ROHDE&SCHWARZ FS300 Spectrum Analyzer 9kHz...3GHz
R&S Smart instruments
The new product family from Rohde & Schwarz

Operating Manual

Spectrum Analyzer R&S®FS300

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Content of the Manual

Introduction

This operating manual provides information about:

- Technical characteristics of the instrument
- Putting into operation
- Basic operating procedures and control elements
- Operation via menus and remote control

By way of an introduction, a typical R&S FS300 measurement is described.

The operating manual also contains information about maintenance and troubleshooting based on the warnings and error messages issued by the instrument.

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Data Sheet

NOTE For the R&S FS300 a calibration cycle of 1 year is recommended.

Frequency

Frequency range		9 kHz to 3 GHz
Reference frequency		
Aging		2•10^{-6}/year
Temperature drift	5 to 30° C	1•10^{-6}
Frequency counter		
Resolution		1 Hz, 10 Hz, 100 Hz, 1 kHz
Frequency span		1 kHz to 3 GHz, 0 Hz
Spectral purity		
SSB phase noise	10 kHz offset from carrier	< -90 dBc/(1 Hz)
Residual FM	1 kHz resolution bandwidth, 1 kHz video bandwidth	< 100 Hz, typ. 60 Hz
Sweep time		
SPAN ≥ 1 kHz		100 ms to 1000 s
SPAN = 0 Hz		100 µs to 20 s
Bandwidth		
Resolution bandwidths (-3 dB)	in 1, 2, 3, 5 steps	200 Hz to 1 MHz
Video bandwidths	in 1, 2, 3, 5 steps	10 Hz to 1 MHz, Off

Amplitude

Level measurement range		> 137 dB
Maximum input level		
50 MHz - 3 GHz		+33 dBm
10 MHz - 50 MHz		+26 dBm
9 kHz - 10 MHz		+20 dBm
Intermodulation-free range		
1 MHz to 100 MHz	two-tone-signal with 2 x -30 dBm at input, 0 dB RF-attenuation	≤ -60 dBc
100 MHz to 3 GHz		≤ -70 dBc
Harmonic distortion	-40 dBm, 0 dB RF-attenuation	≤ -60 dBc
Residual spurious	input terminated, 0 dB RF-attenuation	≤ -85 dBm
Other input related spurious	10 MHz to 3 GHz, -30 dBm level at 1st mixer	≤ -60 dBc
Displayed average noise level	300 Hz resolution bandwidth, 10 Hz video bandwidth, 0 dB RF-attenuation	≤ -110 dBm, typ. -120 dBm
1 dB compression point of 1st mixer	100 kHz to 3 GHz, 0 dB RF-attenuation	-10 dBm
Reference level range		-110 to +36 dBm
Input attenuation	in 2 dB steps, selected manually or automatically coupled to reference level	0 to 70 dB
Display range		80 dB, 40 dB, 16 dB, 8 dB, linear
Display units		
Logarithmic		dBm, dBmV, dBµV
Linear		V, W
Traces		1 active trace and 1 memory trace
Level uncertainty		< 1.5 dB

Markers		
Marker		marker and 1 delta marker
Marker functions		peak, next peak, marker to center, marker to reference
Marker displays		normal, delta, noise marker, frequency counter
Trigger		free-running, video, external, line

Inputs

RF Input		
Connector		type N female
Input impedance		50 Ω
VSWR	10 MHz to 3 GHz, RF-attenuation ≥ 20 dB	< 1.5
Max. input power	with 30 dB RF-attenuation	+33 dBm
Maximum permitted DC voltage		30 V
External trigger input		
Connector		BNC female
Trigger voltage		TTL-voltages
External reference input		
Connector		BNC female
Reference frequency		10 MHz ± 50 Hz
Input voltage		0.5 to 2 V into 50 Ω

Output

Reference output		
Connector		BNC female
Reference frequency		10 MHz
Output level		> 0.5 V into 50 Ω

Interfaces

USB Host		
Connector		type “A-Plug”
USB protocol		version 1.1
Command set	instrument specific command set, software driver for Windows (Windows 2000/XP™)	
USB Device		
Connector		type “B-Plug”
USB protocol		version 1.1

Power Supply

AC supply		100 to 240 V (AC), 50 to 60 Hz, autoranging
Power consumption		< 35 VA

General Data

Display		
Type		5.4” active color TFT-display
Resolution		320 x 240 pixel
Memory		
Trace storage		5
Setup storage		10
Environmental conditions		
Operating temperature range	meets DIN EN 60068-2-1/2	+5 to +45° C
Storage temperature range		-20 to +70° C
Climatic humidity	meets DIN EN 60068-2-78 (non condensing)	95 % at +40° C

Mechanical resistance		
Sinus	meets DIN EN 60068-2-6, DIN EN 61010-1 and MIL-T-28800D class 5	5 to 150 Hz, max. 2g at 55 Hz, 55 to 150 Hz, 0.5g const.
Random	meets DIN EN 60068-2-64	10 to 500 Hz, 1.9g
Shock	meets DIN EN 60068-2-27 and MIL STD 810	shock spectrum
Electromagnetic compatibility	meets EN 55011 class B and EN 61326 (EMC directive 89/336/EEC)	
Radiated susceptibility		< 10 V/m
Safety	DIN EN 61010-1/IEC61010-1 UL3111-1; CSA22.2 No:1010.1	
Dimensions (W x H x D)		219 mm x 147 mm x 350 mm (8.6 in x 5.8 in x 13.8 in)
Weight		approx. 7.4 kg

Before putting the product into operation for the first time, make sure to read the following

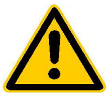
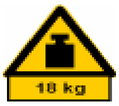
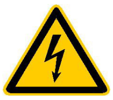
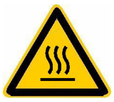
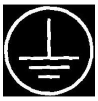
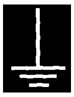
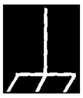
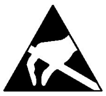
Safety Instructions

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer’s plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz 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 in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for an intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

							
Observe operating instructions	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

I ○	⏻	⎓	∼	≂	⧈
Supply voltage ON/OFF	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double/reinforced insulation

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

Tags and their meaning

DANGER	This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries.
WARNING	This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries.
CAUTION	This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries.
ATTENTION	This tag indicates the possibility of incorrect use that can cause damage to the product.
NOTE	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

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. It is therefore essential to make sure that the tags described here are always used only in connection with the associated documentation and the associated product. The use of tags in connection with unassociated products or unassociated documentation can result in misinterpretations and thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m. Unless specified otherwise in the data sheet, a tolerance of ±10% shall apply to the nominal voltage and of ±5% to the nominal frequency.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by

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

3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.
4. If products/components are mechanically and/or thermically processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
5. If handling the product yields 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.
6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.
7. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.
8. Prior to switching on the product, it must be ensured 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.
9. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
10. 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.

11. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
12. Never use the product if the power cable is damaged. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.
13. The product may be operated only from TN/TT supply networks fused with max. 16 A.
14. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.
15. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
16. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
17. Ensure that the connections with information technology equipment comply with IEC 950/EN 60950.
18. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.
19. 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 skilled electrician.
20. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.
21. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
22. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.
23. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.
24. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.

25. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
26. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
27. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.
28. Please be aware that in the event of a fire, toxic substances (gases, liquids etc.) that may be hazardous to your health may escape from the product.
29. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.
30. 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).
31. Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.
32. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.
33. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.

Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes informaciones de seguridad

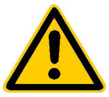
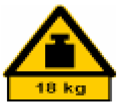
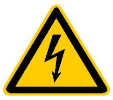
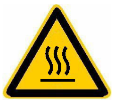
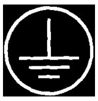
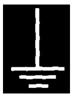
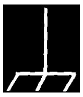
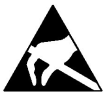
Informaciones de seguridad

Es el principio de Rohde & Schwarz de tener a sus productos siempre al día con los estandards de seguridad y de ofrecer a sus clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. Este producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estandards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, deberá el usuario atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. 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 solamente fue elaborado para ser utilizado en la indústria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del maluso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones del correspondiente manual del uso y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso de los productos hace necesarios conocimientos profundos y el conocimiento del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso de los productos a personas péritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

Símbolos y definiciones de seguridad

							
Ver manual de instruccion es del uso	Informaciones para maquinaria con uns peso de > 18kg	Peligro de golpe de corriente	¡Advertencia! Superficie caliente	Conexión a conductor protector	Conexión a tierra	Conexión a masa conductora	¡Cuidado! Elementos de construción con peligro de carga electroestática

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potencia EN MARCHA/PARADA	Indicación Stand-by	Corriente continua DC	Corriente alterna AC	Corriente continua/alterna DC/AC	El aparato está protegido en su totalidad por un aislamiento de doble refuerzo

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

Palabras de señal y su significado

PELIGRO	Indica un punto de peligro con gran potencial de riesgo para el ususario.Punto de peligro que puede llevar hasta la muerte o graves heridas.
ADVERTENCIA	Indica un punto de peligro con un protencial de riesgo mediano para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas .
ATENCIÓN	Indica un punto de peligro con un protencial de riesgo pequeño para el usuario. Punto de peligro que puede llevar hasta heridas leves o pequeñas
CUIDADO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.
INFORMACIÓN	Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo.

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

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue: como posición de funcionamiento se define principialmente la posición con el suelo de la caja para abajo , modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar.
   A menos que se especifique otra cosa en la hoja de datos, se aplicará una tolerancia de ±10% sobre el voltaje nominal y de ±5% sobre la frecuencia nominal.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Despues de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).
3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se producieran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averigurar los motivos de estas reacciones.

4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.
5. En el caso de que se produjeran agentes de peligro o combustibles en la aplicación del producto que debieran de ser transferidos a un tratamiento de materias residuales, como por ejemplo agentes refrigerantes que deben ser repuestos en periodos definidos, o aceites para motores, deberan ser tenidas en cuenta las prescripciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescripciones de seguridad especiales en la descripción del producto.
6. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar areas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.
7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.
8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del prodcuto.
9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.

11. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (medida del cable de distribución aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en construciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.
12. No utilice nunca el producto si está dañado el cable eléctrico. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
13. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A.
14. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
15. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
16. En las mediciones en circuitos de corriente con una tensión de entrada de Ueff > 30 V se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
17. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.
18. Nunca abra la tapa o parte de ella si el producto está en funcionamiento. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
19. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efecutadas por un electricista especializado.
20. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, deberá la toma de corriente estar protegida de manera que los productos o los usuarios estén suficientemente protegidos.
21. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego o heridas.
22. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.

23. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente o de daños en el producto lo cual también puede llevar al peligro de personas.
24. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.
25. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.
26. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.
27. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención celulas de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Baterías y acumuladores son deshechos problemáticos. Por favor tirenlos en los recipientes especiales para este fín. Por favor tengan en cuenta las prescripciones nacionales de cada país referente al tratamiento de deshechos. Nunca sometan las baterías o acumuladores a un corto circuito.
28. Tengan en consideración de que en caso de un incendio pueden escaparse gases tóxicos del producto, que pueden causar daños a la salud.
29. Por favor tengan en cuenta que en caso de un incendio pueden desprenderse del producto agentes venenosos (gases, líquidos etc.) que pueden generar daños a la salud.
30. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).
31. Las asas instaladas en los productos sirven solamente de ayuda para el manejo que solamente está previsto para personas. Por eso no está permitido utilizar las asas para la sujecion en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean tenidas en cuenta. En caso de que no se tengan en cuenta pueden causarse daños en personas y objetos.

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

33. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

Certified Quality System

DIN EN ISO 9001 : 2000
DIN EN 9100 : 2003
DIN EN ISO 14001 : 1996

DQS REG. NO 001954 QM/ST UM

QUALITÄTSZERTIFIKAT

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 Managementsystems entwickelt, gefertigt und geprüft.
Das Rohde & Schwarz Managementsystem ist zertifiziert nach:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:1996

CERTIFICATE OF QUALITY

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

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:1996

CERTIFICAT DE QUALITÉ

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 conformément aux normes:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:1996

ROHDE&SCHWARZ

ROHDE&SCHWARZ
EC Certificate of Conformity

Certificate No.: 2002-77

This is to certify that:

Equipment type	Stock No.	Designation
FS300	1147.0991.03	Spectrum Analyser

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 (73/23/EEC revised by 93/68/EEC)
- relating to electromagnetic compatibility (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

EN61010-1 : 2001-12
EN55011 : 1998 + A1 : 1999, Klasse B
EN61326 : 1997 + A1 : 1998 + A2 : 2001

For the assessment of electromagnetic compatibility, the limits of radio interference for Class B 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 2002

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München

Munich, 2003-08-28

Central Quality Management FS-QZ / Becker

Support Center Address

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 Rohde & Schwarz equipment always up-to-date, please subscribe to an electronic newsletter at

http://www.rohde-schwarz.com/www/response.nsf/newsletterpreselection

or request the desired information and upgrades via email from your Customer Support Center (addresses see below).

Feedback

We want to know if we are meeting your support needs. If you have any comments please email us and let us know

CustomerSupport.Feedback@rohde-schwarz.com

Customer support center

USA & Canada

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

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1 Introduction

This chapter

Chapter 1 describes the uses of the R&S FS300 and also provides information on the storage and transportation procedures that should be adopted for the instrument. Warranty conditions are also explained.

Further information

Chapter 2 contains an overview of the R&S FS300's control elements, indicators, etc.

Chapter 3 describes how to put the R&S FS300 into operation.

1.1 Applications for the R&S FS300

Uses

RF signals are used by telecommunication systems to transmit information. The transmitted power must remain with strictly specified frequency bands, otherwise interference with other services on adjacent channels would occur.

To ensure that the stringent requirements laid down for RF communication systems are met, it is essential to have measuring equipment that can precisely measure and analyze the modulated and unmodulated signals involved.

Performance features

The Spectrum Analyzer R&S FS300 has all the performance features required to perform precise level and frequency measurements.

The key features are:

- **High-Quality RF characteristics**
- **Resolution bandwidth from 200 Hz to 1 MHz**
- **Frequency counter with 1 Hz resolution**
- **Maximum input level +33 dBm**
- **Ergonomic user interface**

Operation from keypad

All functions and measurement parameters can be set via menus using a keypad and a rotary knob.

The current trace, along with the key parameters and status indicators needed to evaluate the results, can be read at a glance from the TFT colour screen.

Remote control via PC

The R&S FS300 is equipped as standard with a USB interface so that it can communicate with a PC. All functions and parameters can be set.

1.2 Supplied Accessories

Content

1 power cord Europe

1 country specific power cord (if different from Europe)

1 manual German/English

1 USB cable

1 CD (Content: operating manual German/English,
data sheet German/English
PC software R&S FS300-K1,
Acrobat Reader™)

1.3 Warranty

ATTENTION

Equipment returned or sent in for repair must be packed in the original packing or in packing with electrostatic and mechanical protection.

Warranty conditions

The General Terms and Conditions of Rohde & Schwarz shall apply.

Returning a defective R&S FS300

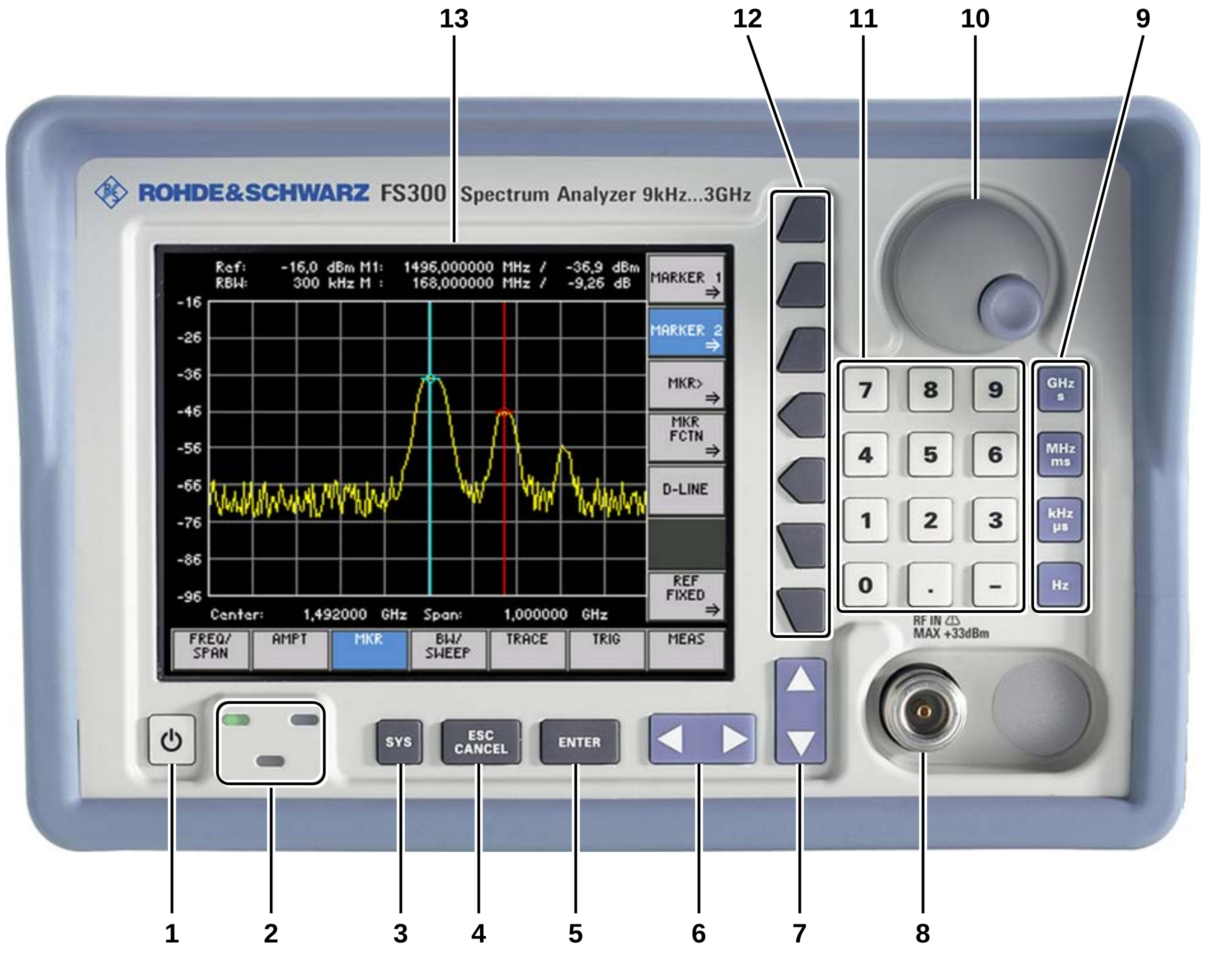
You will find the addresses of your nearest R&S representative and of the support center at the front of the manual.

Indicating claims under the warranty

We would also ask you to state clearly if you are making a claim for repairs under warranty, preferably by including your delivery note. Repair requests that do not explicitly refer to the warranty will, in the first instance, incur charges.
If your warranty has expired, we will, of course, repair your R&S FS300 in accordance with our general installation and service conditions.

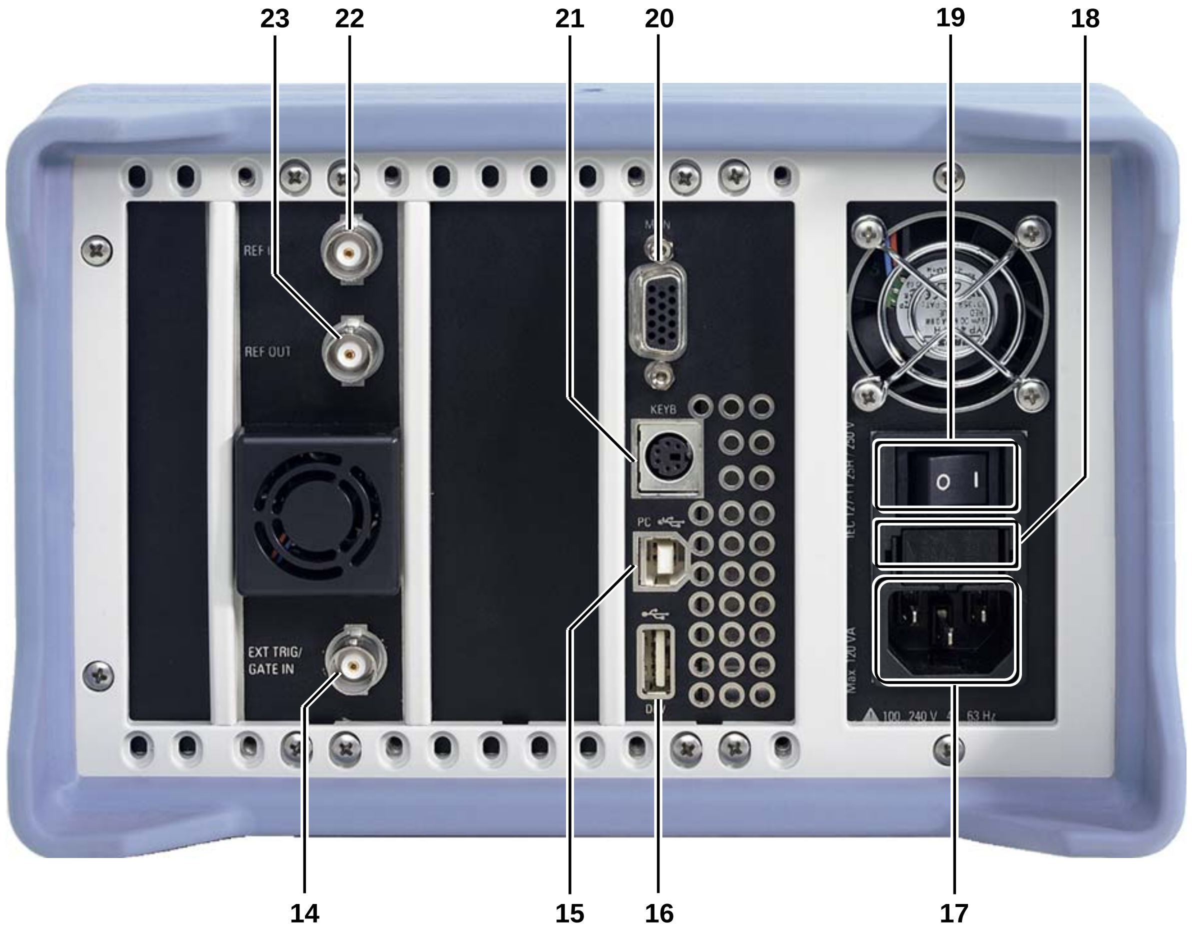
2 Control Elements

2.1 Front View


13
12
11
10
9
ROHDE&SCHWARZ FS300 Spectrum Analyzer 9kHz...3GHz
MARKER 1
MARKER 2
MKR>
MKR FCTN
D-LINE
REF FIXED
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS
GHz s
MHz ms
kHz µs
Hz
RF IN MAX +33dBm
SYS
ESC CANCEL
ENTER
1
2
3
4
5
6
7
8

1	ON/STANDBY switch
2	ON/STANDBY indicator
3	SYS key
4	ESC/CANCEL key
5	ENTER key
6	Cursor keys ◄ / ►
7	Cursor keys ▼ / ▲
8	RF IN, RF input connector
9	Unit keys
10	Rotary knob
11	Numerical keys
12	Function keys
13	Screen

2.2 Rear View


23
22
21
20
19
18
REF IN
REF OUT
EXT TRIG/
GATE IN
MON
KEYB
PC
DEV
Max. 120 VA
14
15
16
17

14	Input connector for external trigger or external gate signal
15	Connector for external USB host
16	Output connector for USB device (e. g. printer)
17	Power supply connector
18	AC line fuses
19	AC line switch
20	Connector for external monitor
21	Connector for external keyboard
22	Input for external reference (10 MHz)
23	Output of internal/external reference (10 MHz)

3 Putting the R&S FS300 into Operation

This chapter

Chapter 3 describes how to put the R&S FS300 into operation.

Further information

Chapter 2 contains an overview of the R&S FS300‘s control elements, indicators, etc.

Chapter 4, “Getting started”, takes you step-by-step through a number of simple measurements.

Chapter 8 is an in-depth description of the instrument’s interfaces.

ATTENTION

⚠

Before putting the R&S FS300 into operation, make the following checks:

- Ensure that the ventilation holes are free of obstructions.
- Ensure that there are no unsuitable signal voltages connected to the input.
- The R&S FS300’s outputs may not be overloaded and correct polarity must be ensured.

The instrument may be damaged if the above checks are not performed.

3.1 Unpacking the R&S FS300

Recommended procedure

When you unpack the R&S FS300, proceed as follows:

1. Remove the R&S FS300 from its packaging and check that the delivery is complete using the accessory list (↗ 1-39).
2. Carefully check the R&S FS300 for any damage.
3. If there is damage, immediately contact the carrier who delivered the instrument. Under these circumstances, it is essential to keep the box in which the R&S FS300 was transported and the packaging material.

3.2 Setting up the Instrument

CAUTION

⚠

There is a risk of injury from sharp edges and becoming wedged between the setting lever and the handle.

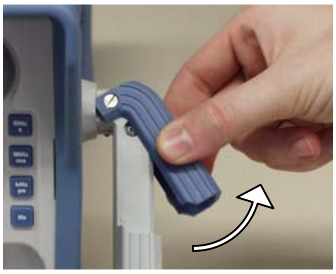
Always be careful not to injure your fingers when installing the instrument and adjusting its handles.

Setup instructions

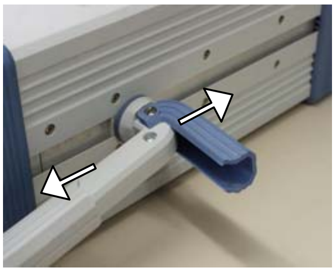
The R&S FS300 must be assembled on a firm, level surface only. The instrument has a carrying handle which is also used for various setup options. This handle can be moved into any position, depending on the particular field of application.

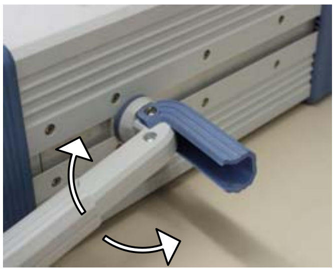
Setting the handle

1. Place the thumb and two fingers around the side-mounted setting lever and loosen it with a turning action.



2. Slide the handle lengthwise while twisting it radially in steps of about 12°.





3. Close the setting lever by pressing on the outer surface.

   ATTENTION: There is a risk of injury from sharp edges and becoming wedged between the setting lever and the handle.

4. Remove the protective film from the screen glass if necessary.

   CAUTION: Use no pointed or sharp objects.

3.3 Connecting the R&S FS300 to the AC Line

WARNING

⚠

Danger of electric shock!

The R&S FS300 meets the requirements for Safety Class I to DIN EN 61010-1/IEC 61010-1, e.g. all metal parts that can be touched or accessed without removing the enclosure are connected to the protective ground of the power supply network.

When connecting the instrument to the AC power supply, always use a power cable and a socket with earthing contact.

Automatic AC line voltage detection

When the R&S FS300 is connected to the AC line, it automatically sets itself to the correct voltage (range: AC voltage 100 V to 240 V, AC frequency 50 Hz to 60 Hz). There is no need to set the voltage manually or change the fuse.

Connecting the AC line

1. Use the supplied power cord to connect the R&S FS300 to the AC line.

   The power supply connector [17] is at the rear of the instrument.
2. Connect the power cord to the AC line.

3.4 Switching On the R&S FS300

NOTE

The AC line is still connected to the R&S FS300 when the instrument is in the standby mode.

AC line switch on the rear panel

The R&S FS300 is connected to the AC line via power supply connector [17]. AC line switch [19] which isolates the R&S FS300 from the AC line is located next to the power supply connector.

ON/STANDBY switch on the front panel

ON operating state
After switching on the R&S FS300 by means of the AC line switch [19] at the rear panel, it is in standby mode and the yellow LED [2] comes on. If you press the ON/STANDBY switch [1], the instrument is switched on and the green LED [2] comes on.

STANDBY operating state
To switch the R&S FS300 from the operating mode to standby mode, press the ON/STANDBY switch [1] for approx. 2 seconds. After switching off the ON/STANDBY switch [1] the yellow LED [2] comes on.

Switching on the R&S FS300

1. Press the AC line switch [19] on the rear panel in the I position.
2. Press the ON/STANDBY switch [1] on the front panel.

   The green ON LED [2] should come on.

3.5 Function Test

ATTENTION

The R&S FS300 does not contain any parts the operator can repair. Only properly qualified technicians are allowed to repair the instrument. When performing service procedures, follow the requirements of VDE 0701.

Function test

After the R&S FS300 has been switched on (↗ 3-44), the green LED ON [2] on the instrument’s front panel comes on. During booting, the "R&S Smart Instruments" symbol appears on a blue screen background [13]. Booting the R&S FS300 is completed when the measurement mask (↗ 5-53) and the trace appear. If the measurement trace does not appear on the screen, the sweep time (↗ 6-129) may have been too long.

In error case

If the measurement mask (↗ 5-53) does not appear and the red or the red or green LED flash alternately, switch the R&S FS300 off and on. In case the error continues, return the instrument to our service center for checking.
If the instrument shows an error message after booting, then follow the instructions in the chapter “Error messages” (↗ 9-243).

NOTE

If the measurement trace does not appear on the screen shortly after booting, the sweep time may have been too long. In this case, reset the R&S FS300 by means of PRESET (↗ 6-153). If the trace still fails to appear, an error occurred and our service center must check the instrument.

3.6 EMC

EMC requirements

The R&S FS300 meets the EMC Directive 89/336/EEC (applied standards EN 55011 Class B and EN 61326).

To prevent EMI, the R&S FS300 may only be operated with its enclosure closed. Only appropriately shielded signal and control cables may be used. External units, such as keyboard, printer or monitor, that are to be connected to the R&S FS300 must comply with EMC directives.

3.7 Connecting an External Keyboard

ATTENTION ⚠

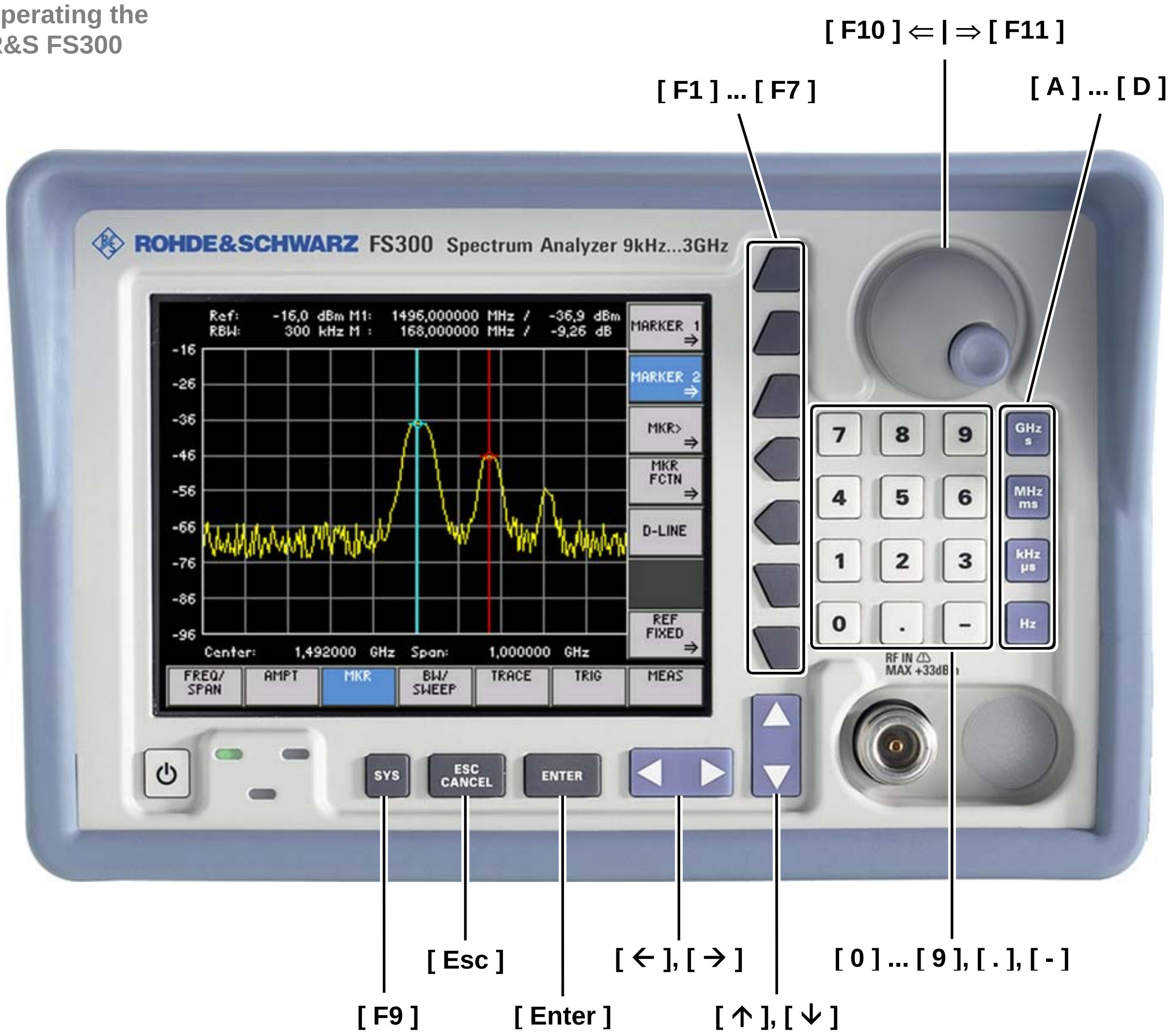
Only connect the keyboard when the R&S FS300 is off or in the STANDBY mode, otherwise malfunctions may occur at a later date.

Use

You can connect an external PC keyboard via the 6-pin PS/2 KEYBOARD connector [21] on the R&S FS300’s rear panel. The keyboard makes it easier to enter file names. The keyboard allows data entry as well as operation of the R&S FS300.

The keyboard is detected automatically when it is connected.

Key assignment for operating the R&S FS300


[F10] ⇐ | ⇒ [F11]
[F1] ... [F7]
[A] ... [D]
ROHDE&SCHWARZ FS300 Spectrum Analyzer 9kHz...3GHz
SYS
ESC CANCEL
ENTER
GHz s
MHz ms
kHz µs
Hz
RF IN MAX +33dBm
[Esc]
[←], [→]
[0] ... [9], [.], [-]
[F9]
[Enter]
[↑], [↓]

3.8 Connecting a USB Stick

ATTENTION

To ensure that the USB stick is detected by the R&S FS300, the stick must be formatted in the FAT32 file system.

Use

You can connect an external USB stick to the USB device interface [16] at the rear of the R&S FS300. The USB stick is an extension of the internal memory. You can use it to save or load instrument settings, to print into a file on the USB stick or to transfer trace data to a PC.

4 Getting Started

This chapter

Chapter 4 uses a number of simple measurements to illustrate how to operate the R&S FS300.

For the following example, the initial setting for instrument is the default setting (factory). This is set by pressing the PRESET key in the menu (↗ 6-153). The full default setup is described in chapter 6.

Further information

Chapter 5 contains an in-depth explanation of the basic operating steps, for example selecting menus and setting parameters. The layout of the screen and the information displayed on the screen are also described.

Chapter 6 describes all the R&S FS300's menus and the associated functions in detail.

4.1 Level and Frequency Measurements

4.1.1 Measurement Task

ATTENTION

⚠ The input stage of the R&S FS300 can be destroyed by overloads or DC components. If there is a possibility that the limits specified in the data sheet may be violated, the input must be protected with an attenuator and/or a DC block.

Measurement problem

Determining the level and frequency of a signal is one of the most common measurements a spectrum analyzer is used to make. Often, when making these measurements on an unknown signal, the PRESET settings (factory) are chosen as a suitable initial setup (↗ 6-153).

Solution

The center frequency (CENTER), the SPAN and the MARKER functions play a key role in level and frequency measurements.

4.1.2 Measurement Procedure

Introduction

In this example, a signal with a frequency of 200 MHz and a level of -30 dBm is applied to the RF input [8]. The center frequency and the span are set manually.

Measurement steps

Perform the following steps:

1. **Reset the R&S FS300.**
   - Press the SYS key.
   - Select PRESET in the bottom menu bar using the ◀ ▶ cursor keys.
   - Press the PRESET function key.
2. **Apply the signal.**
3. **Set the center frequency (CENTER) to 200 MHz.**
   - Select FREQ/ SPAN in the bottom menu bar using the ◀ ▶ cursor keys.
   - Press the CENTER function key.
   - Enter 2 0 0 using the numerical keys. Terminate the entry by pressing the unit key MHz ms.
4. **Reduce the SPAN to 1 MHz.**
   - Stay in the FREQ/ SPAN menu.
   - Press the SPAN function key.
   - Enter 1 from the numerical keys. Terminate the entry by pressing the unit key MHz ms.
5. **Measure the level and frequency with the marker.**
   - Select MKR in the bottom menu bar using the ◀ ▶ cursor keys.
   - Press the MARKER 1 ⇒ function key.
   - Press the PEAK function key in the submenu that appears. The marker jumps to the signal peak. Turn the rotary knob to change the position of the marker.
6. **Frequency measurements with the built-in frequency counter.**
   - Press the SIGNAL COUNT function key in the MARKER 1 ⇒ submenu. You can change the resolution of the frequency counter in the same submenu with the COUNT RESOL function key.

5 Manual Operating Concept

This chapter

Chapter 5 contains an overview of the R&S FS300's basic manual operating concept. This includes a description of the keypad, the screen layout, menu operation and how to set parameters. There is an overview of the menus and functions at the end of this chapter.

Further information

Chapter 4 contains a brief introduction that takes you step-by-step through some simple measurements.

Chapter 6 contains an in-depth description of the menu functions.

Chapter 7 contains note for remote control the R&S FS300 via a USB interface.

5.1 Making Entries from the Keypad

Introduction

The R&S FS300 is operated using menus in conjunction with a keypad and a rotary knob. The keypad comprises the following sections:

- Numerical keys [11]
- Unit keys [9]
- Cursor keys [6, 7]
- Function keys [12]
- Action keys [4, 5]
- SYS key [3]

5.1.1 Numerical Keys

Function

The numerical keys are used to enter numerical parameters.

0 ... 9

– Inserts one of the digits "0" to "9" at the cursor position.

.

– Inserts a decimal point "." at the cursor position.

–

– Inserts a minus sign "-" at the cursor position.

5.1.2 Unit Keys

Function

The unit keys are used to assign the appropriate unit to the number that has been entered, simultaneously terminating the entry.

GHz s

– Assigns **GHz** when a **frequency setting** is being made
– Assigns **s** when a **time setting** is being made

MHz ms

– Assigns **MHz** when a **frequency setting** is being made
– Assigns **ms** when a **time setting** is being made

kHz µs

– Assigns **kHz** when a **frequency setting** is being made
– Assigns **µs** when a **time setting** is being made

Hz

– Assigns **Hz** when a **frequency setting** is being made

NOTE

In the case of all other entries, the unit keys assume the same function as the Enter key. (↗ 5-52).

5.1.3 Rotary Knob

Function

As well as the numerical keys and the cursor keys, the rotary knob is also used to set parameters.

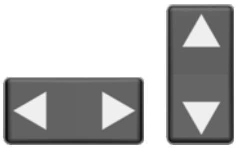
The rotary knob has several functions:

- **Incrementing** (turn clockwise) or **decrementing** (turn counter-clockwise) numerical instrument parameters using a specified step size.
- **Positioning** markers, limits, etc on the screen.

5.1.4 Cursor Keys

Function

As well as the numerical keys and the rotary knob, the cursor keys are also used for entering parameters and to navigate through the menus.



The cursor keys have the following functions:

- **Navigating** through menus and selection fields
- The ◂ or ▸ cursor keys **move** the cursor to the position you want within the numerical editing line.
- The ▾ or ▴ cursor keys **increment** or **decrement** numerical parameter entries.

5.1.5 Function Keys

Function

In the function area, various instrument functions are displayed depending on which menu has been selected.
The displayed instrument functions are assigned to the seven function keys down the right side of the screen. This means that each function key can have a variety of functions (↗ 5-55).

When a function key is pressed, various responses can be elicited:

- Immediate activation of a function or toggling between settings
- Entry of a value or selection of a setting/function
- Confirmation of a new setting and opening of a new menu item
- Branching to a submenu

5.1.6 Action Keys

Function

The action keys are for terminating menu-guided settings.

- This key is for **closing the entry field** or selection field after data has been entered. The **new value** is set on the R&S FS300.

  NOTE: Pressing a unit key will also terminate the entry of setting data.

- This key is for **closing the entry field** or selection field, but the data that has been entered is not saved - in other words the **old value** is retained.

5.1.7 SYS Key

Function

- When you press the SYS key [3], the measuring menu is blanked out and replaced by the SYS menu. Other functions are assigned to the function keys [12] and the measurement diagram is replaced by the system parameters (↗ 6-151).
- By repeatedly pressing the SYS key [3], you can quit the SYS menu and accept the new settings.

5.2 Screen Display

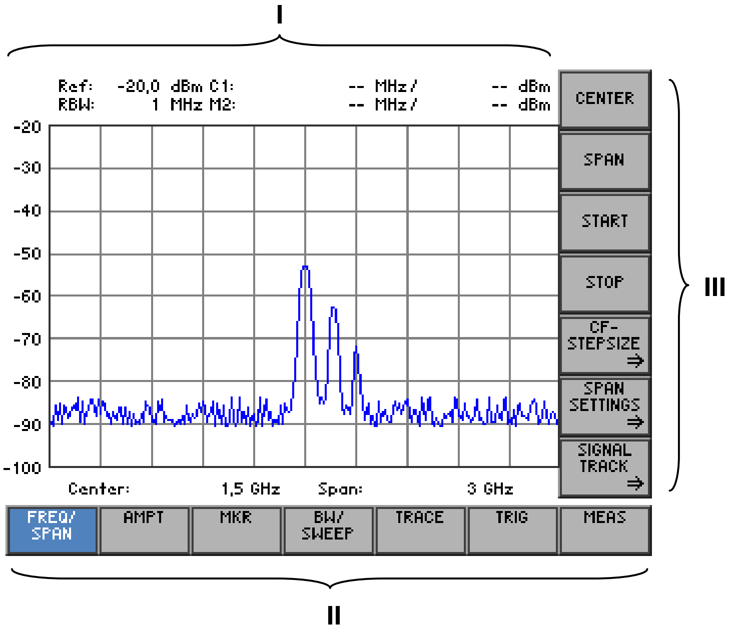
Introduction

The screen [13] provides on-going information about events and the parameters associated with the selected measurement functions.
The display mode for the measurement results, the lettering of the function keys and the type of menu all depend on the current settings.

Screen layout

The screen is divided into three areas:

I Diagram area
II Menu area
III Function area


I
-20
-30
-40
-50
-60
-70
-80
-90
-100
CENTER
SPAN
START
STOP
CF-STEPSIZE
SPAN SETTINGS
SIGNAL TRACK
III
FREQ/SPAN
AMPT
MKR
BW/SWEEP
TRACE
TRIG
MEAS
II

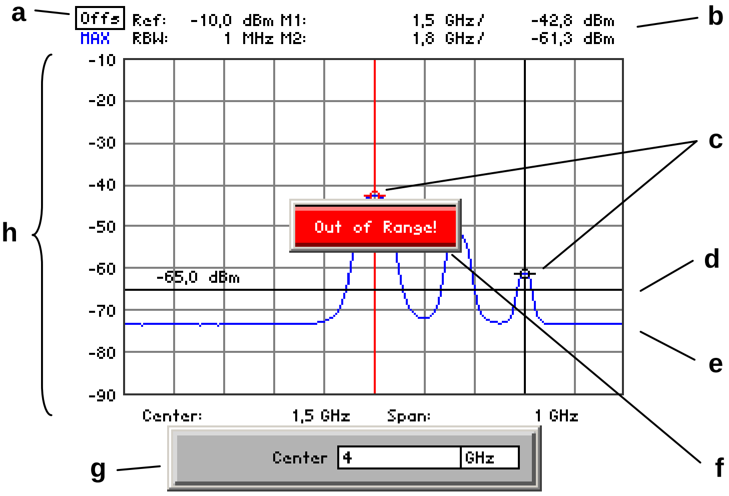
Ref: -20,0 dBm C1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

5.2.1 Diagram Area

Displays in the diagram area

The diagram area contains:

- Measurement diagrams and the associated scales (**h**) and traces (**e**)
- Measured value displays, e. g. display line (**d**) and markers (**c**)
- Parameter field (**b**) and status displays (**a**)
- Selection fields and entry fields that come up on the screen (**g**)
- Error messages that come up on the screen (**f**)


a
Offs
MAX
Ref: -10,0 dBm M1: 1,5 GHz/ -42,8 dBm
RBW: 1 MHz M2: 1,8 GHz/ -61,3 dBm
b
-10
-20
-30
-40
-50
-60
-70
-80
-90
h
c
Out of Range!
-65,0 dBm
d
e
Center: 1,5 GHz Span: 1 GHz
g
Center 4 GHz
f

Measurement diagram

A 10 x 8 grid is superimposed on the diagram area to make it easier to analyze traces.

Parameter field and status display

The following are displayed in the parameter field:

Ref: - upper diagram limit (reference level)
RBW: - current resolution bandwidth
M1: - marker 1 plus marker position and level
M2: - marker 2 plus marker position and level

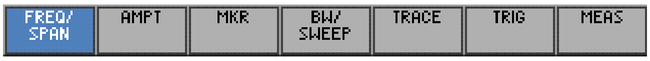
The status display provides the following information:

Offs - level offset is on
MAX - current trace display mode, e. g. max hold

5.2.2 Menu Area

Menu display

Menus for setting the measurement parameters and the measurement functions are displayed in the menu area. The selected menu is highlighted, e. g. FREQ/SPAN menu:

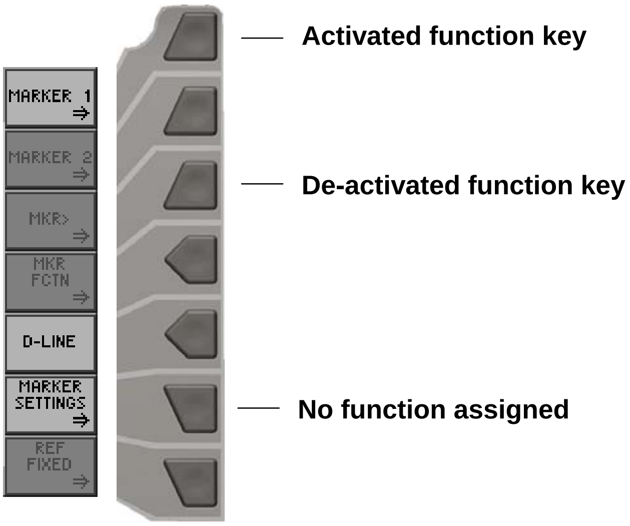

FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

5.2.3 Function Area

Displaying the current assignment for the function keys

When a menu is selected, the associated instrument functions are displayed in the function area.

The displayed instrument functions are assigned to the seven function keys down the right-hand side of the screen. If a key in the function area does not have any lettering, the key has not been assigned a function in the menu in question. If a key has lettering, but not in full brightness, the key has temporarily (current setting) not been assigned a function.


MARKER 1 ⇒
MARKER 2 ⇒
MKR> ⇒
MKR FCTN ⇒
D-LINE
MARKER SETTINGS ⇒
REF FIXED ⇒
Activated function key
De-activated function key
No function assigned

5.3 Calling and Changing Menus

Introduction

Operating the R&S FS300 is menu-guided. All the menus used to set the measurement parameters and measurement functions are displayed in the menu area. The instrument functions associated with any menu you select are displayed in the function area.

Pressing a function key has one of the following effects:

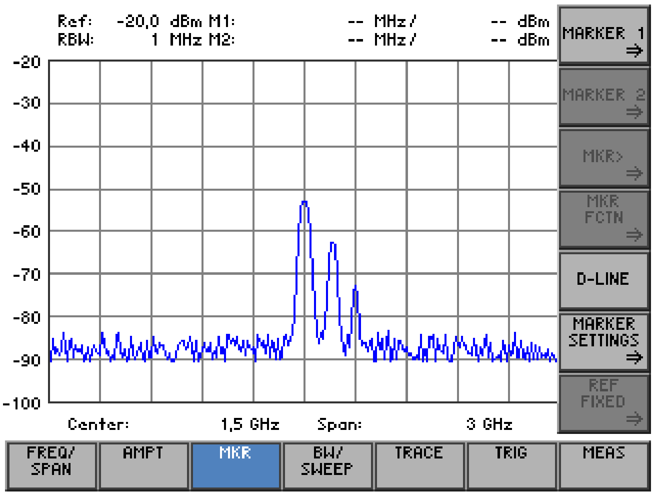
- Direct execution of an instrument function
- Opening of entry or selection windows
- Opening of submenus

The ◂ or ▸ cursor keys [6] are used for menu navigation.

Calling or changing menus

1. Select a **menu,** e. g. MKR, with the ◂ or ▸ [6] **cursor keys**.

   The menu name is highlighted and the appropriate function is assigned to the function keys [12].



Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
MARKER 1 ⇒
MARKER 2 ⇒
MKR> ⇒
MKR FCTN ⇒
D-LINE
MARKER SETTINGS ⇒
REF FIXED ⇒
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

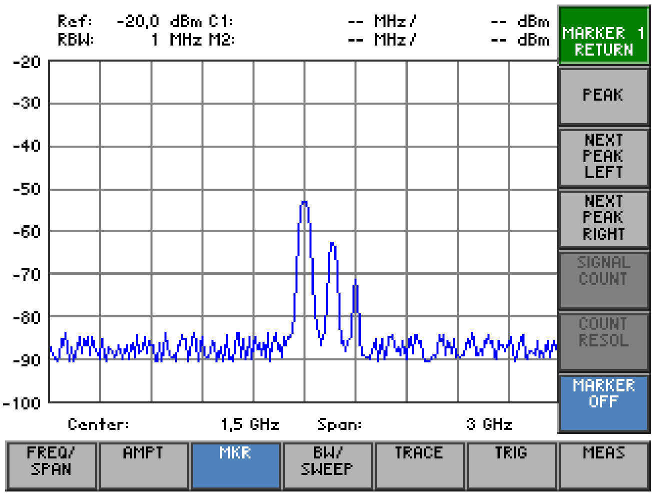
NOTE

A double arrow ⇒ pointing to a function key, e. g. MARKER 1 ⇒, tells you that pressing this key will call a submenu.

Calling/quitting submenus

2. Press the MARKER 1 ⇒ **function key** in the MKR **menu**.

   The MARKER 1 submenu opens and the new functions are assigned to the function keys [12].



Ref: -20,0 dBm C1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
MARKER 1 RETURN
PEAK
NEXT PEAK LEFT
NEXT PEAK RIGHT
SIGNAL COUNT
COUNT RESOL
MARKER OFF
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

3. Press the MARKER 1 RETURN **function key** in the MARKER 1 ⇒ **submenu**.

   The submenu is closed and the previous functions remain assigned to the function keys [12].

5.4 Setting Parameters

There is a choice of methods

Parameters can be set in a number of ways:

- Direct selection of an instrument function (function key)
- Selecting settings from selection fields
- Entering numerical parameters in entry fields

The numerical keys [11], the unit keys [9], the rotary knob [10], the cursor keys [6, 7] and the action keys [4, 5] can all be used to select and enter instrument parameters.

5.4.1 Direct Selection of Instrument Functions

Introduction

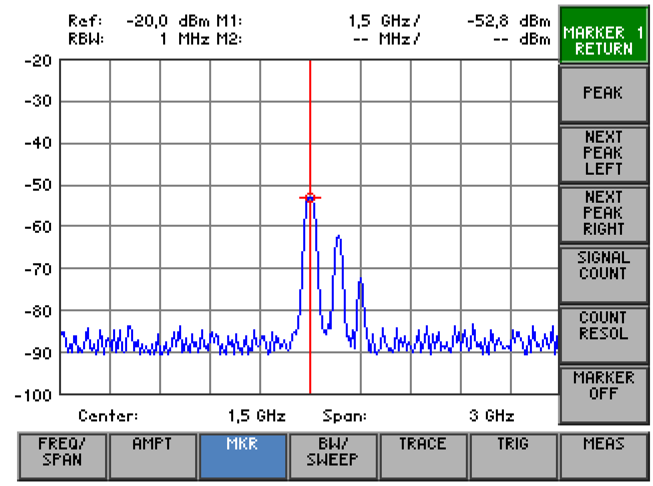
When you select a menu, various instrument functions are displayed in the function area. Some instrument functions can be set directly by pressing a function key.

The function key you select is highlighted.

e. g. :
Displaying marker 1
(↗ 6-99)

1. Press the PEAK **function key** in the MARKER 1 ⇒ **submenu.**

   Marker 1 is turned on and placed on the trace maximum. The M1 marker values are displayed in the parameter field.



Ref: -20,0 dBm M1: 1,5 GHz / -52,8 dBm
RBW: 1 MHz M2: -- MHz / -- dBm

Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
MARKER 1 RETURN
PEAK
NEXT PEAK LEFT
NEXT PEAK RIGHT
SIGNAL COUNT
COUNT RESOL
MARKER OFF
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

2. Press the MARKER OFF **function key** in the MARKER 1 ⇒ **submenu.**

   Marker 1 disappears from the diagram area and the M1 marker values are blanked out.

5.4.2 Selecting Settings

Introduction

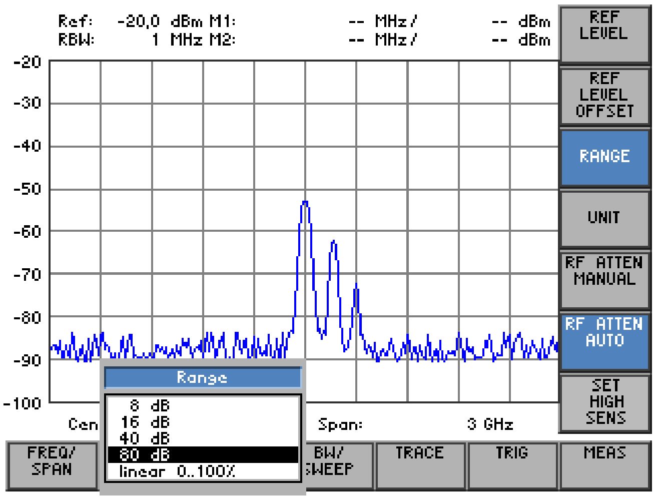
When you select a menu, a number of instrument functions are displayed in the function area. If certain function keys are then pressed, a selection field is displayed in the diagram area. You can then choose and activate any of the settings offered for selection.

The function key you select is highlighted.

e. g. :
Setting the level display range
(↗ 6-90)

1. Press the RANGE **function key** in the AMPT **menu.**

   A selection field containing the available settings is displayed. The default setting is “80 dB”.


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Cen
Span: 3 GHz
REF LEVEL
REF LEVEL OFFSET
RANGE
UNIT
RF ATTEN MANUAL
RF ATTEN AUTO
SET HIGH SENS
Range
8 dB
16 dB
40 dB
80 dB
linear 0..100%
FREQ/ SPAN
BW/ SWEEP
TRACE
TRIG
MEAS

2. Select a level display range with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is saved.

   If you want to keep the old setting, close the entry field with the **ESC/CANCEL key** [4].

NOTE

If there are more than five options, a scroll bar is displayed on the right next to the selection field. At any one time, only five options are displayed on the screen.

5.4.3 Entering Numerical Parameters

Introduction

When you select a menu, a number of instrument functions will be displayed in the function area. If you press certain function keys, an entry field will be displayed in the diagram area.
The function key you select is highlighted.

There are two ways of entering numerical parameters:

- **Entry** of a number with the **numerical keys**
- **Entry** of a number with the **cursor keys** and **rotary knob**

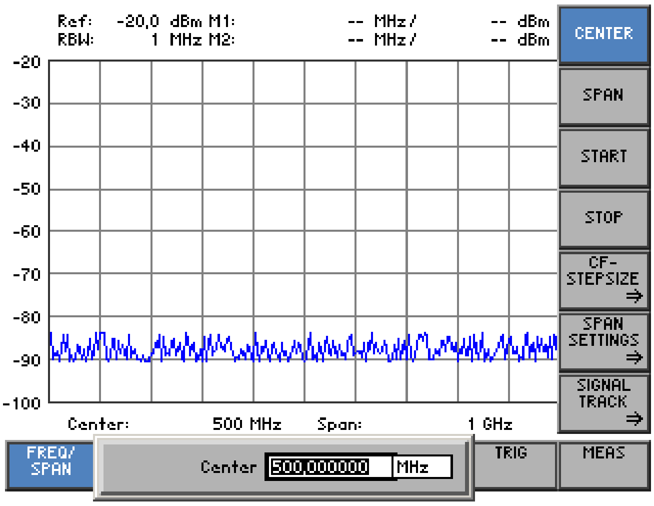
The entry with the cursor keys and rotary knob is useful if you only have a rough idea of what the measurement parameters should be. As the screen is continuously updated as the value is varied, a search is possible.

5.4.3.1 Entry with the Numerical Keys

e.g. :
Setting the center frequency
(↗ 6-77)

1. Press the CENTER **function key** in the FREQ/SPAN **menu**.

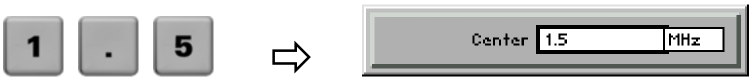
An entry field containing the current setting is displayed.



Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 500 MHz Span: 1 GHz
Center 500,000000 MHz

Entering a new value

2. Overwrite the old value, e.g. **1.5 GHz,** with the **numerical keys** [11].

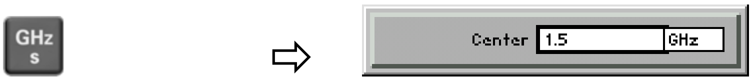


Center 1.5 MHz

NOTE: If a numerical key is pressed after the entry field is brought up on the screen, the old value will be erased. However, a complete new value must now be entered using the numerical keys.

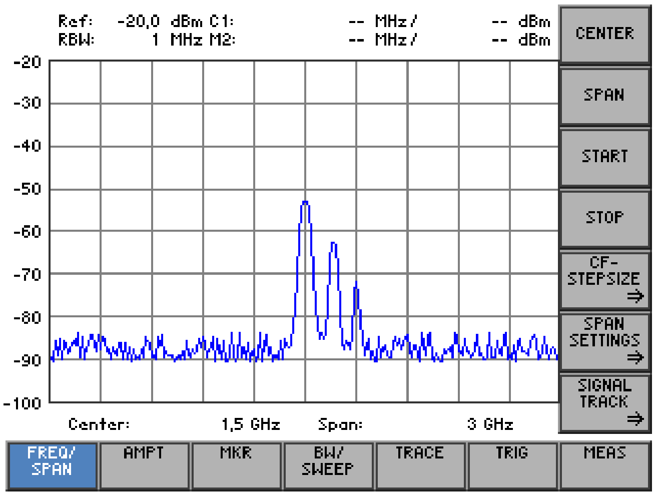
Terminating entries

3a. Press a **unit key** [9], e. g. **GHz,** to terminate the entry.



Center 1.5 GHz

The R&S FS300 sets the value that has been set numerically using the **new unit**. The entry window is closed.

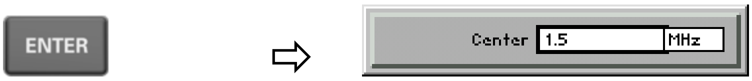


Ref: -20,0 dBm C1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm

Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
CENTER
SPAN
START
STOP
CF-STEPSIZE →
SPAN SETTINGS →
SIGNAL TRACK →
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

3b. Press the **ENTER key** [5] to terminate the entry.

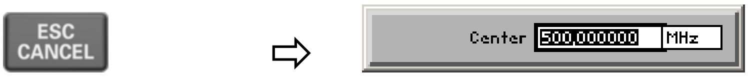


Center 1.5 MHz

The R&S FS300 sets the value that has been set numerically, but with the **old unit**. The entry window is closed.

NOTE: If a parameter is unitless or always has the same unit, you can terminate the entry with the ENTER key or one of the unit keys.

3c. Press the **ESC/CANCEL key** [4] to abort the entry.



Center 500,000000 MHz

The **old value** is retained. The entry window is closed.

Invalid parameter entry

If an invalid parameter is entered, the new value is rejected by the R&S FS300 and an error message is issued:

Out of Range!

- Acknowledge the error message with the **ENTER key** [5] and repeat the entry with the correct value.

NOTE

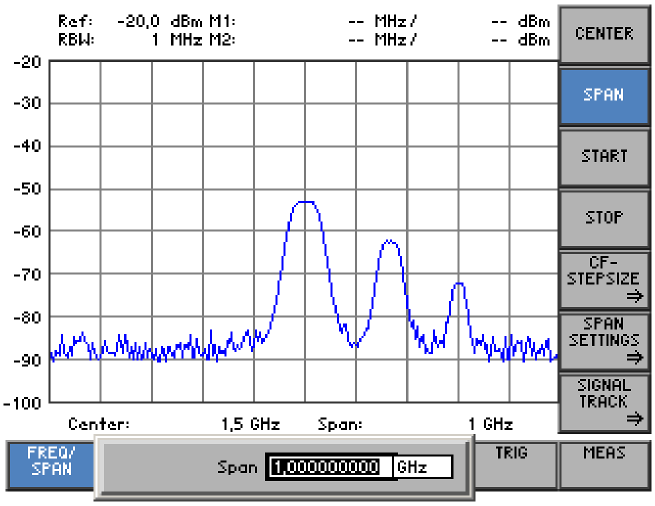
When numbers are displayed, only the digit sequences 1 to 999 appear before the decimal point. In other words, if the digit sequence <5000> and the unit <kHz> are entered, <5 MHz> appears in the display. Trailing zeros will be eliminated in the display area.

5.4.3.2 Entry using the Cursor Keys and the Rotary Knob

e. g. :
Setting the span
(↗ 6-77)

1. Press the SPAN **function key** in the FREQ/ SPAN **menu.**

An entry field containing the current setting is displayed.

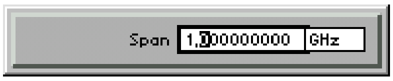

Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 1 GHz
CENTER
SPAN
START
STOP
CF-STEPSIZE
SPAN SETTINGS
SIGNAL TRACK
FREQ/ SPAN
TRIG
MEAS

Span 1,000000000 GHz

Entering a new value, e. g. 1.6

2. Using the **cursor keys** ◂ and ▸ [6], position the cursor on a decimal place in the entry field.

1 × ▶ ⇨

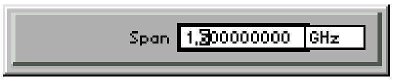


Span 1,000000000 GHz

3a. Press the ▾ or ▴ **cursor key** [7] until you obtain the value you want.

Pressing the ▴ cursor key once increments the value by one; pressing the ▾ cursor key once decrements the value by one.

6 × ▲ ⇨



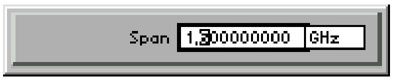
Span 1,600000000 GHz

3b. Turn the **rotary knob** [10] until you obtain the value you want.

Turning clockwise increases the value; turning counter-clockwise reduces the value.

6 ×

⇨



Span 1,600000000 GHz

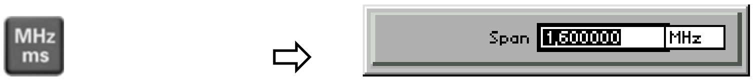
NOTE: In both cases, there are carries associated with incrementation or decrementation. In other words, if a 9 digit is incremented or a 0 digit decremented, a carry is added to or subtracted from next highest digit.

NOTE

When you enter the center frequency, you can specify the step width of the rotary knob. (↗ 6-79). In this case, the value is incremented or decremented in accordance with the specified step width, with the cursor always moving to the highest value, irrespective of its earlier position.

Terminating entries

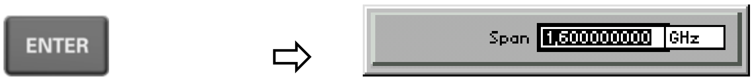
4a. Press a **unit key** [9], e. g. **MHz,** to terminate the entry.



Span 1,600000 MHz

The R&S FS300 sets the value that has been entered using the **new unit**. The entry window is closed.

4b. Press the **ENTER key** [5] to terminate the entry.

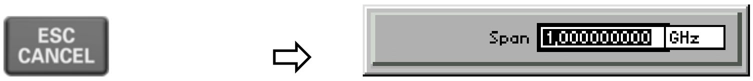


Span 1,600000000 GHz

The R&S FS300 sets the value that has been set numerically but with the **old unit**. The entry window is closed.

NOTE: If a parameter is unitless or always has the same unit, you can terminate the entry with the ENTER key or one of the unit keys.

4c. Press the **ESC/CANCEL key** [4] to abort the entry.



Span 1,000000000 GHz

The **old value** is retained. The entry window is closed.

Invalid parameter entry

If the limit value is reached, the numeric value in the entry window remains the same and is neither increased nor decreased. No error message is issued.

NOTE

When numbers are displayed, only the digit sequences 1 to 999 appear before the decimal point. In other words, if the digit sequence <5000> and the unit <kHz> are entered, <5 MHz> appears in the display. Trailing zeros will be eliminated in the display area.

5.5 Overview of all Menus and Functions

5.5.1 Spectrum Analyzer

5.5.1.1 FREQ/SPAN Menu

Function key assignment

CENTER	Entering the center frequency	(↗ 6-77)
SPAN	Entering the span	(↗ 6-77)
START	Entering the start frequency	(↗ 6-78)
STOP	Entering the stop frequency	(↗ 6-78)
CF-STEPSIZE ⇒	**Open submenu:** Entering the step width of the center frequency	

CF-STEPSIZE RETURN	Quitting the submenu	
MANUAL	Setting the step size manually	(↗ 6-80)
AUTO	Setting the step size automatically	(↗ 6-80)
=CENTER	Setting the step size to the center frequency	(↗ 6-80)
=MARKER	Setting the step size to the marker frequency	(↗ 6-80)

SPAN SETTINGS ⇒	**Open submenu:** Display modes for the frequency axis	

SPAN SETTINGS RETURN	Quitting the submenu	
FULL SPAN	Displaying the whole frequency range	(↗ 6-82)
ZERO SPAN	Switching over to the ZERO SPAN	(↗ 6-83)
LAST SPAN	Restoring the previous setting	(↗ 6-83)
ZOOM IN	Reducing the span	(↗ 6-84)
ZOOM OUT	Increasing the span	(↗ 6-84)
FULL SCREEN	Expanding the diagram area to fill the whole screen	(↗ 6-84)

SIGNAL TRACK ⇒	**Open submenu:** Signal tracking	

SIGNAL TRACK RETURN	Quitting the submenu	
TRACK ON	Activating signal tracking	(↗ 6-86)
TRACK OFF	De-activating signal tracking	(↗ 6-86)

5.5.1.2 AMPT Menu

Function key assignment

REF LEVEL	Entering the reference level	(↗ 6-88)
REF LEVEL OFFSET	Entering a level offset	(↗ 6-89)
RANGE	Selecting the level display range	(↗ 6-90)
UNIT	Selecting a unit for the level display	(↗ 6-91)
RF ATTEN MANUAL	Setting the RF input attenuation manually	(↗ 6-93)
RF ATTEN AUTO	Setting the RF input attenuation automatically	(↗ 6-94)
SET HIGH SENS	Selecting the setting High Sensitivity	(↗ 6-96)

5.5.1.3 MKR Menu

Function key assignment

MARKER 1 ⇒	**Open submenu:** Activate marker 1	

MARKER 1 RETURN	Quitting the submenu	
PEAK	Place marker 1 on the trace maximum	(↗ 6-99)
NEXT PEAK LEFT	Place marker 1 on the next trace maximum to the left	(↗ 6-99)
NEXT PEAK RIGHT	Place marker 1 on the next trace maximum to the right	(↗ 6-99)
SIGNAL COUNT	Measure the signal frequency: Start measurement	(↗ 6-101)
COUNT RESOL	Measure signal frequency: Set resolution	(↗ 6-101)
MARKER OFF	De-activate marker 1	(↗ 6-99)

MARKER 2 ⇒	**Open submenu:** Activate marker 2	

MARKER 2 RETURN	Quitting the submenu	
PEAK	Place marker 2 on the trace maximum	(↗ 6-103)
NEXT PEAK LEFT	Place marker 2 on the next trace maximum to the left	(↗ 6-103)
NEXT PEAK RIGHT	Place marker 2 on the next trace maximum to the right	(↗ 6-103)
MARKER NORM	Set marker 2 as a normal marker (NORM)	(↗ 6-104)
MARKER DELTA	Set marker 2 as a delta marker (DELTA)	(↗ 6-104)
MARKER OFF	De-activate marker 2	(↗ 6-103)

MKR> ⇒	**Open submenu:** Accepting marker values as settings	

MKR> RETURN	Quitting the submenu	
CENTER = MKR FREQ	Set the center frequency to the marker frequency	(↗ 6-106)
REF LVL = MKR LVL	Set the marker level as a reference level	(↗ 6-106)
MKR -> CF STEPSIZE	Set the step size for entering the center frequency to the marker frequency	(↗ 6-108)

MKR FCTN ⇒		**Open submenu:** Marker measurement functions	
	MKR FCTN RETURN	Quitting the submenu	
	NOISE MARKER	Measuring noise power density	(↗ 6-110)
	N dB DOWN	Measuring signal bandwidth	(↗ 6-111)
D-LINE		Bring display line up on screen	(↗ 6-113)
MARKER SETTINGS ⇒		**Open submenu:** Search criterion of functions NEXT PEAK LEFT/RIGHT	
	MARKER SETTINGS RETURN	Quitting the submenu	
	PEAK EXCURS	Entering the peak excursion	(↗ 6-115)
REF FIXED ⇒		**Open submenu:** Reference points for measuring level differences	
	REF FIXED RETURN	Quitting the submenu	
	REF FIXED ON	Activating the entry of arbitrary reference points	(↗ 6-118)
	REF FIXED OFF	Using M1 marker values as a reference point	(↗ 6-118)
	REF POINT LEVEL	Entering the reference-point level	(↗ 6-118)
	REF POINT FREQ	Entering the reference-point frequency	(↗ 6-118)
	REF POINT TIME	Entering the reference-point time	(↗ 6-118)

5.5.1.4 BW/SWEEP Menu

Function key assignment

RES BW MANUAL	Setting the resolution bandwidth manually	(↗ 6-122)
RES BW AUTO	Activating automatic resolution bandwidth setting	(↗ 6-122)
VIDEO BW MANUAL	Setting the video bandwidth manually	(↗ 6-123)
VIDEO BW AUTO	Activating automatic video bandwidth setting	(↗ 6-123)
COUPL RATIO ⇒	**Open submenu:** Setting the RBW/VBW coupling ratio	

COUPL RATIO RETURN	Quitting the submenu	
RBW/VBW MANUAL	Setting the coupling ratio RBW/VBW manually	(↗ 6-125)
RBW/VBW AUTO	Activating the default setting for the coupling ratio RBW/VBW	(↗ 6-125)
RBW/SPAN LOW NOISE	Switching over the coupling RBW/SPAN to low noise	(↗ 6-126)

SWEEP ⇒	**Open submenu:** Setting the sweep time	

SWEEP RETURN	Quitting the submenu	
CONT SWEEP	Starting a continuous frequency sweep	(↗ 6-128)
SINGLE SWEEP	Performing an n-times sweep	(↗ 6-128)
NO. OF SWEEPS	Setting the number of sweeps	(↗ 6-128)
REPEAT SGL SWEEP	Repeating n-times sweeps	(↗ 6-129)
SWEEP TIME MANUAL	Setting the sweep time manually	(↗ 6-129)
SWEEP TIME AUTO	Activating automatic sweep-time setting	(↗ 6-129)

5.5.1.5 TRACE Menu

Function key assignment

SELECT TRACE ⇒		**Open submenu:** Selecting the active trace	
	SELECT TRACE RETURN	Quitting the submenu	
	TRACE 1	Turning on and activating Trace 1	(↗ 6-132)
	TRACE 2	Turning on and activating Trace 2	(↗ 6-132)
CLEAR/ WRITE		Trace display mode: Overwrite mode	(↗ 6-134)
HOLD		Trace display mode: Min./Max. hold	(↗ 6-134)
TRACE AVERAGE		Trace display mode: Averaging	(↗ 6-134)
VIEW		Freezing the trace	(↗ 6-134)
BLANK		Blanking out the trace	(↗ 6-134)
MATH ⇒		**Open submenu:** Trace difference	
	MATH RETURN	Quitting the submenu	
	T1-T2=T1	Turning on the trace-difference mode	(↗ 6-138)
	TRACE POS	Repositioning Trace 1 (result)	(↗ 6-138)
	TRACE MATH OFF	Turning off the trace-difference mode	(↗ 6-138)

5.5.1.6 TRIG Menu

Function key assignment

FREE RUN
EXTERNAL →

Free-running measurements (↗ 6-141)

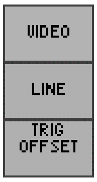
Open submenu:
Triggering by an external TTL signal

EXTERNAL RETURN
RISING EDGE
FALLING EDGE

Quitting the submenu

Triggering on positive-going edge (↗ 6-144)

Triggering on negative-going edge (↗ 6-144)


VIDEO
LINE
TRIG OFFSET

Triggering by the display level (↗ 6-141)

Triggering by the AC-line frequency (↗ 6-141)

Entering a trigger offset (↗ 6-144)

5.5.1.7 MEAS Menu

Function key assignment

TIME DO-MAIN PWR ⇒		**Open submenu:** Measure the power in the time domain (ZERO SPAN)	
	TIME DO-MAIN PWR RETURN	Quitting the submenu	
	PEAK	Output the peak value within the section	(↗ 6-147)
	MEAN	Output the mean value within the section	(↗ 6-147)
	START LIMIT	Insert a vertical line to limit the lower (left) part of a section	(↗ 6-147)
	STOP LIMIT	Insert a vertical line to limit the upper (right) part of a section	(↗ 6-147)
	OFF	Switch off the power measurement	(↗ 6-147)
TOI		Measure the third-order intercept point	(↗ 6-150)

5.5.2 SYSTEM Functions

5.5.2.1 PRESET Menu

Function key assignment

PRESET	Calls an instrument default setting	(↗ 6-154)
PRESET SETTINGS	Selects an instrument default setting	(↗ 6-154)

5.5.2.2 STATUS Menu

Function key assignment

ANALYZER	Displaying the current instrument setting	(↗ 6-155)

5.5.2.3 FILE Menu

Function key assignment

SAVE	Saves a user-defined setting/waveform	(↗ 6-157, 6-159)
RECALL	Loads a user-defined setting/waveform	(↗ 6-157, 6-159)
PRINT	Prints out a screenshot	(↗ 6-157)

5.5.2.4 CONFIG Menu

Function key assignment

DATE/TIME	Sets the date and time	(↗ 6-166)
REF	Selects an internal or external reference source	(↗ 6-168)
INTERFACE	Configures the instrument interfaces	(↗ 6-169)
SCREEN SAVER	Sets the screen saver mode	(↗ 6-171)
MONITOR	Selects an internal or external monitor	(↗ 6-173)

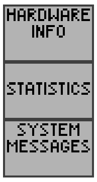
5.5.2.5 SERVICE Menu

Function key assignment

SELFTEST	Performs a selftest	(↗ 6-174)

5.5.2.6 INFO Menu

Function key assignment



HARDWARE INFO	Displays module data	(↗ 6-176)
STATISTICS	Displays instrument statistics	(↗ 6-176)
SYSTEM MESSAGES	Displays system messages	(↗ 6-177)

6 Using the R&S FS300

This chapter

All the spectrum analyzer functions and their uses are fully described in chapter 6. The order in which the menus are described follows that of the procedures for configuring and starting measurements:

- R&S FS300 default settings
- Setting measurement parameters
- Selecting and configuring measurement functions

Further information

The operating concept is explained in chapter 5, which also contains an overview of the menus and functions.

The index at the end of this manual will also help you find the information you want.

6.1 R&S FS300 Factory Settings

Switching on for the first time

When you switch on the R&S FS300 (↗ 3-44), the settings you were using when the instrument was last switched off are restored.

When you switch on for the first time, the factory default settings are activated:

	Parameter	**Setting**
Frequency axis	Center frequency (CENTER)	1.5 GHz
	Frequency span (SPAN)	3 GHz
	Step size for center frequency	150 MHz
Level axis	Reference level (REF LEVEL)	-20 dBm
	Level offset (REF LEVEL OFFSET)	0 dB
	Level range (RANGE)	80 dB
	Level unit (UNIT)	dBm
RF input	Input attenuation (RF ATTEN)	AUTO (NORMAL)
Bandwidth	Sweep time (SWEEP TIME)	AUTO
	Resolution bandwidth (RES BW)	AUTO (1 MHz)
	Video bandwidth (VIDEO BW)	AUTO (1 MHz)
Frequency sweep	Sweep	CONT SWEEP
Trace	Trace	CLEAR/WRITE
Trigger	Trigger	FREE RUN
Markers	Marker 1 and marker 2	OFF

NOTE

The factory default setting is stored in non-volatile memory in the R&S FS300 and can be reloaded at any time (↗ 6-153).

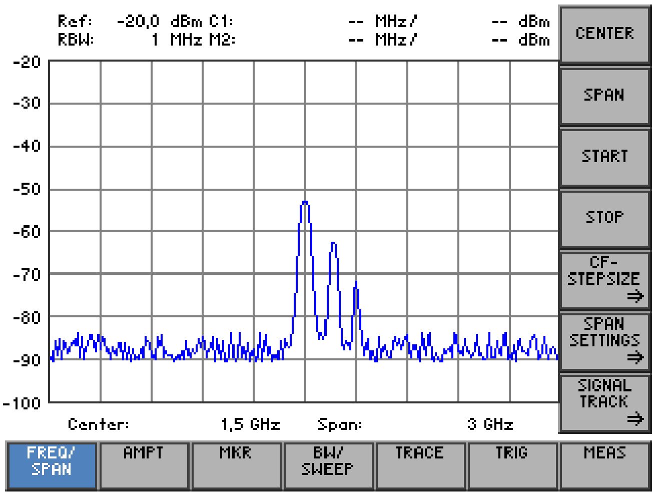
6.2 Spectrum Analyzer

Introduction

The R&S FS300 measures signal spectra over the selected frequency range using the selected resolution bandwidth and sweep. The time characteristic of the amplitude at the set frequency is displayed in zero span.

User interface

When the R&S FS300 is switched on and the selftest passed, the spectrum analyzer's user interface is activated. The following is displayed on the screen [13]:



Ref: -20,0 dBm C1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
CENTER
SPAN
START
STOP
CF-STEPSIZE →
SPAN SETTINGS →
SIGNAL TRACK →
FREQ/SPAN
AMPT
MKR
BW/SWEEP
TRACE
TRIG
MEAS

Menus for configuring and starting measurements

The menus used to set the spectrum analyzer are displayed in the menu area. The order of the menus mirrors that of the procedure for configuring and starting measurements:

FREQ/ SPAN	Selecting the frequency span (setting the x axis in the diagram area)	(↗ 6-76)
AMPT	Setting the level axis and the RF input (setting the y axis in the diagram area)	(↗ 6-87)
MKR	Signal analysis with marker functions	(↗ 6-96)
BW/ SWEEP	Setting the bandwidths and the sweep time	(↗ 6-121)
TRACE	Displaying the trace	(↗ 6-130)
TRIG	Triggering the measurement	(↗ 6-140)
MEAS	Measurement functions	(↗ 6-145)

6.2.1 Selecting the Frequency Span (FREQ/SPAN Menu)

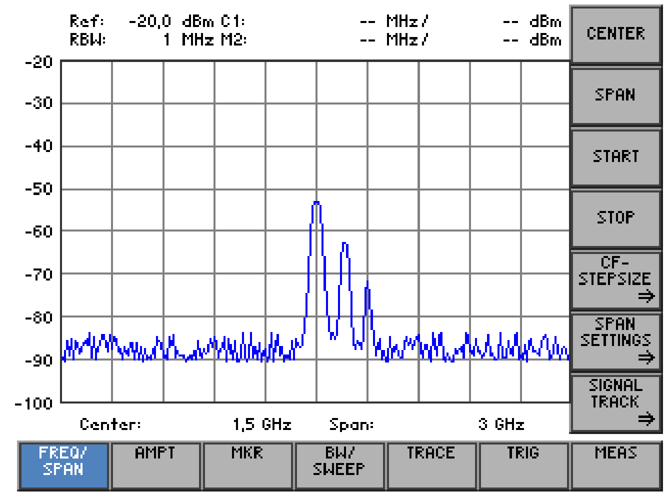
What the settings are for

Use the FREQ/SPAN menu to specify the frequency range.

Selecting the FREQ/SPAN menu

- Select the FREQ/ SPAN **menu** using the ◀ or ▶ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys.


Ref: -20,0 dBm C1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 3 GHz
CENTER
SPAN
START
STOP
CF-STEPSIZE →
SPAN SETTINGS →
SIGNAL TRACK →
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

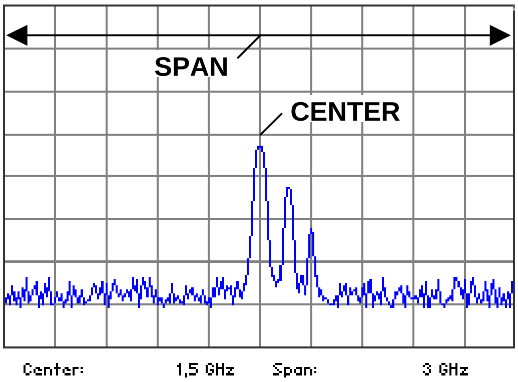
Function key assignment

CENTER, SPAN	**1st variant:** Setting the frequency range Enter the center frequency (CENTER) and the SPAN	(↗ 6-77)
START, STOP	**2nd variant:** Setting the frequency range Enter the START and STOP frequencies	(↗ 6-78)
CF-STEPSIZE →	**Open submenu:** Entering the step width of the center frequency	(↗ 6-79)
SPAN SETTINGS →	**Open submenu:** Frequency axis display modes	(↗ 6-81)
SIGNAL TRACK →	**Open submenu:** Signal tracking	(↗ 6-85)

6.2.1.1 Entering the Center Frequency and the Span

Use

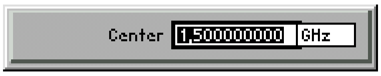
If you know the frequency of the signal you want to measure, you can set the x axis of the diagram area accordingly. Enter the signal frequency as the center frequency (CENTER) and specify a SPAN.



Entering the center frequency

1. Press the CENTER **function key** in the FREQ/SPAN **menu.**

   An entry field containing the current setting is displayed:



Center 1,500000000 GHz

2. Enter the new value (↗ 5-60).

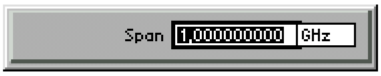
   The entry range for the center frequency is:

   500 Hz ≤ Center ≤ 2.9999995 GHz

Setting the span

3. Press the SPAN **function key** in the FREQ/SPAN **menu.**

   An entry field containing the current setting is displayed:



Span 1,000000000 GHz

4. Enter the new value (↗ 5-60).

   The span entry range is:

   1 kHz ≤ Span ≤ 3 GHz

   The new setting is saved and displayed in the diagram area. The grid lines associated with the frequency axis represent 1/10 of the current span.

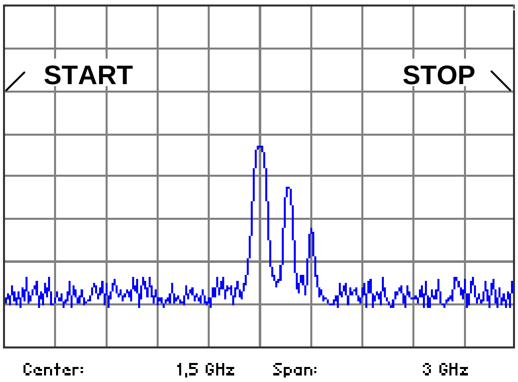
NOTE

The effect of pressing the CENTER or SPAN function key is to switch the frequency axis lettering in the diagram area to the display showing the current center frequency and the span.

6.2.1.2 Entering the Start Frequency and the Stop Frequency

Use

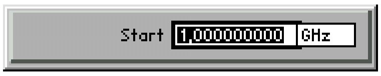
If you want to analyze a specific frequency range, you can enter a start frequency and a stop frequency. The frequency range is shown along the x axis of the diagram area.



Entering a start frequency

1. Press the START **function key** in the FREQ/ SPAN. **menu.**

   An entry field containing the current setting is displayed:



Start 1,000000000 GHz

2. Enter the new value (↗ 5-60).

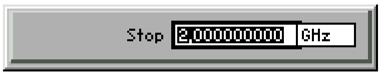
   The entry range for the start frequency is:

   0 ≤ Start ≤ 2.999999 GHz

Entering a stop frequency

3. Press the STOP **function key** in the FREQ/ SPAN **menu.**

   An entry field containing the current setting is displayed:



Stop 2,000000000 GHz

4. Enter the new value (↗ 5-60).

   The entry range for the stop frequency is:

   1 kHz ≤ Stop ≤ 3 GHz

   The new setting is saved and displayed in the diagram area. The grid lines associated with the frequency axis represent 1/10 of the current span.

NOTE

The effect of pressing the START or the STOP function key is to switch the lettering of the frequency axis in the diagram area to the display showing the current start and stop frequencies.

6.2.1.3 Entering the Step Width of the Center Frequency

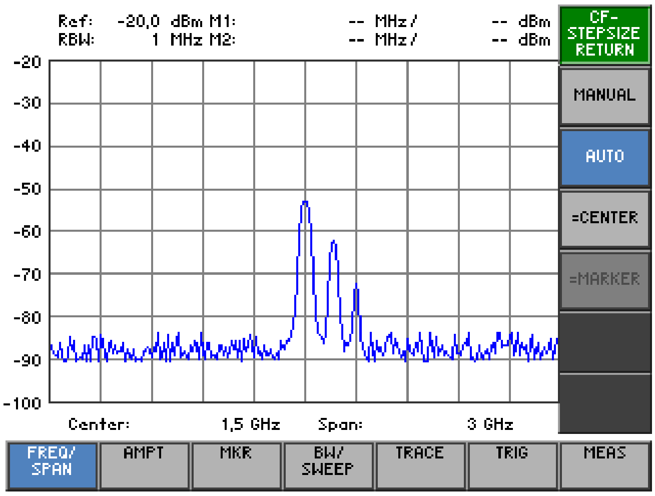
What the settings are for

Using the CF STEP SIZE submenu, you can set any step size of the rotary knob you want or have the R&S FS300 set a step size that is a function of the measurement parameters.

Selecting the CF STEP SIZE submenu

- Press the CF-STEPSIZE → **function key** in the FREQ/SPAN **menu**.

  The submenu opens and the appropriate functions are assigned to the function keys.


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
CF-STEPSIZE RETURN
MANUAL
AUTO
=CENTER
=MARKER
FREQ/SPAN
AMPT
MKR
BW/SWEEP
TRACE
TRIG
MEAS

Function key assignment

CF-STEPSIZE RETURN	Quitting the submenu	
MANUAL	Setting the step size manually	(↗ 6-80)
AUTO	Setting the step size automatically	(↗ 6-80)
=CENTER	Setting the step size to the center frequency	(↗ 6-80)
=MARKER	Setting the step size to the marker frequency	(↗ 6-80)

NOTE

The MANUAL and AUTO function keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted.
The AUTO function is the default setting.

The =MARKER function key is available only when marker 1 is turned on.

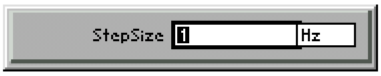
6.2.1.3.1 Setting the Step Size

Setting the step size manually

If you want to examine the frequency spectrum at certain intervals, you can enter the value of your choice for the step size of the rotary knob.

1. Press the MANUAL **function key** in the CF-STEPSIZE ⇒ **submenu.**

   An entry field containing the current setting is displayed:



StepSize 1 Hz

2. Enter the new value (↗ 5-60).

   The entry range for the step size is:

1 Hz ≤ Step Size ≤ 2.999999 GHz

Setting the step size automatically

If you want to change the center frequency using steps that are small compared with the span, select the automatic setting mode.

- Press the AUTO **function key** in the CF-STEPSIZE ⇒ **submenu.**

  The step size is set to a tenth of the current span.

Setting the step size to the center frequency

If you make the step size equal to the center frequency (or an integer multiple of the center frequency), it is easy to find harmonics which are multiples of the center frequency.

- Press the =CENTER **function key** in the CF-STEPSIZE ⇒ **submenu**.

  The step size is made equal to the current center frequency.

Setting the step size to the marker frequency

If you make the step size equal the marker frequency, you can search through the frequency spectrum and quickly jump back to the frequency at which you started.

- Press the =MARKER **function key** in the CF-STEPSIZE ⇒ **submenu**.

  The step size is made equal to the current marker frequency (↗ 6-96).

6.2.1.4 Frequency-Axis Display Modes

What the settings are for

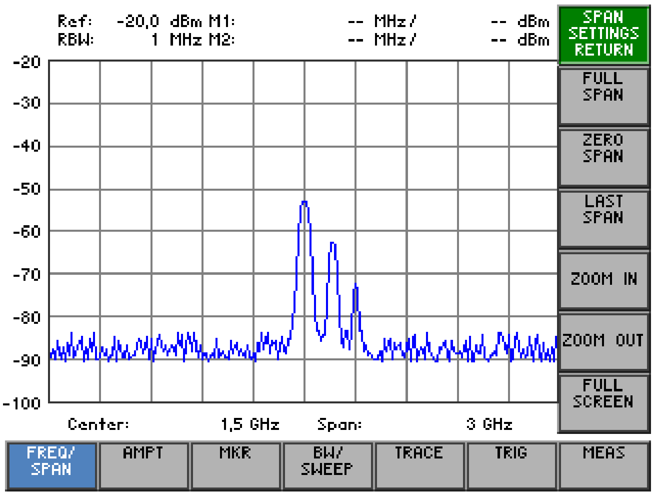
The frequency axis (x axis) can be displayed in a number of ways. Using the SPAN SETTINGS submenu, you can display the whole frequency range, zoom in on subranges of the frequency axis or project the diagram area onto the whole of the screen, if and when you require.

If you switchover to the time domain (ZERO SPAN), you can display the amplitude of the carrier signal as functions of time.

Selecting the SPAN SETTINGS submenu

- Press the SPAN SETTINGS → **function key** in the FREQ/ SPAN **menu**.

  The submenu opens and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 3 GHz
SPAN SETTINGS RETURN
FULL SPAN
ZERO SPAN
LAST SPAN
ZOOM IN
ZOOM OUT
FULL SCREEN
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

SPAN SETTINGS RETURN	Quitting the submenu	
FULL SPAN	Displaying the whole frequency range	(↗ 6-82)
ZERO SPAN	Switching over to the ZERO SPAN	(↗ 6-83)
LAST SPAN	Restoring the previous setting	(↗ 6-83)
ZOOM IN	Zoom function: Reducing the span	(↗ 6-84)
ZOOM OUT	Zoom function: Increasing the span	(↗ 6-84)
FULL SCREEN	Zoom function: Filling the whole screen with the diagram area	(↗ 6-84)

6.2.1.4.1 Displaying the Whole Frequency Range

Use

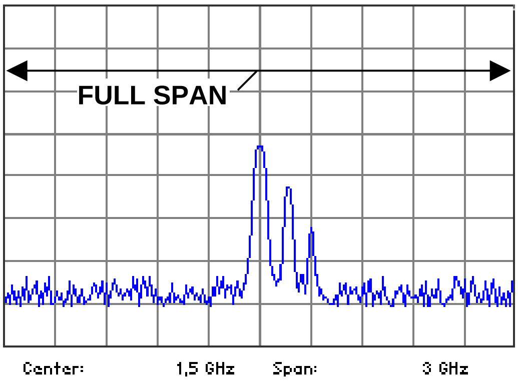
If you do not know the frequency of the signal to be investigated, you can display the R&S FS300’s whole frequency range along the x axis of the diagram area. You can then systematically reduce the span to the appropriate size (↗ 6-77).

The whole frequency range display can also be used to swap backwards and forwards between an overview measurement (FULL SPAN) and a detailed measurement (LAST SPAN, e. g. center frequency and span set manually).

Displaying the whole frequency range

1. Press the FULL SPAN **function key** in the SPAN SETTINGS ⇒ **menu.**

   The old setting is saved and the R&S FS300’s whole frequency range is displayed in the diagram area.

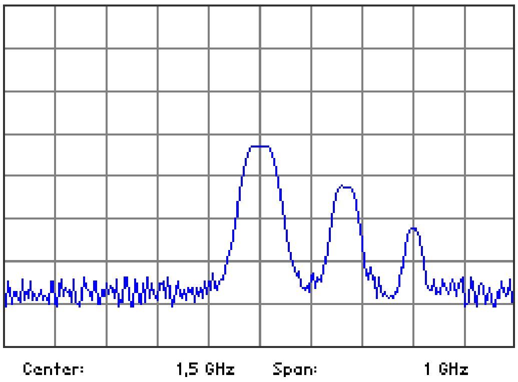


Center: 1,5 GHz Span: 3 GHz

Displaying the last span

2. Press the LAST SPAN **function key** in the SPAN SETTINGS ⇒ **menu.**

   The last span setting is displayed in the diagram area, e. g. 1 GHz:



Center: 1,5 GHz Span: 1 GHz

NOTE

The last span is restored if and only if the span is > 0, in other words, the time domain (ZERO SPAN) will not be selected automatically.

6.2.1.4.2 Switching over to the ZERO SPAN

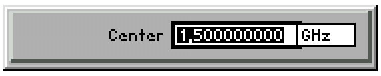
Use

The amplitude of a particular signal component in the frequency spectrum can be displayed as a function of time. To activate this mode, enter the frequency of the signal component as the center frequency. You can then define the x axis to be the time axis.

Specifying the signal component

1. Press the CENTER **function key** in the FREQ/ SPAN menu**.**

   An entry field containing the current setting is displayed:



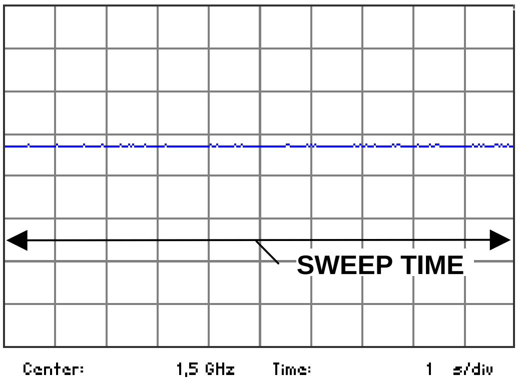
Center 1,500000000 GHz

2. Enter the frequency of the signal component you want to display in the time domain (↗ 6-77).

Switching over to the ZERO SPAN

3. Press the ZERO SPAN **function key** in the SPAN SETTINGS ⇒ **submenu.**

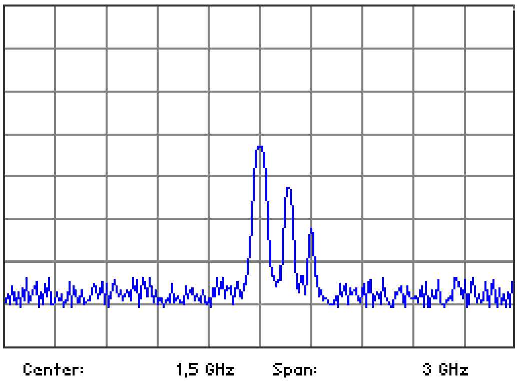
   The x axis becomes the time axis and the signal amplitude at the current center frequency is displayed as a function of time (current sweep time). The grid line spacing represents 1/10 of the current sweep time (↗ 6-126).



Switching over to the frequency domain

4. Press the LAST SPAN **function key** in the SPAN SETTINGS ⇒ **submenu.**

   The last span is displayed in the diagram area.



6.2.1.4.3 ZOOM Functions

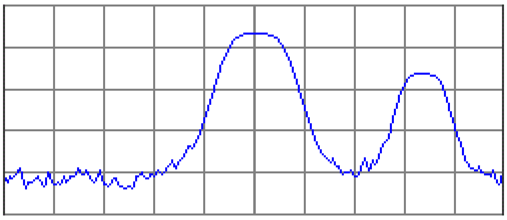
Use

If you want to increase or decrease the size of the screen window to analyze traces, you can zoom onto sections of the span or fill the whole screen with the current screen window.

Reducing the span

- Press the ZOOM IN **function key** in the SPAN SETTINGS ⇒ **submenu.**

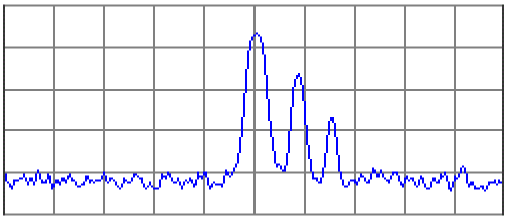
  The span is reduced by a factor of two. The center frequency remains the same.



Increasing the span

- Press the ZOOM OUT **function key** in the SPAN SETTINGS ⇒ **submenu.**

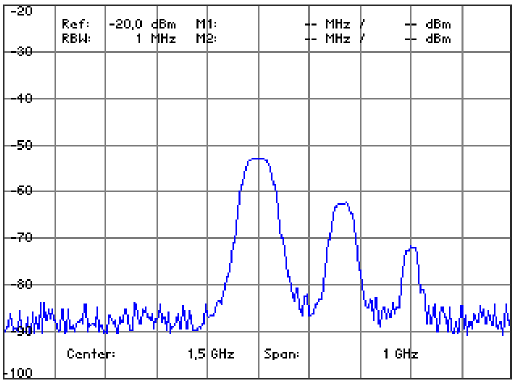
  The span is increased by a factor of two. The center frequency remains the same. The center frequency will be adapted if the new display frequency range exceeds the maximum permissible start or stop frequency.



Whole screen

1. Press the FULL SCREEN **function key** in the SPAN SETTINGS ⇒ **submenu.**

   The menu area, the function area and the parameter field are blanked out on the screen [13]. The diagram area then fills the whole screen. The scale lettering and all key parameters are displayed within the diagram area.


-20
Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-30
-40
-50
-60
-70
-80
-90
Center: 1,5 GHz Span: 1 GHz
-100

2. Press any key to return to the normal display mode.

6.2.1.5 Signal Tracking

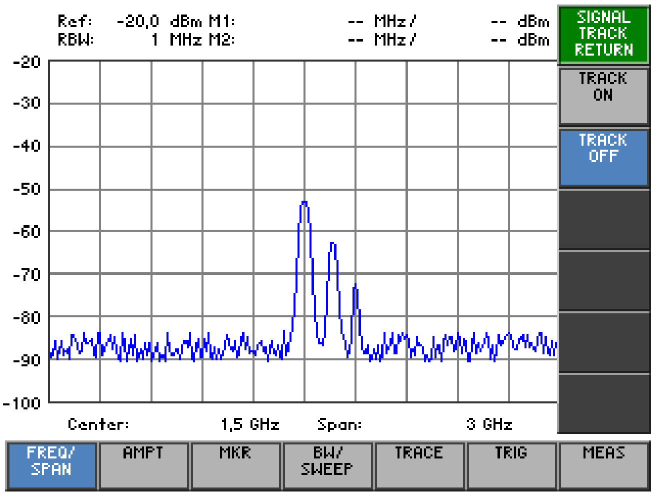
What the settings are for

When signal tracking is selected, the center frequency of the R&S FS300 is continually set to the frequency of the signal with most power. This means that a signal whose frequency is changing slowly in comparison with the sweep time can be kept in the center of the screen. The capture range of the function is ± span/5 referring to the center frequency. The spectrum analyzer's center frequency is adjusted after each sweep.

Selecting the SIGNAL TRACK submenu

- Press the SIGNAL TRACK ⇒ **function key** in the FREQ/ SPAN **menu.**

  The submenu opens and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
SIGNAL TRACK RETURN
TRACK ON
TRACK OFF
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

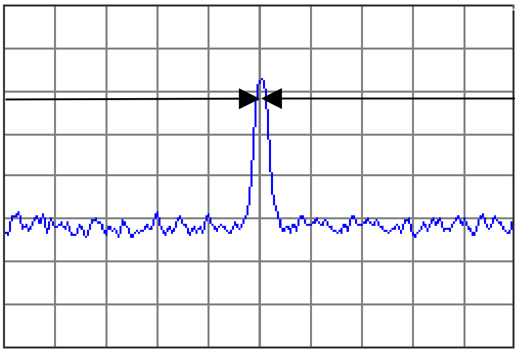
Function key assignment

SIGNAL TRACK RETURN	Quitting the submenu	
TRACK ON	Activating signal tracking	(↗ 6-86)
TRACK OFF	De-activating signal tracking	(↗ 6-86)

6.2.1.5.1 Activating Signal Tracking

Use

If the frequency of the signal being analyzed is continually varying, you can use this function to obtain a display that appears to be stationary. The power of signals of this kind can then be measured over long periods.



Activating signal tracking

- Press the [TRACK ON] **function key** in the [SIGNAL TRACK ⇒] **submenu.**

  The center frequency is constantly adjusted so that the signal peak is always in the middle of the screen. The latest center frequency to be set is displayed. The peak will continue to be tracked provided it remains within the span referring to the center frequency.

De-activating signal tracking

- Press the [TRACK OFF] **function key** in the [SIGNAL TRACK ⇒] **submenu.**

  The center frequency ceases to be tracked and remains at its last value.

6.2.2 Setting the Level Axis and the RF Input (AMPT Menu)

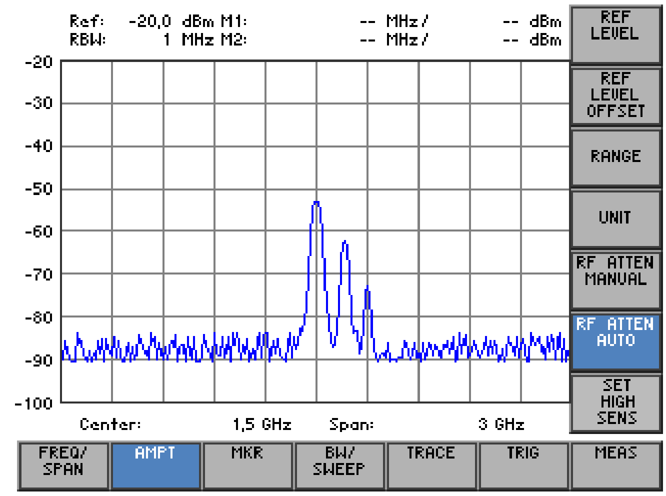
What the settings are for

From the AMPT menu, you can define the y axis of the measurement diagram as the level axis. You can also specify the attenuation of the RF input.

Selecting the AMPT menu

- Select the AMPT **menu** with the ◂ or ▸ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys [12].



Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
REF LEVEL
REF LEVEL OFFSET
RANGE
UNIT
RF ATTEN MANUAL
RF ATTEN AUTO
SET HIGH SENS
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

REF LEVEL	Entering the reference level	(↗ 6-88)
REF LEVEL OFFSET	Entering a level offset	(↗ 6-89)
RANGE	Selecting the level display range	(↗ 6-90)
UNIT	Selecting the level display unit	(↗ 6-91)
RF ATTEN MANUAL	Setting the RF input attenuation manually	(↗ 6-93)
RF ATTEN AUTO	Setting the RF input attenuation automatically	(↗ 6-94)
SET HIGH SENS	Selecting the setting High Sensitivity	(↗ 6-96)

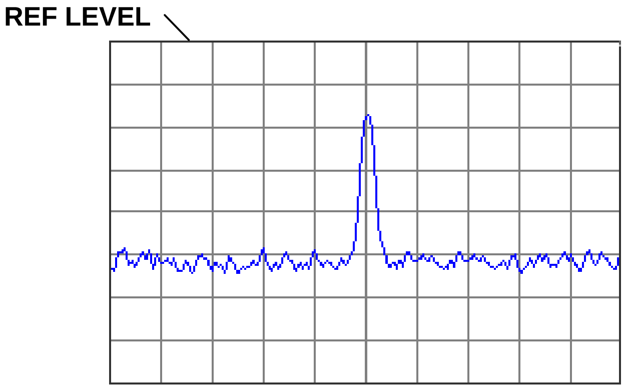
NOTE

The RF ATTEN MANUAL and RF ATTEN AUTO function keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted.
The RF ATTEN AUTO function is the default setting.

6.2.2.1 Entering the Reference Level

Use

The upper diagram limit is specified with the reference level.



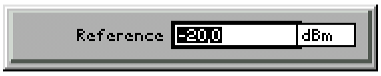
NOTE

The currently activated unit is used as the unit for reference level entries (↗ 6-91). The default setting is “dBm”.

Entering the reference level

1. Press the REF LEVEL **function key** in the AMPT **menu**.

   An entry field containing the current setting is displayed. The default setting is -20 dBm.



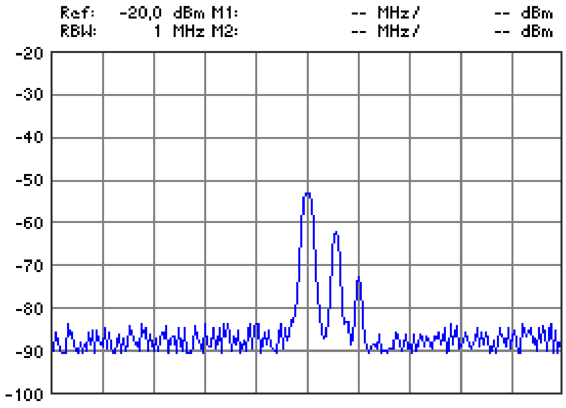
Reference -20,0 dBm

2. Enter a new value in 0.1 dB steps (↗ 5-60).

   The entry range for the reference level is:

   -110 [dBm] ≤ Reference ≤ +36 [dBm]

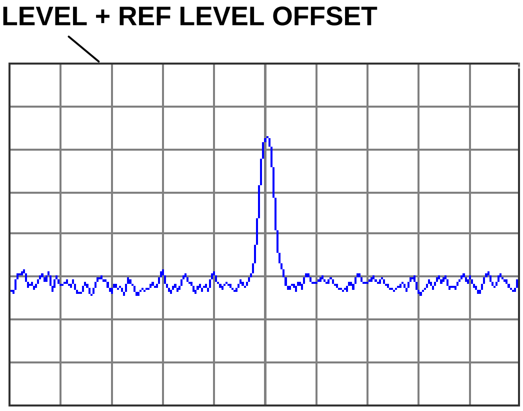
   The new setting is saved and displayed in the diagram area. The reference level defines the upper limit of the diagram.



6.2.2.2 Entering a Level Offset

Use

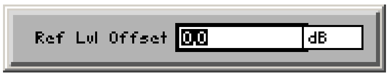
If you have connected external attenuators or amplifiers between the DUT and the RF input, you can enter a level offset to adjust the level display. The level offset is added to the reference level.



Entering a level offset

1. Press the REF LEVEL OFFSET **function key** in the AMPT **menu**.

   An entry field containing the current setting is displayed. The default setting is 0 dB.



Ref Lvl Offset 0.0 dB

2. Enter a new value in 0.1 dB steps (↗ 5-60).

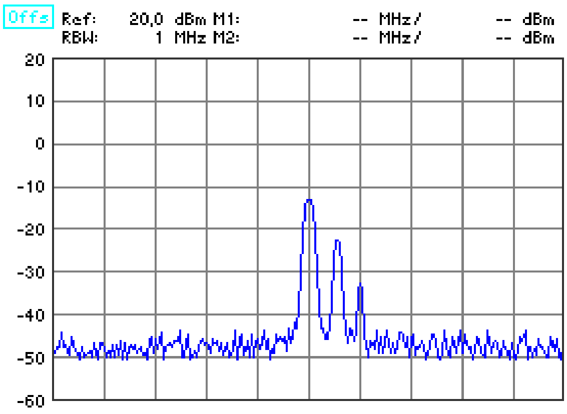
   The entry range for the level offset is:

   -100 [dB] ≤ Ref Lvl Offset ≤ +50 [dB]

   The new setting is saved and displayed in the diagram area. The text “Offs” is also displayed in the top left of the diagram.

   The level offset is always entered in dB no matter what unit is used for the reference level. If the units mV or mW are used, the offset is automatically converted so that the reference level is displayed correctly:

REF LEVEL$_{Display}$	= REF LEVEL	+ REF LEVEL OFFSET	
e. g.	= -20 dBm	+ 40 dB	= 20 dBm

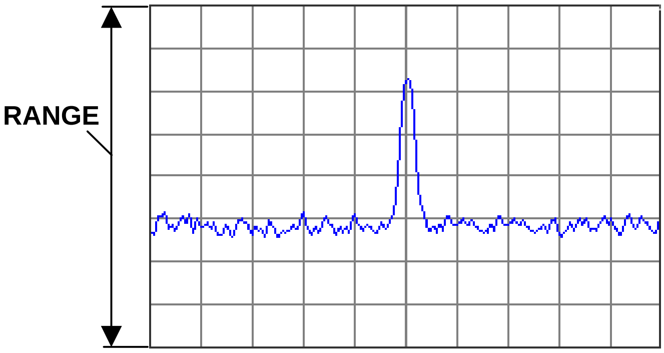


Offs Ref: 20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

6.2.2.3 Selecting the Level Display Range

Use

Use the level display range to define the “visible” level range and set the measurement diagram scale.



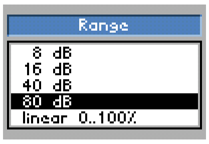
Levels can be displayed using either logarithmic or linear scales. The lettering of the grid lines is automatically adapted.

- **8 dB**
  1 dB/div.
- **16 dB**
  2 dB/div.
- **40 dB**
  5 dB/div.
- **80 dB**
  10 dB/div.
- **LINEAR**
  12.5 %/div., linear scale, 100 % corresponds to the reference level, 0 % to 0 V or 0 W

Entering the level display range

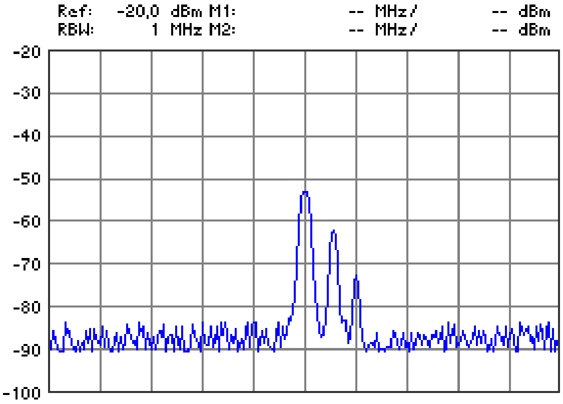
1. Press the RANGE **function key** in the AMPT **menu**.

   A selection field containing the available settings is displayed. The default setting is 80 dB.

2. Select a level display range with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is saved and displayed in inverse video in the diagram area. The level display range is referred to the reference level. This determines how the grid lines are lettered, for example, for REF LEVEL = -20 dBm and RANGE = 80 dB, the first grid line is at -20 dBm and the second at -30 dBm, and so on.


Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100

NOTE The level display range uses the currently activated unit (↗ 6-91).

6.2.2.4 Selecting the Level Display Unit

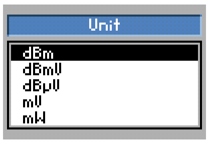
Use

To make it easier to analyze results, you can display levels in **dBm**, **dBmV**, **dBµV**, **mV** and **mW**.

Selecting the unit for the level display

1. Press the UNIT **function key** in the AMPT **menu**.

   A selection field containing the available settings is displayed. The default setting is dBm.


Unit
dBm
dBmV
dBµV
mV
mW

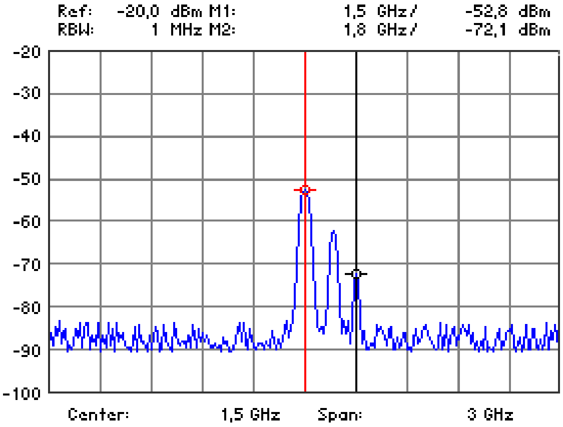
2. Select a unit for the level display with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is saved and displayed in the diagram area.

How RANGE and UNIT are related

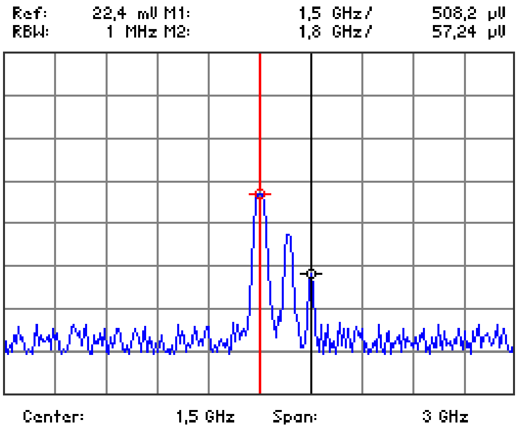
Log display/RANGE in dBx (The letter x is a wildcard character for the letters m, mV or µV.)

If a dB display has been selected for RANGE (↗ 6-90) and a dBx display for UNIT, the vertical-scale unit is dB. The values indicated by the level markers and the relevant level entries are in dBx.


Ref: -20,0 dBm M1: 1,5 GHz/ -52,8 dBm
RBW: 1 MHz M2: 1,8 GHz/ -72,1 dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz

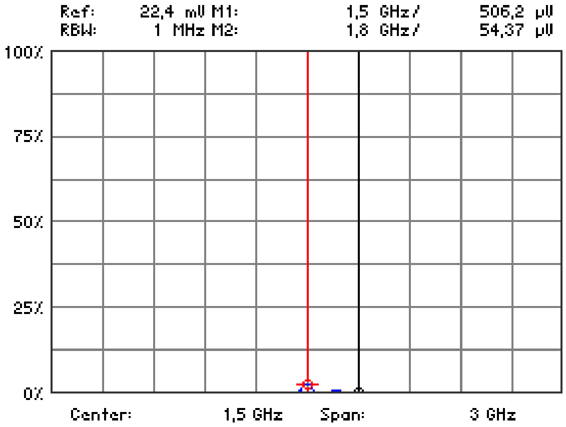
Log display/RANGE in xV or xW (The letter x is a wildcard character for the letters m, mV or µV.)

If a mV or mW has been selected for UNIT, only the reference level is displayed in the selected unit. There is no grid lettering. The values shown by the level markers and the relevant level entries are in the selected unit.


Ref: 22,4 mV M1: 1,5 GHz/ 508,2 µV
RBW: 1 MHz M2: 1,8 GHz/ 57,24 µV
Center: 1,5 GHz Span: 3 GHz

Linear display/RANGE in xV or xW (The letter x is a wildcard character for the letters m, mV or µV.)

If the linear scale is selected for RANGE, the scale lettering indicates percent, e.g. 0 %, 25 %, 50 %, 75 % and 100 %. The values indicated by the level markers and the relevant level entries are in the selected unit.


Ref: 22,4 mV M1: 1,5 GHz/ 506,2 µV
RBW: 1 MHz M2: 1,8 GHz/ 54,37 µV
100%
75%
50%
25%
0%
Center: 1,5 GHz Span: 3 GHz

6.2.2.5 Setting the RF Input Attenuation Manually

Use

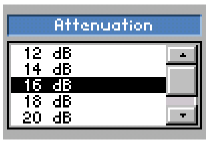
In the default setting, the input attenuation is coupled to the reference level. In most cases, this is the setting that will be used because it prevents the input stages from being overdriven and so, consequently, any incorrect measurements.

In exceptional cases, it may be necessary to adjust the input attenuation manually with input attenuations from **0** to **70 dB**.

Setting the input attenuation manually

1. Press the RF ATTEN MANUAL **function key** in the AMPT **menu**.

   A selection field containing the available settings is displayed. The default setting is 16 dB.



2. Select an input attenuation for the RF input with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is saved and the RF input is re-configured.

Invalid parameter entry

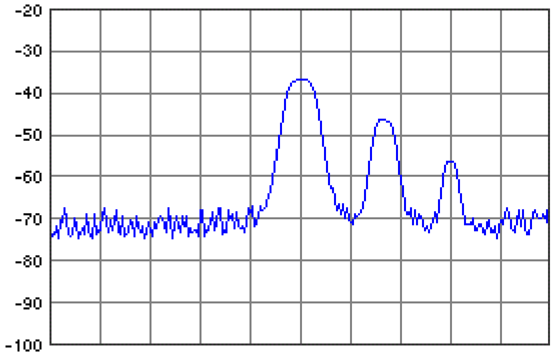
If the reference level you have specified cannot be set for the input attenuation that has been entered, (↗ 6-88), it is automatically adjusted.

6.2.2.6 Setting the RF Input Attenuation Automatically

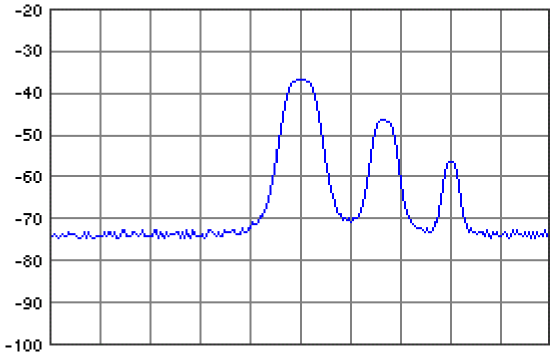
Use

The input attenuation should be set automatically to prevent the R&S FS300's input mixer from being overloaded. There are three RF input modes you can choose from (coupling between reference level and input attenuation) to optimize measurements:

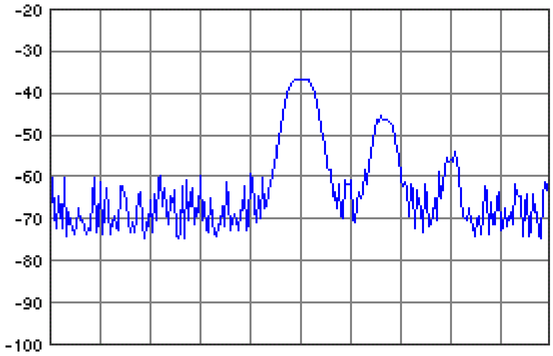
- **NORMAL**
  Normal setting for measurements.



- **LOW NOISE**
  Settings for measurements with low displayed average noise level of the analyzer.



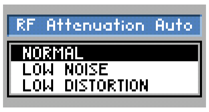
- **LOW DISTORTION**
  Setting for measurements with low inherent distortion of the analyzer.



Activating the automatic input attenuation setting mode

1. Press the RF ATTEN AUTO **function key** in the AMPT **menu**.

   A selection field containing the available settings is displayed. The default setting is NORMAL.

2. Using the **rotary knob** [10] select a criterion for autosetting the input attenuation.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is saved and the RF input is configured automatically according to the setting.

6.2.2.7 Selecting the Setting High Sensitivity

Use

By setting SET HIGH SENS, you can change several settings in the device in order to increase the input and measurement sensitivity of the analyzer in comparison to the normal setting. This function is helpful when you want to measure weak antenna signals with the analyzer.

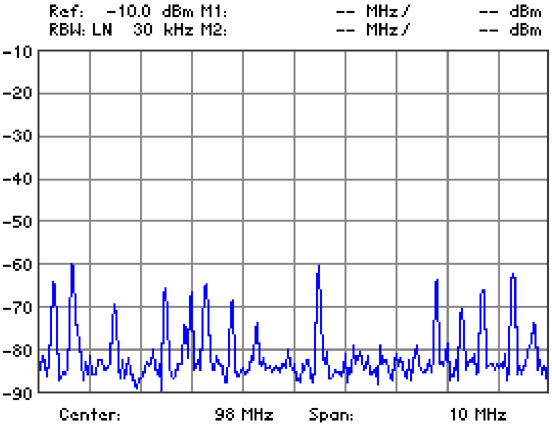
SET HIGH SENS influences the following settings in the R&S FS300:

- Sets the **reference level** (REF LEVEL, ↗ 6-88) to -10 dBm (if RF ATTEN was set to AUTO, the analyzer switches to MANUAL).
- Sets the **input attenuation** (RF ATTEN, ↗ 6-93) to 0 dB (if RES BW was set to MANUAL, the analyzer switches to AUTO).
- Activates the **coupling** (RBW/SPAN LOW NOISE, ↗ 6-126)

Selecting the Setting High Sensitivity

- Press the SET HIGH SENS **function key** in the AMPT **menu**.

  The setting RBW/SPAN LOW NOISE is indicated by the letters LN next to the RBW display.


Ref: -10.0 dBm M1: -- MHz / -- dBm
RBW: LN 30 kHz M2: -- MHz / -- dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center: 98 MHz
Span: 10 MHz

NOTE

You can switch the input attenuation of the analyzer to 0 dB by means of SET HIGH SENS. To ensure that the R&S FS300 is not overdriven, the level at the analyzer input must not exceed the reference level that has been set. (↗ 6-88).

6.2.3 Signal Analysis using Marker Functions (MKR Menu)

What the settings are for

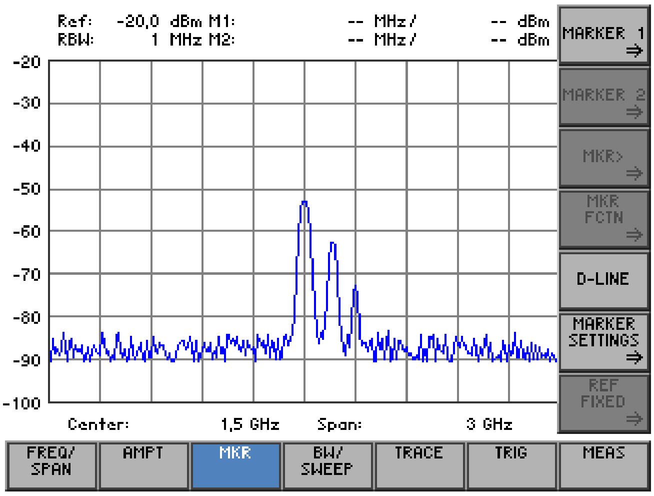
Using the MKR menu, you can position markers on any point on the trace to read off any levels or level differences of interest. The measured values indicated by the markers (marker values) are displayed in the parameter field (↗ 5-54).
A scrollable display line can also be shown on-screen.

Selecting the MKR menu

- Select the MKR **menu** with the ◂ or ▸ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys [12].

Function key assignment


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
MARKER 1
MARKER 2
MKR>
MKR FCTN
D-LINE
MARKER SETTINGS
REF FIXED
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

MARKER 1	**Open submenu:** Activate marker 1	(↗ 6-98)
MARKER 2	**Open submenu:** Activate marker 2	(↗ 6-102)
MKR>	**Open submenu:** Accepting marker values as settings	(↗ 6-105)
MKR FCTN	**Open submenu:** Marker measurement functions	(↗ 6-109)
D-LINE	Show display line	(↗ 6-113)
MARKER SETTINGS	**Open submenu:** Search criterion of functions NEXT PEAK LEFT/RIGHT	(↗ 6-114)
REF FIXED	**Open submenu:** Reference points for level-difference measurements	(↗ 6-117)

NOTE

The MARKER 1 and MARKER 2 function keys are selection keys.

The MARKER 2 function key is available only when marker 1 is turned on.

The MKR>, MKR FCTN and REF FIXED function keys are available only when marker 1 is turned on.

6.2.3.1 Activating Marker 1

What the settings are for

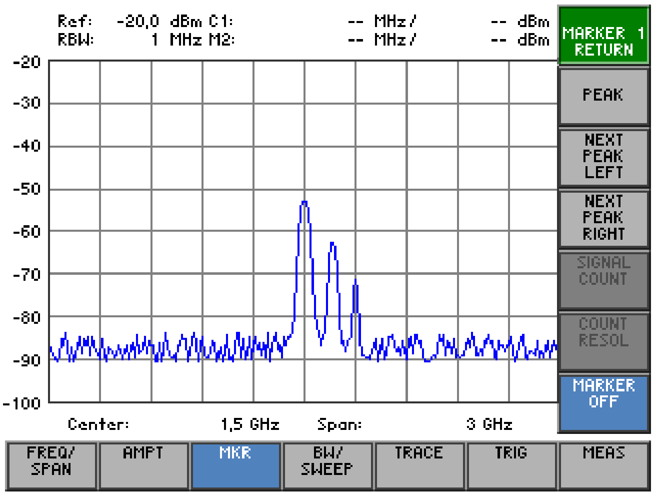
From the MARKER 1 submenu, you can activate a marker and position it on the trace. All the current level and frequency values (marker values) are displayed.

The frequency indicated by the marker can be measured more accurately with the FREQ COUNT function.

Selecting the MARKER 1 submenu

- Press the MARKER 1 ⇒ **function key** in the MKR **menu**.

  The submenu is opened and the appropriate functions are assigned to the function keys [12].



Ref: -20,0 dBm C1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
MARKER 1 RETURN
PEAK
NEXT PEAK LEFT
NEXT PEAK RIGHT
SIGNAL COUNT
COUNT RESOL
MARKER OFF
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

MARKER 1 RETURN	Quitting the submenu	
PEAK	Activate marker 1 and place it on the trace maximum	(↗ 6-99)
NEXT PEAK LEFT	Place marker 1 on the next peak to the left	(↗ 6-99)
NEXT PEAK RIGHT	Place marker 1 on the next peak to the right	(↗ 6-99)
SIGNAL COUNT	Measure the signal frequency: Start the measurement	(↗ 6-101)
COUNT RESOL	Measure the signal frequency: Set the resolution	(↗ 6-101)
MARKER OFF	De-activate marker 1	(↗ 6-99)

NOTE The SIGNAL COUNT and COUNT RESOL function keys are available only when marker 1 has been activated.

6.2.3.1.1 Reading off Measured Values with Marker 1

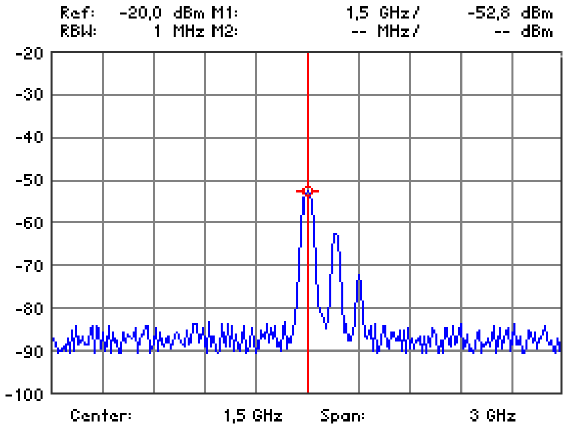
Use

You can position marker 1 on the trace to read off specific levels and frequencies (marker values).

Activating marker 1 and placing it on the trace maximum

1. Press the PEAK **function key** in the MARKER 1 ⇒ **submenu**.

   Marker 1 is activated and placed on the current trace maximum. M1 marker values are displayed in the parameter field.

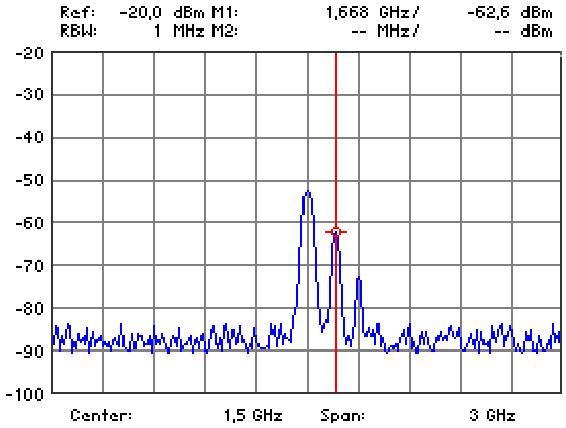


Ref: -20,0 dBm M1: 1,5 GHz/ -52,8 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

Placing marker 1 on the next trace maximum

2. Press the NEXT PEAK RIGHT or NEXT PEAK LEFT **function key** in the MARKER 1 ⇒ **submenu.**

   Marker 1 is positioned on the next trace maximum to the right (or left). The new M1 marker values are displayed in the parameter field.



Ref: -20,0 dBm M1: 1,668 GHz/ -62,6 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

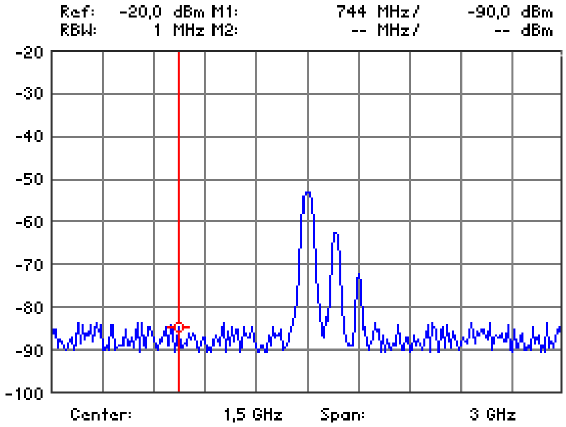
NOTE

The search criterion of functions NEXT PEAK LEFT/RIGHT can be changed by using the function key PEAK EXCURS (↗ 6-115).

Scrolling marker 1

3. Change the marker position with **rotary knob** [10].

   The current M1 marker values are displayed in the parameter field.



Ref: -20,0 dBm M1: 744 MHz/ -90,0 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

Center: 1,5 GHz Span: 3 GHz

De-activating marker 1

- Press the MARKER OFF **function key** in the MARKER 1 ⇒ **submenu**.

  Marker 1 (and marker 2, if activated) disappears from the diagram area and the M1 (M2) marker values are blanked out.

NOTE The NEXT PEAK RIGHT and NEXT PEAK LEFT function keys can also be used to activate marker 1.

6.2.3.1.2 Frequency Measurements using the Frequency Counter

Use

The normal marker indicates the frequency represented by the pixel on which it is placed. The measurement uncertainty is relatively large because the number of pixels is limited to 250.

When a measurement is made with the frequency counter, the sweep is stopped at the frequency indicated by marker 1, the frequency is counted using the required resolution (**1 KHz**, **100 Hz**, **10 Hz**, **1 Hz**) and then the sweep is restarted. There must be a periodic signal at the marker position if the measurement is to be successful.

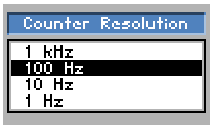
Setting the resolution

1. Position marker 1 on the trace (↗ 6-98).

   The current M1 marker values are displayed in the parameter field.

2. Press the COUNT RESOL **function key** in the MARKER 1 ⇒ **submenu.**

   A selection field containing the available settings is displayed. The default setting is 100 Hz.



Counter Resolution

1 kHz
100 Hz
10 Hz
1 Hz

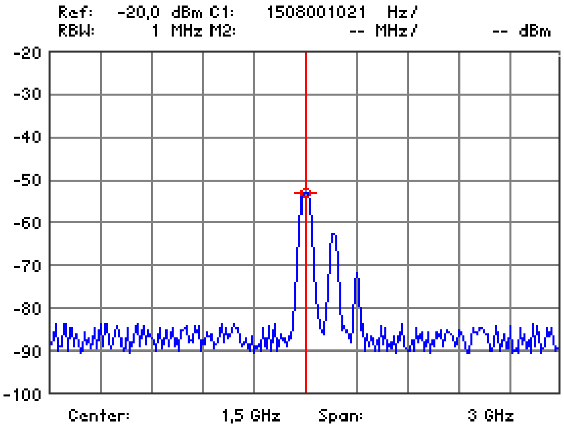
3. Select a resolution for the internal frequency counter with **rotary knob** [10], e.g. 1 Hz.

   The new setting is saved.

Measuring the signal frequency

4. Press the SIGNAL COUNT **function key** in the MARKER 1 ⇒ **submenu.**

   The frequency is counted with the internal counter. The result is displayed in the parameter field instead of the marker frequency (M1).



Ref: -20,0 dBm C1: 1508001021 Hz/
RBW: 1 MHz M2: -- MHz/ -- dBm

Center: 1,5 GHz Span: 3 GHz

De-activating the measurement

- Press the SIGNAL COUNT **function key** in the MARKER 1 ⇒ **submenu.**

  The internal counter is turned off. The current M1 marker values are again displayed in the parameter field.

NOTE

The absolute accuracy of the frequency measurement depends on the frequency stability of the reference-oscillator. When the internal reference is used, the accuracy is given according to the values specified in the data sheet. (↗ 0-11).

6.2.3.2 Activating Marker 2

What the settings are for

From the MARKER 2 submenu, you can activate a second marker and position it on the trace.

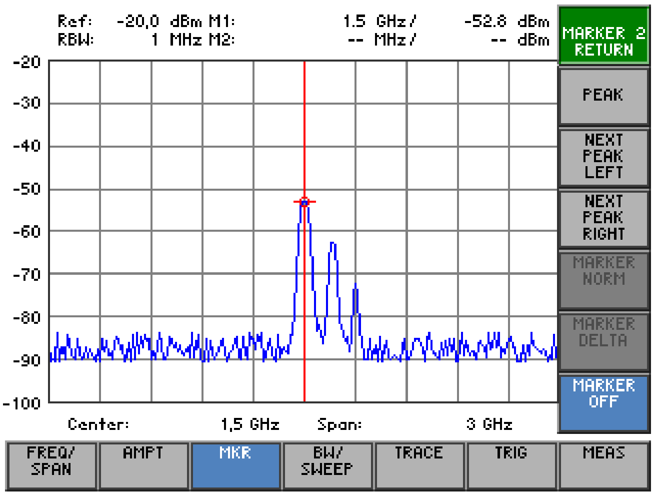
Marker 2 can be used either as a normal marker (NORM) or as a delta marker (DELTA). The delta marker function expands the R&S FS300’s analysis capability and can be used as a basis for a variety of measurement techniques (↗ 6-145).

NOTE Marker 2 can only be activated if marker 1 has been activated.

Selecting the MARKER 2 submenu

- Press the [MARKER 2 →] **function key** in the [MKR] **menu.**

  The submenu is opened and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: 1.5 GHz / -52.8 dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
MARKER 2 RETURN
PEAK
NEXT PEAK LEFT
NEXT PEAK RIGHT
MARKER NORM
MARKER DELTA
MARKER OFF
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

MARKER 2 RETURN	Quitting the submenu	
PEAK	Activate marker 2 and position it on the trace maximum	(↗ 6-103)
NEXT PEAK LEFT	Place marker 2 on the next peak to the left	(↗ 6-103)
NEXT PEAK RIGHT	Place marker 2 on the next peak to the right	(↗ 6-103)
MARKER NORM	Set marker 2 as a normal marker (NORM)	(↗ 6-104)
MARKER DELTA	Set marker 2 as a delta marker (DELTA)	(↗ 6-104)
MARKER OFF	De-activate marker 2	(↗ 6-103)

NOTE The [MARKER NORM] and [MARKER DELTA] function keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted. The MARKER NORM function is the default setting.

6.2.3.2.1 Reading off Measured Values with Marker 2

Use

To read off specific levels, you can activate marker 2 as a normal marker (in addition to marker 1) and position it on the trace. The current level and frequency can be displayed in this way (M2 marker values).

Activating marker 2 as a normal marker (NORM)

1. Press the PEAK **function key** in the MARKER 2 ⇒ **submenu.**

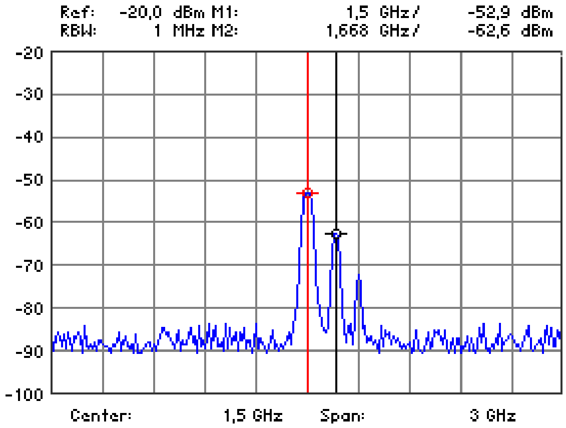
   Marker 2 is activated and placed on the trace maximum.

2. Press the MARKER NORM **function key** in the MARKER 2 ⇒ **submenu.**

   Marker 2 is defined as a normal marker. The M2 absolute marker values are displayed in the parameter field.

3. Position marker 2 on the trace (↗ 6-99).

   The current M2 marker values are displayed in the parameter field.



Ref: -20,0 dBm M1: 1,5 GHz/ -52,9 dBm
RBW: 1 MHz M2: 1,668 GHz/ -62,6 dBm

Center: 1,5 GHz Span: 3 GHz

De-activating marker 2

- Press the MARKER OFF **function key** in the MARKER 2 ⇒ **submenu.**

  Marker 2 disappears from the diagram area and the M2 marker values are blanked out.

NOTE The NEXT PEAK RIGHT and NEXT PEAK LEFT function keys can also be used to activate marker 2.

6.2.3.2.2 Reading off Level Differences

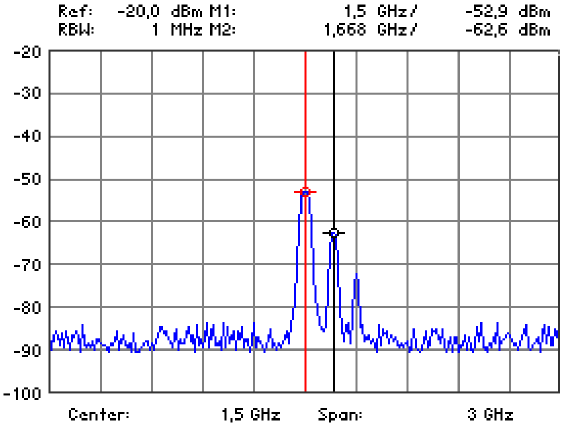
Use

You can define marker 2 as a delta marker to read off level differences from the trace. The level difference between marker 2 and a reference point is displayed. Marker 1 (↗ 6-98) or reference values that have been set manually (↗ 6-117) can be used as reference points.

Activating marker 2

1. Press the PEAK **function key** in the MARKER 2 ⇒ **submenu.**
2. Position marker 2 on the trace (↗ 6-102).

   The current M2 marker values are displayed in the parameter field.

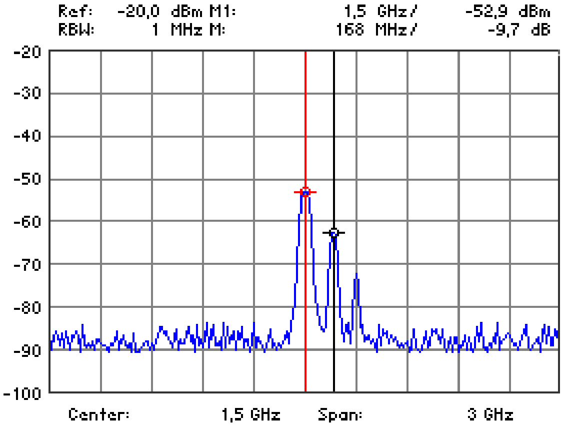


```
Ref:   -20,0  dBm M1:          1,5  GHz/     -52,9  dBm
RBW:       1  MHz M2:        1,668  GHz/     -62,6  dBm
```

Defining marker 2 as a delta marker (DELTA)

3. Press the MARKER DELTA **function key** in the MARKER 2 ⇒ **submenu.**

   Marker 2 is defined as a delta marker. The relative delta marker values (M), which represent the level difference between marker 2 and a reference point, e. g. marker 1, are displayed in the parameter field.



```
Ref:   -20,0  dBm M1:          1,5  GHz/     -52,9  dBm
RBW:       1  MHz M:           168  MHz/      -9,7  dB
```

6.2.3.3 Accepting Marker Values as Settings

What the settings are for

From the MKR> submenu, you can accept the marker values of the active marker as settings for level, frequency or frequency steps.

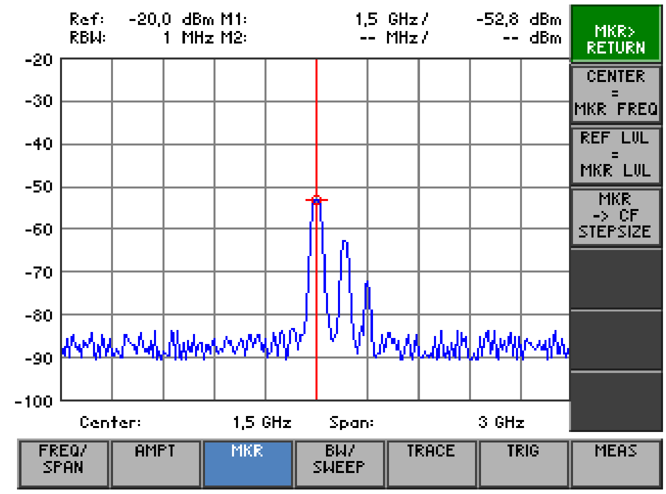
The step size used to enter the center frequency with the help of the rotary knob can also be the marker frequency.

NOTE The MKR> ⇒ function key is only available when the markers are activated.

Selecting the MKR> submenu

- Press the MKR> ⇒ **function key** in the MKR **menu.**

  The submenu is opened and the appropriate functions are assigned to the function keys [12].



Ref: -20,0 dBm M1: 1,5 GHz / -52,8 dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

Function key assignment

MKR> RETURN	Quitting the submenu	
CENTER = MKR FREQ	Set the center frequency (CENTER) to the marker frequency Moving the trace in the diagram area (x axis)	(↗ 6-106)
REF LVL = MKR LVL	Set the reference level (REF LEVEL) to the marker level Moving the trace in the diagram area (y axis)	(↗ 6-106)
MKR -> CF STEPSIZE	Set the step size for entering the center frequency to the marker frequency	(↗ 6-108)

NOTE In the time-domain mode (ZERO SPAN), the CENTER = MKR FREQ function key is not available.

6.2.3.3.1 Moving Trace Sections in the Measurement Diagram

Use

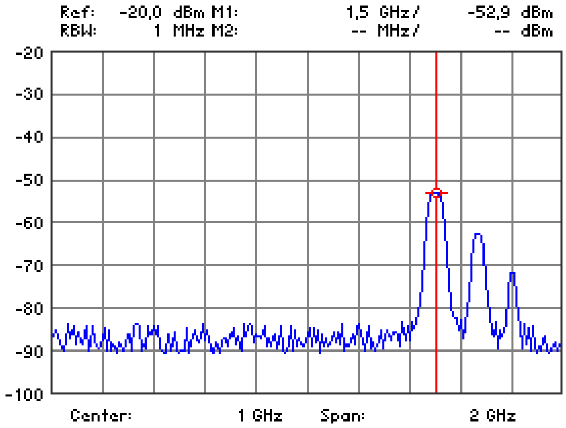
If you want to analyze a section of the trace more closely, you can change ist location within the measurement diagram using the active marker. The marker frequency becomes the center frequency and the marker level becomes the upper diagram boundary.

You can then analyze the trace section using a smaller span (↗ 6-77).

Positioning markers on the trace

1. Activate the markers (↗ 6-98, 6-102).
2. Press the MARKER 1 ⇒ or MARKER 2 ⇒ **function key** in the MKR **menu.**

   The selected marker is activated. All further marker settings are for the active marker, e. g. marker 1.
3. Position the active marker on the trace (↗ 6-99, 6-103).

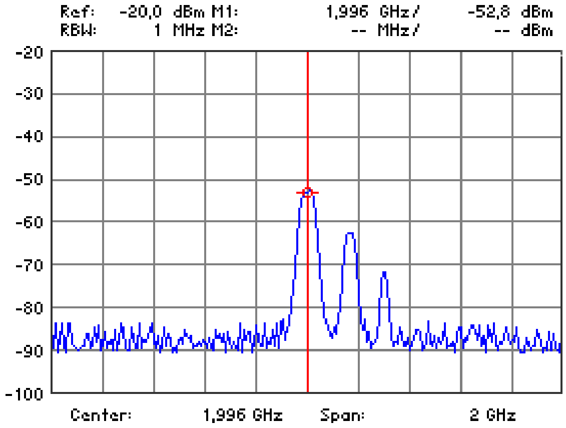

Ref: -20,0 dBm M1: 1,5 GHz/ -52,9 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1 GHz Span: 2 GHz

Setting the center frequency to the marker frequency

4. Press the CENTER = MKR FREQ **function key** in the MKR> ⇒ **menu.**

   The marker frequency is made the current center frequency (↗ 6-77). The trace is shifted horizontally to bring marker 1 into the center of the measurement diagram.

   The span remains unchanged provided the limits of 9 kHz or 3 GHz are not reached. Otherwise the span is reduced symmetrically about the center frequency. The lower limit for the span is 1 kHz.

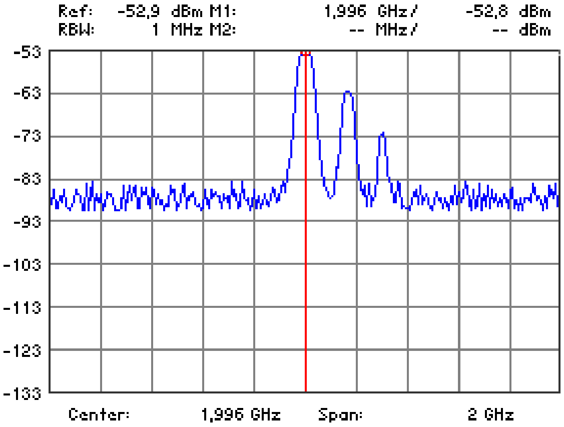

Ref: -20,0 dBm M1: 1,996 GHz/ -52,8 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,996 GHz Span: 2 GHz

NOTE In the time-domain mode (ZERO SPAN), the CENTER = MKR FREQ function key is not available.

Setting the reference level to the marker level

5. Press the REF LVL = MKR LVL **function key** in the MKR→ **submenu.**

The current marker level is set as the reference level (↗ 6-88). The trace is shifted vertically until the marker level forms the upper limit of the measurement diagram. The minimum value that can be set is -110 dBm.



Ref: -52,9 dBm M1: 1,996 GHz/ -52,8 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

Center: 1,996 GHz Span: 2 GHz

6.2.3.3.2 Setting the Step Size to the Marker Frequency

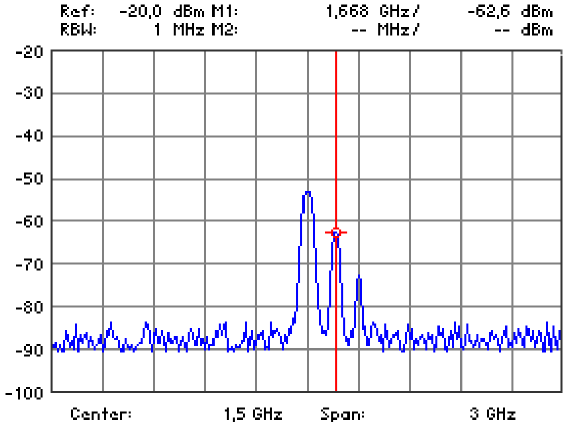
Use

If you set the step size to the marker frequency, you will find that you can quickly jump back to the start frequency when you are stepping through the frequency spectrum with the help of the rotary knob.

Positioning markers on the trace

1. Turn on the markers (↗ 6-98, 6-102).
2. Press the MARKER 1 ⇒ or MARKER 2 ⇒ **function key** in the MKR **menu.**

   The selected marker is activated. All further marker settings are for the active marker, e. g. marker 1.
3. Position the activated marker on the trace (↗ 6-99, 6-103).


Ref: -20,0 dBm M1: 1,668 GHz/ -62,6 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz

4. Press the =MARKER **function key** in the MKR -> CF STEPSIZE **submenu.**

   The step size is set to the current marker frequency.

NOTE

"Setting the step size to the marker frequency" has the same function as the setting "step size for entering the center frequency" (↗ 6-79).

6.2.3.4 Marker Measurement Functions

What the settings are for

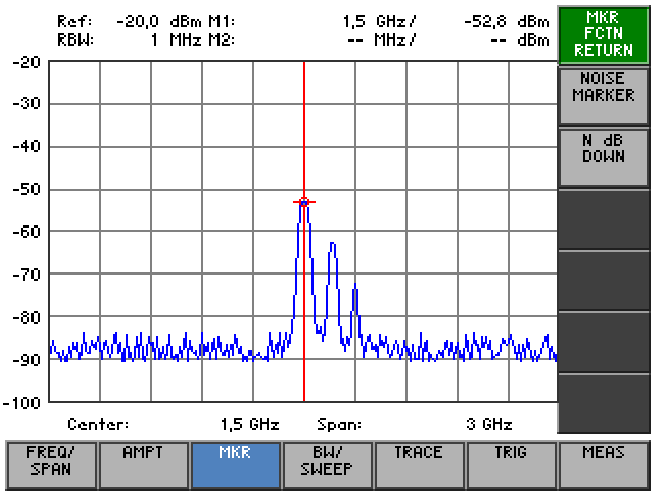
From the MKR FCTN submenu, using the markers, you can select certain spectral components of the input signal to measure the noise power density and the signal bandwidth.

NOTE The MKR FCTN ⇒ function key is available only when the markers are turned on.

Selecting the submenu MKR FCTN

- Press the MKR FCTN ⇒ **function key** in the MKR **menu.**

  The submenu is opened and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: 1,5 GHz / -52,8 dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
MKR FCTN RETURN
NOISE MARKER
N dB DOWN
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

MKR FCTN RETURN	Quitting the submenu	
NOISE MARKER	Measuring the noise power density	(↗ 6-110)
N dB DOWN	Measuring the signal bandwidth	(↗ 6-111)

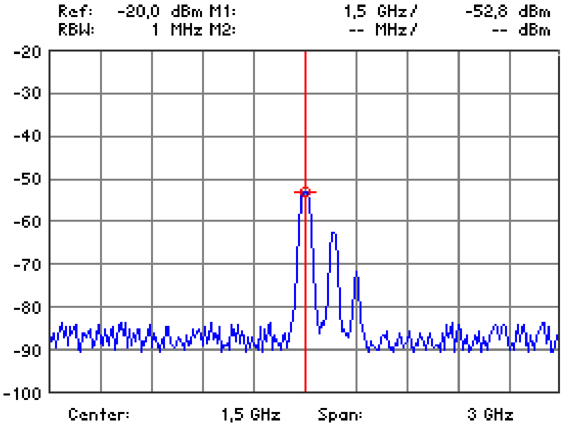
6.2.3.4.1 Measuring the Noise Power Density

Use

The R&S FS300 allows you to measure the noise power density at the active marker position.

Measuring noise power density

1. Turn on the markers (↗ 6-98, 6-102).
2. Position the activated marker (↗ 6-99, 6-103) as desired.


Ref: -20,0 dBm M1: 1,5 GHz/ -52,8 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

3. Press the NOISE MARKER **function key** in the MKR FCTN ⇒ **submenu.**

   The noise power density measurement is started at the frequency indicated by a marker. If marker 1 is the only marker that has been turned on, the measurement is made at its position. If marker 2 has also been turned on, the measurement is made at its position.

   Two points in the frequency domain (one to the right and one to left of the marker) and two points in the time domain (one to the right and one to the left of the marker) are used in the calculation to obtain a stable measurement result.

   The values measured with the noise marker represent the current value of the amplitude of the noise signal and can fluctuate relatively strongly. To obtain a stable measurement result, the video bandwidth must be set to 1/100 of the set resolution bandwidth.

   The noise power density is displayed in the marker field of the appropriate marker.

Ref: -20,0 dBm Noise 1,5 GHz/ -105 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

The noise power density display mode depends on the activated unit:

- **dBm/Hz, W/Hz** for powers
- **dBμV/$\sqrt{Hz}$, mV/$\sqrt{Hz}$** for voltages

De-activating the measurement

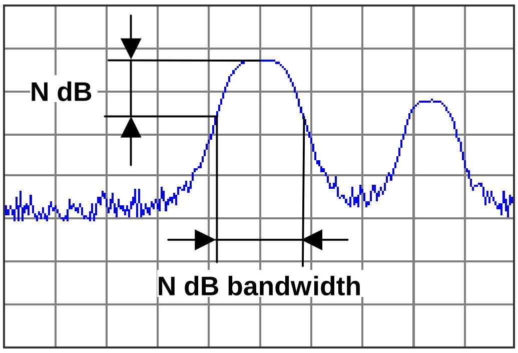
- Press the NOISE MARKER **function key** in the MKR FCTN ⇒ **submenu.**

  The noise power measurement is terminated. The marker used for the measurement reverts to being a normal marker. Marker values are again displayed in the parameter field.

6.2.3.4.2 Measuring the Filter or Signal Bandwidth

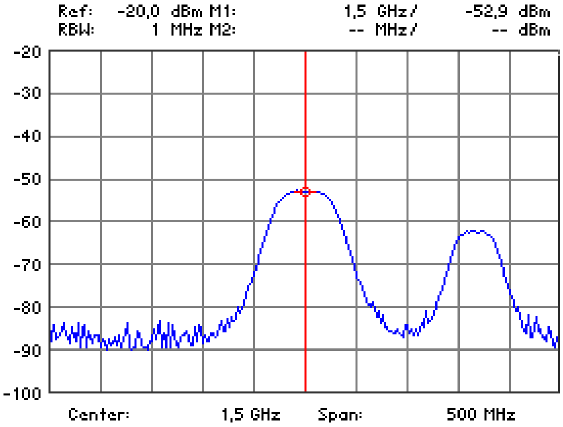
Use

If you want to measure the bandwidth of a certain signal spectrum shown in the measurement diagram, you can do this with the N dB DOWN function. Two lines one of which is n dB down on the active reference marker are displayed on the screen [13]. The difference between the measured frequencies is displayed on the screen as the bandwidth.



Selecting the signal spectrum

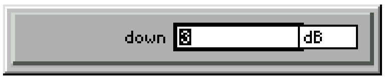
1. Position marker 1 on the trace maximum which is to form the reference for the bandwidth measurement (↗ 6-98).


Ref: -20,0 dBm M1: 1,5 GHz / -52,9 dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 500 MHz

Measuring the signal bandwidth

2. Press the N dB DOWN **function key** in the MKR FCTN ⇒ **submenu.**

   An entry field containing the current attenuation setting of N dB is displayed. The default setting is 3 dB.



down 3 dB

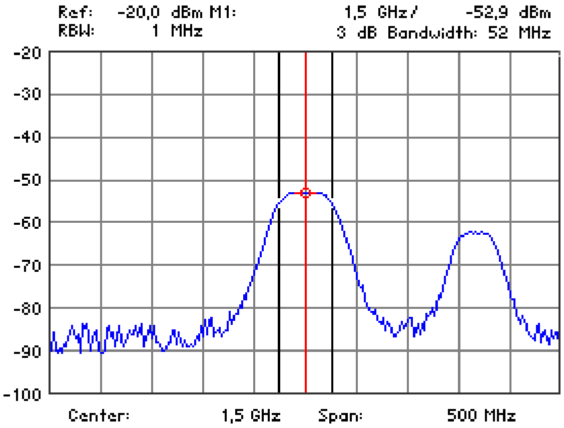
3. Enter a new value (↗ 5-60).

   The entry range for the attenuation N is:

   0 ≤ down ≤ 100 dB

4. Press the **ENTER key** [5] to close the entry field.

   The new setting is saved and the temporary markers T1 and T2 which are positioned to the right and left of marker 1 on the trace are activated. The levels at markers T1 and T2 are N dB less than the level at marker 1. The frequency difference between the markers T1 and T2 (N dB bandwidth) is displayed in the parameter field instead of the M2 marker values.


Ref: -20,0 dBm M1: 1,5 GHz/ -52,9 dBm
RBW: 1 MHz 3 dB Bandwidth: 52 MHz
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 500 MHz

Terminating the measurement

- Press the N dB DOWN **function key** in the MKR FCTN ⇒ **submenu.**

  The signal or filter bandwidth measurement is terminated and the temporary markers T1 and T2 disappear from the screen. The M2 marker values are again displayed in the parameter field.

6.2.3.5 Activating a Display Line

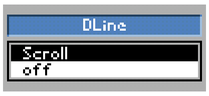
Use

If you want to observe whether a signal exceeds or falls below a certain level you can activate a horizontal display line in the measurement diagram and adjust its position.

Activating the display line

1. Press the D-LINE **function key** in the MKR **menu**.

   A selection field containing the available settings is displayed.



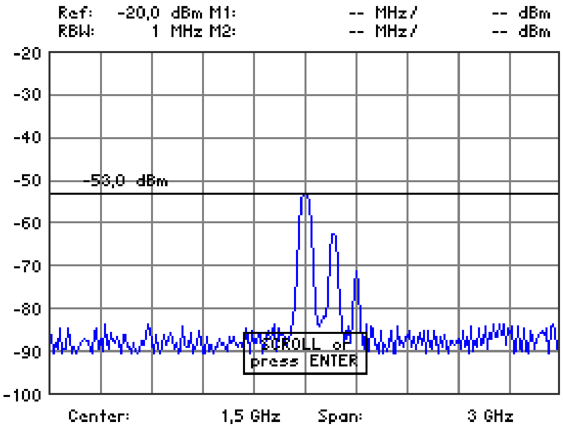
2. Select the **SCROLL** setting with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The display line appears at the top edge of the diagram area (REF LEVEL). The lettering “SCROLL or press ENTER” is displayed and indicates that the display line can be moved “up” or “down”.

Moving the display line

4. Change the position of the display line with **rotary knob** [10].

   The current level is displayed on the left above the display line.



Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

Center: 1,5 GHz Span: 3 GHz

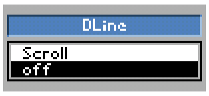
5. Press the **ENTER key** [5] to terminate the scroll mode.

   The text SCROLL disappears, and the display line is now in its new position.

De-activating the display line

1. Press the D-LINE **function key** in the MKR **menu**.

   A selection field containing the available settings is displayed.



2. Select **OFF** with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The display line disappears from the diagram area.

6.2.3.6 Setting the Search Criterion of Functions NEXT PEAK LEFT/RIGHT

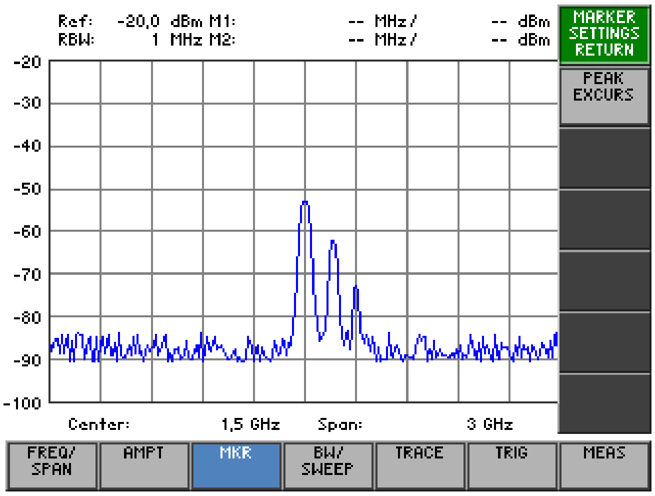
What the settings are for

From the MARKER SETTINGS submenu, you can set the search criterion of functions NEXT PEAK LEFT/RIGHT. The PEAK EXCURSION function key enables – for level measurements – the entry of a minimum level value by which a signal must fall so that it will be identified as a maximum by the NEXT PEAK LEFT and NEXT NEXT PEAK RIGHT search functions.

Selecting the MARKER SETTINGS submenu

- Press the MARKER SETTINGS ⇒ **function key** in the MKR **menu.**

  The submenu is opened and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz
-20
-30
-40
-50
-60
-70
-80
-90
-100
MARKER SETTINGS RETURN
PEAK EXCURS
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

MARKER SETTINGS RETURN	Quitting the submenu	
PEAK EXCURS	Entering the peak excursion	(↗ 6-115)

6.2.3.6.1 Entering the Peak Excursion

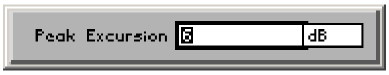
Use

If NEXT PEAK LEFT or NEXT PEAK RIGHT is selected, these functions search for the next relative maximum left or right of the current marker position irrespective of the current signal amplitude. When the signal level decreases for a definite amount, the peak excursion, to either side of the maximum a relative maximum is given.

Entering the peak excursion

1. Press the PEAK EXCURS **function key** in the MARKER SETTINGS ⇒ **submenu.**

   An entry field containing the current setting is displayed. The default setting is 6 dB.



Peak Excursion 6 dB

2. Enter a new value in 0.1 dB steps (↗ 5-60).

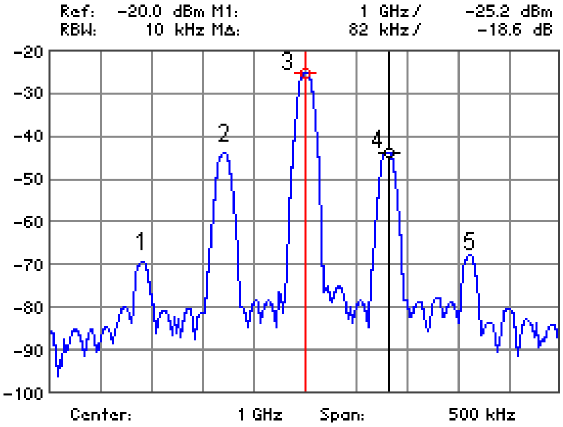
   The entry range for the reference-point level is:

   0 ≤ Peak Excursion ≤ 80 dB

   The new setting is saved and it is the current search criterion when you use the functions NEXT PEAK LEFT/RIGHT (↗ 6-99).

Examples of level measurement with different settings of PEAK EXCURSION

The following example illustrates the effect of different settings of the PEAK EXCURSION.



The following table lists the signals as indicated by numbers in the measuring diagram above, as well as the minimum of the amplitude decrease to both sides of the signal:

Signal #	Min. amplitude decrease to both sides of the signal
1	10 dB
2	35 dB
3	48 dB
4	35 dB
5	10 dB

50 dB peak excursion

With this setting, NEXT PEAK LEFT and NEXT PEAK RIGHT will not find any signal, as the signal level does not decrease by more than 48 dB to either side of any signal.

Order of signals detected:
PEAK: signal 3
NEXT PEAK LEFT: signal 3 (no further signal detected)
NEXT PEAK RIGHT: signal 3 (no further signal detected)

30 dB peak excursion

With this setting, NEXT PEAK LEFT and NEXT PEAK RIGHT will also detect signals 2 and 4, as the signal level decreases at least by 35 dB to either side of this signal, which is now greater than the peak excursion.

Order of signals detected:
PEAK: signal 3
NEXT PEAK LEFT: signal 2
NEXT PEAK LEFT: signal 2 (no further signal detected)
NEXT PEAK RIGHT: signal 3
NEXT PEAK RIGHT: signal 4
NEXT PEAK RIGHT: signal 4 (no further signal detected)

6 dB peak excursion

With this setting, all signals will be detected with NEXT PEAK RIGHT or NEXT PEAK LEFT.

Order of signals detected:
PEAK: signal 3
NEXT PEAK LEFT: signal 2
NEXT PEAK LEFT: signal 1
NEXT PEAK LEFT: signal 1 (no further signal detected)
NEXT PEAK RIGHT: signal 2
NEXT PEAK RIGHT: signal 3
NEXT PEAK RIGHT: signal 4
NEXT PEAK RIGHT: signal 5
NEXT PEAK RIGHT: signal 5 (no further signal detected)

6.2.3.7 Setting Reference Points for Level-Difference Measurements

What the settings are for

From the REF FIXED submenu, you can define any reference point within the R&S FS300's measurement range. You can use this point as a fixed reference for level-difference measurements using the delta marker (↗ 6-104).

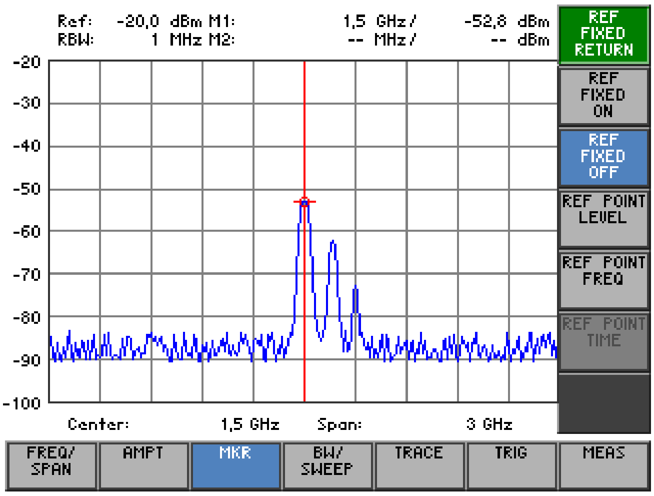
NOTE

The REF FIXED ⇒ function keys are available only when the markers are turned on.

Selecting the REF FIXED submenu

- Press the REF FIXED ⇒ **function key** in the MKR **menu.**

  The submenu is opened and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: 1,5 GHz/ -52,8 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
REF FIXED RETURN
REF FIXED ON
REF FIXED OFF
REF POINT LEVEL
REF POINT FREQ
REF POINT TIME
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

REF FIXED RETURN	Quitting the submenu	
REF FIXED ON	Activate reference point entry	(↗ 6-118)
REF FIXED OFF	Activate the M1 marker values as a reference point	(↗ 6-118)
REF POINT LEVEL	Enter the reference point level	(↗ 6-118)
REF POINT FREQ	Enter the reference point frequency	(↗ 6-118)
REF POINT TIME	Enter the reference point time	(↗ 6-118)

NOTE

The REF FIXED ON and REF FIXED OFF function keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted.

The REF POINT FREQ function key is available only in the frequency domain (SPAN > 0). The REF POINT TIME function key is available only in the time domain (ZERO SPAN).

6.2.3.7.1 Manual Entry of Reference Points

Use

There are two methods you can use to find level differences from the trace. The first method is to define a reference point on the trace using marker 1 (↗ 6-98).

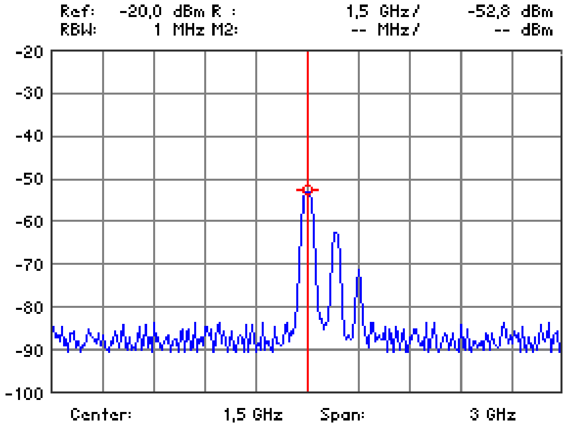
The second approach is entering arbitrary reference points inside and outside the measurement diagram.

When you enter arbitrary reference points the M1 marker values are frozen. Instead, the R reference values are displayed in the parameter field. The M2 marker values indicate the level difference referred to the reference point.

Activating entry of arbitrary reference points

1. Press the REF FIXED ON **function key** in the REF FIXED ⇒ **submenu.**

   It is now not possible to move marker 1. The M1 marker values are frozen and are used as fixed reference values R.

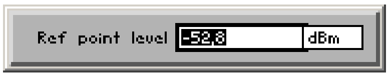


Ref: -20,0 dBm R : 1,5 GHz/ -52,8 dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

Entering reference point levels

2. Press the REF POINT LEVEL **function key** in the REF FIXED ⇒ **submenu.**

   An entry field containing the current setting (frozen marker level) is displayed.



Ref point level -52.8 dBm

3. Enter a new value in 0.1 dB steps (↗ 5-60).

   The entry range for the reference-point level is:

   -200 [dBm] ≤ Ref point level ≤ +200 [dBm]

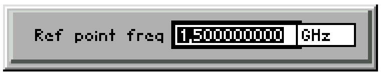
   The new setting is saved and displayed in the diagram area. The value is not displayed if it is outside the diagram area.

Entering a reference point frequency

4a) Frequency-domain display mode (SPAN > 0, ↗ 6-76)**:**

- Press the REF POINT FREQ **function key** in the REF FIXED ⇒ **submenu.**

  An entry field containing the current setting (frozen marker frequency)is displayed.



Ref point freq 1,500000000 GHz

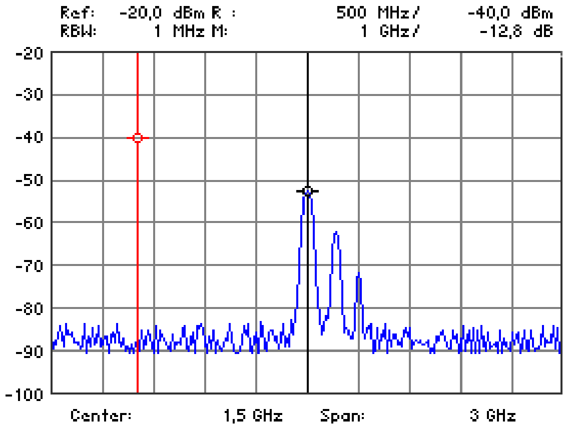
- Enter a new value (↗ 5-60).

  The entry range for the reference point frequency is:

  0 ≤ Ref point freq ≤ 3 GHz

  The new setting is saved and displayed in the diagram area. The value is not displayed if it is outside the diagram area.

  The level and the frequency at the reference point form the fixed reference point for level-difference measurements with the delta marker in the frequency domain (↗ 6-104).

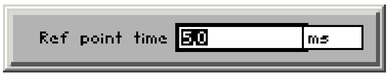


Entering a reference point time

4b) Time-domain display mode (ZERO SPAN, ↗ 6-83)**:**

- Press the REF POINT TIME **function key** in the REF FIXED ⇒ **submenu.**

  An entry field containing the current setting (frozen marker time) is displayed.



Ref point time 5,0 ms

- Enter a new value (↗ 5-60).

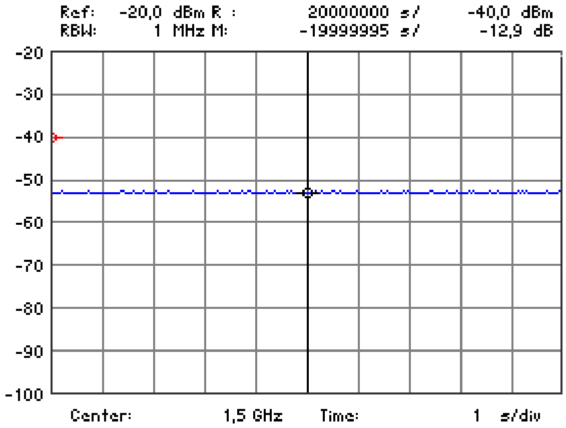
  The entry range for the reference-point time is:

  0 s ≤ Ref point time ≤ t_{SWEEP}

  where t_{SWEEP} - current SWEEP time (↗ 6-129)

  The new setting is saved and displayed in the diagram area. If the value is outside the diagram area, it is not displayed.

  The reference point level and time form a fixed reference point for level difference measurements with the delta marker in the time domain (↗ 6-104).



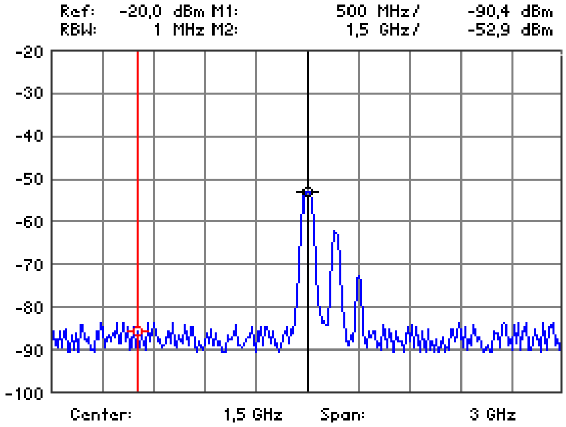
Ref: -20,0 dBm R : 20000000 s/ -40,0 dBm
RBW: 1 MHz M: -19999995 s/ -12,9 dB

Center: 1,5 GHz Time: 1 s/div

Activating M1 marker values as reference points

- Press the REF FIXED OFF **function key** in the REF FIXED ⇒ **submenu.**

  The reference values (R) disappear from the screen and the M1 marker values are again activated. Marker 1 is positioned on the last reference point frequency on the trace and can again be moved, e.g. in the frequency-domain display mode.



Ref: -20,0 dBm M1: 500 MHz/ -90,4 dBm
RBW: 1 MHz M2: 1,5 GHz/ -52,9 dBm

Center: 1,5 GHz Span: 3 GHz

6.2.4 Setting the Bandwidths and the Sweep Time (BW/SWEEP Menu)

What the settings are for

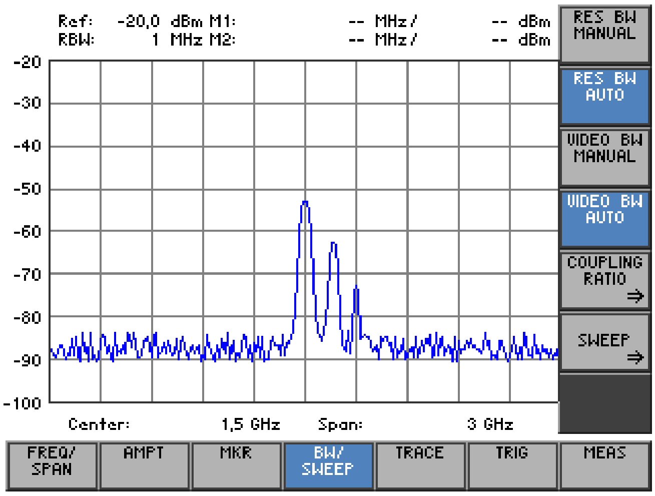
You can set the resolution bandwidth (RBW), the video bandwidth (VBW) and the sweep time using the BW/SWEEP menu.

The parameters determine the measurement procedure and can be coupled as a function of the SPAN or set independently.

Selecting the BW/SWEEP menu

- Select the BW/ SWEEP **menu** with the ◂ or ▸ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
RES BW MANUAL
RES BW AUTO
VIDEO BW MANUAL
VIDEO BW AUTO
COUPLING RATIO →
SWEEP →
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

RES BW MANUAL	Setting the resolution bandwidth manually	(↗ 6-122)
RES BW AUTO	Activating automatic resolution bandwidth setting	(↗ 6-122)
VIDEO BW MANUAL	Setting the video bandwidth manually	(↗ 6-123)
VIDEO BW AUTO	Activating automatic video bandwidth setting	(↗ 6-123)
COUPL RATIO →	**Open submenu:** Setting the RBW/VBW coupling ratio	(↗ 6-124)
SWEEP →	**Open submenu:** Setting the sweep time	(↗ 6-127)

NOTE

The RES BW MANUAL, RES BW AUTO function keys and the VIDEO BW MANUAL, VIDEO BW AUTO function keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted.
The RES BW AUTO and VIDEO BW AUTO functions are the default settings.

The RES BW AUTO function key is not available in the time-domain display mode (ZERO SPAN).

6.2.4.1 Setting the Resolution Bandwidth

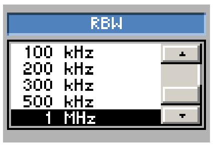
Use

The span and the resolution bandwidth can be set independently. In the default setting, however, these two parameters are coupled to make operating the instrument easier. This setting is recommended for many applications because operating errors are prevented. To make certain measurements, it may be necessary to set the resolution bandwidth and the span independently. With the R&S FS300, you can manually set resolution bandwidths from 200 Hz to 1 MHz in a 1, 2, 3, 5, 10 sequence.

Setting the resolution bandwidth manually

1. Press the RES BW MANUAL **function key** in the BW/ SWEEP **menu**.

   A selection field containing the available settings is displayed. The default setting is 1 MHz.



2. Select a resolution bandwidth with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is saved and the resolution filter is configured.

Activating automatic resolution bandwidth setting

- Press the RES BW AUTO **function key** in the BW/ SWEEP **menu**.

  The resolution bandwidth is set to $^1/_{50}$ of the span. If the span is changed, the resolution bandwidth is adjusted automatically.

NOTE

The RES BW AUTO function key is not available in the time-domain display mode (ZERO SPAN).

6.2.4.2 Setting the Video Bandwidth

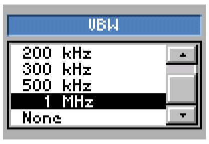
Use

You can set a variety of video bandwidths to smooth the trace. You can set video bandwidths from 10 Hz to 1 MHz in a 1, 2, 3, 5, 10 sequence on the R&S FS300.

Setting the video bandwidth manually

1. Press the RES BW MANUAL **function key** in the BW/ SWEEP **menu**.

   A selection field containing the available settings is displayed. The default setting is 1 MHz.

2. Select a video bandwidth with **rotary knob** [10].
3. Press the **ENTER** key [5] to close the selection field.

   The new setting is saved and the selected video bandwidth is set.

Activating automatic video bandwidth setting

- Press the VIDEO BW AUTO **function key** in the BW/ SWEEP **menu**.

  The R&S FS300's video bandwidth is set to three times the resolution bandwidth. If the resolution bandwidth is changed, the video bandwidth is adjusted automatically.
  Within the permissible setting range, the video bandwidth is set to the value that is closest to three times the value of the resolution bandwidth.

  The coupling ratio can be changed (↗ 6-124).

6.2.4.3 RBW, VBW and SPAN Coupling Ratio

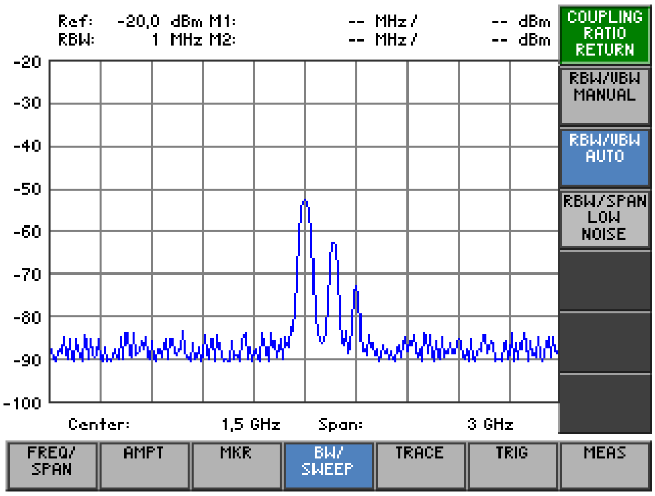
What the settings are for

You can set the coupling ratio between the video bandwidth, the resolution bandwidth and the frequency display span using the COUPLING RATIO submenu.

Selecting the COUPLING RATIO submenu

- Press the COUPL RATIO ⇒ **function key** in the BW/ SWEEP **menu**.

  The submenu is opened and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 3 GHz
COUPLING RATIO RETURN
RBW/VBW MANUAL
RBW/VBW AUTO
RBW/SPAN LOW NOISE
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

COUPL RATIO RETURN	Quitting the submenu	
RBW/VBW MANUAL	Setting the coupling ratio RBW/VBW manually	(↗ 6-125)
RBW/VBW AUTO	Activating the default setting for the coupling ratio RBW/VBW	(↗ 6-125)
RBW/SPAN LOW NOISE	Switching over the coupling RBW/SPAN to low noise	(↗ 6-126)

NOTE

The RBW/VBW MANUAL and RBW/VBW AUTO function keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted.
The RBW/VBW AUTO function is the default setting.

6.2.4.3.1 Changing the Coupling Ratio RBW/VBW

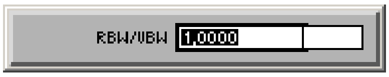
Use

You can change the automatic coupling between resolution bandwidth (RBW) and the video bandwidth (VBW) by means of the RBW/VBW MANUAL function. This makes it possible to increase the display accuracy of the analyzer in comparison to the default setting (RBW/VBW AUTO).

Setting the coupling ratio manually

1. Press the RBW/VBW MANUAL **function key** in the COUPL RATIO ⇒ **submenu**.

An entry field containing the current setting is displayed. The default setting is 1.



RBW/VBW 1,0000

2. Enter a new value (↗ 5-60).

The entry range for the coupling ratio is:

0.001 ≤ RBW/VBW ≤ 1000

The new setting is saved and the VBW/RBW coupling ratio is set. If the resolution bandwidth is changed, the video bandwidth is adjusted automatically.

Activating the default setting for the coupling ratio

- Press the RBW/VBW AUTO **function key** in the COUPL RATIO ⇒ **submenu**.

  The R&S FS300‘s video bandwidth is set to three times the resolution bandwidth.

6.2.4.3.2 Switching Over the Coupling RBW/SPAN to Low Noise

Use

You can change the automatic coupling between frequency display span (SPAN) and resolution bandwidth (RBW) by means of the RBW/SPAN LOW NOISE function. This makes it possible to increase the measurement sensitivity of the analyzer in comparison to the normal setting.

If the span is < 1 GHz in the Low Noise setting, the setting for the resolution bandwidth is as shown in the following table:

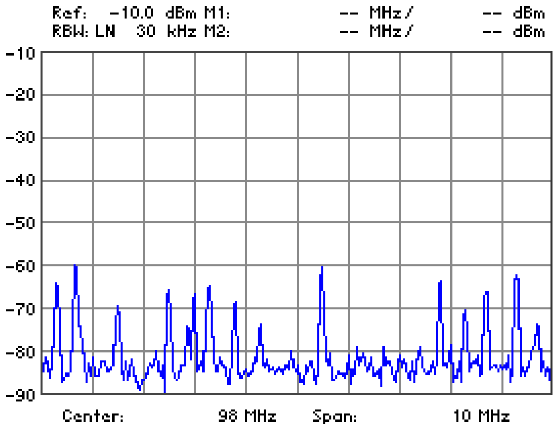
SPAN	RBW
SPAN > 1 GHz	1 MHz
1 GHz ≥ SPAN > 50 MHz	300 kHz
50 MHz ≥ SPAN > 10 MHz	100 kHz
10 MHz ≥ SPAN > 5 MHz	30 kHz
5 MHz ≥ SPAN > 1 MHz	10 kHz
1 MHz ≥ SPAN > 200 kHz	3 kHz
200 kHz ≥ SPAN > 100 kHz	1 kHz
100 kHz ≥ SPAN > 50 kHz	500 Hz
50 kHz ≥ SPAN > 20 kHz	300 Hz
20 kHz ≥ SPAN > 1 kHz	200 Hz

Switching on the coupling RBW/SPAN LOW NOISE

- Press the RBW/SPAN LOW NOISE **function key** in the COUPL RATIO ⇒ **submenu**.

  The ratio between frequency display span (SPAN) and resolution bandwidth (RBW) is set consequently.

  The setting is indicated by the letters LN next to the RBW display.


Ref: -10.0 dBm M1: -- MHz/ -- dBm
RBW: LN 30 kHz M2: -- MHz/ -- dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center: 98 MHz
Span: 10 MHz

Switching off the coupling RBW/SPAN LOW NOISE

- Press the RBW/SPAN LOW NOISE **function key** in the COUPL RATIO ⇒ **submenu**.

  The ratio between frequency display span (SPAN) and resolution bandwidth (RBW) is set normally and provides the shortest possible sweep times for a set SPAN.

  The letters LN next to the RBW display are blanked out.

6.2.4.4 Setting the Sweep

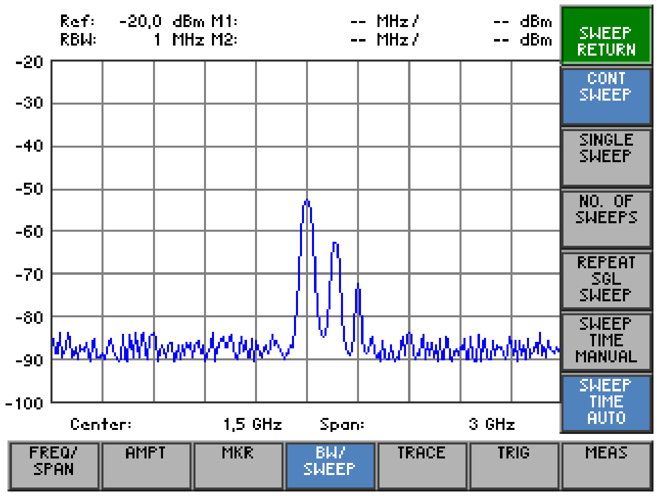
What the settings are for

You can select the type of sweep and the sweep time from the SWEEP submenu.

Selecting the SWEEP submenu

- Press the SWEEP ⇒ **function key** in the BW/ SWEEP **menu**.

  The submenu opens and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 3 GHz
SWEEP RETURN
CONT SWEEP
SINGLE SWEEP
NO. OF SWEEPS
REPEAT SGL SWEEP
SWEEP TIME MANUAL
SWEEP TIME AUTO
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

SWEEP RETURN	Quitting the submenu	
CONT SWEEP	Starting the continuous sweep	(↗ 6-128)
SINGLE SWEEP	Performing an n-times sweep	(↗ 6-128)
NO. OF SWEEPS	Setting the number of sweeps	(↗ 6-128)
REPEAT SGL SWEEP	Repeating an n-times sweep	(↗ 6-129)
SWEEP TIME MANUAL	Setting the sweep time manually	(↗ 6-129)
SWEEP TIME AUTO	Activating automatic sweep time setting	(↗ 6-129)

NOTE

The CONT SWEEP, SINGLE SWEEP function keys and the SWEEP TIME MANUAL, SWEEP TIME AUTO function keys are selection keys. In other words, only one setting is activated at any one time. The function key in question is highlighted.
The COUNT SWEEP and SWEEP TIME AUTO functions are the default settings.

The RES BW AUTO function key is not available in the time-domain display mode (ZERO SPAN).

6.2.4.4.1 Selecting the Frequency Sweep

Use

Frequency sweep is the process where the resolution filter covers a defined frequency range.
Sweeps may be performed continuously (CONT SWEEP) or once (SINGLE SWEEP).

Starting a continuous sweep

- Press the CONT SWEEP **function key** in the SWEEP ⇒ **submenu**.

  The sweep repeats continuously when the trigger event is detected (↗ 6-140).

Performing an n-times sweep

1. Press the SINGLE SWEEP **function key** in the SWEEP ⇒ **submenu**.

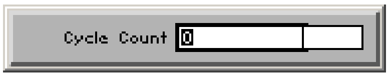
   An n-times sweep is started when the trigger event is detected. The number of sweeps is specified with the NO. OF SWEEPS setting (↗ below).

   When you repeatedly press the SINGLE SWEEP function key, the previous trace is cleared and a new frequency sweep (n times) is started.

Setting the number of sweeps

2. Press the NO. OF SWEEPS **function key** in the SWEEP ⇒ **submenu**.

   An entry field containing the current setting is displayed. The default setting is 0 (endless sweeps).



Cycle Count 0

3. Enter a new value (↗ 5-60).

   The entry range for the number of sweeps is:

   0 ≤ Cycle Count ≤ 32767

   The new setting is saved and when a single sweep has been started, the sweep is repeated n times.

Repeating an n-times sweep

4. Press the REPEAT SGL SWEEP **function key** in the SWEEP ⇒ **submenu**.

   An n-times sweep is started when the trigger event is detected. The trace is not cleared on completion of the sweep as would be the case with the single-sweep function.

   This is most relevant in relation to the TRACE AVERAGE and HOLD functions if measured values that have already been recorded have to be taken into account for averaging and finding the minimum/maximum.

6.2.4.4.2 Setting the Sweep Time

Use

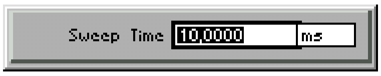
The sweep time is the time taken by the resolution filter set to a specific bandwidth (RBW) to sweep a particular frequency range or span.
In the default setting, the sweep time is coupled to the span (SPAN), the resolution bandwidth (RBW) and the video filter (VBW).

Setting the sweep time manually

1. Press the SWEEP TIME MANUAL **function key** in the SWEEP ⇒ **submenu**.

An entry field containing the current setting is displayed. The default setting is 15.5 ms. The default setting is at SPAN = 1 GHz and

- RBW = 300 kHz: 137.833 ms
- RBW = 1 MHz: 24.825 ms



Sweep Time 10,0000 ms

2. Enter a new value (↗ 5-60).

The entry range for the sweep time is:

0 ms ≤ Sweep Time ≤ 10 ms

3. Press the **ENTER key** [5] to close the entry field.

The new setting is saved and the new sweep time activated.

Activating automatic sweep time setting

- Press the SWEEP TIME AUTO **function key** in the SWEEP ⇒ **submenu**.

The sweep time is coupled to the span, the resolution bandwidth (RBW) and the video bandwidth (VBW). The sweep time is automatically adjusted if either the span, the RBW or the VBW are changed.

The R&S FS300 always selects the shortest possible sweep time consistent with valid results. The maximum level error trade-off for a longer sweep time is < 0.1 dB. If you do not want the additional bandwidth and level error, set the sweep time manually to three times the suggested value (↗ above).

6.2.5 Measured-Value Display (TRACE Menu)

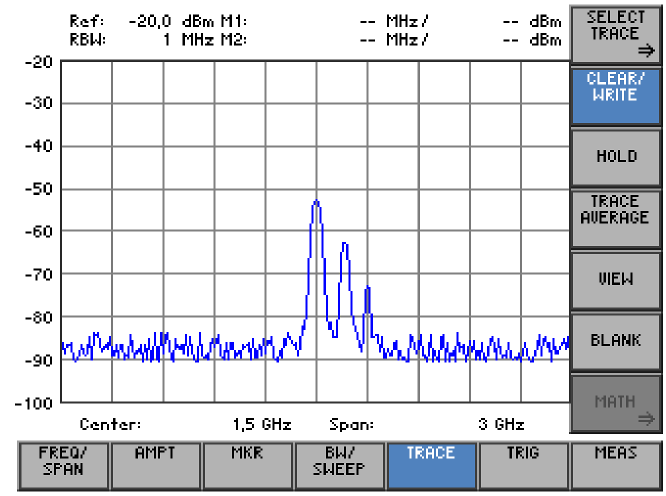
What the settings are for

Using the TRACE menu, you can apply various display modes to the input-signal results. Two traces (Trace 1, Trace 2) are provided for this purpose.

Selecting the TRACE menu

- Select the TRACE **menu** with the ◂ or ▸ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
SELECT TRACE
CLEAR/ WRITE
HOLD
TRACE AVERAGE
VIEW
BLANK
MATH
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignments

SELECT TRACE ⇒	**Open submenu:** Selecting the active trace	(↗ 6-131)
CLEAR/ WRITE	Trace display mode: Overwrite mode	(↗ 6-134)
HOLD	Trace display mode: Min/Max Hold	(↗ 6-134)
TRACE AVERAGE	Trace display mode: Averaging	(↗ 6-134)
VIEW	Freezing the trace	(↗ 6-134)
BLANK	Blanking out the trace	(↗ 6-134)
MATH ⇒	**Open submenu:** Trace difference function	(↗ 6-137)

NOTE

The function keys CLEAR/ WRITE, HOLD, TRACE AVERAGE, VIEW or BLANK are selection keys. In other words, only one setting can be active at any one time. The function key in question is highlighted.
The CLEAR/WRITE function is the default setting.

The MATH ⇒ function key is only available when both traces are on (↗ 6-131).

6.2.5.1 Selecting the Active Trace

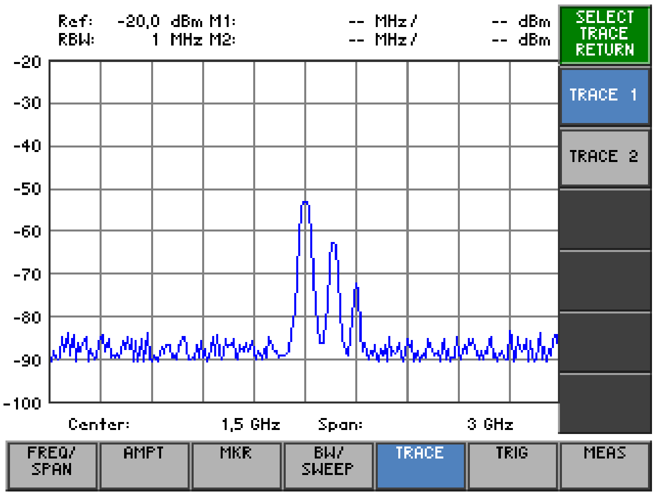
What the settings are for

Via the SELECT TRACE submenu, you can activate a second trace and select the current trace (Trace 1, Trace 2) to which all the following settings will be applied.

Selecting the SELECT TRACE submenu

- Press the [SELECT TRACE →] **function key** in the [TRACE] **menu**.

  The submenu opens and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
SELECT TRACE RETURN
TRACE 1
TRACE 2
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

SELECT TRACE RETURN	Quitting the submenu	
TRACE 1	Turn on and activate Trace 1	(↗ 6-132)
TRACE 2	Turn on and activate Trace 2	(↗ 6-132)

NOTE

The function keys [TRACE 1] and [TRACE 2] are selection keys. In other words, only one setting can be active at any one time. The function key in question is highlighted.
The TRACE 1 function is the default setting.

6.2.5.1.1 Activating Traces

Use

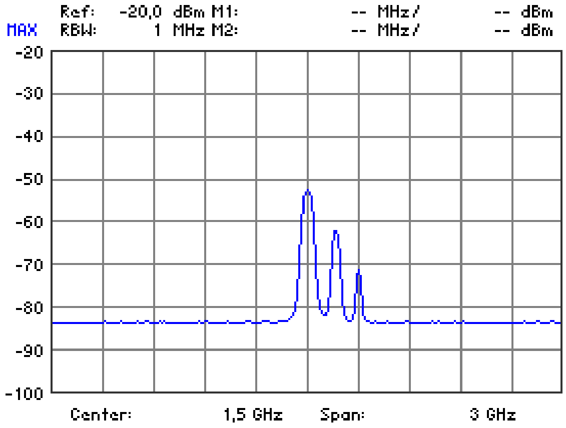
The measured values for the input signal can be displayed using two different traces (Trace 1 and Trace 2). However, only one trace is active and can be used at any one time. The other trace is frozen and displayed. This means that the two traces can be compared.

Activating Trace 1

When you switch on the R&S FS300, Trace 1 is automatically turned on and activated. Trace 2 is turned off. All the settings are for Trace 1.

- In the SELECT TRACE ⇒ **submenu,** press the TRACE 1 **function key** if Trace 2 is turned on and active.

  Trace 1 becomes the active trace. All the following settings are for this trace. The current display mode, e.g. MAX HOLD (MAX, ↗ 6-134), is displayed in the top left of the diagram area in the trace colour:



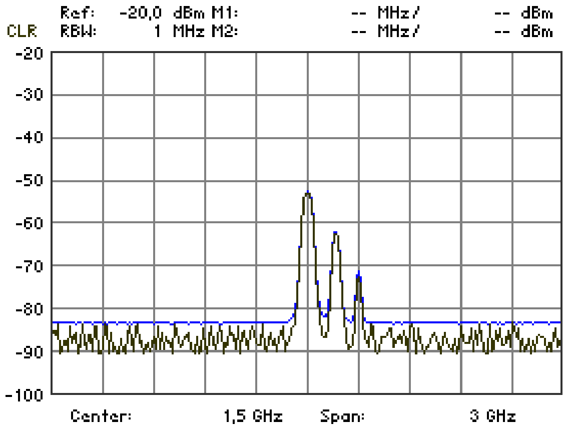
MAX Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
Center: 1,5 GHz Span: 3 GHz

Turning on and activating Trace 2

When the R&S FS300 is turned on, Trace 2 is turned off. When the trace is called for the first time, the CLEAR/WRITE display mode is set.

- Press the TRACE 2 **function key** in the SELECT TRACE ⇒ **submenu.**

  Trace 2 becomes the active trace. All subsequent settings are for this trace. In the top left of the diagram area, the current display mode is shown in the trace colour, e.g. CLEAR/WRITE (CLR, ↗ 6-134):



CLR Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
Center: 1,5 GHz Span: 3 GHz

Turning off Trace 2

1. Press the TRACE 2 **function key** in the SELECT TRACE ⇒ **submenu**.

   Trace 2 is now active.

2. Press the BLANK **function key** in the TRACE **menu**.

   Trace 2 is blanked out.

3. Press the TRACE 1 **function key** in the SELECT TRACE ⇒ **submenu**.

   Trace 1 is activated and Trace 2 is turned off.

NOTE

The current values are displayed in the trace colour. This means that you can quickly tell which trace has been activated.

6.2.5.2 Displaying the Active Trace

Use

You can select the following settings for displaying the active trace:

- **CLEAR/WRITE**
  Overwrites the trace on every frequency sweep.
- **HOLD**
  Displays the minimum/maximum over several sweeps.

  This function is used to find the minimum/maximum value of a signal over several frequency sweeps (↗ CONT. SWEEP, 6-128). This is particularly useful in the case of modulated or pulse-like signals. On every sweep, more data is added to the signal spectrum until all the signal components are displayed using a type of "envelope curve".
- **AVERAGE**
  Displays the average over several frequency sweeps.

  This function is used to display the signal average over several frequency sweeps. This function is most useful for sine signals which have been degraded by noise. Essentially, noise can be eliminated by averaging the samples over several frequency sweeps.

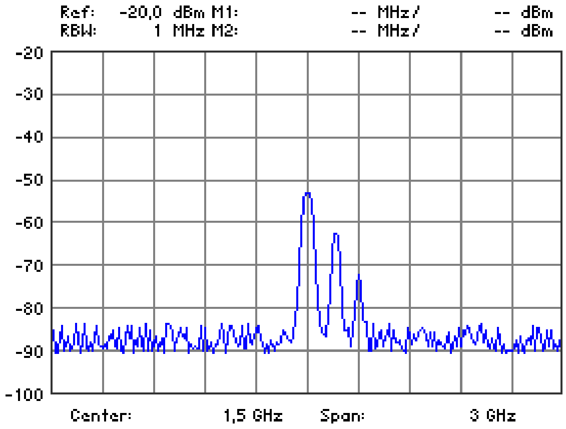
After a measurement has been performed, the trace can be frozen (**VIEW**) or blanked out (**BLANK**).

Displaying current measured values

When the R&S FS300 is switched on, Trace 1 is active and is displayed in the CLEAR/WRITE display mode.

- Press the CLEAR/ WRITE **function key** in the TRACE **menu.**

  The overwrite mode is set. This means that the trace is overwritten on every frequency sweep.



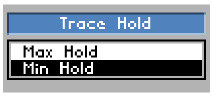
Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm

Center: 1,5 GHz Span: 3 GHz

Displaying signal minimum/maximum

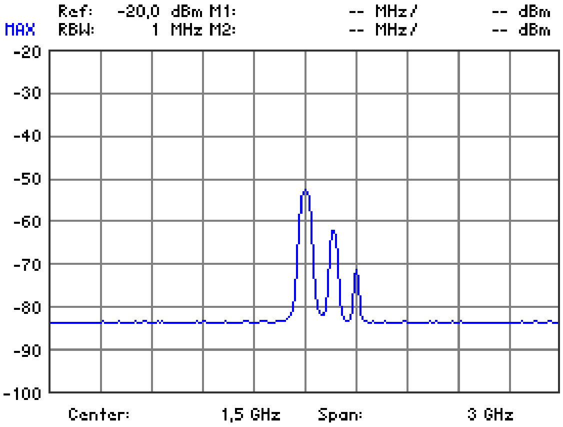
1. Press the HOLD **function key** in the TRACE **menu.**

   A selection field containing the available settings is displayed. The default setting is Min Hold.



2. Select a settings for displaying the active trace with **rotary knob** [10].
3. Press the **ENTER key** [5] to close the selection field.

   The MIN/MAX function is activated. This means that, after every sweep, the R&S FS300 only transfers the new measured value to the measured value memory if it is smaller/greater than the previous value. The current display mode , e. g. MAX , is displayed in the top left of the diagram area.

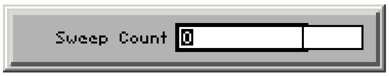

Ref: -20,0 dBm M1: -- MHz/ -- dBm
MAX RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz

Displaying average values

1. Press the TRACE AVERAGE **function key** in the TRACE **menu.**

   Averaging is activated. The average is taken over several frequency sweeps.

   An entry field for entering the number of frequency sweeps is displayed. The default setting is 0.



Sweep Count 0

2. Enter a new value (↗ 5-60).

   The entry range for the number of frequency sweeps is:

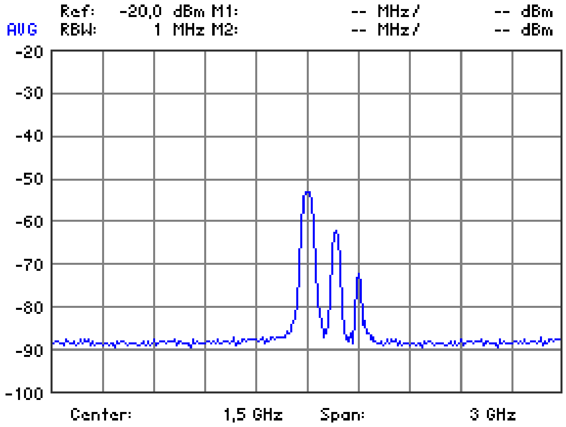
   0 ≤ Sweep Count ≤ 100

   where:

Sweep Count = 0	Continuous averaging
Sweep Count = 1	No averaging
Sweep Count > 1	Averaging over the specified number of frequency sweeps If the continuous sweep mode (↗ CONT. SWEEP, 6-128) has been selected, continuous averaging is automatically activated when the specified number of sweeps has been performed.

3. Press **ENTER key** [5] to close the entry field.

   The new setting is saved. Averaging is started and the result is displayed. The current display mode AVG is shown in the top left of the diagram area.


AVG
Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz

Freezing traces

1. Press the VIEW **function key** in the TRACE **menu**.

   The current trace is frozen and displayed.

2. Press the CLEAR/WRITE, HOLD or TRACE AVERAGE **function key** in the TRACE **menu** when you want to update the trace.

Blanking traces

- Press the BLANK **function key** in the TRACE **menu**.

  The trace is blanked out of the measurement diagram.

  If the trace has been frozen previously at some time, it can be returned to the display by pressing the VIEW function key. Otherwise, the trace is deleted.

6.2.5.3 Trace Difference Function

NOTE The MATH ⇒ function key is available only if both traces are turned on (↗ 6-131).

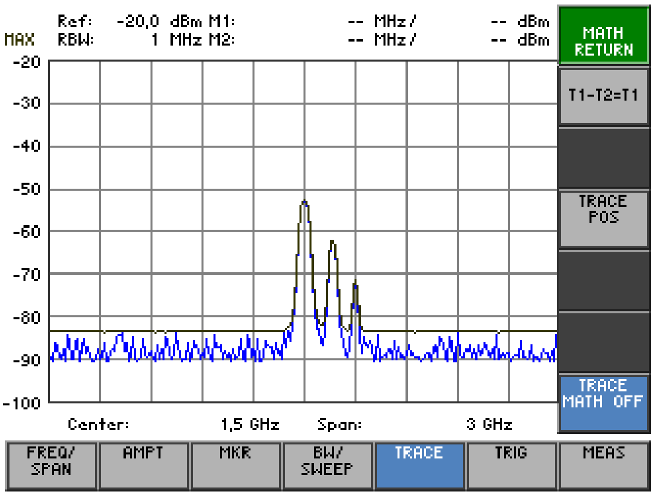
What the settings are for

You can activate the difference function for two traces (Trace 1, Trace 2) from the MATH submenu and use this function to analyze the input signal.

Selecting the MATH submenu

- Press the MATH ⇒ **function key** in the TRACE **menu.**

  The submenu opens and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz/ -- dBm
MAX RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 3 GHz
MATH RETURN
T1-T2=T1
TRACE POS
TRACE MATH OFF
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

MATH RETURN	Quitting the submenu	
T1-T2=T1	Activating the trace difference function	(↗ 6-138)
TRACE POS	Repositioning Trace 1 (result)	(↗ 6-138)
TRACE MATH OFF	Turning off the trace difference function	(↗ 6-138)

6.2.5.3.1 Activating the Trace Difference Function

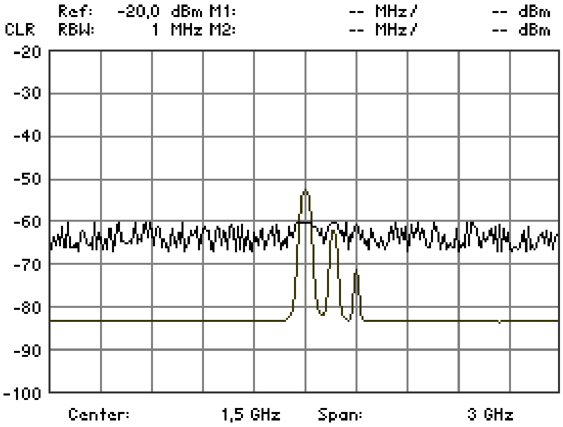
Use

You can use the R&S FS300's MATH function to directly determine differences between signals by forming the difference of two traces. The new reference for the difference trace is in the center of the measurement diagram (50 %). The difference trace can be moved within the measurement diagram by changing the reference.

Turning on the difference function

1. Press the T1-T2=T1 **function key** in the MATH ⇒ **submenu.**

   The new trace, Trace 1, is the difference of the old traces, e. g. T1 = T1 - T2. Each measured value represented by Trace 2 is subtracted from the corresponding measured value represented by Trace 1.



Repositioning Trace 1 (result)

2. Press the TRACE POS **function key** in the MATH ⇒ **submenu.**

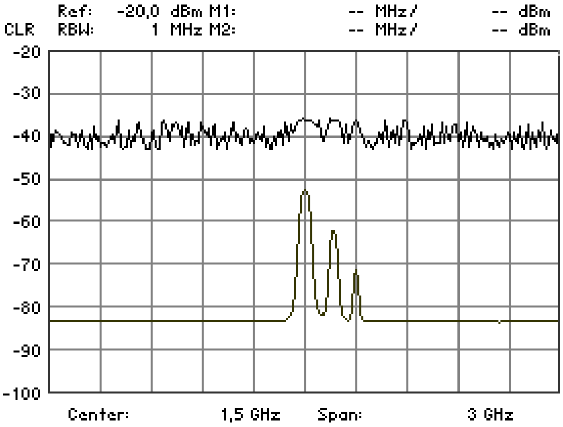
   A reference line is displayed in the middle of the current diagram area. The text “SCROLL or press ENTER” is displayed to tell you that the trace can be moved up or down.

3. Change the position of the reference line with **rotary knob** [10].

   The current position in % is displayed on the left above the reference line.

4. Press the **ENTER key** [5] to terminate scrolling.

   The text “SCROLL” disappears and Trace 1 is now in its new position. The new setting is saved.


Ref: -20,0 dBm M1: -- MHz/ -- dBm
CLR RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Span: 3 GHz

You can then display (↗ 6-134) and analyze (↗ 6-96) Trace 1 in any way you want.

Turning off the trace difference function

- Press the TRACE MATH OFF **function key** in the MATH ⇒ **submenu**.

  The difference function for the two traces (T1=T1-T2) is turned off and the two traces are again displayed independently.

NOTE While a math function is being performed on both traces, it is not possible to change the active trace.

6.2.6 Triggering Measurements (TRIG Menu)

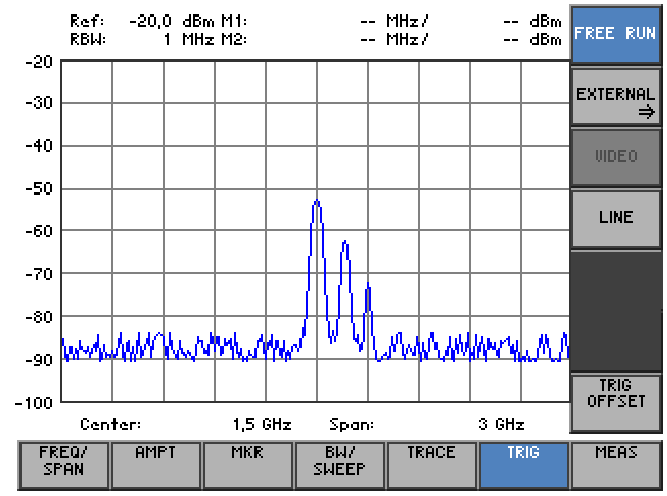
What the settings are for

From the TRIG menu, you can select a variety of trigger sources. You can set the trigger edge and the measurement time for external trigger signals (TTL).

Selecting the TRIG menu

- Select the TRIG **menu** with the ◀ or ▶ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys [12].



Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

Function key assignment

FREE RUN	Free-running measurement. No explicit triggering of the start of measurement	(↗ 6-141)
EXTERNAL ⇒	**Open submenu:** Triggering by an external TTL signal	(↗ 6-143)
VIDEO	Triggering by the display level	(↗ 6-141)
LINE	Triggering related to the zero crossings of the AC line voltage	(↗ 6-141)
TRIG OFFSET	Enter trigger offset	(↗ 6-144)

NOTE

The FREE RUN, EXTERNAL ⇒, VIDEO and LINE functions keys are selection keys. In other words, only one setting can be activated at any one time. The function key in question is highlighted.
The FREE RUN function is the default setting.

The VIDEO function key is available only in the time-domain display mode (ZERO SPAN).

6.2.6.1 Internal Trigger Sources

Use

Depending on the measurement, you can use a variety of criteria for triggering measurements in the frequency domain (SPAN > 0) or in the time domain (ZERO SPAN).

- Free-running triggering
- Triggering by the display level (only in the time domain, ZERO SPAN)
- Triggering by the AC line frequency

Free-running triggering

Suitable for measurements on stationary signals where a time reference is not necessary.

- Press the FREE RUN **function key** in the TRIG **menu.**

  There is no explicit triggering of the start of measurements. When one measurement has been completed, another is started immediately.

Triggering by display level (only available in time domain, ZERO SPAN)

If the video trigger is used, triggering on signals whose carrier amplitude is a function of time is possible. This means that measurements can be made on bursts which are often encountered in mobile radio applications.

1. Press the VIDEO **function key** in the TRIG **menu.**

   A horizontal trigger line is displayed in the diagram area. The associated trigger level is displayed above the trigger line on the left.

   An entry field for entering the trigger level is also displayed. The trigger level can be set to between 0 % and 100 % of the diagram height. The default setting is 50 % corresponding to e. g. -60.0 dBm.

Trig. Video 50 %

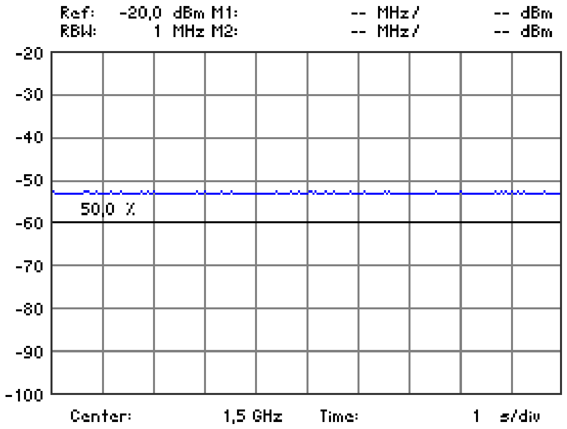
2. Enter a new value (↗ 5-60).

   The entry range for the trigger level is:

   0 % ≤ Trigger Video ≤ 100 %

3. Press the **ENTER key** [5] to close the entry field.

   The trigger line is in its new position and the current trigger level indicates how large the input level must be to start the next measurement.


Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
50,0 %
Center: 1,5 GHz Time: 1 s/div

Triggering by the AC line frequency

This makes it possible to perform synchronized measurements on video signals, for example, which can even be triggered using the frequency of the AC line.

- Press the LINE **function key** in the TRIG **menu.**

  The measurement is triggered by referencing the AC line.

6.2.6.2 External Trigger Sources

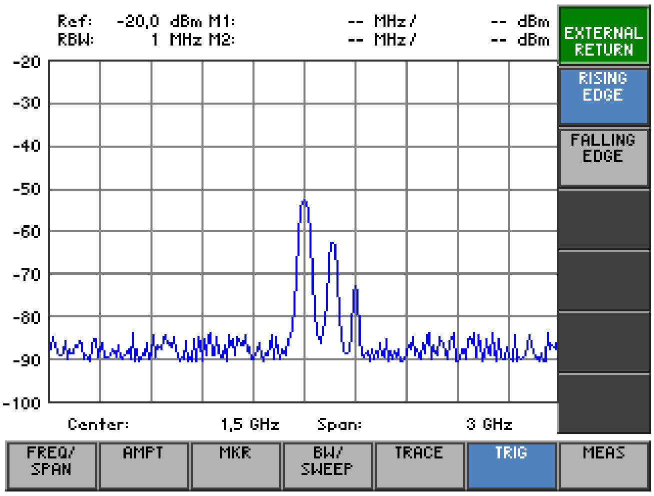
What the settings are for

From the EXTERNAL submenu, you can activate an external TTL signal and specify the trigger edge for triggering measurements.

Selecting the EXTERNAL submenu

- Press the EXTERNAL → **function key** in the TRIG **menu.**

  The submenu is opened and the appropriate functions are assigned to the function keys [12].



Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz

-20
-30
-40
-50
-60
-70
-80
-90
-100
EXTERNAL RETURN
RISING EDGE
FALLING EDGE
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

EXTERNAL RETURN	Quitting the submenu	
RISING EDGE	Triggering on the rising edge of the external TTL signal	(↗ 6-144)
FALLING EDGE	Triggering on the falling edge of the external TTL signal	(↗ 6-144)

NOTE

The RISING EDGE and FALLING EDGE function keys are selection keys. In other words, only one setting can be selected at any one time. The function key in question is highlighted.
The RISING EDGE function is the default setting.

6.2.6.2.1 Setting the Trigger Edge for External TTL Signals

Use

For certain measurements, you can use an external TTL signal (squarewave signal) as a trigger. The trigger period is user-selectable. The R&S FS300 allows you to set triggering on a rising or on a falling edge of the squarewave.

1. Connect the external signal source to the R&S FS300's input connector [14].

Rising trigger edge

2. **a)** Press the RISING EDGE **function key** in the EXTERNAL ⇒ **submenu.**

The measurement is started on every positive-going edge of the trigger signal.

Falling trigger edge

b) Press the FALLING EDGE **function key** in the EXTERNAL ⇒ **submenu.**

The measurement is started on every negative-going edge of the trigger signal.

6.2.6.3 Setting a Trigger Offset

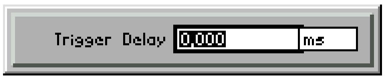
Use

If the time difference between the signal to be measured and the trigger event is too great ($t > t_{Sweep}$), you can enter a time (trigger offset) by which the trigger point will be advanced or delayed.

Entering a trigger offset

1. Press the TRIG OFFSET **function key** in the TRIG **menu.**

An entry field containing the current setting is displayed. The default setting is 0.000 ms.



Trigger Delay 0.000 ms

2. Enter a new value (↗ 5-60).

The entry range for the trigger offset is:

0 s ≤ Trigger Delay ≤ 100 ms (SPAN > 0)

-Sweep Time ≤ Trigger Delay ≤ 100 ms (ZERO SPAN)

3. Press the **ENTER key** [5] to close the entry field.

The new setting is saved and the trigger offset is added to the trigger point.

6.2.7 Measurement Functions (MEAS Menu)

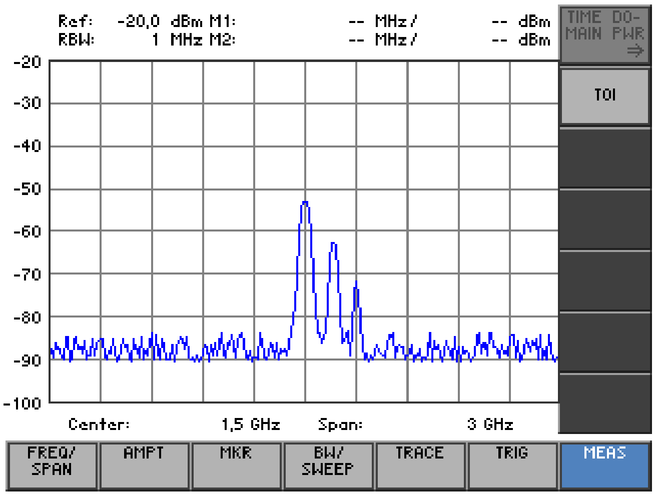
What the settings are for

From the MEAS menu, you can measure the power in the time domain (ZERO SPAN) as well as the third-order intercept point.

Selecting the MEAS menu

- Select the MEAS **menu** with the ◀ or ▶ **cursor key** [6].

  The menu name is highlighted and the appropriate functions are assigned to the function keys [12].


Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm
Center: 1,5 GHz Span: 3 GHz
-20
-30
-40
-50
-60
-70
-80
-90
-100
TIME DO-MAIN PWR ⇒
TOI
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

TIME DO-MAIN PWR ⇒	**Open submenu:** Measure the power in the time domain (ZERO SPAN)	(↗ 6-146)
TOI	Measure the third-order intercept point	(↗ 6-150)

NOTE The TIME DO-MAIN PWR ⇒ function key is only available in the time domain (ZERO SPAN).

6.2.7.1 Measuring the Power in the Time Domain

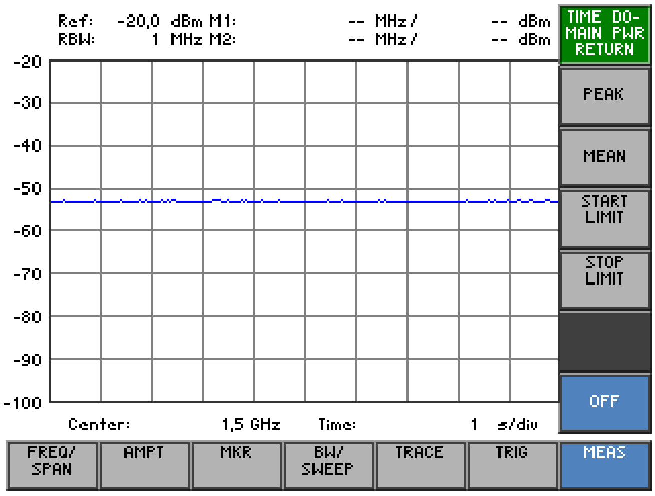
What the settings are for

From the TIME DOMAIN PWR submenu, you can determine the trace section for which the power measurement is to be performed. You can measure either the mean power (MEAN) or the peak power (PEAK).

Selecting the TIME DOMAIN PWR submenu

- Press the TIME DOMAIN PWR → **function key** in the MEAS **menu.**

  The submenu opens and the appropriate functions are assigned to the function keys [12].



Ref: -20,0 dBm M1: -- MHz / -- dBm
RBW: 1 MHz M2: -- MHz / -- dBm

Center: 1,5 GHz Time: 1 s/div

TIME DOMAIN PWR RETURN
PEAK
MEAN
START LIMIT
STOP LIMIT
OFF
-20
-30
-40
-50
-60
-70
-80
-90
-100
FREQ/ SPAN
AMPT
MKR
BW/ SWEEP
TRACE
TRIG
MEAS

Function key assignment

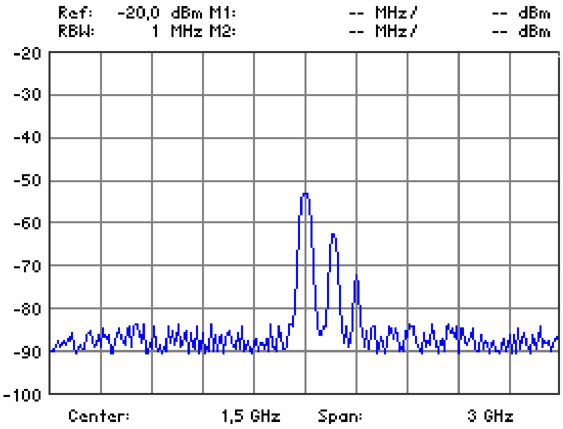
TIME DOMAIN PWR RETURN	Quitting the submenu	
PEAK	Output the peak value within the section	(↗ 6-147)
MEAN	Output the mean value within the section	(↗ 6-147)
START LIMIT	Insert a vertical line to limit the lower (left) part of a section	(↗ 6-147)
STOP LIMIT	Insert a vertical line to limit the upper (right) part of a section	(↗ 6-147)
OFF	Switch off the power measurement	(↗ 6-147)

6.2.7.1.1 Measuring the Power

Use

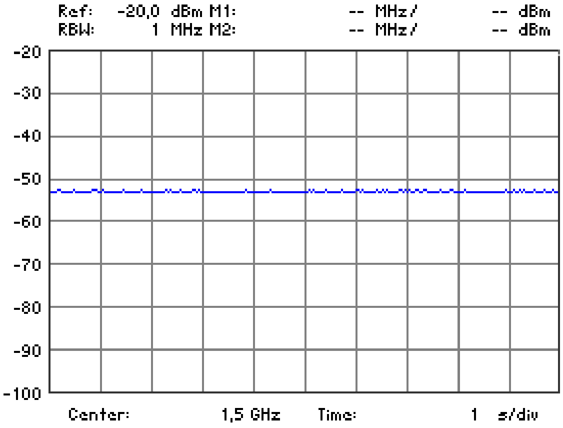
By using the "Time Domain Power" measurement function, the R&S FS300 determines in the time domain (ZERO SPAN) the power of the signal by integrating the pixels within the selected section. This allows you to measure the power of TDMA signals, for example, during the transmission phase or during the mute phase. You can measure either the mean power (MEAN) or the peak power (PEAK).

If both the switch-on and the switch-off phase of a burst signal are displayed, you can limit the measurement range to the transmission phase or the mute phase by means of the vertical lines. Since both phases are measured separately, you can determine the S/N power ratio of a TDMA signal, for example.



Activating the time domain mode

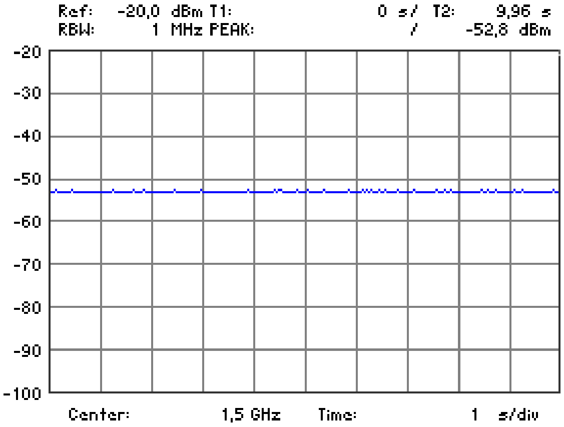
1. Switch the R&S FS300 to the time domain mode (ZERO SPAN, ↗ 6-83).



Activating the measurement

2. Press the PEAK **function key** in the TIME DOMAIN PWR ⇒ **submenu.**

The maximum power is measured within the limit lines T1 and T2 and displayed in the parameter field (PEAK:). In the default setting, these are the left (T1) and the right (T2) limit lines of the measurement diagram.

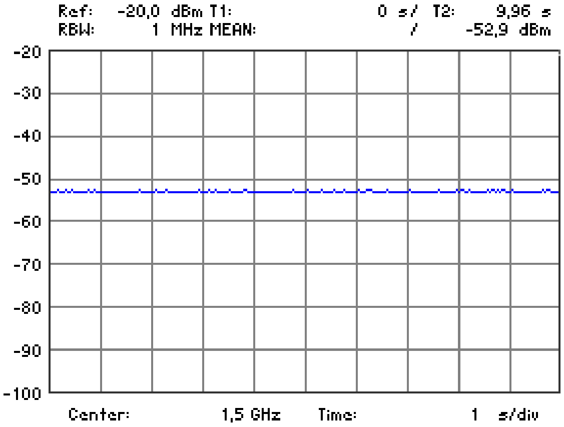


Ref: -20,0 dBm T1: 0 s/ T2: 9,96 s
RBW: 1 MHz PEAK: / -52,8 dBm

Center: 1,5 GHz Time: 1 s/div

3. Press the MEAN **function key** in the TIME DOMAIN PWR ⇒ **submenu.**

The mean power is measured within the limit lines T1 and T2 and displayed in the parameter field (MEAN:). In the default setting, these are the left and the right limit lines of the measurement diagram.



Ref: -20,0 dBm T1: 0 s/ T2: 9,96 s
RBW: 1 MHz MEAN: / -52,9 dBm

Center: 1,5 GHz Time: 1 s/div

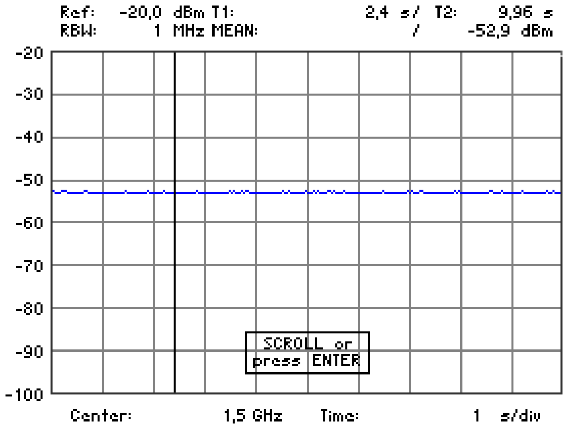
Changing the measurement range (limit lines)

1. Press the START LIMIT **function key** in the TIME DO-MAIN PWR ⇒ **submenu.**

   A limit line is inserted at the left side of the diagram. The "SCROLL or press ENTER" display shows you that the limit lines can be scrolled to the left or to the right.

2. Use the **rotary knob** [10] to change the position of the limit line.

   The current position T1 of the left limit line and the new measured parameter are displayed in the parameter field.


Ref: -20,0 dBm T1: 2,4 s/ T2: 9,96 s
RBW: 1 MHz MEAN: / -52,9 dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
SCROLL or press ENTER
Center: 1,5 GHz Time: 1 s/div

3. Press the **ENTER key** [5] to terminate scrolling.

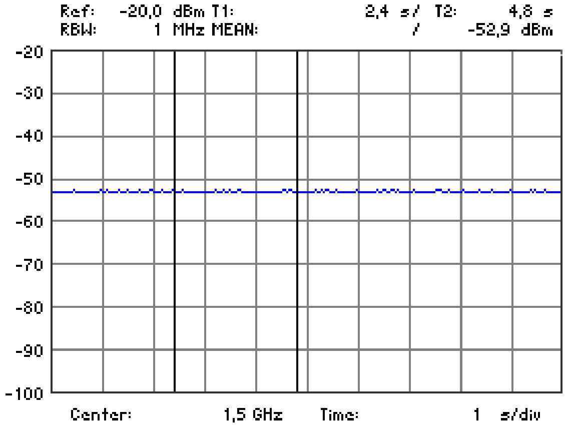
   The SCROLL inscription disappears and the limit line is repositioned.

4. Press the STOP LIMIT **function key** in the TIME DO-MAIN PWR ⇒ **submenu.**

   A limit line is inserted at the right end of the diagram.

5. Repeat steps 2 to 5 to position the right limit line.

   The current position T2 of the right limit line and the new measured parameter are displayed in the parameter field.


Ref: -20,0 dBm T1: 2,4 s/ T2: 4,8 s
RBW: 1 MHz MEAN: / -52,9 dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz Time: 1 s/div

Deactivating the measurement

- Press the OFF **function key** in the TIME DO-MAIN PWR ⇒ **submenu.**

  The "Time Domain Power" measurement function is deactivated.

6.2.7.2 Measuring the Third-Order Intercept Point

Use

If two signals with different frequencies are applied to a DUT with non-linear characteristic, intermodulation products occur at the output. Third-order mixture products are of particular importance since they are close to the useful signals.

The frequencies of the noise products f_{s1} and f_{s2} are located above and below the frequencies of the input signals f_{n1} and f_{n2}:

$$\mathbf{F_{s1} = 2 \times f_{n1} - f_{n2}}$$

$$\mathbf{F_{s2} = 2 \times f_{n2} - f_{n1}}$$

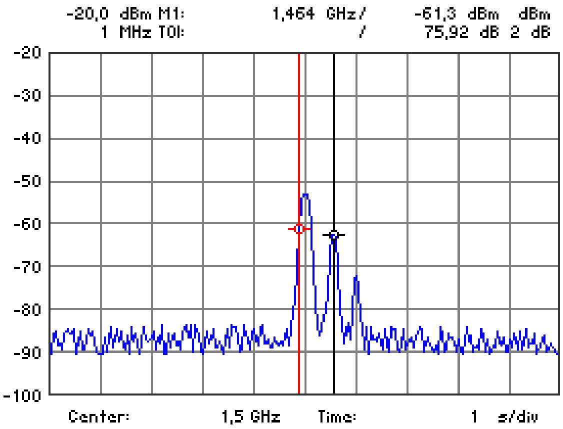
A third-order intercept point can be easily calculated with the input signals at the same level P_n plus the measured value of an intermodulation product:

$$\mathbf{IP3 = a_{d3}/2 + P_n}$$

When the TOI function is set and the markers are set to the input signals, the R&S FS300 automatically measures the intermodulation products and displays the value calculated for the intercept point.

Setting the markers to the input signals

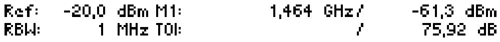
1. Set markers 1 and 2 to the two input signals (↗ 6-98, 6-102).



Activating the measurement

2. Press the TOI **function key** in the MEAS **submenu.**

   The TOI measurement is activated and the function key is highlighted. The value calculated for the TOI is displayed in the parameter field.



```
Ref:   -20,0  dBm M1:          1,464  GHz/     -61,3  dBm
RBW:       1  MHz TOI:                  /       75,92  dB
```

Deactivating the measurement

- Press the TOI **function key** in the MEAS **submenu.**

  The TOI measurement is deactivated and the function key is no longer highlighted.

6.3 SYSTEM Functions (SYS Key)

Introduction

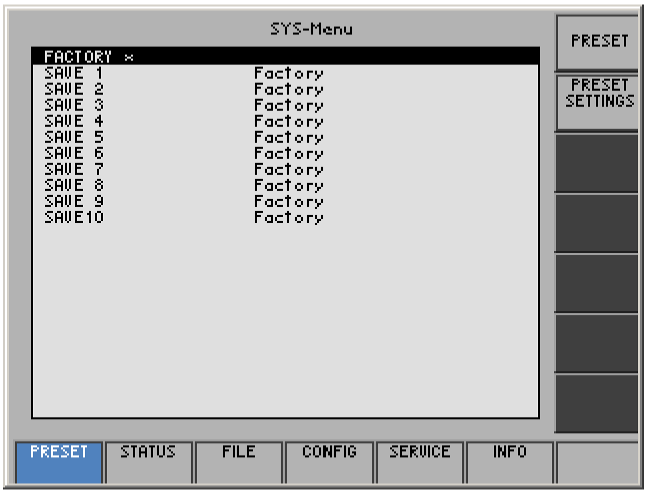
The R&S FS300 has system and service functions as well as measurement functions.
All current settings can be called so that they can be viewed at a glance, and saved for use at a later date, a selftest can be run on the R&S FS300 and the system settings configured. Furthermore, the R&S FS300 can be switched over from remote control to local mode.

Switching over the user interface

When the R&S FS300 has been switched on and the selftest has run without detecting any faults, the spectrum analyzer's user interface is activated.

1. Press the **SYS key** [3].

The measurement diagram and the parameter field are blanked out. The menus for the system and service functions are brought up on the screen in the menu area and the appropriate functions are assigned to the function keys [12]. Depending on the function key assignment, the associated parameters are listed as tables in the diagram area.



FACTORY ×	
SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	Factory
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory

2. Press the **SYS key** [3].

The **new** settings are saved and the spectrum analyzer's user interface is activated again.

Press the **ESC/CANCEL key** [4].

The **old** settings are retained and the spectrum analyzer's user interface is activated again.

Menus for system and service functions

PRESET	Selects and calls the instrument‘s default setting	(↗ 6-153)
STATUS	Displays the current instrument settings	(↗ 6-155)
FILE	Saves and loads user-defined settings	(↗ 6-156)
CONFIG	System settings	(↗ 6-165)
SERVICE	Service functions	(↗ 6-174)
INFO	System information	(↗ 6-175)

6.3.1 Instrument Default Setting (Menu PRESET)

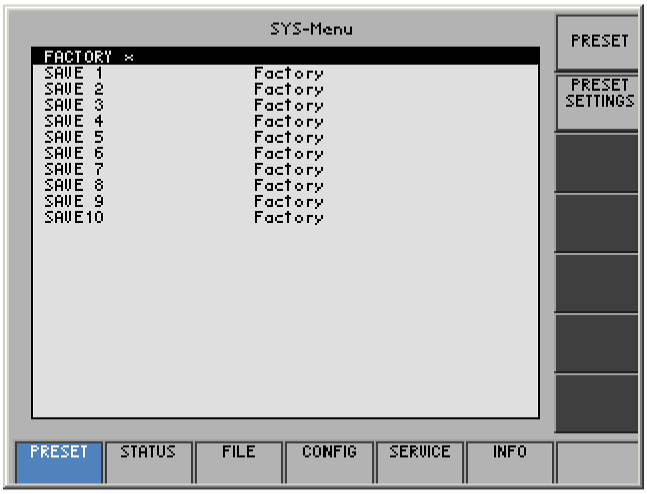
What the settings are for

From the PRESET menu, you can specify a user-defined instrument setting as the instrument default setting and directly call it.

Selecting the PRESET menu

1. Press the **SYS key** [3].
2. Select the **menu** PRESET with the ◂ or ▸ **cursor key** [6].

   The menu name is highlighted and the appropriate functions are assigned to the function keys [12].



```
FACTORY *
SAVE  1           Factory
SAVE  2           Factory
SAVE  3           Factory
SAVE  4           Factory
SAVE  5           Factory
SAVE  6           Factory
SAVE  7           Factory
SAVE  8           Factory
SAVE  9           Factory
SAVE10            Factory
```

Function key assignment

PRESET	Calls an instrument default setting	(↗ 6-154)
PRESET SETTINGS	Selects an instrument default setting	(↗ 6-154)

6.3.1.1 Selecting and Calling the Instrument Default Setting

Use

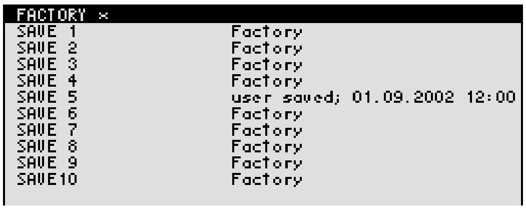
When you switch on the R&S FS300, those settings that were valid when the R&S FS300 was last switched off are restored.

The R&S FS300 also lets you save and call user-defined instrument settings. If you frequently use one of these settings and want to load it quickly, you can define this setting to be the PRESET (default setting) and call it directly at any time.

Selecting user-defined settings

1. Save the user-defined settings (↗ 6-157).
2. Select the **menu** PRESET with the ◂ or ▸ **cursor key** [6].

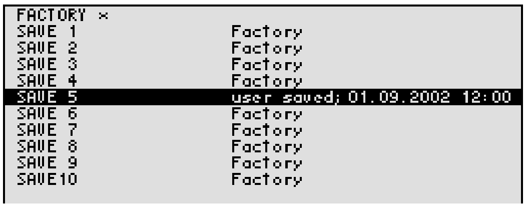
   A table containing the available settings is displayed. The current setting is marked with the sign x.



```
FACTORY ×
SAVE 1              Factory
SAVE 2              Factory
SAVE 3              Factory
SAVE 4              Factory
SAVE 5              user saved; 01.09.2002 12:00
SAVE 6              Factory
SAVE 7              Factory
SAVE 8              Factory
SAVE 9              Factory
SAVE10              Factory
```

3. Select a setting with the ▴ or ▾ **cursor key** [7].

   The selected option is highlighted.
   The PRESET memory location FACTORY contains the factory setting (↗ 6-74).



```
FACTORY ×
SAVE 1              Factory
SAVE 2              Factory
SAVE 3              Factory
SAVE 4              Factory
SAVE 5              user saved; 01.09.2002 12:00
SAVE 6              Factory
SAVE 7              Factory
SAVE 8              Factory
SAVE 9              Factory
SAVE10              Factory
```

4. Press the **function key** PRESET SETTINGS.

   The setting is defined to be the instrument default setting and is marked with the sign x.

Activating the instrument default setting

5. Press the PRESET **function key** in the PRESET **menu**.

   The current instrument default setting is loaded and the SYS menu is leaved. The spectrum analyzer's user interface is activated again.

NOTE

If no user-defined settings have been defined, the PRESET function key PRESET is assigned the FACTORY PRESET, e.g. the factory default setting (↗ 6-74).

6.3.2 Displaying the Current Instrument Setting (STATUS Menu)

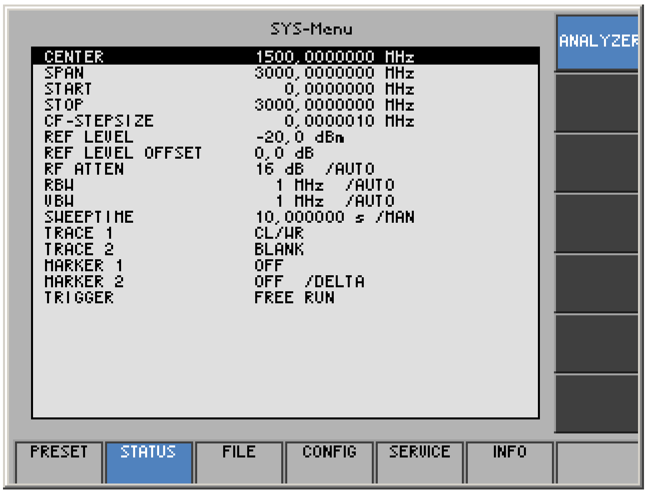
What the settings are for

From the STATUS menu, you can display an overview of the principal current instrument settings.

Selecting the STATUS menu

1. Press the **SYS key** [3].
2. Select the STATUS **menu** with the ◀ or ▶ **cursor key** [6].

   The principal spectrum-analyzer parameters and the current settings are listed in a table.



```
CENTER                1500,0000000 MHz
SPAN                  3000,0000000 MHz
START                    0,0000000 MHz
STOP                  3000,0000000 MHz
CF-STEPSIZE              0,0000010 MHz
REF LEVEL             -20,0 dBm
REF LEVEL OFFSET      0,0 dB
RF ATTEN              16 dB  /AUTO
RBW                     1 MHz  /AUTO
VBW                     1 MHz  /AUTO
SWEEPTIME             10,000000 s /MAN
TRACE 1               CL/WR
TRACE 2               BLANK
MARKER 1              OFF
MARKER 2              OFF  /DELTA
TRIGGER               FREE RUN
```

Explanation of parameters

CENTER	Center frequency	(↗ 6-77)
SPAN	Frequency span	(↗ 6-77)
START	Start frequency for span	(↗ 6-78)
STOP	Stop frequency for span	(↗ 6-78)
CF-STEPSIZE	Entering the step width of the center frequency	(↗ 6-79)
REF LEVEL	Reference level	(↗ 6-88)
REF LEVEL OFFSET	Reference level offset	(↗ 6-89)
RF ATTEN	RF input attenuation	(↗ 6-93)
RBW	Resolution bandwidth	(↗ 6-122)
VBW	Video bandwidth	(↗ 6-123)
SWEEPTIME	Sweep time	(↗ 6-126)
TRACE 1	Display mode for Trace 1	(↗ 6-131)
TRACE 2	Display mode for Trace 2	(↗ 6-131)
MARKER 1	Marker 1 display	(↗ 6-98)
MARKER 2	Marker 2 display	(↗ 6-102)
TRIGGER	Trigger source	(↗ 6-140)

6.3.3 User-Defined Settings (FILE Menu)

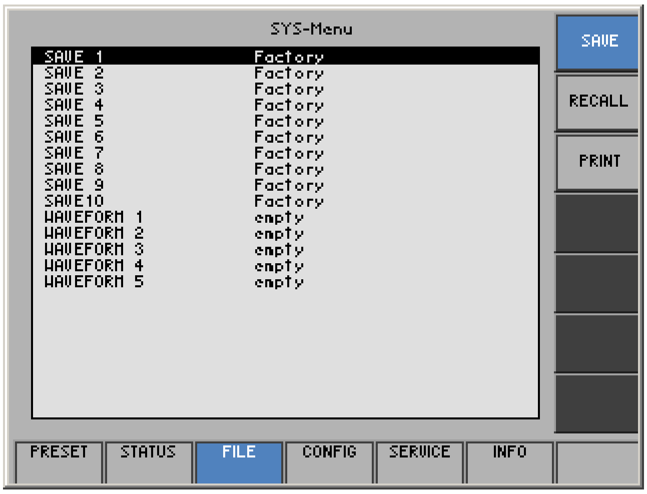
What the settings are for

You can save user-defined settings and waveforms and load them when required from the FILE menu. You can also print out a screenshot.

Selecting the FILE menu

1. Press the **SYS key** [3].
2. Select the FILE **menu** with the ◂ or ▸ **cursor key** [6].

   The menu name is highlighted and the appropriate functions are assigned to the function keys [12].



```
SAVE 1          Factory
SAVE 2          Factory
SAVE 3          Factory
SAVE 4          Factory
SAVE 5          Factory
SAVE 6          Factory
SAVE 7          Factory
SAVE 8          Factory
SAVE 9          Factory
SAVE10          Factory
WAVEFORM 1      empty
WAVEFORM 2      empty
WAVEFORM 3      empty
WAVEFORM 4      empty
WAVEFORM 5      empty
```

Function key assignment

SAVE	Saves a user-defined setting/waveform	(↗ 6-157, 6-159)
RECALL	Loads a user-defined setting/waveform	(↗ 6-157, 6-159)
PRINT	Prints out a screenshot	(↗ 6-161)

6.3.3.1 Saving and Loading User-Defined Settings

Use

When you switch on the R&S FS300, those settings that were valid when the R&S FS300 was last switched off are restored.

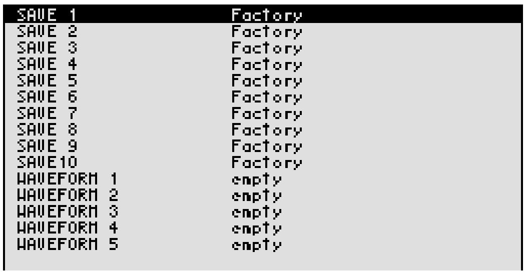
The R&S FS300 also lets you save and load user-defined settings.

You can save 10 different settings (SAVE 1 to 10). When the R&S FS300 is delivered, the factory settings are loaded in the SAVE memory locations.

Saving user-defined settings

1. Set up the R&S FS300 for the measurement you want to perform (↗ 6-74).
2. Press the SAVE **function key** in the FILE **menu**.

   A table containing the available settings is displayed (memory locations).

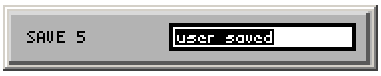


```
SAVE 1          Factory
SAVE 2          Factory
SAVE 3          Factory
SAVE 4          Factory
SAVE 5          Factory
SAVE 6          Factory
SAVE 7          Factory
SAVE 8          Factory
SAVE 9          Factory
SAVE10          Factory
WAVEFORM 1      empty
WAVEFORM 2      empty
WAVEFORM 3      empty
WAVEFORM 4      empty
WAVEFORM 5      empty
```

3. Select a setting with the ▲ or ▼ **cursor key** [7].

   The selected option is highlighted.
4. Press the **ENTER key** [5].

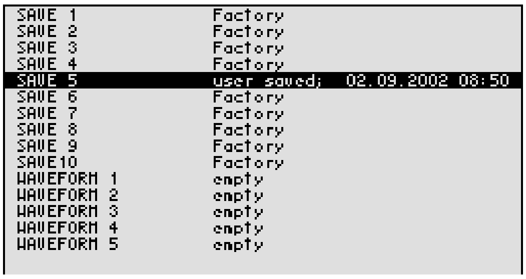
   An entry field for entering a file name is displayed. The default setting is “user saved”.



```
SAVE 5       user saved
```

5. Enter a new file name from the **numerical keys** [11] or from an external keyboard (↗ 3-46).
6. Press the **ENTER key** [5].

   The current setting is saved and the text “Factory” is replaced by the file name, the date and time.

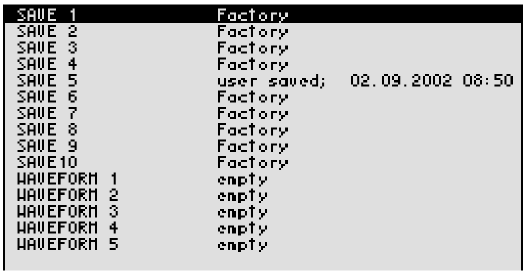


```
SAVE 1          Factory
SAVE 2          Factory
SAVE 3          Factory
SAVE 4          Factory
SAVE 5          user saved;  02.09.2002 08:50
SAVE 6          Factory
SAVE 7          Factory
SAVE 8          Factory
SAVE 9          Factory
SAVE10          Factory
WAVEFORM 1      empty
WAVEFORM 2      empty
WAVEFORM 3      empty
WAVEFORM 4      empty
WAVEFORM 5      empty
```

Loading user-defined settings

1. Press the RECALL **function key** in the FILE **menu**.

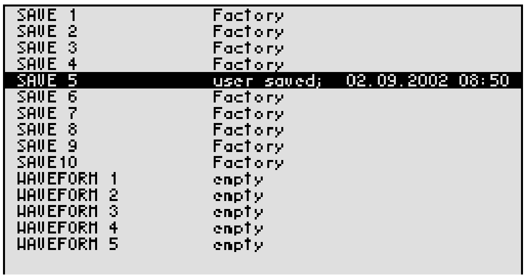
   A table containing the available settings is displayed (memory locations).



SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 02.09.2002 08:50
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory
WAVEFORM 1	empty
WAVEFORM 2	empty
WAVEFORM 3	empty
WAVEFORM 4	empty
WAVEFORM 5	empty

2. Select a setting with the ▲ or ▼ **cursor key** [7].

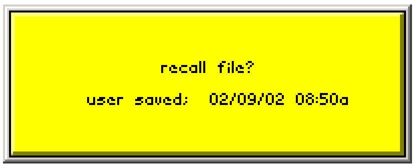
   Note: The “Factory” memory location contains the factory setting (↗ 6-74).



SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 02.09.2002 08:50
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory
WAVEFORM 1	empty
WAVEFORM 2	empty
WAVEFORM 3	empty
WAVEFORM 4	empty
WAVEFORM 5	empty

3. Press the **ENTER key** [5].

   The following message is displayed.



recall file?

user saved: 02/09/02 08:50a

4. Press the **ENTER key** [5].

   The setting you have selected is loaded.

5. Press the **SYS key** [3].

   The SYS menu is leaved and the spectrum analyzer’s user interface with loaded setting is activated again.

NOTE

If you frequently use one of the saved settings and want to load it quickly, you can define this setting to be the PRESET (default setting) and call it directly at any time. (↗ 6-154).

6.3.3.2 Saving and Loading Waveforms

Use

When you switch on the R&S FS300, those settings that were valid when the R&S FS300 was last switched off are restored.

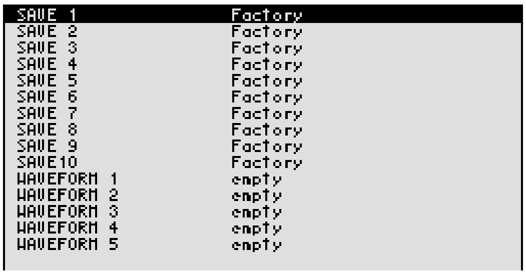
The R&S FS300 also lets you save and load waveforms.

You can save 5 traces (WAVE 1 to 5). When the R&S FS300 is delivered, the WAVE memory locations are empty.

Saving waveforms

1. Set up the R&S FS300 for the measurement you want to perform (↗ 6-74).
2. Press the SAVE **function key** in the FILE **menu**.

   A table containing the available settings is displayed (memory locations).

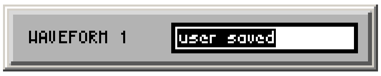


SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	Factory
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory
WAVEFORM 1	empty
WAVEFORM 2	empty
WAVEFORM 3	empty
WAVEFORM 4	empty
WAVEFORM 5	empty

3. Select a setting with the ▲ or ▼ **cursor key** [7].

   The selected option is highlighted, e.g. WAVEFORM 1.
4. Press the **ENTER key** [5].

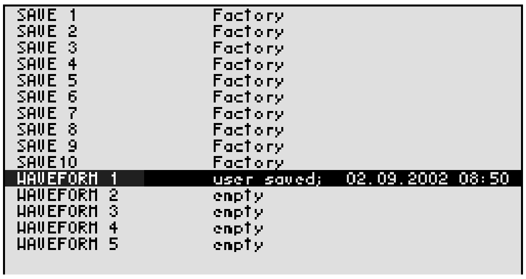
   An entry field for entering a file name is displayed. The default setting is “user saved”.



WAVEFORM 1 user saved

5. Enter a new file name from the **numerical keys** [11] or from an external keyboard (↗ 3-46).
6. Press the **ENTER key** [5].

   The current setting is saved and the text “empty” is replaced by the file name, the date and time.

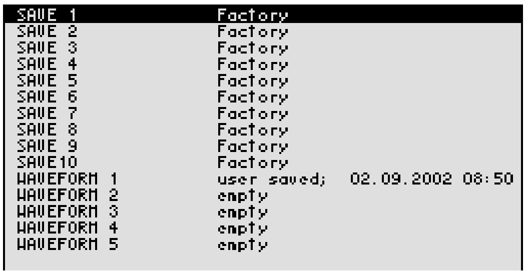


SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	Factory
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory
WAVEFORM 1	user saved; 02.09.2002 08:50
WAVEFORM 2	empty
WAVEFORM 3	empty
WAVEFORM 4	empty
WAVEFORM 5	empty

Loading waveforms

1. Press the RECALL **function key** in the FILE **menu**.

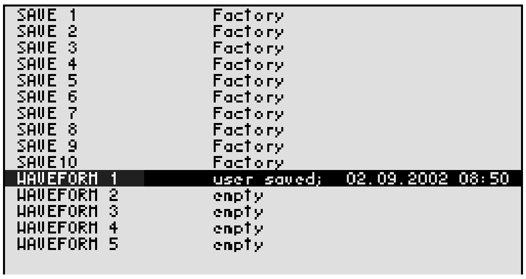
   A table containing the available settings is displayed (memory locations).



```
SAVE 1          Factory
SAVE 2          Factory
SAVE 3          Factory
SAVE 4          Factory
SAVE 5          Factory
SAVE 6          Factory
SAVE 7          Factory
SAVE 8          Factory
SAVE 9          Factory
SAVE10          Factory
WAVEFORM 1      user saved;   02.09.2002 08:50
WAVEFORM 2      empty
WAVEFORM 3      empty
WAVEFORM 4      empty
WAVEFORM 5      empty
```

2. Select a setting with the ▲ or ▼ **cursor key** [7].

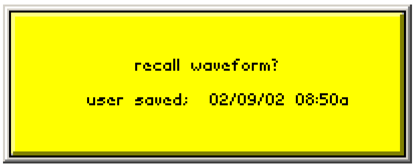
   The EMPTY memory location contains no waveform.



```
SAVE 1          Factory
SAVE 2          Factory
SAVE 3          Factory
SAVE 4          Factory
SAVE 5          Factory
SAVE 6          Factory
SAVE 7          Factory
SAVE 8          Factory
SAVE 9          Factory
SAVE10          Factory
WAVEFORM 1      user saved;   02.09.2002 08:50
WAVEFORM 2      empty
WAVEFORM 3      empty
WAVEFORM 4      empty
WAVEFORM 5      empty
```

3. Press the **ENTER key** [5].

   The following message is displayed.



```
recall waveform?

user saved;  02/09/02 08:50a
```

4. Press the **ENTER key** [5].

   The selected trace will be reloaded to the inactive trace memory (trace 1 or trace 2).

5. Press the **SYS key** [3].

   The SYS menu is leaved and the spectrum analyzer's user interface is activated again.

6.3.3.3 Printing out a Screenshot

Use

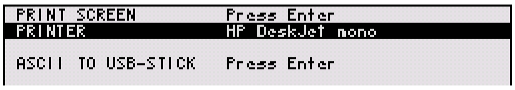
The R&S FS300 prints out (printer) or saves (USB stick) a current screenshot when you press the SYS key and an overview of the principal current instrument settings. A printer with a USB device connector or a USB stick is required.

Selecting an output unit

1. Press the PRINT **function key** in the FILE **menu**.

   A table containing the available parameters is displayed.

2. Select the **PRINTER** parameter with the ▲ or ▼ **cursor key** [7].

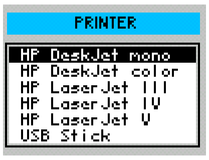


```
PRINT SCREEN          Press Enter
PRINTER               HP DeskJet mono

ASCII TO USB-STICK    Press Enter
```

3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “HP DeskJet mono“.



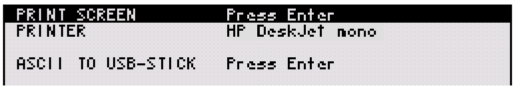
4. Select a setting with the **rotary knob** [10].
5. Press the **ENTER key** [5] to close the selection field.

   The setting is saved and the printer driver is loaded.

Printing out a screenshot

1. Connect a printer to the **USB device connector** [16].
2. Select a printer for the output unit (↗ 6-161).
3. Press the PRINT **function key** in the FILE **menu**.

   A table containing the available parameters is displayed.
4. Select the **PRINT SCREEN** parameter with the ▲ or ▼ **cursor key** [7].

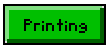


```
PRINT SCREEN          Press Enter
PRINTER               HP DeskJet mono

ASCII TO USB-STICK    Press Enter
```

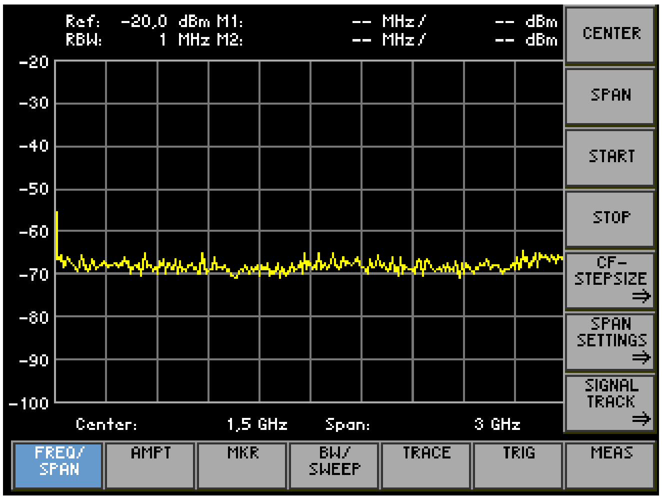
5. Press the **ENTER key** [5].

   The following message is displayed.



Printing

A current screenshot and an overview of the principal current instrument settings (↗ 6-155) is printed out, e. g.:


Ref: -20,0 dBm M1: -- MHz/ -- dBm
RBW: 1 MHz M2: -- MHz/ -- dBm
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center: 1,5 GHz
Span: 3 GHz
CENTER
SPAN
START
STOP
CF-STEPSIZE
SPAN SETTINGS
SIGNAL TRACK
FREQ/SPAN
AMPT
MKR
BW/SWEEP
TRACE
TRIG
MEAS

UMT/FS300 Spectrum Analyzer

Rohde & Schwarz, Munich

Mit 29 Jan 2003 12:46:15 CET

Version 1.05

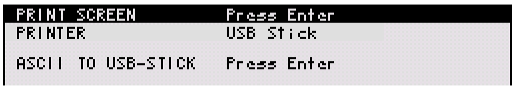
from 29.01.2003

```
CENTER                1500,0000000 MHz
SPAN                  3000,0000000 MHz
START                    0,0000000 MHz
STOP                  3000,0000000 MHz
CF-STEPSIZE            300,0000000 MHz
REF LEVEL             -20,0 dBm
REF LEVEL OFFSET      0,0 dB
RF ATTEN              16 dB  /AUTO
RBW                     1 MHz  /AUTO
VBW                     1 MHz  /AUTO
SWEEPTIME             59,100002 ms /AUTO
TRACE 1               CL/WR
TRACE 2               BLANK
MARKER 1              OFF
MARKER 2              OFF  /DELTA
TRIGGER               FREE RUN
```

Saving the screenshot as a bitmap (.bmp) in the USB stick

1. Connect the USB stick to the **USB device connector** [16].
2. Select the USB stick for the output unit (↗ 6-161).
3. Press the PRINT **function key** in the FILE **menu**.

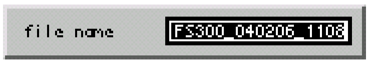
   A table containing the available parameters is displayed.
4. Select the **PRINT SCREEN** parameter with the ▲ or ▼ **cursor key** [7].



PRINT SCREEN	Press Enter
PRINTER	USB Stick
ASCII TO USB-STICK	Press Enter

5. Press the **ENTER key** [5].

   An entry field for entering a file name is displayed. The default setting is “FS_Date_Time”.



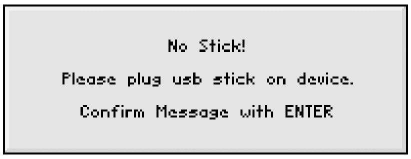
file name FS300_040206_1108

   NOTE: If you wish you can enter a new file name from the **numerical keys** [11] or from an external keyboard (↗ 3-46).
6. Press the **ENTER key** [5].

   The current screenshot before you press the SYS button is saved as a bitmap (.bmp) in the USB stick.

NOTE

When the USB stick is not connected the following message is displayed:



No Stick!

Please plug usb stick on device.

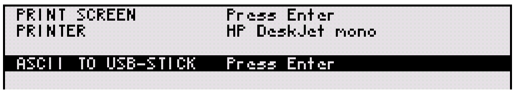
Confirm Message with ENTER

- Connect the USB stick to the USB device connector [16] and confirm the message by pressing the ENTER key [5].

Saving the waveform data as an ASCII file (.asc) in the USB stick

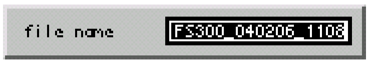
1. Connect the USB stick to the **USB device connector** [16].
2. Press the PRINT **function key** in the FILE **menu**.

   A table containing the available parameters is displayed.
3. Select the **ASCII TO USB-STICK** parameter with the ▲ or ▼ **cursor key** [7].

   PRINT SCREEN Press Enter
   PRINTER HP DeskJet mono
   ASCII TO USB-STICK Press Enter
4. Press the **ENTER key** [5].

   An entry field for entering a file name is displayed. The default setting is "FS_Date_Time".

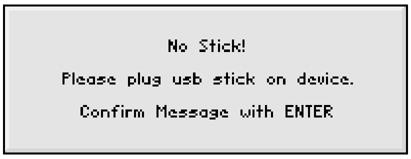
   file name FS300_040206_1108

   NOTE: If you wish you can enter a new file name from the **numerical keys** [11] or from an external keyboard (↗ 3-46).
5. Press the **ENTER key** [5].

   The current screenshot before you press the SYS button is saved as an ASCII file (.asc) in the USB stick.

NOTE

When the USB stick is not connected the following message is displayed:



No Stick!
Please plug usb stick on device.
Confirm Message with ENTER

- Connect the USB stick to the USB device connector [16] and confirm the message by pressing the ENTER key [5].

6.3.4 System Settings (CONFIG Menu)

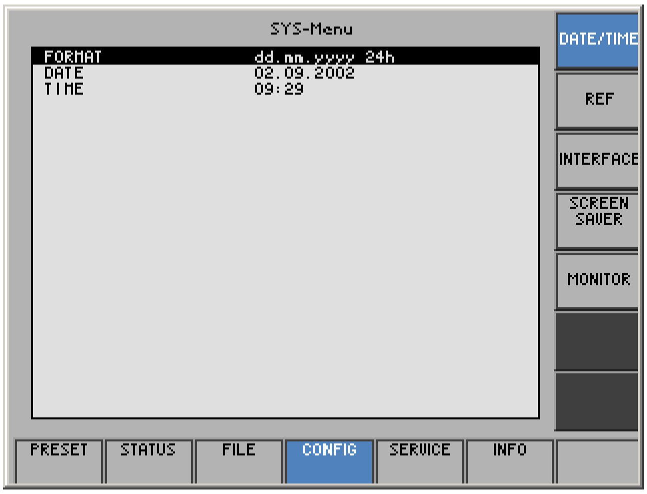
What the settings are for

You can configure the general system parameters for time/date, reference source, instrument interface and screen saver from the CONFIG menu.

Selecting the CONFIG menu

1. Press the **SYS key** [3].
2. Select the CONFIG **menu** with the ◀ or ▶ **cursor key** [6].

   The menu name is highlighted and the appropriate functions are assigned to the function keys [12].


SYS-Menu
DATE/TIME
REF
INTERFACE
SCREEN SAVER
MONITOR
PRESET
STATUS
FILE
CONFIG
SERVICE
INFO

FORMAT	dd.mm.yyyy 24h
DATE	02.09.2002
TIME	09:29

Function key assignment

DATE/TIME	Sets the date and time	(↗ 6-166)
REF	Selects an internal or external reference source	(↗ 6-168)
INTERFACE	Configures the instrument interfaces	(↗ 6-169)
SCREEN SAVER	Sets the screen saver mode	(↗ 6-171)
MONITOR	Selects an internal or external monitor	(↗ 6-173)

6.3.4.1 Setting the Date and Time of Day

Use

When you save a setting, it is time-stamped using the time provided by the internal real-time clock (↗ 6-157).

When you set the internal real-time clock, you can choose between two date and time display format options and modify the parameters.

- **dd.mm.yyyy 24 h clock**
- **mm/dd/yyyy 12 h clock**

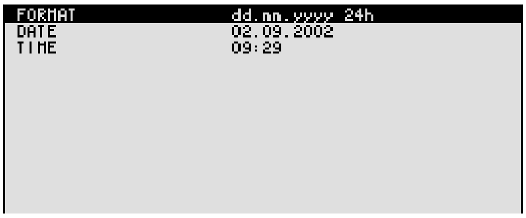
where: d - day
m - month
y - year

Selecting the display format

1. Press the DATE/TIME **functions key** in the CONFIG **menu**.

   A table containing the available parameters is displayed.

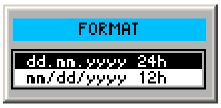
2. Select the **FORMAT** parameter with the ▲ or ▼ **cursor key** [7].



FORMAT dd.mm.yyyy 24h
DATE 02.09.2002
TIME 09:29

3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “dd.mm.yyyy”.



FORMAT
dd.mm.yyyy 24h
mm/dd/yyyy 12h

4. Select a setting with the **rotary knob** [10].
5. Press the **ENTER key** [5] to close the selection field.

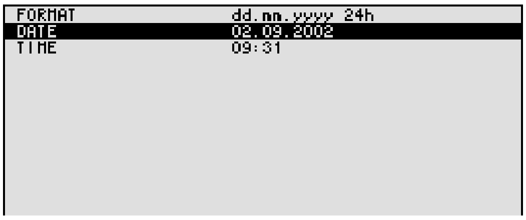
   The setting is saved and the display format updated.

Setting the date

1. Press the DATE/TIME **function key** in the CONFIG **menu**.

   A table containing the available parameters is displayed.

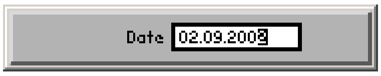
2. Select the **DATE** parameter with the ▲ or ▼ **cursor key** [7].



FORMAT	dd.mm.yyyy 24h
DATE	02.09.2002
TIME	09:31

3. Press the **ENTER key** [5].

   An entry field containing the current setting is displayed.



Date 02.09.2002

4. Enter a new value (↗ 5-60).
5. Press the **ENTER key** [5].

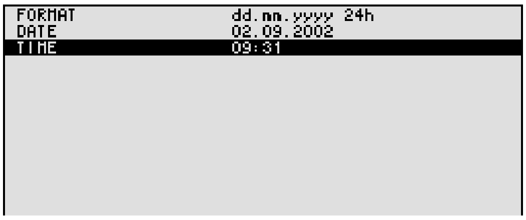
   The setting is saved and displayed.

Setting the time

1. Press the DATE/TIME **function key** in the CONFIG **menu**.

   A table listing the available parameters is displayed.

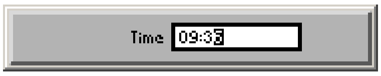
2. Select the **TIME** parameter with the ▲ or ▼ **cursor key** [7].



FORMAT	dd.mm.yyyy 24h
DATE	02.09.2002
TIME	09:31

3. Press the **ENTER key** [5].

   An entry field containing the current setting is displayed.



Time 09:31

4. Enter a new value (↗ 5-60).
5. Press the **ENTER key** [5].

   The setting is saved and displayed.

6.3.4.2 Selecting an Internal or External Reference Source

Use

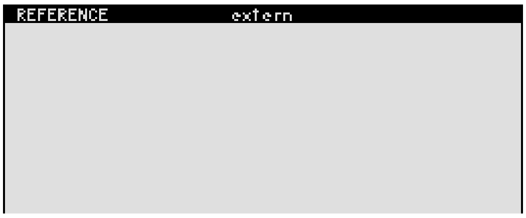
The R&S FS300 acting as the frequency standard for all internal oscillators can use the internal reference source (**internal**) or an external reference source (**external**). A 10 MHz crystal oscillator is used as the internal reference source. When the default setting is activated (internal reference), a 10 MHz frequency is output at the REF OUT rear-panel connector [23] to synchronize other devices to the R&S FS300 reference frequency, for example.

When the “REFERENCE external” setting is activated, the REF IN connector [22] is used as the input for an external frequency standard. All the R&S FS300’s internal oscillators are synchronized to this external reference frequency (also 10 MHz).

Selecting the reference source

1. When required, connect the external reference source to the REF IN connector [22].
2. Press the REF **function key** in the CONFIG **menu**.

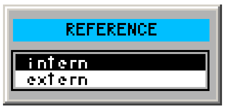
   The current reference source setting is displayed.



REFERENCE extern

3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “internal”.



REFERENCE

intern

extern

4. Select a reference source with **rotary knob** [10].
5. Press the **ENTER key** [5].

   The setting is saved and the R&S FS300 frequency standard is taken from a new source.

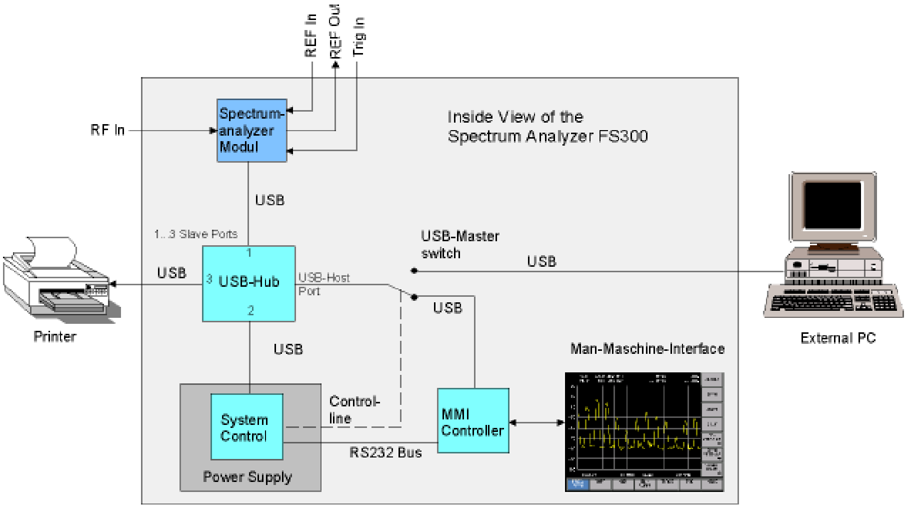
NOTE

If there is no reference signal when you switch over to an external reference, the message PLL UNLOCK is output after a short delay to indicate that there is no sync.

6.3.4.3 Configuring the Instrument Interfaces

Use

The R&S FS300 can be remote-controlled via the existing USB host interface [15]. The R&S FS300 automatically detects an existing connection to a PC and also automatically switches to remote control in the default setting (AUTO).
Switchover between internal USB master (local control on the instrument) and external USB master (remote control via PC) is effected by means of a USB master switch.


REF In
REF Out
Trig In
RF In
Spectrum-analyzer Modul
Inside View of the Spectrum Analyzer FS300
USB
1...3 Slave Ports
USB-Master switch
USB
USB
USB-Hub
1
2
3
USB-Host Port
USB
Printer
External PC
USB
Man-Maschine-Interface
System Control
Control-line
RS232 Bus
MMI Controller
Power Supply

The behaviour of the USB master switch can be controlled via the following settings:

- **AUTO**
  The AUTO setting is the standard configuration of the USB master switch and allows flexible switching between the local control mode on the R&S FS300 and remote control via PC. This setting allows the instrument to automatically find a connected PC and switch immediately to “remote control”. Under Windows™, the R&S FS300 is recognized as a new USB device, and is thus available for software applications on the PC.

  When you press the SYS key [3], the R&S FS300 can be switched to “local mode” at any time. The PC and the R&S FS300 are thus physically disconnected. Reactivate the AUTO setting to switch the R&S FS300 again to “remote control”.

- **INSTRUMENT**
  The INSTRUMENT setting is required if the R&S FS300 is to be controlled only via the front panel (local control), irrespective of a PC connection. This setting avoids automatic switchover to “remote control”.

  When you switch the INSTRUMENT setting to AUTO, an existing PC is recognized, and the R&S FS300 automatically switches to “remote control”.

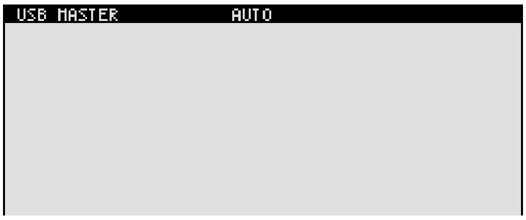
- **EXTERN**
  If EXTERNAL is set, the USB master switch is in the "remote control" mode and the R&S FS300 can only be controlled via a PC.

  When you press the SYS key [3], the R&S FS300 can be switched again to "local mode" at any time, for example for changing settings. Reactivate the EXTERNAL setting to switch the R&S FS300 again to "remote control".

Setting the USB master selector

1. Press the INTERFACE **function key** in the CONFIG **menu.**

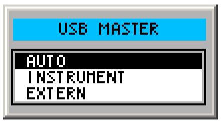
   The current USB master setting is displayed.



USB MASTER AUTO

2. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is AUTO.



3. Select a setting with **rotary knob** [10].
4. Press the **ENTER key** [5] to close the selection field.

   The setting is saved.

NOTE

With remote control, the local control mode of the R&S FS300 is deactivated and can only be reactivated by pressing the SYS key [3] on the front panel. Switching between remote control and local control takes approx. 2 s.

6.3.4.4 Setting the Screen Saver Mode

Use

The R&S FS300 has a screen-saver function that turns off the screen [13] after a certain time. There are a number of timing options for screen turn-off:

- **none**
  The screen is always on.
- **5 min**
  The screen is turned off after 5 minutes.
- **30 min**
  The screen is turned off after 30 minutes.

If the instrument is in remote-control mode and the results are being displayed on the controller (PC monitor) the screen can be switched off.

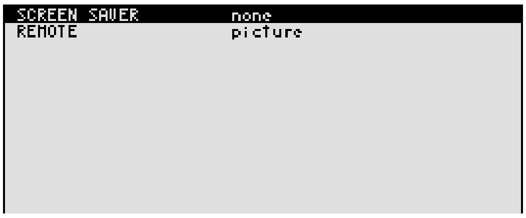
- **picture**
  The screen displays when the instrument is in remote-control mode.
- **black**
  The screen is switched off.

Activating the screen saver

1. Press the SCREEN SAVER **function key** in the CONFIG **menu.**

   A table listing the available parameters is displayed.

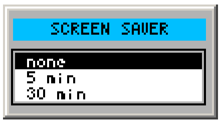
2. Select the **SREEN SAVER** parameter with the ▲ or ▼ **cursor key** [7].



SCREEN SAVER none
REMOTE picture

3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “none”.



4. Select a setting with **rotary knob** [10].
5. Press the **ENTER key** [5].

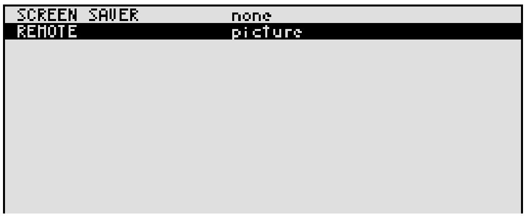
   The setting is saved and the screen saver is activated or de-activated.

Activating the Screen saver in remote-control mode

1. Press the SCREEN SAVER **function key** in the CONFIG **menu.**

   A table listing the available parameters is displayed.

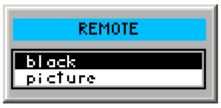
2. Select the **REMOTE** parameter with the ▲ or ▼ **cursor key** [7].



SCREEN SAVER	none
REMOTE	picture

3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “black”.



REMOTE

black
picture

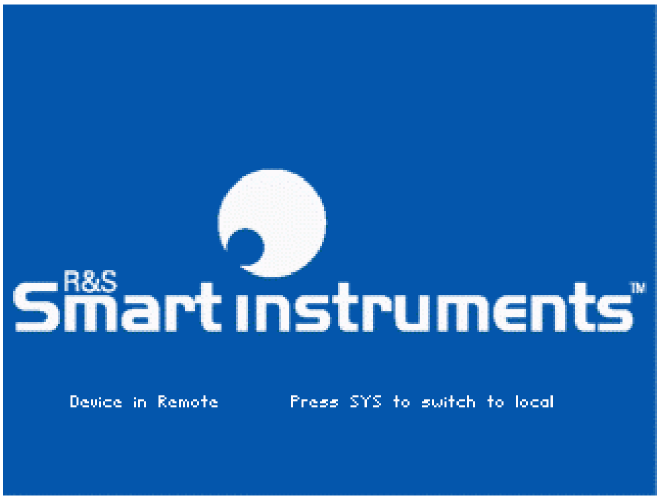
4. Select a setting with **rotary knob** [10].

5. Press the **ENTER key** [5].

   The setting is saved and the screen disconnection in the remote-control mode is activated or de-activated.

   With the “black” setting, the screen is, of course, black, and only the green LED [2] indicates that the R&S FS300 is in remote-control mode.

   With the “picture” setting, the following message is displayed on the screen with the R&S FS300 in remote-control mode:



Device in Remote Press SYS to switch to local

NOTE With remote control, the local control mode of the R&S FS300 is deactivated and can only be reactivated by pressing the SYS key [3] on the front panel. Switching between remote control and local control takes approx. 2 s.

6.3.4.5 Selecting an Internal or External Monitor

Use

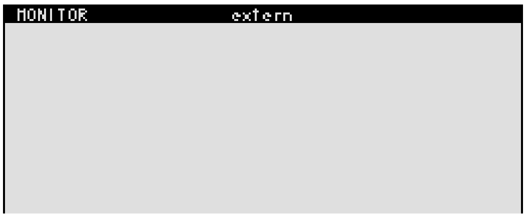
Screen display is possible via the internal monitor or an external monitor.

- **intern**
  Screen display is via the built-in colour TFT display.
- **extern**
  Screen display is via the connected monitor.

Selecting the monitor

1. If required, connect a monitor to the MONITOR connector [20].
2. Press the MONITOR **function key** in the CONFIG **menu.**

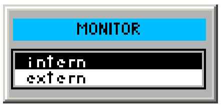
   The current screen setting is displayed.



MONITOR extern

3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “intern”.



4. Select a setting with **rotary knob** [10].
5. Press the **ENTER key** [5].

   The setting is saved.
   If the “external” setting is selected, the connected screen shows the active user interface. The internal monitor is switched off.

6.3.5 Service Functions (SERVICE Menu)

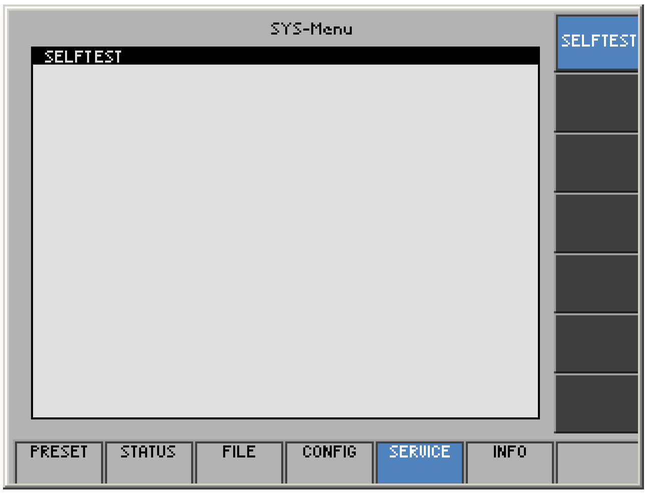
What the settings are for

You can call a number of auxiliary functions to be used for servicing or troubleshooting from the SERVICE menu. These functions are not required for normal measurements with the R&S FS300.

Selecting the SERVICE menu

1. Press the **SYS key** [3].
2. Select the SERVICE **menu** with the ◂ or ▸ **cursor key** [6].

   The menu name is highlighted and the appropriate functions are assigned to the function keys [12].



Function key assignment

SELFTEST Performs a selftest (↗ 6-174)

6.3.5.1 Performing Selftests

Use

The R&S FS300 can perform a module selftest. If there is a fault, the R&S FS300 itself is capable of localizing the defective module.

Starting selftests

1. Press the SELFTEST **function key** in the SERVICE **menu**.

   The text SELFTEST is displayed (↗ below).
2. Press the **ENTER key** [5].

   The selftest starts. All modules are checked one after the other and the result, “passed” or “failed”, is output.

6.3.6 System Information (INFO Menu)

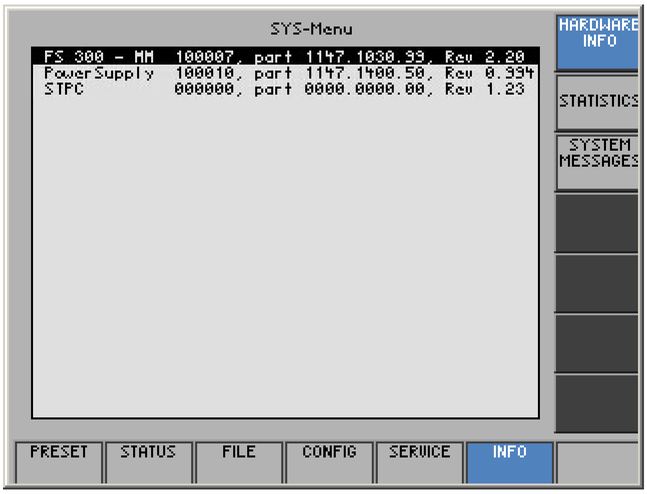
What the settings are for

You can obtain information such as module data, instrument statistics and system messages from the INFO menu.

Selecting the INFO menu

1. Press the **SYS key** [3].
2. Select the INFO **menu** with the ◂ or ▸ **cursor key** [6].

   The menu name is highlighted and the appropriate functions are assigned the function keys [12].


SYS-Menu
HARDWARE INFO
STATISTICS
SYSTEM MESSAGES
PRESET
STATUS
FILE
CONFIG
SERVICE
INFO

```
FS 300 - MM     100007, part 1147.1030.99, Rev 2.20
PowerSupply     100010, part 1147.1400.50, Rev 0.994
STPC            000000, part 0000.0000.00, Rev 1.23
```

Function key assignment

HARDWARE INFO	Displays module data	(↗ 6-176)
STATISTICS	Displays instrument statistics	(↗ 6-176)
SYSTEM MESSAGES	Displays system messages	(↗ 6-177)

6.3.6.1 Displaying Module Data

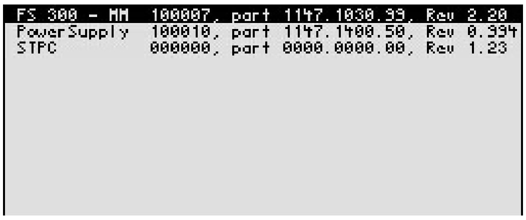
Use

You can display the serial number of the modules installed in the R&S FS300.

Calling module data

- Press the HARDWARE INFO **function key** in the INFO **menu**.

  A table listing the current modules and the serial number is displayed.



```
FS 300 - MM   100007, part 1147.1030.99, Rev 2.20
PowerSupply   100010, part 1147.1400.50, Rev 0.994
STPC          000000, part 0000.0000.00, Rev 1.23
```

6.3.6.2 Displaying Instrument Statistics

Use

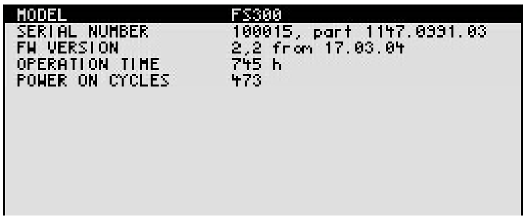
You can display the following R&S FS300 statistics:

- **MODEL** - model designation
- **SERIAL NUMBER** - serial number
- **FW VERSION** - firmware version
- **OPERATION TIME** - operating hours
- **POWER ON CYCLES** - on/off cycles

Direct selection

- Press the STATISTICS **function key** in the INFO **menu**.

  A table listing the current data is displayed.



```
MODEL                     FS300
SERIAL NUMBER             100015, part 1147.0991.03
FW VERSION                2,2 from 17.03.04
OPERATION TIME            745 h
POWER ON CYCLES           473
```

6.3.6.3 Displaying System Messages

Use

You can display the most recent R&S FS300 system messages in their order of occurrence. Operating errors are neither saved nor displayed.

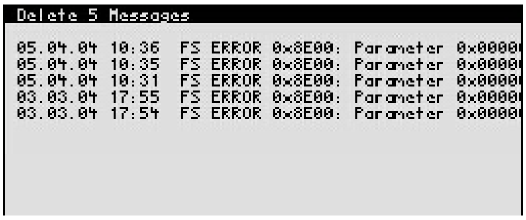
System messages help the service personnel to analyze the instrument and handle errors, and should therefore only be deleted by them.

Displaying system messages

1. Press the SYSTEM MESSAGES **function key** in the INFO **menu**.

A table listing the current system messages is displayed.

2. Select a system message with the ▲ or ▼ **cursor key** [7].

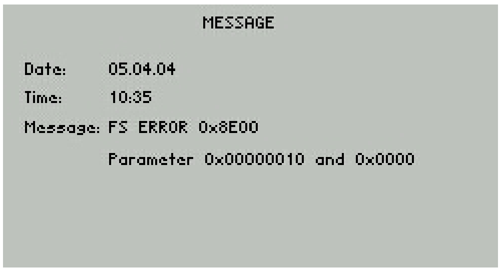


```
Delete 5 Messages

05.04.04 10:36  FS ERROR 0x8E00: Parameter 0x0000
05.04.04 10:35  FS ERROR 0x8E00: Parameter 0x0000
05.04.04 10:31  FS ERROR 0x8E00: Parameter 0x0000
03.03.04 17:55  FS ERROR 0x8E00: Parameter 0x0000
03.03.04 17:54  FS ERROR 0x8E00: Parameter 0x0000
```

3. Press the **ENTER key** [5].

The current system message is clearly displayed with the date and time of their occurrence and the error code.



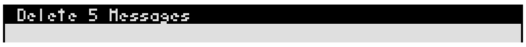
```
              MESSAGE

Date:     05.04.04
Time:     10:35
Message: FS ERROR 0x8E00
          Parameter 0x00000010 and 0x0000
```

4. Press the **ENTER key** [5] for closing the display.

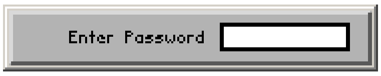
Deleting system messages (only for service

1. Press the SYSTEM MESSAGES **function key** in the INFO **menu**.
   The table of current system messages is displayed.
2. Select the first line with the ▲ or ▼ **cursor key** [7].



Delete 5 Messages

3. Press the **ENTER key** [5].
   The field for the input of the password is displayed.

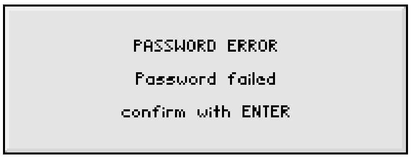


Enter Password

4. Enter the right password and confirm with the **ENTER key** [5].
   The error messages are deleted.

Invalid password

If the password is invalid, the following message is displayed:



PASSWORD ERROR
Password failed
confirm with ENTER

- Confirm the error message with the **ENTER key** [5].
  The deleting of the error messages is breaked off.

7 Remote Control/PC Software FS300-K1

NOTE

The latest remote control commands and software drivers for the USB-interface of the R&S FS300 can be downloaded from the R&S Smart Instruments internet site:

www.smart-instruments.de

7.1 Applications of PC Software

Performance features

The PC Software R&S FS300-K1 allows convenient operation of the R&S FS300 by remote control via a PC. All the functions of the spectrum analyzer are supported. In addition, you can create test reports on your PC. Highlights of the software features are:

- Fast and simple transfer of measurements between the R&S FS300 and the PC
- Permanent analysis of ongoing sweeps to the PC with evaluation capabilities (Marker, Zoom, etc.)
- Practically unlimited memory capacity for storing traces and measurement information (comparison of current and previous information)
- Extended range of functions (Limit Lines, Log File)
- Export of trace values (700 points) in .txt format for import into Microsoft Excel™
- Export of displayed data (screenshots) in JPEG format
- Printing the working window by standard Windows™ printer

Remote control using the keyboard and the mouse

All functions and measuring parameters can be set with the keyboard and the mouse using menus, toolbars or short keys.

Large display on the PC monitor

The current trace as well as parameters and status fields required for measuring result analysis are displayed clearly arranged on the monitor.

7.2 Installation and Configuration

System requirements

The PC software runs on Windows™ 2000 and XP operating systems with USB interface.

7.2.1 Installing the PC Software

NOTE

To install the PC software, you must have administrator rights on your PC. (↗ Windows™ help).

Introduction

The PC software is installed in two steps. Firstly the remote control program for the R&S FS300 is installed. The R&S FS300 must not be connected at this time. Secondly the drivers are installed; at this time the instrument has to be connected.

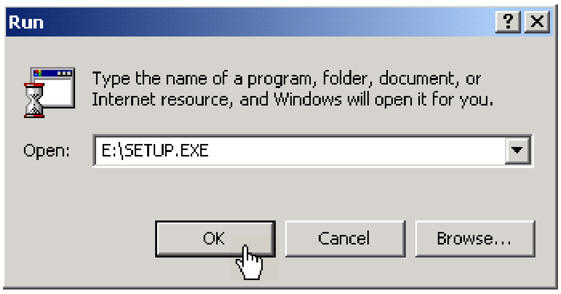
7.2.1.1 Installing the Program

NOTE

The <Back> button enables the user to go back one step during installation. Installation can be interrupted by pressing <Cancel>.

Installation steps

1. Place the CD ROM, which came with the product, in your installation drive. The autorun function automatically initiates installation. Alternatively you may also initiate the installation in the start menu of Windows™ **Start\Run** using the **Setup.exe** from the CD.

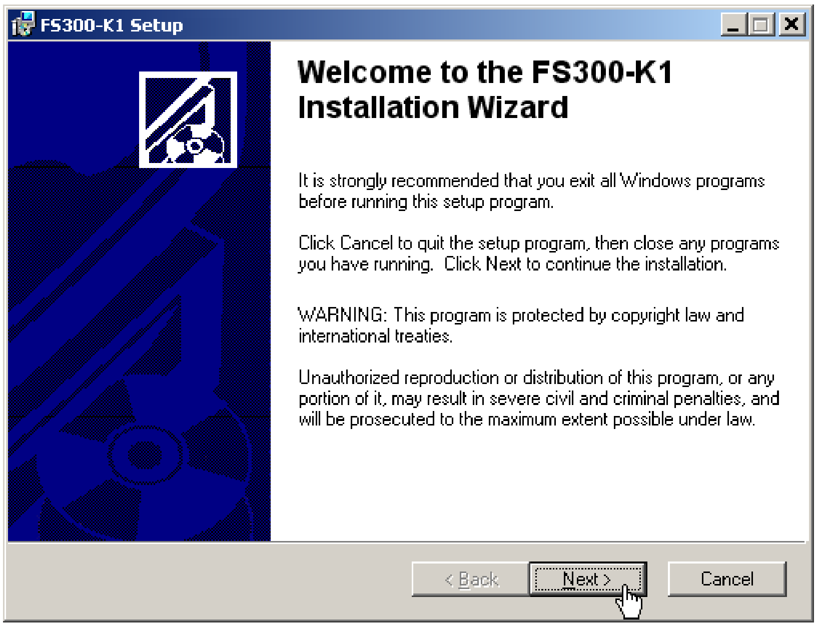


Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: E:\SETUP.EXE

The installation is prepared and the installation wizard appears.

2. Click **<Next>** to continue the installation.



Welcome to the FS300-K1 Installation Wizard

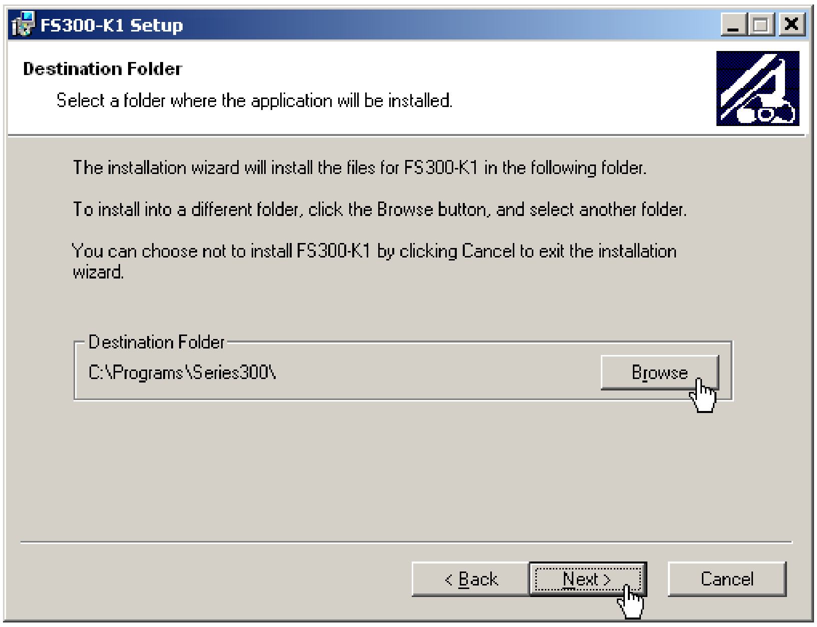
It is strongly recommended that you exit all Windows programs before running this setup program.

Click Cancel to quit the setup program, then close any programs you have running. Click Next to continue the installation.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

3. Click **<Browse>** to assign a new directory if you wish to install the program in another directory than proposed. Click **<Next>** to continue the installation.



Destination Folder

Select a folder where the application will be installed.

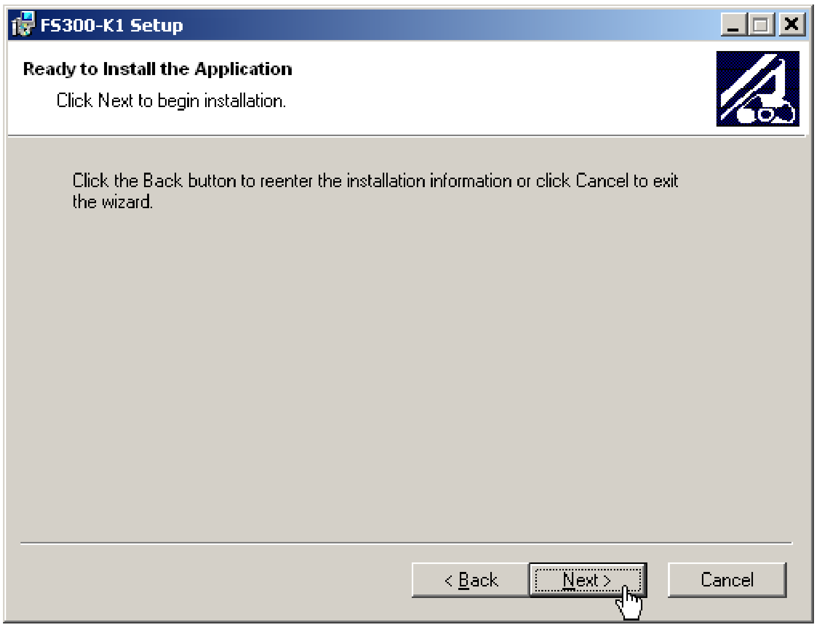
The installation wizard will install the files for FS300-K1 in the following folder.

To install into a different folder, click the Browse button, and select another folder.

You can choose not to install FS300-K1 by clicking Cancel to exit the installation wizard.

Destination Folder: C:\Programs\Series300\

4. Click **<Next>** to continue the installation. Installation begins and the data are transferred to the PC. Please wait a moment.



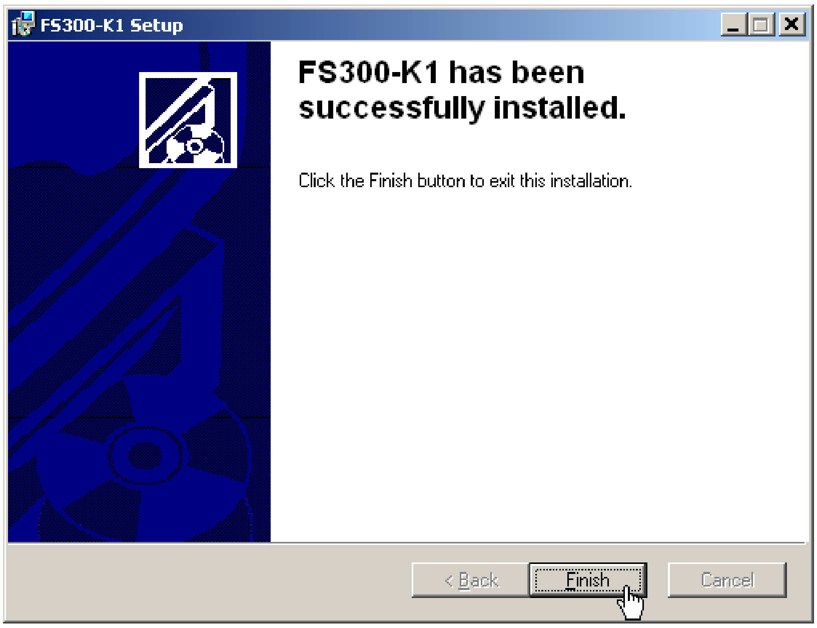
FS300-K1 Setup

Ready to Install the Application

Click Next to begin installation.

Click the Back button to reenter the installation information or click Cancel to exit the wizard.

5. Click **<Finish>** to successfully complete the installation.

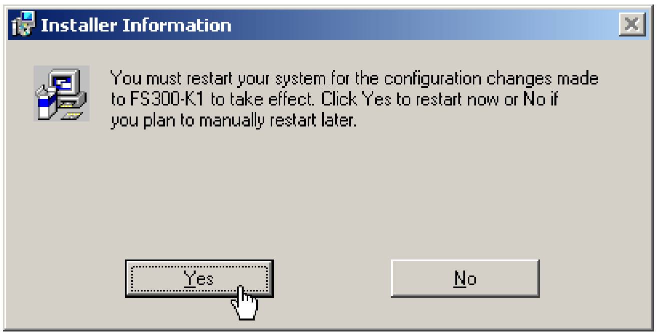


FS300-K1 Setup

FS300-K1 has been successfully installed.

Click the Finish button to exit this installation.

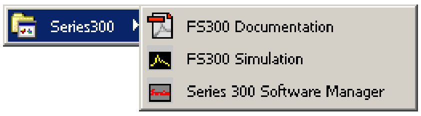
6. Click **<Yes>** to restart the computer.



Installer Information

You must restart your system for the configuration changes made to FS300-K1 to take effect. Click Yes to restart now or No if you plan to manually restart later.

All new settings are now effective and the following appears in the Windows™ **Start\Programs\Rohde&Schwarz\Series300** start-up menu:



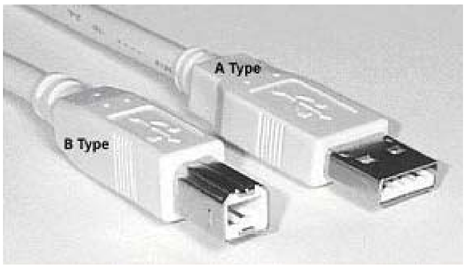
7. Install the device driver now (↗ next section).

7.2.1.2 Installing the Device Drivers

7.2.1.2.1 Installing Steps for Windows™ 2000

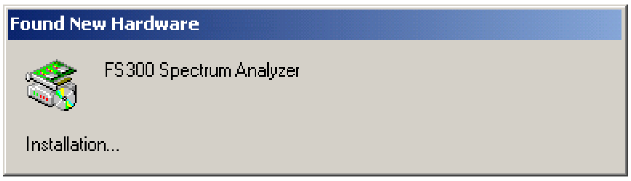
Connecting R&S FS300 to the PC

R&S FS300 is connected to the PC via the USB interface. The connection cable has two plug types. Plug A is connected to the computer (↗ computer manual) and plug B is connected to the R&S FS300 (↗ 2-41).



The FS300 USB drivers will be installed within the FS300-K1.

1. Switch on the R&S FS300 and the PC.
2. Connect the instrument to the PC with the USB cable. The PC (Windows™) recognizes the connected instrument and reports new hardware. This message appears only when an R&S FS300 is installed for the first time.



Found New Hardware

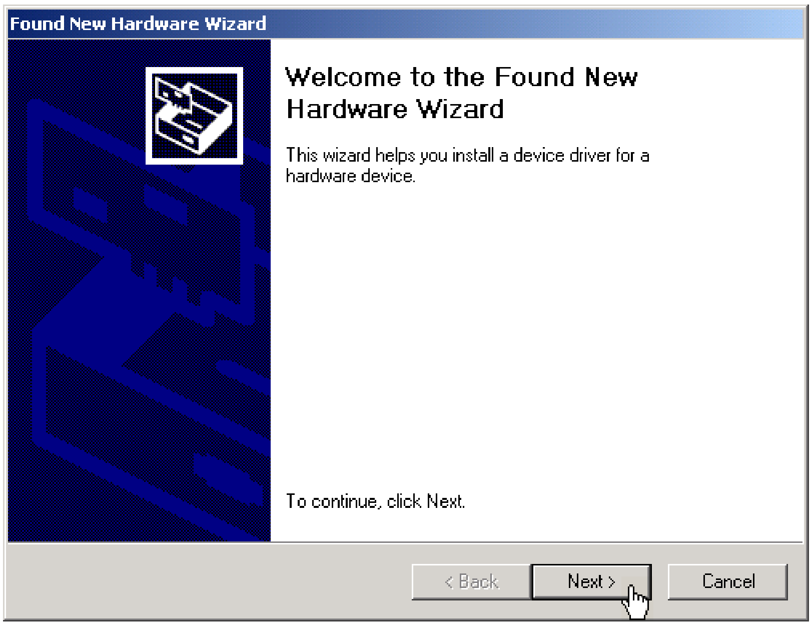
FS300 Spectrum Analyzer

Installation...

If the R&S FS300 is not automatically recognized, check that the USB master switch of the R&S FS300 is at **AUTO** (↗ 6-169).

Installing device drivers

3. Click **<Next>** to continue the installation.



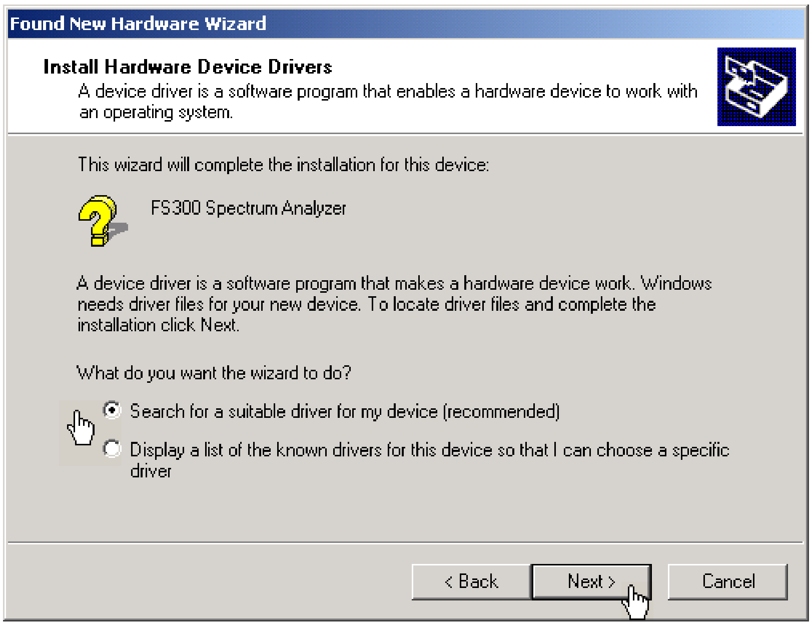
Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

This wizard helps you install a device driver for a hardware device.

To continue, click Next.

4. Select **Search for a suitable driver for my device** and click **<Next>** to continue the installation.



Found New Hardware Wizard

Install Hardware Device Drivers

A device driver is a software program that enables a hardware device to work with an operating system.

This wizard will complete the installation for this device:

FS300 Spectrum Analyzer

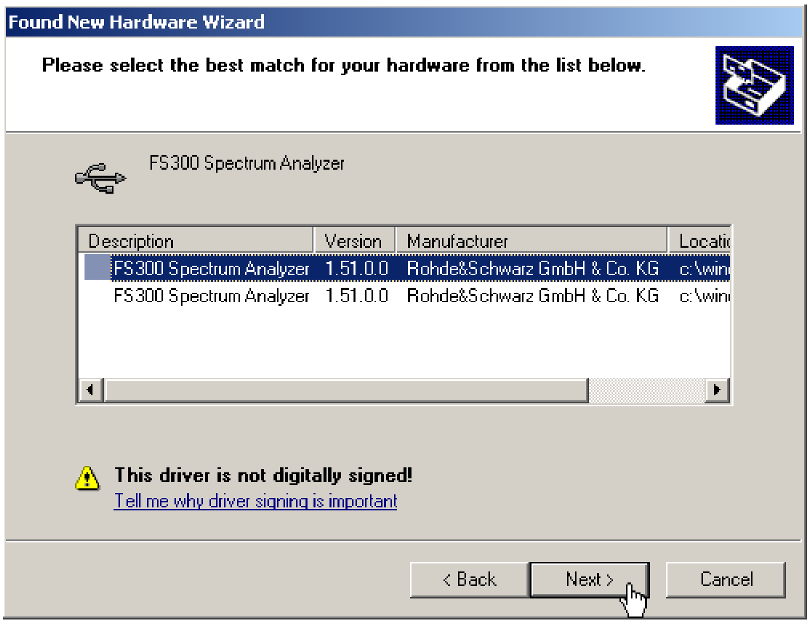
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.

What do you want the wizard to do?

● Search for a suitable driver for my device (recommended)

○ Display a list of the known drivers for this device so that I can choose a specific driver

5. If there is already installed a driver for the R&S FS300 on your system, the Windows Hardware Wizard may give you a selection of already installed drivers: Please select “rssi.inf” and click **<Next>** to continue the installation.



Found New Hardware Wizard

Please select the best match for your hardware from the list below.

FS300 Spectrum Analyzer

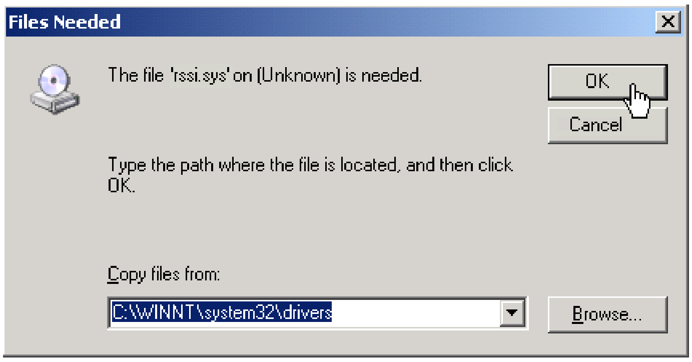
Description	Version	Manufacturer	Locatio
FS300 Spectrum Analyzer	1.51.0.0	Rohde&Schwarz GmbH & Co. KG	c:\win
FS300 Spectrum Analyzer	1.51.0.0	Rohde&Schwarz GmbH & Co. KG	c:\win

This driver is not digitally signed!

Tell me why driver signing is important

Note: This might occur, if you have installed different driver versions, used different installation sources or installed also the VXI PnP drivers on your system.

6. Click **<OK>** to continue the installation.



Files Needed

The file 'rssi.sys' on (Unknown) is needed.

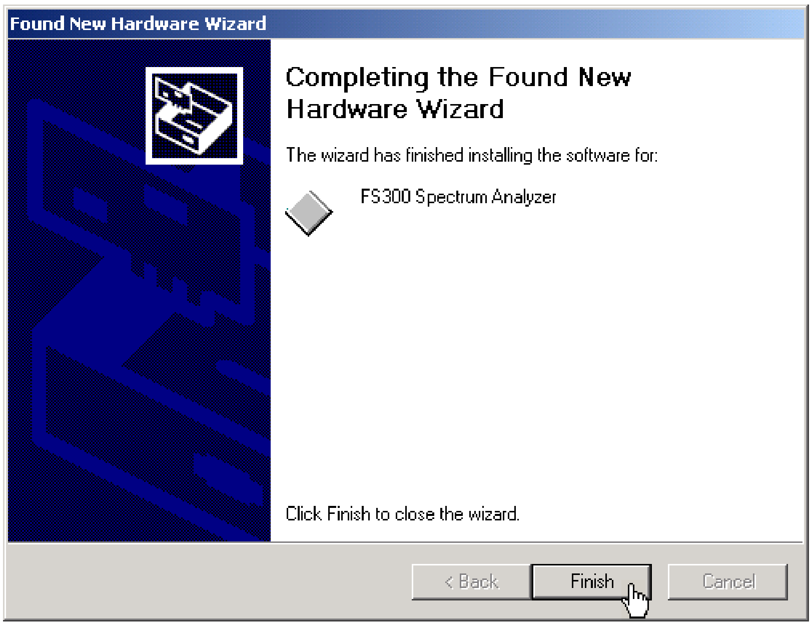
Type the path where the file is located, and then click OK.

Copy files from: C:\WINNT\system32\drivers

Depending on the history of your driver installations, the installation procedure may vary in some steps. If you system is not able to locate the driver files, please select them manually. The driver files will be installed from the update software to the following directories:

- rssi.inf (c:\winnt\inf\)
- rssi.sys (c:\winnt\system32\drivers)

7. Click **<Finish>** to complete the installation.



Found New Hardware Wizard

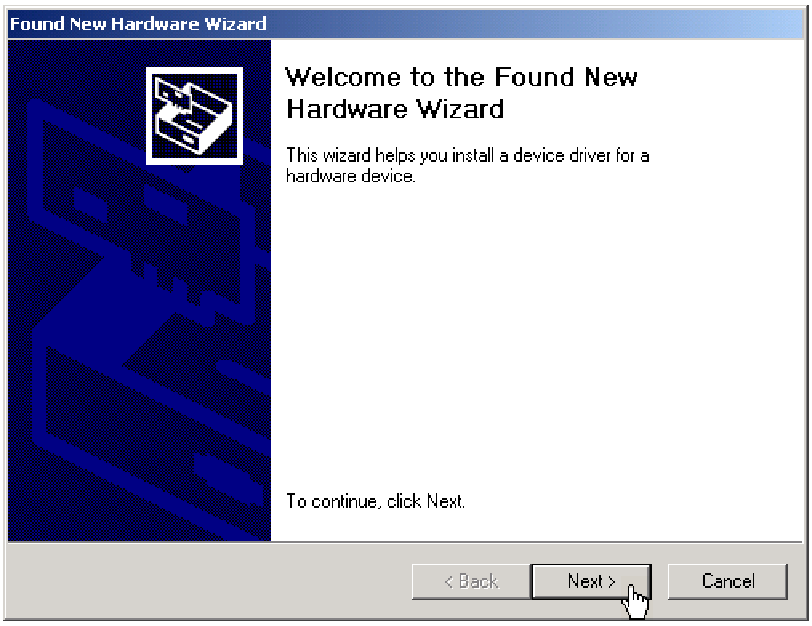
Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

FS300 Spectrum Analyzer

Click Finish to close the wizard.

This is followed by the installation of the device driver for the **Rohde & Schwarz Power Supply**. Windows generally "remembers" all the necessary information when installing the Spectrum Analyzer R&S FS300 and installs the Rohde & Schwarz Power Supply without a query. However, depending on the system, the installation assistant might be activated.



Found New Hardware Wizard

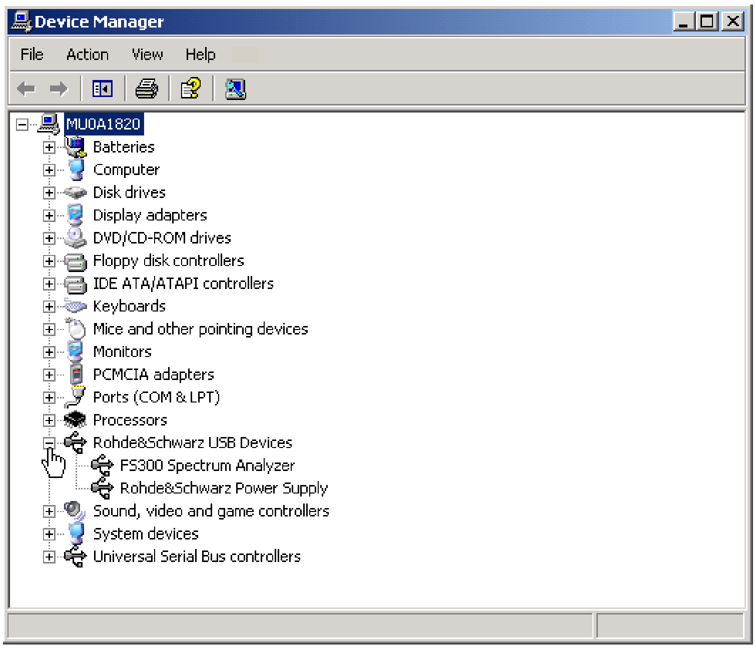
Welcome to the Found New Hardware Wizard

This wizard helps you install a device driver for a hardware device.

To continue, click Next.

In this case, repeat instructions 3. to 7. to successfully complete the installation.

The drivers are now correctly installed and this can be checked using the device manager.

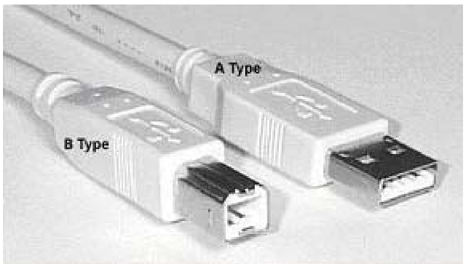

Device Manager
File
Action
View
Help
MU0A1820
Batteries
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Floppy disk controllers
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
PCMCIA adapters
Ports (COM & LPT)
Processors
Rohde&Schwarz USB Devices
FS300 Spectrum Analyzer
Rohde&Schwarz Power Supply
Sound, video and game controllers
System devices
Universal Serial Bus controllers

8. Create now the program version for specific instrument (↗ 7-192).

7.2.1.2.2 Installing Steps for Windows™ XP

Connecting R&S FS300 to the PC

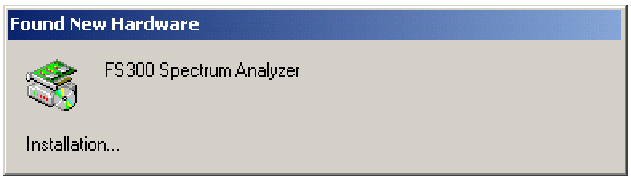
R&S FS300 is connected to the PC via the USB interface. The connection cable has two plug types. Plug A is connected to the computer (↗ computer manual) and plug B is connected to the R&S FS300 (↗ 2-41).


A Type
B Type

The FS300 USB drivers will be installed within the FS300-K1.

1. Switch on the R&S FS300 and the PC.

2. Connect the instrument to the PC with the USB cable. The PC (Windows™) recognizes the instrument when it is connected and reports new hardware. This message appears only when an R&S FS300 is installed for the first time.



Found New Hardware

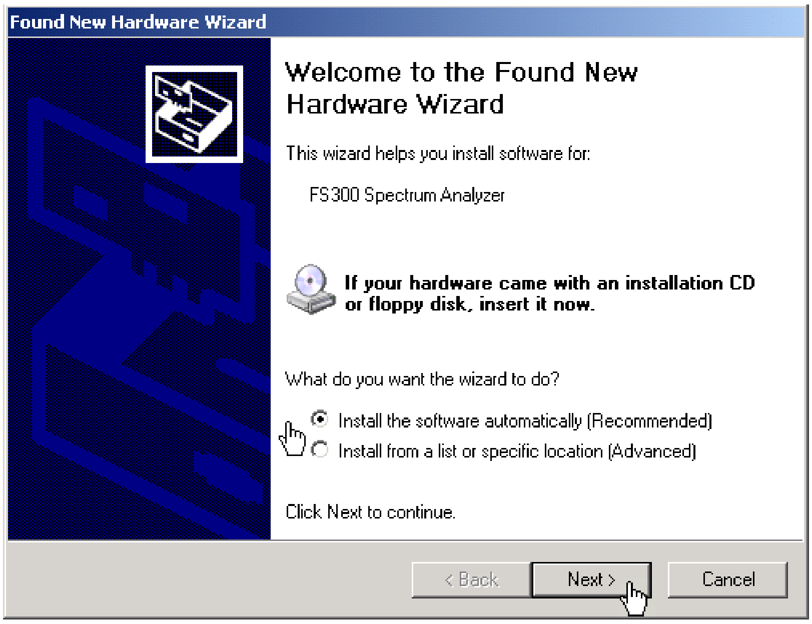
FS300 Spectrum Analyzer

Installation...

If the R&S FS300 is not automatically recognized, check that the USB master switch of the R&S FS300 is at **AUTO** (↗ 6-169).

Installing device drivers

3. Select **Install the software automatically** and click **<Next>** to continue the installation.



Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

This wizard helps you install software for:

FS300 Spectrum Analyzer

If your hardware came with an installation CD or floppy disk, insert it now.

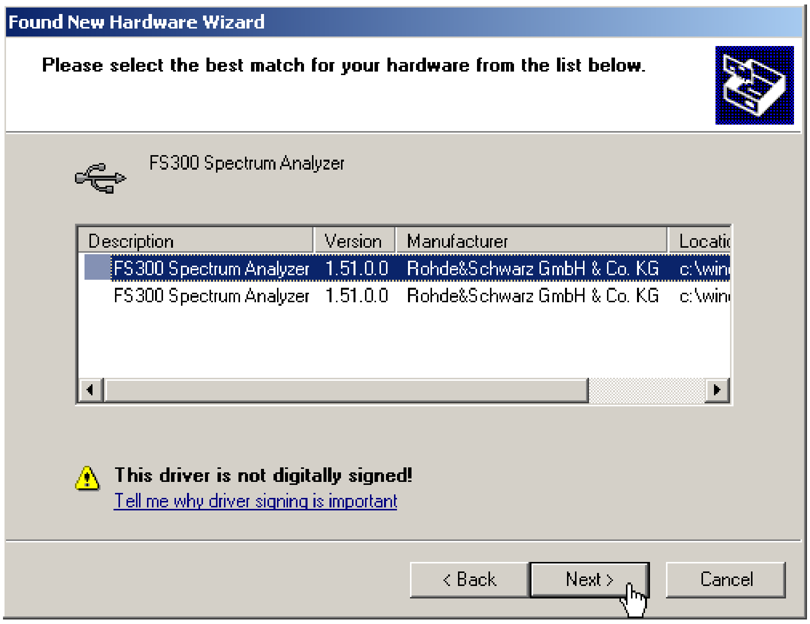
What do you want the wizard to do?

● Install the software automatically (Recommended)

○ Install from a list or specific location (Advanced)

Click Next to continue.

4. If there is already installed a driver for the R&S FS300 on your system, the Windows Hardware Wizard may give you a selection of already installed drivers: Please select “rssi.inf” and click **<Next>** to continue the installation.



Found New Hardware Wizard

Please select the best match for your hardware from the list below.

FS300 Spectrum Analyzer

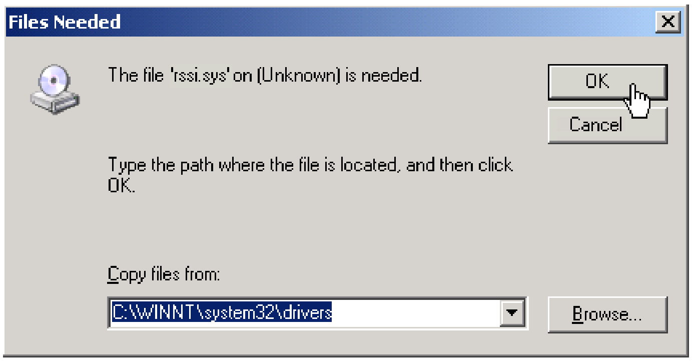
Description	Version	Manufacturer	Locati
FS300 Spectrum Analyzer	1.51.0.0	Rohde&Schwarz GmbH & Co. KG	c:\win
FS300 Spectrum Analyzer	1.51.0.0	Rohde&Schwarz GmbH & Co. KG	c:\win

This driver is not digitally signed!

Tell me why driver signing is important

Note: This might occur, if you have installed different driver versions, used different installation sources or installed also the VXI PnP drivers on your system.

5. Click **<OK>** to continue the installation.



Files Needed

The file 'rssi.sys' on (Unknown) is needed.

Type the path where the file is located, and then click OK.

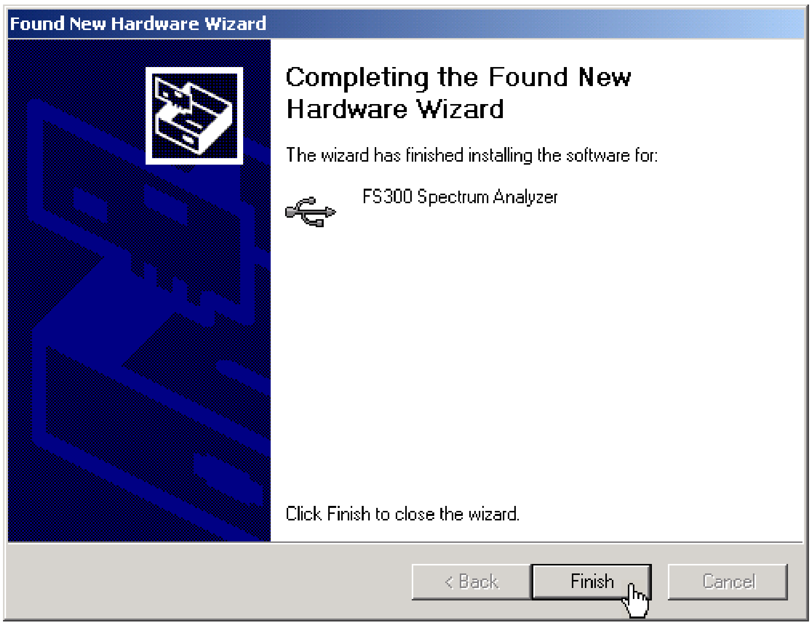
Copy files from:

C:\WINNT\system32\drivers

Depending on the history of your driver installations, the installation procedure may vary in some steps. If your system is not able to locate the driver files, please select them manually. The driver files will be installed from the update software to the following directories:

- rssi.inf (c:\winnt\inf\)
- rssi.sys (c:\winnt\system32\drivers)

6. Click **<Finish>** to successfully complete the installation.



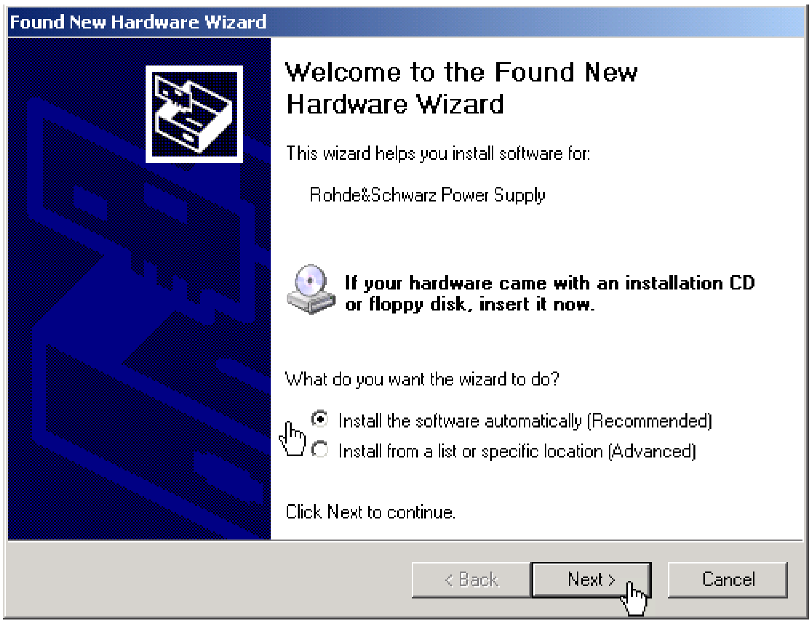
Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

FS300 Spectrum Analyzer

Click Finish to close the wizard.

This is followed by the installation of the device driver for the **Rohde & Schwarz Power Supply**. Windows generally "remembers" all the necessary information when installing the Spectrum Analyzer R&S FS300 and installs the Rohde & Schwarz Power Supply without a query. However, depending on the system, the installation assistant might be activated.



Welcome to the Found New Hardware Wizard

This wizard helps you install software for:

Rohde&Schwarz Power Supply

If your hardware came with an installation CD or floppy disk, insert it now.

What do you want the wizard to do?

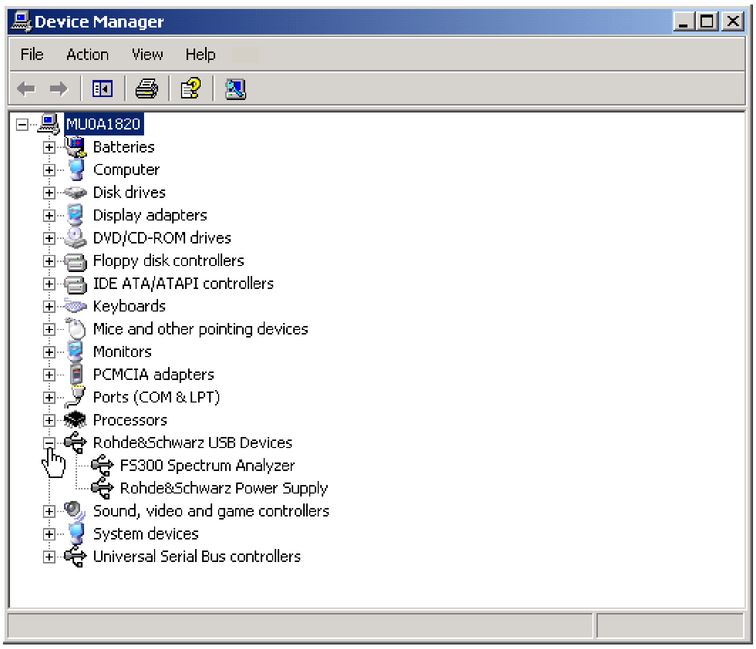
● Install the software automatically (Recommended)

○ Install from a list or specific location (Advanced)

Click Next to continue.

In this case, repeat instructions 3. to 6. to successfully complete the installation successfully.

The drivers are now correctly installed and this can be checked using the device manager.


Device Manager
File
Action
View
Help
MU0A1820
Batteries
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Floppy disk controllers
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
PCMCIA adapters
Ports (COM & LPT)
Processors
Rohde&Schwarz USB Devices
FS300 Spectrum Analyzer
Rohde&Schwarz Power Supply
Sound, video and game controllers
System devices
Universal Serial Bus controllers

7. Create now the program version for specific instrument (↗ 7-192).

7.2.2 Connecting the PC-Software with the R&S FS300

Introduction

Due to the USB-Technology which is used in the R&S FS300, more than one instrument in the 300 Series can be connected with a PC at the same time. For each instrument a connection with the respective software which allows the opening and remote controlling of the specific instrument has to be created.

The creation of an instrument-specific connection of the Software R&S FS300-K1 by using the provided Series 300 Software Manager is explained in the following section. Before this process can be started, the R&S FS300-K1 Software needs to be installed on your PC (↗ 7-180) and one or more instruments have to be connected to the PC via USB-cable (↗ 7-197).

NOTE

No Authorization (Key Code) is required for the provided R&S FS300-K1 Software Version 2.5.

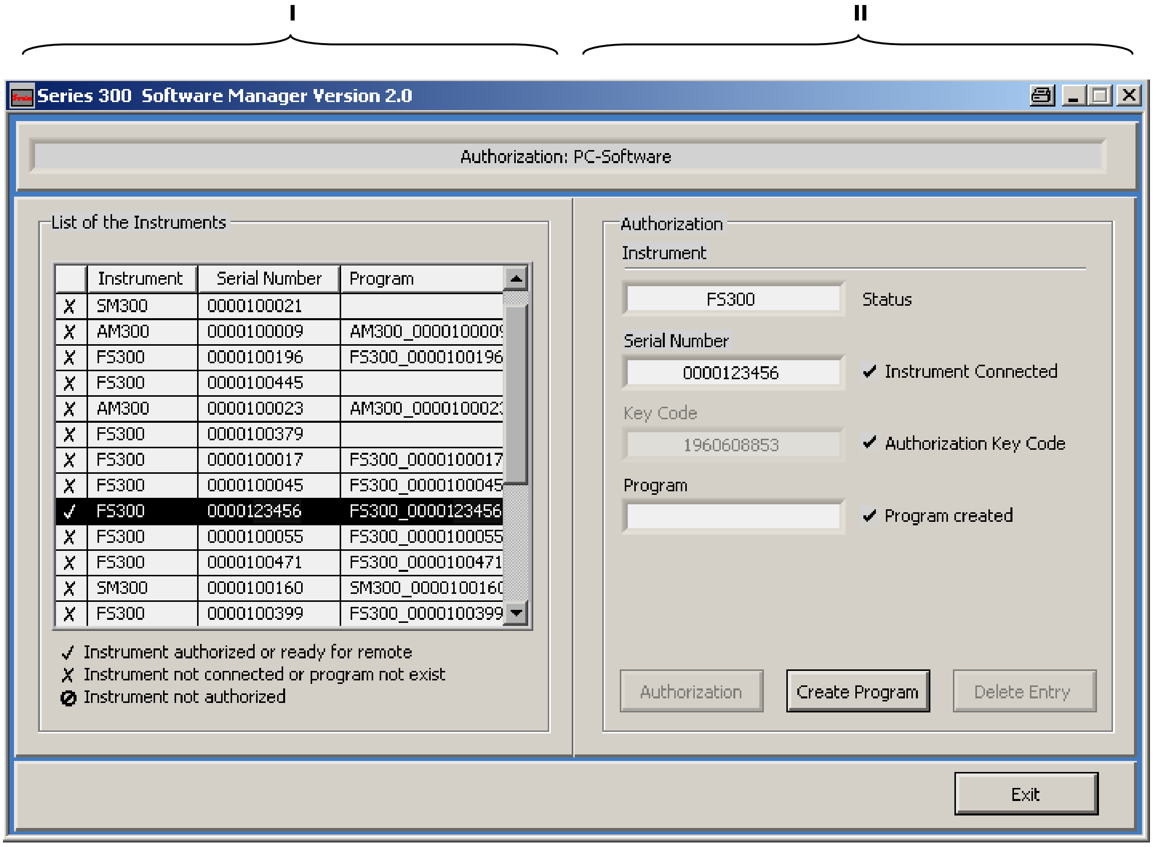
7.2.2.1 Starting the Series 300 Software Manager

Starting the service program

- In the Windows™ start-up directory select:
  Start\Programs\Rohde&Schwarz\Series300\Series 300 Software Manager

  The service program initializes. The program interface is divided into two areas:

  I A list of all previously connected Smart instruments
  II Information, status fields and command buttons for authorization



Series 300 Software Manager Version 2.0

Authorization: PC-Software

List of the Instruments

	Instrument	Serial Number	Program
X	SM300	0000100021	
X	AM300	0000100009	AM300_000010000
X	FS300	0000100196	FS300_0000100196
X	FS300	0000100445	
X	AM300	0000100023	AM300_000010002
X	FS300	0000100379	
X	FS300	0000100017	FS300_0000100017
X	FS300	0000100045	FS300_0000100045
✓	FS300	0000123456	FS300_0000123456
X	FS300	0000100055	FS300_0000100055
X	FS300	0000100471	FS300_0000100471
X	SM300	0000100160	SM300_000010016
X	FS300	0000100399	FS300_0000100399

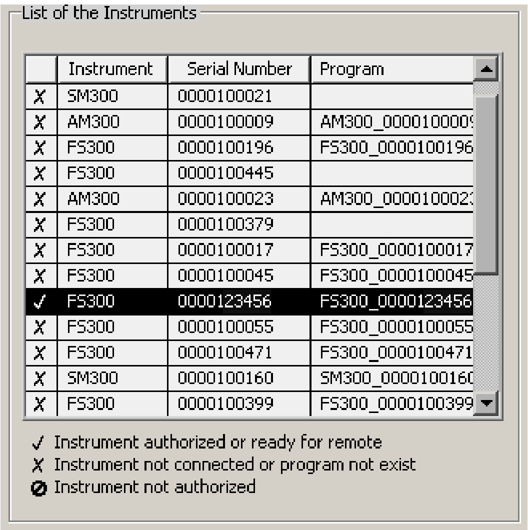
✓ Instrument authorized or ready for remote
X Instrument not connected or program not exist
⊘ Instrument not authorized

Authorization
Instrument: FS300
Status
Serial Number: 0000123456
✓ Instrument Connected
Key Code: 1960608853
✓ Authorization Key Code
Program:
✓ Program created

7.2.2.2 Creating the Program Version

Selecting the instrument

1. In **I** click on the instrument for which you create a link.



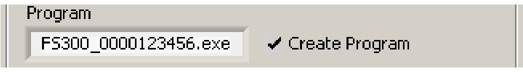
List of the Instruments

	Instrument	Serial Number	Program
✗	SM300	0000100021	
✗	AM300	0000100009	AM300_000010000
✗	FS300	0000100196	FS300_0000100196
✗	FS300	0000100445	
✗	AM300	0000100023	AM300_000010002
✗	FS300	0000100379	
✗	FS300	0000100017	FS300_0000100017
✗	FS300	0000100045	FS300_0000100045
✓	FS300	0000123456	FS300_0000123456
✗	FS300	0000100055	FS300_0000100055
✗	FS300	0000100471	FS300_0000100471
✗	SM300	0000100160	SM300_000010016
✗	FS300	0000100399	FS300_0000100399

✓ Instrument authorized or ready for remote
✗ Instrument not connected or program not exist
⊘ Instrument not authorized

Creating the program version for specific instrument

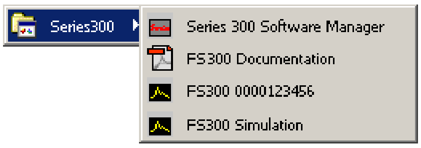
2. Click **<Create Program>**. A program version for specific instrument is created and displayed in **II** with the status (✓). The program number is created from the instrument name (**FS300**) and the serial number (**0000xxxxxx**).



Program

FS300_0000123456.exe

3. In **II** click **<Exit>** to close the service program. After correctly creating the program version, the option **FS300 0000xxxxxx** is available in the Windows™ start-up menu **Start\Programs\Rohde & Schwarz\Series300**.

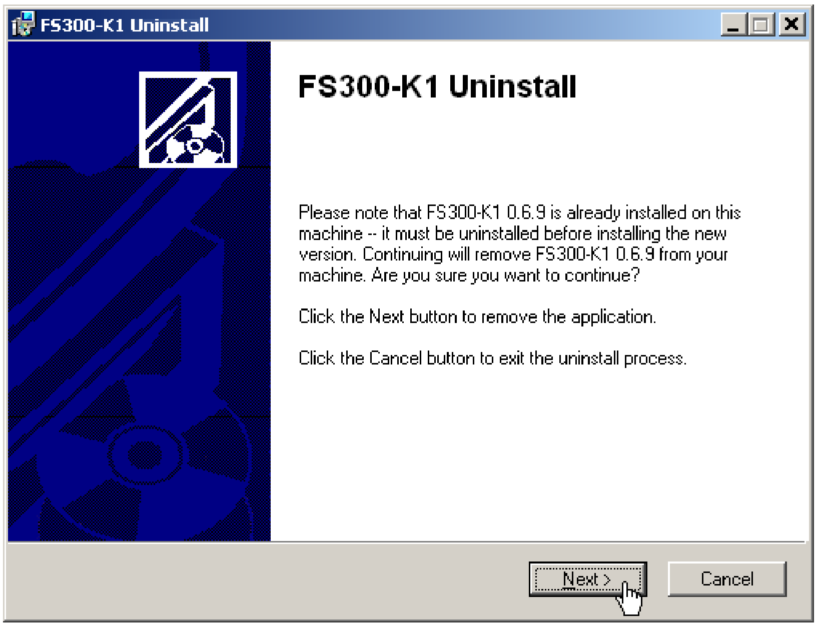


Now the program **FS300 0000xxxxxx** can be started (↗ 7-198).

7.2.3 Uninstalling the PC Software

Installation steps for Windows™ 2000

1. Place the CD ROM, which came with the product, in the installation drive. The autorun function automatically initiates installation. Alternatively you may also initiate the installation in the start menu of Windows™ **Start\Run** using the **Setup.exe** from the CD. The uninstallation is prepared and the uninstallation assistant appears.



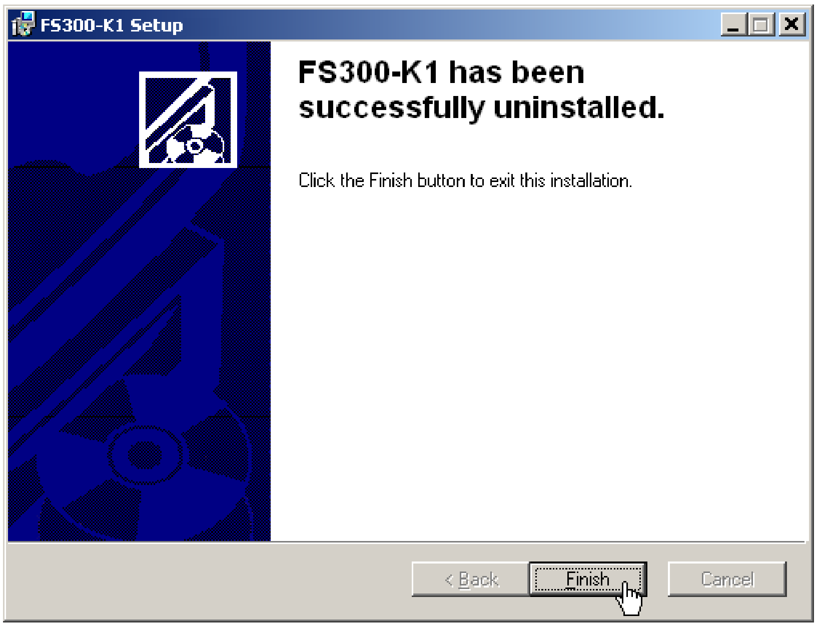
FS300-K1 Uninstall

Please note that FS300-K1 0.6.9 is already installed on this machine -- it must be uninstalled before installing the new version. Continuing will remove FS300-K1 0.6.9 from your machine. Are you sure you want to continue?

Click the Next button to remove the application.

Click the Cancel button to exit the uninstall process.

2. Click **<Next>** to continue the uninstallation.



FS300-K1 has been successfully uninstalled.

Click the Finish button to exit this installation.

3. Click **<Finish>** to complete the uninstallation.

NOTE The PC software can also be uninstalled using the Windows™ control panel.

7.2.4 Update PC Software

Introduction

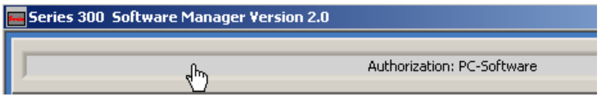
Old versions of the PC-Software can be updated with the Series 300 Software Manager. Therefore the old version has to be uninstalled (↗ 7-194). The new version can then be installed from the CD-ROM (↗ 7-180). After that, the links which already existing to the listed instruments have to be updated manually.

Starting the service program

1. Start the Series 300 Software Manager (↗ 7-192).

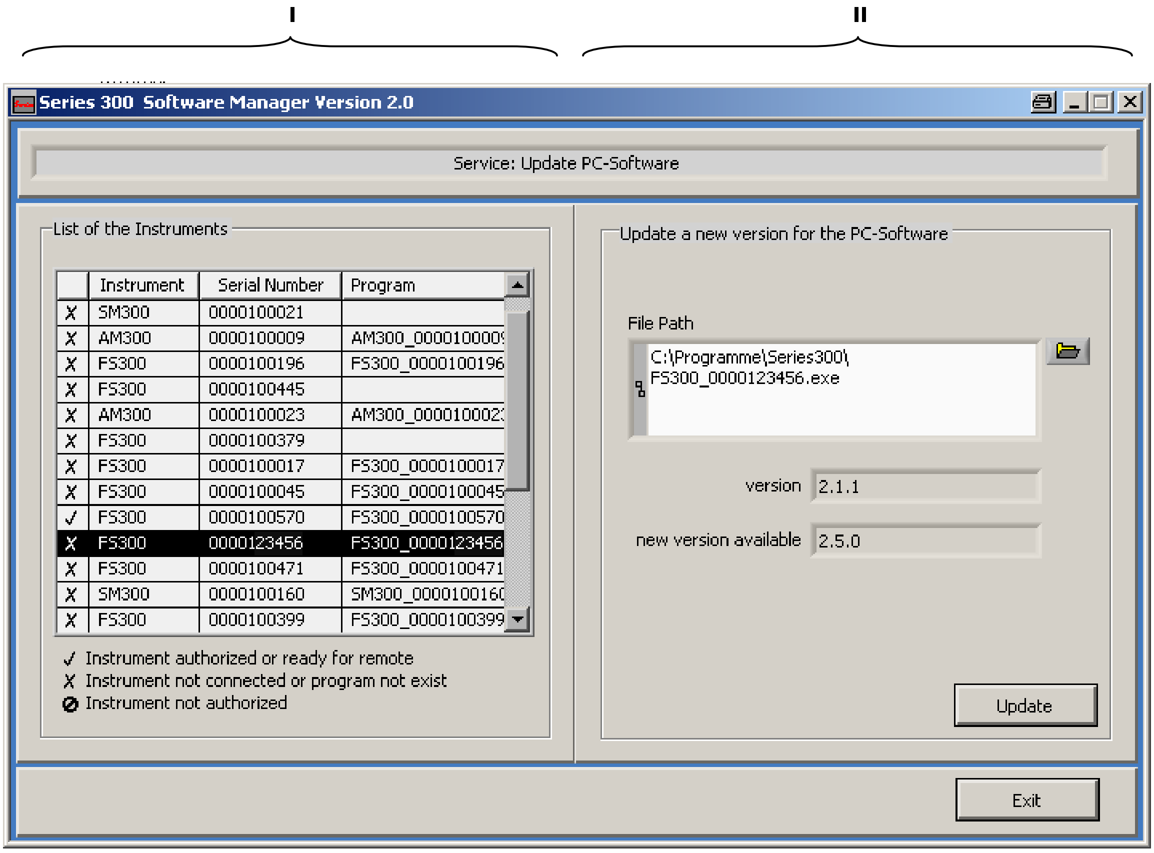
   The service program initializes and the window „Authorization: PC-Software" is displayed.

2. Click on the top bar **Authorization: PC-Software** and choose "Service: Update PC-Software" from the menu.


Series 300 Software Manager Version 2.0
Authorization: PC-Software

The "Update PC-Software" window is displayed and has the following two partitions:

I List of all Smart-Instruments that have been previously connected
II Display of the current version of the program and the available version


I
II
Series 300 Software Manager Version 2.0
Service: Update PC-Software
List of the Instruments
Update a new version for the PC-Software
Update
Exit

	Instrument	Serial Number	Program
✗	SM300	0000100021	
✗	AM300	0000100009	AM300_000010000
✗	FS300	0000100196	FS300_0000100196
✗	FS300	0000100445	
✗	AM300	0000100023	AM300_000010002
✗	FS300	0000100379	
✗	FS300	0000100017	FS300_0000100017
✗	FS300	0000100045	FS300_0000100045
✓	FS300	0000100570	FS300_0000100570
✗	FS300	0000123456	FS300_0000123456
✗	FS300	0000100471	FS300_0000100471
✗	SM300	0000100160	SM300_000010016
✗	FS300	0000100399	FS300_0000100399

✓ Instrument authorized or ready for remote
✗ Instrument not connected or program not exist
⊘ Instrument not authorized

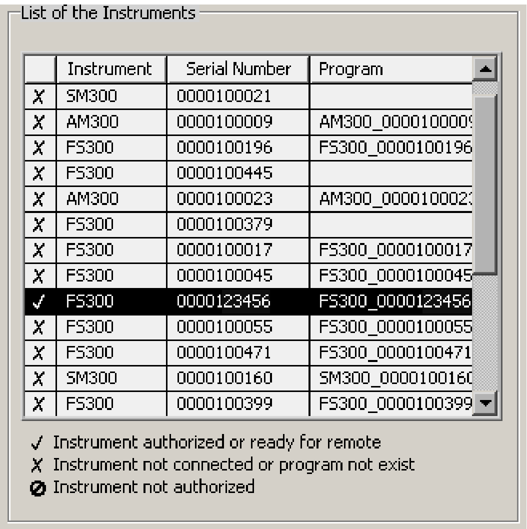
File Path: C:\Programme\Series300\FS300_0000123456.exe

version: 2.1.1

new version available: 2.5.0

Selecting the instrument

3. In **I** click on the instrument for which you wish to update a link.



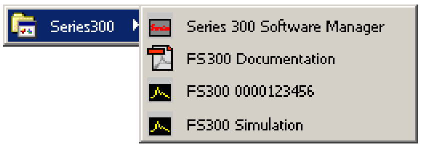
List of the Instruments

	Instrument	Serial Number	Program
✗	SM300	0000100021	
✗	AM300	0000100009	AM300_000010000
✗	FS300	0000100196	FS300_0000100196
✗	FS300	0000100445	
✗	AM300	0000100023	AM300_000010002
✗	FS300	0000100379	
✗	FS300	0000100017	FS300_0000100017
✗	FS300	0000100045	FS300_0000100045
✓	FS300	0000123456	FS300_0000123456
✗	FS300	0000100055	FS300_0000100055
✗	FS300	0000100471	FS300_0000100471
✗	SM300	0000100160	SM300_000010016
✗	FS300	0000100399	FS300_0000100399

✓ Instrument authorized or ready for remote
✗ Instrument not connected or program not exist
⊘ Instrument not authorized

Updating the link

4. Click in **II** on **<Update>**, to update the displayed link.
5. Click in **II** on **<Exit>**, to shut down the service program. The updated connection **FS300 0000xxxxxx** is displayed in the Windows™ Start Menu **Start\Programme\Rohde & Schwarz\Series300**.



Now the program **FS300 0000xxxxxx** can be started (↗ 7-198).

7.3 Starting the Remote Control

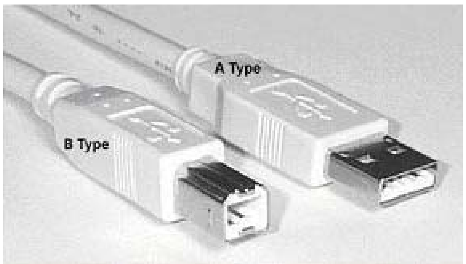
7.3.1 Connecting the Instrument to the PC

NOTE

PC software R&S FS300-K1 must be installed before you can connect the R&S FS300 to the PC (↗ 7-180).

Introduction

R&S FS300 is connected to the PC via the USB interface. The connection cable has two plug types. Plug A is connected to the computer (↗ computer manual) and plug B is connected to the R&S FS300 (↗ 2-41).

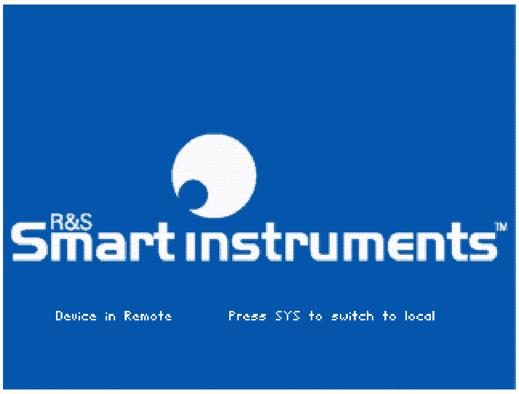


Prepare remote control

1. Switch on the R&S FS300 and the computer.

Connect instrument to PC

2. Connect the instrument to the computer with the USB cable. The computer recognizes the attached instrument and sets up a connection. The following message appears on the monitor of the R&S FS300:



Device in Remote Press SYS to switch to local

If the R&S FS300 is not automatically recognized, please check that the USB master switch of the R&S FS300 is at position **AUTO** (↗ 6-169).

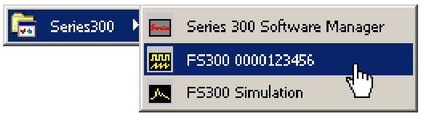
NOTE

In remote control mode, control of the R&S FS300 is deactivated and can only be reactivated by pressing the SYS key at the front panel of the instrument. Switching from remote to local control takes approximately 5 seconds.

7.3.2 Starting the Program

Starting the program

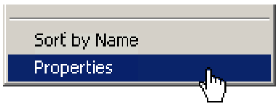
1. In the Windows™ start-up directory click on: **Start\Programs\Rohde&Schwarz\Series300\FS300 0000xxxxxx**


Series300
Series 300 Software Manager
FS300 0000123456
FS300 Simulation

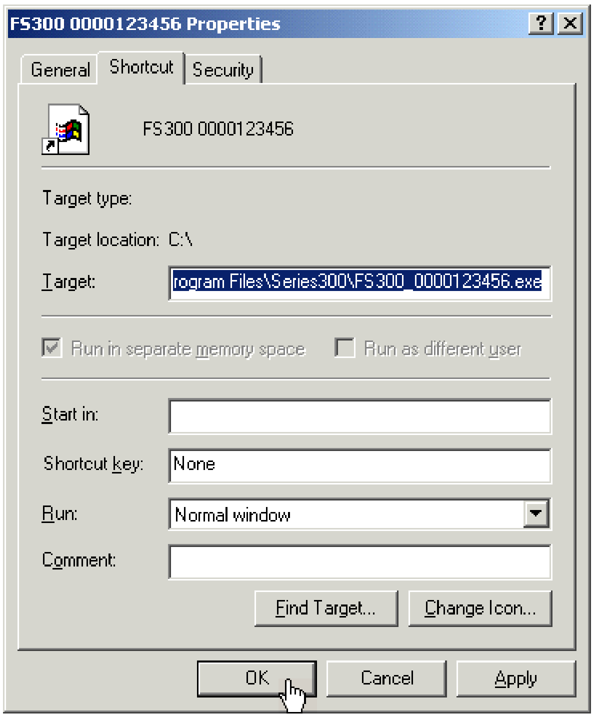
If the link is not available

2. If the program does not start, then click with the right mouse button in the Windows™ start-up directory on: **Start\Programs\Rohde&Schwarz\Series300\FS300 0000xxxxxx**

   Click **Properties**.


Sort by Name
Properties

   Click **<OK>** to create a link between the program and start-up directory.


FS300 0000123456 Properties
?
General
Shortcut
Security
Find Target...
Change Icon...
OK
Cancel
Apply

FS300 0000123456

Target type:

Target location: C:\

Target: rogram Files\Series300\FS300_0000123456.exe

☑ Run in separate memory space ☐ Run as different user

Start in:

Shortcut key: None

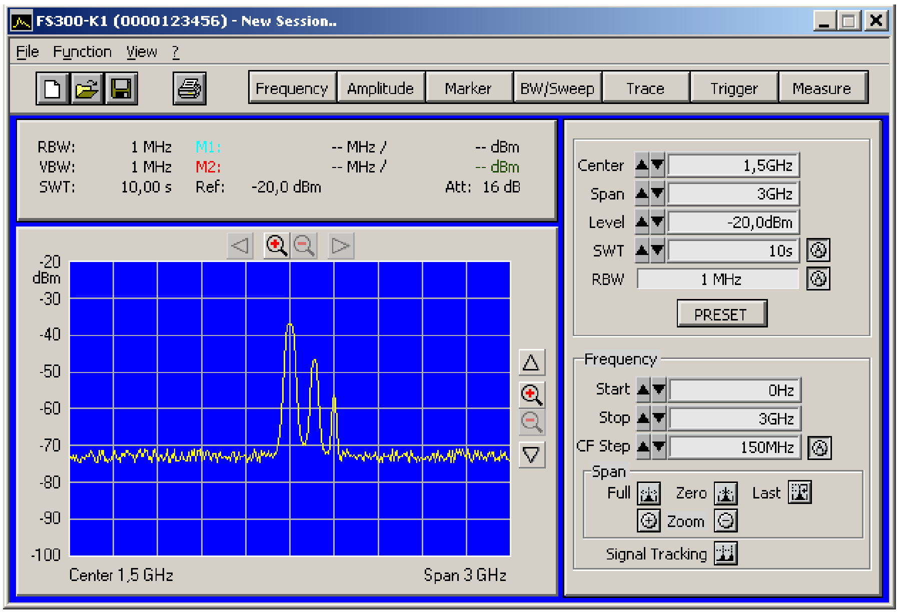
Run: Normal window

Comment:

   Start the program again (↗ above, instruction 1.)

Program interface

The program starts up and you may begin using the R&S FS300 remote control.


FS300-K1 (0000123456) - New Session..
File
Function
View
?
Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
-20
dBm
-30
-40
-50
-60
-70
-80
-90
-100
Center 1,5 GHz
Span 3 GHz
PRESET
Frequency
Span
Full
Zero
Last
Zoom
Signal Tracking

RBW: 1 MHz
VBW: 1 MHz
SWT: 10,00 s
M1: -- MHz / -- dBm
M2: -- MHz / -- dBm
Ref: -20,0 dBm
Att: 16 dB

Center 1,5GHz
Span 3GHz
Level -20,0dBm
SWT 10s
RBW 1 MHz

Start 0Hz
Stop 3GHz
CF Step 150MHz

Loading the current instrument settings

A new session opens automatically when you start the program. The current R&S FS300 settings are loaded. The following settings are display and evaluation functions and are not transferred to the PC software:

- Marker functions (↗ 7-219)
- Scale of measuring diagram (Range, Unit)
- Trace functions (↗ 7-222)
- Measure functions (↗ 7-223)

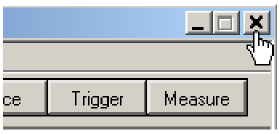
NOTE

If the message **Device not connected** appears on the program interface, you need to check the connection to the instrument (↗ 7-197).

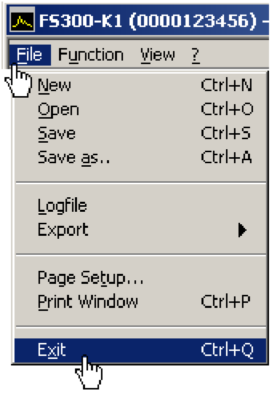
7.3.3 Closing the Remote Control

Closing the program

1. In Windows™ click on the close symbol **x**.


Trigger
Measure

You may also select the option **Exit** in the pull-down menu **File**.


FS300-K1 (0000123456)
File Function View ?
New Ctrl+N
Open Ctrl+O
Save Ctrl+S
Save as.. Ctrl+A
Logfile
Export
Page Setup...
Print Window Ctrl+P
Exit Ctrl+Q

Closing the remote control

2. Remove the USB cable from one side or press the SYS key at the front panel of the R&S FS300.

   Switching between remote and local control takes approximately 5 seconds.

7.4 Getting Started

7.4.1 Level and Frequency Measurement

7.4.1.1 Measuring Task

ATTENTION ⚠

The input stage of the R&S FS300 can be destroyed by overloads or DC components. If there is a possibility that the limits specified in the data sheet may be violated, the input must be protected with an attenuator and/or a DC block.

Measurement problem

Determining the level and frequency of a signal is one of the most common measuring tasks which can be solved with a spectrum analyzer. When measuring an unknown signal the PRESET (factory) setting (↗ 6-74) is used as a start-up setting.

Solution

Important functions for the level and frequency measurement are setting the center frequency (CENTER) and the frequency display span (SPAN) as well as the MARKER functions.

7.4.1.2 Measuring Sequence

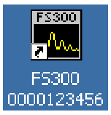
Introduction

In this example, a signal with a frequency of 200 MHz and a level of –30 dBm is applied to the HF input of the R&S FS300. The center frequency and the frequency display span are set manually. Carry out the following steps:

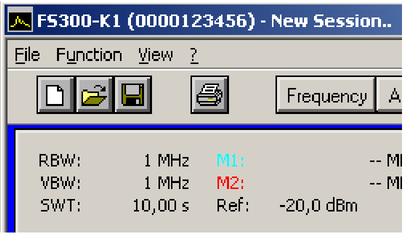
- Reset the R&S FS300
- Apply a signal to the R&S FS300
- Set the center frequency (Center) to 200 MHz
- Reduce frequency display span (Span) to 1 MHz
- Measure the level and frequency with the marker
- Measure the frequency with the built-in frequency counter

Resetting the R&S FS300

1. Start the PC software (FS300 0000123456.EXE) on your PC.



Alternatively you may also open a new session when the PC software is already started. To do so, press **<Ctrl+N>**. The default settings are now active (↗ 6-74).



RBW: 1 MHz M1: -- MI
VBW: 1 MHz M2: -- MI
SWT: 10,00 s Ref: -20,0 dBm

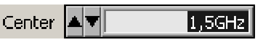
Applying a signal to the R&S FS300

2. Apply the measuring signal to the HF input socket.

RF IN
MAX +33dBm

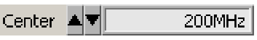
Setting the center frequency (Center) to 200 MHz

3. Press **<Ctrl+Shift+C>**. The input window **Center** is activ.



Center 1,5GHz

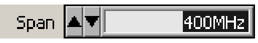
4. Enter the value **<200M>** with the numeric keys. Complete the input by pressing **<Enter>**.



Center 200MHz

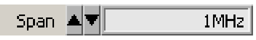
Reducing the frequency display span (Span) to 1 MHz

5. Press **<Ctrl+Shift+S>**. The input window **Span** is active.



Span 400MHz

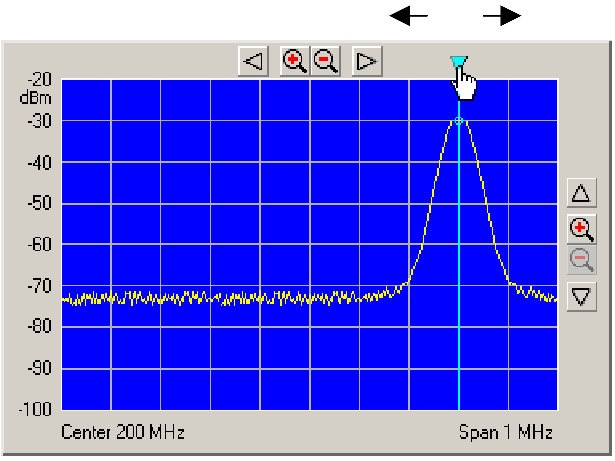
6. Enter the value **<1M>** with the numeric keys. Complete the input by pressing **<Enter>**.



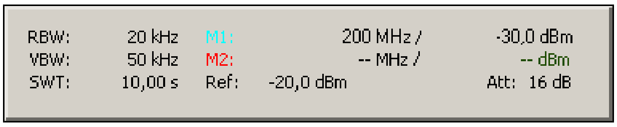
Span 1MHz

Measuring the level and frequency with the marker

7. Press **<Ctrl+Shift+M>**. The marker jumps to the signal peak. An arrow appears above of the diagram at the position of the marker.


-20
dBm
-30
-40
-50
-60
-70
-80
-90
-100
Center 200 MHz
Span 1 MHz

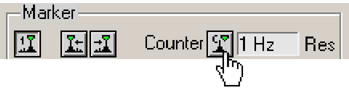
8. You can change the position of the marker by moving the arrow with the left **<Mouse Button>**. The parameter field above shows the marker values M1.



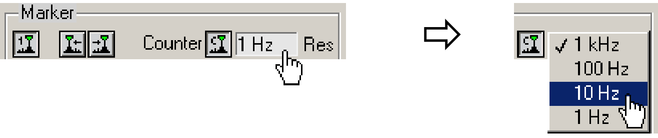
```
RBW:    20 kHz   M1:          200 MHz /     -30,0 dBm
VBW:    50 kHz   M2:           -- MHz /        -- dBm
SWT:   10,00 s   Ref:  -20,0 dBm           Att:  16 dB
```

Measuring the frequency with the built-in frequency counter

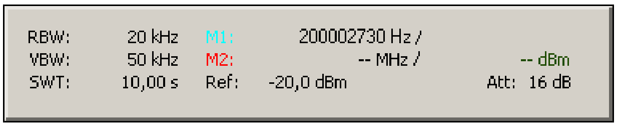
9. In the **Function** display **Marker** click on **<Counter>** with the left **<Mouse Button>**


Marker
Counter
1 Hz
Res

10. Set the resolution of the frequency counter in the selection window **<Res>**.


Marker
Counter
1 Hz
Res
✓ 1 kHz
100 Hz
10 Hz
1 Hz

The exact frequency value C1 can be seen in the parameter field above.



```
RBW:    20 kHz   M1:      200002730 Hz /
VBW:    50 kHz   M2:           -- MHz /        -- dBm
SWT:   10,00 s   Ref:  -20,0 dBm           Att:  16 dB
```

7.5 Control Concept

7.5.1 PC Monitor Display

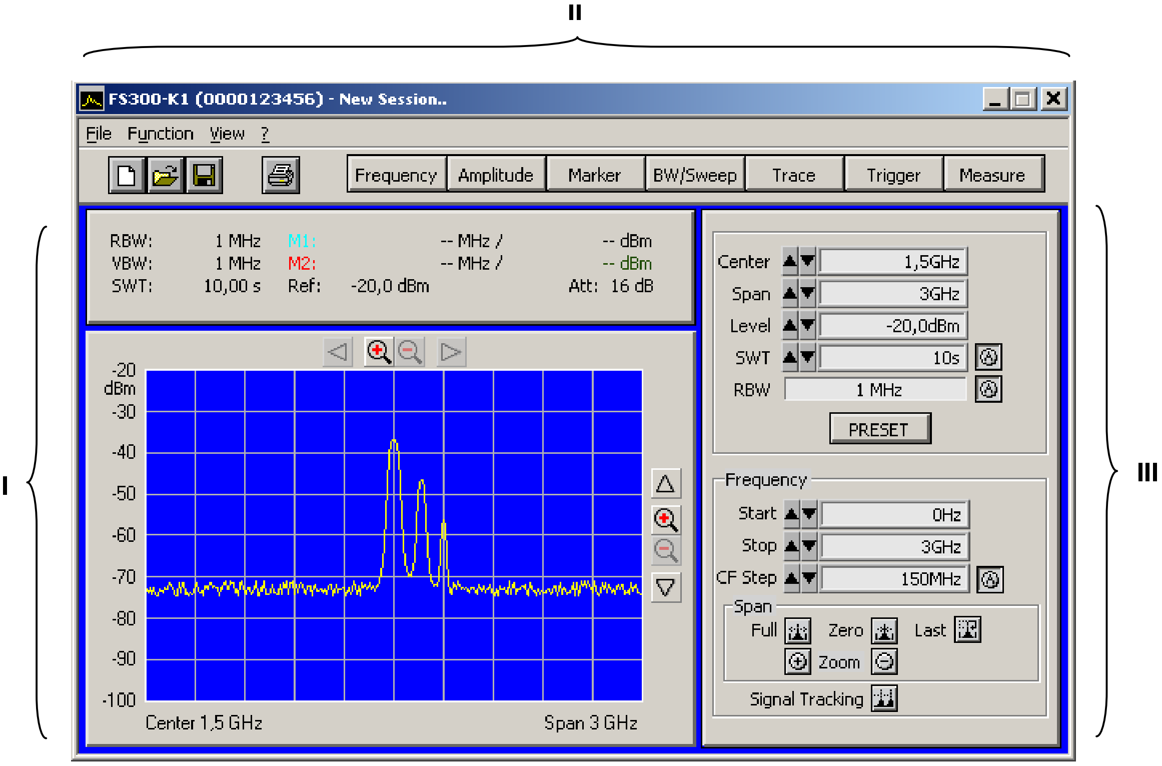
Introduction

The PC monitor provides continuous information about the results and parameters of the selected measuring functions. The display format for the measuring results and the insertion of the function displays depend on the current settings.

Structure of the program interface

The program interface is divided into three areas:

I Diagram
II Menus
III Functions


II
I
III
FS300-K1 (0000123456) - New Session..
File
Function
View
?
Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
-20
dBm
-30
-40
-50
-60
-70
-80
-90
-100
Center 1,5 GHz
Span 3 GHz
PRESET
Frequency
Span
Full
Zero
Last
Zoom
Signal Tracking

RBW: 1 MHz
VBW: 1 MHz
SWT: 10,00 s
M1: -- MHz / -- dBm
M2: -- MHz / -- dBm
Ref: -20,0 dBm
Att: 16 dB

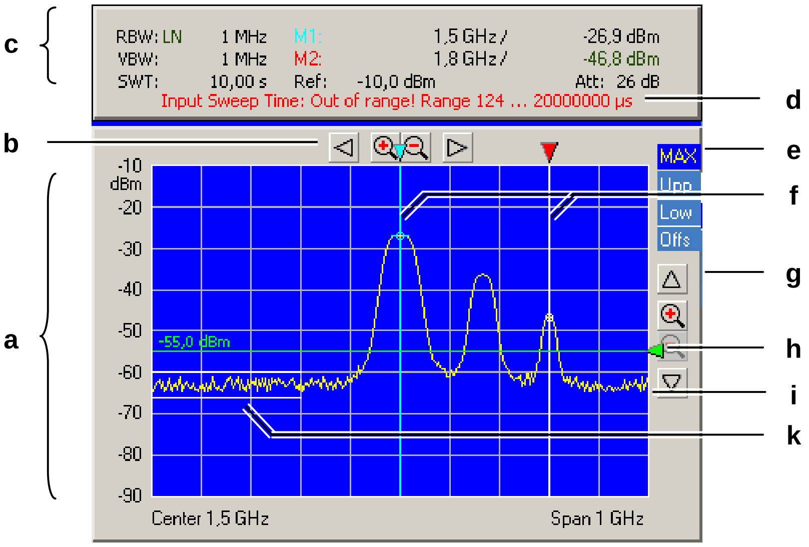
Center 1,5GHz
Span 3GHz
Level -20,0dBm
SWT 10s
RBW 1 MHz
Start 0Hz
Stop 3GHz
CF Step 150MHz

7.5.1.1 Diagram

Diagram displays

The diagram area contains:

- Measuring diagram with scale (**a**) and traces (**i**)
- Measuring value displays, e.g., display lines (**h**) and markers (**f**)
- Limit lines (**k**)
- Parameter field (**c**) and status displays (**e**)
- Pop-up error messages (**d**)



RBW: LN 1 MHz M1: 1,5 GHz / -26,9 dBm
VBW: 1 MHz M2: 1,8 GHz / -46,8 dBm
SWT: 10,00 s Ref: -10,0 dBm Att: 26 dB
Input Sweep Time: Out of range! Range 124 ... 20000000 µs

Measuring diagram A 10 x 8 grid is superimposed on the diagram to facilitate traces analysis.

Parameter field and status display

The following values are displayed in the parameter field:

RBW: - current resolution bandwidth (**LN** for max. sensitivity)
VBW: - current video bandwidth
SWT: - current sweep time
M1: - marker 1 with marker position and level value
M2: - marker 2 with marker position and level value
Ref: - current reference level
Att: - current input attenuation

The status display provides information about:

MAX - current trace display, e.g., maximum value
Upp - limit line Upp is switched on
Low - limit line Low is switched on
Offs - level offset is switched on

NOTE

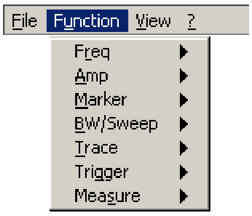
Error messages are closed after several seconds.

Further system messages and warnings in illegal modes of operation are described in detail in chapter 9.

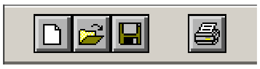
7.5.1.2 Menus

Calling up and displaying menus

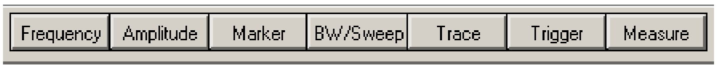
Different pull-down menus can be accessed in the menu area.


File
Function
View
?
Freq
Amp
Marker
BW/Sweep
Trace
Trigger
Measure

In addition, Windows™-typical menu items can be called up via a toolbar (icons).



Menus for setting the measuring parameters and functions are also available as a toolbar and can be selected directly.


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure

NOTE

The ▸ arrow after a menu option in the pull-down menu indicates that a sub-menu will appear after opening, e.g., Amp ▸.

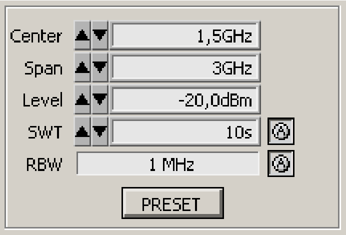
7.5.1.3 Functions

Main functions display

The **main functions** of the R&S FS300 are always displayed in the top part of the function display. These are:

- Center frequency (Center)
- Frequency display span (Span)
- Reference level (Level)
- Sweep time (SWT)
- Resolution band width (RBW)

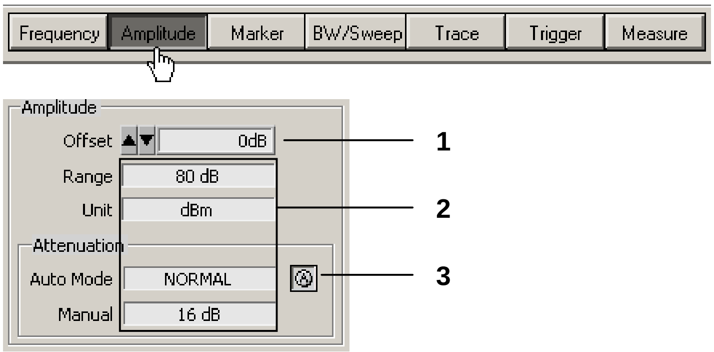
These may be changed at any time.



Center 1,5GHz
Span 3GHz
Level -20,0dBm
SWT 10s
RBW 1 MHz

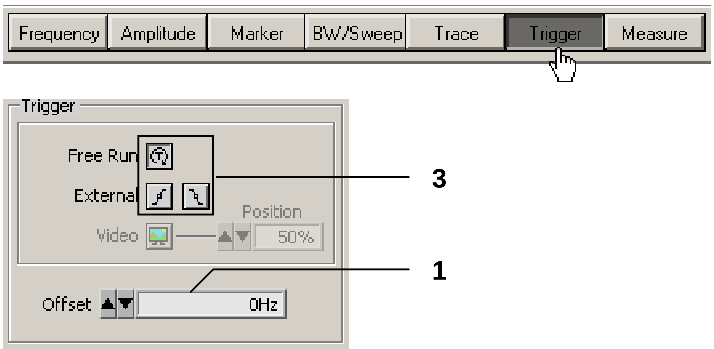
Inserting specific functions

In the lower part of the function display, different function displays with input fields (1), selection fields (2) and control buttons (3) are displayed e.g., **Amplitude** or **Trigger** etc., according to menu selection (↗ 7-211).



Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
Amplitude
1
2
3
Attenuation

Offset 0dB
Range 80 dB
Unit dBm
Auto Mode NORMAL
Manual 16 dB



Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
Trigger
Free Run
External
Video
Position
3
1

Position 50%
Offset 0Hz

NOTE: If a selection is not highlighted, it has currently no function (current setting).

7.5.2 Input via Keyboard and Mouse

Introduction

The R&S FS300 is remote controlled via PC keyboard and mouse with the help of menus. The most important keys are:

▪ Numeric keys	0 ... 9
▪ Arrow keys	◂ / ▸ / ▾ / ▴
▪ Function keys	F5 ... F11
▪ Action keys	Enter, Esc
▪ Tab key	Tab
▪ Space bar	Space
▪ Mouse buttons	left, right

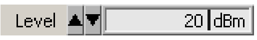
7.5.2.1 Numeric Keys

Function

The numeric keys are used to enter numerical parameters.

0 ... 9

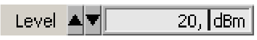
– At cursor, insert numbers **<0>** ... **<9>**



Level 20 dBm

,

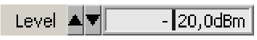
– At cursor, insert decimal separating sign **<,>** or **<.>** dependence on PC system settings



Level 20, dBm

-

– At cursor, insert minus sign **<->**



Level - 20,0dBm

7.5.2.2 Arrow Keys

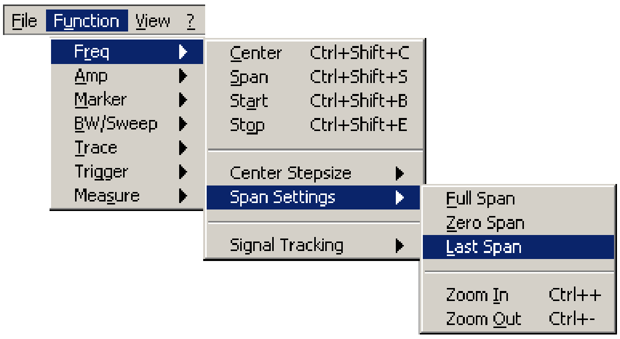
Function

In addition to numeric keys, the arrow keys are used to enter parameters. They can also be used to navigate through the menus.

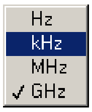
◂ / ▸ / ▾ / ▴

The arrow keys have the following functions:

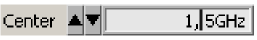
– **Navigating the pull-down menus** with all arrow keys


File
Function
View
?
Freq
Amp
Marker
BW/Sweep
Trace
Trigger
Measure
Center Ctrl+Shift+C
Span Ctrl+Shift+S
Start Ctrl+Shift+B
Stop Ctrl+Shift+E
Center Stepsize
Span Settings
Signal Tracking
Full Span
Zero Span
Last Span
Zoom In Ctrl++
Zoom Out Ctrl+-

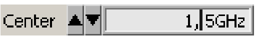
- **Navigating** the selection fields with the ▼ / ▲ arrow keys



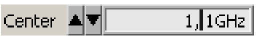
- **Positioning** the cursor in the input fields with the ◀ / ▶ arrow keys

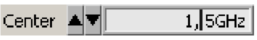

Center 1,5GHz

- **Increasing** or **decreasing** numerical parameter inputs with the ▼ / ▲ arrow keys

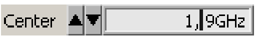

Center 1,5GHz

⇨ 4 x ▼


Center 1,1GHz


Center 1,5GHz

⇨ 4 x ▲


Center 1,9GHz

7.5.2.3 Function Keys

Function

Function keys open the menus to set the measuring parameters and measuring functions and insert the corresponding function display.

F5 – Inserts the **Frequency** function display (↗ 7-217)

F6 – Inserts the **Amplitude** function display (↗ 7-218)

F7 – Inserts the **Marker** function display (↗ 7-219)

F8 – Inserts the **BW/Sweep** function display (↗ 7-221)

F9 – Inserts the **Trace** function display (↗ 7-222)

F10 – Inserts the **Trigger** function display (↗ 7-223)

F11 – Inserts the **Measure** function display (↗ 7-223)

7.5.2.4 Action Keys (Enter, Esc)

Function The action keys complete the menu-operated settings.

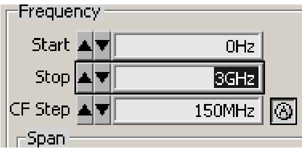
Enter key – This key **closes the input or selection**. The **new value** now applies.

Esc key – This key **closes the selection**. The **old value** is preserved.

7.5.2.5 Tab Key

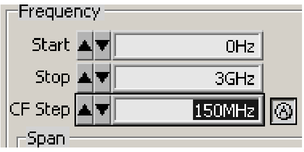
Function The tab key activates the input fields, the selection fields and the buttons within a function display.

Tab key – Jumps from one control element to another in a function display



Start 0Hz
Stop 3GHz
CF Step 150MHz

,



Start 0Hz
Stop 3GHz
CF Step 150MHz

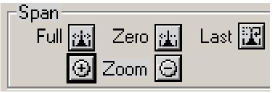
, etc.

NOTE: The tab key can be only used to make selections when an input field, a selection field or a control button has been selected in the function display via a menu (↗ 7-211) or with the mouse (↗ 7-210).

7.5.2.6 Space Key

Function After selecting an input field, a selection field or a control button with the tab key, different actions are initiated by pressing the space key:

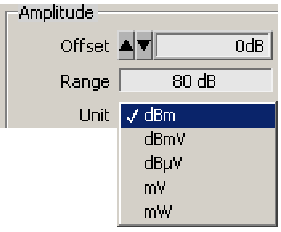
Space key – Immediate function **execution** of the function e.g., Zoom +



– **Toggle** a setting, e.g., switch on/off signal tracking

Signal Tracking

– **Open** selection fields, e.g., set the measuring unit for Amplitude



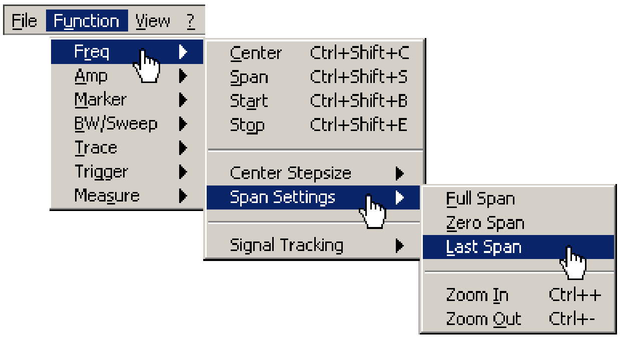
Offset 0dB
Range 80 dB

7.5.2.7 Mouse Buttons

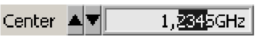
Function Placing the mouse pointer over and clicking on any program interface item will allow for different actions.

Left mouse button

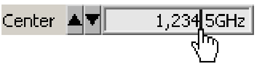
- Pull-down menus can be **opened** with the mouse


File
Function
View
?
Freq
Amp
Marker
BW/Sweep
Trace
Trigger
Measure
Center Ctrl+Shift+C
Span Ctrl+Shift+S
Start Ctrl+Shift+B
Stop Ctrl+Shift+E
Center Stepsize
Span Settings
Signal Tracking
Full Span
Zero Span
Last Span
Zoom In Ctrl++
Zoom Out Ctrl+-

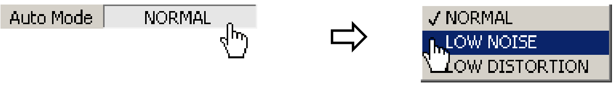
- The contents of input fields can be **highlighted** with mouse button pressed and held


Center
1,2345GHz

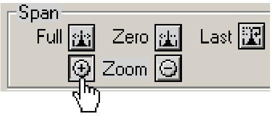
- The cursor can be **positioned** in the input fields by clicking the mouse button


Center
1,2345GHz

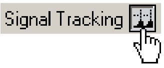
- Selection fields can be **opened** and settings can be **selected** with mouse button pressed and held


Auto Mode
NORMAL
✓ NORMAL
LOW NOISE
LOW DISTORTION

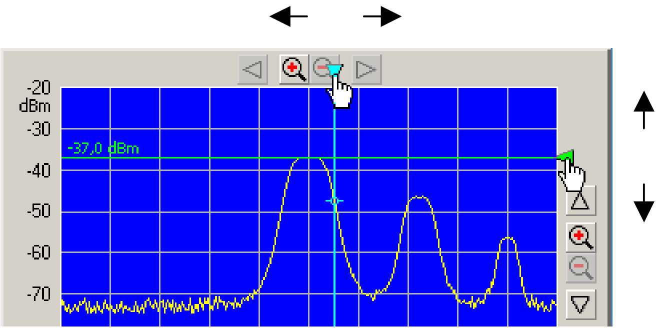
- Immediate **execution** of any function by clicking the mouse button


Span
Full
Zero
Last
Zoom

- **Toggling** a setting with multiple mouse clicks


Signal Tracking

- **Moving** markers and limits, also in the diagram area, with mouse button pressed and held


-20
dBm
-30
-40
-50
-60
-70
-37,0 dBm

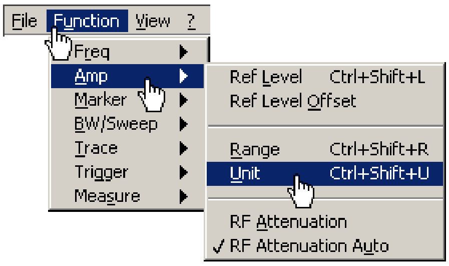
7.5.3 Calling up and Changing the Menus

Various methods are possible

The R&S FS300 is remote controlled via a menu. The keyboard and the mouse can be used to select a menu (↗ 7-207).

Instrument parameters (and program functions) can be selected in different ways on the PC interface, e.g., unit for the level display:

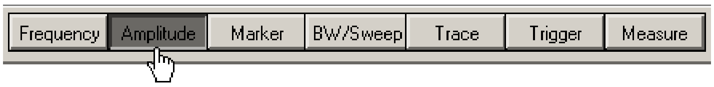
- **Selecting with the pull-down menu**

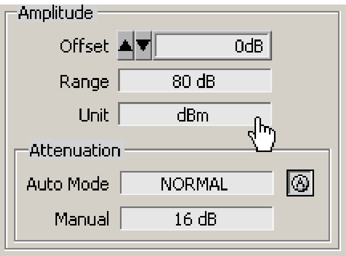

File
Function
View
?
Freq
Amp
Marker
BW/Sweep
Trace
Trigger
Measure
Ref Level Ctrl+Shift+L
Ref Level Offset
Range Ctrl+Shift+R
Unit Ctrl+Shift+U
RF Attenuation
✓ RF Attenuation Auto

- **Selecting with short keys**

Unit Ctrl+Shift+U

- **Selecting with the toolbar menu** and **selecting the selection field** directly in the function display


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure



Amplitude

Offset 0dB

Range 80 dB

Unit dBm

Attenuation

Auto Mode NORMAL

Manual 16 dB

NOTE

The ▸ arrow after a menu option in the pull-down menu indicates that a sub-menu will appear after opening, e.g. .

7.5.4 Setting the Parameters

Introduction

Parameters can be set in different ways:

- Selecting an instrument function directly (command button)
- Selecting settings in the selection fields
- Inputting numerical parameters in the input fields
- Moving markers

The keyboard and mouse can be used for the settings (↗ 7-207).

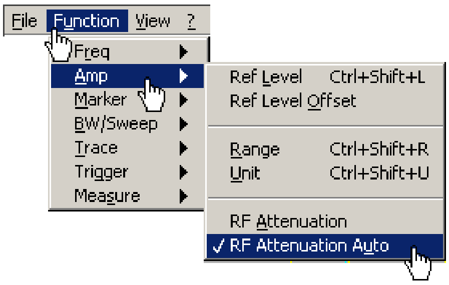
7.5.4.1 Direct Selection of a Instrument Function

Various methods are possible

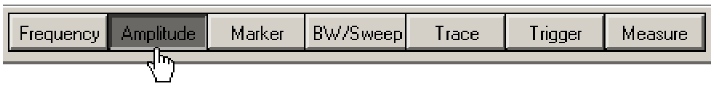
Some instrument functions are executed immediately after selection, e.g., automatic setting of the HF input attenuator.

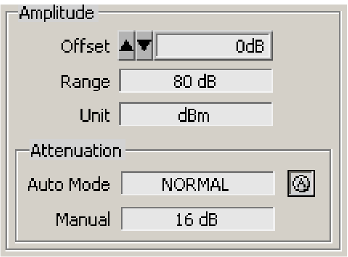
Instrument parameters (control buttons) can be selected in different ways:

- **Selecting and switching on using a pull-down menu**. The current setting is indicated by a tick mark (✓).


File
Function
View
?
Freq
Amp
Marker
BW/Sweep
Trace
Trigger
Measure
Ref Level Ctrl+Shift+L
Ref Level Offset
Range Ctrl+Shift+R
Unit Ctrl+Shift+U
RF Attenuation
✓ RF Attenuation Auto

- **Selecting using a toolbar menu** and **switching on in the function display**


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure

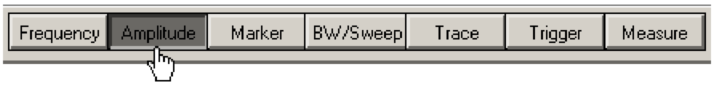

Amplitude
Offset 0dB
Range 80 dB
Unit dBm
Attenuation
Auto Mode NORMAL
Manual 16 dB

7.5.4.2 Selecting the Settings

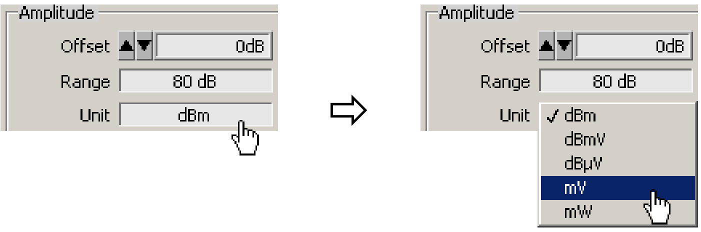
Setting the instrument functions in selection windows

Several settings are available for certain instrument functions, e.g., level display unit.

The selection window can be **reached** in a number of different ways (↗ 7-211), e.g., selection using the toolbar menu.



Opening the selection window and **selecting the instrument functions** takes place in the **function** display. The current setting is indicated by a tick mark (✔).



Offset 0dB
Range 80 dB
Unit dBm

Offset 0dB
Range 80 dB
Unit ✓ dBm

7.5.4.3 Inputting the Numerical Parameters

Setting instrument functions in the input window

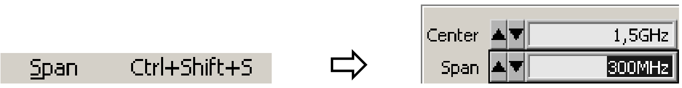
Two methods are available for entering the numerical parameters, e.g., inputting the frequency display range:

- **Inputting** a value with **numeric keys**
- **Inputting** a value with **arrow keys**

You should use the arrow keys for inputting if the value to be measured cannot be determined accurately beforehand. Given that the screen is constantly updated while the values are changing, browsing is possible.

Selecting input window

The input fields can be selected in a number of different ways (↗ 7-211), e.g., using short keys:

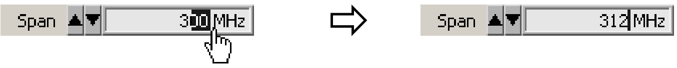


Center 1,5GHz
Span 300MHz

Inputting with numeric keys

Inputting using the numeric keys can be done in a number of different ways:

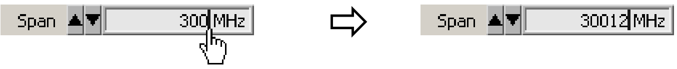
- Highlighting and **overwriting numbers**



Span 300 MHz

Span 312 MHz

- Selecting a decimal point and **inserting numbers**



Span 300 MHz

Span 30012 MHz

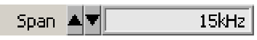
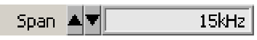
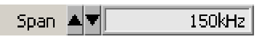
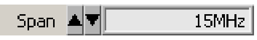
Selecting the unit

The entry is made in the active measurement unit, which is indicated after the numeric value in the entry field and can be changed. Make sure that there are no spaces between the numeric figure and the measurement unit.

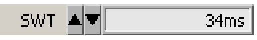
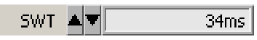
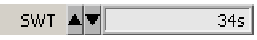
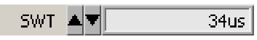
You may omit the base unit (e.g. Hz, s, dBm). However, you must specify the unit size (valid values: G, M, k, m, u, n, p).

Input examples

- **Span:**

15k	⇨	 Span 15kHz
15kHz	⇨	 Span 15kHz
150000	⇨	 Span 150kHz
15M	⇨	 Span 15MHz

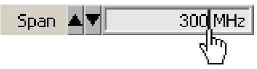
- **Sweep Time:**

34m	⇨	 SWT 34ms
34ms	⇨	 SWT 34ms
34	⇨	 SWT 34s
34u	⇨	 SWT 34us

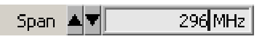
Inputting with arrow keys

Inputting using the arrow keys can be done in a number of different ways:

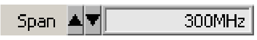
- Selecting a decimal point and incrementation or decrementation **with the ▼ / ▲ arrow keys on the keyboard**


Span 300MHz

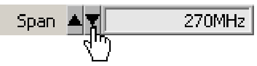
⇨ 4 x ▼


Span 296MHz

- Incrementing or decrementing **with the arrow keys on the user interface**


Span 300MHz

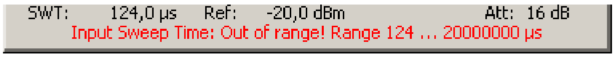
⇨ 4 x


Span 270MHz

NOTE: When entering the center frequency, increment size can be set on the rotary knob (↗ 6-79). The value is then incremented or decremented according to this set value.

Invalid parameter entry

If a parameter entry is invalid, the value will automatically be limited, and an error message indicating the valid value range will appear in the parameter field, e.g.:

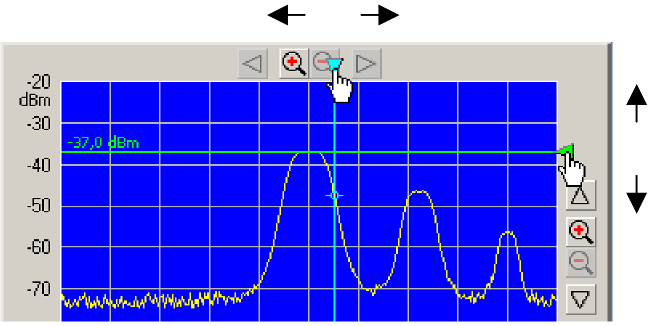

SWT: 124,0 µs Ref: -20,0 dBm Att: 16 dB
Input Sweep Time: Out of range! Range 124 ... 20000000 µs

- Acknowledge the error message with the mouse or the Enter key and repeat the entry with the correct value.

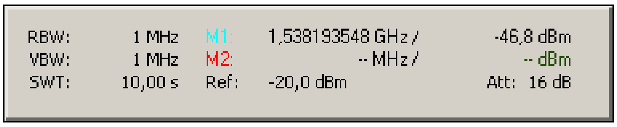
7.5.4.4 Moving the Markers

Introduction

In the diagram area, lines (markers, limits, etc.) can be inserted to analyze the trace. In addition, an arrow is displayed at the edge of the diagram at the position of the corresponding line. The position of the line can be changed by moving the arrow with the left mouse button.



The marker values can be read in the parameter fields above.



RBW: 1 MHz M1: 1,538193548 GHz / -46,8 dBm
VBW: 1 MHz M2: -- MHz / -- dBm
SWT: 10,00 s Ref: -20,0 dBm Att: 16 dB

7.6 Overview of all Menus and Functions (Shortcuts)

7.6.1 File

Menus to prepare for a Session

The following options are available in the pull-down menu **File:** open, save and close a session; create a log file; export data; print screen.

New	Ctrl+N	Begin new session	(↗ 7-225)
Open	Ctrl+O	Open saved session	(↗ 7-226)
Save	Ctrl+S	Save current session	(↗ 7-226)
Save as..	Ctrl+A	Save current session as	(↗ 7-226)
Logfile		Create a log file for the current session	(↗ 7-231)
Export	▶	Export data	(↗ 7-234)
Page Setup...		Page setup for printing	(↗ 7-236)
Print Window	Ctrl+P	Print current window	(↗ 7-236)
Exit	Ctrl+Q	Exit program	(↗ 7-200)

7.6.2 Function

NOTE Instrument functions are accurately described in chapter 6 of the R&S FS300 manual.

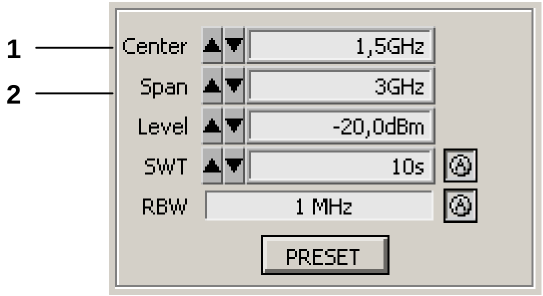
Menus for configuring and starting measurements

The menus used to set the spectrum analyzer are displayed in the pull down menu **Functions** or in the toolbar menu. The order of the menus mirrors that of the procedure for configuring and starting measurements.

Freq ▶	Selecting the frequency span (setting the x axis in the diagram area)
Amp ▶	Setting the level axis and the RF input (setting the y axis in the diagram area)
Marker ▶	Signal analysis with marker functions
BW/Sweep ▶	Setting the bandwidths and the sweep time
Trace ▶	Displaying the trace
Trigger ▶	Triggering the measurement
Measure ▶	Measurement functions

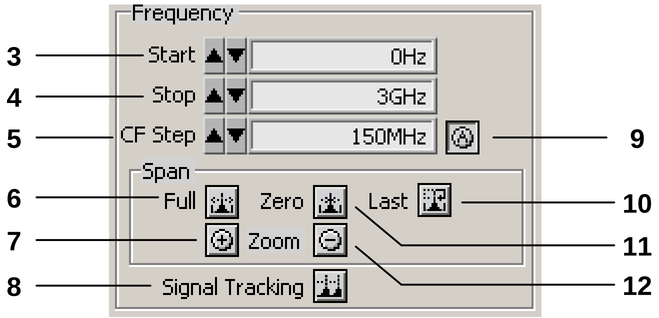
7.6.2.1 FREQ Menu

Main function display (always visible)



Center 1,5GHz
Span 3GHz
Level -20,0dBm
SWT 10s
RBW 1 MHz

Function display (insert with F5 key)



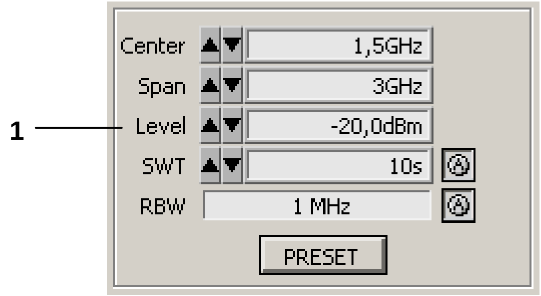
Start 0Hz
Stop 3GHz
CF Step 150MHz

Function and shortcut

Function	Shortcut	Description	
Center	Ctrl+Shift+C	Entering the center frequency	(1)
Span	Ctrl+Shift+S	Entering the span	(2)
Start	Ctrl+Shift+B	Entering the start frequency	(3)
Stop	Ctrl+Shift+E	Entering the stop frequency	(4)
Center Stepsize ▶		**Open submenu:** Entering the step width of the center frequency	
manual		Setting the step size manually	(5)
auto		Setting the step size automatically	(9)
= Centerfrequency		Setting the step size to the center frequency	
= Markerfrequency		Setting the step size to the marker frequency	
Span Settings ▶		**Open submenu:** Display modes for the frequency axis	
Full Span		Displaying the whole frequency range	(6)
Zero Span		Switching over to the ZERO SPAN	(11)
Last Span		Restoring the previous setting	(10)
Zoom In	Ctrl++	Reducing the span	(7)
Zoom Out	Ctrl+-	Increasing the span	(12)
Signal Tracking ▶		**Open submenu:** Signal tracking	
on		Activating signal tracking	(8)
off		De-activating signal tracking	(8)

7.6.2.2 Amp Menu

Main function display (always visible)



Center 1,5GHz

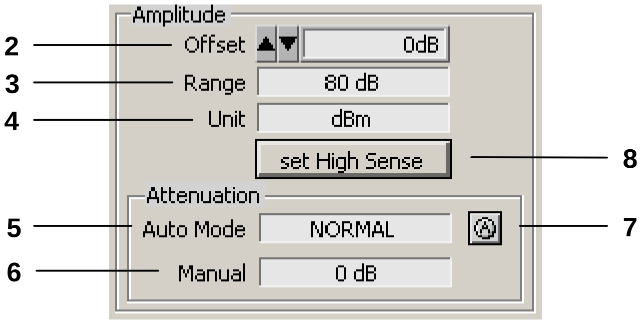
Span 3GHz

Level -20,0dBm

SWT 10s

RBW 1 MHz

Function display (insert with F6 key)



Amplitude

Offset 0dB

Range 80 dB

Unit dBm

Attenuation

Auto Mode NORMAL

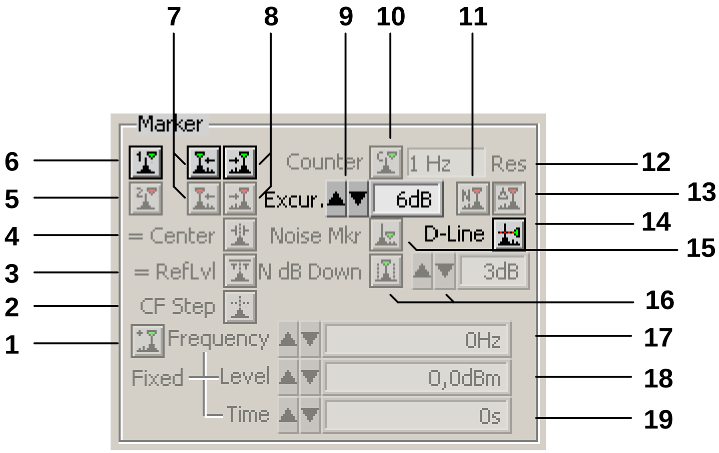
Manual 0 dB

Function and shortcut

Ref Level Ctrl+Shift+L	Entering the reference level	**(1)**
Ref Level Offset	Entering a level offset	**(2)**
Range Ctrl+Shift+R	Selecting the level display range	**(3)**
Unit Ctrl+Shift+U	Selecting a unit for the level display	**(4)**
RF Attenuation	Setting the RF input attenuation manually	**(6)**
RF Attenuation Auto	Setting the RF input attenuation automatically	**(5), (7)**
Set High Sense	Setting the high sensitivity automatically	**(8)**

7.6.2.3 Marker Menu

Function display (insert with F7 key)


7
8
9
10
11
Marker
Counter
1 Hz
Res
Excur.
6dB
= Center
Noise Mkr
D-Line
= RefLvl
N dB Down
3dB
CF Step
Frequency
0Hz
Fixed
Level
0,0dBm
Time
0s
6
5
4
3
2
1
12
13
14
15
16
17
18
19

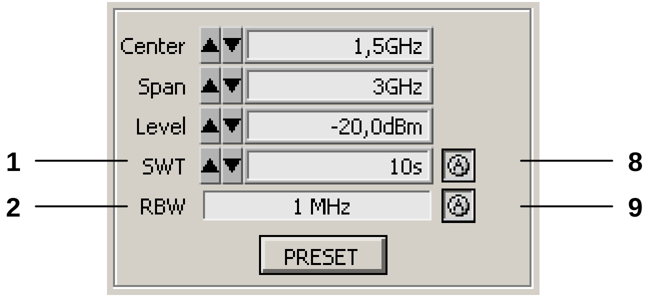
Function and shortcut

Marker 1 ▶	**Open submenu:** Activate marker 1	
Peak Ctrl+Shift+M	Place marker 1 on the trace maximum	(6)
next Peak left	Place marker 1 on the next trace maximum to the left	(7)
next Peak right	Place marker 1 on the next trace maximum to the right	(8)
Signal Count	Measure the signal frequency: Start measurement	(10)
Signal Count Resolution	Measure signal frequency: Set resolution	(12)
off	De-activate marker 1	(6)
Marker 2 ▶	**Open submenu:** Activate marker 2	
Peak	Place marker 2 on the trace maximum	(5)
next Peak left	Place marker 2 on the next trace maximum to the left	(7)
next Peak right	Place marker 2 on the next trace maximum to the right	(8)
Marker norm	Set marker 2 as a normal marker (NORM)	(11)
Marker delta	Set marker 2 as a delta marker (DELTA)	(13)
off	De-activate marker 2	(5)
Marker > ▶	**Open submenu:** Accepting marker values as settings	
Center = Marker Freq	Set the center frequency to the marker frequency	(4)
Ref Level = Marker Level	Set the marker level as a reference level	(3)
Center Stepsize = Marker Freq	Set the step size for entering the center frequency to the marker frequency	(2)

Marker Functions ▶		**Open submenu:** Marker measurement functions	
	Noise Marker	Measuring noise power density	**(15)**
	n dB down	Measuring signal bandwidth	**(16)**
D-Line Ctrl+Shift+D		Bring display line up on screen	**(14)**
Limit Line		Bring limit line up on screen	(↗ 7-228)
Ref fixed ▶		**Open submenu:** Reference points for measuring level differences	
	on	Activating the entry of arbitrary reference points	**(1)**
	off	Using M1 marker values as a reference point	**(1)**
	Ref Point Level	Entering the reference-point level	**(18)**
	Ref Point Freq	Entering the reference-point frequency	**(17)**
	Ref Point Time	Entering the reference-point time	**(19)**
Marker Settings ▶		**Open submenu:** Search criterion of functions NEXT PEAK LEFT/RIGHT	
	Peak Excursion	Entering the peak excursion	**(9)**

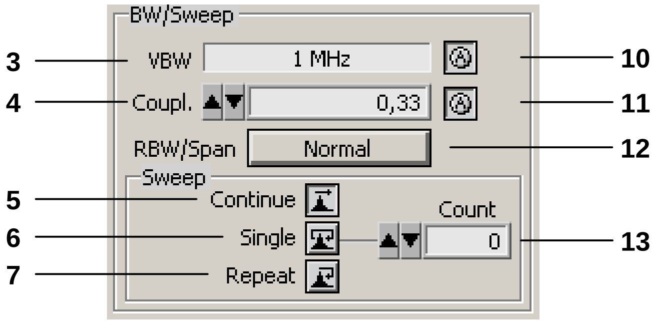
7.6.2.4 BW/Sweep Menu

Main function display (always visible)



Center 1,5GHz
Span 3GHz
Level -20,0dBm
SWT 10s
RBW 1 MHz

Function display (insert with F8 key)



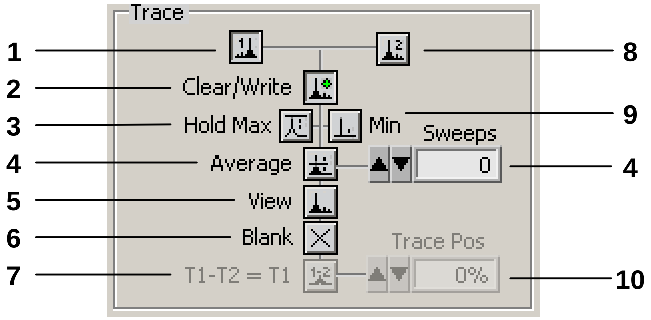
BW/Sweep
VBW 1 MHz
Coupl. 0,33
RBW/Span Normal
Sweep
Count 0

Function and shortcut

Res BW manual Ctrl+Shift+W	Setting the resolution bandwidth manually	(2)
Res BW auto	Activating automatic resolution bandwidth setting	(9)
Video BW manual	Setting the video bandwidth manually	(3)
Video BW auto	Activating automatic video bandwidth setting	(10)
Coupl Ratio ▶	**Open submenu:** Setting the RBW/VBW coupling ratio	
RBW/VBW manual	Setting the coupling ratio manually	(4)
RBW/VBW auto	Activating the default setting for the coupling ratio	(11)
Sweep ▶	**Open submenu:** Setting the sweep time	
Cont Sweep Ctrl+!	Starting a continuous frequency sweep	(5)
Single Sweep Ctrl+"	Performing an n-times sweep	(6)
No. of Sweeps	Setting the number of sweeps	(12)
Repeat Single Sweep	Repeating n-times sweeps	(7)
Sweep time manual	Setting the sweep time manually	(1)
Sweep time auto	Activating automatic sweep-time setting	(8)
RBW/Span Low Noise	Changing automatic resolution bandwidth setting	(12)
Normal	Automatic RBW limits for normal sensitivity	
Low Noise	Automatic RBW limits for maximal sensitivity	

7.6.2.5 Trace Menu

Function display (insert with F9 key)

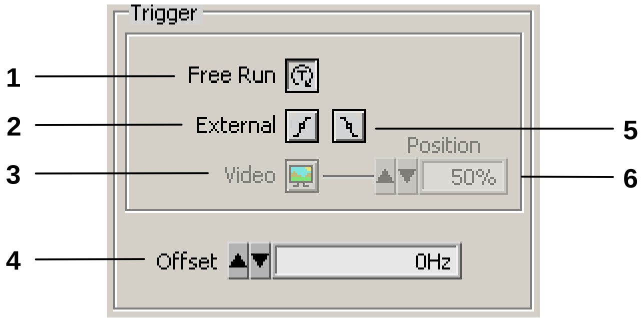

Trace
1
2
3
4
5
6
7
8
9
4
10
Clear/Write
Hold Max
Min
Sweeps
Average
0
View
Blank
Trace Pos
T1-T2 = T1
0%

Function and shortcut

Select Trace ▶		**Open submenu:** Selecting the active trace	
	Trace 1	Turning on and activating Trace 1	(1)
	Trace 2	Turning on and activating Trace 2	(8)
Clear/Write		Trace display mode: Overwrite mode	(2)
Max Hold		Trace display mode: Max. hold	(3)
Min Hold		Trace display mode: Min. hold	(9)
Trace Average		Trace display mode: Averaging	(4)
View		Freezing the trace	(5)
Blank		Blanking out the trace	(6)
Math ▶		**Open submenu:** Trace difference	
	T1-T2=>T1	Turning on the trace-difference mode	(7)
	Trace Pos	Repositioning Trace 1 (result)	(10)
	off	Turning off the trace-difference mode	(7)

7.6.2.6 Trigger Menu

Function display (insert with F10 key)


Trigger
1
Free Run
2
External
5
Position
3
Video
50%
6
4
Offset
0Hz

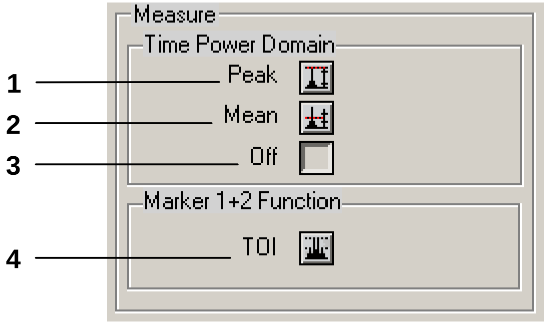
Function and shortcut

Free Run	Free-running measurements	**(1)**
External ▶	**Open submenu:** Triggering by an external TTL signal	
rising edge	Triggering on positive-going edge	**(2)**
falling edge	Triggering on negative-going edge	**(5)**
Video	Triggering by the display level	**(3), (6)**
Offset	Entering a trigger offset	**(4)**

NOTE The trigger function **LINE** (triggering by the AC-line frequency) is not supported.

7.6.2.7 Measure Menu

Function display (insert with F11 key)


Measure
Time Power Domain
1
Peak
2
Mean
3
Off
Marker 1+2 Function
4
TOI

Function and shortcut

Time Power Domain ▶	**Open submenu:** Measure the power in the time domain (ZERO SPAN)	
Peak	Output the peak value within the section	**(1)**
Mean	Output the mean value within the section	**(2)**
off	Switch off the power measurement	**(3)**
TOI	Measure the third-order intercept point	**(4)**

7.6.3 View

Menus for configuring the program interface

Menus for resizing the window and setting screen colors are available in the pull-down menu **View**.

large Window Ctrl+W	Switch on/off large window	(↗ 7-237)
Color Ctrl+L	Set screen color	(↗ 7-238)

7.6.4 ? Help

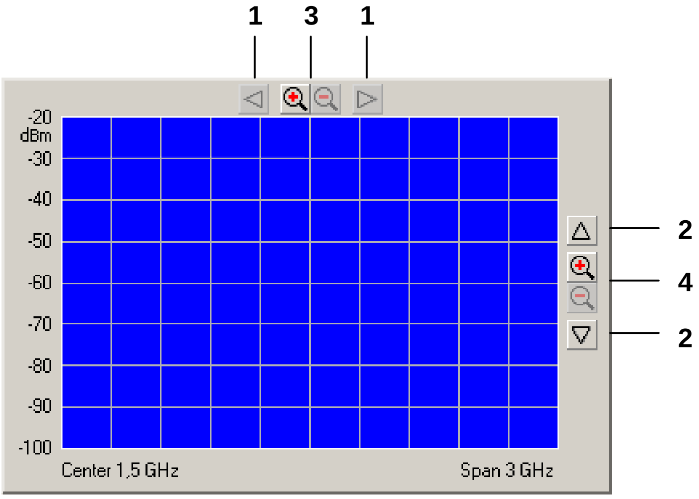
Help menus

Menus for opening the help function and displaying the program information are available in the pull-down menu **Help**.

Help	Start help function	(↗ 7-239)
Info Ctrl+I	Display program information	(↗ 7-239)

7.6.5 Zoom Functions

Diagram area (always visible)



Functions

Zoom Zoom the screen window

(1) Move screen window in X direction (one grid unit)

(2) Move screen window in Y direction (one grid unit)

(3) Zoom screen window in/out in X direction

(4) Zoom screen window in/out in Y direction

NOTE Zoom function **(3)** corresponds to the Zoom In/Out functions (↗ 7-217). Zoom function **(4)** corresponds to the Range functions (↗ 7-218).

7.7 Saving/Exporting Data (File)

7.7.1 Opening the Session

Application

A new session is opened automatically when the program is started (↗ 7-198). The current R&S FS300 settings are loaded. The following settings are display and evaluation functions and are not transferred to the PC software:

- Marker functions (↗ 7-219)
- Scale of measuring diagram (Range, Unit)
- Trace functions (↗ 7-222)
- Measure functions (↗ 7-223)

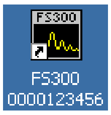
However, you may also open a new session while in remote control mode. Default settings are automatically loaded (↗ 6-74).

You can save and load specific instrument settings if you plan to work with these on a regular basis.

7.7.1.1 Beginning New Measurement

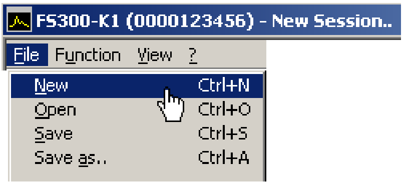
Beginning the measurement with current instrument setting

- Start the PC software on your PC.


FS300
FS300
0000123456

Beginning the measurement with factory setting

- Select menu item: **New**.

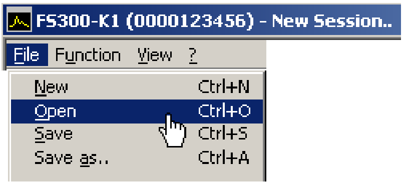

FS300-K1 (0000123456) - New Session..
File Function View ?
New Ctrl+N
Open Ctrl+O
Save Ctrl+S
Save as.. Ctrl+A

7.7.1.2 Loading the Saved Settings

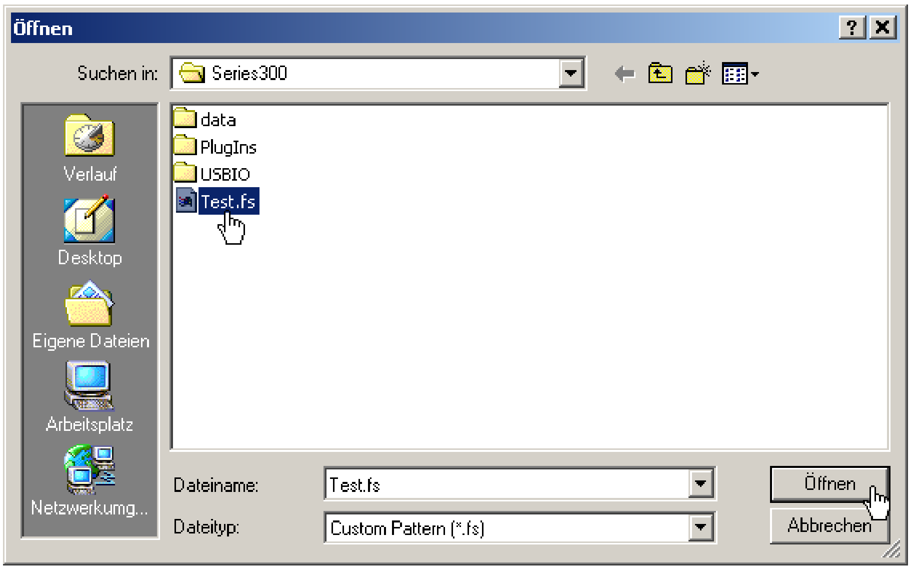
NOTE	If you drag and drop an *.fs file (saved instrument settings) to the FS300-K1.exe icon while the program is closed, the program will open using the settings from this *.fs file.

Beginning the measurement with saved instrument settings

1. Select menu item: **Open**.

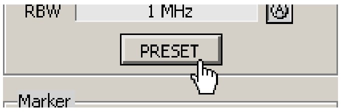

FS300-K1 (0000123456) - New Session..
File
Function
View
?
New Ctrl+N
Open Ctrl+O
Save Ctrl+S
Save as.. Ctrl+A

2. Select a file from the directory and click **<Open>**.


Öffnen
Suchen in:
Series300
Verlauf
Desktop
Eigene Dateien
Arbeitsplatz
Netzwerkumg...
data
PlugIns
USBIO
Test.fs
Dateiname:
Test.fs
Dateityp:
Custom Pattern (*.fs)
Öffnen
Abbrechen

Resetting the instrument settings

- To load the instrument settings that were last loaded or the factory settings, press **<Preset>** in the main function display.


RBW
1 MHz
PRESET
Marker

7.7.2 Saving the Session

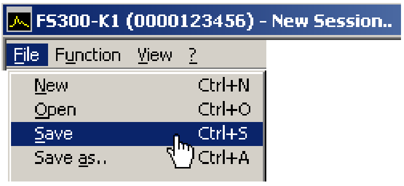
Application

You can save specific instrument settings if you plan to work with them on a regular basis (Save Session).

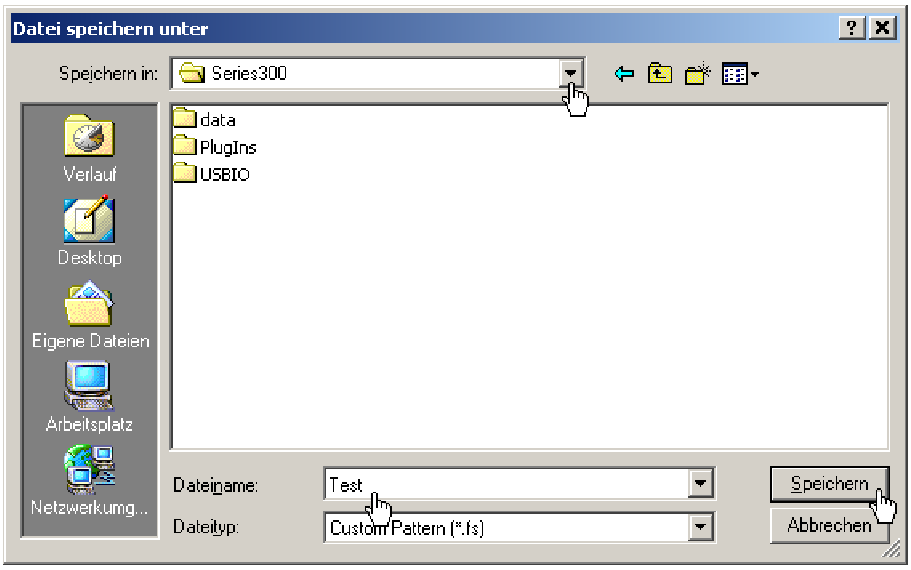
You may also change a previously saved instrument setting and save it under a different file name (Save Session as..).

Saving instrument settings

1. Select menu item: **Save** or **Save as...**


FS300-K1 (0000123456) - New Session..
File Function View ?
New Ctrl+N
Open Ctrl+O
Save Ctrl+S
Save as.. Ctrl+A

2. Select a directory, enter a file name and click **<Save>**.


Datei speichern unter
Speichern in: Series300
data
PlugIns
USBIO
Verlauf
Desktop
Eigene Dateien
Arbeitsplatz
Netzwerkumg...
Speichern
Abbrechen

Dateiname: Test

Dateityp: Custom Pattern (*.fs)

7.7.3 Monitoring the Measuring Values

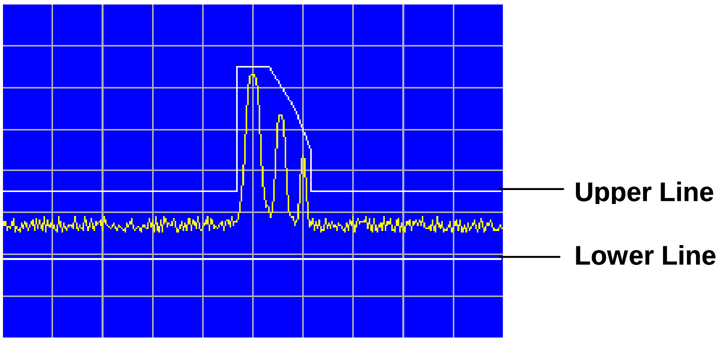
Introduction

If you wish to monitor deviation of measuring values you may set limit lines (Limit Lines) to monitor them. A logfile is created which can be opened with any text editor or with Microsoft Excel™.

7.7.3.1 Inserting the Limit Lines

Application

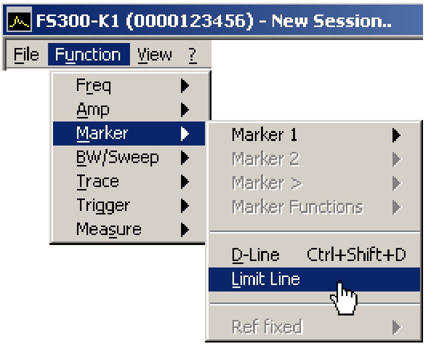
Measuring values which **overshoot** the limit lines are monitored with an **Upper Line** and measuring values which undershoot the limit lines are monitored with a **Lower Line**. The shape of the limit lines are entered into a table in value pairs (frequency, amplitude), they may then be inserted into the measuring diagram.



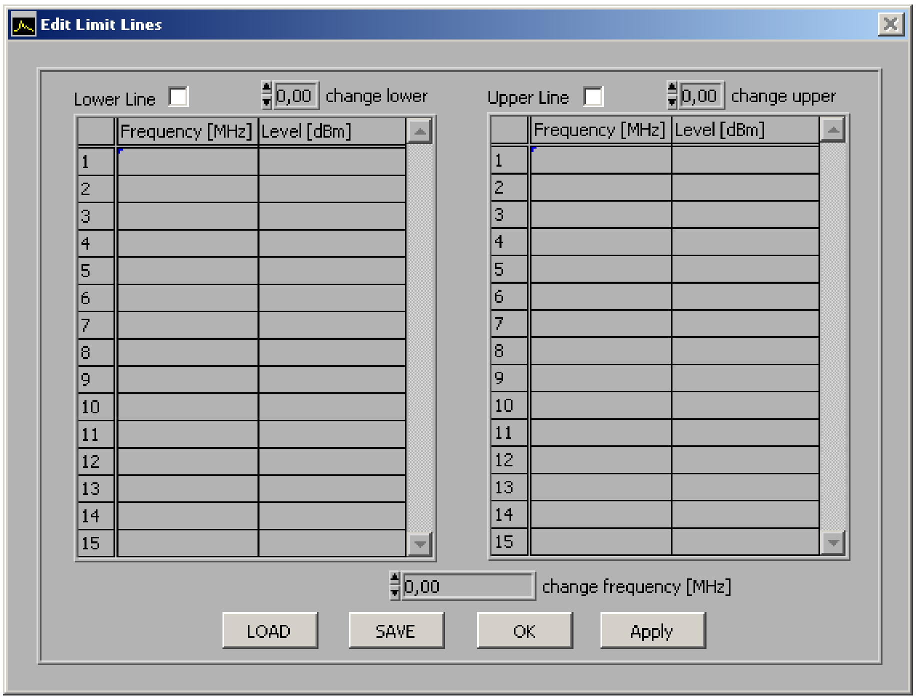
You can create limit lines with up to 50 value pairs, these may be saved and loaded for later use.

Entering limit lines

1. Select menu item: **Limit Line**.

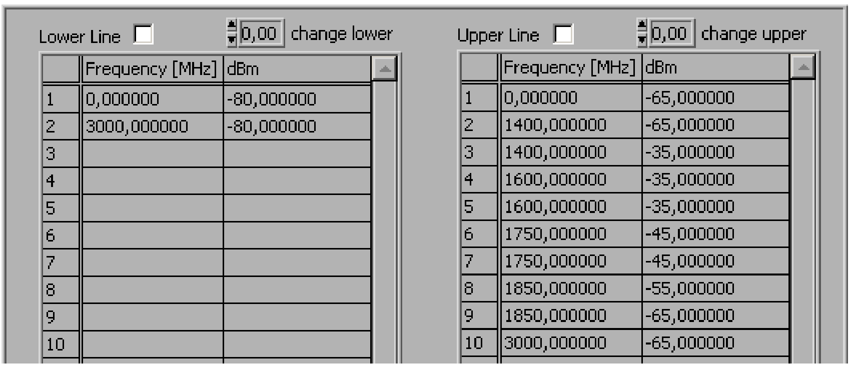

FS300-K1 (0000123456) - New Session..
File Function View ?
Freq
Amp
Marker
BW/Sweep
Trace
Trigger
Measure
Marker 1
Marker 2
Marker >
Marker Functions
D-Line Ctrl+Shift+D
Limit Line
Ref fixed

Edit Limit Lines window opens.


Edit Limit Lines
Lower Line ☐
0,00 change lower
Frequency [MHz]
Level [dBm]
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Upper Line ☐
0,00 change upper
Frequency [MHz]
Level [dBm]
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
0,00 change frequency [MHz]
LOAD
SAVE
OK
Apply

2. Use the left-hand table to enter the frequency and amplitude values for the lower lines and use the right-hand table to enter the upper lines.

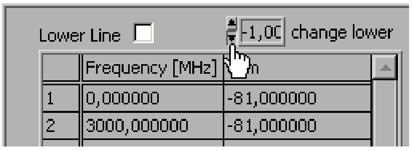
   Each row in the table describes a reference point on the limit line. At least 2 value pairs (reference points) per line must be entered, e.g., lower line: -80 dB for full span.


Lower Line ☐
0,00 change lower
Upper Line ☐
0,00 change upper

	Frequency [MHz]	dBm
1	0,000000	-80,000000
2	3000,000000	-80,000000
3		
4		
5		
6		
7		
8		
9		
10		

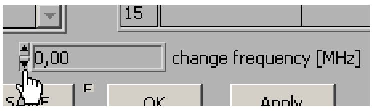
	Frequency [MHz]	dBm
1	0,000000	-65,000000
2	1400,000000	-65,000000
3	1400,000000	-35,000000
4	1600,000000	-35,000000
5	1600,000000	-35,000000
6	1750,000000	-45,000000
7	1750,000000	-45,000000
8	1850,000000	-55,000000
9	1850,000000	-65,000000
10	3000,000000	-65,000000

NOTE: You may increase and decrease the amplitude values of a limit line for all value pairs with the input fields: **change lower**/**change upper**.


Lower Line ☐
-1,0C change lower

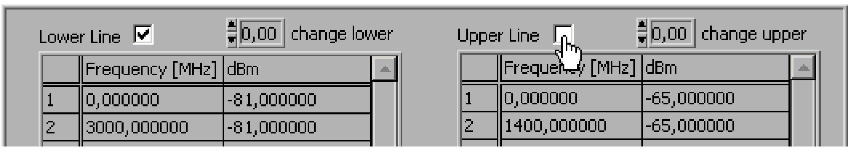
	Frequency [MHz]	n
1	0,000000	-81,000000
2	3000,000000	-81,000000

You may increase and decrease the frequency values of a limit line for all value pairs with the input fields: **change frequency [MHz]**.


15
0,00 change frequency [MHz]
OK
Apply

Inserting limit lines

1. Tick the check boxes for **Lower Line** and/or **Upper Line** to activate the limit line(s).



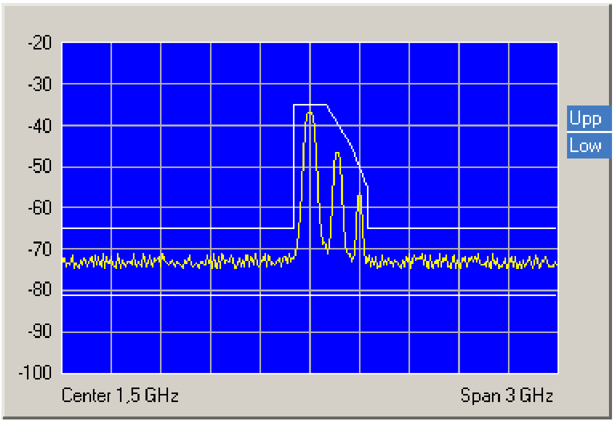
Lower Line ☑ 0,00 change lower

	Frequency [MHz]	dBm
1	0,000000	-81,000000
2	3000,000000	-81,000000

Upper Line ☐ 0,00 change upper

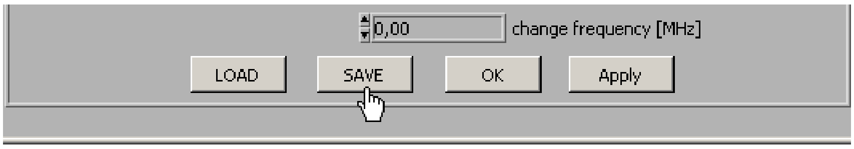
	Frequency [MHz]	dBm
1	0,000000	-65,000000
2	1400,000000	-65,000000

2. Click **<APPLY>** to activate the limit line(s). The status information **Upp** and/or **Low** are displayed in the diagram.



Saving and loading limit lines

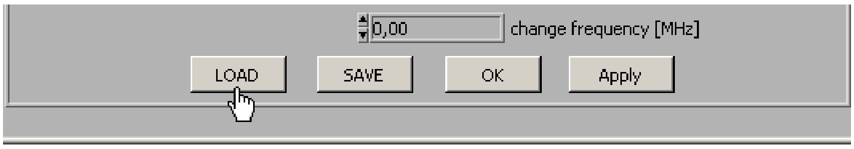
1. Press **<SAVE>** if you plan to use the current settings again.



0,00 change frequency [MHz]

The **Save File as** window opens.

2. Select a directory, enter a file name and click **<Save>**. The current settings are saved.
3. Press **<LOAD>** if you wish to use the saved settings again.



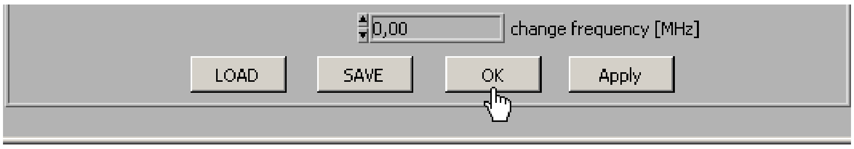
0,00 change frequency [MHz]

The **File open** window opens.

4. Select the (**.lim**) file from your directory and click **<Open>**. The saved settings (frequency and amplitude values) are loaded.

Closing the window

- Press **<OK>** to close the **Edit Limit Lines** window. The current settings remain active in the diagram.



0,00 change frequency [MHz]

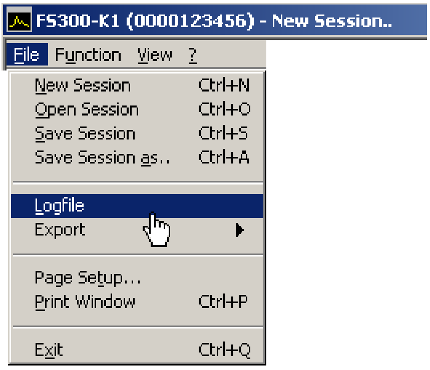
7.7.3.2 Monitoring

Aim

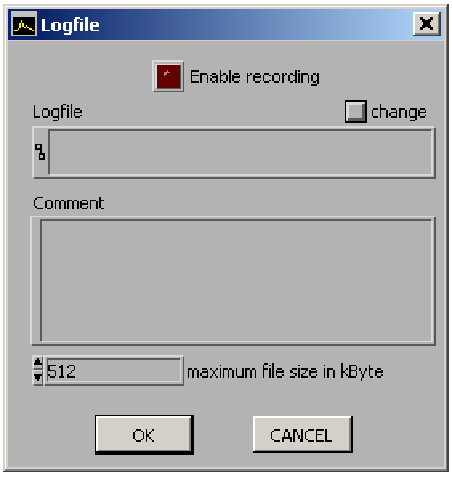
A logfile is created during the monitoring process, which documents over- and undershooting of a limit line. This allows random events to be captured.

Creating the logfile

1. Select menu item: **Logfile**.

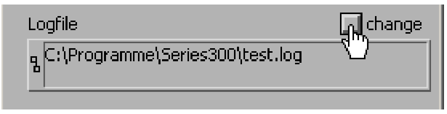

FS300-K1 (0000123456) - New Session..
File Function View ?
New Session Ctrl+N
Open Session Ctrl+O
Save Session Ctrl+S
Save Session as.. Ctrl+A
Logfile
Export
Page Setup...
Print Window Ctrl+P
Exit Ctrl+Q

The **Logfile** window opens.


Logfile
Enable recording
Logfile
change
Comment
512
maximum file size in kByte
OK
CANCEL

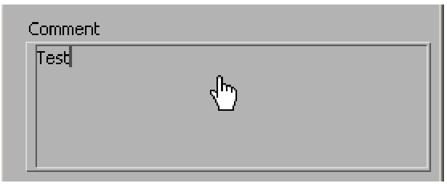
2. Click **<change>** if a logfile has not yet been created.

The **Save File as** window opens. Select a directory, enter a file name and click **<Save>**. The current logfile path is displayed.


Logfile
change

C:\Programme\Series300\test.log

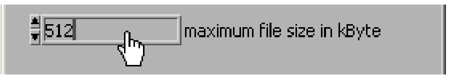
3. Click in the **Comment** window to enter a logfile comment.



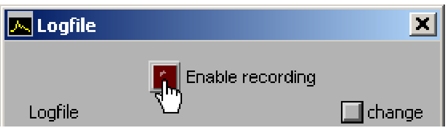
Test

Starting the monitoring

1. Enter the maximum logfile memory size in KB. The default setting is ”512 KB”.


512
maximum file size in kByte

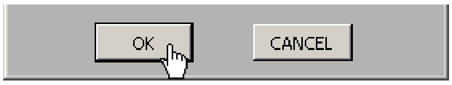
2. Click **<Enable recording>** to start the monitoring process. The button lights up red.


Logfile
Enable recording
Logfile
change

If an over- or undershoot of a limit is detected, the corresponding status information **Upp** and/or **Low** flashes in the diagram. The measuring values are monitored 10x per second and each over- or undershoot of a limit line is recorded.

Stopping the monitoring

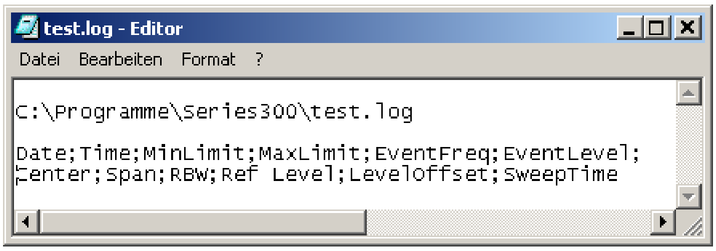
1. Click **<Enable recording>** to finish the monitoring process. The button no longer lights up red.
2. Click **<OK>** to close the **Logfile** window.



7.7.3.3 Analyzing the Logfile

Logfile content

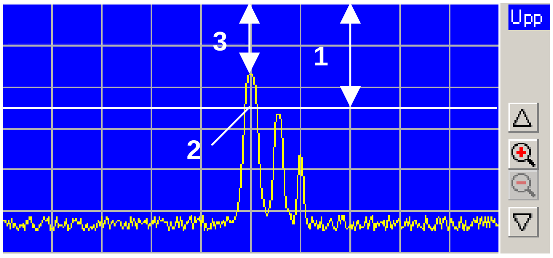
The logfile contains the measuring data, which were recorded during the monitoring process. A record is created from the following parameters when a limit line has been over- or undershot.



```
C:\Programme\Series300\test.log

Date;Time;MinLimit;MaxLimit;EventFreq;EventLevel;
Center;Span;RBW;Ref Level;Leveloffset;SweepTime
```

▪	**Date**		- event date
▪	**Time**		- event time
▪	**MinLimit**	**(1)**	- limit line level Upp
▪	**MaxLimit**		- limit line level Low
▪	**EventFreq**	**(2)**	- event frequency value
▪	**EventLevel**	**(3)**	- event maximum level
▪	**Center**		- center frequency
▪	**Span**		- span
▪	**RBW**		- resolution bandwidth
▪	**Ref Level**		- reference level
▪	**Leveloffset**		- level offset
▪	**SweepTime**		- sweep time



Analyzing the logfile

If the logfile (.log) is saved as a text file (.txt) the data can be opened and analyzed in Microsoft Excel™.

7.7.4 Exporting the Measuring Data

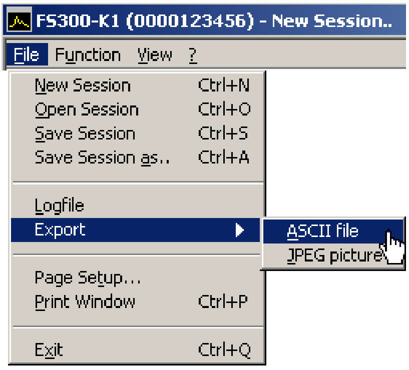
Application

To record the measurements, you can save the current diagram with the most important parameter settings in ASCII code or you can save a screenshot of the current window as a JPEG.

7.7.4.1 Creating the ASCII File

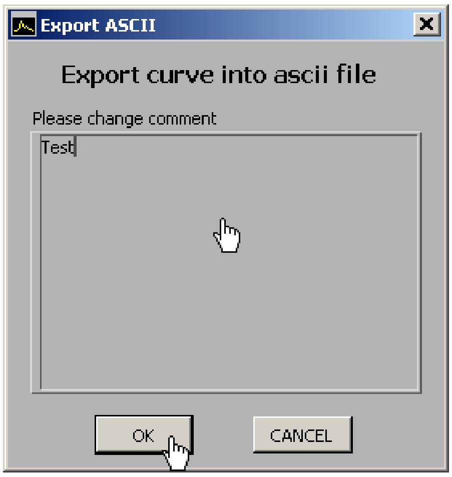
Creating the ASCII file

1. Select menu item: **ASCII file**.


FS300-K1 (0000123456) - New Session..
File Function View ?
New Session Ctrl+N
Open Session Ctrl+O
Save Session Ctrl+S
Save Session as.. Ctrl+A
Logfile
Export
ASCII file
JPEG picture
Page Setup...
Print Window Ctrl+P
Exit Ctrl+Q

The **Export ASCII** window opens.

2. Click in the **Please change comment** window to enter a logfile comment and click **<OK>**.


Export ASCII
Export curve into ascii file
Please change comment
OK
CANCEL

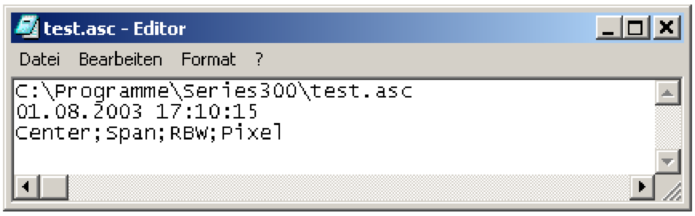
Test

The **Save File as** window opens.

3. Select a directory, enter a file name and click **<Save>**.

ASCII File contents

The ASCII file contains the following parameters:


test.asc - Editor
Datei Bearbeiten Format ?

```
C:\Programme\Series300\test.asc
01.08.2003 17:10:15
Center;Span;RBW;Pixel
```

- **Center** - center frequency
- **Span** - span
- **RBW** - resolution bandwidth
- **Pixel** - level values of the trace

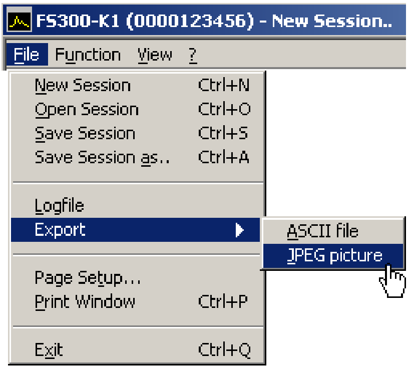
NOTE

The number of exported level values (pixels) depends on the setting for the size of the window. (↗ 7-237, small window: 310 pixels, large window: 700 pixels)

7.7.4.2 Creating the Screenshot

Creating the screenshot

1. Select menu item: **JPEG picture**.


FS300-K1 (0000123456) - New Session..
File Function View ?
New Session Ctrl+N
Open Session Ctrl+O
Save Session Ctrl+S
Save Session as.. Ctrl+A
Logfile
Export
ASCII file
JPEG picture
Page Setup...
Print Window Ctrl+P
Exit Ctrl+Q

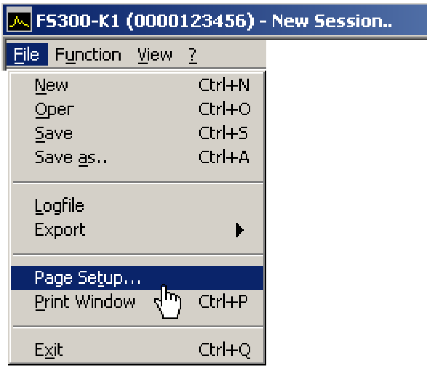
The **Save File as** window opens.

2. Select a directory, enter a file name and click **<Save>**.

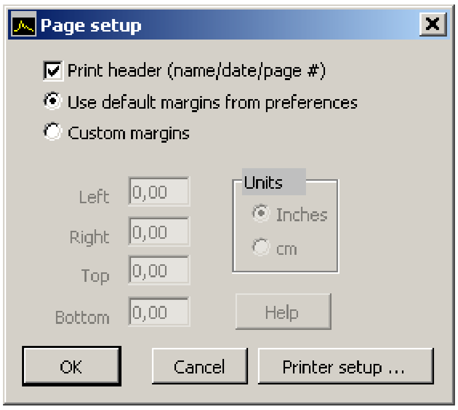
7.7.5 Printing the Window

Page setup

1. Select menu item: **Page setup**.


FS300-K1 (0000123456) - New Session..
File
Function
View
?
New Ctrl+N
Oper Ctrl+O
Save Ctrl+S
Save as.. Ctrl+A
Logfile
Export
Page Setup...
Print Window Ctrl+P
Exit Ctrl+Q

The **Page setup** opens.


Page setup
Units
Help
OK
Cancel
Printer setup ...

☑ Print header (name/date/page #)

● Use default margins from preferences

○ Custom margins

Left 0,00

Right 0,00

Top 0,00

Bottom 0,00

Units: ● Inches ○ cm

2. Check the **<Print header>** box (✓) to print a header with the file name, date and page number.
3. Check **<Use default margins from preferences>** to print page with the presettings.

   You may also check **<Custom margins>** to print page with user-defined settings. You may then adjust the page margins: **<Left>**, **<Right>**, **<Top>** and **<Bottom>**.
4. Click **<Printer setup>** to select your printer settings.
5. Click **<OK>** to close the **Page setup** window.

Printing the window

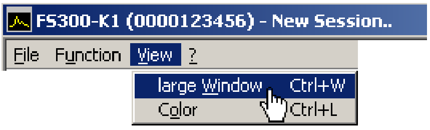
6. Select menu item: **Print Window** from the **File** pull-down menu to print the current program window.

7.8 Customizing the Working Window (View)

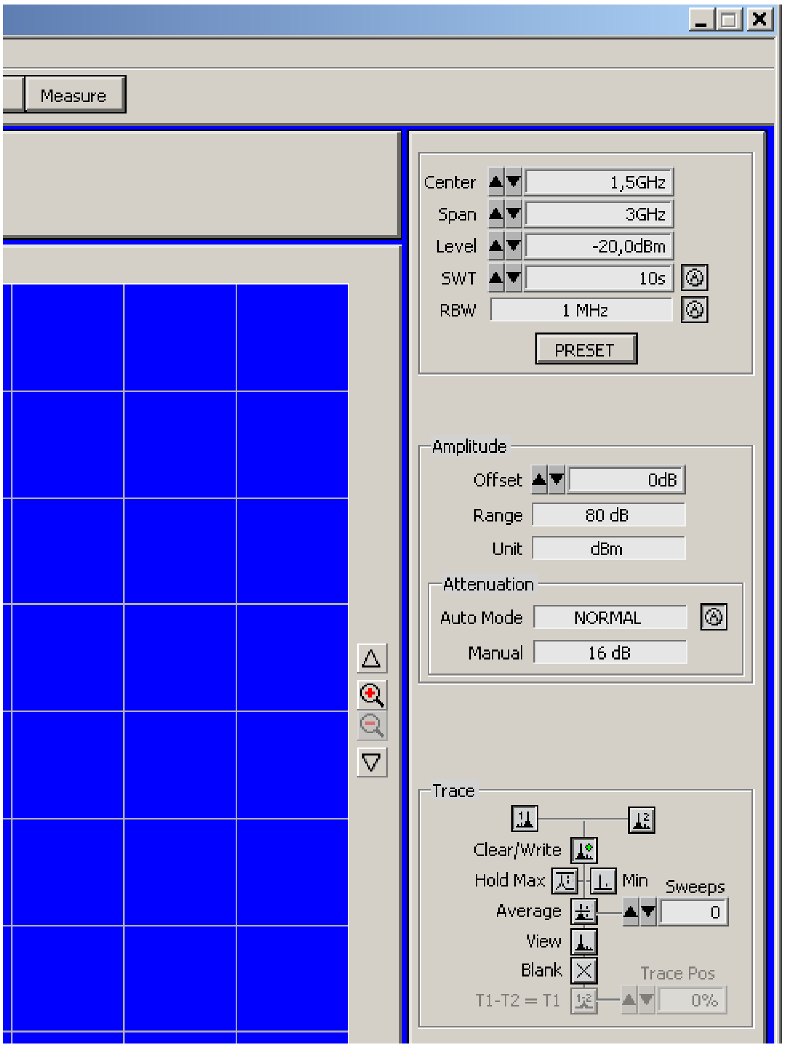
7.8.1 Adjusting the Window Size

Adjusting the window size

1. Select menu item: **Large Window** to enlarge the program window.


FS300-K1 (0000123456) - New Session..
File
Function
View
?
large Window Ctrl+W
Color Ctrl+L

The diagram is enlarged by a factor of 2. In addition to the **Main Settings**, two function displays appear in the function display area. The first function display (e.g., **Amplitude**) refers to the current menu selection and the second function display (e.g., **Trace**) refers to the last menu selection.


Measure
PRESET
Amplitude
Attenuation
Trace
Clear/Write
Hold Max
Min
Average
View
Blank
T1-T2 = T1

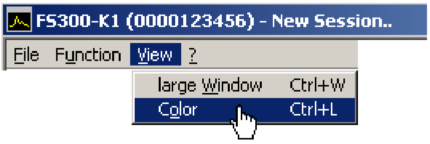
Center 1,5GHz
Span 3GHz
Level -20,0dBm
SWT 10s
RBW 1 MHz
Offset 0dB
Range 80 dB
Unit dBm
Auto Mode NORMAL
Manual 16 dB
Sweeps 0
Trace Pos 0%

2. Select the **Large Window** menu item again to reduce the window size.

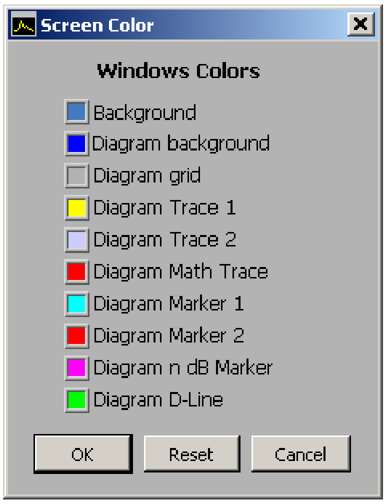
7.8.2 Changing the Window Color

Changing the window color

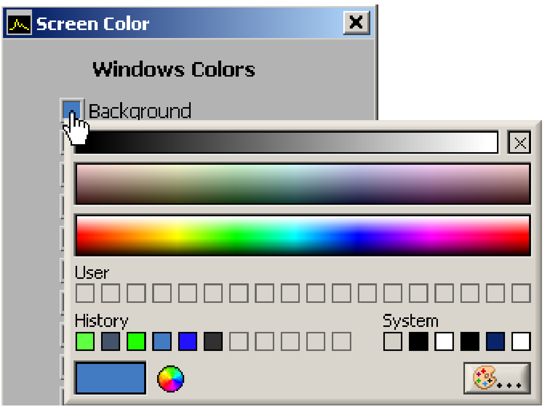
1. Select menu item: **Color**.


FS300-K1 (0000123456) - New Session..
File
Function
View
?
large Window Ctrl+W
Color Ctrl+L

The **Screen Color** window opens. Colors for the listed window elements can be changed.


Screen Color
Windows Colors
Background
Diagram background
Diagram grid
Diagram Trace 1
Diagram Trace 2
Diagram Math Trace
Diagram Marker 1
Diagram Marker 2
Diagram n dB Marker
Diagram D-Line
OK
Reset
Cancel

2. Click on a color field to change the color for the corresponding windows element. A color scheme opens.


Screen Color
Windows Colors
Background
User
History
System

3. Move the mouse over the color bars and click on your preferred color. The color scheme closes and the new color appears in the color field of the window element.
4. Click **<OK>** to close the **Screen Color** window and to activate the new window colors.

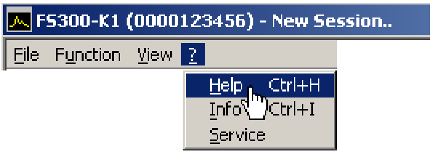
   You may also click **<Reset>** and **<OK>** to revert to the default color settings.

7.9 Getting Help (?)

7.9.1 Starting the Help

Starting the help

- Select menu item: **Help** to start the Windows™ Help for program **FS300 0000xxxxxx**.

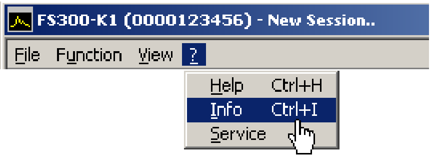

FS300-K1 (0000123456) - New Session..
File
Function
View
?
Help Ctrl+H
Info Ctrl+I
Service

Acrobat Reader™ (↗ CD-ROM) starts up and the English R&S FS300 operating manual opens.

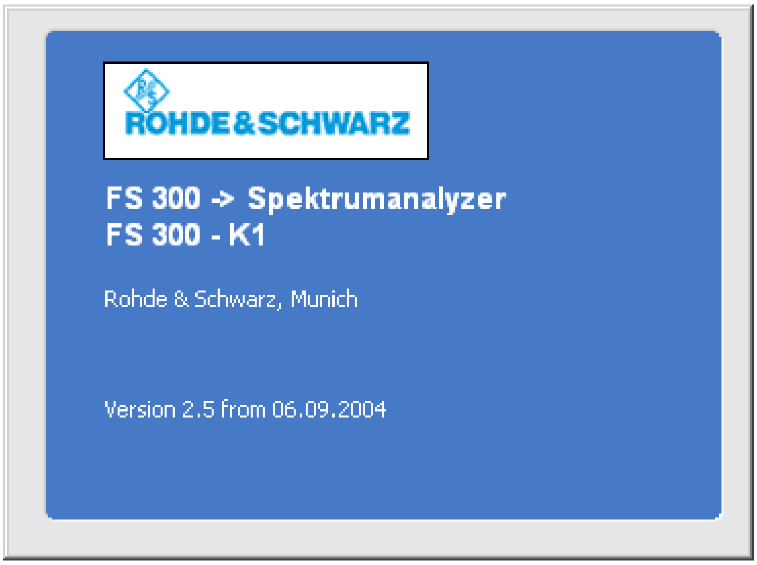
7.9.2 Displaying the Program Version

Opening/closing the program version

1. Select menu item: **Info** for information about the **FS300 0000xxxxxx** program.


FS300-K1 (0000123456) - New Session..
File
Function
View
?
Help Ctrl+H
Info Ctrl+I
Service

An information field opens.


ROHDE&SCHWARZ

FS 300 -> Spektrumanalyzer
FS 300 - K1

Rohde & Schwarz, Munich

Version 2.5 from 06.09.2004

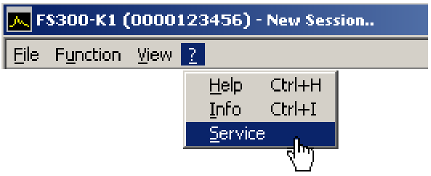
2. Click in the information field with the mouse to close.

   You may also wait approximately 10 seconds for the information field to close automatically.

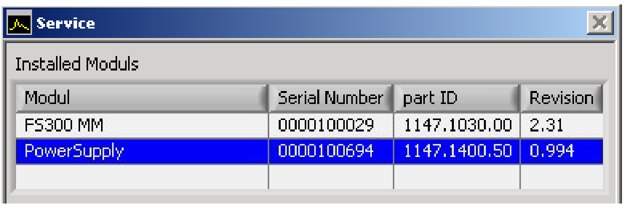
7.9.3 Displaying Module Data

Displaying module data

1. Select menu item: **Service** to obtain information about the individual modules.


FS300-K1 (0000123456) - New Session..
File
Function
View
?
Help Ctrl+H
Info Ctrl+I
Service

The modules of the R&S FS300 will be output and displayed.



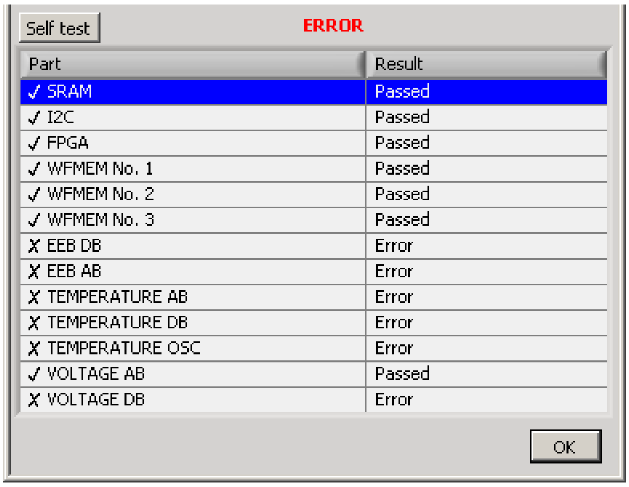
Installed Moduls

Modul	Serial Number	part ID	Revision
FS300 MM	0000100029	1147.1030.00	2.31
PowerSupply	0000100694	1147.1400.50	0.994

Starting self-diagnostics

2. Click the line **<FS300>** to select the generator module.
3. Click **<Self test>** to start self-diagnostics.

   All modules are checked one after the other and the result, “Passed” or “Error”, is output.


Self test
ERROR
OK

Part	Result
✓ SRAM	Passed
✓ I2C	Passed
✓ FPGA	Passed
✓ WFMEM No. 1	Passed
✓ WFMEM No. 2	Passed
✓ WFMEM No. 3	Passed
✗ EEB DB	Error
✗ EEB AB	Error
✗ TEMPERATURE AB	Error
✗ TEMPERATURE DB	Error
✗ TEMPERATURE OSC	Error
✓ VOLTAGE AB	Passed
✗ VOLTAGE DB	Error

4. Click **<OK>** to close the Service window.

8 Instrument Interfaces

This chapter The chapter 8 contains a description of the R&S FS300's interfaces.

Further information The address of our Support Center and a list of Rohde & Schwarz service centers will be found at the front of this manual.

8.1 Keyboard Connector (KEYB)

Connector There is a 6-pin PS/2 connector KEYBOARD [21] on the R&S FS300's rear panel for an external keyboard.

Pin assignment

Pin	Signal
1	KEYBOARDDATA
2	MOUSEDATA
3	GND
4	5 V, KEYBOARD
5	KEYBOARDCLK
6	MOUSECLK

8.2 Monitor Connector (MON)

Connector There is connector MONITOR [20] on the rear panel of the R&S FS300 for an external monitor.

Pin assignment

Pin	Signal
1	R
2	G
3	B
4	(NC)
5	GND
6	GND
7	GND
8	GND
9	GND
10	GND
11	(NC)
12	(NC)
13	HSYNC
14	VSYNC
15	(NC)

8.3 Input for External Trigger (EXT TRIG/GATE IN)

Specification

The connector EXT TRIG/GATE IN [14] is for an external signal which is used to control measurements.

The signal has TTL levels (low < 0.7 V, high > 1.4 V), and the typical impedance is 10 kΩ.

Instrument setting

The TRIG menu (↗ 6-143) allows you to make the appropriate settings when an external signal is used to trigger measurements.

8.4 Reference Input and Output (REF IN and REF OUT)

External reference

If an external reference is used, the internal reference oscillator is synchronized to the 10 MHz reference signal at connector REF IN [22]. The input level must be 0.5 to 2 V.

Internal reference

The 10 MHz signal from the internal reference oscillator is available at the REF OUT connector [23] so that other devices can be synchronized to the R&S FS300. The output level is 0 dBm.

Instrument setting

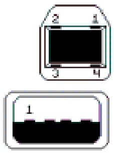
You can switch over between the internal and external reference in the CONFIG menu (↗ 6-168).

8.5 USB Interface (PC, DEV)

Connector

The USB-Host [15] and USB-Device [16] connectors on the rear panel of the R&S FS300 are for a USB device.

Pin assignment



Pin	Signal
1	Vbus (Vcc)
2	D-
3	D+
4	GND
Shell	Shield

9 Error Messages

This chapter

Refer to chapter 9 for a detailed description of errors that may occur in the R&S FS300. You will also find notes on troubleshooting.

The R&S FS300 displays detected errors and warnings on the screen. The various types of messages are described in the following:

- System messages
- Warnings indicating impermissible operating states

Further information

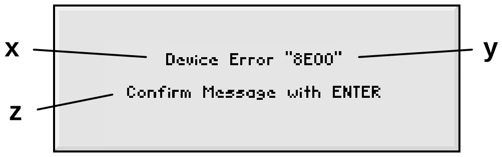
Chapter 6 describes all the R&S FS300‘s menus and the associated functions in detail.

9.1 System Messages

System messages

System messages inform you of internally detected errors. The following informs are displayed, e. g.:

- Type of error (**x**)
- Four-digit error number (**y**)
- Request for closing the system messages (**z**)



Device Error "8E00"

Confirm Message with ENTER

The error number allows the service shop to determine the type of error. In the event of an system message, please write down the error number and proceed according to the following steps.

Device Error “Error number”

A system error was detected in the instrument.

1. Please write down the error number and the corresponding instrument settings.
2. Contact your nearest Rohde & Schwarz representative (**Fehler! Textmarke nicht definiert.**). The instrument may have to be checked in the service shop.

Overtemperature Error “Error number”

An impermissibly high temperature was detected in the instrument. The internal fans are switched to full power for approx. 30 seconds, and then the R&S FS300 is automatically switched off to prevent further overheating.

The overtemperature could be caused by too high an ambient temperature and/or reduced air circulation.

1. Let the instrument cool off for a while and remove any obstructions that could hinder air circulation.
2. If this doesn't eliminate the overtemperature, have the instrument checked by the service shop.

NOTE

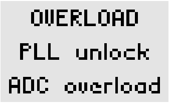
Some errors can cause the instrument or parts of the instrument to be switched off immediately in order to avoid destruction of components. Whenever an system message occurs, an entry is made under SYSTEM MESSAGES (↗ 6-177).

9.2 Warnings Indicating Impermissible Operating States

Warnings

Red labels at the upper left corner of the measurement grid tell the user that the measurement results may be incorrect. This can be caused by excessively high signal levels at the input or by incorrect settings on the instrument. The warning remains on the screen until the problem has been eliminated.

There are three types of messages that can be displayed on the screen:


OVERLOAD
PLL unlock
ADC overload

OVERLOAD

A level above 13 dBm is detected at the R&S FS300 input and the current input attenuation setting is less than 20 dB. In this case, the instrument automatically increases the input attenuation by 20 dB to prevent the subsequent stages from being overdriven. The displayed signal level decreases by 20 dB as a result of the additional attenuation, without the display being corrected.

1. To obtain a correct level display, the reference level must be increased (↗ 6-88) until the message disappears.
2. If the message does not disappear, it is possible that the input attenuation is set to Manual. Raise the input attenuation above 20 dB (↗ 6-93), or switch to automatic setting of the input attenuation (↗ 6-94).

NOTE: This display will appear even if the signal is outside the currently selected span. In FULL SPAN mode (↗ 6-82), check whether a signal exceeds the permissible value and reduce the level if necessary.

PLL unlock

The control loop, which is used to set the frequency of the internal reference oscillator with crystal accuracy, does not lock. This causes a frequency error, and the spectrum analyzer no longer operates according to specifications. The cause for this may be an internal instrument error or the absence of the 10 MHz reference signal at the external input REF IN. The absence of the reference signal, however, is not indicated unless the reference has been switched to “external”.

1. If the missing external reference signal is the cause of this error message, connect a 10 MHz signal to the REF IN [22] input or switch the reference to “internal” (↗ 6-168).
2. If the missing external reference signal is not the cause of this error message, an internal instrument error has occurred. In this case, switch the instrument off and on again. If the error message is still present, the instrument must be sent to the service shop to be checked.

ADC overload

the level of the input signal is approx. 20 dB above the set reference level. In this case, the analog/digital converter is being overdriven, causing intermodulation products and distortions in the spectrum.

- This can be remedied by increasing the value for the reference level in the instrument (↗ 6-88).

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