install options.

Internet Site



The Internet site at: [Signal Generator R&S SMF100A](#) provides the most up to date information on the R&S SMF. The current operating manual at a time is available as printable PDF file in the download area.

Also provided for download are firmware updates including the associated release notes, instrument drivers, current data sheets and application notes.

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1 Putting into Operation

Introduction - Putting into Operation

Chapter 1, "Putting into Operation" explains the control elements and connectors of the Signal Generator R&S SMF with the aid of the front and rear views and describes how to put the instrument into operation. It also describes the connection of peripherals such as keyboard and mouse. A detailed description of the device interfaces is given in Chapter 8, "*Maintenance and Remote Control Interfaces*". Specifications of interfaces can be seen in the data sheet.

Chapter 2, "*Getting Started*" gives an overview of generator functions and introduces the operating concept. Detailed operating instructions and an overview of menus follow in Chapter 3, "*Manual Operation*".

The complete manual on the CD-ROM in printable pdf-format provides chapters 4 to 9: Menus and instrument functions are described in detail in Chapter 4, "*Instrument Functions*", basics of remote control of the instrument in Chapter 5, "*Remote Control - Basics*" and commands for remote control in chapter 6 "*Remote Control - Commands*". Chapter 9, "*Error Messages*" contains a list of possible status and error messages.

Legend for Front Panel View

This section gives an overview of control elements and connectors on the front panel of the R&S SMF. Each element/connector is briefly described and a reference is given to the chapters containing detailed information.

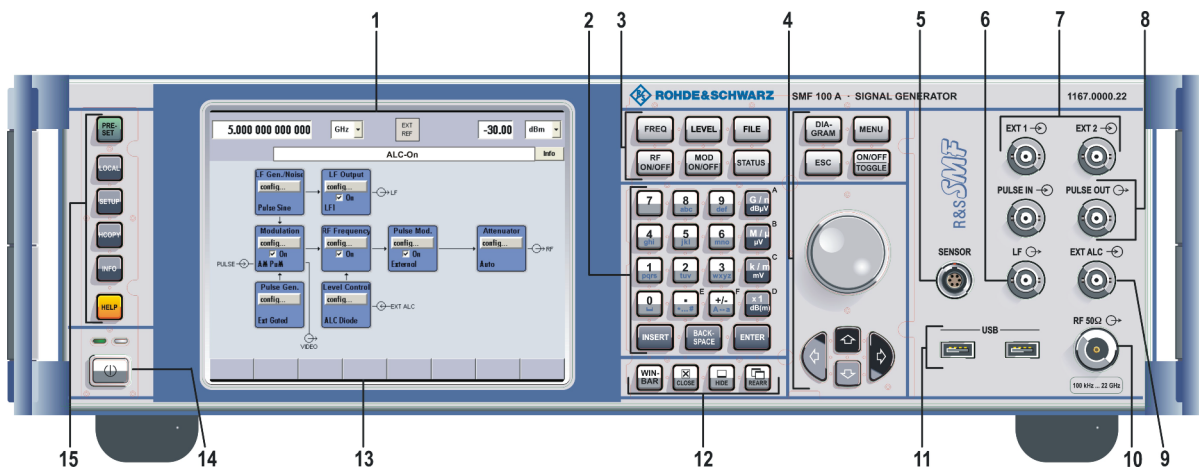
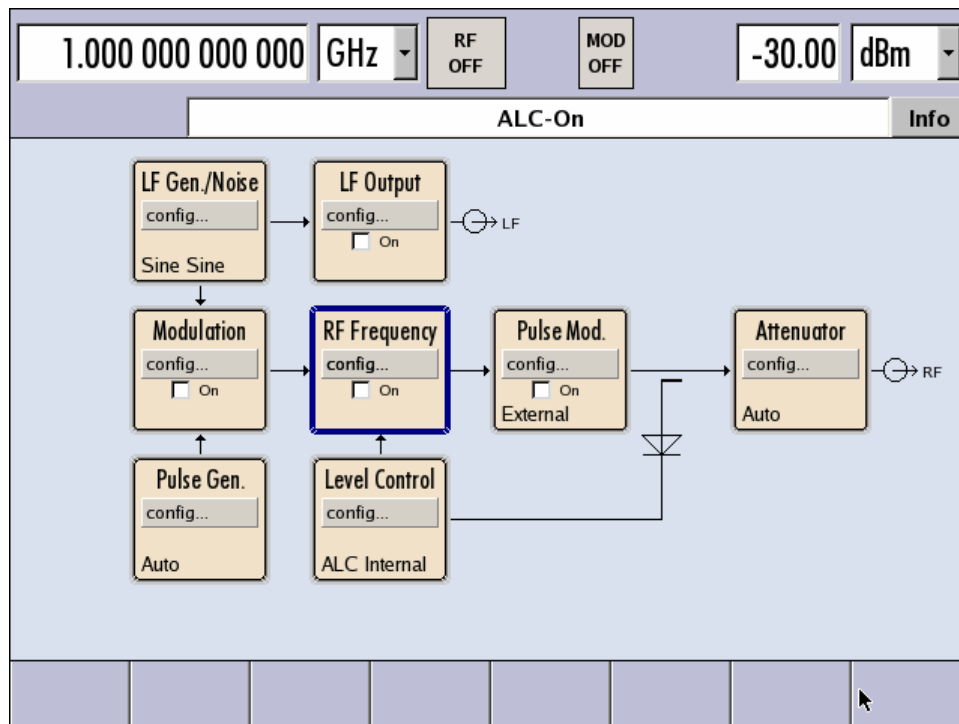


Figure 1-1 Front panel view

1 Display



Display

The display clearly shows all main settings and signal generator states.

The display is divided into two sections:

- Frequency and level display with info line
- Block diagram

The **frequency and level display section with info line** shows

- Frequency and level settings containing offset
- Status messages

Brief error messages (detailed information for a message can be called with the **INFO** key)

The block diagram shows the current configuration and the signal flow in the generator with the aid of function blocks containing an on/off switch. Clicking the function block opens a list of associated setting menus. Active menus, info windows and graphs are displayed on top of the block diagram. The block diagram can be displayed in the foreground anytime with the **DIAGRAM** key.

See chapter 3, section "Display"

2 Keypad for data entry

Numeric and Alphanumeric Keys



Keypad for data entry

- 0...9
Entry of numeric values
- .
Entry of decimal point
- -
Entry of sign
- abc
Entry of letters
- Entry of a space
- *...#
Entry of special characters
- A ↔ a
Switchover between uppercase and lowercase letters.

See chapter 3, section "

*Entering a Value -
Setting Parameters*"

Enter Key

ENTER

- Calls the next menu level.
- Activates the editing mode for highlighted numeric and alphanumeric parameters.
- Terminates a data entry; the new value is set. In case of numeric parameters, the unit indicated next to the value in the menu applies.
- Switches highlighted status parameters on and off (on/off state).
- Confirms (OK) and closes message windows.

Backspace Key

BACKSPACE

- Deletes the character to the left of the cursor.

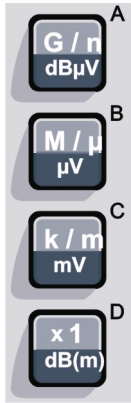
Insert Key

INSERT

- Toggles between insert and overwrite mode.

2 Keypad for data entry

Unit Keys



Keys for data entry

The unit keys can either select a unit and thus determine the absolute value, or change the unit, i.e. trigger a recalculation without changing the absolute value. Their function depends on the time at which they are pressed during parameter entry:

Selecting the unit

If a unit key is pressed immediately after a numeric value has been entered, it terminates the entry and determines the multiplication factor for the respective basic unit (e.g. the k/m key determines the unit kHz after frequency entry).

If a level value is entered, the unit keys are directly labelled with the units they select. The level entry must be active in this case, e.g. by pressing the **LEVEL** key.

Changing the unit

If a numeric entry is terminated with ENTER (e.g. by clicking the rotary knob) and not with a unit key, the unit displayed in the unit field of the parameter in the menu is assigned. If the unit key is pressed later, the unit is changed but not the value. The value is recalculated to suit the new unit (e.g. the display changes from 1000 to 1 when the Hz is changed to kHz). The new unit is then indicated in the value field of the menu.

Assignment

G/n	dBμV	giga/nano, dBμV for RF levels, dBu for LF levels
M/μ	μV	mega/micro, μV for levels
k/m	mV	kilo/milli, mV for levels
x1	dB(m)	basic unit dBm for levels dB for level offset and level step width same function as ENTER key for unit-free values

See chapter 3, section "Selecting a Unit - Setting Parameters"

3 Keys for setting parameters**FREQ**

Activates frequency entry.

LEVEL

Activates level entry.

FILE

Activates the menu for storing or loading files.

RF ON/OFF

Switches the RF signal on and off.

RF OFF is displayed in the header next to the **Frequency** field.

MOD ON/OFF

Switches the active modulations on and off.

MOD OFF is displayed in the info line of the header next to the **Level** field.

STATUS

Indicates the instrument status.

See chapter 3, section "Introduction - Manual Operation", and chapter 4, section "RF Signal" and "Modulation"

4 Keys for settings and navigation in the display and for setting parameters

Display Keys



DIAGRAM

Brings the block diagram to the foreground. Active menus are minimized. Active menus are indicated by the buttons in the menu bar.

MENU

Calls the menu tree.

ESC

- Calls the next higher selection level. This opens up the following functions:
- Closes the active menu if the cursor is in the top-level menu (parameter selection). If settings in this menu require acknowledgement by means of an **Accept** button, a query is displayed asking whether the changes made should be cancelled.
- Switches between different entry fields of a menu.
- Quits the editing mode and restores the previous value. This function is only available in the editing mode, i.e. only before an entry is confirmed or selected with Enter.
- Cancels queries in message windows.
- Shifts the entry cursor from the frequency or level display to the previously active menu, or to the previously highlighted block in the block diagram if no menu is active.

ON/OFF TOGGLE

- 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.

See chapter 3, section "Introduction - Manual Operation"

4 Keys for settings and navigation in the display and for setting parameters

Rotary Knob



Keys for settings and navigation in the display and for setting parameters

Rotary knob

- Varies the value at a cursor position. For frequency and level entry, a fixed step width can be set and activated for the variation.
- Moves the entry cursor in the block diagram or menu.
- Moves the cursor in tables and selection lists.
- Clicking the rotary knob (= Enter) terminates entries. In this case the entry mode is terminated and the value set.

See chapter 3, section "Introduction - Manual Operation"

Arrow keys



Keys for setting and navigation in the display and for setting parameters

Arrow keys



Vary the entry value or highlight a selected list item in the editing mode. Highlight parameters in menus and tables (up/down).



Move the cursor in the entry fields (editing mode). Highlight parameters in menus and tables (left/right).

See chapter 3, section "Introduction - Manual Operation"

5 Connector for power sensor



SENSOR

Connector for R&S NRP-Zxx power sensors.

With the aid of the **User Correction** function, a table with correction values for external test assemblies can be automatically determined, e.g. for compensating the frequency response of cables.

The power sensors are connected by inserting the male connector. To disconnect hold the connector by its sleeve. Pulling on the sensor cable will not release the sensor connector.

6 LF output



LF

Output for internal LF Generator and monitoring signal (option R&S SMF-B20).

7 Inputs for external modulation signals



EXT 1 | EXT 2

Inputs for external modulation signals for AM, FM, Phase Modulation, ASK, FSK, and PSK (option R&S SMF-B20).

8 Input/output for pulse generation



PULSE IN

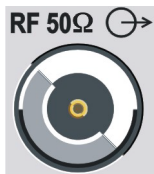
Input of external pulse signal or input for triggering the pulse generator (option R&S SMF-K23).

PULSE OUT

Output of internal pulse signal generated by the internal pulse generator (option R&S SMF-K23).

9 EXT ALC input**EXT ALC**

Input for detection voltage of an external level detector.

10 RF output

Output for RF signal.

See data sheet

NOTICE**Maximum Input Levels**

Do not overload the RF output. The maximum permissible back-feed is specified in the data sheet.

11 USB connectors type A**USB A**

Universal serial bus interfaces of type A (host).

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

Optionally, another USB interface type A (host) and a USB interface type B (device, for remote control) are available on the rear panel (option R&S SMF-B84).

See chapter 1, section "Connecting an External Keyboard and Mouse" and chapter 8, section "USB Connection"

12 Keys for setting parameters



WINBAR
Toggles between display and blanking of the Winbar.

CLOSE
Closes the currently active menu.

HIDE
Hides the open menus.

REARR

13 Winbar



The **Winbar** is the bar at the bottom of the display. The **Winbar** indicates open menus by a labelled button. When a button is clicked using the rotary knob, the associated menu is displayed either in the foreground or minimized in the **Winbar**.

The **Winbar** can be called with the **WINBAR** key.

14 Standby on/off switch



The on/off switch switches the instrument from the standby mode to the operating state provided the power switch on the instrument rear is switched on.

The yellow LED (right) is on in the standby mode; the green LED (left) is on when the instrument is ready for operation.

See chapter 1, section "Switching On"







DANGER



Danger of shock hazard!

The instrument is still power-supplied while it is in standby mode.

15 Keys for general instrument settings

	PRESET Sets the instrument to a defined state.	See chapter 4, section "General Instrument Settings"
	LOCAL Switches from REMOTE control to LOCAL (manual) control.	
	SETUP Opens the setup menu for configuring presetting.	
	HCOPY Opens the print menu for configuring and starting printing.	
	INFO Activates the display of status messages, error messages, and warnings.	
	HELP Activates the context-sensitive help display.	

Legend for Rear Panel View

This section gives an overview of connectors on the rear panel of the R&S SMF. Each connector is briefly described and a reference is given to the chapters containing detailed information. For technical data of the connectors refer to the data sheet.

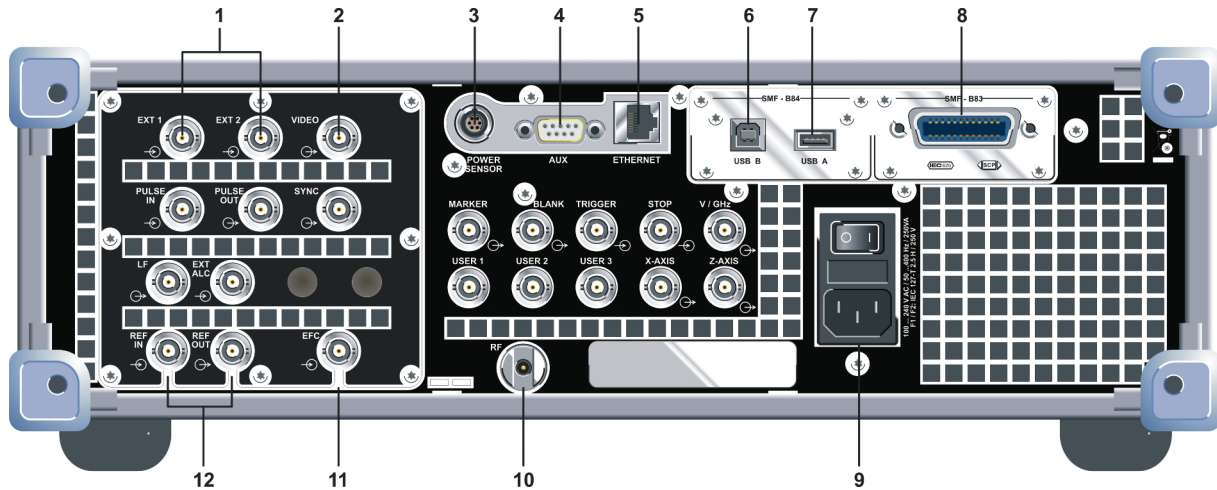


Fig. 1-2 Rear panel view, connectors 1 - 12

1 Inputs for external signal



EXT 1 | EXT 2
 Inputs for external modulation signals for AM, FM, Phase Modulation, ASK, FSK, and PSK (option R&S SMF-B20).

The rear panel inputs are available only with option R&S SMF-B81. This option is recommended for use of the instrument in a 19" rack. Installing the instrument in a 19" rack requires a rack adapter (refer to data sheet for Order No.).

2 Output for video signal



VIDEO
 Output of the external or internal pulse modulation signal (video signal).

3 Connector for power sensor**SENSOR**

Rear panel connector for R&S NRP-Zxx power sensors.

4 AUX I/O interface**AUX**

Interface for direct control of additional external devices.

5 LAN interface**ETHERNET**

LAN interface

- Integrating signal generators in a network
- Remote control of signal generator
- Manual remote control of signal generator
- Firmware update

6 USB connector type B**USB B**

Universal serial bus interface of type B (device USB)

- Remote control of signal generator

This USB interface is available only with option R&S SMF-B84.

7 USB connector type A



USB A

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

- Connection of peripherals such as mouse and keyboard
- Connection of memory stick for file transmission

This USB interface is available only with option R&S SMF-B84.

Two further USB interfaces of type A are available on the front panel.

8 IEC/IEEE-bus connector



IEC-bus (IEEE 488) interface for remote control of the R&S SMF.

The IEC-bus is available only with option R&S SMF-B83.

See data sheet and chapter 8, section "IEC/IEEE Bus Interface"

9 AC supply



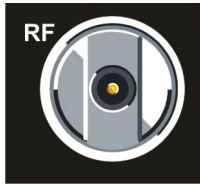
Power switch

Power connector

AC supply connector & Power Switch

When the R&S SMF is connected to the AC supply, it automatically sets itself to the correct range for the applied voltage (range: see type label). There is no need to set the voltage manually or change fuses.

See section "Connecting the R&S SMF to the AC Supply" and data sheet

10 Output for RF

Rear panel output for internal RF generator signal.

See data sheet

This rear panel output is available only with option R&S SMF-B81.

This option is recommended for use of the instrument in a 19" rack. Installing the instrument in a 19" rack requires a rack adapter (refer to data sheet for Order No.).

NOTICE**Risk of instrument damage**

Do not overload the RF output. The maximum permissible back-feed is specified in the data sheet.

11 Input for EFC**EFC**

Input for external EFC signal (external frequency control).

12 REF input/output**REF IN**

Input for external reference signal.

**REF OUT**

Output for the reference signal. It can be adjusted whether the internal or the external signal is to be output.

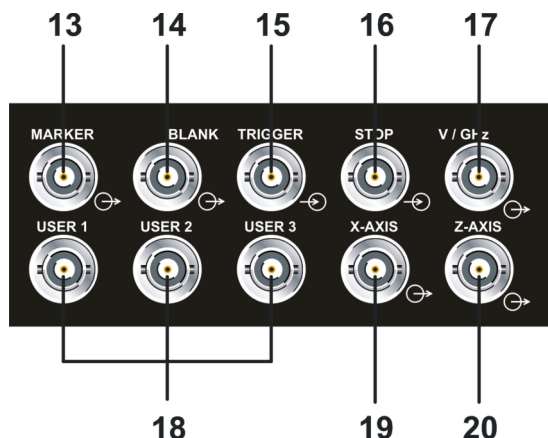


Fig. 1-3 Selection of Rear panel view, connectors 13 - 20

13 Sweep output Marker



MARKER

Output for user-programmable marker signal used for brightness control of an oscilloscope. This output becomes active when the sweep run has reached the marker.

14 Sweep output Blank



BLANK

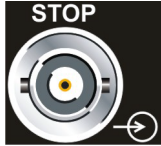
Output for triggering and blanking an oscilloscope or for PEN LIFT control of an XY recorder.

15 Sweep input Trigger



TRIGGER

Input for triggering the sweep in the **Extern Single** and **Extern Step** modes.

16 Sweep input Stop**STOP**

Input and output for stopping the sweep in all modes. This connector is bidirectional: Used as an input, the sweep can be stopped by an external network analyzer. Used as an output, the generator can stop the sweep of an external network analyzer.

17 Sweep output V/GHz**V/GHz**

Output for supplying a voltage which is proportional to the frequency.

18 User connector**USER 1 | USER 2 | USER 3**

Input/output for configurable signals for triggering and control.

19 Sweep output X-Axis**X-AXIS**

Output for supplying a voltage ramp for the X deflection of an oscilloscope or an XY recorder.

20 Sweep output Z-Axis**Z-AXIS**

Output for supplying a voltage pulse for the combined blanking and marker generation for network analyzers.

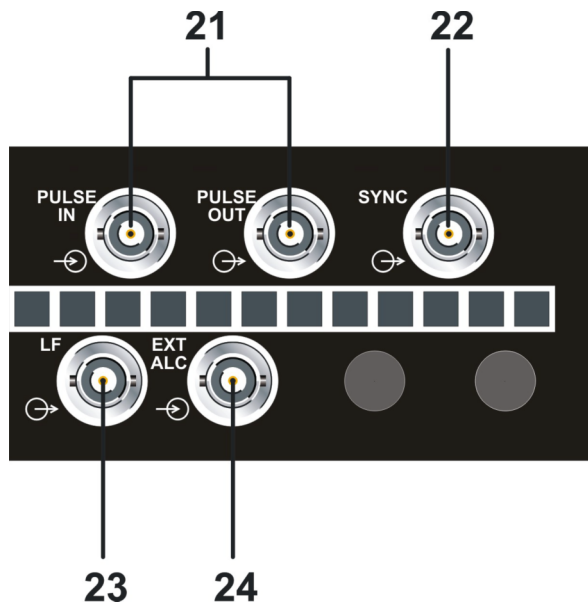


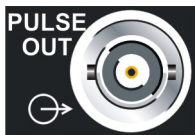
Fig. 1-4 Selection of Rear panel view, connectors 21- 24

21 Input/output for pulse generation



PULSE IN

Input of external pulse signal or input for triggering the pulse generator (option R&S SMF-K23).



PULSE OUT

Output of internal pulse signal generated by the internal pulse generator (option R&S SMF-K23).

The PULSE IN/PULSE OUT connectors at the rear panel are available only with option R&S SMF-B81.

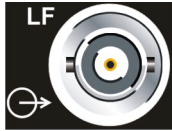
This option is recommended for use of the instrument in a 19" rack. Installing the instrument in a 19" rack requires a rack adapter (refer to data sheet for Order No.).

22 Output for SYNC



SYNC

Output for internal SYNC signals for pulse modulation.

23 Output for LF**LF**

Output for internal LF generator signals.

This rear panel output is available only with option R&S SMF-B81.

This option is recommended for use of the instrument in a 19" rack. Installing the instrument in a 19" rack requires a rack adapter (refer to data sheet for Order No.).

24 Input for Automatic Level Control**EXT ALC**

Input for detection voltage of an external level detector.

This rear panel output is available only with option R&S SMF-B81.

This option is recommended for use of the instrument in a 19" rack. Installing the instrument in a 19" rack requires a rack adapter (refer to data sheet for Order No.).

Putting into Operation

The following section describes the procedure for putting the instrument into operation. It contains general safety instructions for instrument operation.

The installation of options and the firmware update are described in Chapter 4 of the Service Manual (supplied with the instrument on the CD-ROM).

Unpacking the Instrument

- Remove the instrument from its packaging and check the equipment for completeness using the delivery note and the accessory lists for the various items.
- First, pull off the polyethylene protection pads from the instrument's rear feet and then carefully remove the pads from the instrument handles at the front.
- Pull off the corrugated cardboard cover that protects the rear of the instrument.
- Carefully unthread the corrugated cardboard cover at the front that protects the instrument handles and remove it.
- Check the instrument for any damage. If there is damage, immediately contact the carrier who delivered the instrument. In this case, make sure not to discard the box and packing material.

It is advisable to keep the original packing material in order to prevent control elements and connectors from being damaged in case the instrument is to be transported or shipped at a later date.

Setting up the Instrument or Installing it in a 19" Rack

The instrument is designed for indoors use. It can either be set up independently or mounted in a 19" rack.

A rack adapter (refer to data sheet for Order No.) is required for installation in a 19" rack. The mounting instructions are supplied with the adapter. With options R&S SMF-B81 (Rear Panel Connectors, factory-fitted) the front panel inputs and outputs are relocated to the rear panel. An adapter for telescopic sliders may not be used because it obstructs the vents.

NOTICE**Risk of overheating**

To less airflow for cooling may cause overheating of the instrument.

Prior to putting the instrument into operation always check for space between the ventilation holes and the rack casing to get sufficient air supply in the rack.

Safety Instructions

General Precautions

NOTICE**Instrument damage caused by disregarding the following precautions!**

Any non-compliance with the following precautions may cause damage to the instrument. Prior to putting the instrument into operation, check the following:

- The covers of the housing are in place and screwed on.
- Vents are not obstructed. Make sure that the air can escape freely through the vents at the rear and at the sides. The minimum distance to the wall should therefore be at least 10 cm.
- The signal levels at the inputs do not exceed permissible limits.
- The outputs of the instrument are not overloaded or incorrectly connected. This particularly applies to the maximum permissible back-feed at the outputs, which is specified in the data sheet
- The instrument should only be operated in horizontal position on an even surface.
- The ambient temperature must not exceed the range specified in the data sheet.

Please also observe the instructions in the following sections and the general safety instructions at the beginning of this manual.

Protection against Electrostatics



To avoid damaging the electronic components of the EUT due to electrostatic discharge produced by contact, the use of appropriate protective measures is recommended.

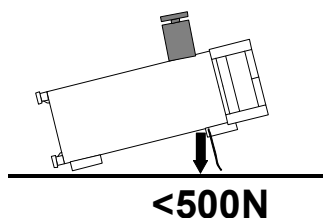
Setting up the Instrument

WARNING

Risk of injury and instrument damage.

Safe operation with support feet!

- Stacked **instruments** may slip off.
Secure stacked instruments against slipping (e.g. by locking the feet to the top of the front-panel frame).
The feet must be fully folded in or folded out. Only then a stable position of the instrument and reliable operation can be ensured. The uniform pressure on the folded-out feet must not exceed 500 N (weight of instrument and of equipment stacked on top).
- When the instrument with expanded feet, the feet might collapse and fold in.
Do not shift the instrument with the feet out.



EMC Safety Precautions

To avoid electromagnetic interference, only suitable, double shielded signal, and control cables must be used.

Cleaning the Outside and Storing

What is necessary is essentially the cleaning of the instrument.

NOTICE**Instrument damage caused by cleaning agents!**

Cleaning agents contain substances that may damage the instrument, e.g. solvent-containing cleaning agents may damage the front panel labeling or plastic parts.

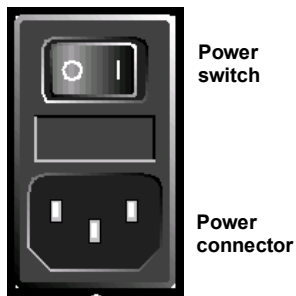
Never use cleaning agents such as solvents (thinners, acetone, etc), acids, bases, or other substances.

The outside of the instrument is suitably cleaned using a soft, line-free dust cloth.

Connecting the R&S SMF to the AC Supply

The R&S SMF is automatically matched to the applied AC voltage (see rear panel). There is no need to set the voltage manually or change fuses. The AC supply connector is at the rear of the unit (see below).

Switching On



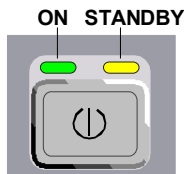
- Connect the signal generator to the AC supply by means of the supplied power cable.

Since the instrument is a protection class I Equipment, it should only be connected to a socket with a protective earth contact.

- Press the main power switch at the rear of the instrument to position I.
- After power-up, the instrument is either ready for operation (STANDBY) or in operating mode, depending on the position of the ON/STANDBY switch on the instrument front (see below).

Note:

The power switch may remain on for any period of time. Switching off is required only if the instrument should be completely isolated from the AC supply.



- Press the ON/STANDBY switch on the front panel; the green LED must be on.
- The instrument is ready for operation. All modules in the instrument are supplied with power.

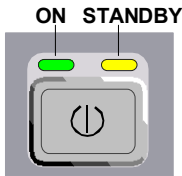
Start Display and Booting the R&S SMF

After instrument switch-on, the Linux operating system boots and then the instrument firmware. During booting of the instrument firmware, a selftest is performed. After booting is completed, the block diagram of the signal generator is displayed and the instrument is ready to be operated. The settings that were active before the last switch-off are established unless another start setting has explicitly been selected in the **File** menu.

Note:

If the software stops unexpectedly, the instrument can be shut down by pressing the STANDBY key for approx. 5 s.

Switching Off



- Press the ON/STANDBY switch on the front panel.

The R&S SMF stores the current setting on the compact flash disk before it shuts down the Linux operating system. Then the AC supply is switched to the STANDBY mode.

- Only the AC supply is powered and the oven-controlled crystal oscillator is kept at operating temperature.
- The yellow LED must be on.

DANGER



Danger of shock hazard!

The instrument is still power-supplied while it is in standby mode.



Power switch

Power connector

- Press the main power switch at the rear of the instrument to position 0. None of the front-panel LEDs should be on.

Note:

It is recommended to switch the instrument to STANDBY mode before completely disconnecting it from the AC supply. If the power switch is set to 0 before the instrument is switched to the standby mode, all current settings are lost.

Power Fuses



Fuse holder

The R&S SMF is fully fused by two fuses IEC127-T4H/250 V. The fuses are accommodated in the pull out fuse holder next to the power connector. Before replacing the fuses, disconnect the power cord from the R&S SMF; the fuse box is locked mechanically as long as a power connector is plugged in. Use two screwdrivers simultaneously to lift the fuse holder below the power connector and pull it out. Use only fuses of the mentioned type.

Function Check

The signal generator automatically monitors the main functions when the instrument is switched on and continuously during operation.

If a fault is detected, ERROR is displayed in the info line together with a brief error description.

For in-depth identification of the error, press the **INFO** key. In response, a description of the error(s) is displayed (see "Error Messages").

Besides automatic monitoring of instrument functions, other capabilities in the R&S SMF ensure correct functioning of the signal generator.

Internal Adjustments

Adjustments can be performed in the **Setup-System-Internal Adjustments** menu. Thus maximum level accuracy can be obtained, for instance.

Test points

Internal test points can be queried by the user and the results can be displayed. See section "Test Point... - Setup-Test".

Default Settings

The **PRESET** key calls up a defined instrument setup. All parameters and switching states are preset (also those of inactive operating modes). The default instrument settings provide a reproducible initial basis for all other settings. However, functions that concern the integration of the instrument into a measurement setup are not changed, e.g. IEC/IEEE bus address or reference oscillator source settings.

Note:

Resetting the instrument to the factory state is possible in the **Factory Preset - Setup Settings** menu of the menu

Remote-control command:

*RST

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

User-defined instrument states can be stored and called up in the **File** menu.

The following table gives an overview of the presets for the most important generator settings. The other presets can be found in the information accompanying the IEC/IEEE-bus commands (Chapter "Remote Control Commands - Description").

The list below the table shows the settings that are not affected by the **PRESET** key.

Setting	Preset value
RF frequency	1 GHz
RF level	RF output switched off
Frequency Offsets	0
Level Offset	0
Modulations	switched off
Setting	Preset value
Uninterrupted level setting	switched off; level attenuator mode: AUTO
Setting	Preset value
Internal level control	Level ALC: OFF
User correction	Level Ucor: OFF
LF output	switched off
Sweep	switched off
LIST mode	switched off

Table 1-1 Preset state - important generator settings

Settings that are not affected by the **PRESET** key

- Reference frequency settings (Ref Oscillator menu)
- Power on settings (Level/EMF menu)
- Network settings (Setup menu)
- IEC/IEEE-bus address (Setup menu)
- *IDN? identification (Setup menu)
- Password and settings protected by passwords (Setup menu)
- Start/Stop Gui Update (Setup menu)
- Display and keyboard settings (Setup menu).

Linux Operating System

NOTICE**Possible impairment of the instrument functioning**

The instrument is equipped with the Linux operating system. It is thus possible to install commercial off-the-shelf software on the instrument. The use and installation of commercial off-the-shelf software may impair the instrument function. < For this reason, we recommend that you only execute programs tested by Rohde & Schwarz with regard to their compatibility with the instrument software.

The drivers and programs used on the instrument under Linux have been adapted to the instrument. Existing instrument software must only be modified with update software released by Rohde & Schwarz.

The signal generator is equipped with the Linux operating system. The configuration of the operating system is optimally adapted to signal generator functions in the factory. Changes in the system setup are only required if peripherals like keyboard are installed or in the event that the network configuration does not comply with the default settings (see sections "*Connecting the R&S SMF to a Network (LAN)*").

After power-up of the signal generator, the operating system boots and the instrument firmware is started automatically. The operating system cannot be accessed. All necessary system settings can be made in the **Environment** section of the **Setup** menu.

The R&S SMF provides a internal compact flash card, it does not contain a disk drive. The compact flash card holds the firmware and the stored data. However, data transfer is only possible via a memory stick connected to a USB interface. The memory stick and the flash card are accessed via the **File Manager**.

Screen saver:

A screen saver is activated by default in the R&S SMF. The display lamp is shut off when no entries via front panel, external mouse or external keyboard are made for a period of time. The screen saver prolongs the life time of the display lamp.

The screen saver can be switched off and on and the time period can be set in the **Environment** section of the **Setup** menu.

Connecting an External Keyboard and Mouse

A commercial, external keyboard and mouse with USB interface can be connected to the R&S SMF. A keyboard simplifies entry of list items, comments, file names, etc. A mouse simplifies control of the block diagram and of associated menus.

The keyboard and the mouse are connected to a USB interface, type A, on the front or rear panel of the instrument.

1 USB 2



The keyboard and mouse are recognized automatically when it is connected. The US keyboard assignment is the default setting. The keyboard language and the layout can be changed in the **Environment** section of the **Setup** menu.

Connecting the R&S SMF to a Network (LAN)

The R&S SMF 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 instrument can be remote-controlled and remote-accessed in the network.

Remote-access means that the user can operate the R&S SMF from any remote PC in the network using the **VNC** protocol. For instance, the user can control one or more R&S SMFs from a desk that is part of a test assembly located in another section of the building.

A VNC client program for Windows operating systems is provided on the R&S SMF CD-ROM (included in delivery). VNC client programs for other operating systems are available free-of-charge on the internet.

Remote-control of the instrument via the LAN interface is described in section "*Remote Control via LAN Interface*". A firmware update via the LAN interface is described in chapter 2 of the service manual (on CD-ROM).

The configuration of the R&S SMF for networking is performed in the **Environment** section of the **Setup** menu.

Connection to the Network

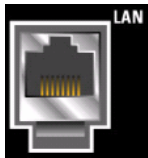
NOTICE**Risk of network errors!**

Connecting errors may affect the entire network.

We recommend to coordinate the connection of the instrument to the network with the network administrator.

Do not connect or disconnect the network cable until the instrument is **switched off** (standby). Only then the network connection can be reliably detected and impairments to instrument operation can be avoided.

The instrument is connected to the LAN with the aid of a commercial RJ-45 cable suitable for a 10/100 Mbps connection attached to the LAN interface at the rear of the instrument.



The connector is described in chapter 8.

Configuring the R&S SMF for Network Operation

The network interface functions with 10/100 Mbps Ethernet IEEE 802.3u. The TCP/IP network protocol and the associated network services are preconfigured.

For data exchange in a LAN, each connected PC or instrument must be accessible via an IP address or via an unambiguous computer name.

Networks using DHCP

The R&S SMF is preconfigured for networks using DHCP (dynamic host configuration protocol). In these networks, an available IP address is automatically assigned to the R&S SMF. The R&S SMF provides an unambiguous computer name in the network via the DHCP request. The DHCP server in the network must consider this name and pass it to the DNS server in order to ensure that the R&S SMF can be addressed in the network.

Each R&S SMF is assigned an individual computer name in the factory. This name can be queried and changed in Environment section of the Setup menu.

Networks using fixed IP addresses

In networks using fixed IP addresses, the addresses are mostly assigned by the network administrator. A fixed IP address must be entered in the Environment section of the Setup menu (see "*Identifying the R&S SMF in the Network*" below).

Point-to-Point Connection

To build a simple network – just a LAN connection between the R&S SMF and a controller without integration into a larger network – an IP address has to be assigned to the R&S SMF and the controller. For such purposes, the IP addresses 192.168.xxx.yyy are available. The value range for xxx and yyy is 1...254, the value for the subnet mask is always 255.255.255.0. The gateway IP address must also be provided, however, it is without relevance. The mode setting is **Peer To Peer**.

Example:

On the PC:

1. Open the TCP/IP settings tab (network connection in the control panel)
2. Set fixed IP address (= deactivate DHCP)
3. Select IP address 192.168.0.1
4. Select subnet mask 255.255.255.0

On the signal generator:

1. Open the network setting panel in the Setup menu
2. Select IP address 192.168.0.2
3. Select subnet mask 255.255.255.0
4. Activate the setting

For this type of connection, a commercial cross-over RJ-45 cable is used.

Identifying the R&S SMF in the Network

1. Open the **Setup** menu by pressing the Setup key.
2. Click **Network Settings** menu in the **Environment** section.
3. Select the IP address mode and enter the network data in the respective fields of the menu. The data is provided by the network administrator. The Computer name is indicated in the **Hostname** field. The name can be changed.

Remote Access via an External Controller

The R&S SMF can be remote-accessed from an external PC via a network link. This allows convenient operation of the signal generator from the desktop although the instrument is integrated in a rack somewhere else.

Remote access in contrast to **remote control** does not use remote-control commands but the regular user interface displayed using separate software which is installed on the external PC. The instrument can thus be manually operated from the PC as on the unit itself.

There are different ways to establish a remote access connection to the signal generator. The simplest way to remote access the signal generator is to use a Web browser, such as Windows Internet Explorer or Mozilla Firefox for instance. Alternatively a remote access via Ultra@VNC can be used.

Preconditions for remote access are a connection between signal generator and PC via a LAN network and the installation of the VNC client software on the PC and on the R&S SMF.

The VNC client software for setting up the connection is included in the Linux/Unix operating system per default.

For Windows operating system, the free-of-charge software **Ultr@VNC** is provided on the R&S SMF CD-ROM. VNC client programs for other operating systems are available free-of-charge on the internet. After the connection is established, the signal generator screen with the block diagram is displayed on the external PC and the R&S SMF can be manually remote-accessed from the external PC. The individual functions are operated using the mouse and keyboard. Specific instrument functions can be executed using specific key combinations on the keyboard or a front panel key emulation that can be operated with the mouse (see chapter 3, section "*Legend of Front-Panel Controls*").

Installation of the software Ultr@VNC and establishing the connection between external PC and signal generator for Windows operating system is described in the following. Remote access via an external controller with Linux/Unix operating system is performed accordingly.

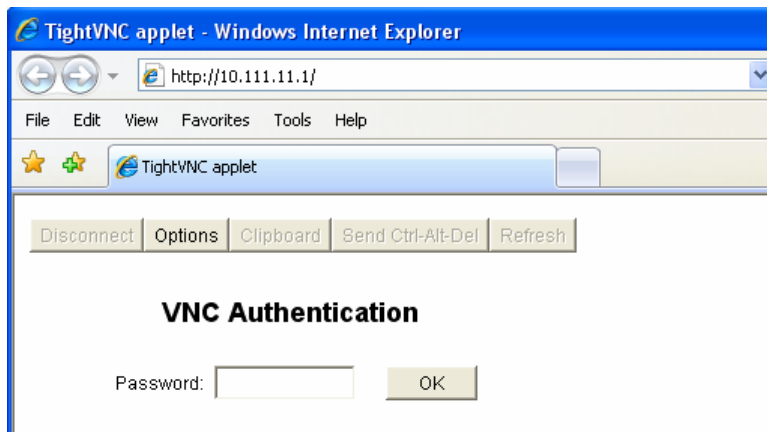
Using a Web Browser for Remote Access

Remote access via Web Browser to the signal generator is possible under the following conditions:

- The external PC with Linux/Unix or Windows operating system (Windows 95 or higher) is equipped with a LAN interface which is configured for the network.
- The signal generator and the PC are linked via a LAN.
- A Point-to-Point connection is established between the signal generator and the PC.
- Java Runtime Environment JRE has to be installed on the PC.
- A user-specific password for the **VNC** connection is defined on the R&S SMF. The default password is "instrument"; it can be changed in the **Environment-Security** section of the **Setup** menu.

The instrument can be remote-accessed via any Web browser, like Windows Internet Explorer or Mozilla Firefox for instance.

1. Type the instruments' IP address in the address field of the Web browser on your PC, e.g. <http://10.111.11.1>
The "VNC Authentication" screen appears.



2. Enter the password and select OK.
The default password is "instrument".

After the connection is established, the current signal generator screen with the block diagram is displayed and the R&S SMF can be remote-accessed from the external PC.

Configuration for Remote Access via Ultr@VNC

The instrument is operated with the aid of the program **Ultr@VNC**. It is available as a free-of-charge download on the internet for operating system Windows XP (<http://ultravnc.sourceforge.net/download.htm>) and on the R&S SMF CD-ROM.

Remote access of the signal generator is possible under the following conditions:

- ◆ The external PC with Linux/Unix or Windows operating system (Windows 95 or higher) is equipped with a LAN interface which is configured for the network.
- ◆ The signal generator and PC are linked via a LAN.
- ◆ A user-specific password for the **VNC** connection is defined on the R&S SMF. The default password is "instrument", it can be changed in the **Environment** section of the **Setup** menu.
- ◆ The **Ultr@VNC Viewer** software is installed on the external PC (or any other VNC client) R&S SMF IP address and the user-specific password for the **VNC** connection are entered in the **VNC Viewer** panel.

NOTICE

Risk of unauthorized access!

After enabling the VNC connection, any user on the network who knows the password and IP address of the signal generator can access this R&S SMA. Even after cutting it, the connection is still enabled and the R&S SMA can be accessed any time. To disable the connection, the **VNC program on the R&S SMA must be uninstalled or the VNC server service disabled.**

To enhance security, also communication on the network via Ultr@VNC program should be disabled in the firewall.

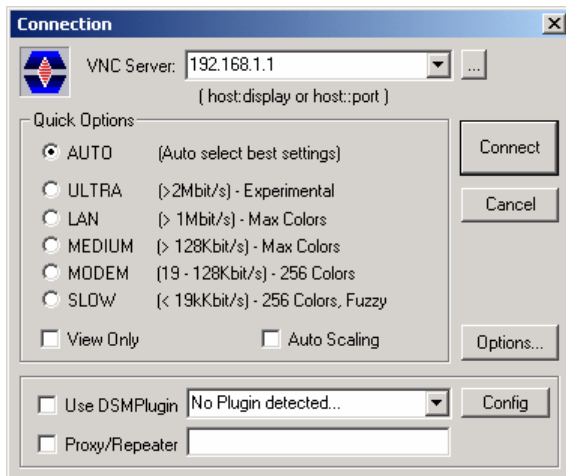
Install VNC Viewer and Establish VNC Connection on the Windows PC

The **Ultr@VNC** program is available on the Internet as a free-of-charge download or on the R&S SMF CD-ROM.

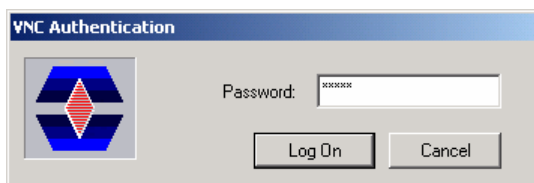
Following the instructions on the Internet, the program can be copied onto the external Windows PC. Only the program component **VNC Viewer** is required.

Note: The **VNC Viewer** program is included in the download for the installation of the **Ultr@VNC** program on the signal generator if **Full installation** was selected in the **Select Component** panel. In this case, the program `ultr@vncviewer.exe` can be copied to the Windows PC.

1. Install **VNC Viewer** program component on the PC.
2. Start **VNC Viewer** program component on the PC.



3. Enter IP address (or host name) of R&S SMA in input line **VNC Server**.
4. Initialize the connection by pressing the **Connect** button.
A message requesting the password appears.



5. Enter the **VNC** password defined in the **Environment** section of the **Setup** menu of R&S SMF (default = "instrument"). The connection is established when the **Log On** button is pressed. .

After the connection is established, the current signal generator screen with the block diagram is displayed and the R&S SMF can be manually remote-controlled from the external PC. The individual functions are operated using the mouse and keyboard. Specific instrument functions can be executed using specific key combinations on the keyboard (see table in Chapter 3, section "*Legend of Front-Panel Controls*"). Direct control on the R&S SMF is possible while manual remote-control is established, it can be performed alternately with the remote access.

Close Remote Access Connection via Ultr@VNC

The connection can be closed on the external PC by closing the VNC Viewer program. Closing the connection does not disable it. It can be established again any time.

Contents - Chapter 2 "Getting Started"

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	Info and Help System	2.5
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2 Getting Started

Introduction - Getting Started

The main field of application of the R&S SMF is the generation of microwave signals with very high spectral purity. The signals can be generated with a set frequency and level (CW mode), based on a list with predefined frequency/level pairs (List mode), or as a sweep with corresponding parameters (Sweep mode).

The RF signal can also be generated in modulated form. Option R&S SMF-B20 provides two internal LF generators, a noise generator and two external modulation inputs **EXT 1** and **EXT 2** at the front of the instrument which are available as the source for analog and/or digital modulations. Option R&S SMF-K23 provides an internal pulse generator.

The architecture of the R&S SMF and the signal flow are shown in a block diagram on the R&S SMF user interface. In the diagram, signal processing is performed from left to right (left: modulation generator, right: RF output/LF output). The block diagram in the figure below shows a fully equipped R&S SMF.

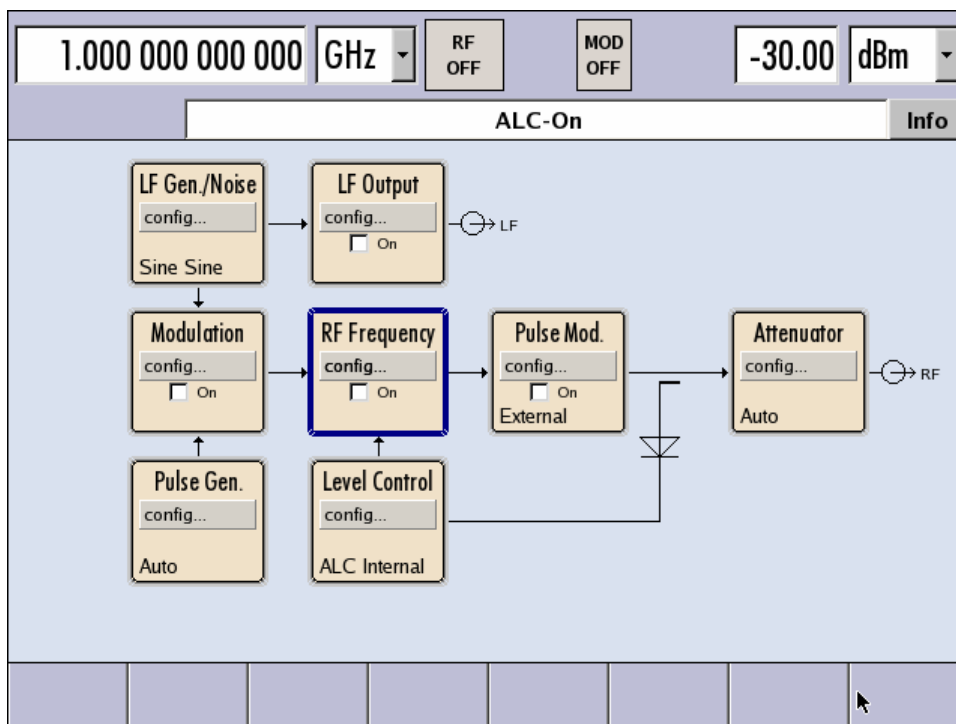


Fig. 2-1 Block diagram of a fully equipped R&S SMF

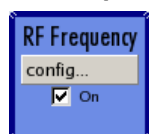
For more detailed information on options, refer to the R&S SMF data sheet (available on the R&S SMF Homepage on the Internet; <http://www.rohde-schwarz.com/products>).

Description of Individual Diagram Blocks

Available Blocks

Block	Function of block	Status display in the block	Effect of TOGGLE ON/OFF key
RF Frequency	RF signal is activated and configured. Frequency sweep is activated and configured. List mode is activated and configured. Reference oscillator is configured.	State of RF output	Switches the RF output on or off.
Level Control	RF signal is activated. Level sweep is activated and configured. ALC is activated and configured. Power Viewer, Power Analysis and Pulse Analysis is configured and activated User Correction is activated and configured.	State of RF output State of ALC	
Modulation	Analog and digital modulations are activated and configured.	Active modulations	Switches the modulation on or off.
LF Gen. Noise	LF and noise generator signals are configured. LF frequency sweep is activated and configured.	Waveform shapes of the LF generators	
LF Output	LF signal output is activated and configured. LF Level Sweep is activated and configured.	State of LF output and monitoring. Source of LF signal.	
Pulse Generator	Generation and configuration of pulse modulation signals	Trigger mode	
Pulse Modulation	Pulse Modulation is activated and configured.	State of Pulse Modulation Modulation source	
Attenuator	RF signal attenuation	Attenuator mode	

RF Frequency block



In this block, the RF frequency settings are performed.

RF frequency settings include:

- RF frequency and phase settings
- Frequency sweep settings including sweep markers
- List mode settings
- Reference oscillator settings

The **RF ON/OFF** key switches the RF signal on and off.

Note: Numeric values for the frequency are entered best and quickest with the aid of the **FREQ** key.

Level Control block



In this block, the RF level settings are performed.

RF level settings include:

- RF level settings
- RF level sweep settings including sweep markers
- Automatic level control
- NRP-Z Power Viewer using power sensors
- NRP-Z Power and Pulse Data Analysis using power sensors
- User Correction

Note:

Numeric values for the level are entered best and quickest with the aid of the **LEVEL** key.

Modulation block



In this block, the modulation settings are performed. The **MOD ON/OFF** key switches the active modulation(s) on/off.

The external inputs EXT 1 and EXT 2 at the front of the instrument are provided for external amplitude, frequency, phase, and digital modulation (ASK, FSK, PSK).

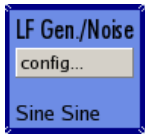
Pulse modulation is available via the internal standard pulse generator. The external pulse modulation is available via the PULSE IN connector at the front of the instrument. The connector can be used as trigger input for internal pulse modulation. The external (and internal) pulse signal is output at the VIDEO connector at the back of the instrument.

Internal Pulse Modulation with extended features, e.g. generation of double pulse, requires option R&S SMF-K23, Pulse Generator. The pulse signal is output at the PULSE OUT connector at the front of the instrument. Narrow pulse modulation is provided by option R&S SMF-K3, and pulse train by option R&S SMF-K27.

Note:

For modulation modes that can be simultaneously used, refer to the R&S SMF data sheet or section Chapter 4, section "Simultaneous Operating of Several Modulations or Other Operating Modes".

The status display in the block shows the active modulation(s).

LF Gen./Noise block

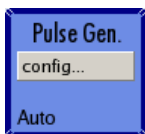
In this block, two internal LF generators and a noise generator which can be used as internal modulation sources for analog modulations (amplitude modulation, frequency modulation, phase modulation) are configured. The LF/noise generators can also be used as the signal source for the LF output at the rear of the instrument.

The LF frequency sweep is also configured in this block.

LF Output block

In this block, the LF output and the LF level sweep are configured.

The internal LF generators, the noise generator, or the external inputs **EXT 1** and **EXT 2** can be selected as source for the LF output.

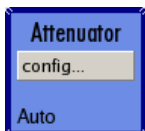
Pulse Gen. block

In this block, the settings for the internal pulse generator can be performed.

The pulse generator provides single and double pulse modulation with selectable pulse widths and periods. The signal is output at the PULSE OUT connector.

Pulse Mod. block

In this block, the narrow pulse modulation is activated and configured. Narrow pulse modulation requires option R&S SMF-K3.

Attenuator block

In this block, the attenuator settings for the RF signal are performed.

Info and Help System

The R&S SMF comprises a comprehensive **info** and **help system**. Context-sensitive help can be called any time with the **HELP** key. The help system indicates the currently selected parameter and offers additional services such as cross references, index, and contents. The content of the help system corresponds to the operating manual of the R&S SMF.

Warning and conflict messages caused by incorrect operation as well as further information are displayed in the **Info line**. A complete list of existing conflicts is displayed when the **INFO** key is pressed. Additional information on entries can be requested from the help system. The history function permits display of all messages.

Detailed operating instructions and an overview of menus follow in Chapter 3, "*Manual Operation*".

Menus and instrument functions are described in detail in Chapter 4, "*Instrument Functions*".

Example of Setup

A central element of the R&S SMF display is the block diagram that illustrates the signal flow. Each block represents a section of signal generation. The main settings of a block are indicated in the block. The interconnection of employed inputs and outputs is also shown. The user is thus always informed about the connection of inputs and outputs in the signal flow and where they can be configured.

A window is opened for each menu where parameters can be set. All open menus are of equal priority (not modal) and can be accessed any time via the Winbar.

The R&S SMF can be entirely operated from the front panel. Peripherals such as mouse or keyboard can be connected but are not essential.

With the aid of the rotary knob, the user can navigate in the block diagram and the dialogs. The cursor is moved line by line through the block diagram or dialog. Turning the button clockwise advances the cursor.

The selected block can be activated or deactivated with the **ON/OFF TOGGLE** key. Active blocks are highlighted by a colored background.

Generation of an Amplitude-Modulated Signal

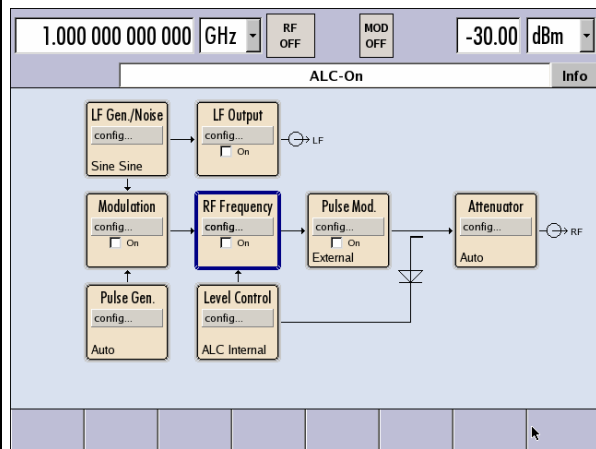
In the example, a simple AM-modulated signal is configured. Proceed as described below:

1. Activate default (preset) state.
2. Select and activate AM modulation.
3. Set frequency and level and activate RF signal.

Step 1: Activate default (preset) state



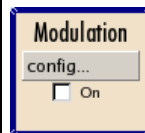
Set a defined instrument state by pressing the **PRESET** key.



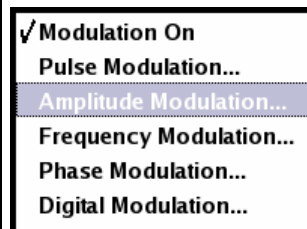
Step 2: Select and activate AM modulation



Select the **Modulation** block by turning the rotary knob.

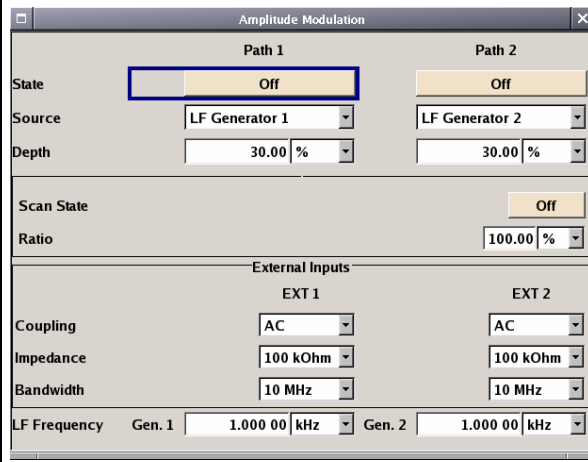


Press the rotary knob to open the menu where the modulation can be selected.

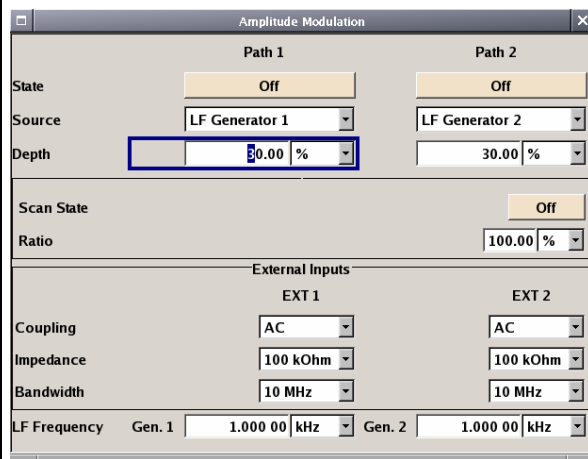




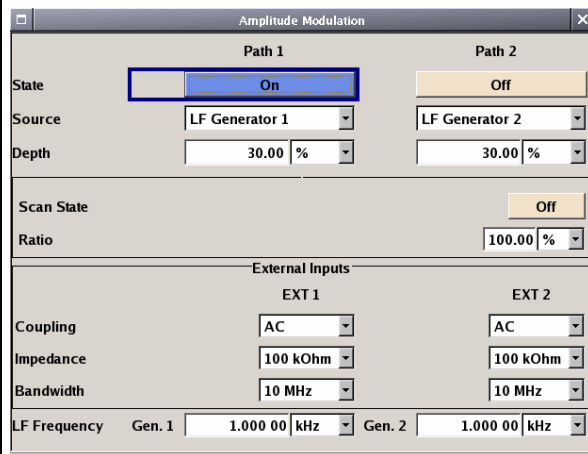
Press the rotary knob to open the **Amplitude Modulation** menu.



Select the **Depth** parameter by turning the rotary knob, and then enter the desired AM depth with the aid of the numeric keypad and the unit keys.



Finally, switch on AM modulation by selecting **State On** and subsequently pressing the rotary knob.



To indicate the active state, the **Modulation** block is displayed in blue. The **RF Frequency** is not yet active, which means that no RF signal is output.

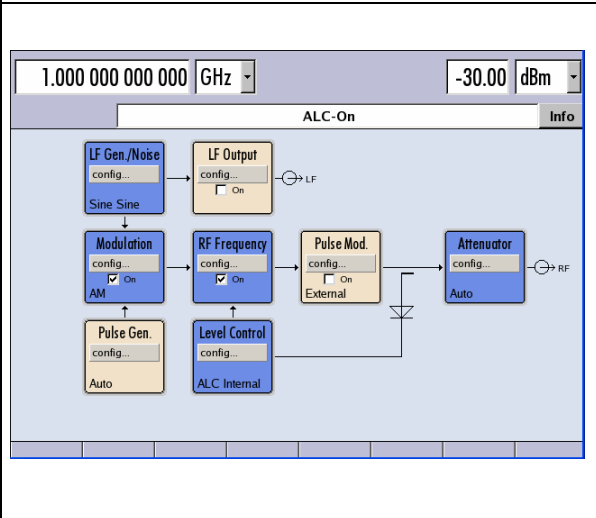
Step 3: Set frequency and level and activate RF signal

Press the **FREQ** key to activate the editing mode for frequency entry. The frequency entry field in the header section of the display is highlighted.

Enter the frequency of the desired RF carrier using the numeric keypad and terminate the entry by pressing a unit key.

Enter the level of the desired RF carrier in the same way after pressing the **LEVEL** key.

Select the **RF Frequency** block by turning the rotary knob and activate it by pressing the **RF ON/OFF** key.



The AM modulation signal is now present at the RF output.

Generation of a Frequency Modulated Signal with Noise

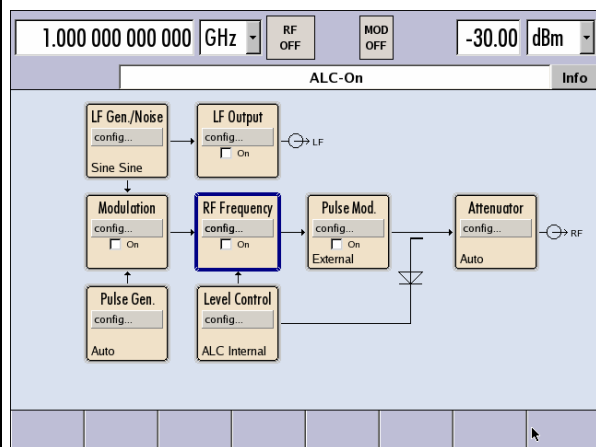
In the example, a FM modulated signal with noise is configured. Proceed as described below:

1. Activate default (preset) state.
2. Select FM modulation with internal noise signal and a deviation of 500 kHz.
3. Set frequency and level and activate RF signal.

Step 1: Activate default (preset) state



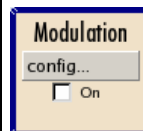
Set a defined instrument state by pressing the **PRESET** key.



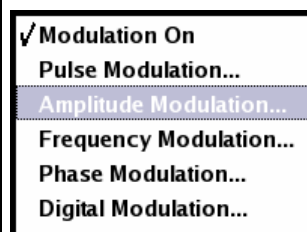
Step 2: Select FM modulation with internal noise signal and a deviation of 500 kHz



Select the **Modulation** block by turning the rotary knob.



Press the rotary knob to open the menu where the modulation can be selected.



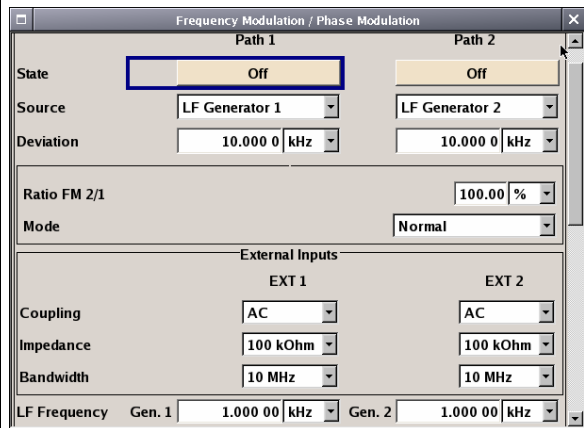


Highlight **Frequency Modulation...** by turning the rotary knob.



Press the rotary knob to open the **Frequency / Phase Modulation** menu.

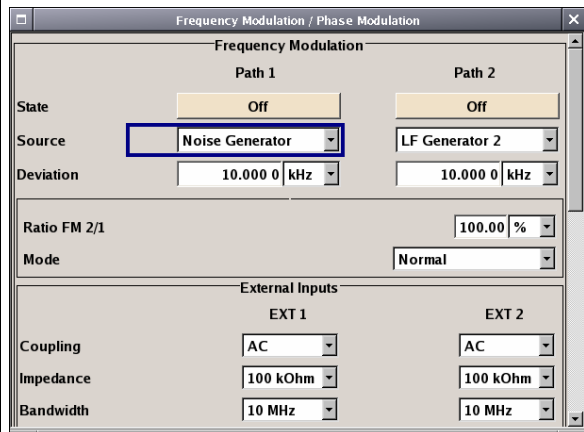
The internal source is the LF generator 1 by default. This setting is not changed.



Select the **Source** parameter by turning the rotary knob. Press the button to open the selection list. Select **Noise Generator** by turning the rotary knob and press it to activate the selected item.

The settings for the noise generator are performed in the **LF Gen./Noise** block.

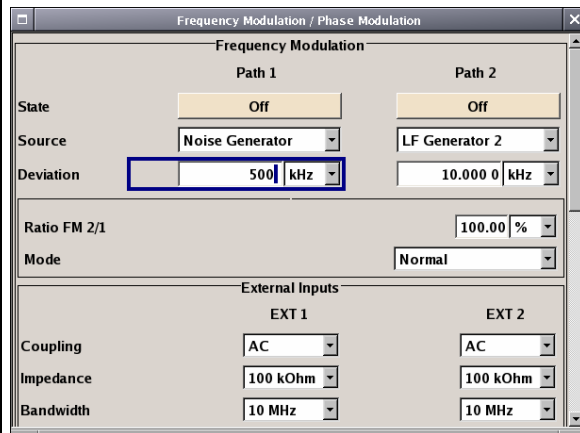
Gauss distribution with a bandwidth of 100 kHz are the default settings for the noise signal.



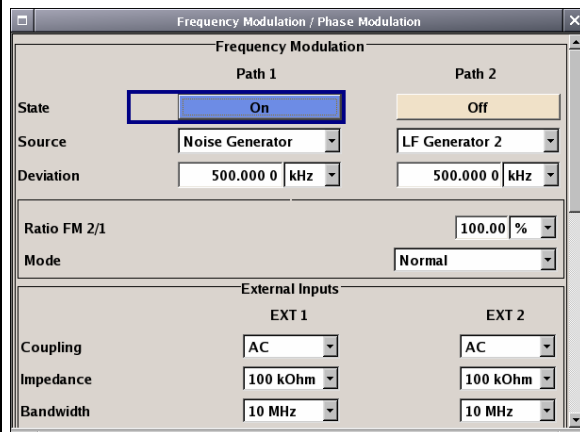


Select the **Deviation** parameter by turning the rotary knob. Enter 500 with the numeric key pad and press the rotary knob.

Now the deviation is set to 500 kHz.



Finally, switch on FM modulation by selecting **State On**.



Close menu by pressing the **CLOSE** key.

To indicate the active state, the **Modulation** block is displayed in blue. The **RF Frequency** is not yet active, which means that no RF signal is output.

Step 3: Set frequency and level and activate RF signal





Press the **FREQ** key to activate the editing mode for frequency entry. The frequency entry field in the header section of the display is highlighted.

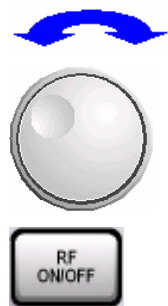
Enter the frequency of the desired RF carrier using the numeric keypad and terminate the entry by pressing a unit key.



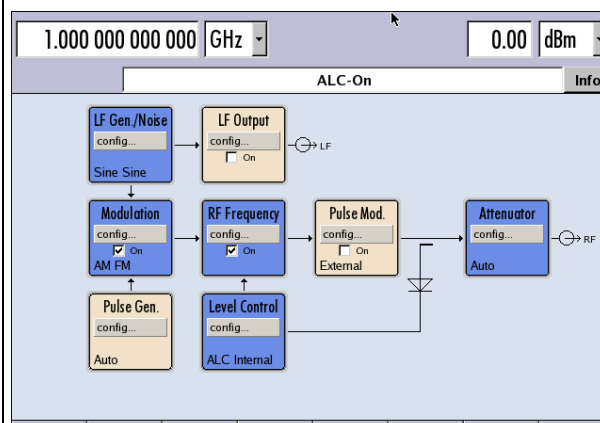
Enter a level of 0 dB for the RF carrier in the same way after pressing the **LEVEL** key.



The noise now superimposed the modulation signal. The **RF Frequency** is not yet active, which means that no RF signal is output.

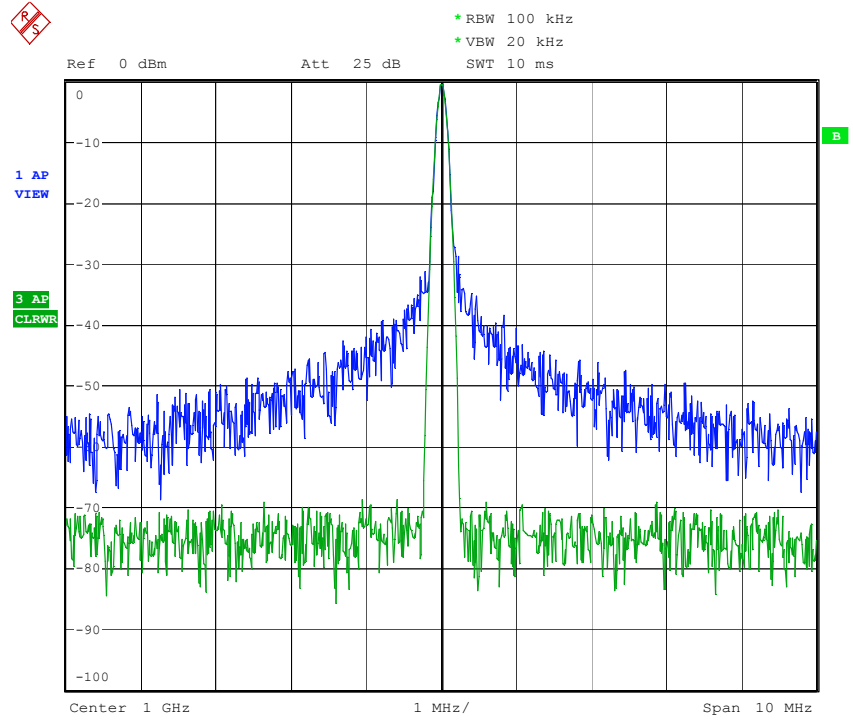


Select the **RF Frequency** block by turning the rotary knob and activate it by pressing the **RF ON/OFF** key.



The FM modulated RF signal with noise is now present at the RF output. The LF output is not yet activated, i.e., the modulation signal is not output there.

The graph below shows the FM modulated signal with noise (lower green trace) and the unmodulated signal (upper blue trace).



Date: 13.DEC.2005 15:15:42

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3 Manual Operation

Introduction - Manual Operation

The Signal Generator R&S SMF can be operated intuitively either via the interactive block diagram or via a menu tree. All menus are in the form of windows that can be operated in the same way. Rotary knob, keys and softkeys, or alternatively a mouse, allow direct and therefore convenient access to entries and settings. The clear-cut display shows the current signal generator state. Numerous help functions support the user in signal configuration.

The following chapter describes manual operation of the signal generator. This includes a description of screenshots, operation of menus and the block diagram and the setting of parameters.

Chapter 4 includes a detailed description of signal generator functions. Chapter 2 explains the operating concept in general and includes a brief introduction to operation by a step-by-step description of the configuration. Remote control of the instrument is described in chapters 5 and 6.

Operating Concept

The operating concept of the R&S SMF enables the user to make settings as intuitively as possible and at the same time gives a permanent overview of characteristics of the generated signal and of the current instrument state. Numerous on-line help functions support user settings.

The block diagram is the core of the operating concept

A large graphics display showing the current configuration and the signal flow in the form of a block diagram is the core of the operating concept of the Signal Generator R&S SMF. The block diagram gives an overview of signal configuration, and the graphical elements can be accessed for operation. The desired element is selected by means of the rotary knob and the associated setting function is called by clicking this button. Required menus are displayed on the block diagram which is displayed again in the foreground whenever the **DIAGRAM** key is pressed.

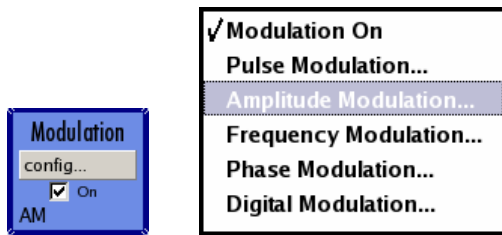
Permanent display of frequency and level of the RF output signal

The main characteristics of the RF signal, frequency and level, are permanently displayed in the header section of the screen and can be directly set in the display fields after the **FREQ** or **LEVEL** key is pressed. Status messages for the output signal are displayed in addition to frequency and level.

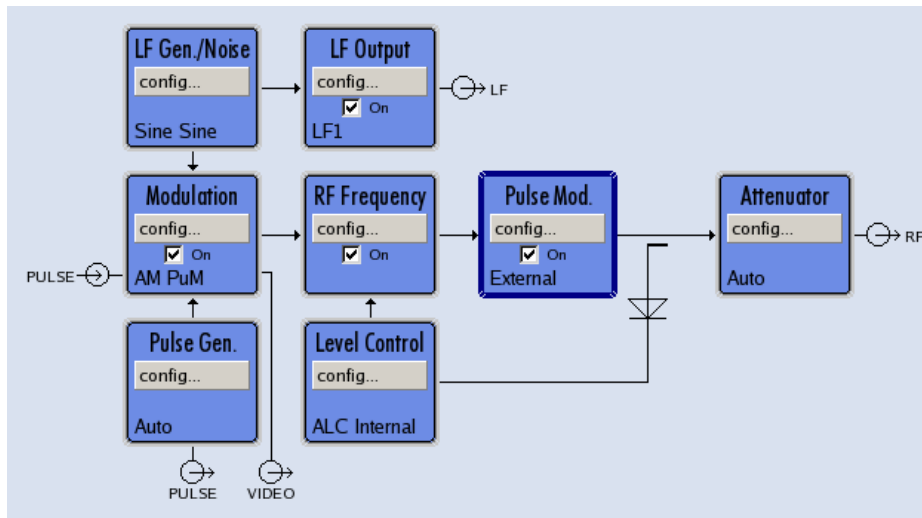


Operation via the graphics interface

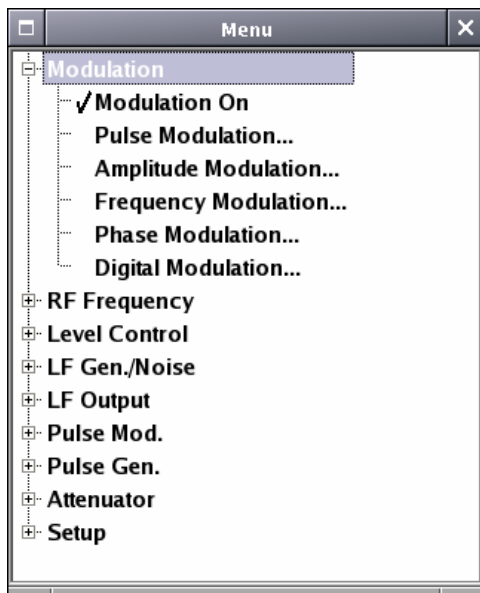
Menus are assigned to the specific function blocks in the block diagram. The function blocks represent elements of signal generation, e.g. the **Modulation** block which contains all menus required for modulation signal configuration. In this block, all modulations can be selected. Function blocks displayed with a blue frame can be directly switched on and off by means of the **TOGGLE ON/OFF** key. In the example, amplitude modulation can be activated in this way. The menus of the highlighted function blocks can be called by clicking the rotary knob or by pressing the **ENTER** key.



The signal flow between the function blocks and the employed inputs and outputs are also shown.

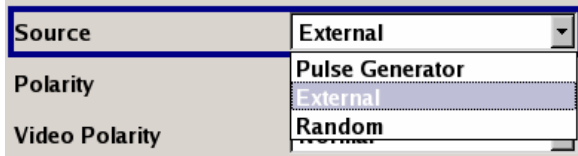


The menu tree can be opened and closed with the **[MENU]** key. The menu tree is organized in the same way as the directories under Windows. The function blocks correspond to the first directory level, the menus to subdirectories.



Operation corresponds to the Windows concept

To offer the user a familiar environment, operation is very similar to operation of Windows user interfaces. All menus and tables are made up of known elements, e.g. selection lists,



check boxes, 

or entry fields. 

A blue frame indicates that the selected item is active. In the highlighted element, entries can be made.

Most of the settings can be easily made with the rotary knob

Operation is possible via front-panel keys, an external keyboard, and the mouse. Most of the settings can be made with the rotary knob:

Turning the rotary knob shifts the entry focus to the desired element.

Clicking the rotary knob activates the selected entry field.

Depending on the parameter, the submenu is now called, the numeric value varied, the list entry selected, or the check box activated or deactivated.

If a value is entered, the entry is stored by another click on the rotary knob and the editing mode is exited.

Clear settings with the aid of independent submenus

A separate menu is opened for each menu and submenu. The menus can be operated independently of each other, i.e. none of the menus requires that settings in other menus be completed before it can be closed. This ensures flexible operation at all times.

The Winbar gives an overview of menus and simplifies their access

The menus are displayed on top of the block diagram but they can be "hidden" using the **[DIAGRAM]** key. They can be displayed again in full size (**[WINBAR]** key). This makes room on the screen for other displays that may be required but the setting menus can thus be accessed any time.

The keys are assigned simple functions

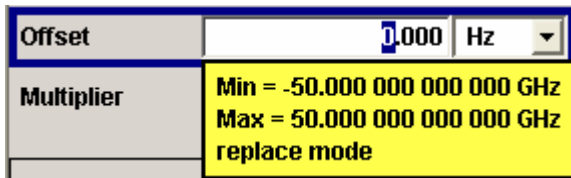
Most keys on the front panel of the R&S SMF directly perform a simple function. Since a great number of settings can thus be made by a keystroke, operation is easy. For instance, the **[CLOSE]** key closes the active menu; with the **[RF ON/OFF]** key the RF output signal can be switched on or off.

An exception are keys that call a menu such as the **[MENU]** key which opens the complete menu tree of the R&S SMF, the **[SETUP]** key which opens the menus for general instrument settings or the **[FILE]** key which opens the menu for file management.

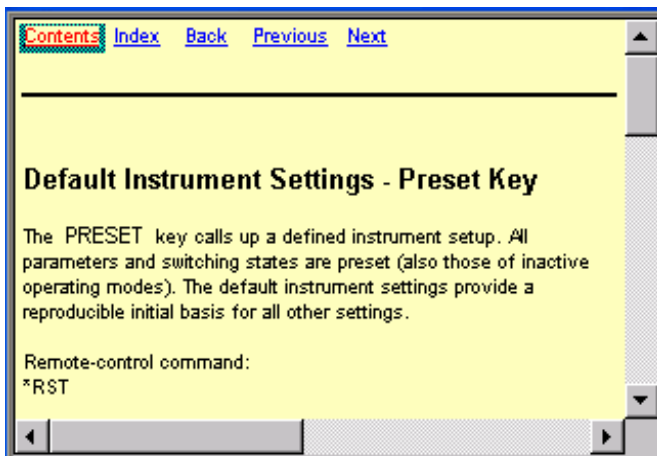
Help functions support the user

Numerous help functions support the user in signal configuration.

The valid setting range can be displayed for each numeric parameter. This requires a short wait after activation of the entry field. The range is then displayed automatically after a few seconds. If the entered value is outside the permissible range, the next permissible value is automatically set and a message is output (see below).



Context-sensitive help for each parameter can be called with the **HELP** or **F1** key:



Each help page is part of a comprehensive online help function which can be called by means of the **Content**, **Index**, **Back**, **Previous** and **Next** links.

Messages indicate the current instrument state

A great variety of different messages such as status messages, error messages, warnings, or information are displayed in the header field of the screen. With the aid of the **INFO** key, help pages can be called for most of the messages. They provide background information on the message and indicate operating steps that may be required. All messages are explained in the online help which can be called with the **HELP** key.

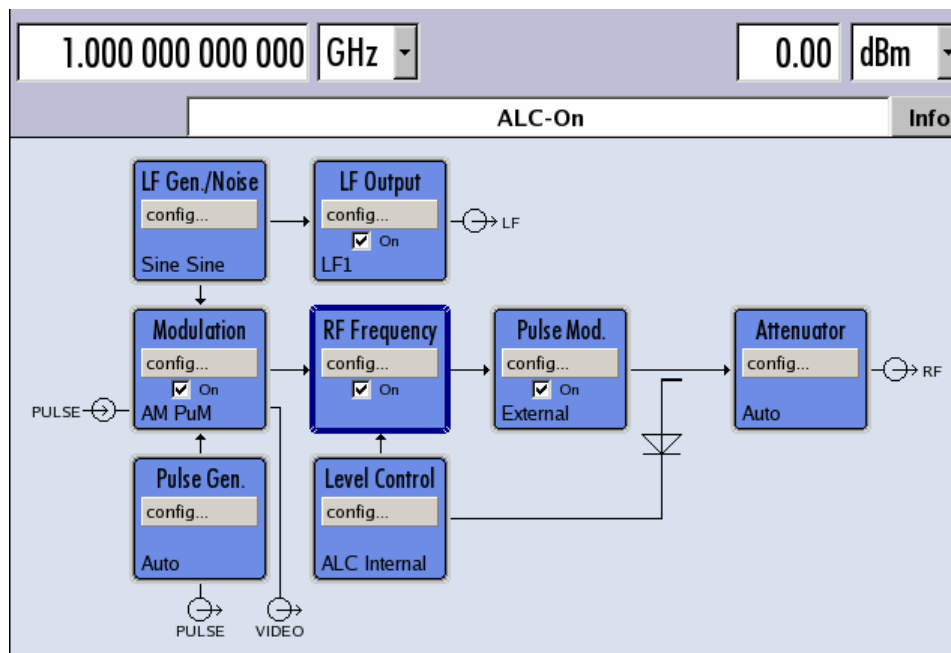


Display

The display shows the current signal generator state and offers graphical elements for direct operation. It is divided into two sections:

The frequency and level display with info line indicates the main output signal parameters and reports the current state with status, error, and warning messages.

The block diagram shows the instrument configuration, the signal characteristic as well as the inputs and outputs used and permits interactive operation via graphics elements. Active menus and graphs are displayed on top of the block diagram.



Frequency and Level Setting - Display

Frequency/level settings and a few status messages (see below) are displayed in the header field of the screen. The display may vary depending on the instrument's operating mode:

- In the sweep mode, the current frequency or level of the output signal is displayed. The status message **SweepMode** is displayed in the info line.
- In the list mode, neither the current frequency nor level is displayed, the indication is dimmed.

If user correction is active, the status message **UCorr** is displayed in the info line.

It should be noted that the signal at the RF output may differ from the indicated value by a set offset (frequency or level) or multiplier factor (see sections "RF Frequency" and "RF Level" in chapter 4).

Status Information and Messages - Display

The status information and messages are displayed in the header section of the screen. The messages differ with respect to their importance (errors, warnings, info) and the time of their appearance (brief and permanent messages). They require different treatment by the user. Further information on all messages can be called in the info window (see section "Info Window - Display").

Chapter "Error Messages" includes an overview of all status information and messages as well as instructions for error elimination.

Status Information

The status information gives the user an overview of the main operating states and settings of the R&S SMF. The states are indicated for information only and do not necessitate any action by the user. Status information is displayed between the frequency and level fields, at the left of the info line or in the info line itself.



Messages

Messages indicate errors in the instrument. They are displayed in the info line in different colors depending on their importance and display duration. Errors (e.g. no calibration data) are displayed in red, information (e.g. file not found) and warnings in black. Warnings indicate less significant errors (e.g. the instrument operates outside specified data).

Volatile messages

Volatile messages report automatic settings in the instrument (e.g. switching off of incompatible types of modulation) or on illegal entries that are not accepted by the instrument (e.g. range violations). They are displayed in the info line on a yellow background. They are displayed on top of status information or permanent messages.

Volatile messages do not normally demand user actions and disappear automatically after a brief period of time. They are stored in the history, however.

Remote-control command:

```
SYST:ERR? or SYST:ERR:ALL?
```

Permanent messages

Permanent messages are displayed if an error occurs that impairs further instrument operation, e.g. a hardware fault. The error signaled by a permanent message must be eliminated before correct instrument operation can be ensured.

The message is displayed until the error is eliminated. It covers the status display in the info line. After error elimination, the message automatically disappears and is also recorded in the history.

Remote-control command:

```
SYST:SERR?
```

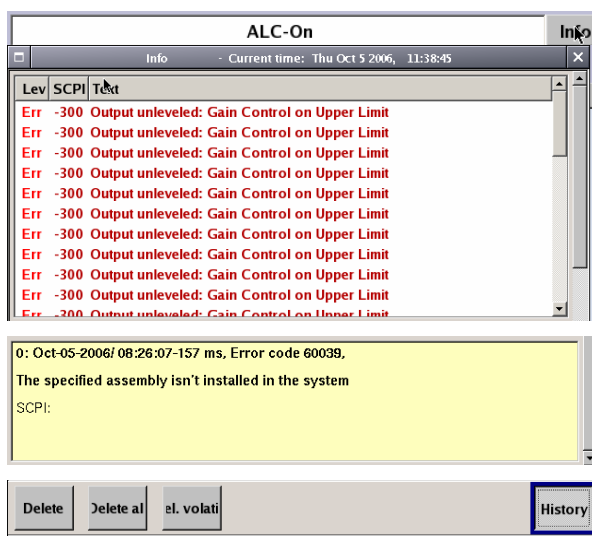
Info Window - Display

A few operating states and the current message are displayed in the info line (see also Chapter "Error Messages").

The info window with a list of current permanent messages and a detailed description of each message can be opened with the **INFO** key.

The upper section of the info window contains a list of all current permanent messages in the order of their occurrence, i.e. the most recent message is displayed first. In the lower section of the window, additional information on the highlighted message is displayed.

A history of all messages that have occurred since instrument switch-on can be called with the **History** button. The most recent message is displayed first.



Info line

List of current messages with short message text

Detailed description for highlighted message

Softkeys

The messages are color-coded according to their level. Device-specific messages are red, info and remote control error are black. The level is also indicated in the **Lev** column (Err, Sys or Info). Column **SCPI** indicates the SCPI error code.

With the aid of the softkey buttons, error messages can be cleared and a history of all messages called.

Delete Clears the highlighted message. This button is available only if the history of the messages is displayed.

Remote-control command: n.a.

Delete All Clears all messages. This button is available only if the history of the messages is displayed.

Remote-control command: n.a

Sel. volatile Clears all volatile messages. This button is available only if the history of the messages is displayed.

Remote-control command:

SYST:ERR:ALL?

(Each time a SYSTem:ERRor:ALL? query is sent, the error queue is returned and at the same time cleared).

History Calls the list of all messages that have occurred since instrument switch-on. The most recent messages are displayed at the top of the list. When the button is pressed again, the list of current messages is displayed.

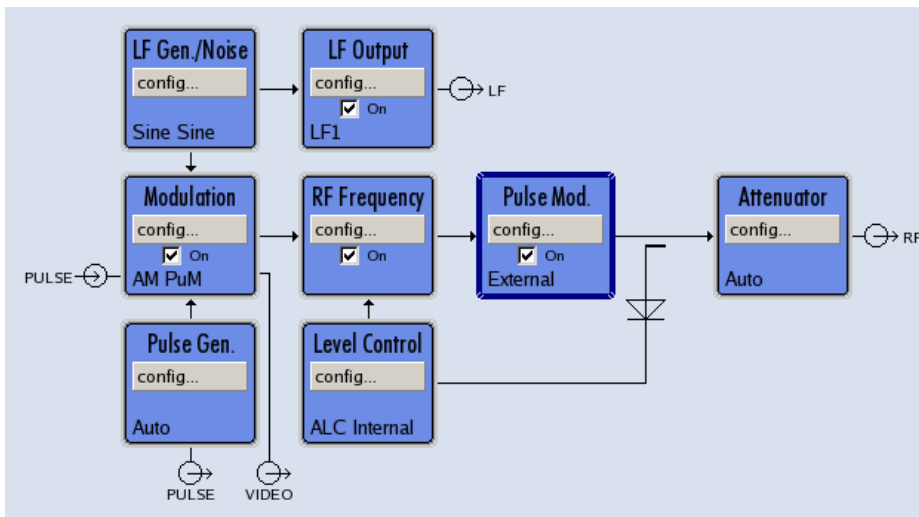
Remote-control command:

SYST:ERR? or STAT:QUE?

(Each time a SYSTem:ERRor? or :STATus:QUEue? query is sent, the oldest entry in the error queue is returned and at the same time cleared in the list).

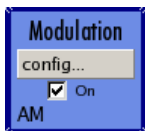
Block Diagram - Display

The block diagram shows provided options, signal configuration and the currently selected signal flow of the generator with inputs and outputs used. Signal generation can be completely operated from the block diagram. The highlighted function block can be directly switched on and off with the **TOGGLE ON/OFF** key. Clicking the rotary knob (= Enter) opens the associated setting menu.



Function Blocks in the Block Diagram

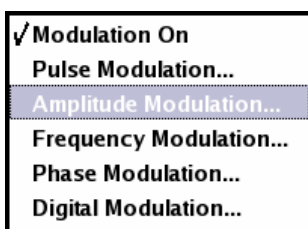
Each block represents a function of signal generation. The function is indicated in the headline of the block, e.g. **Modulation**. In this block, the modulation signals are set, for instance.



In the check box **On**, the respective function can be quickly activated/deactivated with the **TOGGLE ON/OFF** key. After activation, the block is displayed in blue.

Status information is displayed below the check box. It is different for the different blocks. In the **Modulation** block, for instance, the selected modulation is indicated.

Clicking the rotary knob (front panel) or the **config...** button (mouse) opens the associated setting menu.



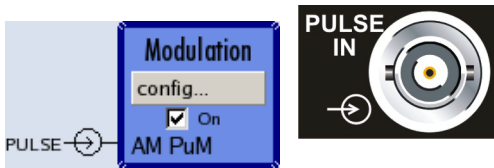
Signal Flow and Input/Output Symbols in the Block Diagram

The input/output symbols in the block diagram show the currently used inputs and outputs of the signal generator. Unused inputs and outputs are not shown. The lines indicate the signal flow.

Symbols and labels refer to the corresponding inputs and outputs on the front and rear panel of the signal generator. The direction - input or output - is indicated by an arrow.

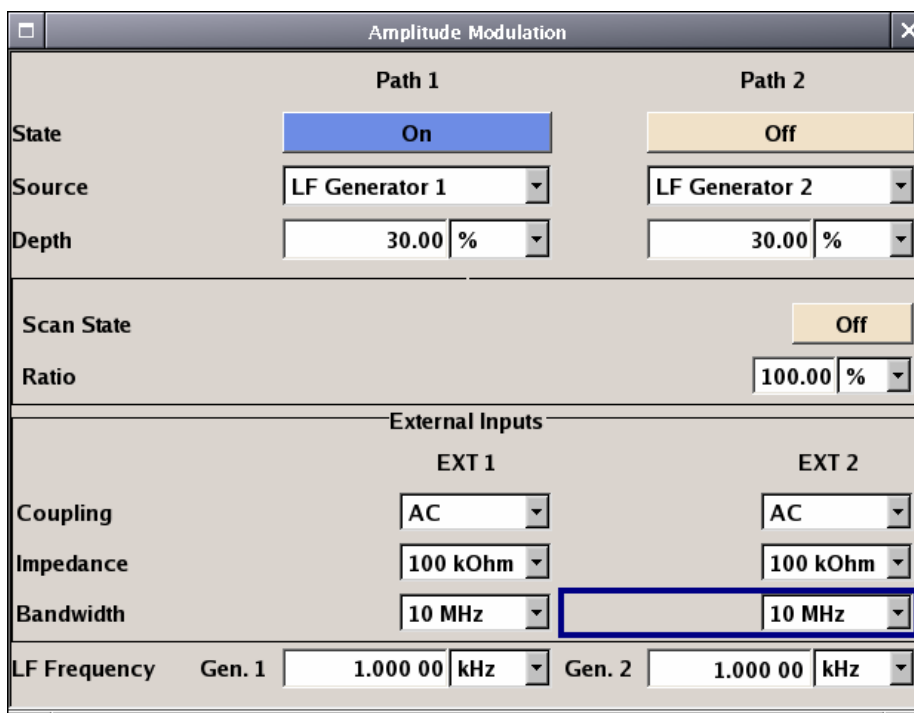
Example:

The symbols indicate the input for the external pulse signal on the instrument rear panel.



Menu Structure - Display

The parameters are set in the menus. Menus are called either via the function blocks in the diagram or by means of the **[MENU]** key. The menus are displayed on top of the block diagram. If the menu buttons assign menu-specific functions to the softkeys, the Winbar is hidden.





This section describes the menu structure. Menu operation is described in section "*Menu Operation*", page 3.21, the setting of parameters in section "*Setting Parameters*", page 3.12.

The menus are in Linux format. They differ in details depending on their function but they consist of the same main elements.

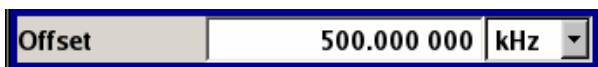


Menu header

The header line contains the name of the menu (e.g. Frequency / Phase) and the buttons for minimizing  and closing  the menu. The buttons can be operated with the mouse. For operation from the front panel, the **HIDE** and **CLOSE** keys can be used.

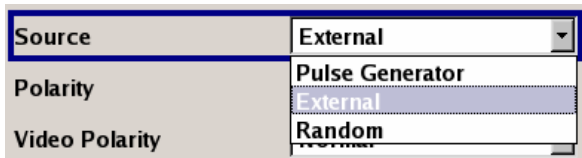
The remaining menu area is variable and comprises various fields for setting parameters.

Each of the setting fields is assigned a parameter name. The kind of setting varies depending on the parameter to be set.




Entry field

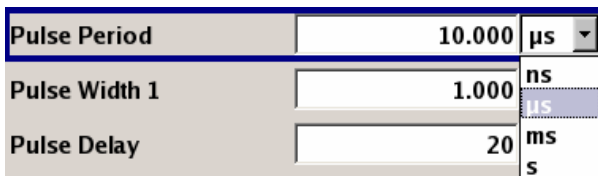
A numeric value (e.g. offset) or an alpha-numeric value (e.g. file name) can be entered in this field.



Selection field

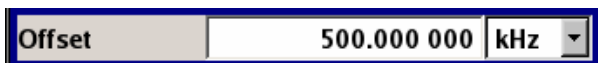
The  button indicates that a selection can be made from a list. The fold-down selection list is displayed below the selection field. Depending on the number of entries, the full list or only part of it is shown.

One entry at a time can be selected from the list. If an item is not available for selection, it is printed in grey and cannot be accessed.



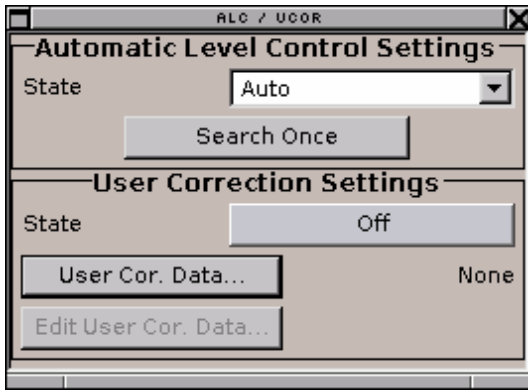
Units

The unit of a parameter is displayed next to the value. When the parameter is edited, the unit is selected either from the list or by means of the front-panel keys. When the entry is completed, the unit can be changed. In this case the value remains unchanged but is automatically adapted to the new unit.



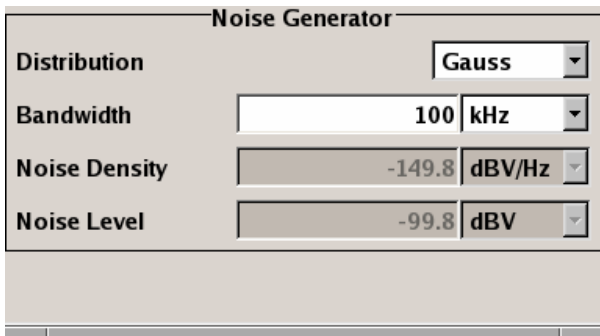
Check-box field

If the check box is ticked, the associated parameter setting is active (e.g. switched on).



Access denied

Some settings can only be made in a specific configuration. If setting is not permitted with the specific configuration selected, the respective item is disabled and displayed in grey and the entry or selection field or button cannot be accessed.



Menu area

Several fields of associated but separately set parameters can be organized in a menu area. The menu area is framed and labelled with the function common to all parameters (e.g. Noise Generator).



Buttons

The buttons either trigger a single action (e.g. Execute Single Sweep), or call the next menu level (to be identified by 3 dots, e.g. User Cor. Data...).

Setting Parameters

The R&S SMF offers several and sometimes alternative possibilities for setting parameters. Operation is possible from the front panel, with the aid of a mouse and/or from a PC keyboard. Operation of the R&S SMF with the aid of these control media is shown in the tables below.

Frequency and level are directly set in the header area of the display using the **FREQ** and **LEVEL** keys.

Some of the keys trigger a direct action, e.g. the **RF ON/OFF** key switches the RF output on and off. An overview of key functions can be found at the end of this chapter (see section "*Legend of Front-Panel Controls*", page 3.31), a detailed description of key functions is given in chapter 4, "*Instrument Functions*".

Most of the parameters are set in the menus. Menus can be opened from the function blocks of the diagram either with the aid of the rotary knob (= Enter) on the front-panel or by a mouse click on the **Config...** button.

An exception are the **Setup** and **File** menus. In the **Setup** menu, general settings are made which are not directly concerned with signal generation, e.g. setting of the IEC/IEEE-bus address. In the **File** menu, files and lists are managed. These menus can only be called with the **SETUP** and **FILE** keys.

Specific settings can also be made directly in the block diagram, e.g. activating a function block by means of the **TOGGLE ON/OFF** key. Changes affecting the signal flow are immediately visible in the graphics display.

Calling a Menu - Setting Parameters

After instrument switch-on, the cursor is always on the first function block of the diagram (default setting). It can be moved by means of the rotary knob or the arrow keys. Clicking the rotary knob opens the menu associated with the function block. The **MENU** key opens the complete menu tree.

With the aid of the appropriate keys and softkeys, the cursor can also be moved to the header area or the Winbar.

- ◆ The **FREQ** and **LEVEL** keys activate the frequency or level entry fields in the header area.
- ◆ The **DIAGRAM** key moves the cursor to the block diagram.
- ◆ The **WINBAR** key moves the Winbar to the foreground. The button that was active last in the Winbar is highlighted. The associated menu is activated by clicking the rotary knob (= Enter).
- ◆ The **MENU** key opens the complete menu tree, the **FILE** and **SETUP** keys the respective menus. Menus can be closed with the **CLOSE** key.
- ◆ The cursor can also be moved with the **ESC** key. However, the function of this key depends on the current cursor position:

Parameter field (editing mode):

The editing mode is terminated and the previous value is restored (exception: value variations with the rotary knob cannot be cancelled).

Menu area:

The cursor is set to another menu area.

Menu:

The menu is closed and the cursor changes to the next higher control level.

Frequency/level field:

The cursor is set on the previously active menu or, if no menu was active, on the first function block in the diagram.

Function block in the diagram:

The cursor is set on the first menu in the Winbar. If no menus are open, the current cursor position remains unchanged.

Function	Front panel	PC keyboard	Mouse
Edits the frequency or level in the entry fields of the header area	Press FREQ or LEVEL key. Enter value.	Press CTRL + F (frequency) or CTRL + L (level). Enter value.	Click the entry field and enter value.
Activates the block diagram	Press DIAGRAM key.	Press CTRL + D.	Click the function block.
Activates the Winbar	Press softkey. Press WINBAR key .	Press CTRL + F1... F8 Press CTRL + W.	Click button in Winbar.
Calls the Setup or File menu or the menu tree	Press SETUP , FILE or MENU key.	Press CTRL + E (Setup), CTRL + S (File) or CTRL + M (menu tree).	-

Selecting a Control Element - Setting Parameters

Control elements are always selected in the same way no matter whether a function block in the diagram, a menu in the menu tree, a parameter in the menu, or an entry in a list or table is concerned.

- An element is activated by means of the cursor. An active element is highlighted by a blue frame.

Variation Step MHz

Function	Front panel	PC keyboard	Mouse
Selects an element	Select element by means of the rotary knob or the arrow keys.	Select element by means of the arrow keys.	Click element.

Switching Parameters On/Off - Setting Parameters

A parameter can be activated and deactivated using a button or a check box.

- The ENTER function of the different control media switches the highlighted element on or off (toggle function). Color and label of a button change, the check box is ticked or the tick is removed.

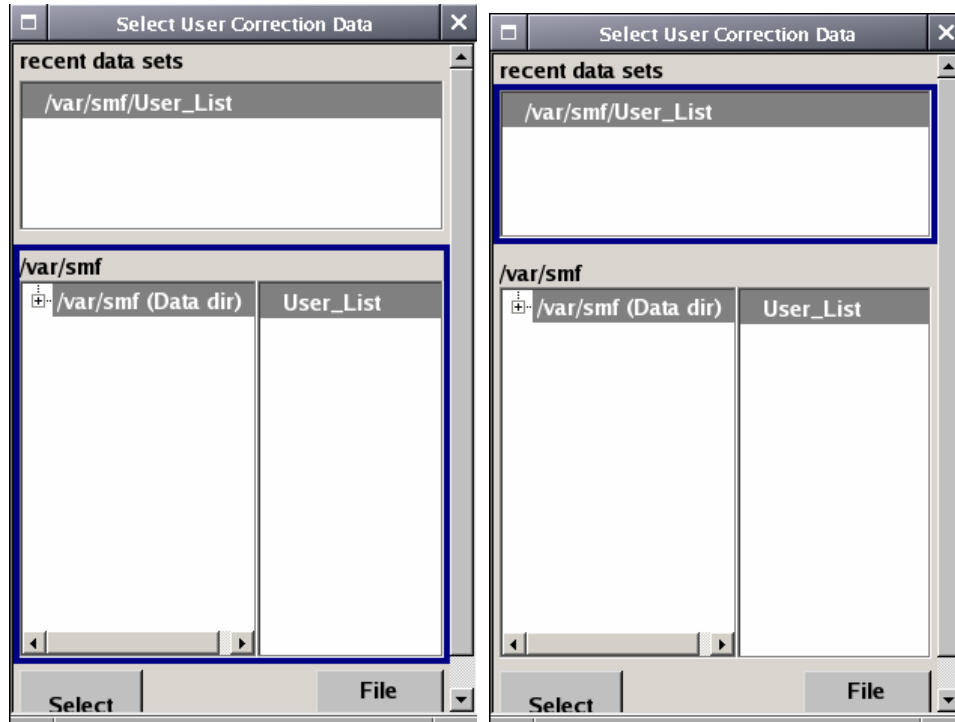
State On Off

Variation Active Variation Active

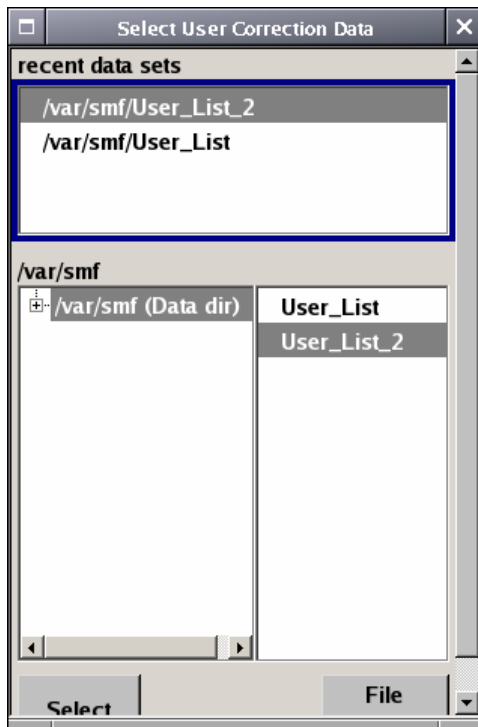
Function	Front panel	PC keyboard	Mouse
Switches on/off	Press rotary knob, ENTER or TOGGLE ON OFF key.	Press Enter key.	Click check box or button.

Selecting and Exiting a Menu Area - Setting Parameters

Some menus are organized in areas. The cursor can be moved either only within an area or between the higher-level menu areas. This applies to the **File Select** menus when files are saved or loaded. When the menu is called, one of the menu areas is highlighted by a blue frame.



- ◆ Another menu area can be selected (highlighted) by means of the rotary knob or the arrow keys.
- ◆ Clicking the rotary knob (= Enter) moves the cursor to the highlighted menu area. When the cursor is placed on a lower-level area in the menu, the area is highlighted by a grey frame. The currently selected item is printed on a blue background (in the example the selected directory). The rotary knob and the arrow keys up/down move the cursor only within the grey-framed area.



- ◆ Clicking the rotary knob (= Enter) terminates the setting, i.e. selection of a file. The cursor is either set on the next higher menu level or the menu is closed as in our example.
- ◆ The left/right cursor keys first shift the entry focus within the menu range from left to right (or vice versa); in the example, from the directory tree to the file list. Press again and the entry focus is shifted up one menu level.
- ◆ Clicking the rotary knob (= Enter) performs a setting. In the example of the **File Select** menu, this is the display of the subdirectories if a directory is marked and, if a file is marked, the selection of this file. After a file has been selected, the menu closes automatically.
- ◆ The `ESC` key moves the cursor to the next higher menu level.

Function	Front panel	PC keyboard	Mouse
Selects a menu area	Select menu area using the rotary knob or the arrow keys. Press the rotary knob or the <code>ENTER</code> key. Rotary knob and arrow keys up/down move the cursor only within the selected menu area.	Select menu area using the arrow keys. Press the Enter key. The arrow keys up/down move the cursor only within the selected menu area.	- (The menu area is selected by selecting an entry.)
Exits a menu area	Press the <code>ESC</code> key. Rotary knob or arrow keys move the cursor between different menu areas.	Press the Enter key. The arrow keys move the cursor between different menu areas.	- (The menu area is exited by setting the cursor on an item outside the area).

Entering a Value - Setting Parameters

Numeric and alphanumeric values can be edited in the entry fields. In the editing mode, cursors of different color are used. A blue cursor indicates the overwrite mode, a green cursor the insert mode. The **INSERT** key toggles between the two modes. The insert mode is the default setting.

Numeric values can either be newly entered or the existing value can be varied. Incorrect entries are cleared with the **BACK SPACE** key.

- ◆ **Entering a new value:**

A click on a numeric key activates the editing mode. The previous value is cleared and the new value can be entered.

- ◆ **Variation:**

Clicking the rotary knob (= Enter) activates the editing mode. Set the cursor to the left of the number to be changed using the left/right arrow keys. The value at the cursor position is varied. An increase or decrease of the value depends on the cursor used (up/down) or on the direction of rotation of the rotary knob.

Alphanumeric values can be newly entered (e.g. file name).

- ◆ **New entry:**

The entry is started by clicking an alphanumeric key.

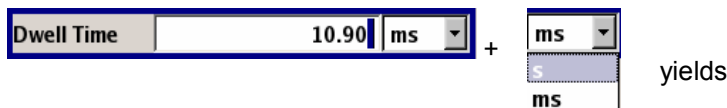
Function	Front panel	PC keyboard	Mouse
Enters a new value	Press an alphanumeric key.	Press a letter key or a numeric key.	-
Edits a value	Click the rotary knob. Select the desired numeric digit with the rotary knob and mark it by clicking the button. Change the number using the keypad.	Press the Enter key. Select the desired numeric digit using the left/right arrow keys. Enter new value using the keyboard.	Click the desired position to set the cursor. Change the value using the keyboard.
Varies a value	Click the rotary knob. Select the desired numeric digit with the rotary knob and mark it by clicking the button. Vary the number using the rotary knob.	Press the Enter key. Select the desired numeric digit using the left/right arrow keys. Vary the number using the up/down arrow keys.	-

Selecting a Unit - Setting Parameters

The entry of a numeric value can be terminated by pressing a unit key on the front panel, selecting a unit in the selection field next to the value or by clicking the rotary knob (= Enter). The unit is assigned in different ways:

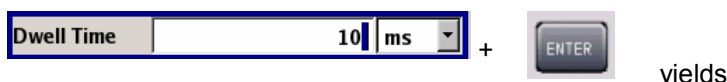
Terminating the value entry by selecting a unit in the units field

When the entry is terminated by selecting a unit in the units field next to the value, the selected unit is assigned, e.g. s (for list selection see next section).



Terminating the value entry with Enter

If an entry is terminated by clicking the rotary knob (= Enter) or with the **ENTER** key, the unit displayed in the entry field next to the value is assigned (in the example ms).






Function	Front panel	PC keyboard	Mouse
Assigns a unit	To terminate the entry, press one of the unit keys or select unit in the field at the right of the value (for list selection see next section).	To terminate the entry press one of the key combinations ALT + F9/+ F10/+ F11/+ F12 or select unit in the field at the right of the value (for list selection see next section).	Select unit in the field at the right of the value before entering the value (for list selection see next section).
Changes a unit	After the value entry has been terminated press a unit key or select unit in the field at the right of the value (for list selection see next section).	After the value entry has been terminated press one of the key combinations ALT + F9/+ F10/+ F11/+ F12 or select unit in the field at the right of the value (for list selection see next section).	Select unit in the field at the right of the value after the value entry (for list selection see next section).

Selecting a Value from a List - Setting Parameters

The  button next to the value field indicates that a selection list is available.

- ◆ Clicking the rotary knob (= Enter) opens the list. Selection is made by choosing an entry (item is highlighted) and confirmation with ENTER. If the list is longer than the displayed window, a scroll bar is available



Function	Front panel	PC keyboard	Mouse
Opens the selection list	Press rotary knob or ENTER key.	Press Enter key.	Click  button.
Selects an entry	Select entry using the rotary knob or the up/down arrow keys and confirm with the rotary knob or the ENTER key or press ON/OFF TOGGLE key several times until the desired entry is displayed in the selection field.	Select entry using the up/down arrow keys and confirm with the Enter key.	Double-click the desired entry.
Scrolls	Shift the displayed list section using the rotary knob or the up/down arrow keys.	Shift the displayed list section using the up/down arrow keys.	Press  or  button in the scroll bar until the desired entry is displayed.

Terminating Entries - Setting Parameters

Variations by means of the rotary knob are immediately set, e.g. RF frequency variation.

All other parameter settings have to be confirmed by pressing the rotary knob or one of the unit keys (see also section "Setting Parameters", page 3.12).

Some settings require additional confirmation with the **Accept** button. This is the case when it is useful to first enter a few values and to confirm them together, e.g. when network settings are made. Settings not yet confirmed by **Accept** are displayed in the menu on a yellow background. This indicates that the currently displayed values do not represent the desired signal.

All settings of instrument functions that can be switched on and off are calculated and effective only after this function has been switched on.

This applies to most settings on the R&S SMF. An exception is, for instance, the frequency variation of the reference oscillator, which is immediately set after confirmation.

Function	Front panel	PC keyboard	Mouse
Accepts value immediately	Vary the value using the rotary knob or the up/down arrow keys.	Vary the value with the up/down arrow keys.	-
Confirms entries	Press rotary knob or ENTER key or press unit key.	Press Enter key or one of the key combinations ALT + F9/+ F10/+ F11/+ F12.	Exit entry field.
Confirms entries in the menus with the Accept button.	Press Accept button.	Select Accept button with the arrow keys and press Enter.	Click Accept button.
Sets the entries in the instrument	If the instrument function is active, the new value is immediately calculated and set. If the instrument function is not active, the new confirmed value is calculated and set only when the function is switched on.	(see front panel)	(see front panel)

Restoring the Previous Value - Setting Parameters

Parameter variations with the rotary knob are immediately set and therefore not reversible.

Normally, values cannot be restored also in the case of mouse control because no explicit confirmation is required in this case and entries are automatically confirmed when the entry or selection field is exited.

In the case of front-panel control or operation from the keyboard, previous values can be restored as long as the new value is not confirmed, i.e. the entry is not completed. This can be done with the **ESC** key.

Function	Front panel	PC keyboard	Mouse
Restores previous values	Press the ESC key before the entries are confirmed.	Press the Esc key before the entries are confirmed.	-

Menu Operation

Menus are operated with the aid of the Winbar buttons and with the **CLOSE**, **DIAGRAM**, and **REARR** keys on the front panel.

Note:

For configuration of power sensor measurements the hardkeys are assigned special functions, see chapter 4, section "Power Sensors".

The Winbar can be called to the front with the **WINBAR** key.

- ◆ The **DIAGRAM** key moves the cursor to the block diagram. All active menus are hidden. They are still open and can be displayed again with the **WINBAR** key.
- ◆ The **CLOSE** key closes an active menu.
- ◆ The **REARR** key rearranges all open menus that were shifted outside the display range with the mouse.
- ◆ The **WINBAR** key calls the Winbar to the front. The open menus are displayed after pressing the associated Winbar button.

Note:

The **ESC** key also closes the active menu if the cursor is at the highest menu level.

Function	Front panel	PC keyboard	Mouse
Displays the block diagram in the foreground	Press the DIAGRAM key.	Press CTRL + D.	Click function block.
Displays a menu in the foreground	Press the associated button.	Press CTRL + F1 to F8.	Click the respective button in the Winbar.
Closes an active menu	Press the CLOSE key.	Press CTRL + G.	Click the X button in the menu bar.
Hides all menus	Click the DIAGRAM key.	Press CTRL + D.	-
Automatically arranges displayed menus	Click the REARR key.	Press CTRL + A.	- The menus can be shifted with the mouse as required. The frequency and level fields and the info line cannot be covered, however.

Editors

The R&S SMF provides user-friendly editors for defining lists. Lists containing frequency and level value pairs are used for the user-defined level correction.

The lists are saved to files and may thus have any length. The file name of the lists and the directory to which the files are saved are user-selectable. The file prefix is different for each list type and is permanently assigned by the system (see section "File Management", page 3.26).

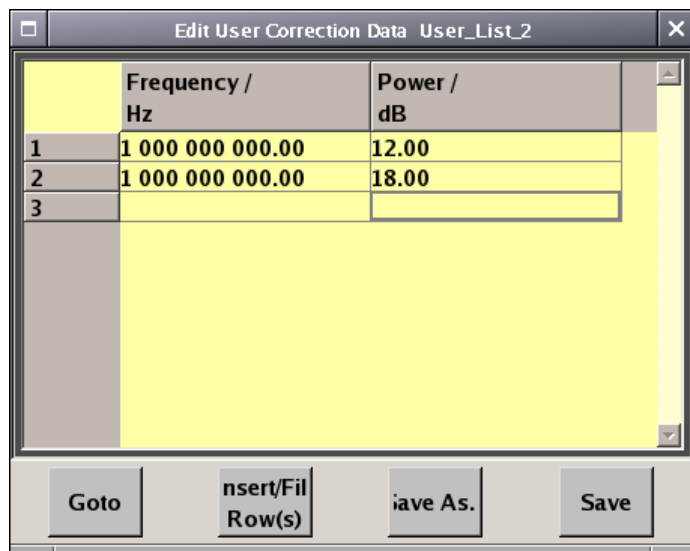
List Editor

The **User Correction** and **List Mode** menus provide the list editor for defining the frequency/level value pairs. The associated buttons call up the list editor.

The **User Correction** menu provides the list editor for defining the frequency/level value pairs.

User Cor. Data...

- ◆ The selected list is displayed. If no list has been selected, a blank list of only one row is displayed.



- ◆ The value pairs are entered in the **Frequency/Hz** and **Power/dBm** table columns. A blank row is inserted at the end of the list.
- ◆ New rows can be inserted anywhere in the table by means of the **Insert Row(s)...** button.
- ◆ After the list has been edited, i.e. changed, it can be saved under its current name by means of the **Save** button, or under a new name by means of the **Save as...** button. Only complete value pairs are taken into consideration; rows containing an entry in only one column are ignored.
- ◆ An existing list can be edited in the insert or overwrite mode.
- ◆ A new list can be created under a new name either by generating a blank file in the **File Select** menu (see section "File Management", page 3.26) or by changing an existing list which will then be saved under a new name.

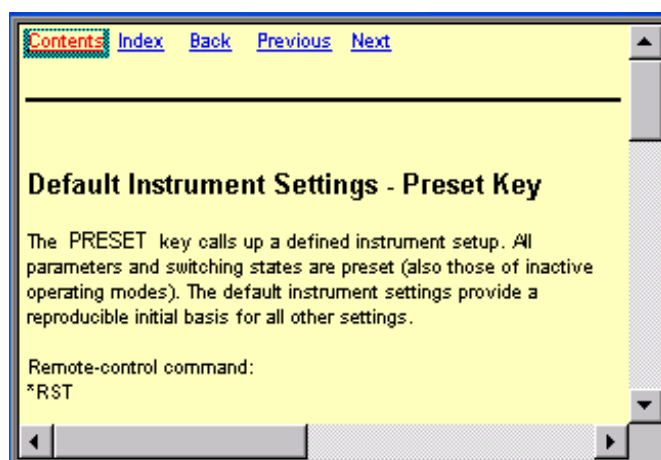
Function	Front panel	PC keyboard	Mouse
Call up editor The cursor marks the first row of the Frequency/Hz column.	Use the rotary knob or the cursor keys to mark the Edit xxx Data... button in the individual menu, click the rotary knob or press the ENTER key.	Mark the Edit xxx Data... button in the individual menu and press the Enter key.	Click the Edit xxx Data... button in the individual menu.
Enter value	Use the numeric keys to enter the value and terminate the entry by pressing the Unit key.	Use the numeric keys to enter the value and terminate the entry by pressing the Enter key.	-
Change column	Press the left/right cursor keys.	Press the left/right cursor keys.	Click cell.
Change row	Use the rotary knob or the up/down cursor keys to mark the row.	Use the up/down cursor keys to mark the row.	Click cell.
Select row The cursor moves to the selected row.	Use the rotary knob or the cursor keys to mark the GoTo button, click the rotary knob or press the ENTER key. Enter the row index in the entry field by means of the numeric keys, click the rotary knob or press the ENTER key.	Mark the GoTo button and press the Enter key. Use the numeric keys to enter the row index and terminate the entry by pressing the Enter key.	Click cell.
Insert row A row is inserted above the currently marked row. If no row has been selected, a row is inserted at the beginning of the list.	Select the row above which the new row is to be inserted. Use the rotary knob or the cursor keys to mark the Insert Row(s) button, click the rotary knob or press the ENTER key.	Select the row above which the new row is to be inserted. Mark the Insert Row(s) button and press the Enter key.	Click the row above which the new row is to be inserted. Click the Insert Row(s) button.
Save list under a new name	Use the rotary knob or the cursor keys to mark the Save as.. button, click the rotary knob or press the ENTER key. Enter the file name in the File Select menu and select the directory.	Mark the Save as.. button and press the Enter key. Enter the file name in the File Select menu and select the directory.	Double-click the Save as... button. Enter the file name in the File Select menu and select the directory.
Save list under the same name	Use the rotary knob or the cursor keys to mark the Save button, click the rotary knob or press the ENTER key.	Mark the Save button and press the Enter key.	Double-click the Save button.
Create new list	Mark the User Correction Data button, click the rotary knob or press the ENTER key. Mark Create New List , click the rotary knob or press the ENTER key. Enter the file name in the File Select menu and select the directory.	Mark the User Correction Data button and press the ENTER key. Mark Create New List and press the Enter key. Enter the file name in the File Select menu and select the directory.	Double-click the User Correction Data button. Double-click Create New List. Enter the file name in the File Select menu and select the directory.

Help system

The R&S SMF is equipped with a context-sensitive help function. A help page is available for each parameter and can be called any time during instrument operation. The context-sensitive page which is opened with the **[HELP]** key is part of a comprehensive help system. It is possible to move from this context-sensitive page to any page of the help system.

Note:

Compiled online help systems are also available for all functions of the R&S SMF on the CD-ROM supplied with the instrument. This help program can be called on any controller with Internet Explorer version V 4.0 and higher.



The help function is provided with a navigation bar, i.e. other help pages can be called from the context-sensitive page via the table of contents, the index, arrows for scrolling, and page-internal links.

Operation of context-sensitive help

Function	Front panel	PC keyboard	Mouse
<p>Open the help system</p> <p>The help page for the respective parameter is displayed.</p>	Press HELP key.	Press F1 key.	-
Close the help system	Press HELP key again.	Press F1 key again.	-
<p>Activate the link</p> <p>The help system branches to the linked page.</p>	Select link with rotary knob or arrow keys and activate by clicking the rotary knob or ENTER key.	Select link using the arrow keys and activate with the Enter key.	Click link.
Page Up/down	Select Previous , Next or Back in the help window using the arrow keys and activate by clicking the rotary knob or the ENTER key.	Select Previous , Next or Back in the help window using the arrow keys and activate with the Enter key.	Click Previous, Next or Back.
Scroll	Move indicated help window area using the rotary knob and the arrow keys	Move indicated help window area using the arrow keys.	Click the scroll bar and move to the desired position.
<p>Select an item in the table of contents</p> <p>The help page of the item is displayed.</p>	Select Content in the help window using the arrow keys and activate by clicking the rotary knob or the ENTER key. Select the desired item using the rotary knob or the arrow keys up/down and activate by clicking the rotary knob or the ENTER key.	Select Content in the help window using the arrow keys left/right and activate with the Enter key. Select the desired item using the arrow keys and activate with Enter.	Click Content Click item.
<p>Select an index term</p> <p>The help page of the term is displayed.</p>	Select Index in the help window using the arrow keys and activate by clicking the rotary knob or the ENTER key. Select the desired item using the rotary knob or the arrow keys up/down and activate by clicking the rotary knob or the ENTER key.	Select Index in the help window using the arrow keys left/right and activate with the Enter key. Select the desired item using the arrow keys and activate with Enter.	Click Index Click item.

File Management

The R&S SMF uses files to save all instrument data, i.e. system and user data. The user data includes saved instrument settings and lists for the user correction.

The files are stored on the flash card of the instrument. The /var directory can be used to save user-defined data; any subdirectory structure can be created on /var. Some default subdirectories are predefined, but can be changed at any time.


The /opt directory is a protected and therefore unaccessible system directory. The files on this directory contain data that must not be changed. Therefore, this directory should not be accessed, since reconstruction of the system partition will lead to data loss. To prevent inadvertent deletion or overwriting of system files, this directory is not specified in the file menus.

Files can be exchanged via a memory stick. The memory stick has to be connected to the USB interface and accessed via the **File** menu.

The files are accessed in a **File Select** window in the individual menus. Depending on the data type, a file can either be selected or it can be selected and saved:

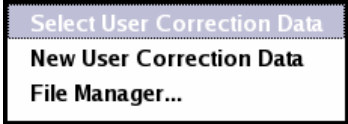
Instrument settings can be saved and loaded. In case of saving, the current setting is saved to the specified file.

Lists, e.g. user correction lists, can be loaded. They can be generated either externally or internally. For internal generation, a new list must be created in the **File Select** window which will then be edited in the list editor of the individual menu.

A rectangular button with a light gray background and a thin black border. The text "User Cor. Data..." is centered in a dark gray font.

The files are differentiated according to their extensions; each type of file is assigned a specific file content. The extension is usually of no consequence to the user since access to the files occurs in the individual menus where only the relevant type of file is available.

A button in the individual menu calls up the selection of the **Select/New** and **File Manager** functions.

A vertical menu with a light blue header bar containing the text "Select User Correction Data". Below the header are two items: "New User Correction Data" and "File Manager...", both in a dark gray font.

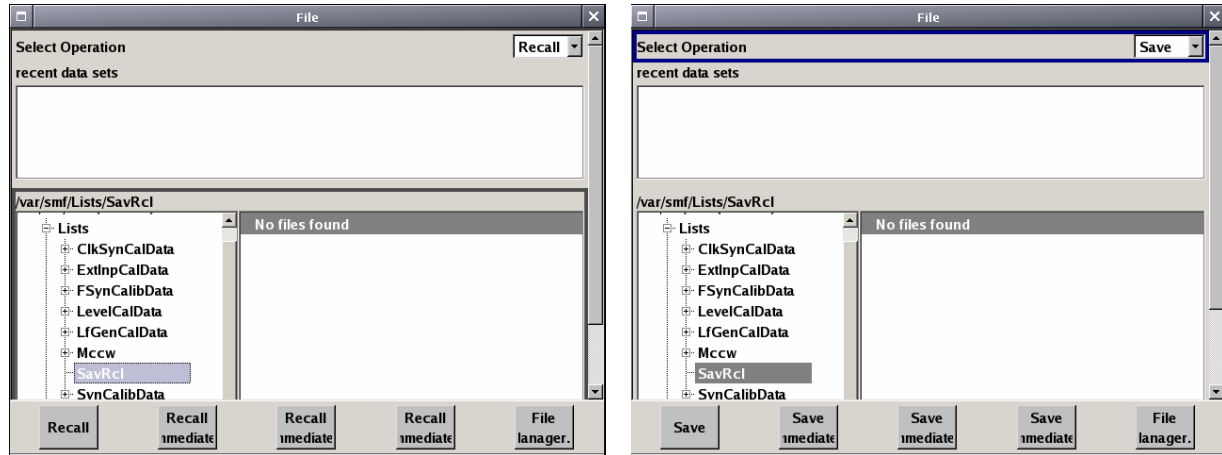
After the **Select/New** selection, a **File Select** window for loading, saving, or creating a file is displayed (see the following section "*File Select Menu*", page 3.27).

After the **File Manager** selection, a menu for managing all files is displayed (see section "*File Manager*", page 3.28).

The complete instrument settings are saved and loaded in the **File** menu which is called up by means of the **[File]** key (see chapter 4, section "*Storing and Loading Instrument Data – File Key*").

File Select Menu

The **File Select** menu consists of several areas.



In the upper area, **Recent Data Sets**, the files last used are listed; a maximum of ten files is displayed.

The available drives and directories are displayed on the left side, the files of the selected directory on the right side. The currently selected path is displayed above the windows. Only the relevant files without file extensions are displayed. If the area is opened several times, the path last selected is displayed.

When a file is saved or created, its name is user-selectable; the extension is assigned automatically and cannot be entered. The file is saved to the selected path.

Operation is similar to the operation of menus with several areas (see section "*Selecting and Exiting a Menu Area - Setting Parameters*", page 3.15): By using the rotary knob or cursor keys, the area is marked; the entry focus is shifted to this area by clicking the rotary knob or using the Enter key. The rotary knob and the up/down cursor keys will then navigate only within this area. By using the left/right cursor keys, it is possible to switch between the directory tree and the file list. The subdirectories of the selected directory will only be displayed after a short delay to allow quick navigation in the directory tree. Pressing the ESC key again shifts the entry focus up one level. The button for saving or loading the file can be selected and pressed. After the setting, e.g. after selecting the file, the menu will be closed automatically.

- ◆ **Load file:**
Mark file and load it by clicking the rotary knob or by pressing the **Select** button/softkey.
- ◆ **Save file:**
Enter file name in the **File Name:** field. Mark the directory to which the file is to be saved and then click the **Save** button/softkey.
- ◆ **Create file:**
Enter file name in the **File Name:** field. Mark the directory to which the file is to be saved and then click the **Create** button/softkey. The created file is empty; it must be filled with the necessary values in the individual editor.

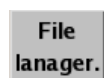
File Manager

The **File Manager** allows general file management such as copying, shifting, renaming, and deleting files as well as generating new directories.

The **File Manager** can be called up in any menu to which files can be saved. Call-up is either at the level of the small selection menu



or via the **File Manager** button in the **File Select** window.



The **File Manager** can also be called up in the **Save/Recall - Setup-Settings** menu.

In the upper area, **File Type**, the **File Manager** allows the type file selection to be displayed. This can be used to process either all files (all files (*.*) selection) or a specific selection of files (e.g. user correction (*.ucor) selection). The table at the end of this section contains a list of the file types.

The available drives and directories are displayed on the left side, the files of the selected directory on the right side. The currently selected path is displayed above the windows. If the area is opened several times, the path last selected is displayed. Unlike the **File Select** window, the **File Manager** displays the full file names including extensions.

The buttons trigger the associated actions such as copying, shifting, or deleting the marked files. Plus, a new directory can be created in the level below the marked directory.

Operation is similar to the operation of menus with several areas (see section "*Selecting and Exiting a Menu Area - Setting Parameters*", page 3.15). By using the rotary knob or cursor keys, the area is marked; the entry focus is shifted to this area by clicking the rotary knob or using the Enter key. The rotary knob and up/down cursor keys will then navigate only within this area. By using the left/right cursor keys, it is possible to switch between the directory tree and the file list. The subdirectories of the selected directory will only be displayed after a short delay to allow quick navigation in the directory tree. Pressing the **[ESC]** key again shifts the entry focus up one level. The buttons/softkeys can be selected and activated.

- ◆ **Shift file:**
Mark file and then press the **Cut** button/softkey. Mark the directory to which the file is to be shifted and then click the **Paste** button/softkey. If the target directory already contains a file with the same name, a confirmation query is displayed to confirm overwriting of this file.
- ◆ **Copy file:**
Mark file and then press the **Copy** button/softkey. Mark the directory to which the file is to be copied and then click the **Paste** button/softkey. If the target directory already contains a file with the same name, a confirmation query is displayed to confirm overwriting of this file.
- ◆ **Rename file:**
Mark file and then press the **Rename** button/softkey. An entry window for entering the new file name opens. Enter the name and press the Enter key. If a file with the same name already exists, a confirmation query is displayed to confirm overwriting of this file.
- ◆ **Delete file:**
Mark file and then press the **Delete** button/softkey. Prior to deletion, a confirmation query is displayed which the user must confirm for this file to be deleted.

- ◆ **Create new directory:**
Mark drive or directory level where the new directory is to be created and then press the **Create New Directory** button/softkey. An entry window for entering the directory name opens. Enter the name and press the Enter key.

Table 3-1 List of file extensions for user files the R&S SMF assigns automatically

List type	Contents	File suffix
Instrument State	Instrument settings	*.savrc1
User Correction	User-defined level correction values	*.uco

Remote Access

The R&S SMF can be remote-accessed from an external PC. This allows convenient operation of the Signal Generator from the desktop although the instrument is integrated in a rack somewhere else.

Remote access in contrast to **remote control** does not use remote-control commands but the regular user interface displayed using separate software which is installed on the external PC. The instrument can thus be manually operated from the PC as on the unit itself.

Preconditions for remote access are a connection between signal generator and PC via a LAN network and the installation of the VNC client software on the PC and on the R&S SMF.

Establishing the connection and installation of the remote-control software on the external PC is described in Chapter 1, section "*Connecting the R&S SMF to a Network (LAN)*".

After the connection is established, the current signal generator screen with the block diagram is displayed and the R&S SMF can be remote-accessed from the external PC. The individual functions are operated using the mouse and keyboard. Specific instrument functions can be executed using specific key combinations on the keyboard. Front-panel keys which are not directly available on the keyboard can be substituted by key combinations or by the front panel key emulation panel (see next section).




When the connection is set up, direct control on the R&S SMF is possible while manual remote-control is established, it can be performed alternately with the remote access.

For return to direct operation on the R&S SMF, the connection must be closed. After closing the connection, it is still enabled and can be established again any time (see Chapter 1, section "*Remote Access via an External Controller*")

Legend of Front-Panel Controls

The following table lists all key functions available on the front panel. Key combinations used on the PC keyboard to trigger key functions on the instrument front panel are also described. Keyboard labels are described in alphabetical order.

In addition, a front panel key emulation and an on-screen keyboard can be used for manual operation by mouse only (see below).

Front-panel key	Key of PC keyboard	Function
	Tab key (towards the right) Shift + Tab (towards the left)	Sets the cursor with the rotary knob.
	Enter	Pressing the rotary knob confirms an entry; it has the same function as the ENTER key.
	Arrow keys	Moves the cursor.
*1 / dB(m)	ALT + F12	Confirms entries in the base unit and values without a unit. Selects dBm for the RF level and dB for level offset and level step width.
. / *...#	. / *...#	Enters a period/decimal point. Enters a special character.
+/- / A↔a	- / (shift+) a—z	Enters the sign. Switches between upper-case and lower-case letters.
0-9 / a...z	CTRL+ 0-9 / a...z CTRL	Enters the number/letter.
BACKSPACE	Backspace	Clears the last entry (number, sign or decimal point).
CLOSE	CTRL + G	Closes an active menu.
DIAGRAM	CTRL+ D	Sets the cursor on the block diagram and hides all menus.
ENTER	Enter	Terminates an entry.
ESC	ESC	Selects the next higher menu/selection level. When the editing mode is exited with ESC, the previous value is restored.
FILE	CTRL + S (storage under Windows)	Activates the menu for storing instrument settings.
FREQ	CTRL+ F	Activates the frequency entry.
G/n / dB μ V	ALT + F9	Selects the unit Giga/Nano, dB μ V for the RF level and dBu for the LF level.
HELP	F1	Opens/closes context-sensitive help.
HIDE	CTRL+ H	Minimizes the active menu. Pressing the respective button in the Winbar opens the menu again.
INFO	CTRL + I	Opens/closes the info window.
k/m / μ V	ALT + F11	Selects the units Kilo/Milli and μ V for RF levels.
LEVEL	CTRL + L	Activates the level entry.
LOCAL	CTRL + Q	Switches the instrument from remote control to manual control.
M/ μ / μ V	ALT + F10	Selects the units Mega/Micro and μ V for RF levels.
MENU	CTRL + M	Calls the menu selection list.

Front-panel key	Key of PC keyboard	Function
MOD ON/OFF	CTRL + O	Switches modulation on/off. MOD OFF is indicated in the status line.
ON/OFF TOGGLE	CTRL + T	Switches a block or parameter on/off. Toggles between the different possibilities of setting a selection parameter.
PRESET	CTRL + P	Restores a defined basic instrument setup.
REARR	CTRL + A	Arranges open menus automatically.
RF ON/OFF	CTRL + R	Switches the RF output signal on/off. RF OFF is indicated in the status line.
SETUP	CTRL + E	Opens the setup menu for general instrument settings.
Softkey 1 – 8	CTRL + F1 – F8	Triggers the function assigned to the softkey.
WINBAR	CTRL + W	Displays the Winbar in the foreground/background.

Front Panel Key Emulation

The R&S SMF provides a front panel key emulation to enable execution of the front panel key functions by mouse e.g. for remote access. The emulation is called by a right mouse click. The front panel key functions are executed by a mouse click on the associated button.



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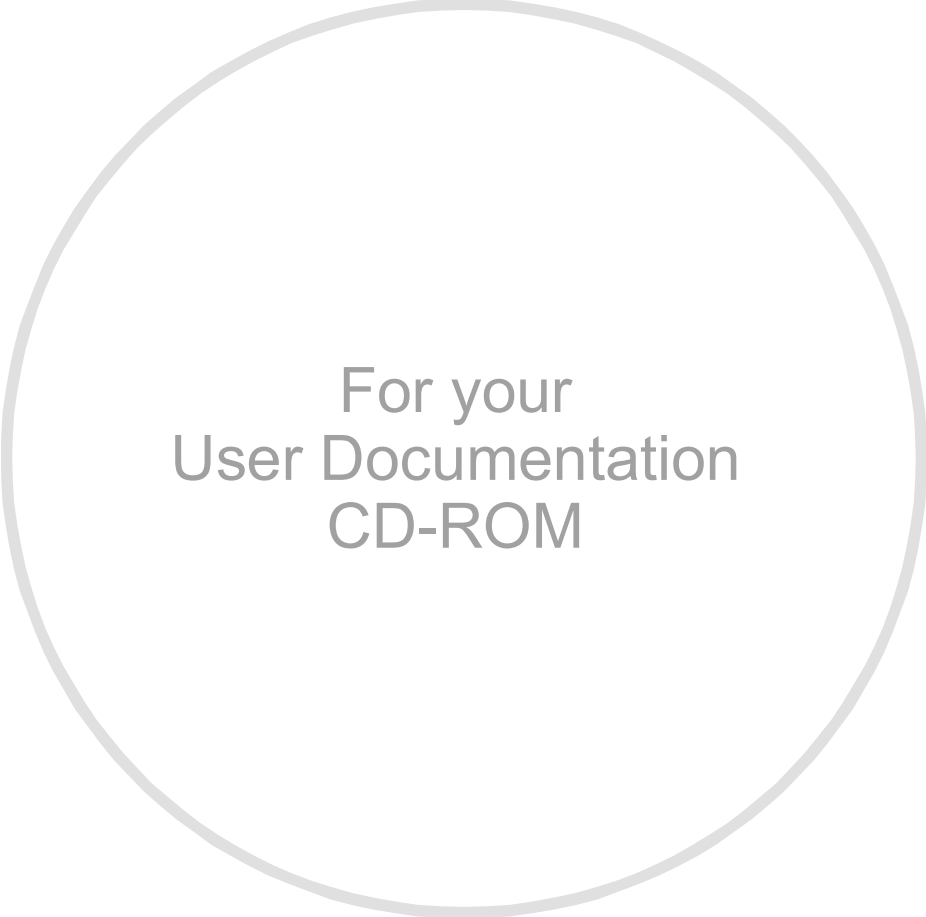
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