Operating Manual

Audio Analyzer
R&S®UP300/UP350

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Chapter Overview

Content of the Manuals

Introduction

This operating manual provides information about:

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

In the introduction, a typical R&S UP300/350 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: In a highly innovative company like Rohde & Schwarz, products are continuously undergoing further development. To obtain information about new applications and features, visit our Internet page at http://www.smart.rohde-schwarz.com.

Analyzer

Analog audio inputs		
Frequency range		DC/10 Hz to 80 kHz
Frequency response	10 Hz to 20 Hz	±0.1 dB
(referenced to 1 kHz)	20 Hz to 22 kHz	±0.05 dB
	22 kHz to 40 kHz	±0.1 dB
	40 kHz to 80 kHz	±0.25 dB
BNC connectors	2 channels, floating, selectable AC/DC coupling, channel 1 on front panel, channel 2 on rear panel	
Maximum input voltage	rms, sinewave	33 V
Measurement ranges	in steps of 6 dB	0.4 V to 50 V (max. input 33 V)
Input impedance	inner/outer conductor to ground	100 kΩ
Crosstalk attenuation	frequency < 20 kHz, 600 Ω source impedance	> 100 dB
Common-mode rejection	at 50 Hz, V_{in} < 3 V at 1 kHz, V_{in} < 3 V at 16 kHz, V_{in} < 3 V	> 80 dB > 75 dB > 60 dB
Generator output	each input channel switchable to the other generator output channel	
Digital audio inputs (model R&S UP350 only)		
BNC connector	unbalanced, grounded, on rear panel	
Impedance		75 Ω
Input level (V_{pp})		100 mV to 5 V
Optical input		TOSLINK
Channels		1, 2, or both
Audio bits		16 to 24
Sampling rate		32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz

Format		professional and consumer
Measurement functions		
RMS value, wideband		
Error limits	measurement speed AUTO, at 1 kHz sine, AC coupling measurement speed AUTO FAST	±0.1 dB, additional error with DC coupling ±0.1 % of measurement range ±0.1 dB additional error
Integration time	AUTO FAST/AUTO VALUE	5 ms/50 ms, at least 1 cycle 1 ms to 10 s
Noise	with A filter, 600 Ω source impedance with CCIR unweighting filter, 600 Ω source impedance	< 2 µV < 4 µV
Filters	weighting filters and sets of predefined octave and third-octave filters; up to 3 filters can be combined	
RMS value, selective		
Error limits		±0.2 dB
Bandwidth (-3 dB)	Relative Absolute	1%, 3%, 1/3 octave, 1/12 octave, value minimum BW 10 Hz 10 Hz to $f_{max}/5$
Selectivity		100 dB
Frequency setting		fixed through entered value or autotuning
Peak value		
Measurement		pos. peak, neg. peak, peak-to-peak, absolute peak
Error limits	at 1 kHz	±0.2 dB
Interval		20 ms to 10 s
Filters	weighting filters and sets of predefined octave and third-octave filters; up to 3 filters can be combined	
Quasi-peak		
Measurement		in accordance with CCIR 468-4
Error limits	analyzer bandwidth 22 kHz	in accordance with CCIR 468-4
Noise	with CCIR weighting filter, 600 Ω source impedance	<12 µV
Filters	weighting filters and sets of predefined octave and third-octave filters; up to 3 filters can be combined	

DC voltage		
Voltage range		0 V to ±33 V
Error limits		± (1 % of measured value + 0.5 % of measurement range)
Total harmonic distortion (THD)		
Fundamental		20 Hz to 20 kHz
Frequency tuning	fixed through entered value, auto-tuning to input signal	
Weighted harmonics	up to 80 kHz	any combination of d2 to d9
Error limits	harmonics < 50 kHz harmonics < 80 kHz	±0.7 dB ±1 dB
Inherent distortion	fundamental 1 kHz fundamental 20 Hz to 5 kHz fundamental 5 kHz to 15 kHz fundamental 15 kHz to 20 kHz	< -100 dB < -90 dB < -85 dB < -80 dB
Spectrum	bar graph showing signal and distortion	
THD+N and SINAD		
Fundamental		20 Hz to 20 kHz
Frequency tuning	fixed through entered value, auto-tuning to input signal	
Bandwidth	weighting filters and sets of predefined octave and third-octave filters; up to 3 filters can be combined	
Error limits	bandwidth < 22 kHz bandwidth < 80 kHz	±0.8 dB ±1.4 dB
Inherent distortion	bandwidth 20 Hz to 22 kHz, fundamental 1 kHz bandwidth 20 Hz to 22 kHz, fundamental 20 Hz to 5 kHz bandwidth 20 Hz to 80 kHz, fundamental 20 Hz to 20 kHz	< -95 dB + 4 µV < -90 dB + 4 µV < 80 dB + 8 µV
Spectrum	post-FFT of filtered signal	
Difference frequency distortion (DFD)		
Measurement method		in accordance with IEC 268-3 or IEC 118
Frequency range	difference frequency center frequency	80 Hz to 2 kHz 200 Hz to 80 kHz
Error limits	f_{center} < 20 kHz	±0.5 dB
Inherent distortion	DFD d2, f_{center} < 20 kHz DFD d3, 5 kHz < f_{center} < 20 kHz	< -105 dB < -90 dB

Spectrum	bar graph showing signal and distortion	

Modulation distortion (MOD DIST)		
Frequency range	lower frequency upper frequency	30 Hz to 2.7 kHz 8 × f_{lower} to 20 kHz
Error limits		±0.5 dB
Inherent distortion	f_{lower} = 60 Hz, 4 kHz < f_{upper} < 15 kHz f_{lower} = 60 Hz, 15 kHz < f_{upper} < 20 kHz input voltage ≤ 4 V input voltage > 4 V	< -85 dB < -80 dB < -75 dB
Spectrum	bar graph showing signal and distortion	
Frequency		
Frequency range		20 Hz to 80 kHz
Error limits	measurement time 10 s measurement time 1 s	±10 ppm ±100 ppm
Phase		
Frequency range	analyzer bandwidth 22 kHz analyzer bandwidth 80 kHz	20 Hz to 22 kHz 80 Hz to 80 kHz
Error limits	f < 20 kHz, both channels with same range	±1°
Polarity test		
Measurement		polarity of unsymmetrical input signal
Display		positive/negative
Filters	For all analog and digital analyzers. Up to three filters can be combined. All filters are digital filters with a coefficient accuracy of 32 bit floating point.	
Weighting filters	A weighting C message CCITT CCIR unweighted CCIR 1k weighted CCIR 2k weighted deemphasis 50/15, 50, 75, J.17 IEC/IEEE tuner	
Set of third-octave and octave filters		

FFT analyzer		
Frequency range		DC to 80 kHz
FFT size		1 k, 2 k, 4 k, 8 k, 16 k points
Window functions		rectangular, Hann, Blackman-Harris, Rife-Vincent 1 to 3, Hamming, flat top, Kaiser (β = 12)
Resolution	16 k points, bandwidth 22 kHz	2.93 Hz
Averaging	exponential or normal	1 to 256

Generator

Analog audio outputs		
BNC connectors	2 channels, electronic, floating (max. 0.2 V peak referenced to ground) or grounded, short-circuit-proof, max. current 120 mA with external feed channel 1 on front panel, channel 2 on rear panel	
Voltage range	sine, open-circuit	0.1 mV to 7.5 V (V_{rms})
Source impedance		27 Ω
Crosstalk attenuation	f < 20 kHz	> 100 dB
Load impedance		> 200 Ω
Common-mode rejection	at 1 kHz	> 50 dB
Digital audio outputs (model R&S UP350 only)	Frequency limits specified for the signals apply to a sampling rate of 48 kHz. For other sampling rates, limits are calculated in accordance with the following formula: $f_{new} = f_{48kHz} \times$ sampling rate/48 kHz.	
BNC connectors	unbalanced, transformer coupling, on rear panel	
Impedance		75 Ω, short-circuit-proof
Output level (V_{pp})	into 75 Ω	0.5 V
Optical output		TOSLINK
Channels		1, 2, or both
Audio bits		16 to 24
Sampling rate		32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
Format		professional and consumer
Signals		

Sine		
Frequency range		2 Hz to 80 kHz
Error limits	at 1 kHz	±0.1 dB
Frequency response (ref. to 1 kHz)	20 Hz to 20 kHz	±0.05 dB
Inherent distortion THD+N	measurement bandwidth 20 Hz to 22 kHz	< -90 dB
Sweep parameters		frequency, level
MOD DIST	for measuring modulation distortion	
Frequency range	lower frequency upper frequency	30 Hz to 2700 Hz 8 × f_{lower} to 39.95 kHz
Level ratio (LF:UF)	selectable	from 10:1 to 1:1
Error limits		±0.5 dB
Inherent distortion	at 60 Hz, 7 kHz, level ratio 4:1 other settings; f_{upper} < 20 kHz	< -90 dB < -84 dB
DFD	for measuring difference frequency distortion	
Frequency range	difference frequency center frequency	80 Hz to 2 kHz 200 Hz to 39.95 kHz
Error limits		±0.5 dB
Inherent distortion	DFD d2, 7 kHz < f_{center} < 20 kHz DFD d3, 7 kHz < f_{center} < 20 kHz	< -105 dB < -90 dB
Multisine		
Frequency range		2.4 Hz to 80 kHz
Minimum frequency spacing	bandwidth 22 kHz	2.4 Hz
Dynamic range	referenced to peak value	100 dB
Characteristics		1 to 17 spectral lines, level, start phase and frequency selectable for each line
Sine burst		
Burst time		1 signal period up to 60 s
Interval time		burst time up to 60 s
Low level		zero to burst level, absolute or relative to burst
Noise		
Distribution		Gaussian, triangular, rectangular
Polarity test signal		

$SINE^2$ BURST signal		1.2 kHz
ON-TIME		1 cycle
INTERVAL		2 cycles
Sweep		
Generator function	Sine	
Sweep parameters	frequency and/or level	
Sweep spacing	linear, logarithmic	
Sweep Modes	Single, continuous	
Coupled analyzer functions	RMS; RMS Sel.; THD(N)	
Sweep Points	X-Axis Z-Axis (Freq. & Ampl. Sweep)	2 to 1024 1 to 10

Display of results

Units		
Level (analog)	V, dBu, dBV, dBm and dBr (ratio to reference value)	
Level (digital)	FS, %FS, dBFS and dBr (ratio to reference value)	
Distortion	% or dB	
Frequency	Hz	
Phase	deg	
Graphical display of results		
Display modes	spectrum plot curve plot bar graph lists of results	
Display functions	autoscale x-axis zoom full-screen and part-screen mode 2 vertical, 2 horizontal cursor lines search function for max. values	
Audio monitor		
Headphone connector		3.5 mm jack
Output voltage		< 2 V

Output current		< 20 mA
Source impedance		10 Ω, short-circuit-proof
Recommended headphone impedance		600 Ω
Digital audio protocol (model R&S UP350 only)		
Generator		
Validity bit		NONE, L+R
Channel status data		predefined masks for professional or consumer format in acc. with IEC 60958
Analyzer		
Display of protocol bits	validity bit	L or R
	channel status bits	mnemonic display of data fields, predefined settings for professional or consumer format in acc. with IEC 60958; automatically detected
	error indication	block errors, sequence errors, preamble errors
Clock rate measurement	error limits	±50 ppm
General specifications		
Interfaces		
USB host	printer; USB stick	A plug, protocol version 1.1
USB device	device-specific command set, remote control via Windows driver (Windows XP/2000)	B plug, protocol version 1.1
Connector for external monitor (VGA)		15-pin D-Sub female
Keyboard connector		PS/2 female
Display		
Type		5.4“ active TFT color display
Resolution		320 × 240 pixels
Max. refresh rate		10 pictures/s, nominal
Power supply		
Input voltage range	autoranging	100 V to 240 V (AC), 50 Hz to 60 Hz
Power consumption		< 120 VA

Ambient conditions		
Operating temperature range	meets EN 60068-2-1/2	+5 °C to +45 °C
Storage temperature range		-20 °C to +70 °C
Relative humidity	meets EN 60068-2-78 (non-condensing)	95 % at +40 °C
Mechanical resistance		
Sinusoidal vibration	meets EN 60068-2-6, EN 61010-1 and MIL-T-28800D class 5	5 Hz to 150 Hz, max. 2g at 55 Hz, 55 Hz to 150 Hz: 0.5g constant
Random vibration	meets EN 60068-2-64	10 Hz to 500 Hz: 1.9g
Shock	meets EN 60068-2-27 and MIL-STD-810	shock spectrum
Electromagnetic compatibility		meets EN 55011 class B and EN 61326 (EMC Directive of EU (89/336/EEC))
EMI field strength		10 V/m
Safety		EN 61010-1/IEC 61010-1, UL 3111-1; CSA C22.2 No. 1010.1
Dimensions (W × H × D)		219 mm × 147 mm × 350 mm
Weight		9 kg

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

Safety Instructions

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

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

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that the product 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 product documentation	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

					
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 relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories.

Tags and their meaning

DANGER	This tag indicates a definite hazard carrying a high risk of death or serious injury if not avoided.
WARNING	This tag indicates a possible hazard carrying a medium risk of death or (serious) injury if not avoided.
CAUTION	This tag indicates a hazard carrying a low risk of minor or moderate injury if not avoided.
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 in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. 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 2000 m above sea level, max. transport altitude 4500 m above sea level.
   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/operator is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.
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 (corresponding to the length of connecting cable, approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
12. Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.
13. The product may be operated only from TN/TT supply networks fused with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
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. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.

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 license 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 for the user 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. Do not short-circuit batteries and storage batteries.
    If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries must be recycled and kept separate from residual waste. Batteries and storage batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.
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. The product can be very heavy. Be careful when moving it to avoid back or other physical injuries.
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 product 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

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estandards de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estandards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto solamente fue elaborado para ser utilizado en la industria 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 mal uso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones de la correspondiente documentación de producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos profundos y conocimientos parciales del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso del producto a personas peritas 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 documen-tación de producto	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 construcción con peligro de carga electroestática

					
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 el capítulo correspondiente de la documentación de producto y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por el grupo de empresas Rohde & Schwarz bajo la denominación de „producto“, entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

PELIGRO	Identifica un peligro directo con riesgo elevado de provocar muerte o lesiones de gravedad si no se toman las medidas oportunas.
ADVERTENCIA	Identifica un posible peligro con riesgo medio de provocar muerte o lesiones (de gravedad) si no se toman las medidas oportunas.
ATENCIÓN	Identifica un peligro con riesgo reducido de provocar lesiones de gravedad media o leve si no se toman las medidas oportunas.
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 área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación de producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a malinterpretaciones y tener por consecuencia daños en personas u objetos.

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento 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, transporte hasta 4.500 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 perito 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/usario está comprometido a valorar y señalar areas de trabajo en las que se corra un riesgo aumentado de exposición a radiaciones 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. 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 (según la medida del cable de distribución, aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en 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. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
13. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A (utilización de fusibles de mayor amperaje sólo previa consulta con el grupo de empresas Rohde & Schwarz).
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 U_{eff} > 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. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
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 efectuadas 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, el circuito de suministro de corriente deberá estar protegido de manera que usuarios y productos 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 para el usario 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. No cortocircuitar baterías ni acumuladores. 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). Las baterías y acumuladores deben reutilizarse y no deben acceder a los vertederos. Las baterías y acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de evacuación y reciclaje.
28. 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.
29. El producto puede poseer un peso elevado. Muévalo con cuidado para evitar lesiones en la espalda u otras partes corporales.
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 sujeción en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean 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. 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 producto. 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 : 2004

DQS REG. NO 001954 QM 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 14001:2004

CERTIFICATE OF QUALITY

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

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

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 14001:2004

ROHDE&SCHWARZ

1171.0200.11-02.00

ROHDE&SCHWARZ

EC Certificate of Conformity

CE

Certificate No.: 2005-33

This is to certify that:

Equipment type	Stock No.	Designation
UP300	1147.2497.03	Audio Analyzer
UP350	1147.2507.03	Audio Analyzer

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
EN55011 : 1998 + A1 : 1999 + A2 : 2002, Klasse B
EN61326 : 1997 + A1 : 1998 + A2 : 2001 + A3 : 2003

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 2005

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

Munich, 2005-11-03

Central Quality Management MF-QZ / Radde

Customer Support

Technical support – where and when you need it

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

Up-to-date information and upgrades

To keep your Rohde & Schwarz equipment always up-to-date,
please subscribe to our 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.

USA & Canada

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

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From outside USA	+1 410 910 7800 (opt 2)
Fax	+1 410 910 7801
E-mail	Customer.Support@rsa.rohde-schwarz.com

East Asia

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8:30 AM – 6:00 PM Singapore Time (SGT)

Tel.	+65 6 513 0488
Fax	+65 6 846 1090
E-mail	Customersupport.asia@rohde-schwarz.com

Rest of the World

Monday to Friday (except German public holidays)
08:00 – 17:00 Central European Time (CET)

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ROHDE&SCHWARZ

1171.0200.22-01.00

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1 Introduction

This chapter

Chapter 1 describes the use of the R&S UP300/350, provides information on functions and supplies tips regarding storage and transportation procedures. Furthermore, you will find a description on how to proceed in warranty cases.

Further information

Chapter 2 contains an overview of the R&S UP300/350´s control elements, indicators, etc.

Chapter 3 describes how to put the instrument into operation.

1.1 Application Range of the R&S UP300/350

Use

The R&S UP300/350 is a two-channel audio analyzer which provides a large number of functions and measurement features at favourable price. The R&S UP300/350 is capable of performing standard audio measurements with a high degree of accuracy. The extended frequency range which stretches beyond the audio range and up to 80 kHz permits a large number of other T & M applications (e.g. in ultrasonic technology, RFI voltage analysis, etc.) in addition to classic audio measurements.

The R&S UP300/350 generates and analyzes signals using digital signal processing. Conversion into the analog signal world is performed by means of high-end 24 bit D/A and A/D converters. This gives the measurement features a high level of stability. The R&S UP350 also has digital inputs and outputs.

Performance features

The key features are:

- Frequency range from DC to 80 kHz
- Two-channel generator with separate amplitude, phase and frequency settings for sinewave signal
- Generator generates all signals required for audio measurements: sinewave, two-tone (DFD and Mod Dist), multi-tone, noise, polarity, burst sinewave)
- Generator sweep with up to 2 function parameters
- Intrinsic distortion of 0.0003 % at 1 kHz
- Simultaneous numeric display of up to 3 measurement values
- Clearly structured, graphical representation of measurement results
- FFT up to 16 K
- Up to 3 digital filters can be activated
- All filters commonly used for audio measurements are predefined
- USB interface for remote control and for connecting a USB stick

Operation from a keypad

All functions and parameters can be set via menus using a keypad and a rotary knob. Current parameters and operating states are clearly arranged on a TFT colour display.

Remote control from a PC

The R&S UP300/350 is standardly equipped with a USB interface to allow communication with a PC. All functions and parameters can be set. Using the USB device driver, you can create your own measurement applications in automatic measurement and test systems.

1.2 Supplied Accessories

Content

1 power cord Europe

1 country specific power cord (if different from Europe)

1 German/English manual

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 UP300/350

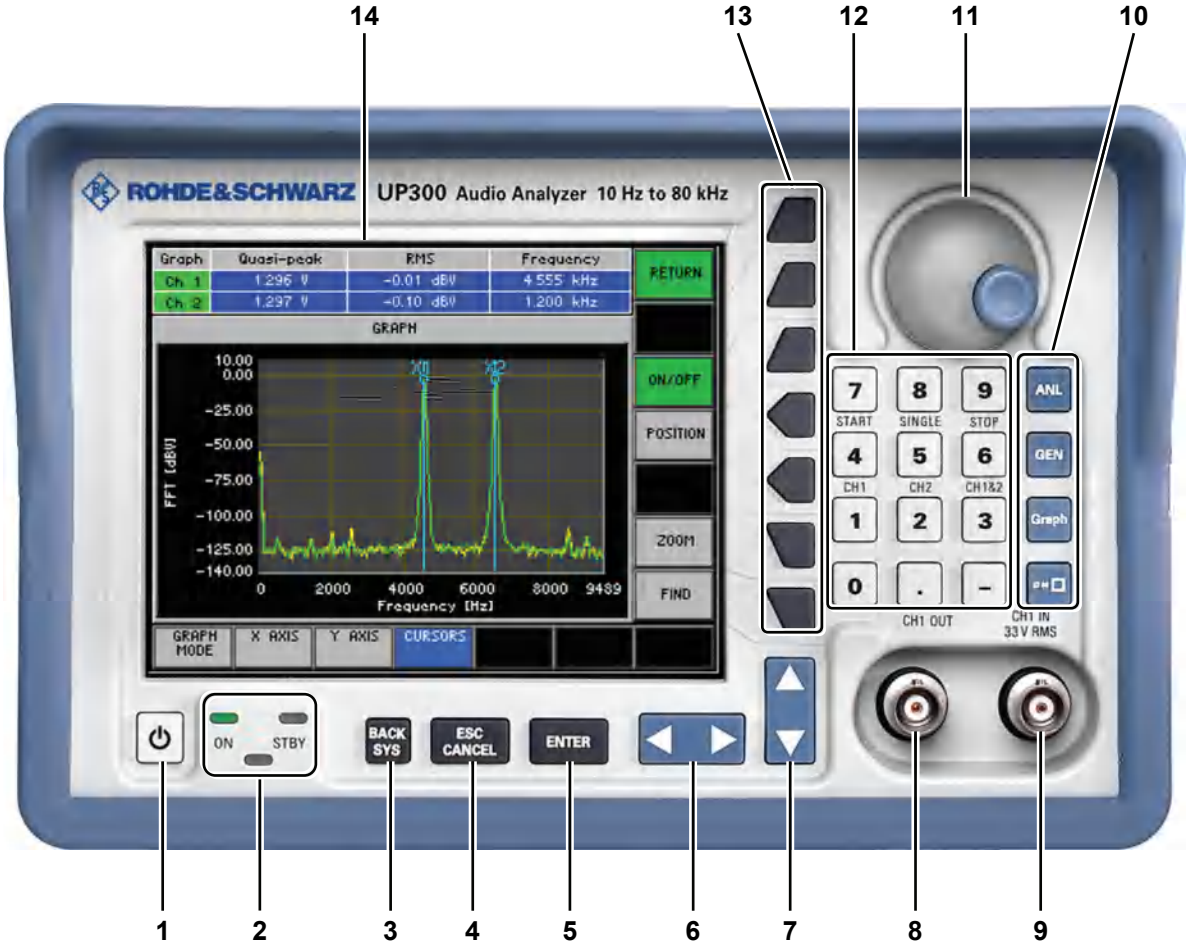
You will find the addresses of your nearest Rohde & Schwarz's representative and of the support center at the front of the manual.

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 UP300/350 in accordance with our general installation and service conditions.

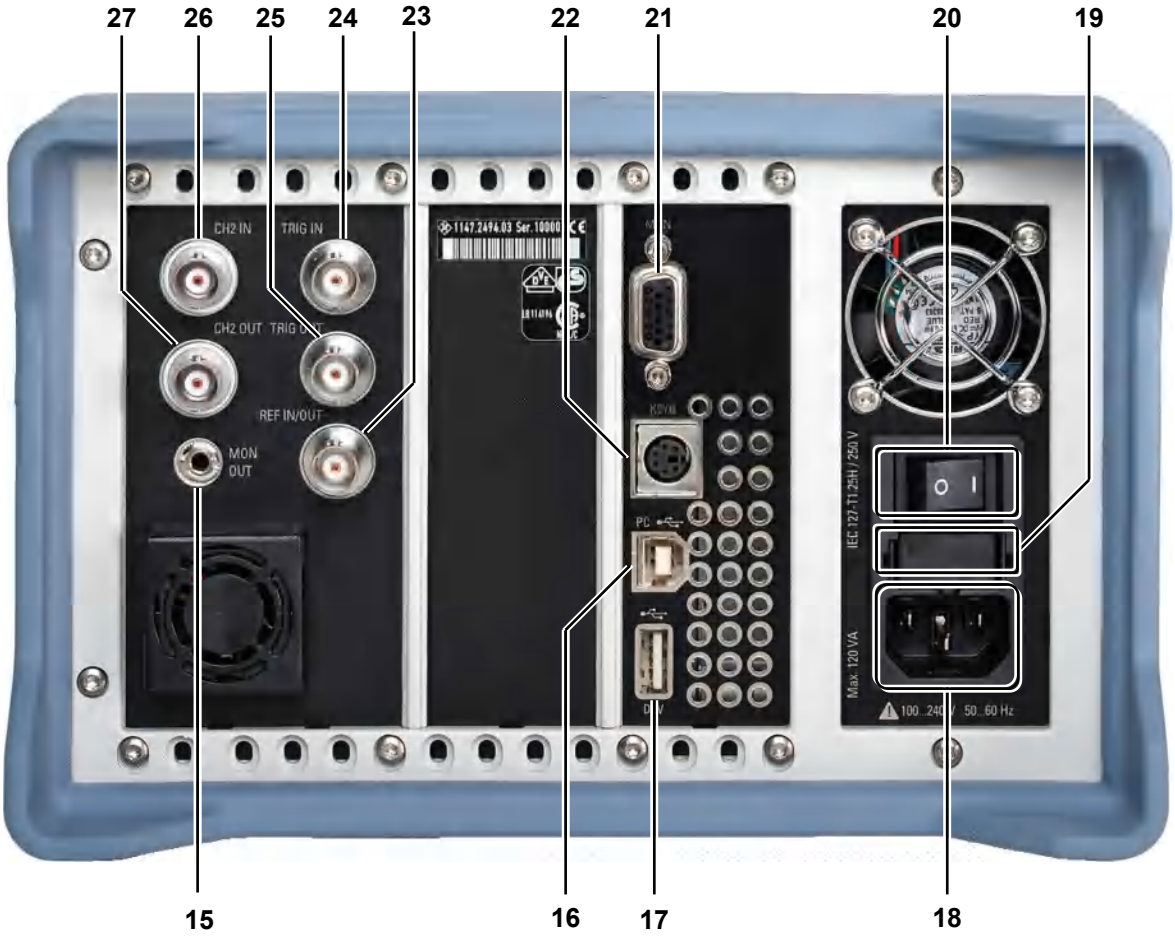
2 Control Elements

2.1 Front View



1	ON/STANDBY switch	**8**	Signal output Ch 1 (BNC connector)
2	ON/STANDBY indicator	**9**	Signal input Ch 1 (BNC connector)
3	BACK/SYS key	**10**	Main menu selection keys
4	ESC/CANCEL key	**11**	Rotary knob
5	ENTER key	**12**	Numeric keys
6	Cursor keys ◄ / ►	**13**	Function keys
7	Cursor keys ▼ / ▲	**14**	Screen

2.2 Rear View: R&S UP300/350



15 Audio monitoring output (jack)

16 Connector for external USB host

17 Connector for external USB device

18 AC supply connector

19 AC line fuse

20 AC line switch

21 Connector for external monitor

22 Connector for external keyboard

23 Input/output for external reference (10 MHz)

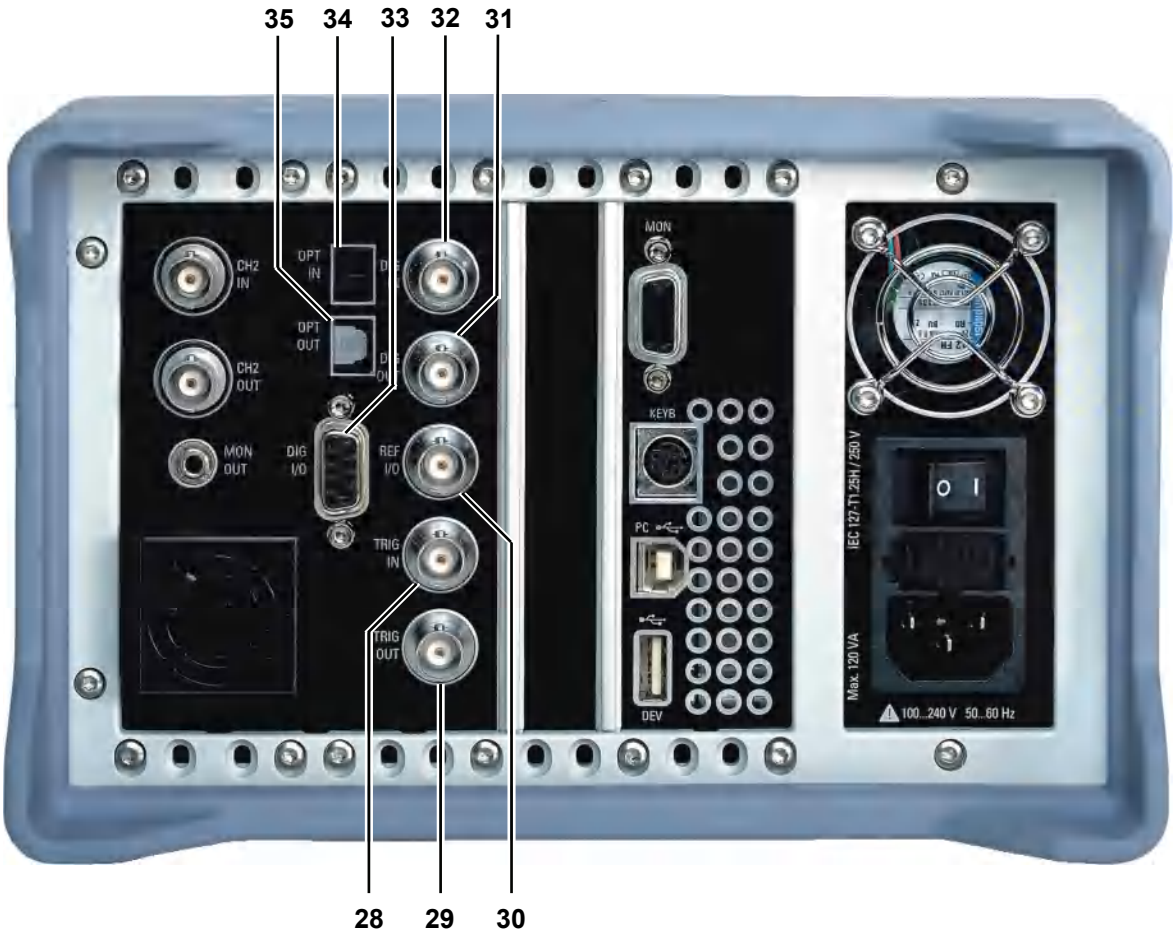
24 Reserved

25 Reserved

26 Signal input Ch 2 (BNC connector)

27 Signal output Ch 2 (BNC connector)

2.3 Rear View: R&S UP350 (Digital Interface)



28 Reserved

29 Reserved

30 Input/output for external reference (10 MHz)

31 Digital output S/P DIF

32 Digital input S/P DIF

33 Reserved

34 Optical input TOSLINK

35 Optical output TOSLINK

3 Putting the R&S UP300/350 into Operation

This chapter

Chapter 3 describes how to put the R&S UP300/350 into operation and connect an external keyboard.

Further information

Chapter 2 contains an overview of the R&S UP300/350's control elements, indicators, etc.

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

Chapter 7 is an in-depth description of the instrument's interfaces.

ATTENTION

Before putting the R&S UP300/350 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 UP300/350'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 UP300/350

Recommended procedure

When you unpack the R&S UP300/350, proceed as follows:

1. Remove the R&S UP300/350 from its packaging and check that the delivery is complete using the accessory list (↗ 1-36).
2. Carefully check the R&S UP300/350 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 UP300/350 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.

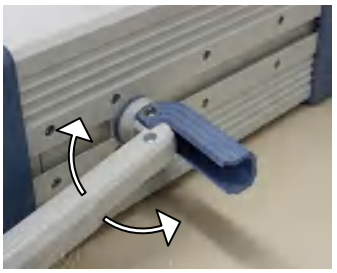
Setup instructions

The R&S UP300/350 must be only assembled on a firm, level surface. 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.

   CAUTION: 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.

   ATTENTION: Do not use pointed or sharp objects.

3.3 Connecting the R&S UP300/350 to the AC Line

WARNING

Danger of electric shock!

The R&S UP300/350 meets the requirements for Safety Class I according 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 UP300/350 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 UP300/350 to the AC line.

   The power supply connector [18] is at the rear of the instrument.

2. Connect the power cord to the AC line.

3.4 Switching On the R&S UP300/350

Note: The AC line is still connected to the R&S UP300/350 when the instrument is in the standby mode.

AC line switch on the rear panel

The R&S UP300/350 is connected to the AC line via power supply connector [18]. The AC line switch [20] which isolates the R&S UP300/350 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 by means of the AC line switch [20] at the rear panel, the R&S UP300/350 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 UP300/350 over 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 UP300/350

1. Press the AC line switch [20] on the rear panel in the “I” position.
2. Press the ON/STANDBY switch [20] on the front panel.

   The green LED ON [2] comes on.

3.5 Function Test

ATTENTION

The R&S UP300/350 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 UP300/350 has been switched on (↗ 3-42), 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 [14]. Booting the R&S UP300/350 is completed when the waveform and menu bar (↗ 5-57) appear.

In error case

If the application display (↗ 5-57) does not appear and the red, or green LED flash alternately, switch the R&S UP300/350 off and on. In case the error continues, return the instrument to our service center for checking.
When the red and green LEDs [2] flash alternately, an internal error has been recognized. Return the instrument to our service center for checking.

3.6 EMC

EMC requirements

The R&S UP300/350 meets the EMC Directive 89/336/EEC (applied standards EN 55011 Class B and EN 61326).

To prevent EMI, the R&S UP300/350 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 UP300/350, must comply with EMC directives.

Notes on the R&S UP300/350's interference

In audio engineering, inputs and outputs of test or operating instruments are usually not referenced to the housing ground, but are rather floating or balanced (or both). The main reason for this complex circuitry is to separate hum loops.

The R&S UP300/350 inputs are implemented via BNC connectors; the reference potential is at the outer conductor. If the input is floating (no connection to the housing), interference at the input amplifier may occur at extremely high-frequency RFI field strengths due to demodulation, which can impair the measurement at low levels. Appropriate grounding measures on the DUT as well as short line lengths help to reduce interference.

In case of doubt, check the spectrum of the measured signal.

3.7 Connecting a DUT

ATTENTION

The analyzer inputs of the R&S UP300/350 are protected against overvoltage, but must not be overloaded on a permanent basis (V_{rms} > 33 V). If overloaded, the instrument may be damaged, and subsequent malfunctions cannot be excluded.

Generator output

Via the generator outputs Ch 1 [8] and Ch 2 [27], you can stimulate the DUT with high-end test signals (↗ 6-98).

Analyzer input

Via the analyzer inputs Ch 1 [9] and Ch 2 [26], you can measure and evaluate the output signals of your DUT (↗ 6-212).

Audio analysis with the R&S UP300/350

By combining the generator and the analyzer, the R&S UP300/350 provides versatile capabilities for audio analysis (↗ 6-259, 6-267, 6-268, 6-272, 6-275).

3.8 Connecting an External Keyboard

ATTENTION

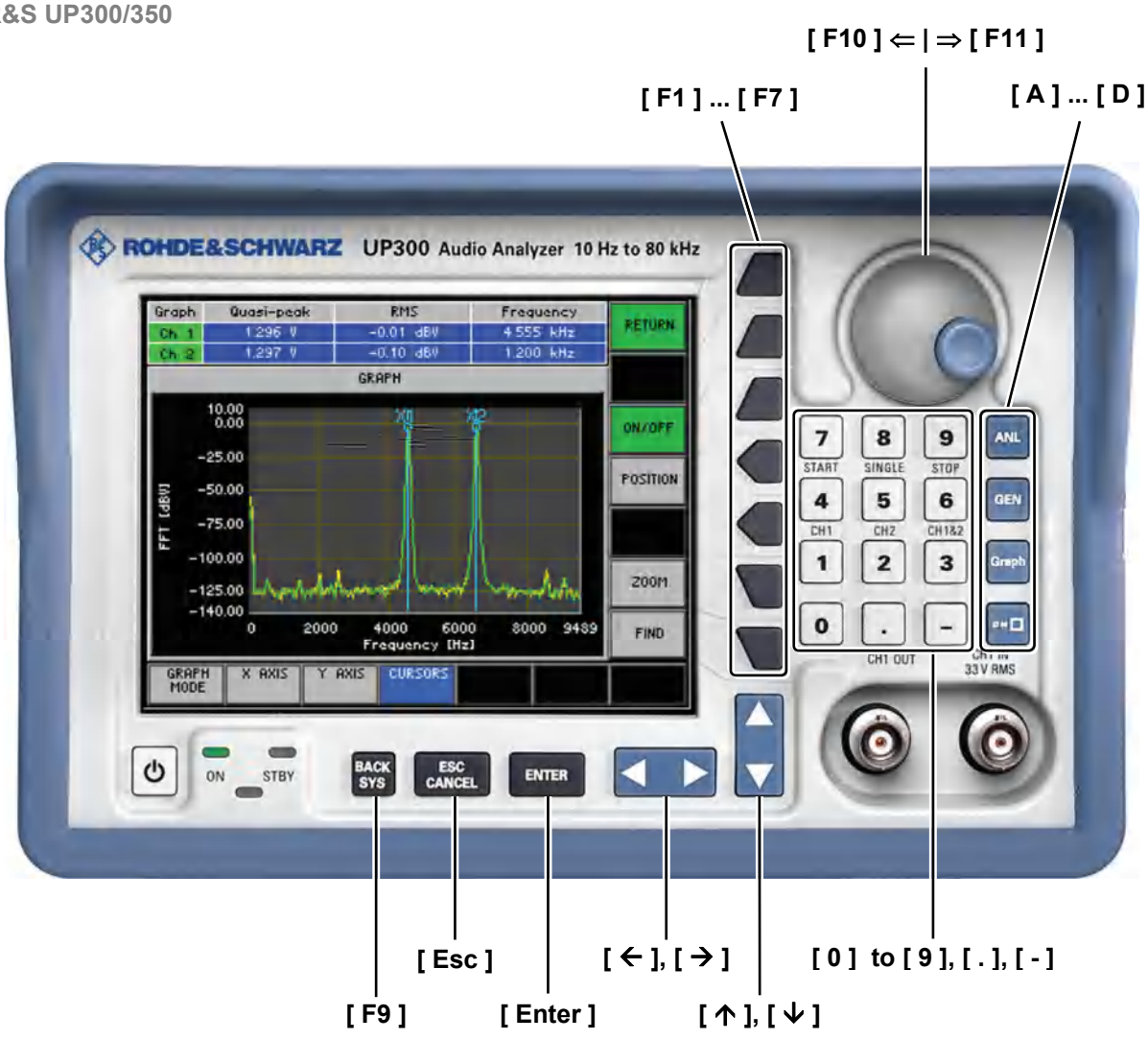
Connect the keyboard only when the R&S UP300/350 is off or in the STANDBY mode, otherwise malfunctions may occur at a later time.

Use

You can connect an external PC keyboard via the 6-pin PS/2 KEYB connector [22] on the R&S UP300/350'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 UP300/350.

The keyboard is detected automatically when it is connected.

Key assignment for operating the R&S UP300/350



3.9 Connecting a USB Stick

ATTENTION

To ensure that the USB stick is detected by the R&S UP300/350, the stick must be formatted in the FAT32 file system.

Use

You can connect an external USB stick to the USB device interface [17] at the rear of the R&S UP300/350. The USB stick is an extension of the internal memory. You can use it 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 settings to illustrate how to operate the R&S UP300/350.

For the following example, the initial instrument setting is the default setting (factory). This is set in the PRESET menu (↗ 6-317). 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 UP300/350's menus and the associated functions in detail.

4.1 Generator and Analyzer Settings

Introduction

In this example, the SINE generator function is set at channel Ch 1 with a frequency of 960 Hz and at channel Ch 2 with a frequency of 2 kHz. Both signal amplitudes have the value of V_{rms} = 1 V. The measurement function FREQ DC RMS is then set and the measurement result is displayed graphically with the aid of an FFT analysis. The parameters are set manually.

Generator settings

Perform the following steps:

1. **Reset the R&S UP300/350.**
   - Press the BACK SYS key.
   - Using the ◀ ▶ cursor keys select PRESET from the bottom menu bar.
   - Press the PRESET key.
2. **Set the sine signal in the generator.**
   - Press the main menu GEN selection key.
   - Using the ◀ ▶ cursor keys select FUNCTIONS from the bottom menu bar.
   - Press the SINE key.
   - Using the ◀ ▶ cursor keys select SINE from the bottom menu bar.

3. **Set the signal frequency to 960 Hz in Ch 1 and to 2 kHz in Ch 2.**
   - Press the numeric key 1 to select the channel Ch 1.
   - Press the FREQ key.
   - Use the numeric keys 9 6 0 to enter the value. Finish the entry with the Hz unit key.
   - Press the numeric key 2 to select the channel Ch 2.
   - Press the FREQ key.
   - Use the numeric key to enter the value 2. Finish the entry with the kHz unit key.
4. **Set the signal amplitude V_{rms} = 1 V.**
   - Press the numeric key 3 to select the channels Ch 1 and Ch 2.
   - Stay in the SINE menu.
   - Press the AMPL key.
   - Use the numeric key to enter the value 1. Finish the entry with the V key.

Analyzer settings

1. **Set the analyzer input to generator.**
   - Press the main menu ANL selection key.
   - Using the cursor keys select CONFIG from the bottom menu bar.
   - Press the INPUT key.
   - Use the  to select the **Gen Meas** setting.
     Finish the selection procedure with the ENTER key.
2. **Switch on the FREQ, DC, RMS, and FFT measurement functions.**
   - Using the cursor keys select FUNCTIONS from the bottom menu bar.
   - Press the FREQ, DC, RMS key.
   - Press the FFT key.

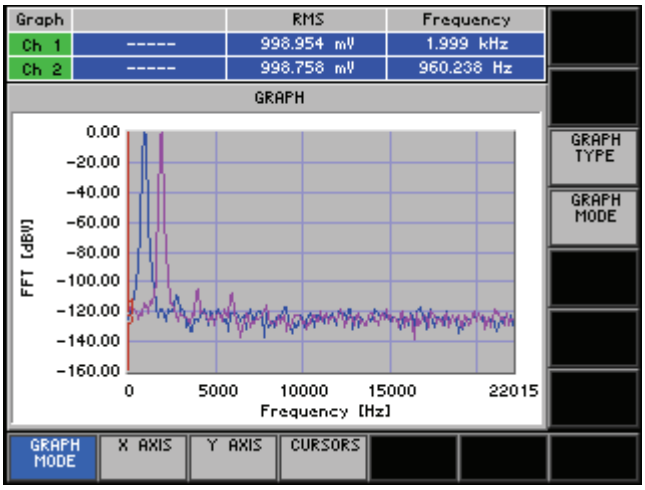
Graphical display

1. Graphical display of the measurement results.

- Press the main menu Graph selection key.
- Using the ◀ ▶ cursor keys select GRAPH MODE from the bottom menu bar.
- Press the GRAPH TYPE key.
- Use the  to select the **Spectrum** setting.

  Finish the selection procedure with the ENTER key.

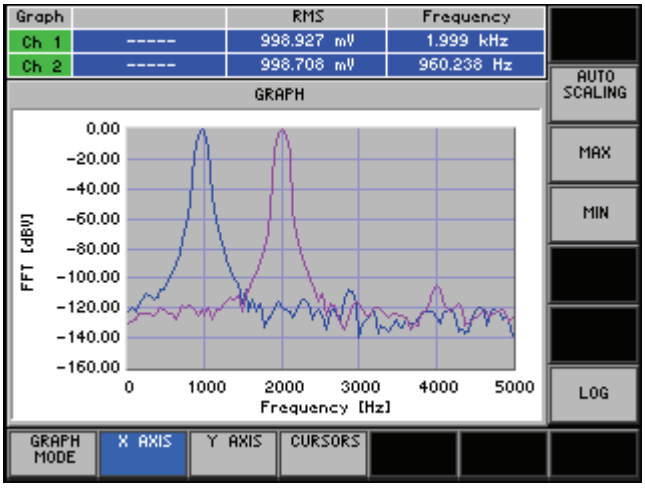
The R&S UP300/350 display



2. Change the scaling of the X axis in the measurement diagram.

- Using the ◀ ▶ cursor keys select X AXIS from the bottom menu bar.
- Press the MAX key.
- Use the numeric key to enter the value 5. Finish the entry with the kHz key.

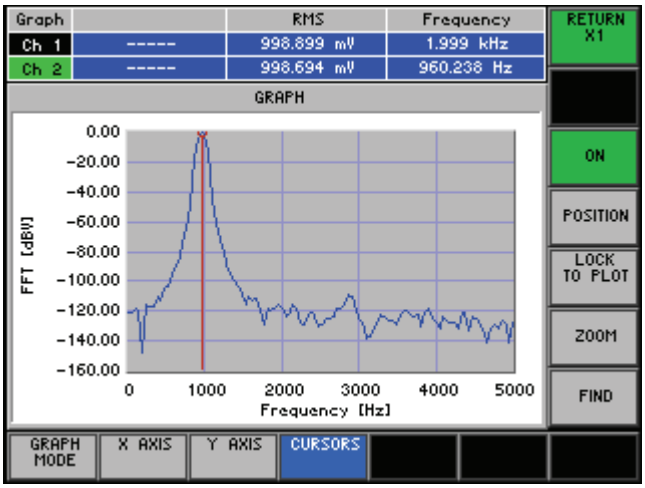
The R&S UP300/350 display



3. **Position the cursor 1 on trace 2.**
   - Using the ◀ ▶ cursor keys select CURSORS from the bottom menu bar.
   - Press the numeric key 2 to select the channel Ch 2.
   - Press the X1 ⇒ key.
   - Press the ON key to switch on the cursor.
   - Press the FIND key.
   - Use the rotary knob to select the **Max** setting.

     Finish the selection procedure with the ENTER key.

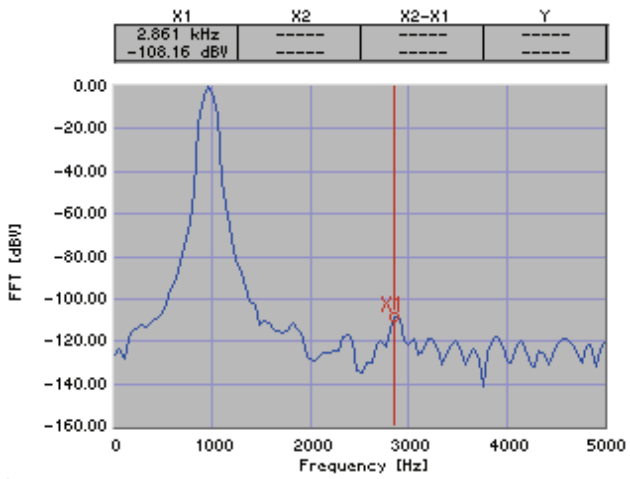
The R&S UP300/350 display



Full-screen display

1. **Set the full-screen display.**
   - Press the main menu selection key.
   - Use the rotary knob to move the cursor in little steps.
   - Use the ◀ ▶ cursor keys to position the cursor on the maximum value.

The R&S UP300/350 display



5 Manual Operating Concept

This chapter

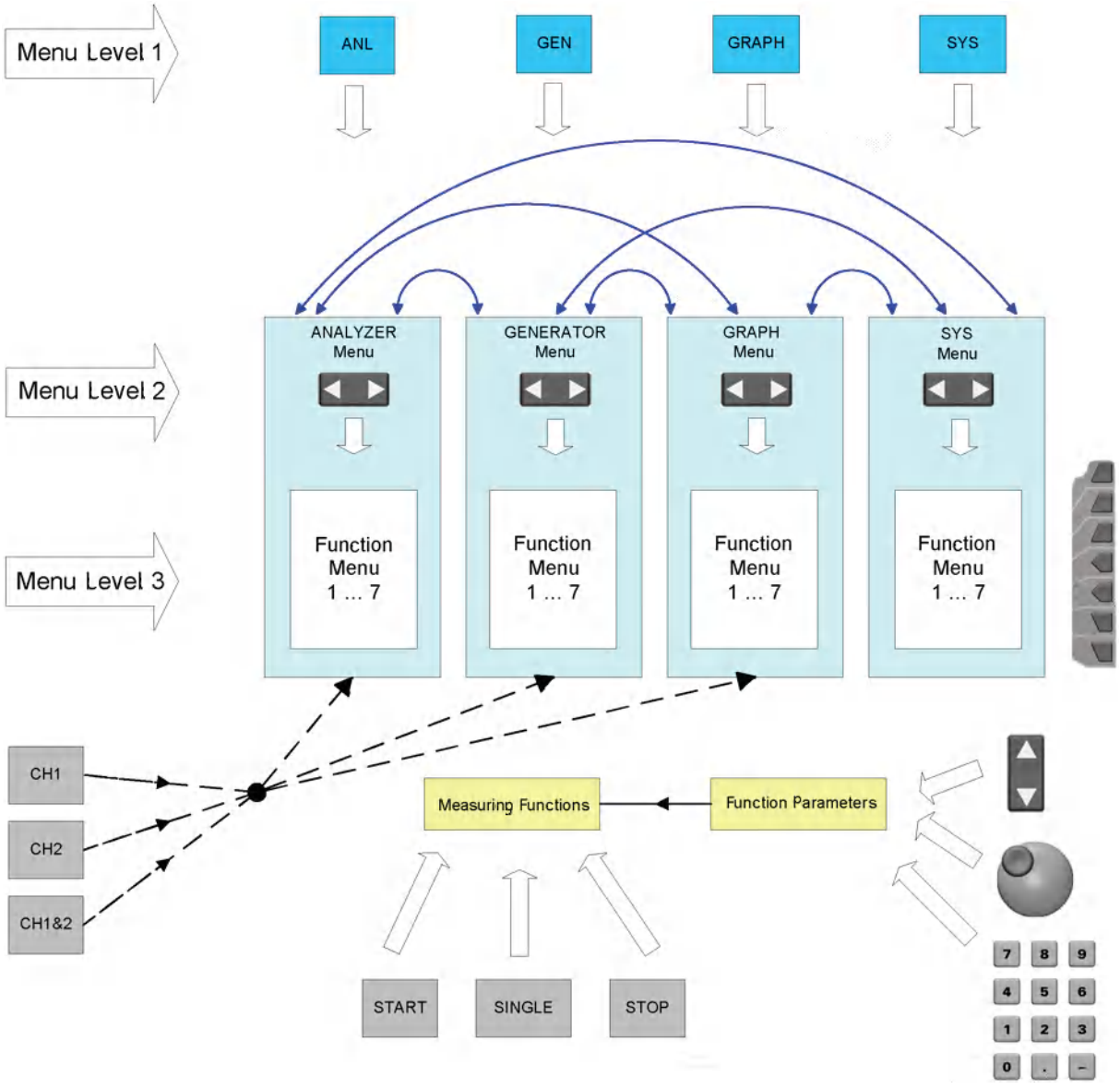
Chapter 5 contains an overview of the R&S UP300/350's basic manual operating concept. This includes a description of the keypad, screen layout, menu operation, and how to set parameters. There is an overview of the menus and functions at the end of this chapter.

Further information

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

Chapter 4 contains a brief introduction which takes you step-by-step through some simple settings.

5.1 Overview of Operating Steps



First hierarchical level

The R&S UP300/350 is basically operated via hierarchically arranged menus. The following four **main menus** are simultaneously available at the first hierarchical level:

- **Analyzer**
- **Generator**
- **Graph**
- **System**

Using the four keys **ANL, GEN, GRAPH,** and **SYS**, you can switch between these menus. Each menu is called at the position where it has been quitted.

Second hierarchical level

Within the main menu, the corresponding **function menus** make up the second hierarchical level. These functions are on the horizontal softkey bar. Using the horizontal cursor keys, you can navigate between these functions.

Third hierarchical level

The **parameter menus** for each function menu are displayed on the vertical softkey bar at the third hierarchical level.

Some parameter menus include further submenus (fourth level).

Channel selection keys

The keys **Ch 1, Ch 2,** and **Ch 1&2** (the numeric keys 1, 2, and 3 are assigned twice) affect the Analyzer, Generator, and Graph menus. They control which channel is affected by a setting.

Measurement control keys

The keys **START, SINGLE,** and **STOP** (the numeric keys 4, 5, and 6 are assigned twice) control the sequence of the measurement functions.

Entry possibilities

Enter a parameter value by using the **numeric keypad**, **rotary knob,** or vertical **cursor keys**.

5.2 Making Entries from the Keypad

Introduction

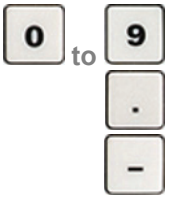
The R&S UP300/350 is operated using menus in conjunction with a keypad and a rotary knob. The keypad comprises the following sections:

- Numeric keys [12]
- Main menu selection keys [10]
- Cursor keys [6, 7]
- Function keys [13]
- Action keys [4, 5]
- BACK/SYS key [3]

5.2.1 Numeric Keys

Function 1

When the **entry field** is **open**, the numeric keys are used to enter numeric parameters.



- 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.

Function 2

When the **entry field** is **closed**, the numeric keys have special functions. The numeric keys 1, 2, and 3 are used to select the channels, and the numeric keys 4, 5, and 6 are used to control the measurement.

- Selects channel Ch 1 for settings and measurements.
- Selects channel Ch 2 for settings and measurements.
- Selects both channels (CH 1&2) for settings and measurements.
- Starts continuous measurement.
- Starts a single measurement.
- Stops continuous measurement.

5.2.2 Main Menu Selection Keys

Function

These keys represent the top operator control level and are used to switch between the Generator menu, Analyzer menu, and Graph menu. The menu items in the menu section of the display also change accordingly. When switching between the main menus, the selected menu level is always shown in its most recent state.

- Switches to the Analyzer menu.
- Switches to the Generator menu.
- Switches to the Graph menu.
- Displays the measurement diagram in the Graph menu in full-screen mode (toggle function).

5.2.3 Rotary Knob

Function

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

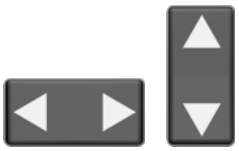
The rotary knob has several functions:

- **Incrementing** (turn clockwise) or **decrementing** (turn counter-clockwise) numerical instrument parameters.
- **Navigating** through selection fields upwards (turn clockwise) or downwards (turn counter-clockwise).
- **Positioning** markers, cursors, etc. on the screen.

5.2.4 Cursor Keys

Function

As well as the numeric keys and the rotary knob, the cursor keys are 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** to change the position you want within the numerical editing line. Use the ◂ or ▸ cursor keys to move the cursor in the full screen graph (↗ 6-314).
- The ▾ or ▴ cursor keys **increment** or **decrement** numerical parameter entries.

5.2.5 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 (↗ 5-60).

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
- Entry of units
- Confirmation of a new setting and opening of a new menu item
- Branching to a submenu
- Opening and closing a selection field

5.2.6 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 in the R&S UP300/350.

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

– This key is for **closing the entry field** or selection field, but the data that has been entered is not saved, i.e. the **old value** is retained.

5.2.7 BACK/SYS Key

Function 1: BACK If the **entry field is open,** the BACK/SYS [3] key can be used to correct numeric inputs (**BACK**).

– If the parameter entry field is open, the key functions as the BACK key (i.e. a value entered using the keyboard can be deleted again one character at a time). The key has no effect if the value in the entry field was changed using the cursor keys or rotary knob.

Function 2: SYS If the **entry field is closed,** the BACK/SYS key [3] will open or close the system menu (**SYS**).

– When you press the key, the measurement menu is blanked out and replaced by the SYS menu. Other functions are assigned to the function keys [13].

– By pressing the key again, you can quit the SYS menu and accept the new settings.

5.3 Screen Display

Introduction

The screen [14] provides on-going information about events and the parameters associated with the selected setting functions.
The display mode for the parameters, lettering of the function keys, and type of menu, all depend on the current settings.

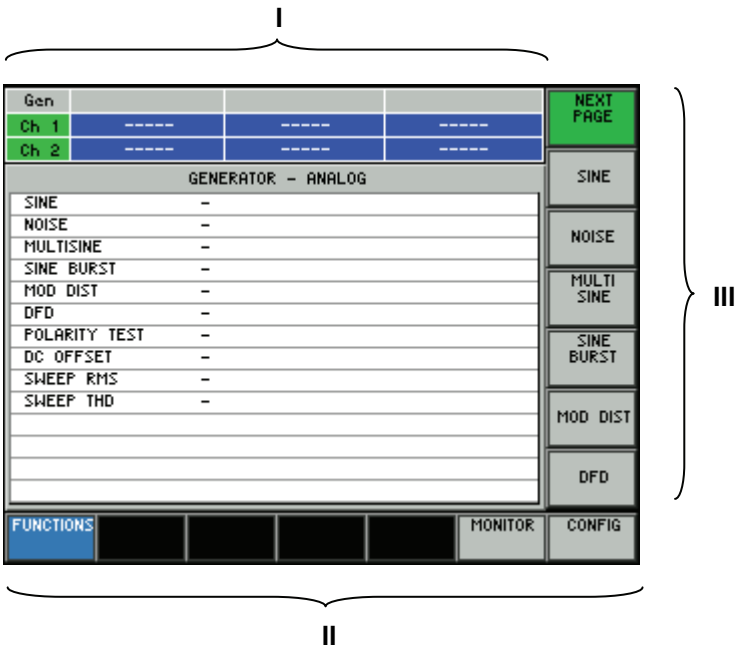
Screen layout

The screen is divided into three areas:

I Display area

II Menu area

III Function area



5.3.1 Display Area

Introduction

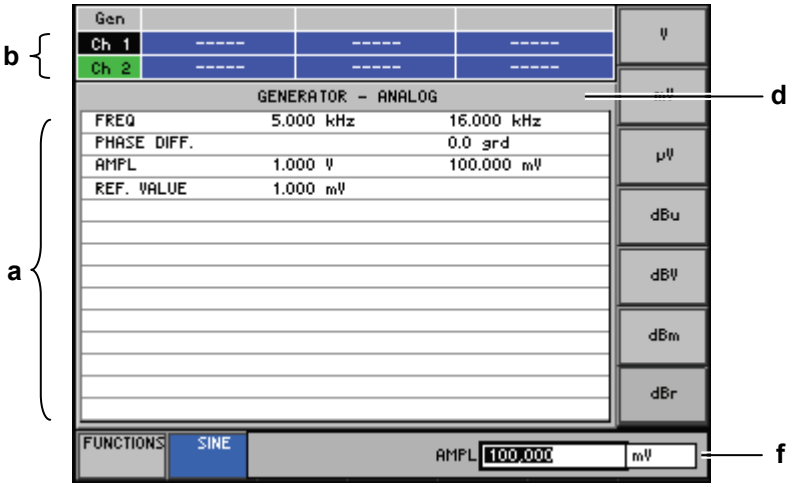
The display window of the R&S UP300/350 changes depending on the selected main menu. In the Analyzer and Generator menus, the currently set values are displayed in the form of a list. If you select the Graph menu, a measurement diagram is displayed in the parameter field. With all other main menus, the measurement values are displayed in the top part of the screen.

Display of menus:

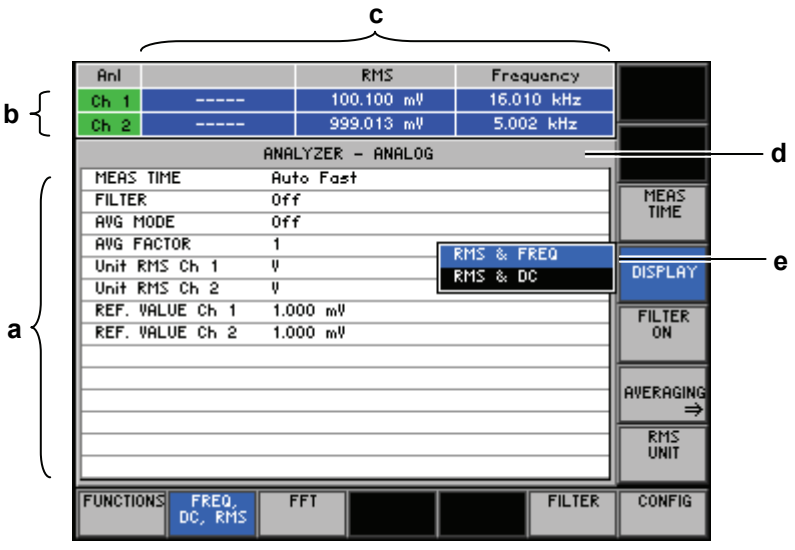
The display window contains:

- Parameter list/Measurement diagram (**a**) (↗ 6-98, 6-212, 6-286)
- Channel display (**b**) (↗ 6-115)
- Measurement displays/Cursor parameters (**c**) (↗ 6-227, 6-300, 6-314)
- Status line with error messages (**d**) (↗ 6-285, 8-347)
- Selection fields that appear on screen (**e**) (↗ 5-64)
- Entry fields that appear on screen (**f**) (↗ 5-65)
- Traces (**g**) (channel Ch 1: green, channel Ch 2: yellow) (↗ 6-227)
- X cursors (**i**) and Y cursors (**h**) (↗ 6-300)

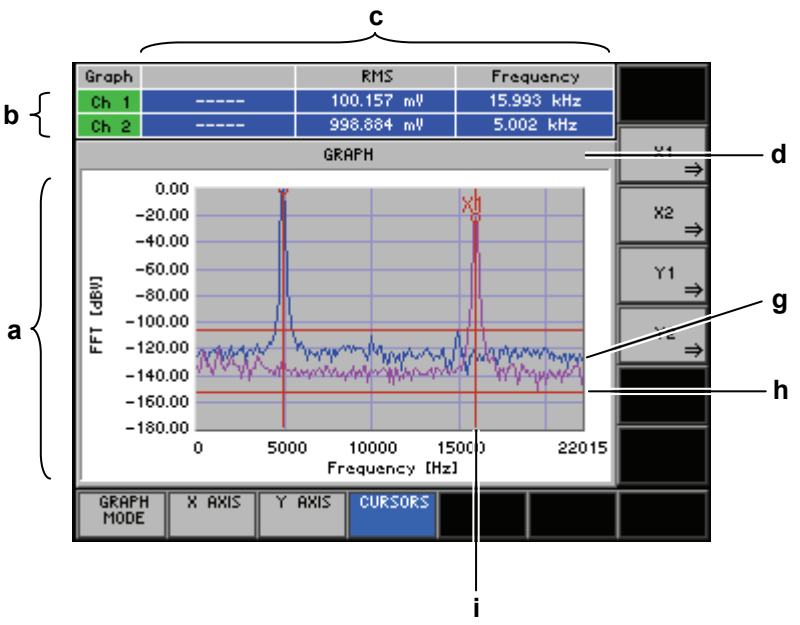
Generator menu (call with GEN)



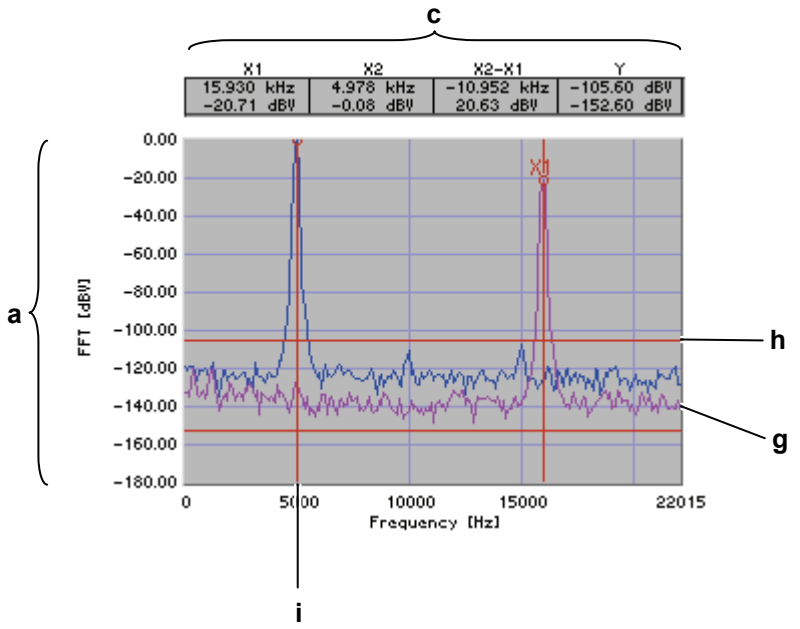
Analyzer menu (call with ANL)



Graph menu
(call with Graph)



Full screen
(call with)



5.3.2 Menu Area

Menu display

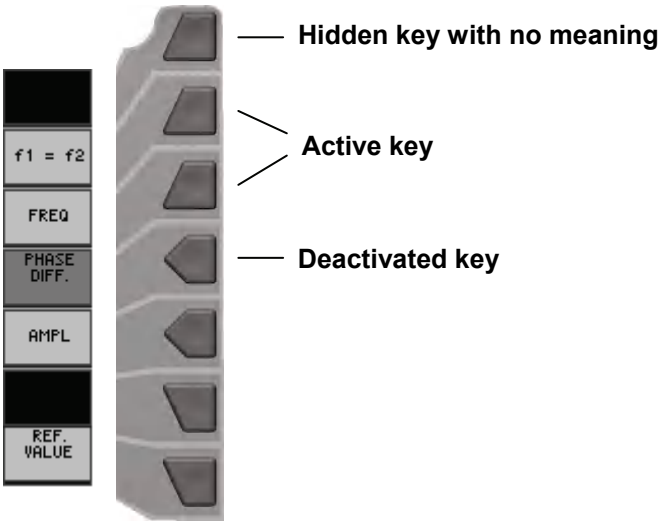
Menus for setting the setting parameters and functions are displayed in the menu area. The selected menu is highlighted, e. g. Generator menu.

5.3.3 Function Area

Displaying the current assignment

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 button cannot be used. Every attempt to press the button will be ignored. If a key has lettering in grey colour, the key has been deactivated.



5.4 Calling and Changing the Menus

Introduction

Operating the R&S UP300/350 is menu-guided. The instrument settings associated with any menu you select are displayed in the function area.

Pressing a function key has one of the following effects:

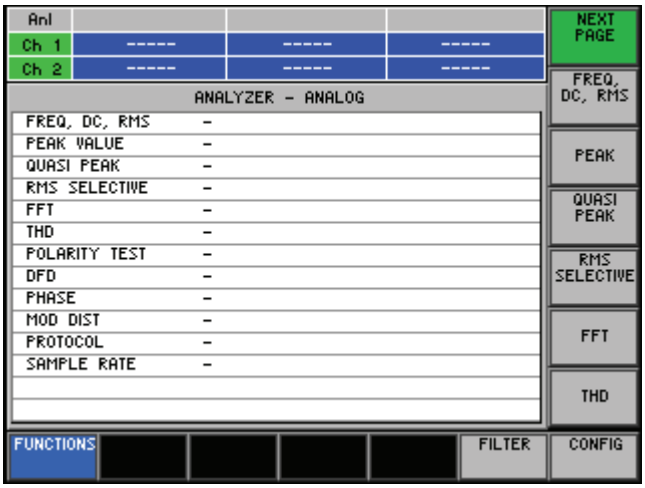
- Switching functions on/off
- Toggling a setting
- Opening entries or selection fields
- Opening the submenus

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

Calling or changing menus

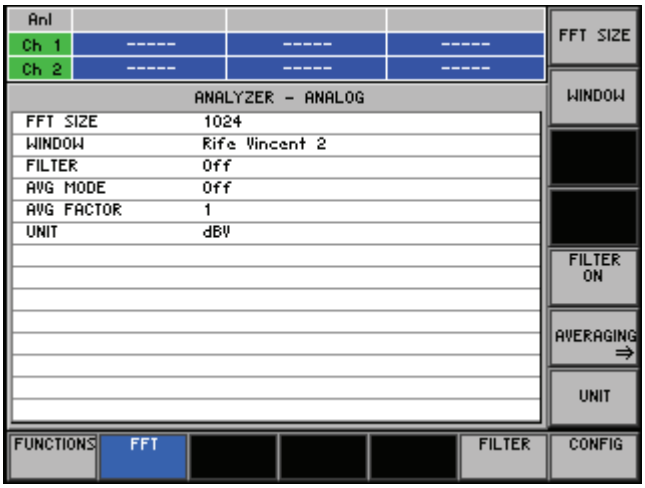
1. Press the main menu ANL selection key.
2. Select a **menu,** e. g. FUNCTIONS, with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the appropriate function is assigned to the function keys [13].



3. Press the FFT **function key** in the FUNCTIONS **menu**.The FFT key will appear in the function area.
4. Select the FFT **menu** with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the appropriate function is assigned to the function keys [13].

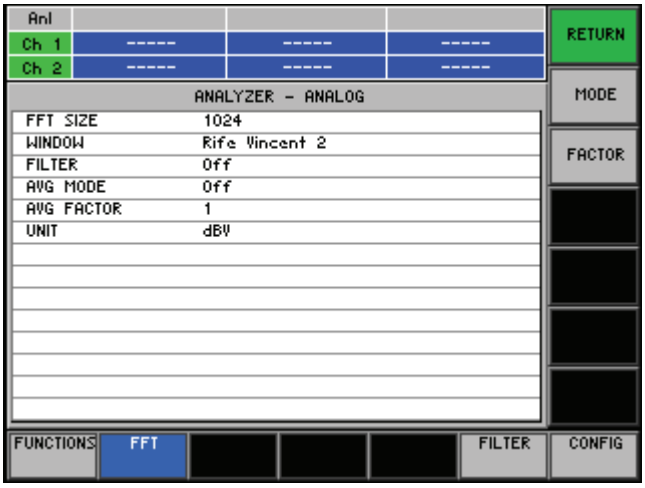


Note: A function key with a double arrow, e.g. AVERAGING ⇒, tells you that pressing this key will call a submenu.

Calling/Quitting submenus

1. Press the AVERAGING ⇒ **function key** in the FFT **menu**.

   The AVERAGING submenu opens and the new functions are assigned to the function keys [13].



2. Press the RETURN **function key** in the AVERAGING ⇒ **submenu**.

   The submenu is closed and the previous functions remain assigned to the function keys [13].

5.5 Setting the Parameters

Choice of methods

Parameters can be set in a number of ways:

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

The numeric keys [12], the main menu selection keys [10], rotary knob [11], cursor keys [6, 7], function keys [13] and action keys [4, 5] can all be used to select and enter instrument parameters.

5.5.1 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.

Example: Scaling the X axis (↗ 6-292)

1. Press the **main menu** Graph **selection key**.
2. Select the X AXIS **menu** with the ◂ or ▸ **cursor keys** [6].
3. Press the AUTO SCALING **function key** in the X AXIS **menu.**

   The X axis of the measurement diagram is automatically scaled.

5.5.2 Toggling a Setting

Introduction

When a menu is selected, a number of instrument functions will be displayed in the function area. Some instrument functions can be switched on or off by a stroke of the function key (toggling).

The function key is highlighted when the instrument function is active.

Example: Activating/ Deactivating the channel output Ch 1 (↗ 6-104)

1. Press the **main menu** GEN **selection key**.
2. Select the CONFIG **menu** with the ◂ or ▸ **cursor keys** [6].
3. Press the numeric key 1 to select the channel **Ch 1**.
4. Press the OUTPUT ON **function key** in the CONFIG **menu.**

   The function key is **highlighted** and the new setting is saved. After switching on, the output signal with the currently set parameters is present at the output [8].
5. To deactivate the channel output Ch 1, press the OUTPUT ON **function key** in the CONFIG **menu**.

   The function key is **no longer highlighted** and the output signal is no longer present at the channel output.

5.5.3 Selecting Settings

Introduction

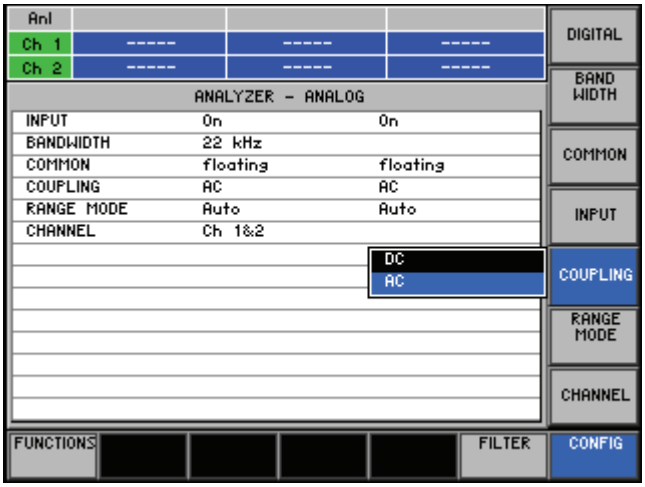
When you select a menu, a number of instrument functions are displayed in the function area. If certain function keys are then pressed, a selection field is displayed in the diagram area. You can then choose and activate any of the settings offered for selection.

The function key you select is highlighted.

Example: Selecting the signal coupling (↗ 6-219)

1. Press the **main menu** ANL **selection key**.
2. Select the CONFIG **menu** with the ◂ or ▸ **cursor keys** [6].
3. Press the COUPLING **function key** in the CONFIG **menu.**

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



4. Select the signal coupling with the **rotary knob** [11].
5. Press the **ENTER key** [5] to confirm the selection field.

   The new value is set and saved and the field will be closed.

   If you want to keep the old setting, close the selection field with the **ESC/CANCEL key** [4] or press the function key again.

Note: If there are more than 12 options available, a scroll bar is displayed on the right side of the selection field.

5.5.4 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 menu area.
The function key you select is highlighted.

There are two ways of entering numerical parameters:

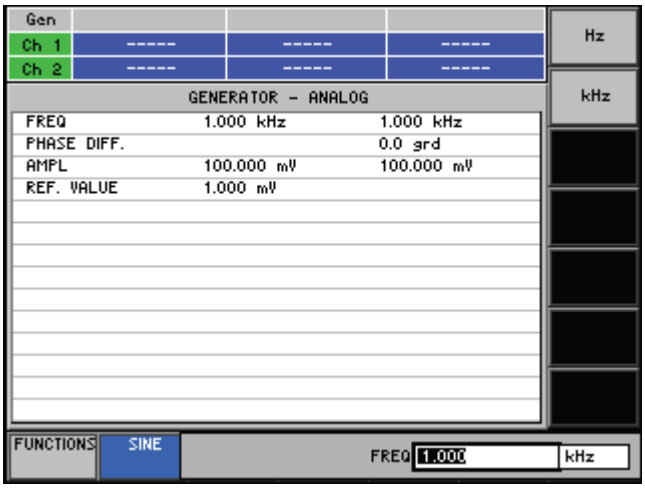
- **Entry** of a number with the **numeric keys**
- **Change** of a number with the **cursor keys** and **rotary knob**

5.5.4.1 Entry with the Numeric Keys

Example: Entering a signal frequency (↗ 6-116)

1. Press the **main menu** GEN **selection key**.
2. Select the FUNCTIONS **menu** with the ◂ or ▸ **cursor keys** [6].
3. Press the SINE **function key** in the FUNCTIONS **menu.**
4. Select the SINE **menu** with the ◂ or ▸ **cursor keys** [6].
5. Press the FREQ **function key** in the SINE **menu.**

   An entry field containing the current setting is displayed. At the same time, the function keys are assigned various units of measurement.



Entering a new value

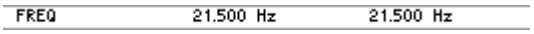
6. Overwrite the old value, e. g. with **21.5 kHz,** with the **numeric keys** [12].

Note: If a numeric 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 numeric keys.
With the SYS/BACK key [3], a value entered using the keyboard can be deleted again one character at a time.

Terminating entries

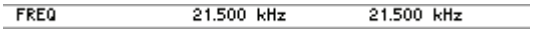
7. **a)** Press the [Hz] **function key** to terminate the entry.

The R&S UP300/350 sets the value that has been set numerically using the **new unit**. The entry window is closed.



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

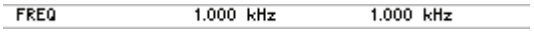
The R&S UP300/350 sets the value that has been set numerically, but with the **old unit**. The entry window is closed.



Note: If a parameter is unitless or always has the same unit, you can terminate the entry with the **ENTER key**.

c) Press the [ESC CANCEL] **key** [4] to cancel the entry.

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



Invalid parameter entry

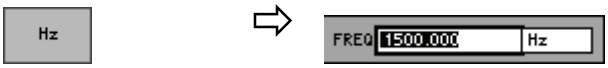
If the entered value is outside the permissible range, the largest or smallest permissible value is coerced and the message **"Value is out of range"** appears in the status line.

Using another unit of measure to display a value

1. Press the [FREQ] **function key** in the [SINE] **menu.**

An entry field containing the current setting is displayed. At the same time, the function keys are assigned various units of measurement.

2. Press the [Hz] **function key** to display the value in **Hz**.



The value is displayed using the **new unit**. The input window is **not** closed.

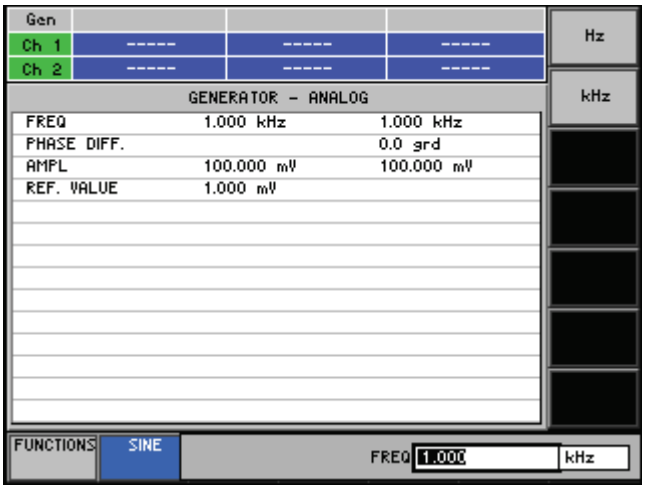
Note: In the parameter list, values from 1 to 999 are displayed in front of the decimal point. In other words, if the digit sequence <5000> and the unit <Hz> are entered, <5.000 kHz> appears in the display.

5.5.4.2 Entry with the Cursor Keys and Rotary Knob

Example: Entering a signal frequency (↗ 6-115)

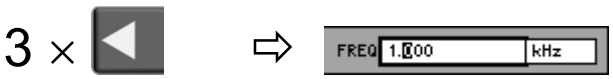
1. Press the **main menu** GEN **selection key**.
2. Select the FUNCTIONS **menu** with the ◂ or ▸ **cursor keys** [6].
3. Press the SINE **function key** in the FUNCTIONS **menu.**
4. Select the SINE **menu** with the ◂ or ▸ **cursor keys** [6].
5. Press the FREQ **function key** in the SINE **menu.**

   An entry field containing the current setting is displayed. At the same time, the function keys are assigned various units of measurement.



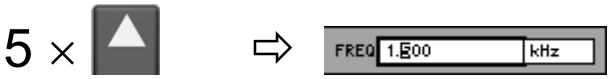
Entering a new value, e. g. 1.5 kHz

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



7. **a)** Press the ▾ or ▴ **cursor keys** [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.



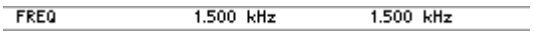
   b) Turn the **rotary knob** [11] until you obtain the value you want. Turning clockwise increases the value; turning counter-clockwise reduces the value.

   Note: In both cases, there is a carry 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 the next highest digit.

Terminating entries

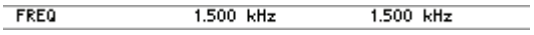
8. **a)** Press the kHz **function key** to terminate the entry.

The **new unit** is displayed and the input window is closed.



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

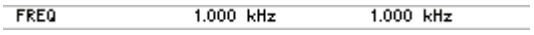
The R&S UP300/350 sets the value that has been set numerically but with the **old unit**. The entry window is closed.



Note: If a parameter is unitless or always has the same unit, you can set and terminate the entry only with the **ENTER key**.

c) Press the ESC CANCEL **key** [4] to cancel the entry.

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



Invalid parameter entry

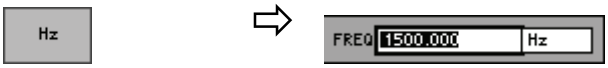
If the limit value is reached, the numeric value in the entry window remains the same and is neither increased nor decreased. No error message is issued.

Using another unit of measure to display a value

1. Press the FREQ **function key** in the SINE **menu.**

An entry field containing the current setting is displayed. At the same time, the function keys are assigned various units of measurement.

2. Press the Hz **function key** to display the value in **Hz**.



The numerically set value is displayed using the **new unit**. The input window is **not** closed.

Note: In the parameter list, values from 1 to 999 are displayed in front of the decimal point. In other words, if the digit sequence <5000> and the unit <Hz> are entered, <5.000 kHz> appears in the display.

5.6 Overview of all Menus and Functions

5.6.1 Generator

5.6.1.1 FUNCTIONS Menu

Function key assignment

NEXT PAGE	Display the next set of functions.	
SINE	Sinewave signal	(↗ 6-114)
NOISE	Noise signal	(↗ 6-119)
MULTI SINE	Multi-sinewave signal	(↗ 6-122)
SINE BURST	Sine burst signal	(↗ 6-132)
MOD DIST	Two-tone signal for measurement of modulation distortions	(↗ 6-138)
DFD	Difference frequency signal	(↗ 6-144)
PREV PAGE	Display the previous set of functions.	
POLARITY TEST	Polarity test signal	(↗ 6-150)
DC OFFSET	DC voltage component	(↗ 6-152)
SWEEP RMS	Sweeped sinewave signal and measured RMS	(↗ 6-154)
SWEEP RMS SEL.	Sweeped sinewave signal and measured RMS Selective	(↗ 6-171)
SWEEP THD	Sweeped sinewave signal and measured RMS Selective	(↗ 6-190)

5.6.1.2 SINE Menu

Function key assignment

f1 = f2	Activate/Deactivate the frequency coupling of the channels.	(↗ 6-116)
FREQ	Enter the signal frequency of the active channel.	(↗ 6-115)

PHASE DIFF.	Enter the phase difference between the channels.	(↗ 6-116)
AMPL	Enter the signal amplitude.	(↗ 6-117)
REF. VALUE	Enter the reference value.	(↗ 6-118)

5.6.1.3 NOISE Menu

Function key assignment

PDF	Select the amplitude distribution function.	(↗ 6-120)
AMPL	Enter the signal amplitude.	(↗ 6-120)
REF. VALUE	Enter the reference value.	(↗ 6-118)

5.6.1.4 MULTISINE Menu

Function key assignment

NUMBER OF SINE	Enter the number of sinewave tones.	(↗ 6-123)
COMPON LIST ⇒	**Open the submenu:** Configuration of signal parameters	
RETURN	Exit the submenu.	
FREQ	Enter the frequency.	(↗ 6-124)
PHASE	Enter the start phase.	(↗ 6-125)
REL AMPL	Enter the relative signal amplitude.	(↗ 6-125)
SPACING	Enter the frequency resolution.	(↗ 6-126)
REF. VALUE	Enter the reference value for the signal.	(↗ 6-128)
AM ON	Activate/Deactivate amplitude modulation.	(↗6-129)
AM FREQ	Enter the AM frequency.	(↗ 6-130)
AM DEPTH	Enter the AM modulation depth.	(↗ 6-131)

5.6.1.5 SINE BURST Menu

Function key assignment

GEN FREQ	Enter the signal frequency.	(↗ 6-133)
HIGH LEVEL TIME	Enter the high-level time.	(↗ 6-134)
INTERVAL	Enter the interval time.	(↗ 6-135)
HIGH LEVEL AMPL	Enter the high-level amplitude.	(↗ 6-136)
LOW LEVEL AMPL	Enter the low-level amplitude.	(↗ 6-137)
REF. VALUE	Enter the reference value.	(↗ 6-118)

5.6.1.6 MOD DIST Menu

Function key assignment

UPPER FREQ	Enter the useful signal frequency.	(↗ 6-140)
LOWER FREQ	Enter the interference signal frequency.	(↗ 6-140)
AMPL RATIO	Enter the ratio between interference amplitude and useful amplitude.	(↗ 6-142)
TOTAL RMS	Enter the total RMS of the signal.	(↗ 6-143)
REF. VALUE	Enter the reference value.	(↗ 6-118)

5.6.1.7 DFD Menu

Function key assignment

UPPER FREQ	Measurement acc. to IEC 118: Enter the upper DFD frequency.	(↗ 6-145)
MEAN FREQ	Measurement acc. to IEC 268: Enter the center frequency.	(↗ 6-145)
DIFF FREQ	Enter the difference frequency.	(↗ 6-145, 6-147)
TOTAL RMS	Enter the total RMS of the signal.	(↗ 6-149)

REF. VALUE	Enter the reference value.	(↗ 6-118)

5.6.1.8 POLARITY TEST Menu

Function key assignment

PEAK	Enter the signal amplitude.	(↗ 6-151)
REF. VALUE	Enter the reference value.	(↗ 6-118)

5.6.1.9 DC OFFSET Menu

Function key assignment

DC OFFSET	Enter the DC offset.	(↗ 6-153)

5.6.1.10 SWEEP RMS Menu

Function key assignment

MODE — Select the sweep mode. (↗ 6-156)

MEAS TIME — Set the measurement time. (↗ 6-157)

PARAM FREQ ⇒ — **Open the submenu:**
Set the sweep parameters for frequency.

- RETURN FREQ — Exit the submenu.
- START — Enter the start value. (↗ 6-159)
- STOP — Enter the stop value. (↗ 6-159)
- SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-161)
- POINTS — Enter the number of reading points. (↗ 6-161)
- STEP SIZE — Enter the step size. (↗ 6-161)
- MEAS DELAY — Enter the measurement delay. (↗ 6-163)

PARAM AMPL ⇒ — **Open the submenu:**
Set the sweep parameters for amplitude.

- RETURN AMPL — Exit the submenu.
- START — Enter the start value. (↗ 6-165)
- STOP — Enter the stop value. (↗ 6-165)
- SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-161)
- POINTS — Enter the number of reading points. (↗ 6-167)
- STEP SIZE — Enter the step size. (↗ 6-167)
- MEAS DELAY — Enter the measurement delay. (↗ 6-168)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

UNIT — Select the unit for the level display. (↗ 6-169)

5.6.1.11 SWEEP RMS SELECTIVE Menu

Function key assignment

MODE — Select the sweep mode. (↗ 6-156)

BAND WIDTH — Select the measurement bandwidth. (↗ 6-174)

PARAM FREQ ⇒ — **Open the submenu:**
Set the sweep parameters for frequency.

- RETURN FREQ — Exit the submenu.
- START — Enter the start value. (↗ 6-159)
- STOP — Enter the stop value. (↗ 6-159)
- SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-161)
- POINTS — Enter the number of reading points. (↗ 6-161)
- STEP SIZE — Enter the step size. (↗ 6-161)
- MEAS DELAY — Enter the measurement delay. (↗ 6-163)

PARAM AMPL ⇒ — **Open the submenu:**
Set the sweep parameters for amplitude.

- RETURN AMPL — Exit the submenu.
- START — Enter the start value. (↗ 6-165)
- STOP — Enter the stop value. (↗ 6-165)
- SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-161)
- POINTS — Enter the number of reading points. (↗ 6-167)
- STEP SIZE — Enter the step size. (↗ 6-167)
- MEAS DELAY — Enter the measurement delay. (↗ 6-168)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

UNIT — Select the unit for the level display. (↗ 6-169)

5.6.1.12 SWEEP THD Menu

Function key assignment

MODE — Select the sweep mode. (↗ 6-192)

MEAS MODE — Select the measurement mode. (↗ 6-193)

MEAS TIME — Set the measurement time. (↗ 6-195)

PARAM FREQ ⇒ — **Open the submenu:**
Set the sweep parameters for frequency.

- RETURN FREQ — Exit the submenu.
- START — Enter the start value. (↗ 6-197)
- STOP — Enter the stop value. (↗ 6-197)
- SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-198)
- POINTS — Enter the number of reading points. (↗ 6-198)
- STEP SIZE — Enter the step size. (↗ 6-198)
- MEAS DELAY — Enter the measurement delay. (↗ 6-201)

PARAM AMPL ⇒ — **Open the submenu:**
Set the sweep parameters for amplitude.

- RETURN AMPL — Exit the submenu.
- START — Enter the start value. (↗ 6-203)
- STOP — Enter the stop value. (↗ 6-203)
- SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-205)
- POINTS — Enter the number of reading points. (↗ 6-206)
- STEP SIZE — Enter the step size. (↗ 6-206)
- MEAS DELAY — Enter the measurement delay. (↗ 6-207)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

UNIT — Select the unit for the level display. (↗ 6-208)

5.6.1.13 MONITOR Menu

Function key assignment

OUTPUT ON	Switch the audio monitoring output on/off.	(↗ 6-210)
SOURCE	Select the signal source.	(↗ 6-211)
VOLUME	Enter the volume.	(↗ 6-211)

5.6.1.14 CONFIG Menu

Function key assignment

DIGITAL	Select the generator type (digital) (R&S UP350 only).	(↗ 6-101)
BAND WIDTH	Select the bandwidth of the generator.	(↗ 6-102)
COMMON	Select the reference potential of the output signal.	(↗ 6-103)
OUTPUT ON	Switch the generator output on/off.	(↗ 6-104)
RANGE MODE	Select the level range switching mode.	(↗ 6-105)
ANALOG	Select the generator type (analog) (R&S UP350 only).	(↗ 6-101)
SAMPLE RATE	Select the sample frequency of the output signal (R&S UP350 only).	(↗ 6-107)
RATE OFFSET	Enter the offset of the sample frequency (R&S UP350 only).	(↗ 6-108)
VALIDITY BIT	Set the validity bit (R&S UP350 only).	(↗ 6-108)
NO. OF BITS	Select the word size of the output signal (R&S UP350 only).	(↗ 6-109)
PROTOCOL	Select the interface protocol (R&S UP350 only).	(↗ 6-109)

5.6.2 Analyzer

5.6.2.1 FUNCTIONS Menu

Function key assignment

NEXT PAGE	Display the next set of functions.	
FREQ, DC, RMS	Measure the frequency, DC voltage, and RMS.	(↗ 6-228)
PEAK	Measure the peak value.	(↗ 6-237)
QUASI PEAK	Measure the quasi-peak value.	(↗ 6-243)
RMS SELECTIVE	Selective RMS measurement	(↗ 6-246)
FFT	Frequency-domain display mode of the input signal	(↗ 6-251)
THD	Measure distortion (THD, THD+N, SINAD, Noise).	(↗ 6-259)
PREV. PAGE	Display the previous set of functions.	
POLARITY	Perform the polarity test	(↗ 6-267)
DFD	Measure the difference frequency distortion.	(↗ 6-268)
PHASE	Measure the phase difference between channels Ch 1 and Ch 2.	(↗ 6-272)
MOD DIST	Measure modulation distortion.	(↗ 6-275)
PROTOCOL	Protocol analysis (R&S UP350 only)	(↗ 6-278)
SAMPLE RATE	Measure the sample frequency (R&S UP350 only).	(↗ 6-281)

5.6.2.2 FREQUENCY, DC, RMS Menu

Function key assignment

MEAS TIME — Select the measurement time. (↗ 6-230)

DISPLAY — Select the measurement result display. (↗ 6-232)
(RMS & FREQ, or RMS & DC)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

AVERAGING ⇒ — **Open the submenu:**
Set the averaging mode.

- RETURN — Exit the submenu.
- MODE — Activate/Deactivate the averaging. (↗ 6-233)
- FACTOR — Enter the averaging factor. (↗ 6-233)

RMS UNIT — Select the unit for the level display. (↗ 6-235)

5.6.2.3 PEAK Menu

Function key assignment

MEAS MODE — Select the measurement method. (↗ 6-239)

INTERVAL TIME — Set the interval time. (↗ 6-240)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

UNIT — Select the unit for the level display. (↗ 6-241)

5.6.2.4 QUASI PEAK Menu

Function key assignment

INTERVAL TIME	Select the interval time.	(↗ 6-245)
FILTER ON	Activate/Deactivate the filter.	(↗ 6-232)
UNIT	Select the unit for the level display.	(↗ 6-241)

5.6.2.5 RMS SELECTIVE Menu

Function key assignment

TUNING MODE	Select the tuning mode.	(↗ 6-247)
CENTER FREQ	Enter the measurement frequency.	(↗ 6-247)
BAND WIDTH	Select the measurement bandwidth.	(↗ 6-248)
FILTER ON	Activate/Deactivate the filter.	(↗ 6-232)
POST FFT ⇒	**Open the submenu:** Set the POST FFT.	(↗ 6-265)
RETURN	Exit the submenu.	
POST FFT ON	Activate/Deactivate the FFT.	(↗ 6-266)
FFT SIZE	Set the FFT size.	(↗ 6-253)
WINDOW	Set the FFT window.	(↗ 6-253)
UNIT	Select the unit for the level display.	(↗ 6-266)

5.6.2.6 FFT Menu

Function key assignment

FFT SIZE — Set the FFT size. (↗ 6-253)

WINDOW — Set the FFT window. (↗ 6-253)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

AVERAGING ⇒ — **Open the submenu:**
Set the averaging mode.

- RETURN — Exit the submenu.
- MODE — Activate/Deactivate the averaging. (↗ 6-255)
- FACTOR — Enter the averaging factor. (↗ 6-255)

UNIT — Select the unit for the level display. (↗ 6-257)

5.6.2.7 THD Menu

Function key assignment

MEAS MODE — Select the measurement mode. (↗ 6-261)

FREQ MODE — Select the frequency search mode. (↗ 6-262)

MEAS TIME — Select the measurement time. (↗ 6-264)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:**
Set the POST FFT.

- RETURN — Exit the submenu.
- POST FFT ON — Activate/Deactivate the FFT. (↗ 6-266)
- FFT SIZE — Set the FFT size. (↗ 6-253)
- WINDOW — Set the FFT window. (↗ 6-253)

UNIT — Select the unit for the level display. (↗ 6-266)

5.6.2.8 DFD Menu

Function key assignment

MEAS MODE — Select the difference frequency distortions and measurement standard. (↗ 6-271)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:** Set the POST FFT.

- RETURN — Exit the submenu.
- POST FFT ON — Activate/Deactivate the FFT. (↗ 6-266)
- FFT SIZE — Set the FFT size. (↗ 6-253)
- WINDOW — Set the FFT window. (↗ 6-253)

UNIT — Select the unit for the level display. (↗ 6-266)

5.6.2.9 PHASE Menu

Function key assignment

MEAS MODE — Select the type of signal search. (↗ 6-273)

5.6.2.10 MOD DIST Menu

Function key assignment

FILTER ON — ActivateDeactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:**
Set the POST FFT.

- RETURN — Exit the submenu.
- POST FFT ON — Activate/Deactivate the FFT. (↗ 6-266)
- FFT SIZE — Set the FFT size. (↗ 6-253)
- WINDOW — Set the FFT window. (↗ 6-253)

UNIT — Select the unit for the level display. (↗ 6-266)

5.6.2.11 PROTOCOL Menu

Function key assignment

MEAS TIME — Enter the measurement time. (↗ 6-280)

5.6.2.12 SAMPLE RATE Menu

Function key assignment

MEAS TIME — Enter the measurement time. (↗ 6-280)

5.6.2.13 FILTER Menu

Function key assignment

FILTER NO.1	Select filter 1.	(↗ 6-283)
FILTER NO.2	Select filter 2.	(↗ 6-283)
FILTER NO.3	Select filter 3.	(↗ 6-283)

5.6.2.14 CONFIG Menu

Function key assignment

DIGITAL	Select the analyzer type (digital).	(↗ 6-215)
BAND WIDTH	Select the bandwidth of the analyzer.	(↗ 6-216)
COMMON	Select the reference potential of the input signal.	(↗ 6-217)
INPUT	Select the signal source.	(↗ 6-218)
COUPLING	Select the signal coupling.	(↗ 6-219)
RANGE MODE	Select the measurement range selection mode.	(↗ 6-220)
CHANNEL	Select the measurement channel.	(↗ 6-221)
ANALOG	Select the analyzer type (analog) (R&S UP350).	(↗ 6-215)
SAMPLE RATE	Select the sample frequency of the input signal (R&S UP350).	(↗ 6-222)
INPUT	Select the input (R&S UP350)	(↗ 6-223)
NO. OF BITS	Select the valid number of bits in the input signal (R&S UP350).	(↗ 6-223)
CHANNEL	Select the measurement channel.	(↗ 6-221)

5.6.3 Graph Menu

5.6.3.1 GRAPH MODE Menu

Function key assignment

GRAPH TYPE	Select the display parameters.	(↗ 6-287)
GRAPH MODE	Select the display mode.	(↗ 6-290)

5.6.3.2 X AXIS Menu

Function key assignment

AUTO SCALING	Activate automatic display area scaling.	(↗ 6-292)
MAX	Manual display area scaling: Enter the upper limit of the display area.	(↗ 6-292)
MIN	Manual display area scaling: Enter the lower limit of the display area.	(↗ 6-292)
LOG	Select the display mode.	(↗ 6-299)

5.6.3.3 Y AXIS Menu

Function key assignment

AUTO SCALING	Activate automatic display area scaling.	(↗ 6-296)
MAX	Manual display area scaling: Enter the upper limit of the display area.	(↗ 6-296)
MIN	Manual display area scaling: Enter the lower limit of the display area.	(↗ 6-296)
LOG	Select the display mode.	(↗ 6-299)

5.6.3.4 CURSORS Menu

Function key assignment

X1 ⇒ **Open the submenu:**
Configure cursor 1 on the X axis.

- RETURN — Exit the submenu.
- ON — Activate/Deactivate the cursor. (↗ 6-302)
- POSITION — Position the cursor manually. (↗ 6-305)
- LOCK TO PLOT — Assign a cursor to a trace (Ch 1 or Ch 2). (↗ 6-303)
- ZOOM — Zoom the display area. (↗ 6-307)
- FIND — Position a cursor on the maximum value. (↗ 6-303)

X2 ⇒ **Open the submenu:**
Configure cursor 2 on the X axis.

- RETURN — Exit the submenu.
- ON — Activate/Deactivate the cursor. (↗ 6-302)
- POSITION — Position the cursor manually. (↗ 6-305)
- LOCK TO PLOT — Assign a cursor to a trace (Ch 1 or Ch 2). (↗ 6-303)
- ZOOM — Zoom the display area. (↗ 6-307)
- FIND — Position the cursor on the maximum value. (↗ 6-303)

Y1 ⇒ **Open the submenu:**
Configure cursor 1 on the Y axis.

- RETURN — Exit the submenu.
- ON — Activate/Deactivate the cursor. (↗ 6-310)
- POSITION — Position the cursor manually. (↗ 6-311)
- ZOOM — Zoom the display area. (↗ 6-312)

Open the submenu:
Configure cursor 2 on the Y axis.

Exit the submenu.

Activate/Deactivate the cursor. (↗ 6-310)

Position the cursor manually. (↗ 6-311)

Zoom the display area. (↗ 6-312)

5.6.4 System menu (SYS Menu)

5.6.4.1 PRESET Menu

Function key assignment

PRESET	Call the instrument setting.	(↗ 6-318)
PRESET SETTINGS	Select the instrument setting.	(↗ 6-318)
GOTO REMOTE	Start the remote control manually.	(↗ 6-319)

5.6.4.2 STATE Menu

Function key assignment

STATE	Configuration settings of the analyzer and generator.	(↗ 6-320)

5.6.4.3 FILE Menu

Function key assignment

SAVE	Save a user-defined setting.	(↗ 6-323)
RECALL	Load a user-defined setting.	(↗ 6-323)
PRINT	Print out a screenshot, save the measurement results.	(↗ 6-325)

5.6.4.4 CONFIG Menu

Function key assignment

DATE/TIME	Set the date and time.	(↗ 6-329)
REF	Select an internal or external reference source.	(↗ 6-331)
INTERFACE	Configure the instrument interfaces.	(↗ 6-332)
SCREEN	Set the screen saver mode.	(↗ 6-334)
MONITOR	Select an internal or external monitor.	(↗ 6-336)

5.6.4.5 SERVICE Menu

Function key assignment

SELFTEST	Perform a selftest.	(↗ 6-337)

5.6.4.6 INFO Menu

Function key assignment

HARDWARE INFO	Display the module data.	(↗ 6-339)
STATISTICS	Display the instrument statistics.	(↗ 6-339)
SYSTEM MESSAGES	Display the system messages.	(↗ 6-340)

5.6.4.7 CALIB Menu

Function key assignment

CALIB	Perform the automatic calibration.	(↗ 6-341)

6 Working with the R&S UP300/350

This chapter

Chapter 6 fully explains all the functions of the audio analyzer, and the application of these functions. The menus are described in the same sequence as the procedure for configuring and producing an output signal:

- Factory default settings
- Configuration of the generator
- Configuration of the analyzer
- Graphical display of the measurement results

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 Factory Default Settings

Switching on for the first time

When the R&S UP300/350 (↗ 3-42) is switched on, the settings used when the instrument was last switched off are restored. When you switch on for the first time and if the "Factory" setting has been selected as the PRESET default setting (↗ 6-323), the factory default settings are activated.

6.1.1 Generator

Note: All level parameters of the individual generator functions as well as the frequency at SINE can be set channel independently (Ch 1, Ch 2). These parameters are listed in two columns in the table below the “Settings”. The function parameters applying to both channels (Ch 1&2) are listed in one column.

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
SINE	f1 = f2	Off	
	FREQ	1 kHz	1 kHz
	AMPL	100 mV (0.1 FS)	100 mV (0.1 FS)
	PHASE DIFF.	0 grd	
	REF. VALUE	1 mV	1 mV
NOISE	PDF	Rectangular	
	AMPL	100 mV (0.1 FS)	100 mV (0.1 FS)
	REF. VALUE	1 mV	1 mV
MULTISINE	NUMBER OF SINE	1	
	SPACING	100.058 Hz	
	REF. VALUE	100 mV (0.1 FS)	100 mV (0.1 FS)
	AM STATE	Off	
	AM FREQ	10 Hz	
	AM DEPTH	10 %	
SINE BURST	GEN FREQ	1 kHz	
	HIGH LEVEL TIME	500 ms	
	INTERVAL	1 s	
	HIGH LEVEL AMPL	100 mV (0.1 FS)	100 mV (0.1 FS)
	LOW LEVEL AMPL	0	0
	REF. VALUE	1 mV	1 mV
MOD DIST	UPPER FREQ	7 kHz	
	LOWER FREQ	60 Hz	
	AMPL RATIO	4	4
	TOTAL RMS	100 mV (0.1 FS)	100 mV (0.1 FS)

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
	REF. VALUE	1 mV	1 mV
DFD	UPPER FREQ	8.100 kHz	
	MEAN FREQ	8.000 kHz	
	DIFF FREQ	200 Hz	
	TOTAL RMS	100 mV (0.1 FS)	100 mV (0.1 FS)
	REF. VALUE	1 mV	1 mV
POLARITY TEST	PEAK	100 mV (0.1 FS)	100 mV (0.1 FS)
	REF. VALUE	1 mV	1 mV
DC OFFSET	DC OFFSET	100 mV (0.1 FS)	100 mV (0.1 FS)
SWEEP RMS	MODE	FREQ SWEEP	
	MEAS TIME	10 ms	
	FILTER	Off	
	UNIT	V (FS)	
	REF. VALUE	1 mV	
	PARAM FREQ		
	START	10 Hz	
	STOP	22.139 kHz	
	POINTS	100	
	STEP SIZE	223.470 Hz	
	SPACING	Linear	
	MEAS DELAY	0 s	
	PARAM AMPL		
	START	100 mV (0.1 FS)	
	STOP	7.495 V (0.999 FS)	
	POINTS	100	
	STEP SIZE	74.7 mV (0.0998)	
	SPACING	Linear	
	MEAS DELAY	200 ms	
SWEEP RMS Sel.	MODE	FREQ SWEEP	
	BANDWIDTH	1/3 octave	

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
	FILTER	Off	
	UNIT	V (FS)	
	REF. VALUE	1 mV	
	PARAM FREQ		
	START	10 Hz	
	STOP	22.139 kHz	
	POINTS	100	
	STEP SIZE	223.470 Hz	
	SPACING	Linear	
	MEAS DELAY	0 s	
	PARAM AMPL		
	START	100 mV (0.1 FS)	
	STOP	7.495 V (0.999 FS)	
	POINTS	100	
	STEP SIZE	74.7 mV (0.0998)	
	SPACING	Linear	
	MEAS DELAY	200 ms	
SWEEP THD	MODE	FREQ SWEEP	
	MEAS MODE	THD (All.Harm.)	
	HARMONICS		
	MEAS TIME	10 ms	
	FILTER	Off	
	UNIT	dB	
	PARAM FREQ		
	START	10 Hz	
	STOP	22.139 kHz	
	POINTS	100	
	STEP SIZE	223.470 Hz	
	SPACING	Linear	
	MEAS DELAY	0 s	
	PARAM AMPL		
	START	100 mV (0.1 FS)	
	STOP	7.495 V (0.999 FS)	
	POINTS	100	

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
	STEP SIZE	74.7 mV (0.0998)	
	SPACING	Linear	
	MEAS DELAY	200 ms	
MONITOR	OUTPUT	Off	
	SOURCE	Generator	
	VOLUME	20 %	20 %
CONFIG ANALOG	BANDWIDTH	22 kHz	
	COMMON	Floating	Floating
	OUTPUT	On	On
	RANGE MODE	Auto	Auto
CONFIG DIGITAL	SAMPLE RATE	44.1 kHz	
	FS OFFSET	0 ppm	
	VALIDITY BIT	valid	
	NO. OF BITS	24	24
	PROTOCOL	Consumer	

6.1.2 Analyzer

Note: Some parameters of the analyzer functions (FILTER, CONFIG) can be set channel independently (Ch 1, Ch 2). These parameters are listed in two columns in the table below the “Settings”. The function parameters applying to both channels (Ch 1&2) are listed in one column.

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
RMS DC FREQ	MEAS TIME	Auto fast	
	FILTER	Off	
	AVG MODE	Off	
	AVG FACTOR	1	
	UNIT Ch1	V (FS)	
	UNIT Ch2	V (FS)	
	REF. VALUE Ch1	1 mV (0.001 FS)	
	REF. VALUE Ch2	1 mV (0.001 FS)	
PEAK	MEAS MODE	Peak pos	
	INTERVAL TIME	250 ms	
	FILTER	Off	
	AVG MODE	Off	
	AVG FACTOR	1	
	UNIT Ch1	V (FS)	
	UNIT Ch2	V (FS)	
	REF. VALUE Ch1	1 mV (0.001 FS)	
	REF. VALUE Ch2	1 mV (0.001 FS)	
QUASI PEAK	INTERVAL TIME	3 s	
	FILTER	Off	
	UNIT Ch1	V (FS)	
	UNIT Ch2	V (FS)	
	REF. VALUE Ch1	1 mV (0.001 FS)	
	REF. VALUE Ch2	1 mV (0.001 FS)	
RMS SELECTIVE	TUNING MODE	Auto	
	CENTER FREQ	1 kHz	
	BANDWIDTH	1/3 octave	

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
	FILTER	Off	
	POST FFT	Off	
	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	UNIT Ch1	V (FS)	
	UNIT Ch2	V (FS)	
	REF. VALUE Ch1	1 mV (0.001 FS)	
	REF. VALUE Ch2	1 mV (0.001 FS)	
FFT	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	FILTER	Off	
	AVG MODE	Off	
	AVG FACTOR	1	
	UNIT	dBV (dBFS)	
	REF. VALUE	1 mV	
THD	MEAS MODE	THD (All Harm.)	
	HARMONICS		
	FREQ MODE	Auto	
	MEAS TIME	Fast	
	FILTER	Off	
	POST FFT	Off	
	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	UNIT	dB	
POLARITY	STATUS	On	
DFD	MEAS MODE	d2 (IEC 268)	
	FILTER	Off	
	POST FFT	Off	
	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	UNIT	dB	

Function	Parameter	Settings	
		Channel Ch 1	**Channel Ch 2**
PHASE	MEAS MODE	Auto tuning	
	FREQ	1 kHz	
MOD DIST	FILTER	Off	
	POST FFT	Off	
	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	UNIT	dB	
PROTOCOL	MEAS TIME	100 ms	
SAMPLE RATE	MEAS TIME	100 ms	
FILTER	FILTER NO. 1	Off	Off
	FILTER NO. 2	Off	Off
	FILTER NO. 3	Off	Off
CONFIG ANALOG	BANDWIDTH	22 kHz	
	COMMON	Floating	Floating
	INPUT	On	On
	COUPLING	AC	
	RANGE MODE	Auto	Auto
	CHANNEL	Ch 1&2	
CONFIG DIGITAL	SAMPLE RATE	44.1 kHz	
	INPUT	S/P DIF	
	NO. OF BITS	24	24
	CHANNEL	Ch 1&2	

6.1.3 Graph

Function	Parameter		Settings
GRAPH MODE	GRAPH TYPE		Spectrum
	GRAPH MODE		Overwrite
X AXIS	AUTO SCALING (MAX,MIN,LOG)		On
Y AXIS	AUTO SCALING (MAX,MIN,LOG)		On
CURSORS	X1, X2,	STATUS	Off
		POSITION	-
		LOCK TO PLOT	Ch1&2
		ZOOM	-
		FIND	-
	Y1,Y2	STATUS	Off
		POSITION	-
		ZOOM	-

6.1.4 System

Function	Parameter	Settings
PRESET	PRESET	FACTORY
FILE	PRINT	HP DeskJet mono
CONFIG	REFERENCE	Intern
	USB MASTER	AUTO
	MONITOR	Intern

6.2 Generator

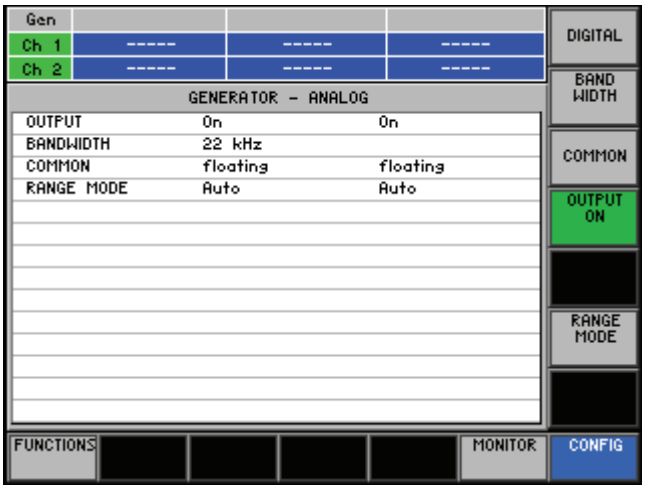
Introduction

The generator is used to generate all the signals required for the audio measurements. These signal functions can be generated in an analog or digital form (R&S UP350 only). Acoustic analysis of the output signal is possible at the audio monitoring output.

Activating the Generator menu

1. The instrument has to be in local mode.
2. Close the SYS menu if opened.
3. Close every entry field if opened.
4. Press the **main menu** GEN **selection key**.

   The Generator menu is displayed:



Menus for configuring and setting output parameters

The menus used to set the generator functions are displayed in the menu area (↗ 6-112).

FUNCTIONS — Select the signal functions. (↗ 6-110)

Reservation for parameter menu of the 1st activated function

Reservation for parameter menu of the 2nd activated function

Reservation for parameter menu of the 3rd activated function

MONITOR — Configure the monitor output. (↗ 6-209)

CONFIG — Configure the output parameters. (↗ 6-99)

6.2.1 Configuring Generator Parameters (CONFIG)

Description

The CONFIG menu is used for basic configuration of the generator. The following settings are made in the CONFIG menu:

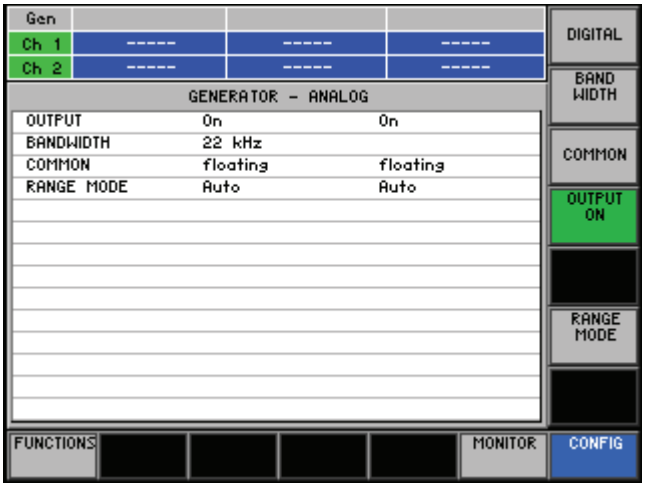
- Switchover between the analog and digital generator (R&S UP350 only)
- Configuration of parameters for digital interface (R&S UP350 only)
- Switchover between bandwidths (sample rate)
- Activation/Deactivation of analog generator output
- Configuration of output
- Selection of range switching and setting of level range

Selecting the CONFIG Menu

Use the ◂ or ▸ **cursor keys** to select the CONFIG **menu**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.

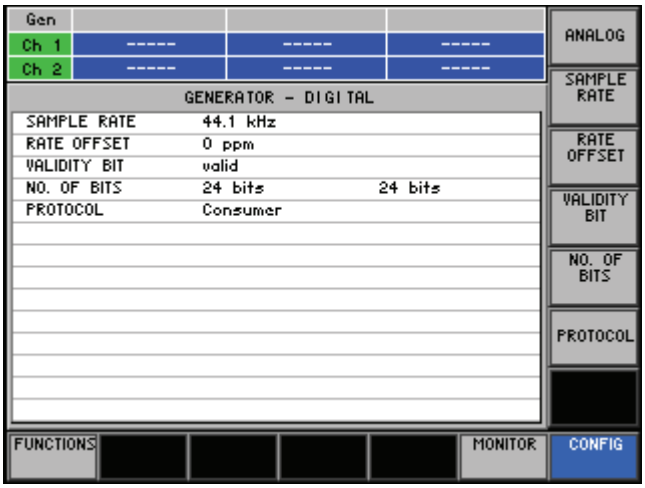
Analog generator



Function key assignment

DIGITAL	Select the generator type (digital) (R&S UP350 only).	(↗ 6-101)
BAND WIDTH	Select the bandwidth of the generator.	(↗ 6-102)
COMMON	Select the reference potential of the output signal.	(↗ 6-103)
OUTPUT ON	Switch the generator output on/off.	(↗ 6-104)
RANGE MODE	Select the level range switching mode.	(↗ 6-105)

Digital generator (R&S UP350 only)



Function key assignment

ANALOG	Select the generator type (analog).	(↗ 6-101)
SAMPLE RATE	Select the sample frequency of the output signal.	(↗ 6-107)
RATE OFFSET	Enter the sample frequency offset.	(↗ 6-108)
VALIDITY BIT	Set the validity bit.	(↗ 6-108)
NO. OF BITS	Select the valid number of bits in the input signal.	(↗ 6-109)
PROTOCOL	Select the interface protocol.	(↗ 6-109)

6.2.1.1 Selecting the Generator Type – Analog/Digital (R&S UP350 only)

Introductions

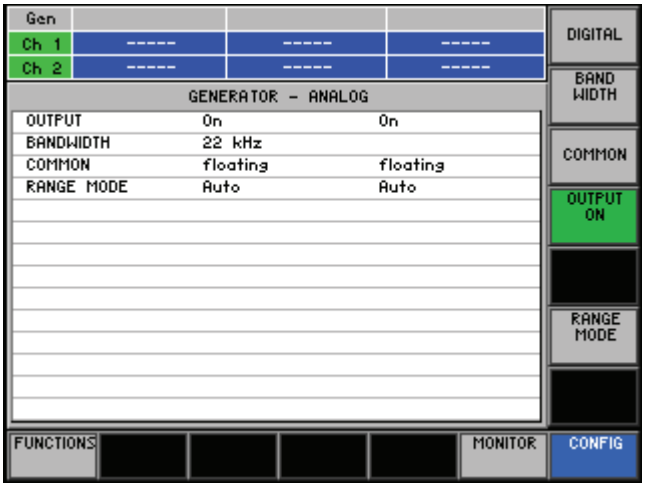
The analog generator and the digital generator have separate parameter sets. When the generator type is changed, the new generator with the currently selected measurement functions and the stored parameters of the old generator type is started.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the Analog generator

Press the ANALOG **function key** in the CONFIG **menu**.

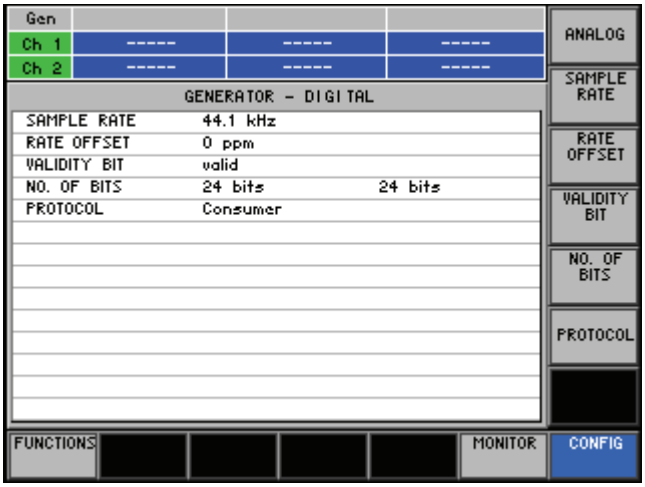
The instrument is in the analog mode. You can then use all the function keys which appear to configure the output parameters. If the status line shows “GENERATOR – ANALOG”, the instrument is in the analog mode.



Selecting the Digital generator

Press the DIGITAL **function key** in the CONFIG **menu**.

The instrument is in the digital mode. You can then use all the function keys which appear to configure the output parameters. If the status line shows “GENERATOR–DIGITAL”, the instrument is in the digital mode.



6.2.1.2 Analog Generator

6.2.1.2.1 Selecting the Generator Bandwidth

Use

Switching the bandwidth changes the sample rate of the signal. Since the properties of the digital filters have become less favourable as the sample rate increases, you should select the lowest possible bandwidth for your specific application.

The R&S UP300/350 provides the following bandwidths for the analog generator:

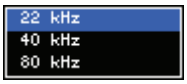
- **22 kHz**
- **40 kHz**
- **80 kHz**

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the bandwidth

3. Press the BAND WIDTH **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “22 kHz “.



4. Use the **rotary knob** [11] to select a setting.
5. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	22 kHz

6.2.1.2.2 Selecting the Reference Potential of the Output Signal

Use

To prevent hum pick-up caused by grounding loops, the test setup must not have multiple grounding points. Instead, only one point of the test setup should be connected to the housing ground. Depending on the application, you can select the following reference potentials for the output signal of the generator (input signal of the analyzer, ↗ 6-217):

- **Grounded**
  Refering to the housing potential
- **Floating**
  "Electronically floating"

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Selecting the reference potential

2. Press the COMMON **function key** in the CONFIG **menu.**

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

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
COMMON	floating	floating

6.2.1.2.3 Activating/Deactivating the Generator Output

Use

To make the output signal with all configured functions and parameters available at the output, you must first switch on the generator output.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Activating the generator output

2. Press the OUTPUT ON **function key** in the CONFIG **menu.**

   The function key is highlighted and the new setting is stored. After the generator output is switched on, the configured output signal is available at the output [8].

   The current status is displayed in the parameter field.

	Ch 1	Ch 2
OUTPUT	On	On

Deactivating the generator output

3. Press the OUTPUT ON **function key** in the CONFIG **menu.**

   The function key is **no longer highlighted**. No signal is available at the output.

   The current status is displayed in the parameter field.

	Ch 1	Ch 2
OUTPUT	Off	Off

6.2.1.2.4 Selecting the Type of the Level Range Switchover

Use

By selecting the level range switching mode, you determine how the output voltage is to be adjusted at the output amplifier of the generator:

- **Auto**
  The internal signal paths are optimally driven; the output voltage is always adjusted using the attenuators. This provides the best noise and THD values for measurements with a constant level (e.g. THD+N measurement).
- **Fixed**
  The signal path is adjusted to the specified maximum voltage. The actual output voltage is adjusted only by scaling the digital values on the D/A converter. This provides faster level changes and better settling. Interference during switching operations is prevented but this may in some cases have a negative effect on the signal-to-noise ratio.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Selecting the type of level range switchover

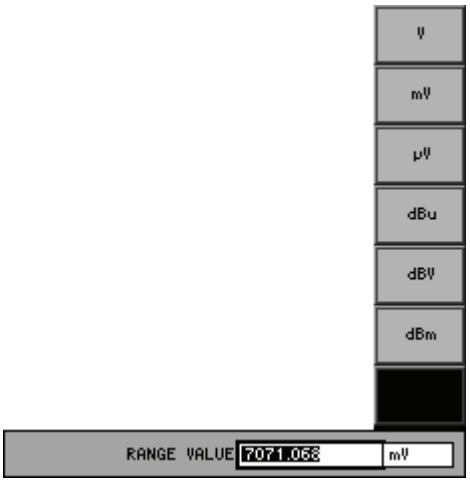
2. Press the RANGE MODE **function key** in the CONFIG **menu.**
   A selection field containing the available settings is displayed. The default setting is “Auto“.

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
RANGE MODE	Auto	Auto

Entering the level range (at level setting "Fixed")

After you have selected the "Fixed" level setting, an entry field with the current level range pops up. The default setting is "7.071 V". At the same time, the function keys are assigned various units of measurement.



5. Enter a new value that corresponds to the maximum RMS voltage that can be set (↗ 5-65).

The permissible entry range is:

0 V ≤ RANGE VALUE ≤ 7.5 V

The new setting is stored and displayed in the parameter field. The entered value is used for interval selection of the level range.

	Ch 1	Ch 2
RANGE MODE	Fixed: 7.071 V	Fixed: 7.071 V

6.2.1.3 Digital Generator (R&S UP350 only)

6.2.1.3.1 Selecting the Sample Frequency of the Output Signal

Use

The sample frequencies for digital audio interfaces are standardized. When you select a sample frequency, all of the parameters in the digital generator are adapted to this frequency.

By entering the sample frequency, you also determine the maximum generator frequency f_{max}. You can select the following sample frequencies:

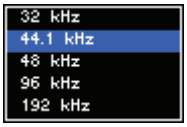
- **32 kHz** **(f_{max} = 14.51 kHz)**
- **44.1 kHz** **(f_{max} = 19.999 kHz)**
- **48 kHz** **(f_{max} = 21.768 kHz)**
- **96 kHz** **(f_{max} = 43.536 kHz)**
- **192 kHz** **(f_{max} = 87.07 kHz)**

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the sample frequency

1. Press the SAMPLE RATE **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “44.1 kHz“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

SAMPLE RATE	44.1 kHz

6.2.1.3.2 Entering the Sample Frequency Offset

Use

Using the Rate Offset parameter, you can shift the sample frequency in relation to the nominal value.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the rate offset

1. Press the RATE OFFSET **function key** in the CONFIG **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “0 ppm“.

2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   -1000 ppm ≤ RATE OFFSET ≤ 1000 ppm

   The new setting is stored and displayed in the parameter field.

Ch 1&2

RATE OFFSET	0 ppm

6.2.1.3.3 Setting the Validity Bit

Use

Using the validity bit, you can set the validity identification within the AES EBU data stream:

- **Valid**
  The validity bit has been set.
- **Invalid**
  The validity bit has not been set.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the validity bit

1. Press the VALIDITY BIT **function key** in the CONFIG **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

VALIDITY BIT	valid

6.2.1.3.4 Selecting the Valid Number of Bits in the Output Signal

Use

Use the word size to determine the resolution of the output signal. You can generate word sizes between 16 and 24 bits.

Selecting the channel

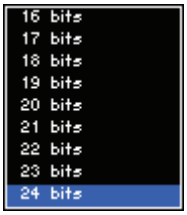
1. Press the numeric keys **1**, **2,** or **3** to select channel **Ch 1**, **Ch 2,** or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Selecting the word size

2. Press the NO. OF BITS **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “24 bits“.



3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
NO. OF BITS	24 bits	24 bits

6.2.1.3.5 Selecting the Interface Protocol

Use

There are two standardized interface protocols: consumer and professional. They differ with respect to the meaning of the status bit information. Selecting the correct protocol ensures that the data from the DUT is interpreted correctly.

Note: The setting is always valid for both channels (Ch 1&2). The channel status data are listed in chapter 6.3.2.2.11 (↗ 6-278).

Selecting the protocol

1. Press the PROTOCOL **function key** in the CONFIG **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1&2
PROTOCOL	Consumer

6.2.2 Setting the Generator Signal Type (FUNCTIONS)

Description

In the FUNCTIONS menu, you can select the generator signal. The selected function is displayed in a vacant field in the menu bar and is available as a menu key to allow you modifying the function parameters. At the same time, the appropriate function is activated in the generator.

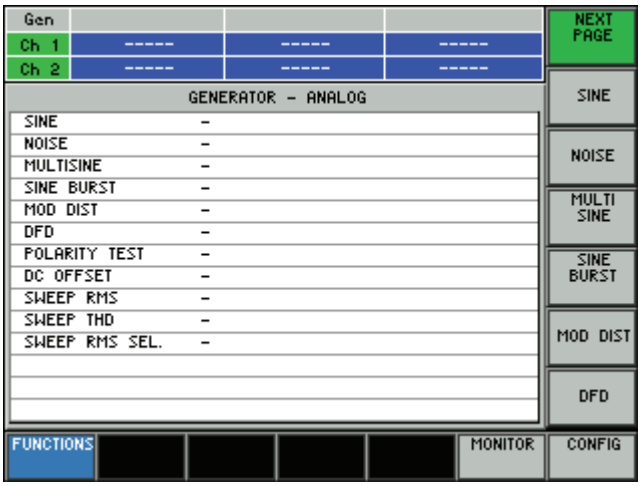
One signal type can be activated in combination with NOISE and DC OFFSET. All other function keys are deactivated (displayed in gray).

When you have selected a function in the menu bar, the list of available signal parameters appears on the screen (↗ 6-112).

Selecting the FUNCTIONS menu

Select the FUNCTIONS **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



The 1st function key assignment

NEXT PAGE — Display the next set of functions.

SINE — Sinewave signal (↗ 6-114)

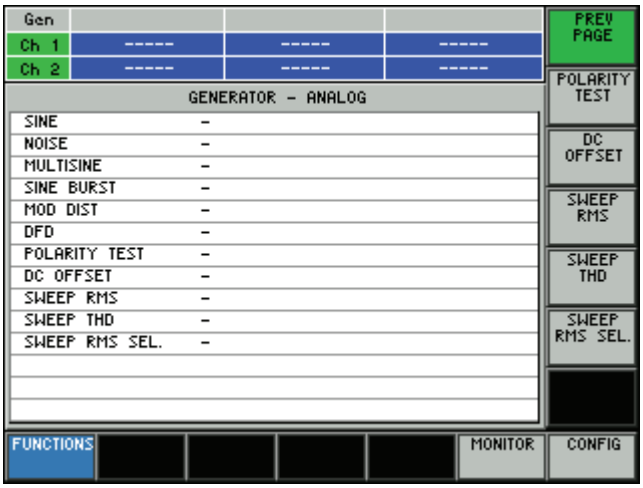
NOISE — Noise signal (↗ 6-119)

MULTI SINE — Multi-sinewave signal (↗ 6-122)

SINE BURST — Sine burst signal (↗ 6-132)

MOD DIST — Two-tone signal for measurement of modulation distortions (↗ 6-138)

DFD — Difference frequency signal (↗ 6-144)



The 2nd function key assignment

PREV PAGE — Display the previous set of functions.

POLARITY TEST — Polarity test signal (↗ 6-150)

DC OFFSET — DC voltage component (↗ 6-152)

SWEEP RMS — Sweeped sinewave signal and measured RMS (↗ 6-154)

SWEEP RMS SEL. — Sweeped sinewave signal and measured RMS SELECTIVE (↗ 6-171)

SWEEP THD — Sweeped sinewave signal and measured THD (↗ 6-190)

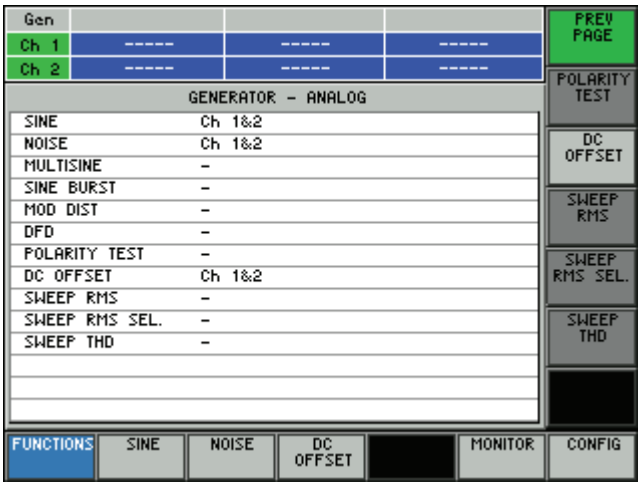
6.2.2.1 Selecting Generator Functions

Switching on the function

1. Press a **function key** for a generator function in the FUNCTIONS **menu**.

   A new menu item (e.g. SINE) appears in the menu area:

   You can select a maximum of 3 functions at a time. Only one signal type can be activated in combination with NOISE and DC OFFSET. All other function keys are deactivated (displayed in gray).



Switching off the function

2. Press the **function key** for the desired function in the FUNCTIONS **menu**.

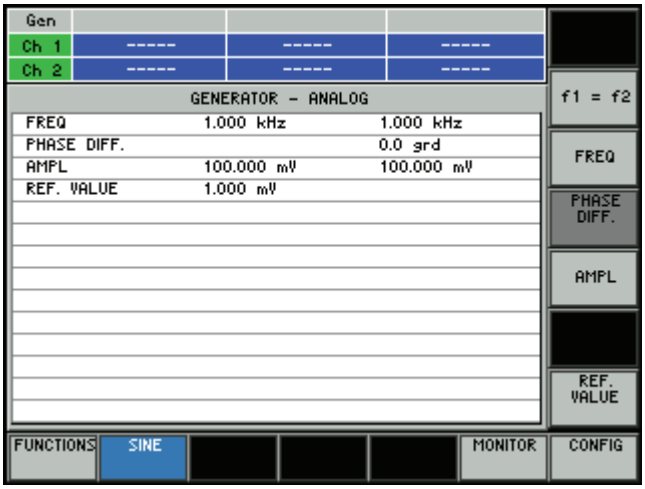
   The menu item disappears from the menu area.

6.2.2.2 Configuring Signal Parameters

Use

In the FUNCTIONS menu, you can select the generator signal. The selected function is displayed in a vacant field in the menu bar and is available as a menu key to allow you modifying the function parameters. At the same time, the appropriate function is activated in the generator.

When you have selected a function in the menu bar, the list of available signal parameters (e.g. SINE) appears on the screen (↗ 6-114).



Settings for the selected channel

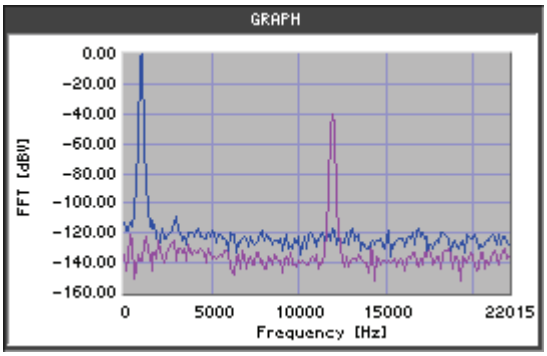
All level parameters of the individual generator functions can be set channel independently (Ch 1, Ch 2), or simultaneously in both channels (Ch 1&2). These parameters are listed in two columns in the parameter field. The function parameters applying to both channels (Ch 1&2) are listed in one column.

To get an overview, refer to the factory default settings (↗ 6-89).

6.2.2.2.1 SINE (Sinewave Signal)

Description

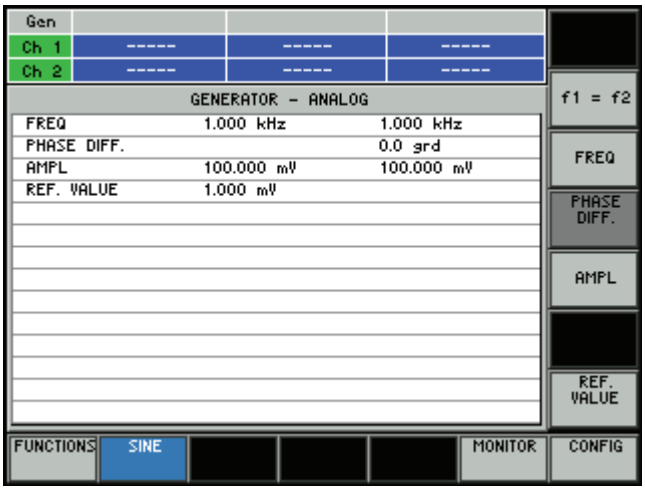
In the SINE Menu, you can set the function parameters for the sinewave signal.



Selecting the SINE menu

1. Call the generator **SINE** function (↗ 6-112).
2. Select the SINE **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

f1 = f2	Activate/Deactivate frequency coupling of the channels.	(↗ 6-116)
FREQ	Enter the signal frequency of the active channel.	(↗ 6-115)
PHASE DIFF.	Enter the phase difference between the channels.	(↗ 6-116)
AMPL	Enter the signal amplitude.	(↗ 6-117)
REF. VALUE	Enter the reference value.	(↗ 6-118)

Note: The PHASE DIFF. function key is only available if the frequency coupling of the channels is activated (↗ 6-116).

Entering the Signal Frequency

Use

You can enter the signal frequency for the selected channel.

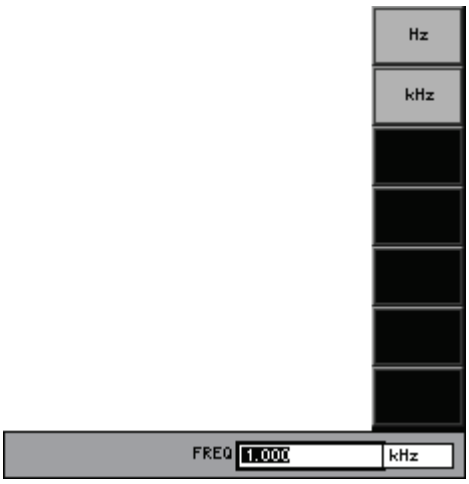
Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

   Note: You can also activate the frequency coupling of the channels (↗ 6-116). The setting is always valid for both channels.

Entering the signal frequency

2. Press the FREQ **function key** in the SINE **menu.**
   An entry field containing the currently applicable setting is displayed. The default setting is “1 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65).
   The permissible entry range is:

   0.001 Hz ≤ FREQ ≤ f_{max}

   within: f_{max} - maximum frequency of generator type (↗ 6-107)

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
Frequency	1.000 kHz	1.000 kHz

Activating/Deactivating Channel Frequency Couplings

Use

An exact phase relationship between two signals can only be defined if the frequency settings for channels Ch 1 and Ch 2 are identical.

Activating channel frequency couplings

Press the f1 = f2 **function key** in the SINE **menu.**

The function key is highlighted.

The setting is always valid for both channels.

Deactivating channel frequency couplings

Press the f1 = f2 **function key** in the SINE **menu.**

The associated function key is **no longer highlighted** and coupling of the frequency setting is deactivated. The previous frequency setting of channel Ch 2 is reactivated again. However, it is again possible to set the frequencies separately for each channel.

Entering the Phase Difference between Channels

Note: The PHASE DIFF. function key is only available if the function key f1=f2 is activated (↗ 6-116) because the phase shift is only possible for signals of the same frequency.

Use

The signal phase in channel Ch2 can be offset by entering a phase difference with respect to channel Ch 1 (0°). The channel Ch 1 serves as the reference.

Activating channel frequency couplings

1. Press the f1 = f2 **function key** in the SINE **menu.**

   The function key is highlighted.

   The setting is always valid for both channels.

Entering the phase difference

2. Press the PHASE DIFF. **function key** in the SINE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “0 grd“.

3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   -180 grd ≤ PHASE DIFF ≤ +180 grd

   The new setting is stored and displayed in the parameter field.

Entering the Signal Amplitude

Use

You can enter the amplitude of the output signal as an RMS value.

Selecting the channel

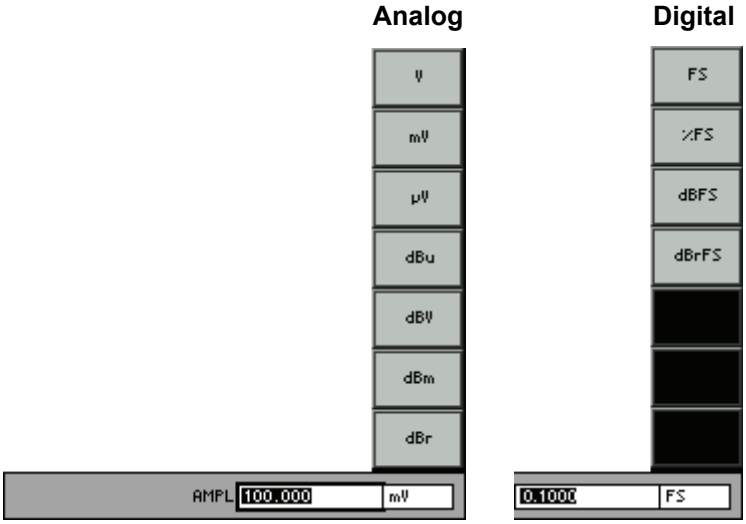
1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the signal amplitude

2. Press the AMPL **function key** in the SINE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a value (↗ 5-65) and complete the entry by selecting a unit of measurement (function key).

   The permissible entry range is:

   0 ≤ AMPL ≤ 7.495 V **(Analog)**

   0 ≤ AMPL ≤ 0.9999 FS **(Digital)**

   The new setting is stored and displayed in the parameter field.

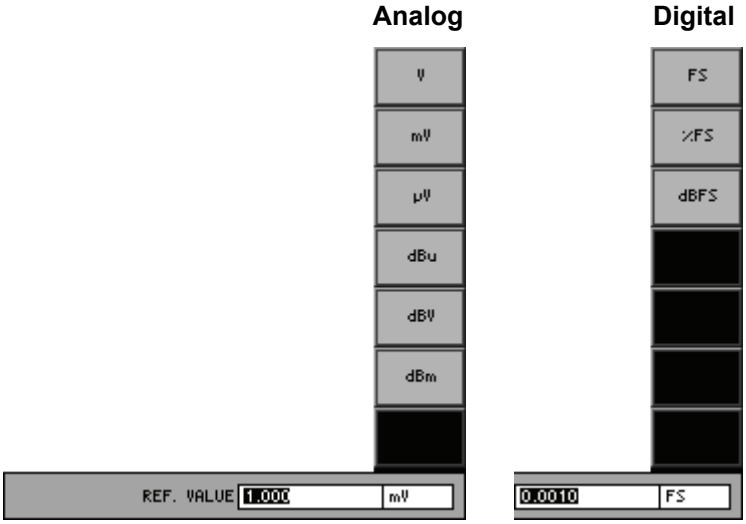
	Ch 1	Ch 2	
AMPL	100.000 mV	100.000 mV	**(Analog)**
AMPL	0.1000 FS	0.1000 FS	**(Digital)**

Note: The maximum limit of signal amplitude applies if only the SINE generator function is set. If other generator functions (e.g. DC OFFSET, NOISE) are activated, their amplitude will also be taken into consideration and the maximum signal amplitude decreases accordingly.

Entering the Reference Value

Entering the reference value

1. Press the REF. VALUE **function key** in the current **measurement menu.** An entry field containing the currently applicable setting is displayed. The default setting is "1.000 mV (0.001 FS) ". At the same time, the function keys are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

1 µV ≤ REF. VALUE ≤ 100 V **(Analog)**

0.001 FS ≤ REF. VALUE ≤ 0.999 FS **(Digital)**

The new setting is stored and displayed in the parameter field.

Analog

REF. VALUE	1.000 mV

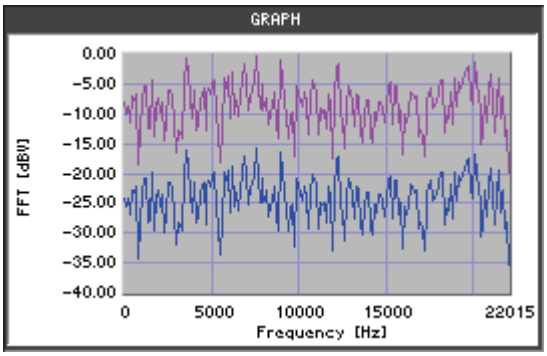
Digital

REF. VALUE	0.0010 FS

6.2.2.2.2 NOISE (Noise Signal)

Description

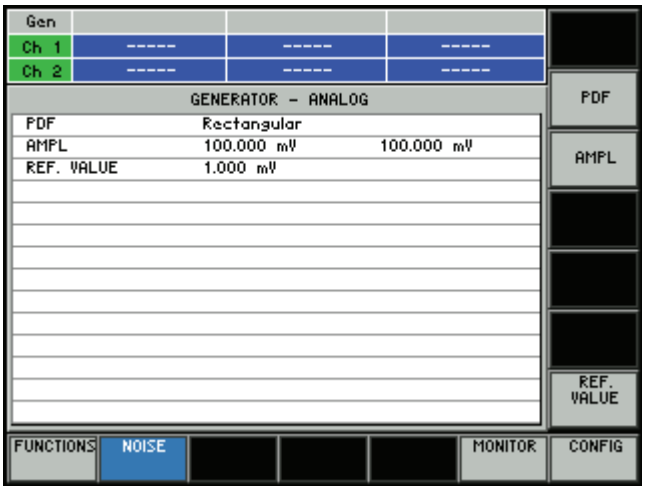
In the SINE menu you can set the function parameters for the noise signal.



Selecting the NOISE menu

1. Call the generator **NOISE** function (↗ 6-112).
2. Select the NOISE **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

PDF	Select the amplitude distribution function.	(↗ 6-120)
AMPL	Enter the signal amplitude.	(↗ 6-120)
REF. VALUE	Enter the reference value.	(↗ 6-118)

Selecting the Amplitude Distribution Function

Use

You can select the following amplitude distribution functions for the noise signal:

- **Gaussian**
  Gaussian distribution functions (Gaussian factor = 5),
  crest factor = 3.873
- **Rectangular**
  Rectangular distribution functions, most favourable ratio between the RMS and peak value (crest factor = 1.732)
- **Triangular**
  Triangular distribution functions, crest factor = 2.450

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the amplitude distribution function

1. Press the PDF **function key** in the NOISE **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Entering the Signal Amplitude

Use

You can enter the amplitude of the output signal as an RMS value. Here, the maximum value depends on the amplitude distribution functions.

Selecting the channel

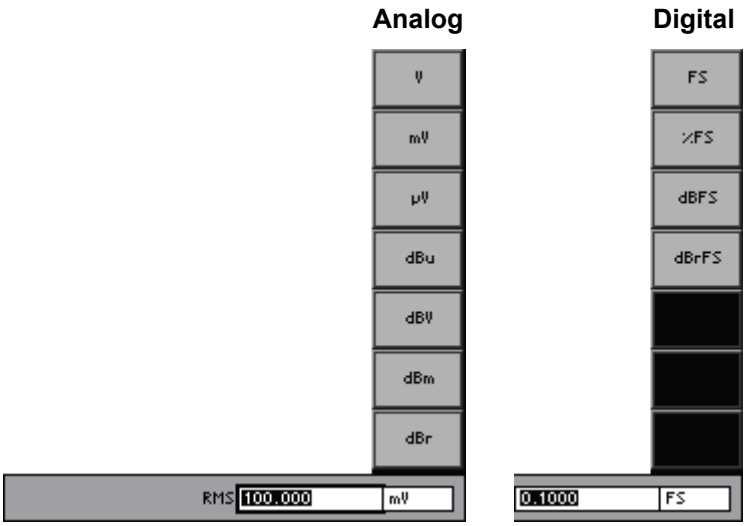
1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the signal amplitude

2. Press the AMPL **function key** in the NOISE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)“. At the same time, the function keys are assigned various units of measurement.



3. Enter a new value (↗ 5-65) and complete the entry by selecting a unit of measurement (function key).

The permissible entry range depends on the distribution function (↗ 6-120):

Analog:

0 ≤ RMS ≤ 2.736 V **(Gaussian)**

0 ≤ RMS ≤ 6.119 V **(Rectangular)**

0 ≤ RMS ≤ 4.327 V **(Triangular)**

Digital:

0 ≤ RMS ≤ 0.3647 FS **(Gaussian)**

0 ≤ RMS ≤ 0.8156 FS **(Rectangular)**

0 ≤ RMS ≤ 0.5767 FS **(Triangular)**

The new setting is stored and displayed in the parameter field.

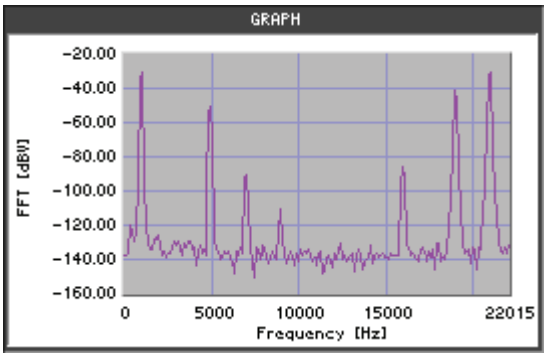
	Ch 1	Ch 2	
AMPL	100.000 mV	100.000 mV	**(Analog)**
AMPL	0.1000 FS	0.1000 FS	**(Digital)**

Note: The maximum limit of signal amplitude applies if only the NOISE generator function is set. If other generator functions (e.g. SINE, DC OFFSET) are activated, their amplitude will also be taken into consideration and the maximum signal amplitude decreases accordingly.

6.2.2.2.3 MULTISINE (Multitone Signal)

Description

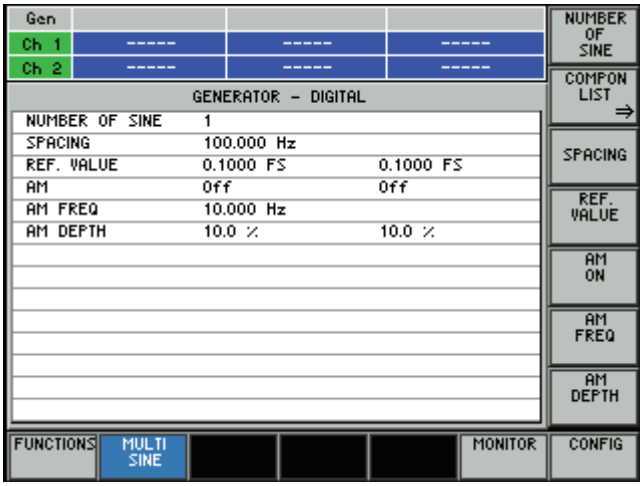
In the MULTISINE menu, you can set the function parameters for the multi-tone signal. This signal may consist of up to 17 sinewave tones with selectable relative amplitude.



Selecting the MULTISINE menu

1. Call the generator **MULTISINE** function (↗ 6-112).
2. Select the MULTI SINE **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

NUMBER OF SINE	Enter the number of sinewave tones.	(↗ 6-123)
COMPON LIST ⇒	**Open the submenu:** Configuration of signal parameters	(↗ 6-123)
SPACING	Enter the frequency resolution.	(↗ 6-126)
REF. VALUE	Enter the reference value for the sum of all amplitudes.	(↗ 6-128)
AM ON	Activate/Deactivate amplitude modulation.	(↗ 6-129)
AM FREQ	Enter the AM frequency.	(↗ 6-130)
AM DEPTH	Enter the AM modulation depth.	(↗6-131)

Entering the Number of Sinewave Tones

Use

You can enter up to 17 sinewave tones with selectable relative amplitude.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the number

1. Press the NUMBER OF SINE **function key** in the MULTI SINE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “1“.

2. Enter a new value, e.g. 7 (↗ 5-65).

   The permissible entry range is:

   1 ≤ NUMBER OF SINE ≤ 17

   The new setting is stored and displayed in the parameter field.

Ch 1&2

NUMBER OF SINE	7

Configuring the Signal Parameters

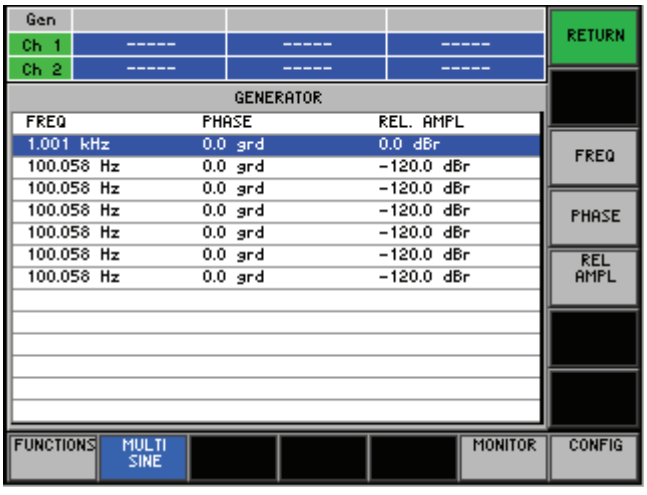
Description

In the COMPONENT LIST menu, you can configure the parameters for the individual signal components (sinewave tones).

Selecting the COMPONENT LIST submenu

Press the COMPON LIST ⇒ **function key** in the MULTI SINE **menu.**

The menu name is highlighted and the function keys [13] are assigned the appropriate function. The current sinewave tones together with the frequency, phase, and relative amplitude are displayed in the parameter field.



Function key assignment

RETURN	Exit the submenu.	
FREQ	Enter the frequency.	(↗ 6-124)
PHASE	Enter the start phase.	(↗ 6-125)
REL AMPL	Enter the relative signal amplitude.	(↗ 6-125)

Entering the Frequency

Use

You can enter the frequency of the individual signal components. The entered value will be automatically adjusted because the frequency has to be an integer multiple of the frequency resolution (spacing, ↗ 6-126).

The individual frequencies can be spaced as closely as required or can even overlap (the frequency resolution must, however, be taken into consideration in all cases).

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the signal component

1. Select a signal component in the parameter field using the ▼ or ▲ **cursor keys**.

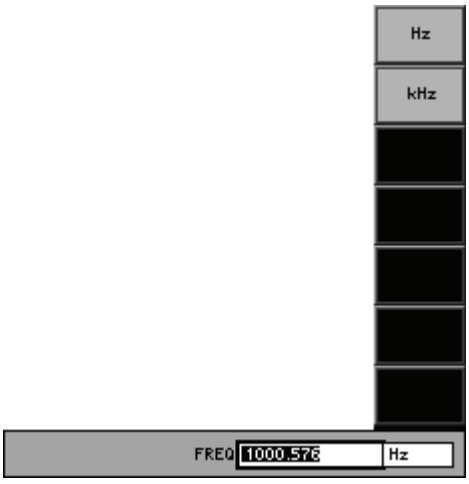
   The line (signal component) is highlighted.

FREQ	PHASE	REL. AMPL
1.001 kHz	0.0 grd	0.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr

Entering the frequency

2. Press the FREQ **function key** in the COMPON LIST ⇒ **submenu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “1000.576 Hz“. At the same time, the function keys are assigned various units of measurement.



3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   $$f_{Spacing} \leq FREQ \leq f_{max}$$

   within: $f_{Spacing}$ - spacing for frequency setting (↗ 6-126)

   f_{max} - maximum frequency of generator type (↗ 6-107)

   The new setting is stored and displayed in the parameter field.

Ch 1&2

1.001 kHz	0.0 grd	0.0 dBr

Entering the Phase

Use

The multi-sinewave is generated by periodically playing back a sequence of signals at a repetition frequency which corresponds to the frequency resolution (spacing). All sinewave tones have the entered phase position at the beginning of the sequence.

The mutual phase position of the individual components influences the crest factor. You can change the crest factor by selecting the appropriate phase.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the signal component

1. Select a signal component in the parameter field using the ▼ or ▲ **cursor keys**.

   The line (signal component) is highlighted.

FREQ	PHASE	REL. AMPL
1.001 kHz	0.0 grd	0.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr

Entering the phase

2. Press the PHASE **function key** in the COMPON LIST ⇒ **submenu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “0 grd“.

3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   -180 grd < PHASE < +179.9 grd

   The new setting is stored and displayed in the parameter field.

Ch 1&2

1.001 kHz	0.0 grd	0.0 dBr

Entering the Relative Signal Amplitude

Use

You can enter the amplitude ratio of the individual signal components in dBr refering to the reference value (↗ 6-128).

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the signal component

1. Select a signal component in the parameter field using the ▼ or ▲ **cursor keys**.

   The line (signal component) is highlighted.

FREQ	PHASE	REL. AMPL
1.001 kHz	0.0 grd	0.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr
100.058 Hz	0.0 grd	-120.0 dBr

Entering the relative signal amplitude

2. Press the REL AMPL **function key** in the COMPON LIST ⇒ **submenu.**

An entry field containing the currently applicable setting is displayed. The default setting is “0 dBr“.

3. Enter a new value (↗ 5-65).

The permissible entry range depends on the reference value (↗ 6-128) and the total signal amplitude (↗ 1-11).

The new setting is stored and displayed in the parameter field.

Entering the Frequency Resolution

Use

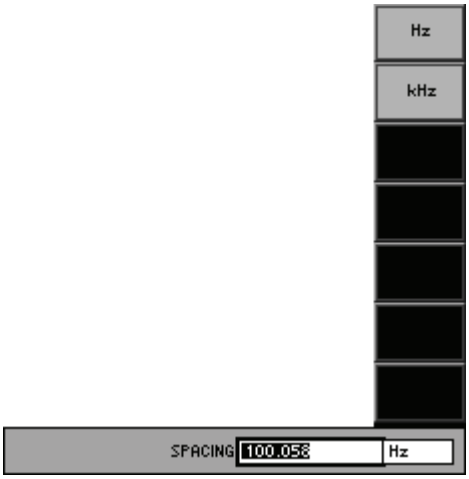
Use the frequency resolution to determine the smallest step size for the frequency setting (↗ 6-124) of the individual signal components. All frequencies will be automatically adjusted to an integer multiple of the frequency resolution.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the frequency resolution

1. Press the SPACING **function key** in the MULTI SINE **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “100.058 Hz“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).
The permissible entry range is:

2.4 Hz < SPACING < 12200 Hz	**BW = 22 kHz**
4.8 Hz < SPACING < 24400 Hz	**BW = 40 kHz**
9.6 Hz < SPACING < 48800 Hz	**BW = 80 kHz**
1.56 Hz < SPACING < 8000 Hz	**Fs = 32 kHz**
2.154 Hz < SPACING < 11025 Hz	**Fs = 44.1 kHz**
2.344 Hz < SPACING < 12000 Hz	**Fs = 48 kHz**
4.688 Hz < SPACING < 24000 Hz	**Fs = 96 kHz**
9.375 Hz < SPACING < 48000 Hz	**Fs = 192 kHz**

The new setting is stored and displayed in the parameter field.

Ch 1&2

SPACING	100.058 Hz

Entering the Reference Value for the Individual Amplitudes

Use

You can enter the amplitudes of the individual signal components in dBr (a[dBr]), refering to the reference value (V_{ref}). The absolute amplitude of each component (V_{abs}) is derived from:

$$V_{abs} = V_{ref} * 10^{\frac{a[dBr]}{20}}$$

Selecting the channel

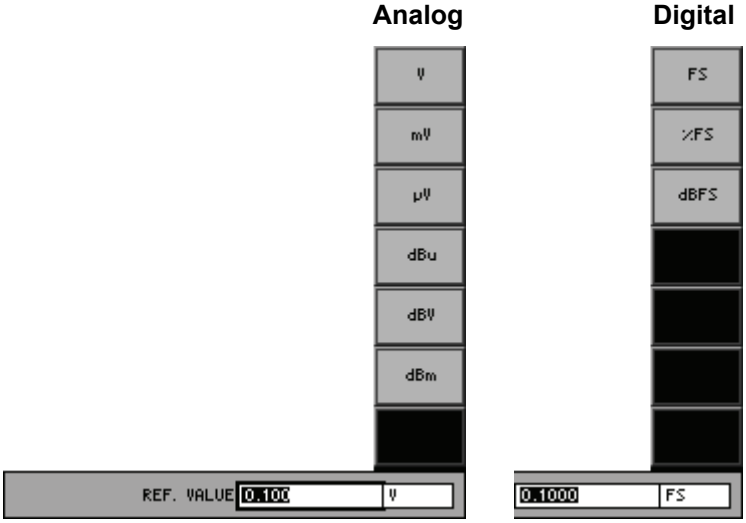
1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the reference value

2. Press the REF. VALUE **function key** in the MULTI SINE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65) and complete the entry by selecting a unit of measurement (function key).

   The permissible entry range depends on the total signal amplitude (↗ 1-15).

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2	
REF. VALUE	100.000 mV	100.000 mV	**(Analog)**
REF. VALUE	0.1000 FS	0.1000 FS	**(Digital)**

Note: The maximum limit of signal amplitude applies if only the MULTISINE generator function is set. If other generator functions (e.g. DC OFFSET, NOISE) are activated, their amplitude will also be taken into consideration and the maximum signal amplitude decreases accordingly.

Activating/Deactivating the Amplitude Modulation

Use

In order to make the amplitude modulation (AM) with the multi-tone signal available at the output, you must first activate the amplitude modulation.

The AM is deactivated in the factory default settings.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Activating the AM

2. Press the AM ON **function key** in the MULTI SINE **menu.**

   The function key is highlighted and the new setting is stored. After amplitude modulation is activated, the multi-tone signal is modulated with respect to amplitude.

   The current status is displayed in the parameter field.

	Ch 1	Ch 2
AM STATE	On	On

Deactivating the AM

3. Press the AM ON **function key** in the MULTI SINE **menu.**

   The function key is **no longer highlighted**. The multi-tone signal is unmodulated.

   The current status is displayed in the parameter field.

	Ch 1	Ch 2
AM STATE	Off	Off

Entering the AM Frequency

Use

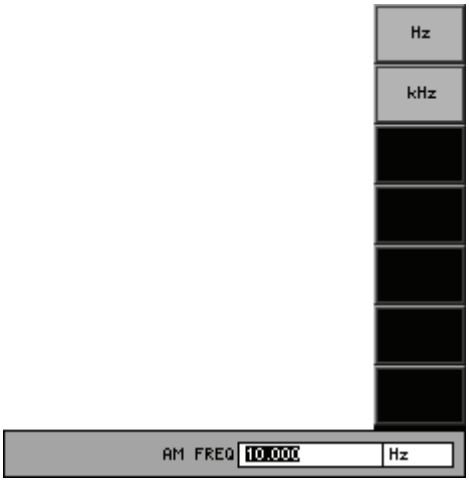
You can enter a specific modulation frequency for amplitude modulation of the multi-tone signal.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the AM frequency

1. Press the AM FREQ **function key** in the MULTI SINE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “10 Hz“.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0.001 Hz < AM FREQ < 22 kHz (BW 22 kHz)
   0.001 Hz < AM FREQ < 40 kHz (BW 40 kHz)
   0.001 Hz < AM FREQ < 80 kHz (BW 80 kHz)
   0.001 Hz < AM FREQ < 14.51 kHz (Fs = 32 kHz)
   0.001 Hz < AM FREQ < 19.999 kHz (Fs = 44.1 kHz)
   0.001 Hz < AM FREQ < 21.768 kHz (Fs = 48 kHz)
   0.001 Hz < AM FREQ < 43.536 kHz (Fs = 96 kHz)
   0.001 Hz < AM FREQ < 87.072 kHz (Fs = 192 kHz)

   The new setting is stored and displayed in the parameter field.

Ch 1&2

AM FREQ	10.000 Hz

Entering the AM Modulation Depth

Use

The AM modulation depth (m) describes the ratio from the maximum to the minimum amplitude (A) of the modulated signal.

$$m = \frac{A_{max} - A_{min}}{A_{max} + A_{min}}$$

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the AM modulation depth

2. Press the AM DEPTH **function key** in the MULTI SINE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “10 %“.

3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0 % ≤ AM DEPTH ≤ 99.8 %

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
AM DEPTH	10.0 %	10.0 %

6.2.2.2.4 SINE BURST (Sine Burst Signal)

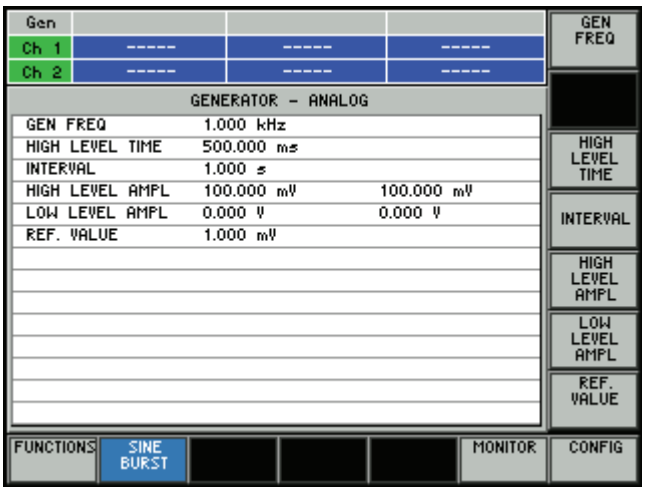
Description

In the SINE BURST menu, you can set the function parameters for the sine burst signal. This is a sinewave signal which switches periodically between high and low levels.

Selecting the SINE BURST menu

1. Call the generator **SINE BURST** function (↗ 6-112).
2. Select the SINE BURST **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

GEN FREQ	Enter the signal frequency.	(↗ 6-133)
HIGH LEVEL TIME	Enter the high-level time.	(↗ 6-134)
INTERVAL	Enter the interval time.	(↗ 6-135)
HIGH LEVEL AMPL	Enter the high-level amplitude.	(↗ 6-136)
LOW LEVEL AMPL	Enter the low-level amplitude.	(↗ 6-137)
REF. VALUE	Enter the reference value.	(↗ 6-118)

Entering the Signal Frequency

Use

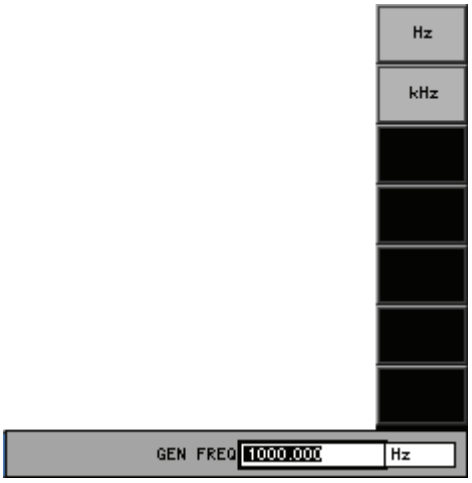
You can enter a specific frequency for the sine burst signal.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the signal frequency

1. Press the GEN FREQ **function key** in the SINE BURST **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “1 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

The permissible entry range is:

10 Hz ≤ GEN FREQ ≤ f_{max}

within: f_{max} - maximum frequency of generator type (↗ 6-107)

The new setting is stored and displayed in the parameter field.

Ch 1&2

GEN FREQ	1.000 kHz

Entering the High-Level Time

Use

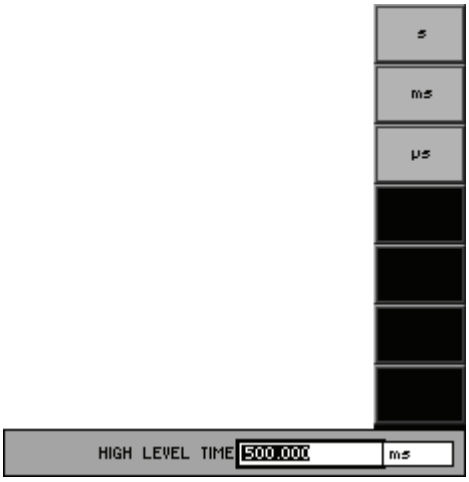
Use the high-level time (burst duration) to determine the time during which the sinewave has its high level.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the high-level time

1. Press the HIGH LEVEL TIME **function key** in the SINE BURST **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “500 ms“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0.001 s ≤ HIGH LEVEL TIME ≤ 60 s

   The new setting is stored and displayed in the parameter field.

Ch 1&2

HIGH LEVEL TIME	500.000 ms

Entering the Interval Time

Use

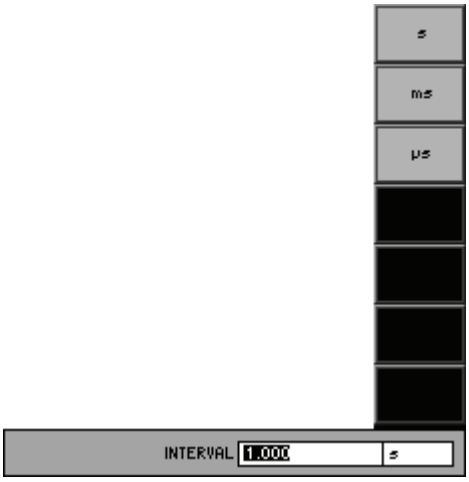
Using the interval time, you define the overall time of the sine burst signal (high-level time + low-level time).

Note: The setting is always valid for both channels (Ch 1&2).

Entering the interval time

1. Press the INTERVAL **function key** in the SINE BURST **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “1 s“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   HIGH LEVEL TIME ≤ INTERVAL ≤ 60 s

   The new setting is stored and displayed in the parameter field.

Ch 1&2

INTERVAL	1.000 s

Entering the High-Level Amplitude

Use

Use the high-level amplitude to determine the sinewave amplitude during the high-level time (burst duration).

Selecting the channel

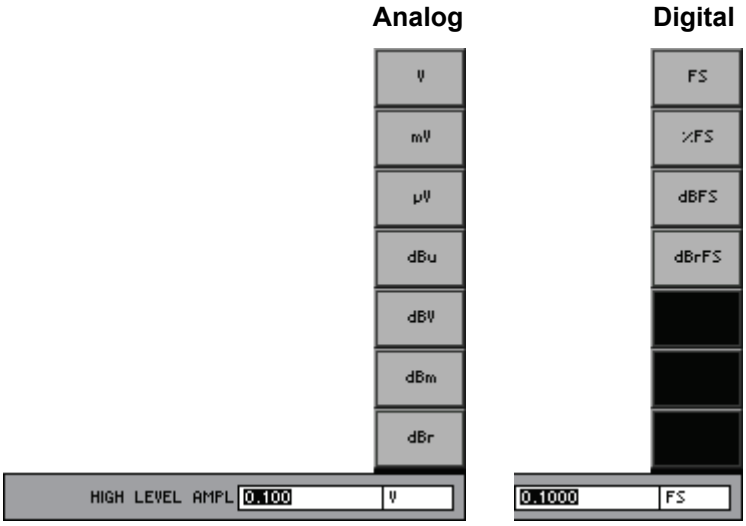
1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the high-level amplitude

2. Press the HIGH LEVEL AMPL **function key** in the SINE BURST **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   LOW LEVEL AMPL ≤ HIGH LEVEL AMPL ≤ 7.495 V **(Analog)**

   LOW LEVEL AMPL ≤ HIGH LEVEL AMPL ≤ 0.9999 FS **(Digital)**

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2	
HIGH LEVEL AMPL	100.000 mV	100.000 mV	**(Analog)**
HIGH LEVEL AMPL	0.1000 FS	0.1000 FS	**(Digital)**

Note: The maximum limit of signal amplitude applies if only the SINE BURST generator function is set. If other generator functions (e.g. DC OFFSET, NOISE) are activated, their amplitude will also be taken into consideration and the maximum signal amplitude decreases accordingly.

Entering the Low-Level Amplitude

Use

You use the low-level amplitude to determine the sinewave amplitude during the low-level time.

Selecting the channel

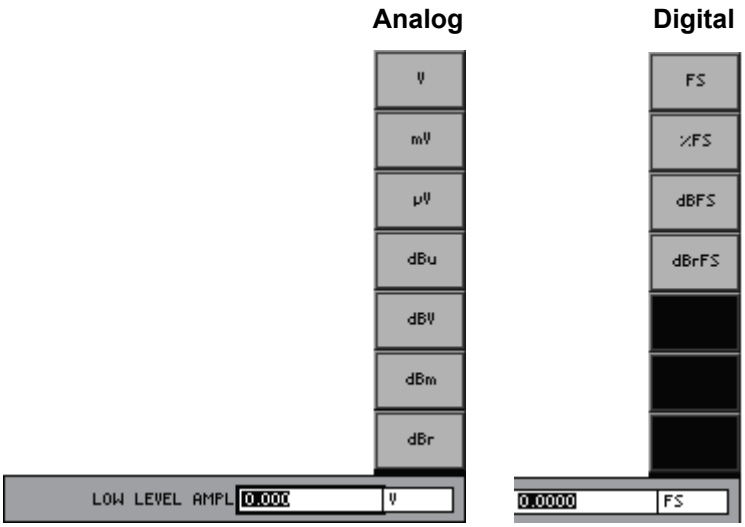
1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the low-level amplitude

2. Press the LOW LEVEL AMPL **function key** in the SINE BURST **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “0 V (0 FS)”. At the same time, the function keys are assigned various units of measurement.



3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0 ≤ LOW LEVEL AMPL ≤ HIGH LEVEL AMPL

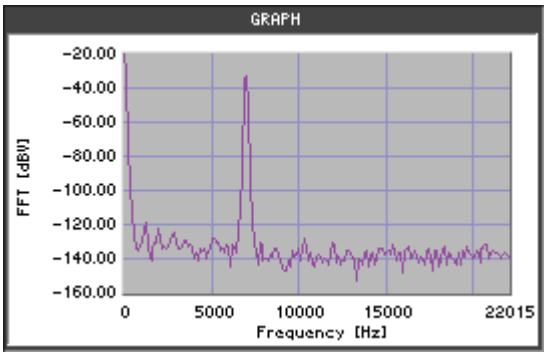
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2	
LOW LEVEL AMPL	0.000 V	0.000 V	**(Analog)**
LOW LEVEL AMPL	0.0000 FS	0.0000 FS	**(Digital)**

6.2.2.2.5 MOD DIST (Two-Tone Signal in Accordance with IEC)

Description

In the MOD DIST menu, you can set the function parameters for the two-tone signal. The two-tone signal is produced by superimposing 2 sinewave signals: low-frequency interference signal and high-frequency useful signal. The interference signal is 1 to 10 times larger than the useful signal.



The signal is used for intermodulation measurements as defined by SMPTE (Society of Motion Picture and Television Engineers) and for modulation factor analysis according to DIN IEC 268-3.

Recommendation of DIN IEC 268-3:

Interference signal f_1 is between 0.5 and 1.5 octaves above the lower limit frequency f_u of the DUT:

f_u + 0.5 octaves = f_1 = f_u + 1.5 octaves

Useful signal f_2 is between 0.5 and 1.5 octaves below the upper limit frequency f_o of the DUT:

f_o - 1.5 octaves = f_2 = f_o - 0.5 octaves
f_2 = 8 x f1

SMPTE standard:

Interference signal: f_1 = 60 Hz
Useful signal: f_2 = 7 kHz

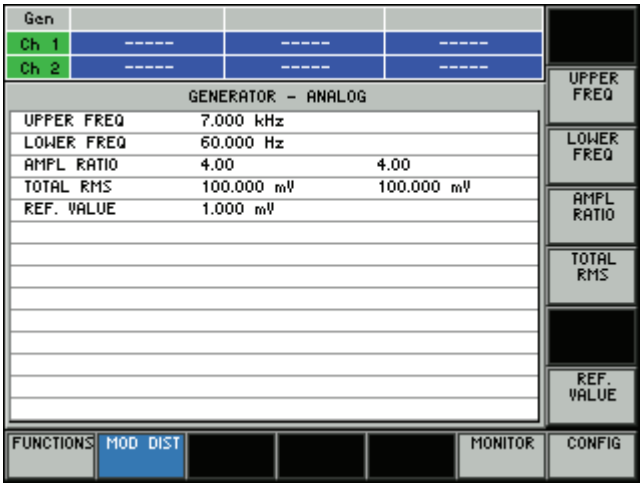
Amplitude ratio of interference signal to useful signal:

4:1 (SMPTE standard); 10:1 also possible according to DIN

Selecting the MOD DIST menu

1. Call the generator **MOD DIST** function (↗ 6-112).
2. Select the MOD DIST **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

UPPER FREQ — Enter the useful signal frequency. (↗ 6-140)

LOWER FREQ — Enter the interference signal frequency. (↗ 6-140)

AMPL RATIO — Enter the ratio between interference amplitude and useful amplitude.(↗ 6-142)

TOTAL RMS — Enter the total RMS of the signal. (↗ 6-143)

REF. VALUE — Enter the reference value. (↗ 6-118)

Note: To be able to measure the intermodulation for MOD DIST, you must set an appropriate measurement function in the Analyzer menu (↗ 6-275).

Entering Frequencies of the Two-Tone Signal

Use

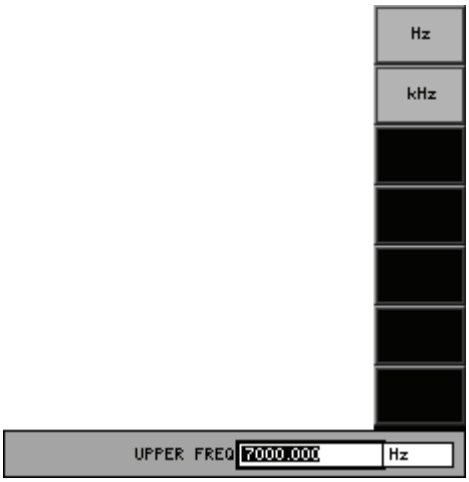
The two-tone signal is produced by superimposing 2 sinewave signals: low-frequency interference signal and high-frequency useful signal. You can change the frequencies of the interference and useful signals to allow measurements to be performed to various standards.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the useful signal frequency (UPPER FREQ)

1. Press the UPPER FREQ **function key** in the MOD DIST **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “7 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

The permissible entry range is:

$$8 * LF \leq UPPER\ FREQ \leq f_{max} - 2 * LF$$

within: f_{max} - maximum frequency of generator type (↗ 6-107)

The new setting is stored and displayed in the parameter field.

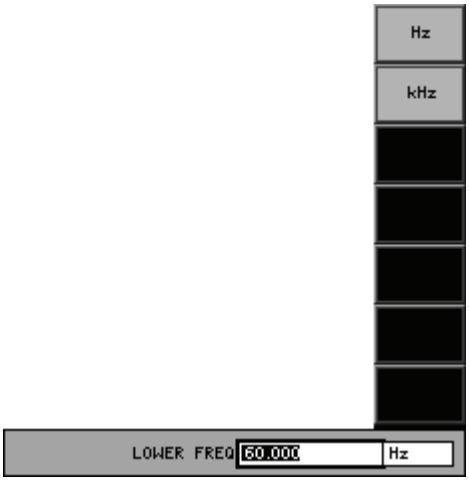
Ch 1&2

UPPER FREQ	7.000 kHz

Entering the interference signal frequency (LOWER FREQ)

3. Press the LOWER FREQ **function key** in the MOD DIST **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “60 Hz“. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

30 Hz ≤ LOWER FREQ ≤ (UPPER FREQUENCY)/8

The new setting is stored and displayed in the parameter field.

Ch 1&2

LOWER FREQ	60.000 Hz

Entering the Ratio Between Interference and Useful Amplitude

Use

You can change the ratio between interference and useful amplitude to allow measurements to be performed to various standards.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the ratio

2. Press the AMPL RATIO **function key** in the MOD DIST **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “4“.

3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 ≤ AMPL RATIO ≤ 10

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
AMPL RATIO	4.00	4.00

Entering the Total Signal RMS

Use

The total voltage is divided between the useful and interference signal in the (selectable) ratio. The maximum voltage setting is limited by the maximum peak value. As a result, the limits for the user-selectable RMS depend on the amplitude ratio.

Selecting the channel

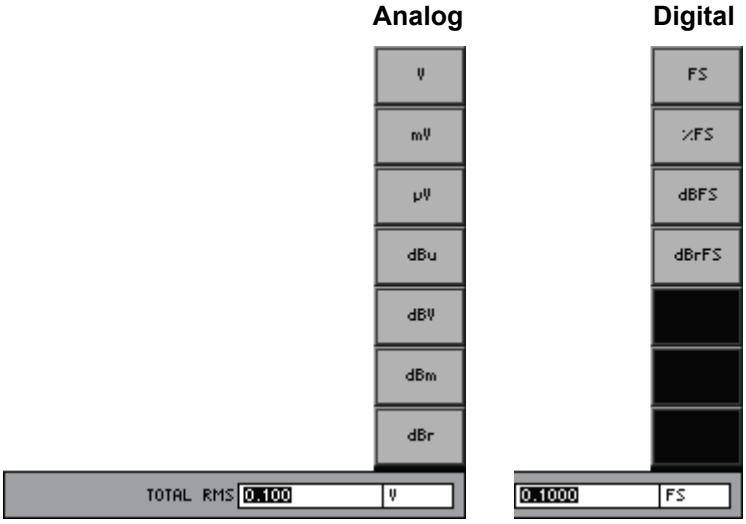
1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the total signal RMS

2. Press the TOTAL RMS **function key** in the MOD DIST **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65).

   The permissible entry range depends on amplitude ratio:

   0 ≤ TOTAL RMS ≤ 5.299 V **(Analog)**

   0 ≤ TOTAL RMS ≤ 0.7063 FS **(Digital)**

   The new setting is stored and displayed in the parameter field.

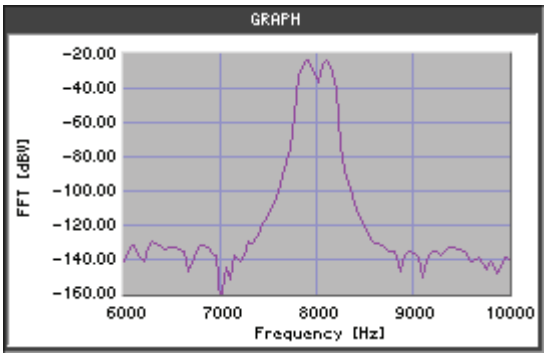
	Ch 1	Ch 2	
TOTAL RMS	100.000 mV	100.000 mV	**(Analog)**
TOTAL RMS	0.1000 FS	0.1000 FS	**(Digital)**

Note: The maximum limit of signal amplitude applies if only the SINE MOD DIST generator function is set. If other generator functions (e.g. DC OFFSET, NOISE) are activated, their amplitude will also be taken into consideration and the maximum signal amplitude decreases accordingly.

6.2.2.2.6 DFD (Difference Frequency Signal)

Description

In the DFD menu, you can set the function parameters for the difference frequency signal. The signal consists of two very close sinewave signals of the same amplitude.

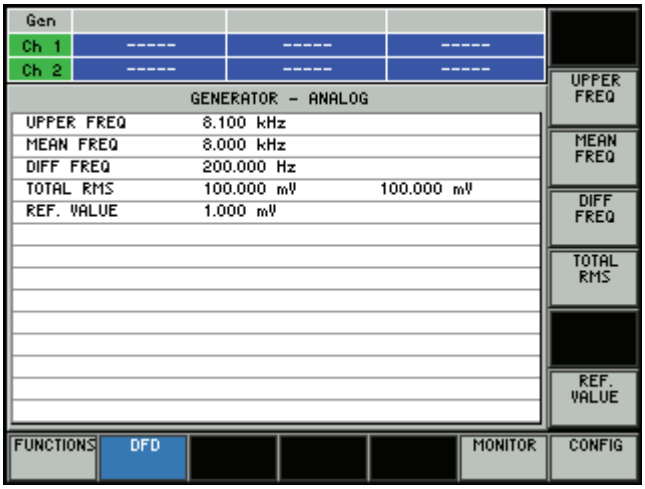


The signal is used for intermodulation measurements according to IEC 118 and IEC 268 (↗ 6-268).

Selecting the DFD menu

1. Call the generator **DFD** function (↗ 6-112).
2. Select the DFD **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

UPPER FREQ — Measurement acc. to IEC 118: Enter the upper DFD frequency. (↗ 6-145)

MEAN FREQ — Measurement acc. to IEC 268: Enter the center frequency. (↗ 6-147)

DIFF FREQ — Enter the difference frequency. (↗ 6-145, 6-147)

TOTAL RMS — Enter the total RMS of the signal. (↗ 6-149)

REF. VALUE — Enter the reference value. (↗ 6-118)

Note: To be able to measure the intermodulation for DFD, you must set an appropriate measurement function in the Analyzer menu (↗ 6-268).

Entering Frequencies for Measurements in Accordance with IEC 118

Use

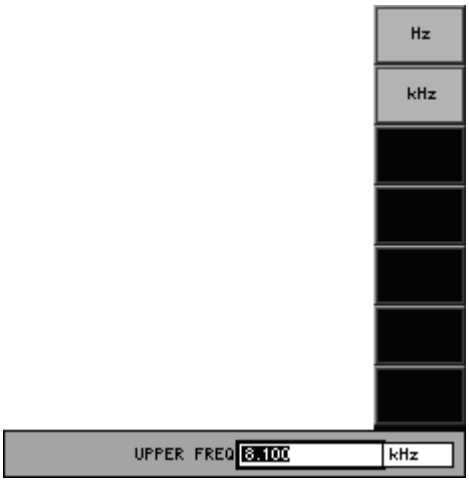
For measurements according to IEC 118 (↗ 6-145), enter the frequency parameters of the sinewave signals under the upper DFD frequency and difference frequency.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the upper DFD frequency

1. Press the UPPER FREQ **function key** in the DFD **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “8.1 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   DIFF FREQ ≤ UPPER FREQ ≤ f_{max}

   within: f_{max} - maximum frequency of generator type (↗ 6-107)

   The new setting is stored and displayed in the parameter field.

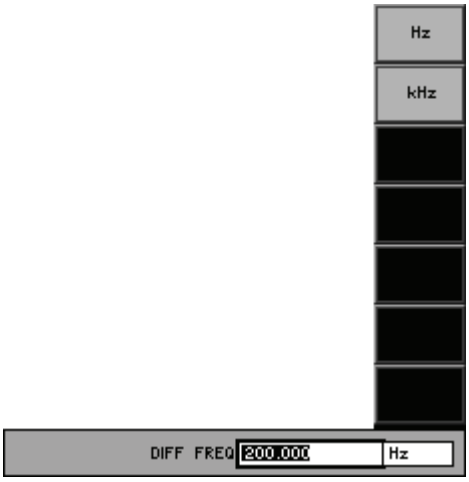
Ch 1&2

UPPER FREQ	8.100 kHz

Entering the difference frequency

3. Press the MEAN FREQ **function key** in the DFD **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “200 Hz“. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the bandwidth (↗ 6-107).

The new setting is stored and displayed in the parameter field.

Ch 1&2

DIFF FREQ	200.000 Hz

Entering Frequencies for Measurements in Accordance with IEC 268

Use

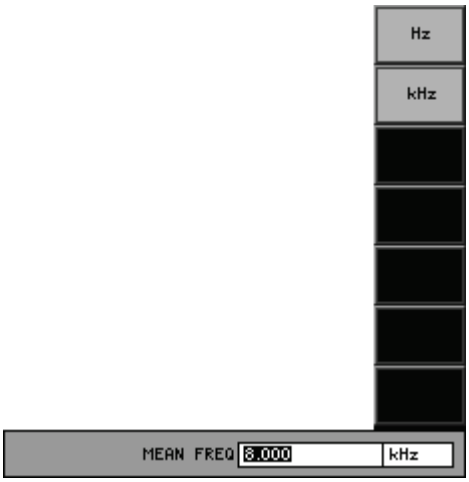
For measurements according to IEC 268 (↗ 6-147), enter the frequency parameters of the sinewave signals under the center frequency and difference frequency.

Note: The setting is always valid for both channels (Ch 1&2).

Entering the center frequency

1. Press the MEAN FREQ **function key** in the DFD **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “8 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

The permissible entry range is:

$$\textbf{DIFF FREQ / 2} \leq \textbf{MEAN FREQ} \leq f_{max} - \textbf{DIFF FREQ / 2}$$

within: f_{max} - maximum frequency of generator type (↗ 6-107)

The new setting is stored and displayed in the parameter field.

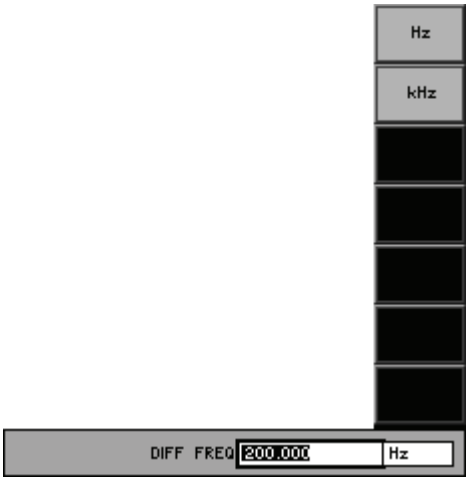
Ch 1&2

MEAN FREQ	8.000 kHz

Entering the difference frequency

3. Press the DIFF FREQ **function key** in the DFD **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “200 Hz“. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the bandwidth (↗ 6-107).

The new setting is stored and displayed in the parameter field.

Ch 1&2

DIFF FREQ	200.000 Hz

Entering the Total Signal RMS

Use

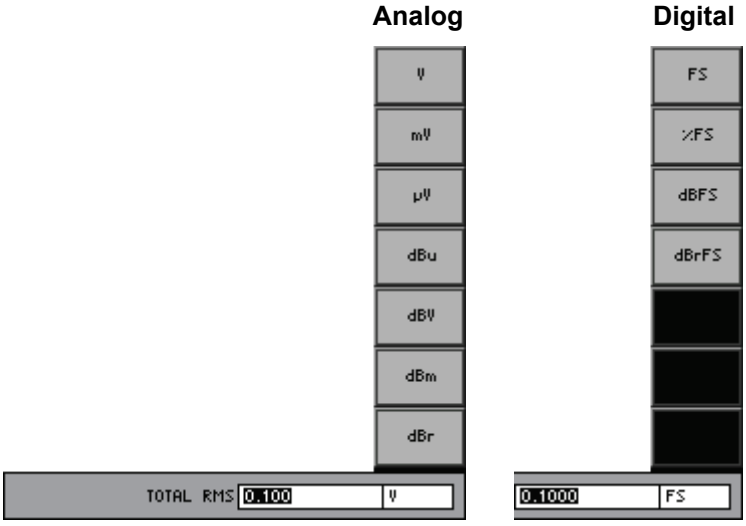
You can enter the amplitude of the sinewave signals as a total RMS.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Entering the total RMS

2. Press the TOTAL RMS **function key** in the DFD **menu.**
   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65).
   The permissible entry range is:

   0 ≤ TOTAL RMS ≤ 5.3 V **(Analog)**

   0 ≤ TOTAL RMS ≤ 0.7063 FS **(Digital)**

   The new setting is stored and displayed in the parameter field.

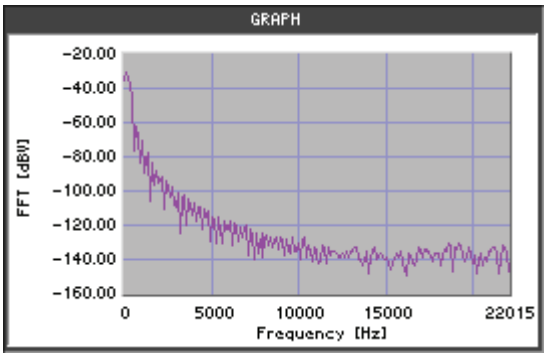
	Ch 1	Ch 2	
TOTAL RMS	100.000 mV	100.000 mV	**(Analog)**
TOTAL RMS	0.1000 FS	0.1000 FS	**(Digital)**

Note: The maximum limit of signal amplitude applies if only the SINE MOD DFD generator function is set if other generator functions (e.g. DC OFFSET, NOISE) are activated, their amplitude will also be taken into consideration and the maximum signal amplitude decreases accordingly.

6.2.2.2.7 POLARITY TEST (Polarization Test Signal)

Description

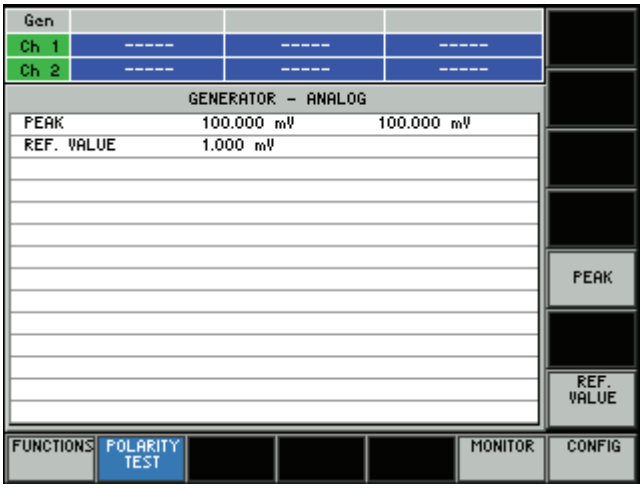
In the POLARITY TEST menu, you can set the function parameters for the polarity test signal. This signal is a special SINE^2 BURST signal and is used to check if the polarity is reversed by the DUT.



Selecting the POLARITY TEST menu

1. Call the generator **POLARITY TEST** function (↗ 6-112).
2. Select the POLARITY TEST **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

PEAK — Enter the signal amplitude. (↗ 6-151)

REF. VALUE — Enter the reference value. (↗ 6-118)

Note: To perform a polarity test, you have to set the relevant measurement function in the Analyzer menu (↗ 6-267).

Entering the Signal Amplitude

Use

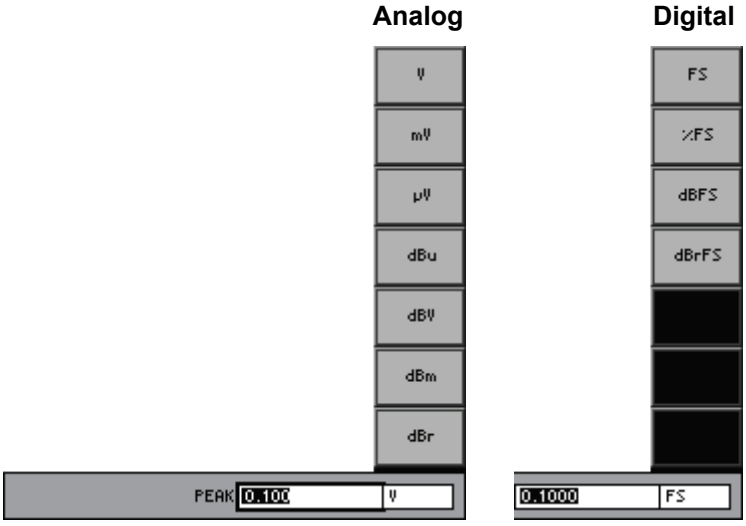
You can set the amplitude of the polarity test signal.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Entering the peak

2. Press the PEAK **function key** in the POLARITY TEST **menu.**
   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65).
   The permissible entry range is:

   0 ≤ PEAK ≤ 10.6 V (Analog)

   0 ≤ PEAK ≤ 0.9999 FS (Digital)

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2	
PEAK	100.000 mV	100.000 mV	**(Analog)**
PEAK	0.1000 FS	0.1000 FS	**(Digital)**

6.2.2.2.8 DC OFFSET (DC Voltage Component)

Description

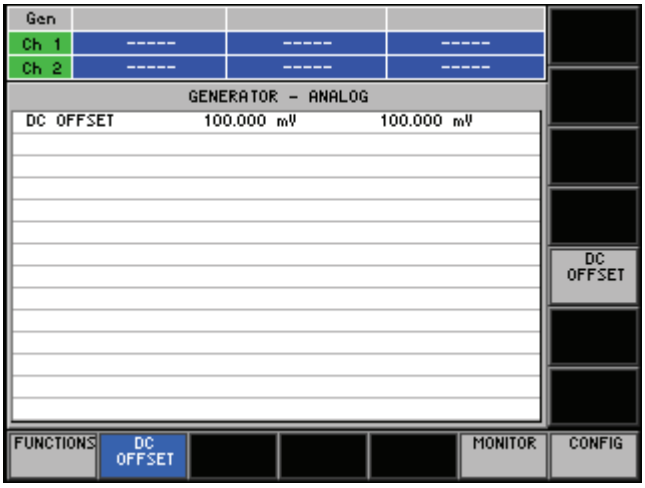
In the DC OFFSET menu, you can set a DC voltage component at the generator output.

Note: The DC Offset function is only effective if combined with a signal function (e.g. SINE).

Selecting the DC OFFSET menu

1. Call the generator **DC OFFSET** function (↗ 6-112).
2. Select the DC OFFSET **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function key [13] is assigned the appropriate function.



Function key assignment

DC OFFSET — Enter the DC offset. (↗ 6-153)

Entering the DC Offset Voltage Component

Use

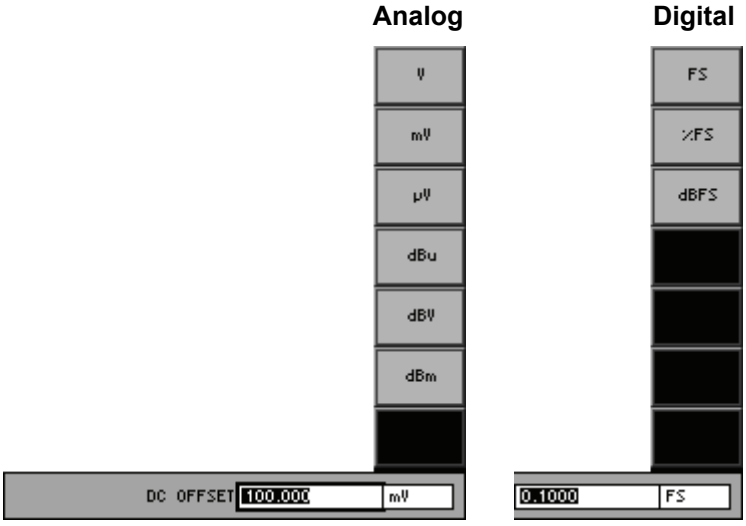
All generator functions can be combined with a DC voltage component.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Entering the DC offset

2. Press the DC OFFSET **function key** in the DC OFFSET **menu.**
   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



3. Enter a new value (↗ 5-65).
   The permissible entry range is:

   -10.6 V ≤ DC OFFSET ≤ 10.6 V **(Analog)**

   -0.9999 FS ≤ DC OFFSET ≤ 0.9999 FS **(Digital)**

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2	
DC OFFSET	100.000 mV	100.000 mV	**(Analog)**
DC OFFSET	0.1000 FS	0.1000 FS	**(Digital)**

Note: The DC Offset function is only effective if combined with a signal function (e.g. SINE). In this case, the maximum signal amplitude of the DC OFFSET function depends on the amplitude of the other generator function; the maximum signal amplitude decreases accordingly.

6.2.2.2.9 SWEEP RMS

Description

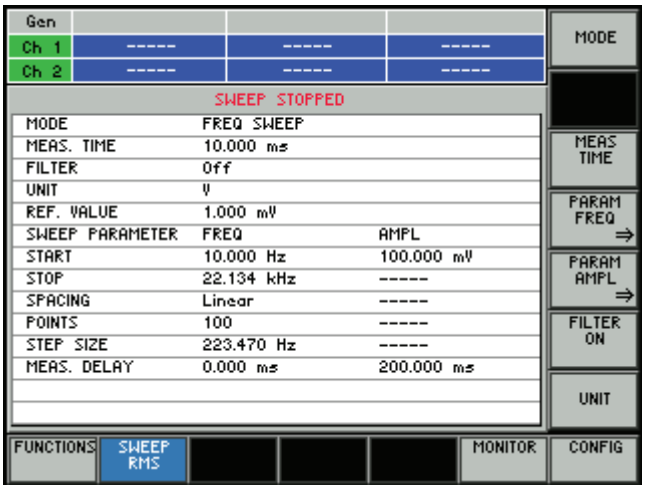
You can set the function parameters for a swept sinewave signal in the SWEEP RMS menu. Frequency and/or amplitude may change in this case. The associated measurement function RMS is automatically activated in the analyzer.

Note: The sweep can be combined with only a few analyzer functions (Peak, Quasi peak). You have to switch off all other analyzer functions before you can activate the sweep. In some applications it is useful to set the analyzer range mode to "Fixed" (↗ 6-220) to speed up the measurement and to reduce the settling time with AC coupling.

Selecting the SWEEP RMS menu

1. Call the generator **SWEEP RMS** function (↗ 6-112).
2. Select the SWEEP RMS **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

MODE — Select the sweep mode. (↗ 6-156)

MEAS TIME — Set the measurement time. (↗ 6-157)

PARAM FREQ ⇒ — **Open the submenu:** (↗ 6-158)
Set the sweep parameters for frequency.

PARAM AMPL ⇒ — **Open the submenu:** (↗ 6-164)
Set the sweep parameters for amplitude.

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

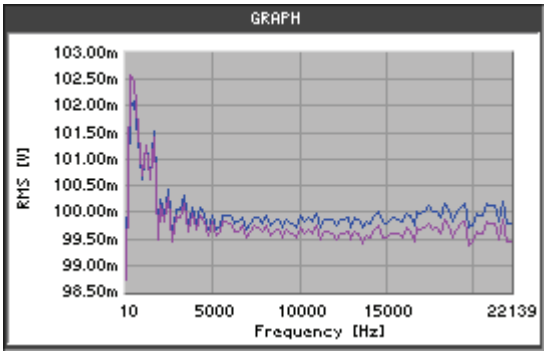
UNIT — Select the unit for level display. (↗ 6-169)

Displaying and analyzing measurement results

Graphical display

- Switch the DUT between the generator [8] and analyzer [9], **or** switch the Generator output to Analyzer input internally (↗ 6-218).
- Select the **CURVE PLOT** display mode in the Graph menu (↗ 6-288).
- Press the numeric key **4** to start sweeping (↗ 6-285).

A measurement diagram with the sweep parameters is shown in the display area.



Note: In the Graph menu, you can change the graphic display area (↗ 6-288) and analyze the trace using the cursors (↗ 6-300). For activating the cursors you must stop the sweep.

List of measurement values

- Switch the DUT between the generator [8] and analyzer [9], **or** switch the Generator output to Analyzer input internally (↗ 6-218).
- Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-288).
- Press the numeric key **4** to start sweeping (↗ 6-285).

The frequency and level values of the sweep are displayed.

GRAPH

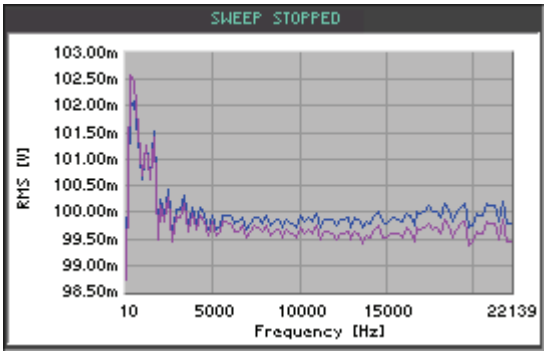
Amplitude	0.100 V	0.100 V
Frequency	Ch1	Ch2
10.00 Hz	0.099 V	0.099 V
233.52 Hz	0.103 V	0.102 V
457.04 Hz	0.102 V	0.102 V
680.57 Hz	0.102 V	0.101 V
904.09 Hz	0.101 V	0.101 V
1127.61 Hz	0.101 V	0.101 V
1351.13 Hz	0.101 V	0.101 V
1574.65 Hz	0.101 V	0.102 V
1798.18 Hz	0.099 V	0.100 V
2021.70 Hz	0.100 V	0.100 V
2245.22 Hz	0.100 V	0.100 V
2468.74 Hz	0.100 V	0.100 V

Selecting the Sweep Mode

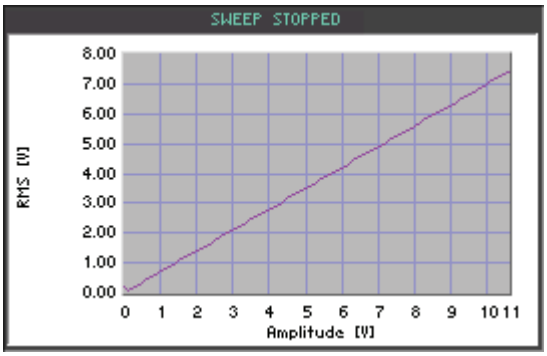
Use

You can select the parameters for sweeping:

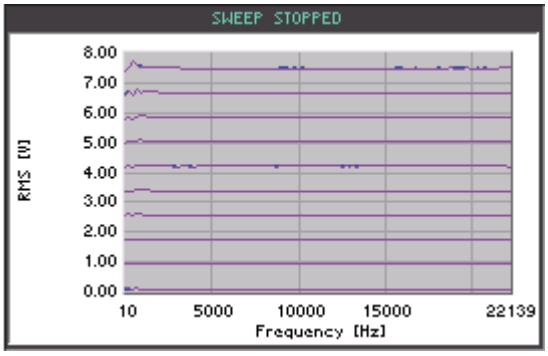
- **FREQ SWEEP**
  The generator sweeps the frequency at fixed amplitude. The measured RMS level versus the FREQ generator frequency is displayed.



- **AMPL SWEEP**
  The generator sweeps the amplitude at a fixed frequency. The measured RMS level versus the AMPL generator amplitude is displayed.



- **FREQ&AMPL SWEEP**
  The generator sweeps the frequency at different amplitudes. The measured RMS level versus the FREQ generator frequency is displayed.



Note: The setting is always valid for both channels (Ch 1&2).

Selecting the sweep mode

1. Press the MODE **function key** in the SWEEP RMS **menu.**

   A selection field containing the available settings is displayed. The default setting is “FREQ SWEEP “.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Ch 1&2

MODE	FREQ SWEEP

Setting the Measurement Time

Use

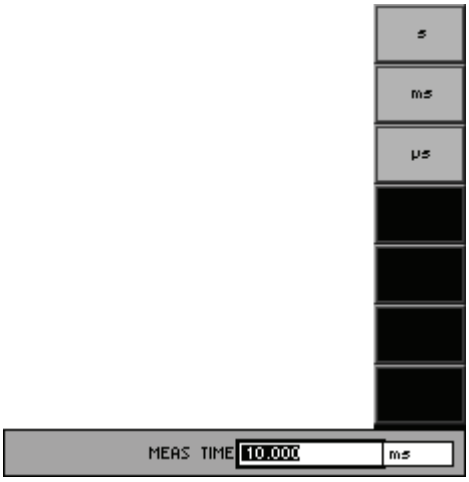
You can set the measurement time dependent on the task.

Note: The setting is always valid for both channels (Ch 1&2).

Setting the measurement time

1. Press the MEAS TIME **function key** in the SWEEP RMS **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “10 ms“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 ms ≤ MEAS TIME ≤ 10 s

   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS. TIME	10.000 ms

Setting the Sweep Parameters for Frequency

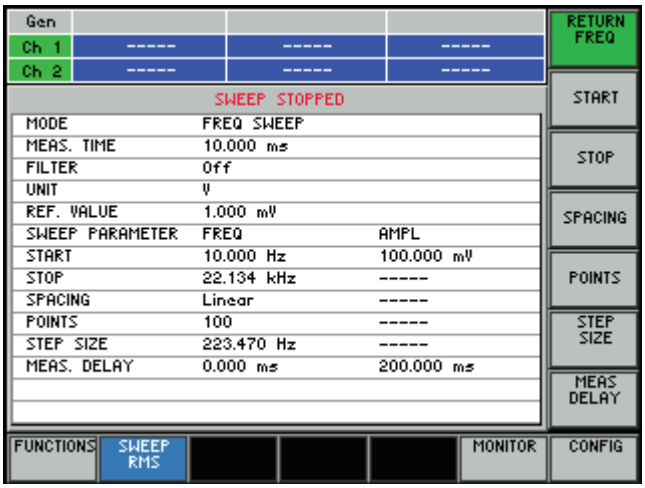
Description

You can set the sweep parameters for frequency in the PARAM FREQ submenu.

Selecting the PARAM FREQ submenu

Press the PARAM FREQ ⇒ **function key** in the SWEEP RMS **menu.**

The submenu is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN FREQ — Exit the submenu.

START — Enter the start value. (↗ 6-159)

STOP — Enter the stop value. (↗ 6-159)

SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-161)

POINTS — Enter the number of reading points. (↗ 6-161)

STEP SIZE — Enter the step size. (↗ 6-161)

MEAS DELAY — Enter the measurement delay. (↗ 6-163)

Note: With the AMPL SWEEP sweep mode (↗ 6-156), only the START and MEAS DELAY function keys are available. By using the START key, you can enter a frequency value; MEAS DELAY determines the start delay of a new sweep.

Entering the Frequency Range

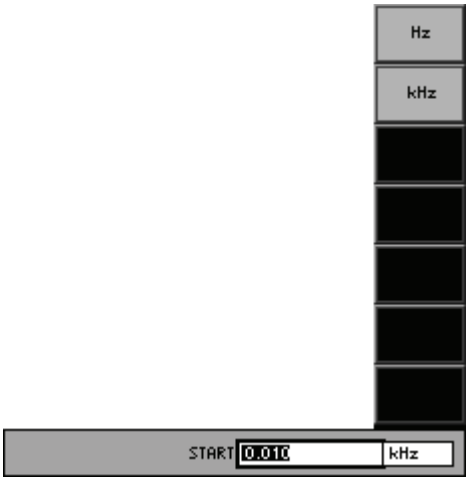
Use

To set the frequency range, enter the start [START] and stop [STOP] values of the frequency sweep.

Entering the start value

1. Press the [START] **function key** in the [PARAM FREQ ⇒] **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is "10 Hz". At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

The permissible entry range is:

10 Hz ≤ Start ≤ f_{max}

within: f_{max} - maximum frequency of generator type (↗ 6-107)

The new setting is stored and displayed in the parameter field.

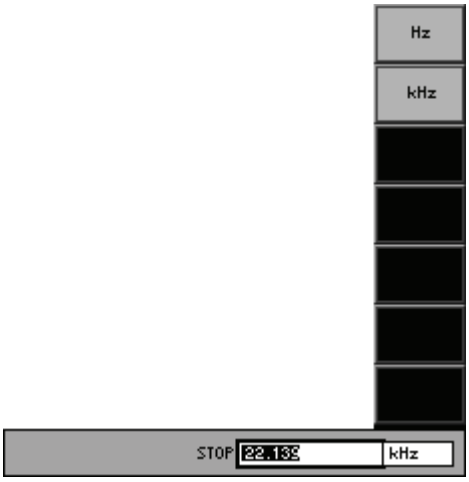
SWEEP PARAMETER	FREQ	AMPL
START	10.000 Hz	

Note: If the start value is higher than the stop value, the stop value is adjusted automatically.

Entering the stop value

3. Press the STOP **function key** in the PARAM FREQ ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “22.139 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

10 Hz ≤ Stop ≤ f_{max}

within: f_{max} - maximum frequency of generator type (↗ 6-107)

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP	22.139 kHz	

Note: If the start value is higher than the stop value, the start value is adjusted automatically.

Selecting the Spacing of Sweep Steps (Lin/Log)

Use

The spacing of the sweep points can be selected. You can decide if the distance between the valus set one after another is in **Linear** or **Logarithmic** steps.

Selecting the Spacing

1. Press the SPACING **function key** in the corresponding PARAM FREQ ⇒ or PARAM AMPL ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING	Linear	Linear

Entering the Frequency Resolution

Use

You can enter the frequency resolution in two different ways:

- **POINTS**
  Enter the number of reading points.
  Based on the frequency range, the generator calculates the position of the reading points and automatically determines the step size.
- **STEP SIZE**
  Enter the step size.
  Based on the frequency range, the generator calculates the number of reading points and automatically determines their position.

The first possibility: Entering the number of reading points

1. Press the POINTS **function key** in the PARAM FREQ ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “100“.

2. Enter a new value (↗ 5-65).

   The permissible entry range depends on the frequency range; with maximum frequency range it is:

   2 ≤ POINTS ≤ 1024

   The new setting is stored and displayed in the parameter field.

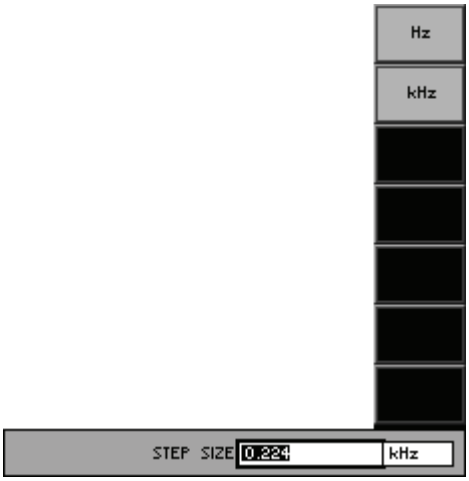
SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS	100	

The second possibility: Entering the step size

3. Press the STEP SIZE **function key** in the PARAM FREQ ⇒ **submenu**.

In case of linear spacing, the default setting is “224 Hz“. At the same time, the function keys [13] are assigned various units of measurement.

In case of logaritmic spacing, the factor for step size is used.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the frequency range; with maximum frequency range it is:

Linear spacing:

(START-STOP)/1023 ≤ STEP SIZE ≤ f_{max}

Logarithmic spacing:

(STOP/START)/1023 ≤ STEP SIZE ≤ STOP/START

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE	223.522 Hz	

Entering the Measurement Delay

Use

You can set a delay for the level measurement. This delay refers to the waiting period between the frequency setting and the start of the amplitude measurement.

Entering the measurement delay

1. Press the MEAS DELAY **function key** in the PARAM FREQ ⇒ **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is ”0 ms“.

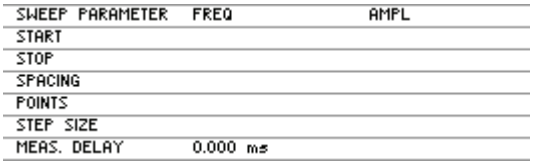
   

2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0 ms ≤ MEAS DELAY ≤ 5 s

   The new setting is stored and displayed in the parameter field.

Setting the Amplitude Sweep Parameters

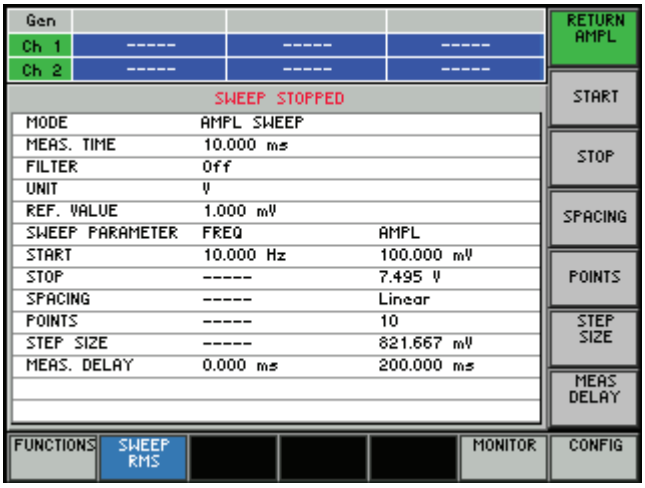
Description

You can set the sweep parameters for the amplitude in the PARAM AMPL submenu.

Selecting the PARAM AMPL submenu

Press the PARAM AMPL ⇒ **function key** in the SWEEP RMS **menu.**

The submenu name is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN AMPL — Exit the submenu.

START — Enter the start value. (↗ 6-165)

STOP — Enter the stop value. (↗ 6-165)

SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-161)

POINTS — Enter the number of reading points. (↗ 6-167)

STEP SIZE — Enter the step size. (↗ 6-167)

MEAS DELAY — Enter the measurement delay. (↗ 6-168)

Note: With the FREQ SWEEP sweep mode (↗ 6-156), only the START and MEAS DELAY function keys are available. By using the START key, you can enter an amplitude value; MEAS DELAY determines the start delay of a new sweep.

Entering the Amplitude Range

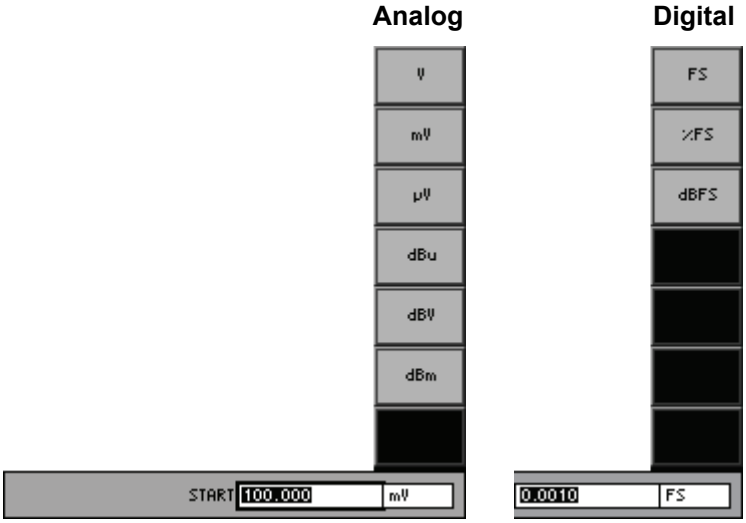
Use

To set the amplitude range, enter the START and STOP values of the amplitude sweep.

Entering the start value

1. Press the START **function key** in the PARAM AMPL ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 µV ≤ Start ≤ V_{Stop} **(Analog)**

   0.0001 FS ≤ Start ≤ V_{Stop} **(Digital)**

   -140 dBFS ≤ Start ≤ V_{Stop} **(Digital)**

   within: V_{Stop} - stop value of amplitude sweep (↗ below)

   The new setting is stored and displayed in the parameter field.

   Analog

SWEEP PARAMETER	FREQ	AMPL
START		100.000 mV

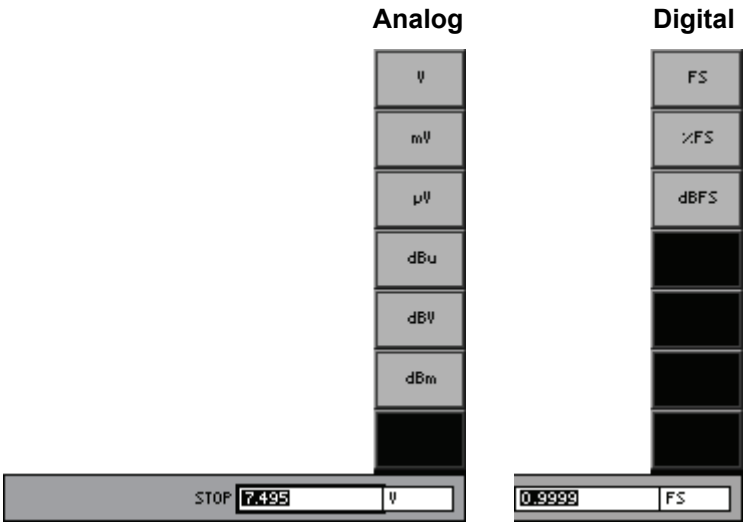
   Digital

SWEEP PARAMETER	FREQ	AMPL
START		0.0010 FS

Entering the stop value

3. Press the STOP **function key** in the PARAM AMPL ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “7.495 V (0.9999 FS)”. At the same time, the function keys are assigned various units of measurement.



4. Enter a new value (↗ 5-65).
   The permissible entry range is:

   V_{Start} ≤ Stop ≤ 7.495 V **(Analog)**

   V_{Start} ≤ Stop ≤ 0.9999 FS **(Digital)**

   within: V_{Start} - stop value of amplitude sweep (↗ above)

   The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		7.495 V

Digital

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		0.9999 FS

Selecting the Spacing of Sweep Steps (Lin/Log)

Use

The spacing of the sweep points can be selected. You can decide if the distance between the valus set one after another is in **Linear** or **Logarithmic** steps.

Selecting the Spacing

1. Press the SPACING **function key** in the corresponding PARAM FREQ ⇒ or PARAM AMPL ⇒ **submenu**.
   A selection field containing the available settings is displayed. The default setting is “Linear“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING	Linear	Linear

Entering the Amplitude Resolution

Use

You can enter the amplitude resolution in two different ways:

- **POINTS**
  Enter the number of reading points.
  Based on the amplitude range, the generator calculates the position of the reading points and automatically determines the step size.
- **STEP SIZE**
  Enter the step size.
  Based on the amplitude range, the generator calculates the number of reading points and automatically determines their position.

The first possibility: Entering the number of reading points

1. Press the POINTS **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “100“.

2. Enter a new value (↗ 5-65).

The permissible entry range depends on the sweep mode; with maximum amplitude range it is:

2 ≤ POINTS ≤ 10 **for concatenated sweep**

2 ≤ POINTS ≤ 1024 **for amplitude sweep**

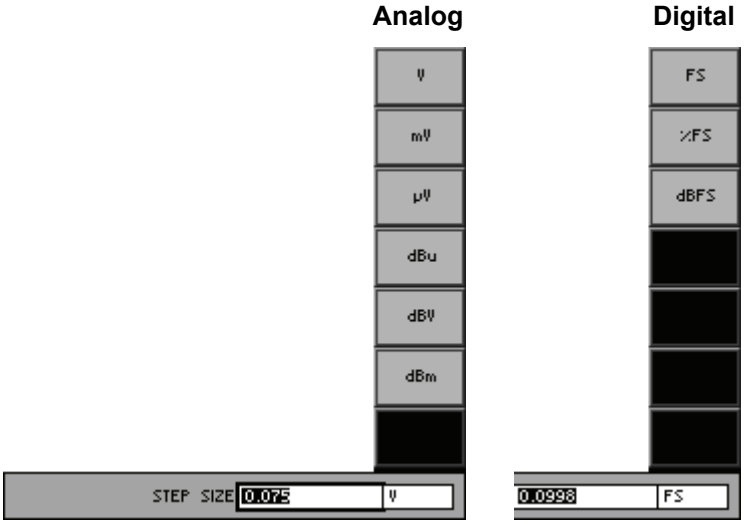
The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		100

The second possibility: Entering the step size

3. Press the STEP SIZE **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “74.7 mV (0.9998 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the amplitude range; with maximum amplitude range and linear spacing it is:

8 mV ≤ STEP SIZE ≤ 7.494 V **(Analog)**

0.0010 FS ≤ STEP SIZE ≤ 0.9980 FS **(Digital)**

The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		74.700 mV

Digital

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		0.0998 FS

Entering the Measurement Delay

Use

You can set a delay for the level measurement. This delay refers to the waiting time between the amplitude setting and the start of the amplitude measurement.

Entering the measurement delay

1. Press the MEAS DELAY **function key** in the PARAM AMPL ⇒ **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is ”200 ms“.

2. Enter a new value (↗ 5-65).

The permissible entry range is:

0 ms ≤ MEAS DELAY ≤ 5 s

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		
MEAS. DELAY		200.000 ms

Selecting the Unit for the Level Display

Use

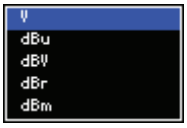
All measurements that return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the relative unit (dBr, dBrFS), the measurement result is displayed taking the entered reference value into consideration.

Selecting a unit

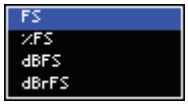
1. Press the UNIT **function key** in the SWEEP RMS **menu.**

   A selection field containing the available settings is displayed. The default setting is “V (FS)”.

   Analog

   Digital

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

   Analog

   Digital

Selecting the reference value

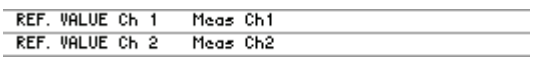
If you have selected the relative unit (dBr, dBrFS), a selection field containing various reference values appears.

- **Value**
  Manual reference value entry (↗ below)
- **Cursor X1**
  The current Y-coordinate value of the X1 cursor is stored and used as the reference value for other measurements.
- **Cursor X2**
  The current Y-coordinate value of the X2 cursor is stored and used as the reference value for other measurements.

The default setting is “Value“.

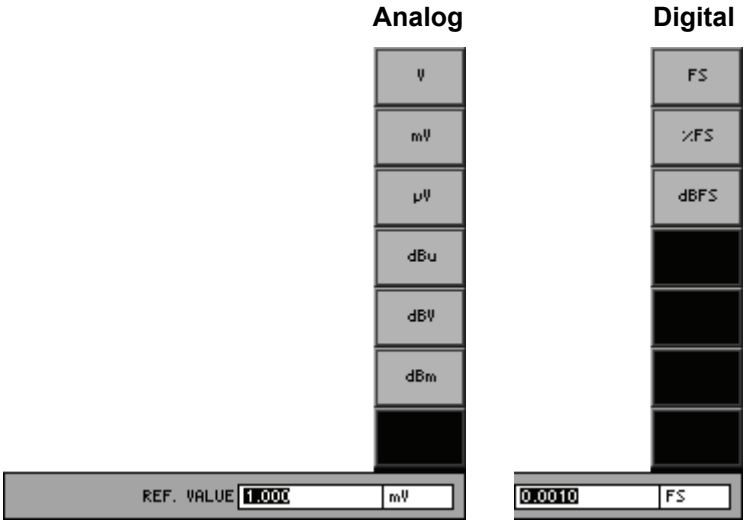
4. Use the **rotary knob** [11] to select a setting.
5. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.



Entering the reference value manually

After you have selected the “Value” setting, an entry field with the current reference value pops up. The default setting is “1 mV (0.001 FS)”. At the same time, the function keys are assigned various units of measurement.



6. Enter a new value (↗ 5-65).

The permissible entry range is:

1 µV ≤ REF. VALUE ≤ 100 V **(Analog)**

0.001 FS ≤ REF. VALUE ≤ 0.999 FS **(Digital)**

-120 dBFS ≤ REF. VALUE ≤ -0.001 dBFS **(Digital)**

The new setting is stored and displayed in the parameter field.

Analog

REF. VALUE	1.000 mV

Digital

REF. VALUE	0.0010 FS

6.2.2.2.10 SWEEP RMS SELECTIVE

Description

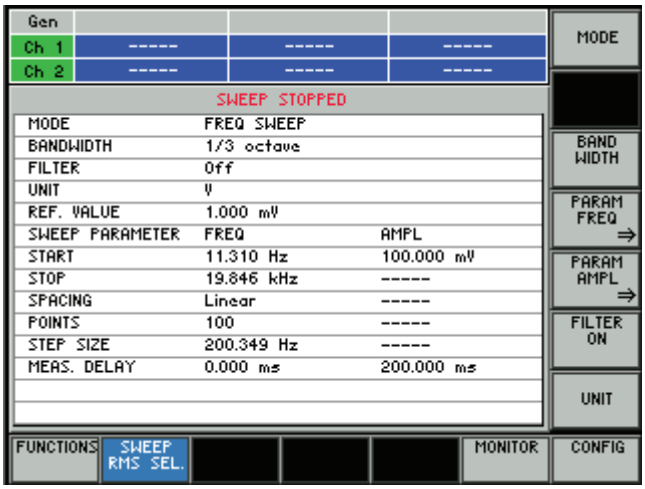
You can set the function parameters for a swept sinewave signal in the SWEEP RMS SELECTIVE menu. Frequency and/or amplitude may change in this case. The associated measurement function is automatically activated in the analyzer.

Note: The sweep can be combined with only a few analyzer functions (Peak, Quasi peak, RMS/Freq). You have to switch off all other analyzer functions before you can activate the sweep. In some applications, it is useful to set the analyzer range mode to “Fixed” (↗ 6-220) to speed up the measurement and to reduce the settling time with AC coupling.

Selecting the SWEEP RMS SELECTIVE menu

1. Call the generator **SWEEP RMS SELECTIVE** function (↗ 6-112).
2. Select the SWEEP RMS SEL. **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

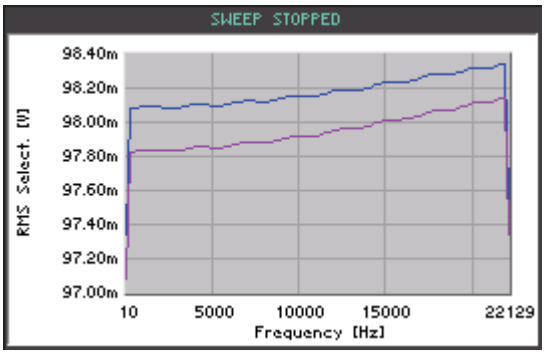
MODE	Select the sweep mode.	(↗ 6-156)
BAND WIDTH	Select the measurement bandwidth.	(↗ 6-174)
PARAM FREQ ⇒	**Open the submenu:** Set the sweep parameters for frequency.	(↗ 6-158)
PARAM AMPL ⇒	**Open the submenu:** Set the sweep parameters for amplitude.	(↗ 6-164)
FILTER ON	Activate/Deactivate the filter.	(↗ 6-232)
UNIT	Select the unit for the level display.	(↗ 6-188)

Displaying and analyzing measurement results

Graphical display

- Switch the DUT between the generator [8] and analyzer [9], **or** switch the Generator output to Analyzer input internally (↗ 6-218).
- Select the **CURVE PLOT** display mode in the Graph menu (↗ 6-288).
- Press the numeric key **4** to start sweeping (↗ 6-285).

A measurement diagram with the sweep parameters is shown in the display area.



Note: In the Graph menu you can change the graphic display area (↗ 6-288) and analyze the trace using the cursors (↗ 6-300). For activating the cursors, you must stop the sweep.

List of measurement values

- Switch the DUT between the generator [8] and analyzer [9], **or** switch the Generator output to Analyzer input internally (↗ 6-218).
- Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-288).
- Press the numeric key **4** to start sweeping (↗ 6-285).

The frequency and level values of the sweep are displayed.

SWEEP STOPPED

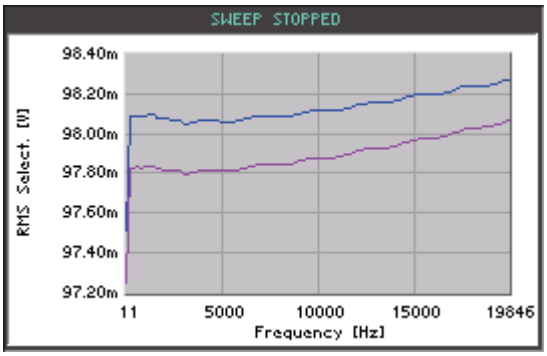
Amplitude	0.100 V	0.100 V
Frequency	Ch1	Ch2
11.310 Hz	9.7253E-2 V	9.7510E-2 V
211.659 Hz	9.7828E-2 V	9.8086E-2 V
412.009 Hz	9.7828E-2 V	9.8087E-2 V
612.358 Hz	9.7832E-2 V	9.8089E-2 V
812.708 Hz	9.7830E-2 V	9.8087E-2 V
1013.057 Hz	9.7833E-2 V	9.8091E-2 V
1213.406 Hz	9.7835E-2 V	9.8094E-2 V
1413.756 Hz	9.7837E-2 V	9.8093E-2 V
1614.105 Hz	9.7824E-2 V	9.8081E-2 V
1814.455 Hz	9.7822E-2 V	9.8078E-2 V
2014.804 Hz	9.7819E-2 V	9.8076E-2 V
2215.153 Hz	9.7817E-2 V	9.8072E-2 V

Selecting the Sweep Mode

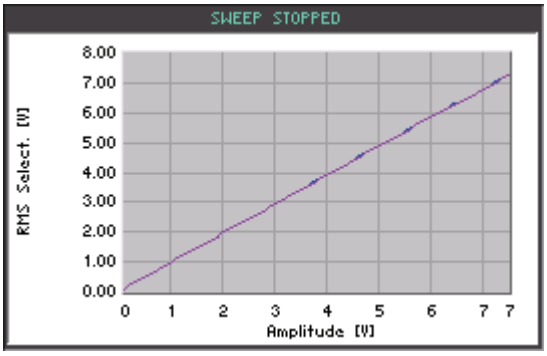
Use

You can select the parameters for sweeping:

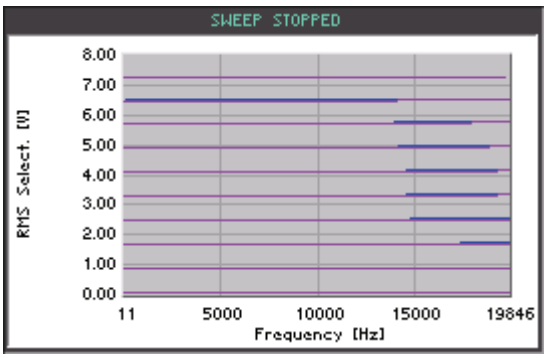
- **FREQ SWEEP**
  The generator sweeps the frequency at fixed amplitude. The measured RMS SELECTIVE level versus the FREQ generator frequency is displayed.



- **AMPL SWEEP**
  The generator sweeps the amplitude at a fixed frequency. The measured RMS SELECTIVE level versus the AMPL generator amplitude is displayed.



- **FREQ&AMPL SWEEP**
  The generator sweeps the frequency at different amplitudes. The measured RMS SELECTIVE level versus the FREQ generator frequency is displayed.



Note: The setting is always valid for both channels (Ch 1&2).

Selecting the sweep mode

1. Press the MODE **function key** in the SWEEP RMS SEL. **menu.**

   A selection field containing the available settings is displayed. The default setting is “FREQ SWEEP “.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Ch 1&2

MODE	FREQ SWEEP

Selecting the Measurement Bandwidth

Use

You can select different measurement bandwidths:

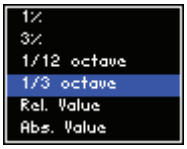
- **1%**
  The Bandwidth is 1 % of the centre frequency.
- **3%**
  The Bandwidth is 3 % of the centre frequency.
- **1/12 octave**
  The Bandwidth is 1/12 octave (5.77 %) of the centre frequency.
- **1/3 octave**
  The Bandwidth is 1/3 octave (23.15 %) of the centre frequency.
- **Rel.Value**
  The Bandwidth is the entered Value of the centre frequency [%].
- **Abs. Value**
  The Bandwidth is constant, refering to the entered Value in Hz.

Note: The setting is always valid for both channels (Ch 1&2). The bandwidth used for measurement is always higher than or equal 10 Hz, independent of customer bandwitdh settings.

Selecting the measurement bandwidth

1. Press the BAND WIDTH **function key** in the SWEEP RMS SEL. **menu.**

   A selection field containing the available settings is displayed. The default setting is “1/3 octave“.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	1/3 octave

Entering the relative bandwidth manually

After you have selected the “Rel. Value” item, an entry field with the current relative bandwidth size pops up. The default setting is “1%“.

4. Enter a new value (↗ 5-65).

The permissible entry range is:

0.001 % ≤ REL. BANDWIDTH ≤ 100 %

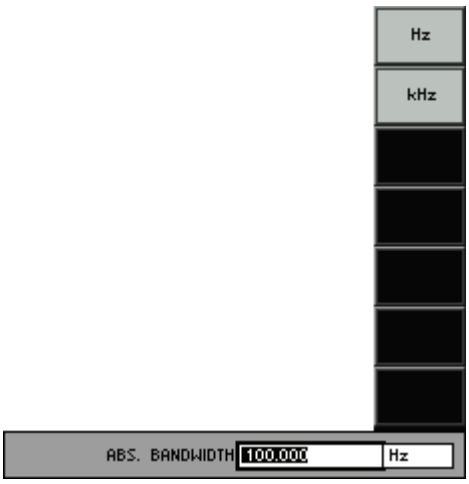
The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	1.000 %

Entering the absolute bandwidth

After you have selected the “Abs. Value” item, an entry field with the current absolute bandwidth size pops up. The default setting is “100 Hz“. At the same time, the function keys are assigned various units of measurement.



5. Enter a new value (↗ 5-65).

The permissible entry range is:

10 Hz ≤ ABS. BANDWIDTH ≤ fs * 0.1 Hz

within: fs - the lower value of the current generator´s and analyzor´s sampling frequencies in [Hz]

The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	100.000 Hz

Setting the Sweep Parameters for Frequency

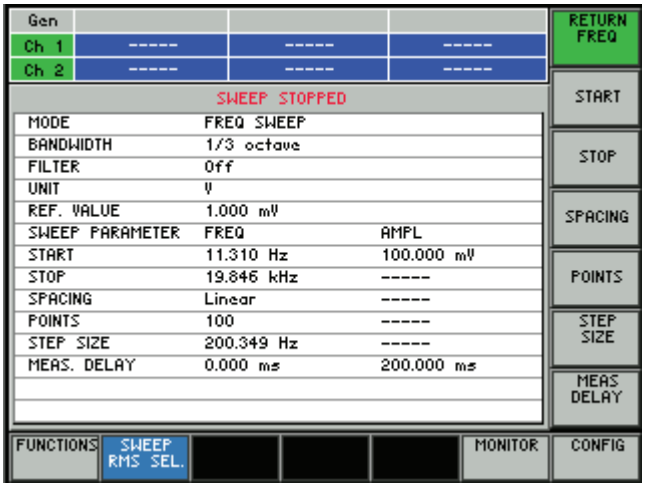
Description

You can set the sweep parameters for the frequency in the PARAM FREQ submenu.

Selecting the PARAM FREQ submenu

Press the PARAM FREQ ⇒ **function key** in the SWEEP RMS SEL. **menu.**

The submenu is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN FREQ	Exit the submenu.	
START	Enter the start value.	(↗ 6-159)
STOP	Enter the stop value.	(↗ 6-159)
SPACING	Select scaling of sweep steps (Lin/Log).	(↗ 6-161)
POINTS	Enter the number of reading points.	(↗ 6-161)
STEP SIZE	Enter the step size.	(↗ 6-161)
MEAS DELAY	Enter the measurement delay.	(↗ 6-163)

Note: With the AMPL SWEEP sweep mode (↗ 6-156), only the START and MEAS DELAY function keys are available. By using the START key, you can enter a frequency value; MEAS DELAY determines the start delay of a new sweep.

Entering the Frequency Range

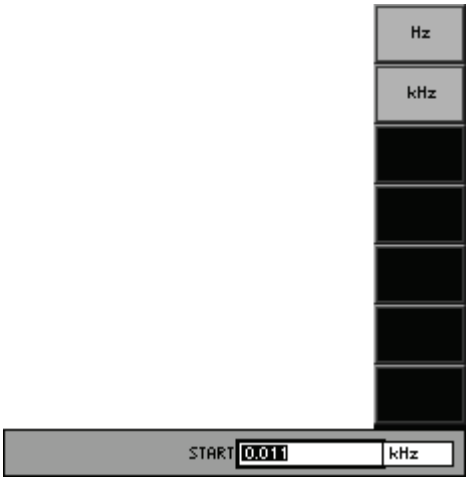
Use

To set the frequency range, enter the start [START] and stop [STOP] values of the frequency sweep.

Entering the start value

1. Press the [START] **function key** in the [PARAM FREQ ⇒] **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is "11 Hz". At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   BW/2 ≤ Start ≤ f_{max} – BW/2

   within: f_{max} - maximum frequency of generator type (↗ 6-107)

   The new setting is stored and displayed in the parameter field.

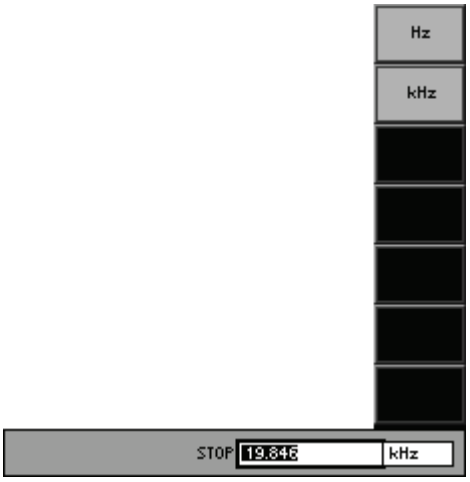
SWEEP PARAMETER	FREQ	AMPL
START	11.310 Hz	

Note: If the start value is higher than the stop value, the stop value is adjusted automatically.

3. Press the STOP **function key** in the PARAM FREQ ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “19.846 kHz“. At the same time, the function keys [13] are assigned various units of measurement.

Entering the stop value



4. Enter a new value (↗ 5-65).

The permissible entry range is:

$$\mathbf{BW/2 \leq Start \leq f_{max} - BW/2}$$

within: f_{max} - maximum frequency of generator type (↗ 6-107)

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP	19.846 kHz	

Note: If the start value is higher than the stop value, the start value is adjusted automatically.

Selecting the Spacing of Sweep Steps (Lin/Log)

Use

The spacing of the sweep points can be selected. You can decide if the distance between the values set one after another is in **Linear** or **Logarithmic** steps.

Selecting the Spacing

1. Press the SPACING **function key** in the corresponding PARAM FREQ ⇒ or PARAM AMPL ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING	Linear	Linear

Entering the Frequency Resolution

Use

You can enter the frequency resolution in two different ways:

- **POINTS**
  Enter the number of reading points.
  Based on the frequency range, the generator calculates the position of the reading points and automatically determines the step size.
- **STEP SIZE**
  Enter the step size.
  Based on the frequency range, the generator calculates the number of reading points and automatically determines their position.

The first possibility: Entering the number of reading points

1. Press the POINTS **function key** in the PARAM FREQ ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “100“.

2. Enter a new value (↗ 5-65).

   The permissible entry range depends on the frequency range; with maximum frequency range it is:

   2 ≤ POINTS ≤ 1024

   The new setting is stored and displayed in the parameter field.

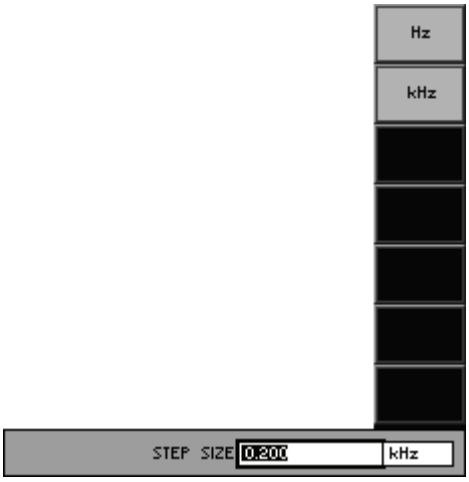
SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS	100	

The second possibility: Entering the step size

3. Press the STEP SIZE **function key** in the PARAM FREQ ⇒ **submenu**.

In case of linear spacing, the default setting is “200 Hz“. At the same time, the function keys are assigned various units of measurement.

In case of logarithmic spacing, factor for step size is used.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the frequency range; with maximum frequency range it is:

Linear spacing:

(START-STOP)/1023 ≤ STEP SIZE ≤ f_{max}

Logarithmic spacing

(STOP/START)/1023 ≤ STEP SIZE ≤ STOP/START

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE	200.349 Hz	

Entering the Measurement Delay

Use

You can set a delay for the level measurement. This delay refers to the waiting period between the frequency setting and the start of the amplitude measurement.

Entering the measurement delay

1. Press the MEAS DELAY **function key** in the PARAM FREQ ⇒ **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is ”0 ms“.

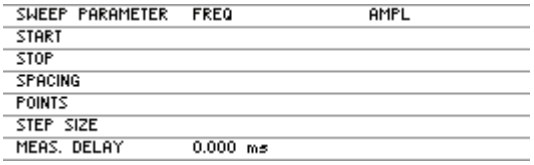
   

2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0 ms ≤ MEAS DELAY ≤ 5 s

   The new setting is stored and displayed in the parameter field.

Setting the Amplitude Sweep Parameters

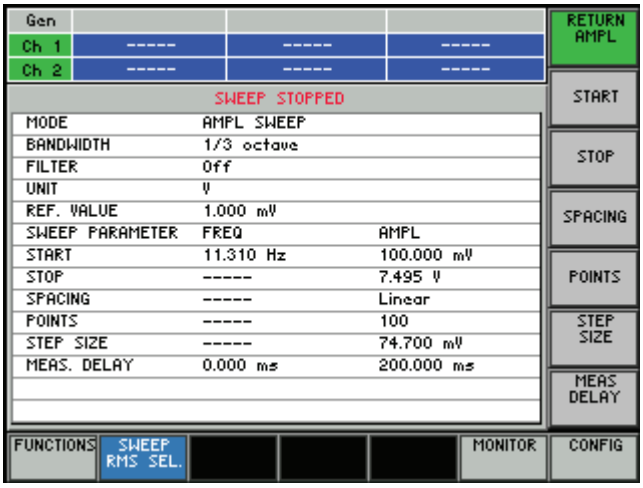
Description

You can set the sweep parameters for the amplitude in the PARAM AMPL submenu.

Selecting the PARAM AMPL submenu

Press the PARAM AMPL ⇒ **function key** in the SWEEP RMS SEL. **menu.**

The submenu name is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN AMPL	Exit the submenu.	
START	Enter the start value.	(↗ 6-165)
STOP	Enter the stop value.	(↗ 6-165)
SPACING	Select scaling of sweep steps (Lin/Log).	(↗ 6-161)
POINTS	Enter the number of reading points.	(↗ 6-167)
STEP SIZE	Enter the step size.	(↗ 6-167)
MEAS DELAY	Enter the measurement delay.	(↗ 6-168)

Note: With the FREQ SWEEP sweep mode (↗ 6-156), only the START and MEAS DELAY function keys are available. By using the START key, you can enter an amplitude value; MEAS DELAY determines the start delay of a new sweep.

Entering the Amplitude Range

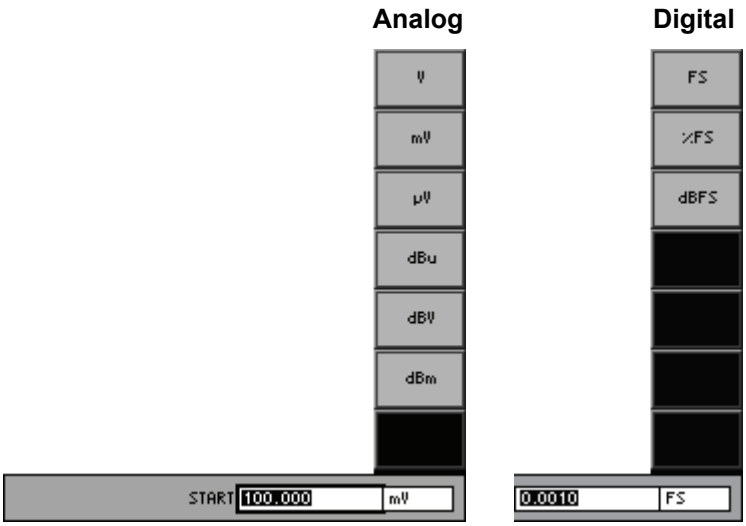
Use

To set the amplitude range, enter the START and STOP values of the amplitude sweep.

Entering the start value

1. Press the START **function key** in the PARAM AMPL ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)”. At the same time, the function keys are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 µV ≤ Start ≤ V_{Stop} **(Analog)**

   0.0001 FS ≤ Start ≤ V_{Stop} **(Digital)**

   -140 dBFS ≤ Start ≤ V_{Stop} **(Digital)**

   within: V_{Stop} - stop value of amplitude sweep (↗ below)

   The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		100.000 mV

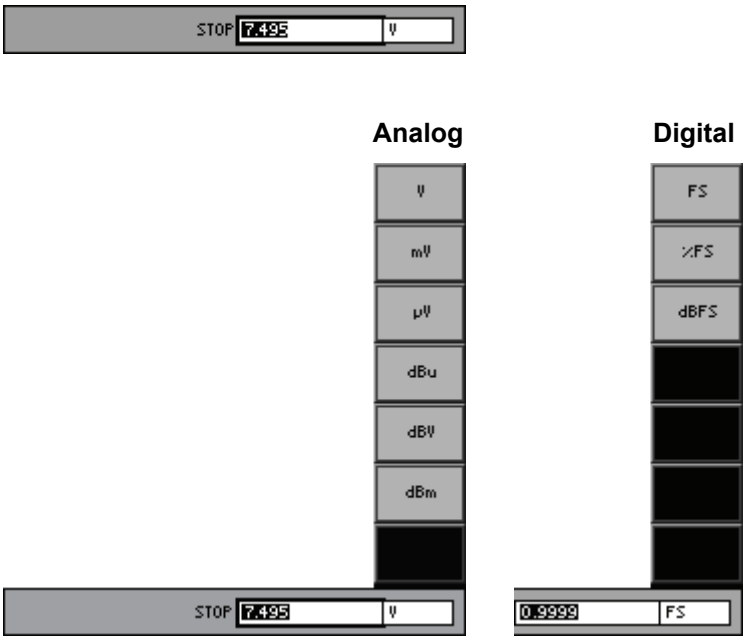
Digital

SWEEP PARAMETER	FREQ	AMPL
START		0.0010 FS

Entering the stop value

3. Press the STOP **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “7.495 V (0.9999 FS)”. At the same time, the function keys are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

V_{Start} ≤ Stop ≤ 7.495 V **(Analog)**

V_{Start} ≤ Stop ≤ 0.9999 FS **(Digital)**

within: V_{Start} - stop value of amplitude sweep (↗ above)

The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		7.495 V

Digital

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		0.9999 FS

Selecting the Spacing of Sweep Steps (Lin/Log)

Use

The spacing of the sweep points can be selected. You can decide if the distance between the valus set one after another is in **Linear** or **Logarithmic** steps.

Selecting the Spacing

1. Press the SPACING **function key** in the corresponding PARAM FREQ ⇒ or PARAM AMPL ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING	Linear	Linear

Entering the Amplitude Resolution

Use

You can enter the amplitude resolution in two different ways:

- **POINTS**
  Enter the number of reading points.
  Based on the amplitude range, the generator calculates the position of the reading points and automatically determines the step size.
- **STEP SIZE**
  Enter the step size.
  Based on the amplitude range, the generator calculates the number of reading points and automatically determines their position.

The first possibility: Entering the number of reading points

1. Press the POINTS **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “100“.

2. Enter a new value (↗ 5-65).

The permissible entry range depends on the sweep mode; with maximum amplitude range it is:

2 ≤ POINTS ≤ 10 **for concatenated sweep**

2 ≤ POINTS ≤ 1024 **for amplitude sweep**

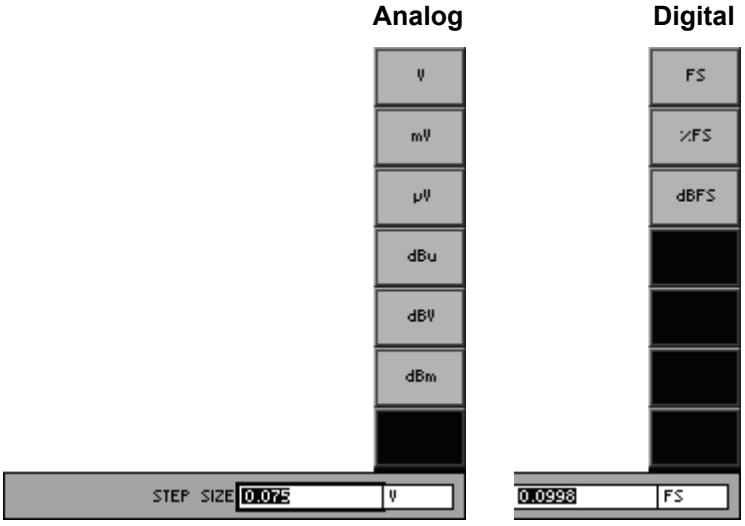
The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		100

The second possibility: Entering the step size

3. Press the STEP SIZE **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “74.7 mV (0.9998 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the amplitude range; with maximum amplitude range and linear spacing it is:

8 mV ≤ STEP SIZE ≤ 7.494 V **(Analog)**

0.0010 FS ≤ STEP SIZE ≤ 0.9980 FS **(Digital)**

The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		74.700 mV

Digital

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		0.0998 FS

Entering the Measurement Delay

Use

You can set a delay for the level measurement. This delay refers to the waiting time between the amplitude setting and the start of the amplitude measurement.

Entering the measurement delay

1. Press the MEAS DELAY **function key** in the PARAM AMPL ⇒ **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is ”200 ms“.

2. Enter a new value (↗ 5-65).

The permissible entry range is:

0 ms ≤ MEAS DELAY ≤ 5 s

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		
MEAS. DELAY		200.000 ms

Selecting the Unit for the Level Display

Use

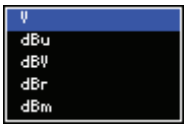
All measurements that return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the relative unit (dBr, dBrFS), the measurement result is displayed taking the entered reference value into consideration.

Selecting a unit

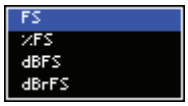
1. Press the UNIT **function key** in the SWEEP RMS SEL. **menu.**

   A selection field containing the available settings is displayed. The default setting is “V (FS)”.

   Analog

   Digital

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

   Analog

   Digital

Selecting the reference value

If you have selected the relative unit (dBr, dBrFS), a selection field containing various reference values appears.

- **Value**
  Manual reference value entry (↗ below)
- **Cursor X1**
  The current Y-coordinate value of the X1 cursor is stored and used as the reference value for other measurements.
- **Cursor X2**
  The current Y-coordinate value of the X2 cursor is stored and used as the reference value for other measurements.

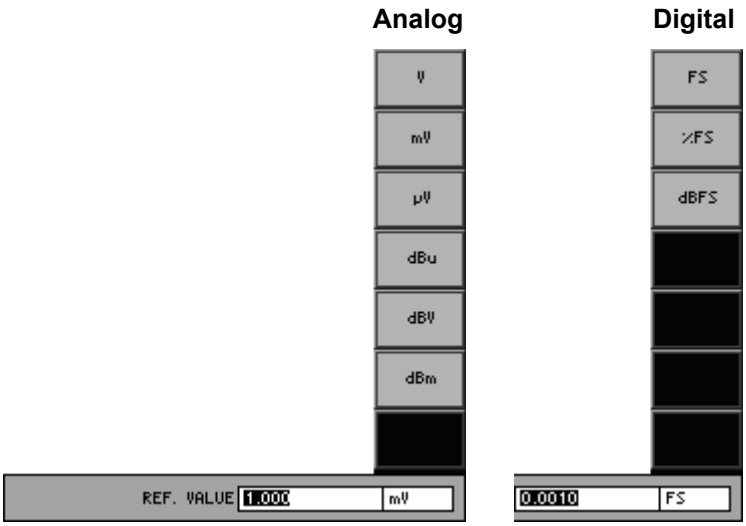
The default setting is “Value“.

4. Use the **rotary knob** [11] to select a setting.
5. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Entering the reference value manually

After you have selected the “Value” setting, an entry field with the current reference value pops up. The default setting is “1 mV (0.001 FS)”. At the same time, the function keys are assigned various units of measurement.



6. Enter a new value (↗ 5-65).

The permissible entry range is:

1 µV ≤ REF. VALUE ≤ 100 V **(Analog)**

0.0001 FS ≤ REF. VALUE ≤ 0.999 FS **(Digital)**

-120 dBFS ≤ REF. VALUE ≤ -0.001 dBFS **(Digital)**

The new setting is stored and displayed in the parameter field.

Analog

REF. VALUE	1.000 mV

Digital

REF. VALUE	0.0010 FS

6.2.2.2.11 SWEEP THD

Description

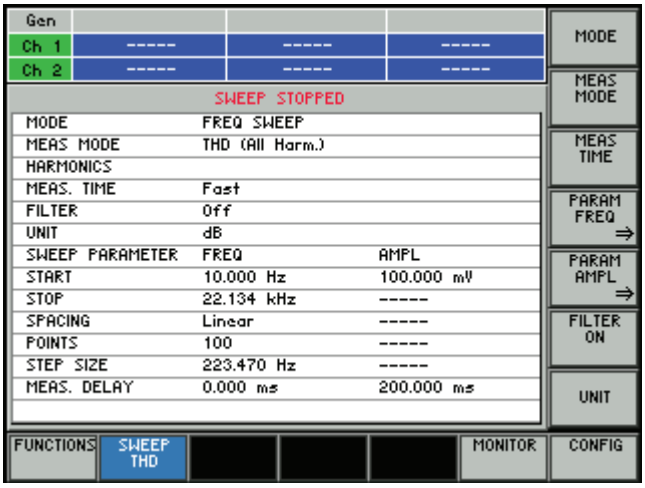
You can set the function parameters for a swept sinewave signal in the SWEEP THD menu. Frequency and/or amplitude may change in this case. The associated measurement function is automatically activated in the analyzer.

Note: The sweep can be combined with only a few analyzer functions (Peak, Quasi peak, RMS/FREQ). You have to switch off all other analyzer functions before you can activate the sweep.

Selecting the SWEEP THD menu

1. Call the generator **SWEEP THD** function (↗ 6-112).
2. Select the SWEEP THD **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

MODE — Select the sweep mode. (↗ 6-156)

MEAS MODE — Select the mesurement mode. (↗ 6-193)

MEAS TIME — Set the measurement time. (↗ 6-157)

PARAM FREQ ⇒ — **Open the submenu:** (↗ 6-158)
Set the sweep parameters for frequency.

PARAM AMPL ⇒ — **Open the submenu:** (↗ 6-164)
Set the sweep parameters for amplitude.

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

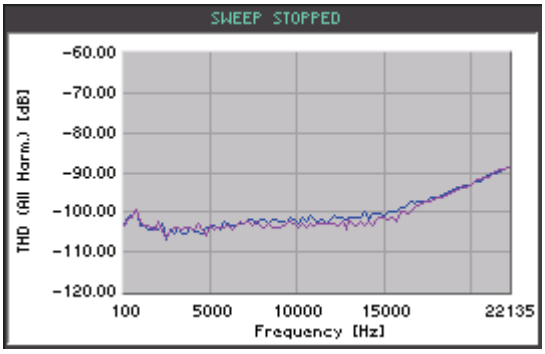
UNIT — Select the unit for the level display. (↗ 6-208)

Displaying and analyzing measurement results

Graphical display

- Switch the DUT between the generator [8] and analyzer [9], **or** switch the
  Generator output to Analyzer input internally (↗ 6-218).
- Select the **CURVE PLOT** display mode in the Graph menu (↗ 6-288).
- Press the numeric key **4** to start sweeping (↗ 6-285).

A measurement diagram with the sweep parameters is shown in the display area.



Note: In the Graph menu, you can change the graphic display area (↗ 6-288) and analyze the trace using the cursors (↗ 6-300). For activating the cursors you must stop the sweep.

List of measurement values

- Switch the DUT between the generator [8] and analyzer [9], **or** switch the
  Generator output to Analyzer input internally (↗ 6-218).
- Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-288).
- Press the numerical key **4** to start sweeping (↗ 6-285).

The frequency and level values of the sweep are displayed.

SWEEP STOPPED

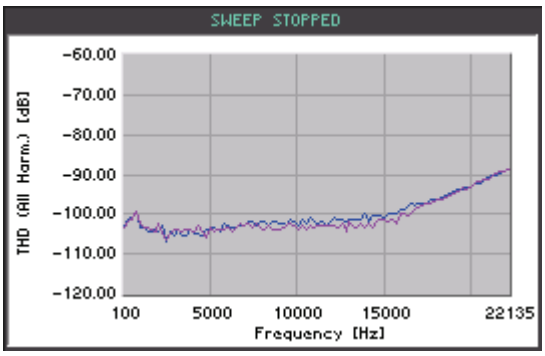
Amplitude	0.100 V	0.100 V
Frequency	Ch1	Ch2
100.000 Hz	-102.60 dB	-103.44 dB
199.000 Hz	-97.56 dB	-96.29 dB
298.000 Hz	-102.33 dB	-102.37 dB
397.000 Hz	-69.77 dB	-99.92 dB
496.000 Hz	-56.56 dB	-101.26 dB
595.000 Hz	-54.50 dB	-102.17 dB
694.000 Hz	-62.14 dB	-98.68 dB
793.000 Hz	-64.67 dB	-103.38 dB
892.000 Hz	-62.33 dB	-104.05 dB
991.000 Hz	-49.97 dB	-102.10 dB
1090.000 Hz	-55.28 dB	-100.97 dB
1189.000 Hz	-61.73 dB	-101.02 dB

Selecting the Sweep Mode

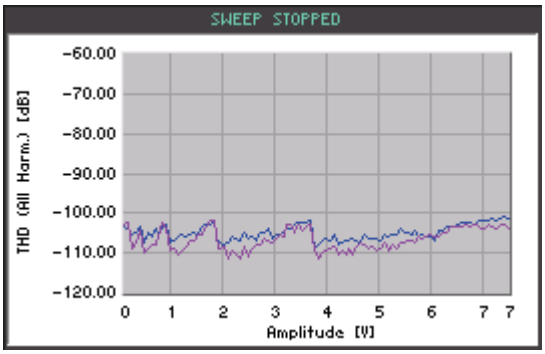
Use

You can select the parameters for sweeping:

- **FREQ SWEEP**
  The generator sweeps the frequency at fixed amplitude. The measured **THD** versus the FREQ generator frequency is displayed.

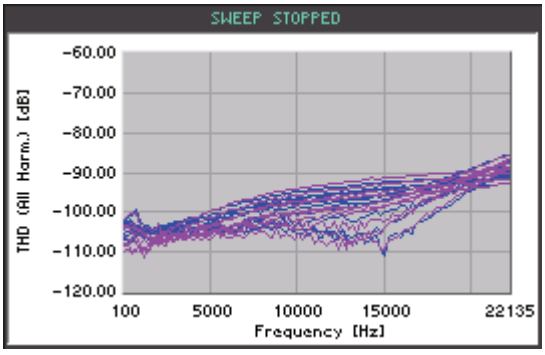


- **AMPL SWEEP**
  The generator sweeps the amplitude at a fixed frequency. The measured **THD** versus the AMPL generator amplitude is displayed.



- **FREQ&AMPL SWEEP**

  The generator sweeps the frequency at different amplitudes. The measured **THD** versus the FREQ generator frequency is displayed.



Note: The setting is always valid for both channels (Ch 1&2).

Selecting the sweep mode

1. Press the MODE **function key** in the SWEEP THD **menu.**

   A selection field containing the available settings is displayed. The default setting is “FREQ SWEEP “.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Ch 1&2

MODE	FREQ SWEEP

Selecting the Measurement Mode

Use

All harmonics (with the distortion factor measurement) and the noise power (with THD+N and SINAD) are measured and displayed as a table or graph.

You can select different measurement methods for the distortion factor and the signal/noise ratio.

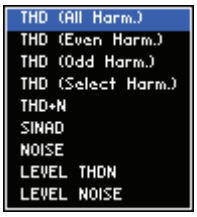
- **THD (All Harm.)**
  All harmonics are measured.
- **THD (Even Harm.)**
  All even harmonics are measured.
- **THD (Odd Harm.)**
  All odd harmonics are measured.
- **THD (Select Harm.)**
  All selected harmonics are measured.
- **THD + N**
  All harmonics and the noise are measured.
- **SINAD**
  All harmonics and the noise are measured.
- **NOISE**
  The noise is measured.
- **LEVEL THDN**
  The RMS value of harmonics and noise is measured.
- **LEVEL NOISE**
  The RMS value of the noise is measured.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the measurement mode

1. Press the MEAS MODE **function key** in the SWEEP THD **menu.**

   A selection field containing the available settings is displayed. The default setting is “THD (All Harm.)”.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

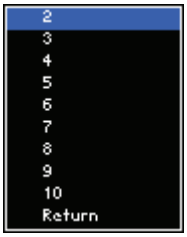
   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS MODE	THD (All Harm.)

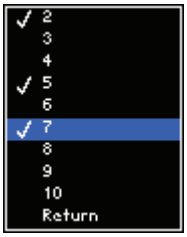
Selecting the harmonics (at measurement mode "Select Harm.")

If you have selected the "THD (Select Harm.)" measurement mode, the selection field is displayed with all harmonics.



4. Use the **rotary knob** [11] to select a setting and press the **ENTER key** [5] to change the selection.

   A check marker "✓" is displayed next to the corresponding number (harmonic), indicating the selection.



   Note: For deactivation of numbers (harmonics with marking) use the same way.

5. Use the **rotary knob** [11] to select the **Return** item.
6. Press the **ENTER** key [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

HARMONICS	3,4,5,9,10

Seting the Measurement Time

Use

You can select different measurement times according to the measurement task:

- **Fast**
  A fast measurement with a lower dynamic range is performed.
- **Normal**
  Measurement is performed with a higher dynamic range.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the measurement time

1. Press the MEAS TIME **function key** in the SWEEP THD **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS TIME	Fast

Setting the Sweep Parameters for Frequency

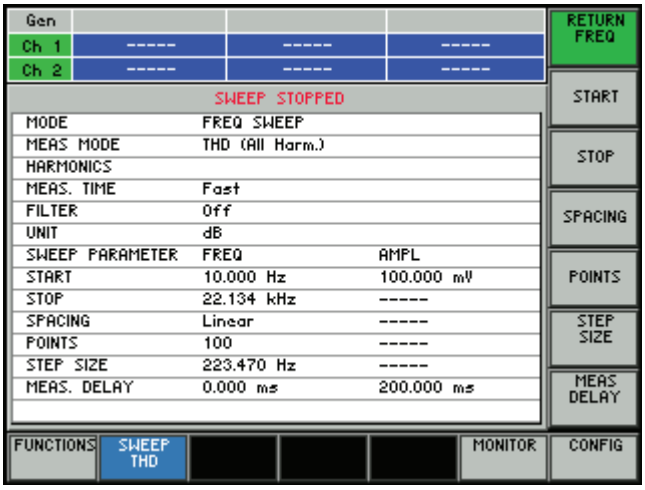
Description

You can set the sweep parameters for the frequency in the PARAM FREQ submenu.

Selecting the PARAM FREQ submenu

Press the PARAM FREQ ⇒ **function key** in the SWEEP THD **menu.**

The submenu is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN FREQ — Exit the submenu.

START — Enter the start value. (↗ 6-197)

STOP — Enter the stop value. (↗ 6-197)

SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-198)

POINTS — Enter the number of reading points. (↗ 6-199)

STEP SIZE — Enter the step size. (↗ 6-199)

MEAS DELAY — Enter the measurement delay. (↗ 6-201)

Note: With the AMPL SWEEP sweep mode (↗ 6-192), only the START and MEAS DELAY function keys are available. By using the START key, you can enter a frequency value; MEAS DELAY determines the start delay of a new sweep.

Entering the Frequency Range

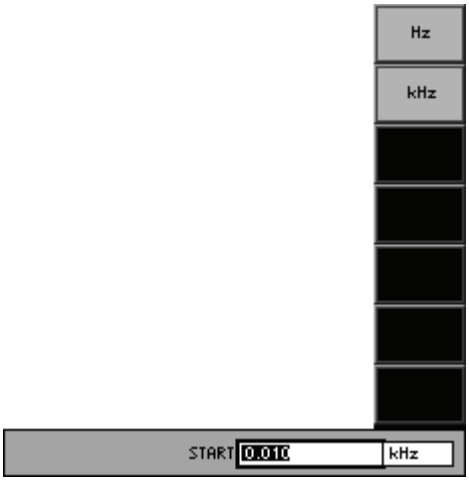
Use

To set the frequency range, enter the start [START] and stop [STOP] values of the frequency sweep.

Entering the start value

1. Press the [START] **function key** in the [PARAM FREQ ⇒] **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is "10 Hz". At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   10 Hz ≤ Start ≤ f_{max}

   within: f_{max} - maximum frequency of generator type (↗ 6-107)

   The new setting is stored and displayed in the parameter field.

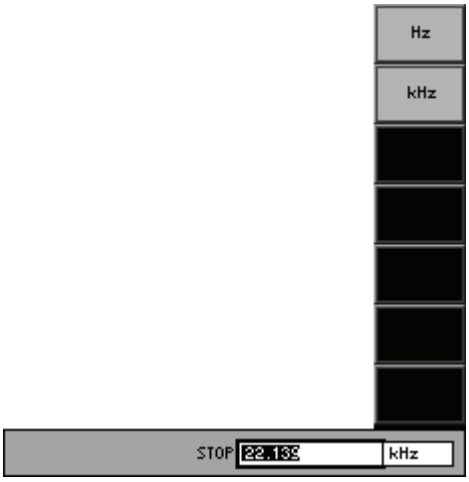
SWEEP PARAMETER	FREQ	AMPL
START	10.000 Hz	

Note: If the start value is higher than the stop value, the stop value is adjusted automatically.

Entering the stop value

3. Press the STOP **function key** in the PARAM FREQ ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “22.139 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

   The permissible entry range is:

   10 Hz ≤ Stop ≤ f_{max}

   within: f_{max} - maximum frequency of generator type (↗ 6-107)

   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP	22.139 kHz	

Note: If the start value is higher than the stop value, the start value is adjusted automatically.

Selecting the Spacing of Sweep Steps (Lin/Log)

Use

The spacing of the sweep points can be selected. You can decide if the distance between the valus set one after another is in **Linear** or **Logarithmic** steps.

Selecting the Spacing

1. Press the SPACING **function key** in the corresponding PARAM FREQ ⇒ or PARAM AMPL ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER** key [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING	Linear	Linear

Entering the Frequency Resolution

Use

You can enter the frequency resolution in two different ways:

- **POINTS**
  Enter the number of reading points.
  Based on the frequency range, the generator calculates the position of the reading points and automatically determines the step size.
- **STEP SIZE**
  Enter the step size.
  Based on the frequency range, the generator calculates the number of reading points and automatically determines their position.

The first possibility: Entering the number of reading points

1. Press the POINTS **function key** in the PARAM FREQ ⇒ **submenu**.

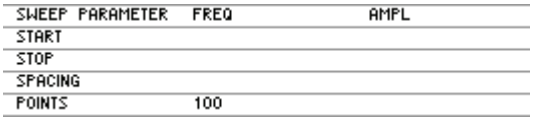
An entry field containing the currently applicable setting is displayed. The default setting is “100“.

2. Enter a new value (↗ 5-65).

The permissible entry range depends on the frequency range; with maximum frequency range it is:

2 ≤ POINTS ≤ 200

The new setting is stored and displayed in the parameter field.



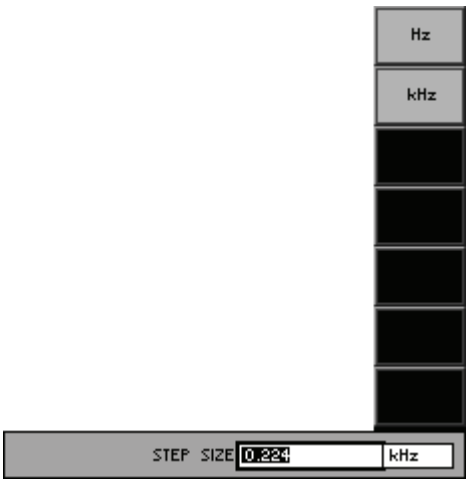
The second possibility: Entering the step size

3. Press the STEP SIZE **function key** in the PARAM FREQ ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed.

In case of linear spacing, the default setting is “224 Hz“. At the same time, the function keys are assigned various units of measurement.

In case of logaritmic spacing, a factor for step size is used.



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the frequency range; with maximum frequency range it is:

Linear spacing:

(START-STOP)/199 ≤ STEP SIZE ≤ f_{max}

Logarithmic spacing:

(STOP/START)/199 ≤ STEP SIZE ≤ STOP/START

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE	223.522 Hz	

Entering the Measurement Delay

Use

You can set a delay for the level measurement. This delay refers to the waiting period between the frequency setting and the start of the amplitude measurement.

Entering the measurement delay

1. Press the MEAS DELAY **function key** in the PARAM FREQ ⇒ **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is ”0 ms“.

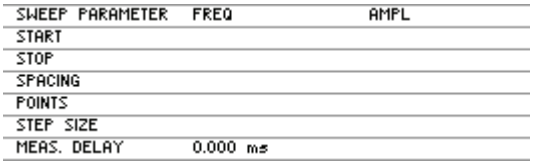
   

2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0 ms ≤ MEAS DELAY ≤ 5 s

   The new setting is stored and displayed in the parameter field.

Setting the Amplitude Sweep Parameters

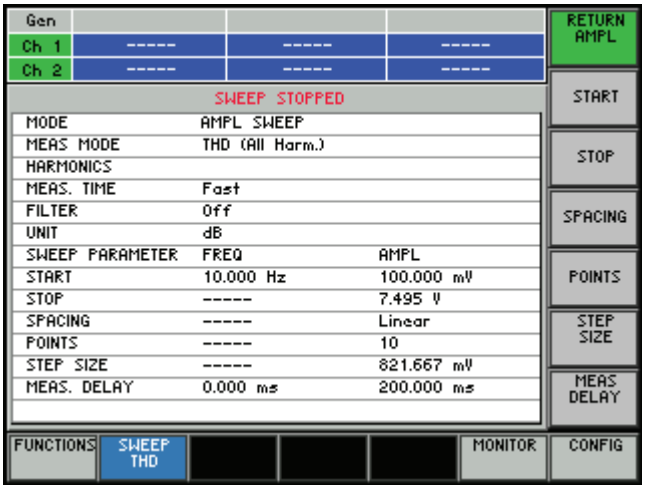
Description

You can set the sweep parameters for the amplitude in the PARAM AMPL submenu.

Selecting the PARAM AMPL submenu

Press the PARAM AMPL ⇒ **function key** in the SWEEP THD **menu.**

The submenu name is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN AMPL — Exit the submenu.

START — Enter the start value. (↗ 6-203)

STOP — Enter the stop value. (↗ 6-203)

SPACING — Select scaling of sweep steps (Lin/Log). (↗ 6-205)

POINTS — Enter the number of reading points. (↗ 6-206)

STEP SIZE — Enter the step size. (↗ 6-206)

MEAS DELAY — Enter the measurement delay. (↗ 6-207)

Note: With the FREQ SWEEP sweep mode (↗ 6-192), only the START and MEAS DELAY function keys are available. By using the START key, you can enter an amplitude value; MEAS DELAY determines the start delay of a new sweep.

Entering the Amplitude Range

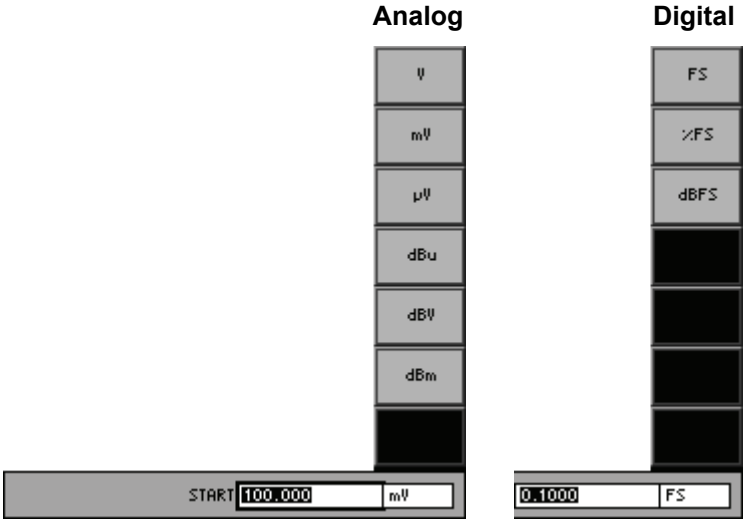
Use

To set the amplitude range, enter the START and STOP values of the amplitude sweep.

Entering the start value

1. Press the START **function key** in the PARAM AMPL ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “100 mV (0.1 FS)“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 µV ≤ Start ≤ V_{Stop} **(Analog)**

   0.0001 FS ≤ Start ≤ V_{Stop} **(Digital)**

   -140 dBFS ≤ Start ≤ V_{Stop} **(Digital)**

   within: V_{Stop} - stop value of amplitude sweep (↗ below)

   The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		100.000 mV

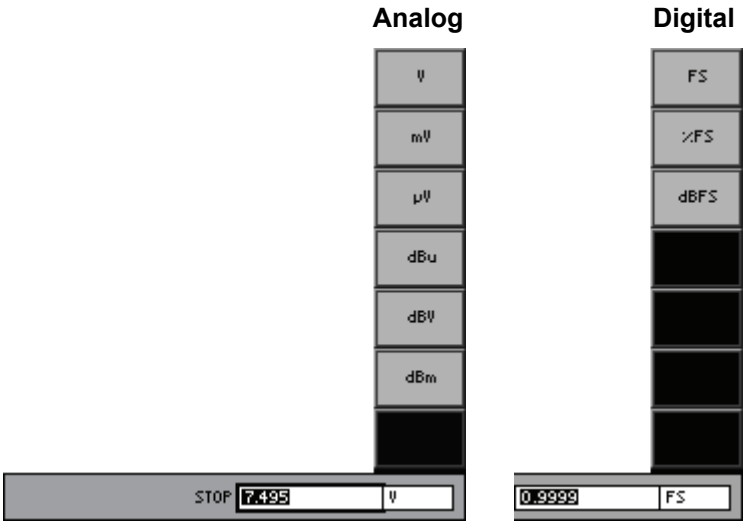
Digital

SWEEP PARAMETER	FREQ	AMPL
START		0.0010 FS

Entering the stop value

3. Press the STOP **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “7.495 V (0.9999 FS)”. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

V_{Start} ≤ Stop ≤ 7.495 V **(Analog)**

V_{Start} ≤ Stop ≤ 0.9999 FS **(Digital)**

within: V_{Start} - stop value of amplitude sweep (↗ above)

The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		7.495 V

Digital

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		0.9999 FS

Selecting the Spacing of Sweep Steps (Lin/Log)

Use

The spacing of the sweep points can be selected. You can decide if the distance between the valus set one after another is in **Linear** or **Logarithmic** steps.

Selecting the Spacing

1. Press the SPACING **function key** in the corresponding PARAM FREQ ⇒ or PARAM AMPL ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING	Linear	Linear

Entering the Amplitude Resolution

Use

You can enter the amplitude resolution in two different ways:

- **POINTS**
  Enter the number of reading points.
  Based on the amplitude range, the generator calculates the position of the reading points and automatically determines the step size.
- **STEP SIZE**
  Enter the step size.
  Based on the amplitude range, the generator calculates the number of reading points and automatically determines their position.

The first possibility: Entering the number of reading points

1. Press the POINTS **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “100“.

2. Enter a new value (↗ 5-65).

The permissible entry range depends on the sweep mode; with maximum amplitude range it is:

2 ≤ POINTS ≤ 10 **for concatenated sweep**

2 ≤ POINTS ≤ 200 **for amplitude sweep**

The new setting is stored and displayed in the parameter field.

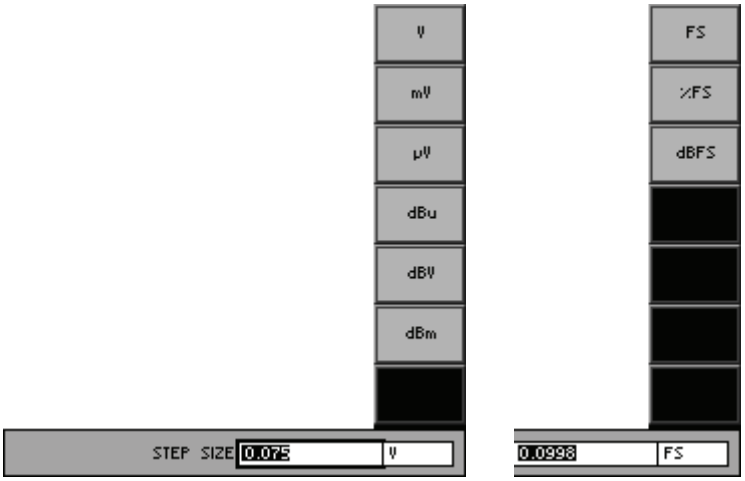
SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		100

The second possibility: Entering the step size

3. Press the STEP SIZE **function key** in the PARAM AMPL ⇒ **submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is “74.7 mV (0.9998 FS)”. At the same time, the function keys are assigned various units of measurement.

Analog **Digital**



4. Enter a new value (↗ 5-65).

The permissible entry range depends on the amplitude range; with maximum amplitude range it is:

8 mV ≤ STEP SIZE ≤ 7.494 V **(Analog)**

0.0010 FS ≤ STEP SIZE ≤ 0.9980 FS **(Digital)**

The new setting is stored and displayed in the parameter field.

Analog

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		74.700 mV

Digital

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		0.0998 FS

Entering the Measurement Delay

Use

You can set a delay for the level measurement. This delay refers to the waiting time between the amplitude setting and the start of the amplitude measurement.

Entering the measurement delay

1. Press the MEAS DELAY **function key** in the PARAM AMPL ⇒ **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is ”200 ms“.

2. Enter a new value (↗ 5-65).

The permissible entry range is:

0 ms ≤ MEAS DELAY ≤ 5 s

The new setting is stored and displayed in the parameter field.

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
SPACING		
POINTS		
STEP SIZE		
MEAS. DELAY		200.000 ms

Selecting the Unit for the Level Display

Use

You can set different units of the level display depending on measurement task.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the unit

1. Press the UNIT **function key** in the SWEEP THD **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Ch 1&2

UNIT	dB

6.2.3 Audio Monitoring Output (MONITOR)

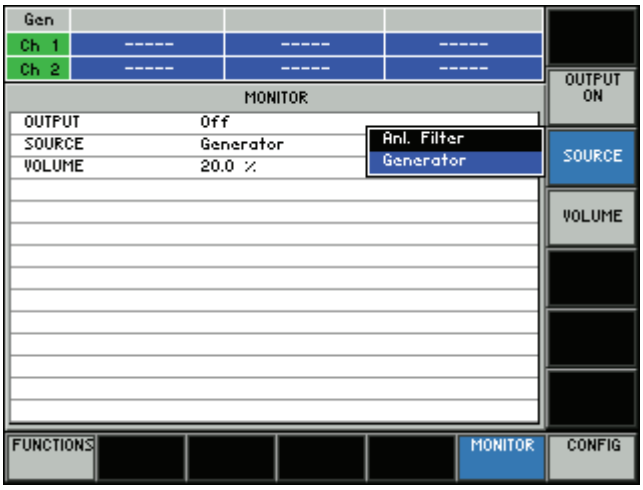
Description

In the MONITOR menu, you can configure the audio monitoring output of the R&S UP300/350. This includes selection of the signal source and the volume adjustment.

Selecting the MONITOR menu

Select the MONITOR **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

OUTPUT ON — Switch the audio monitoring output on/off. (↗ 6-210)

SOURCE — Select the signal source. (↗ 6-211)

VOLUME — Enter the volume. (↗ 6-211)

Activating/Deactivating the Audio Monitoring Output

Use

At the audio monitoring output [15], you can use headphones or scope to monitor signals which can be tapped at various points in the R&S UP300/350. To do so, you must first switch on the audio monitoring output.

Note: The setting is always valid for both channels (Ch 1&2).

Activating the audio monitoring output

1. Press the OUTPUT ON **function key** in the MONITOR **menu.**

The function key is **highlighted**. The new setting is stored and displayed in the parameter field.

After you switch on the audio monitoring output, the generator signal is applied at the output [8].

Deactivating the audio monitoring output

2. Press the OUTPUT ON **function key** in the MONITOR **menu.**

The function key is **no longer highlighted**. The new setting is stored and displayed in the parameter field.

Selecting the Signal Source

Use

You can monitor signals at the audio monitoring output [15] using headphones. You can select the following signal sources:

- **Anl. Filter**
  Analyzer signal downstream of the filter stage
- **Generator**
  Generator output signal

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the signal source

1. Press the SOURCE **function key** in the MONITOR **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1&2
SOURCE	Generator

Setting the Volume

Use

You can enter the volume of the signal at the audio monitoring output. The setting is in percent and refers to the corresponding signal level.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Entering the volume

2. Press the VOLUME **function key** in the MONITOR **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is "20 %".

3. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0 % ≤ VOLUME ≤ 100 %

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
VOLUME	20.0 %	20.0 %

6.3 Analyzer

Introduction

The analyzer is capable of performing standard audio measurements with a high degree of accuracy. The measurement functions are either analog or digital (R&S UP350 only). You can activate up to 3 digital filters. All of the filters commonly used for audio measurements are predefined.

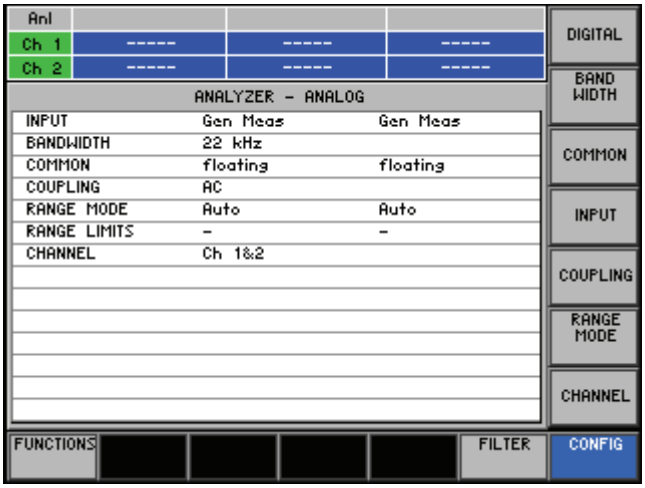
Apart from displaying measurement results numerically, you can also analyze the measurements graphically (↗ 6-286).

Activating the Analyzer menu

Press the **main menu** ANL **selection key.**

1. The instrument has to be in local mode.
2. Close the SYS menu if opened.
3. Close every entry field if opened.

The Analyzer menu is displayed:



Menus for configuring and setting measurement parameters

The menus used to set the analyzer functions are displayed in the menu area.

FUNCTIONS — Select the measurement functions. (↗ 6-224)

FILTER — Configure the filter. (↗ 6-282)

CONFIG — Configure the input parameter. (↗ 6-213)

6.3.1 Configuring the Analyzer (CONFIG)

Description

The CONFIG menu is used for basic configuration of the analyzer. The following settings are made in the CONFIG menu:

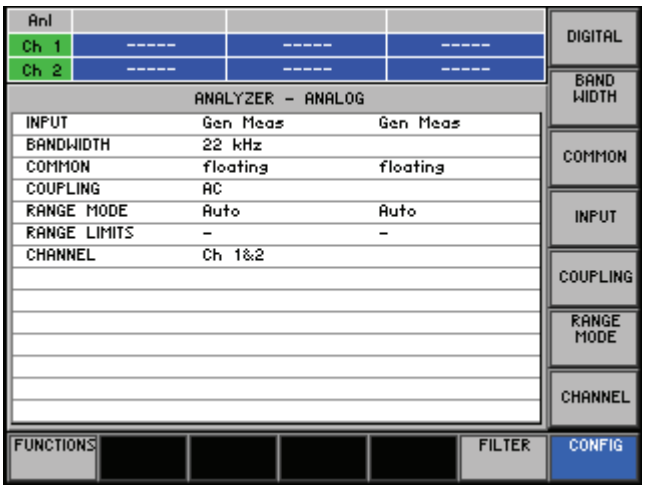
- Switchover between the analog and digital analyzer (R&S UP350 only)
- Input switchover of the digital analyzer (R&S UP350 only)
- Switchover between bandwidths (sample rate)
- Activation/Deactivation of analog input and switchover to generator output
- Input configuration
- Selection of range switching and of measurement range
- Selection of measurement channel

Selecting the CONFIG menu

Select the CONFIG **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.

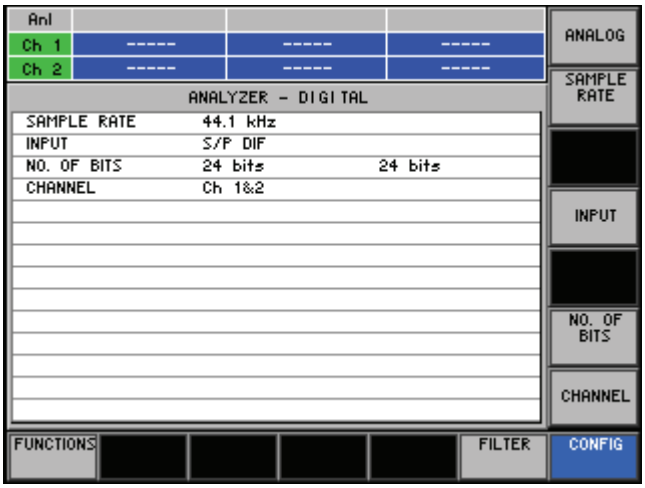
Analog analyzer



Function key assignment

DIGITAL	Select the analyzer type (digital) (R&S UP350 only).	(↗ 6-215)
BAND WIDTH	Select the analyzer bandwidth.	(↗ 6-216)
COMMON	Select the reference potential of the input signal.	(↗ 6-217)
INPUT	Select the signal source.	(↗ 6-218)
COUPLING	Select the signal coupling.	(↗ 6-219)
RANGE MODE	Select the measurement range selection mode.	(↗ 6-220)
CHANNEL	Select the measurement channel.	(↗ 6-221)

Digital analyzer (R&S UP350 only)



Function key assignment

ANALOG	Select the analyzer type (analog).	(↗ 6-215)
SAMPLE RATE	Select the sample frequency of the input signal.	(↗ 6-222)
INPUT	Select the input signal.	(↗ 6-223)
NO. OF BITS	Select the valid number of bits in the input signal.	(↗ 6-223)
CHANNEL	Select the measurement channel.	(↗ 6-221)

6.3.1.1 Selecting the Analyzer Type – Analog/Digital (R&S UP350 only)

Use

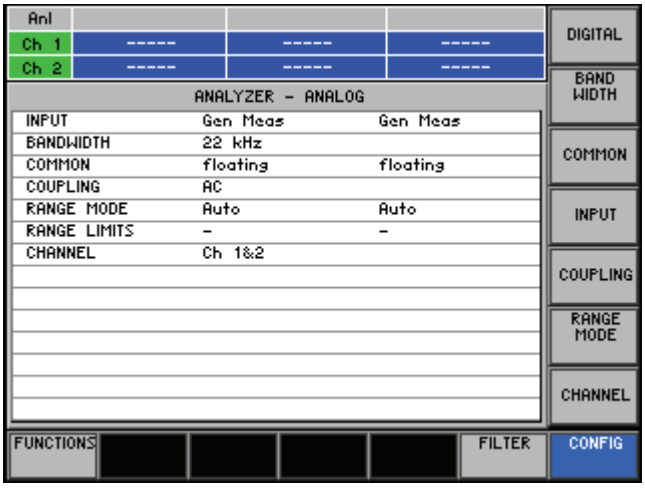
When the analyzer type is changed, the new analyzer (e.g. digital) with the currently selected measurement functions and the stored parameters of the old analyzer type (e.g. analog) is started.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the Analog analyzer

Press the ANALOG **function key** in the CONFIG **menu.**

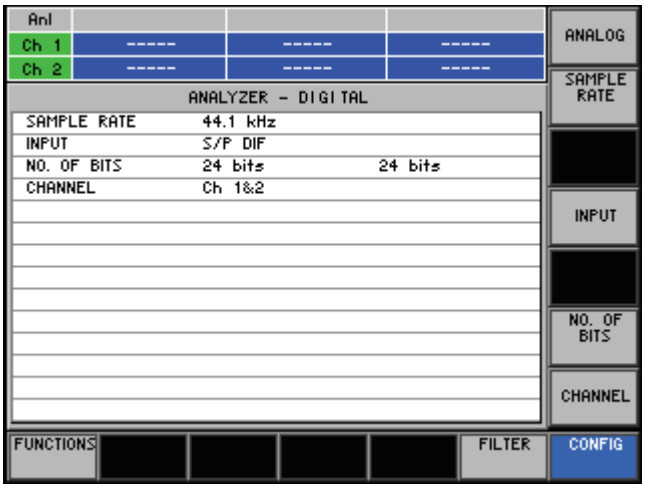
The instrument is in the analog mode. You can then use all the function keys which appear to configure the input parameters and the basic conditions of the analyzer. If the status line shows “ANALYZER – ANALOG”, the instrument is in the analog mode.



Selecting the Digital analyzer

Press the DIGITAL **function key** in the CONFIG **menu.**

The instrument is in the digital mode. You can then use all the function keys which appear to configure the input parameters. If the status line shows “ANALYZER – DIGITAL”, the instrument is in the digital mode.



6.3.1.2 Analog Analyzer

6.3.1.2.1 Selecting the Analyzer Bandwidth

Use

Switching the bandwidth changes the sample frequency. The measurement features depend on the ratio of signal frequency to sample frequency. It influences, for example, the lower limit frequency of the phase measurement, the frequency resolution of the FFT, and the dynamic range of filters at low frequencies. To fully utilize the features of the R&S UP300/350, you should therefore set your instrument to the bandwidth that you actually require.

The R&S UP300/350 provides the following bandwidths for the analog analyzer:

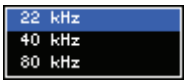
- **22 kHz**
- **40 kHz**
- **80 kHz**

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the analyzer bandwidth

1. Press the BAND WIDTH **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “22 kHz“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	22 kHz

6.3.1.2.2 Selecting the Reference Potential of the Input Signal

Use

To prevent hum pick-up caused by grounding loops, the test setup must not have multiple grounding points. Instead, only one point of the test setup should be connected to the housing ground. Depending on the application, you can select the following reference potentials for the input signal of the analyzer (output signal of the generator, ↗ 6-103):

- **Grounded**
  Refering to the housing potential
- **Floating**
  "Electronically floating"

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

   The selected channel is displayed in green in the channel display.

Selecting the reference potential

2. Press the COMMON **function key** in the CONFIG **menu.**

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

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
COMMON	floating	floating

6.3.1.2.3 Selecting the Signal Source

Use

The R&S UP300/350 allows you to deactivate the analyzer input or to activate either the test connectors or the generator output.

- **Off**
  The signal inputs are deactivated.
- **On**
  The signal inputs are activated.
- **Gen Meas**
  Analyzer input Ch 2 is internally switched to generator output Ch 1, and analyzer input Ch 1 to generator output Ch 2.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Selecting the signal source

2. Press the INPUT **function key** in the CONFIG **menu.**
   A selection field containing the available settings is displayed. The default setting is “On“.

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
INPUT	On	On

Note: When the signal inputs are switched off, INPUT OFF is displayed in measurement displays (↗ 5-57).

6.3.1.2.4 Selecting the Signal Coupling

Use

The signal coupling function is used to select between a DC voltage coupling (**DC**) and AC voltage coupling (**AC**). Owing to the capacitive signal coupling associated with the AC coupling, a digital high-pass filter is added to ensure effective suppression of the DC offset.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the signal coupling

1. Press the COUPLING **function key** in the CONFIG **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
COUPLING	AC	AC

6.3.1.2.5 Selecting the Measurement Range Selection Mode

Use

The measurement range selection mode determines how the input voltage is to be measured at the input amplifier of the analyzer:

- **Auto**
  Automatic measurement range selection; the optimum range is selected.
- **Fixed**
  The set measurement range is selected.
- **Lower**
  Automatic measurement with the defined lowest possible range used.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Selecting the measurement range selection mode

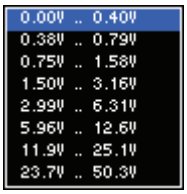
2. Press the RANGE MODE **function key** in the CONFIG **menu.**
   A selection field containing the available settings is displayed. The default setting is “Auto“.

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
RANGE MODE	Auto	Auto
RANGE LIMITS	-	-

Entering the level range (at level setting „Fixed/Lower“)

After you have selected the “Fixed/Lower” level setting, an entry field with the current level range pops up. The default setting is “0.00 V .. 0.40 V“.



1. Use the **rotary knob** [11] to select a setting.
2. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
RANGE MODE	Fixed	Fixed
RANGE LIMITS	0.00V .. 0.40V	0.00V .. 0.40V

6.3.1.2.6 Selecting the Measurement Channel

Use

You can first select the channel which you want for measurements. You can choose between the following settings:

- **Ch 1**
  Measurement channel Ch 1 is active.
- **Ch 2**
  Measurement channel Ch 2 is active.
- **Ch 1&2**
  Both measurement channels Ch 1 and Ch 2 are active.

Selecting the measurement channel

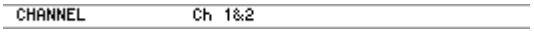
1. Press the CHANNEL **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “Ch 1&2“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

6.3.1.3 Digital Analyzer (R&S UP350 only)

6.3.1.3.1 Selecting the Sample Frequency of the Input Signal

Use

You can set the sample rate of the input signal. If the sample frequency of the analyzer does not correspond to the signal frequency, many measurement functions will return incorrect measurements (especially if filters are activated).

The sample frequency f_{sample} determines the maximum analyzer frequency f_{max}. You can select the following sample frequencies:

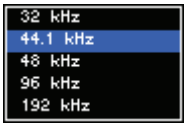
- **32 kHz** (f_{max} = 14.51 kHz)
- **44.1 kHz** (f_{max} = 19.999 kHz)
- **48 kHz** (f_{max} = 21.768 kHz)
- **96 kHz** (f_{max} = 43.536 kHz)
- **192 kHz** (f_{max} = 87.07 kHz)

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the sample frequency

1. Press the SAMPLE RATE **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “44.1 kHz“.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

SAMPLE RATE	44.1 kHz

6.3.1.3.2 Selecting the Input Signal

Use

The R&S UP350 allows you to select the following digital interfaces as signal sources:

- **S/P DIF**
  BNC digital input
- **Optical**
  Optical digital input

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the interface protocol

1. Press the INPUT **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “S/P DIF“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1&2
INPUT	S/P DIF

6.3.1.3.3 Selecting the Valid Number of Bits in the Input Signal

Use

If the word size of the input signal is reduced, the audio data is truncated to the specified wordwidth (bits).

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

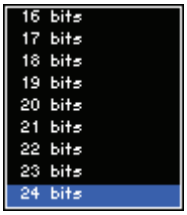
   The selected channel is displayed in green in the channel display.

Selecting the valid number of bits

2. Press the NO. OF BITS **function key** in the CONFIG **menu.**

   A selection field containing the available settings is displayed. The default setting is “24 bits“.

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
NO. OF BITS	24 bits	24 bits

6.3.2 Setting the Measurement Functions (FUNCTIONS)

Description

In the FUNCTIONS menu, you can select the analyzer functions which you want to activate and configure. The selected measurement function is displayed in a vacant field in the menu bar and is available as a menu key to allow you to enter parameters for the measurement function. At the same time, the appropriate measurement function is activated in the analyzer.

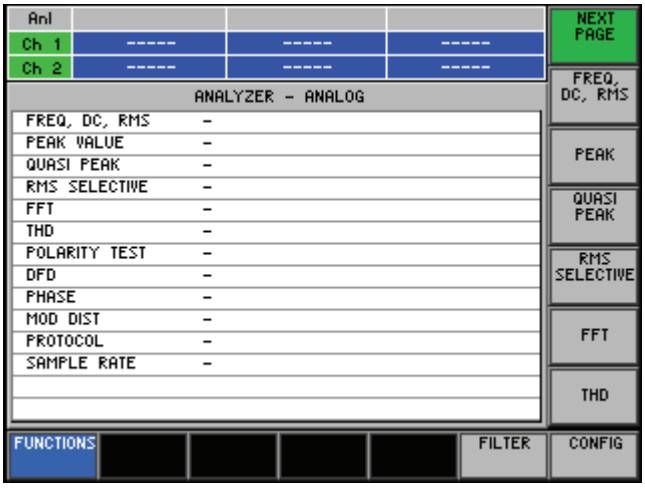
You can only activate a limited number of measurement functions. All functions which can no longer be combined with the already selected measurement functions are deactivated (displayed in gray).

When you have selected a measurement function in the menu bar, the list of available measurement parameters appears on the screen (↗ 6-226).

Selecting the FUNCTIONS menu

Select the FUNCTIONS **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



The 1st function key assignment

NEXT PAGE — Display the next set of functions.

FREQ, DC, RMS — Measure the frequency, DC voltage, and RMS. (↗ 6-228)

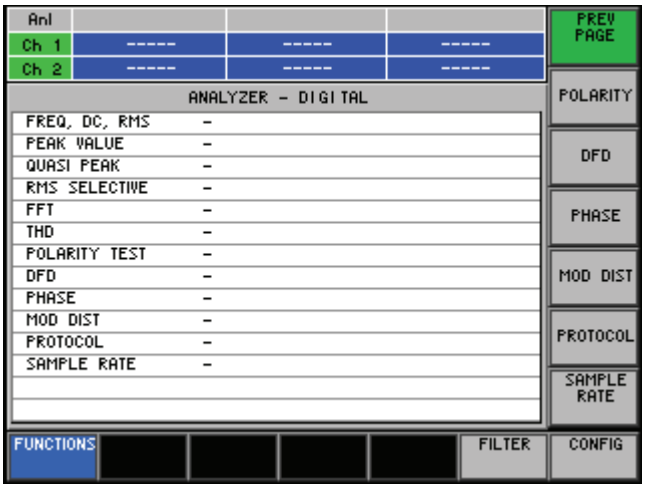
PEAK — Measure the peak value. (↗ 6-237)

QUASI PEAK — Measure the quasi-peak value. (↗ 6-243)

RMS SELECTIVE — Selective RMS measurement (↗ 6-246)

FFT — Frequency-domain display mode of the input signal (↗ 6-251)

THD — Measure distortion (THD, THD+N, SINAD, Noise). (↗ 6-259)



The 2nd function key assignment

PREV. PAGE — Display the previous set of functions.

POLARITY — Perform the polarity test. (↗ 6-267)

DFD — Measure the difference frequency distortion. (↗ 6-268)

PHASE — Measure the phase difference between channels Ch 1 and Ch 2. (↗ 6-272)

MOD DIST — Measure the modulation distortion. (↗ 6-275)

PROTOCOL — Protocol analysis (R&S UP350 only). (↗ 6-278)

SAMPLE RATE — Measure the sample frequency (R&S UP350 only). (↗ 6-281)

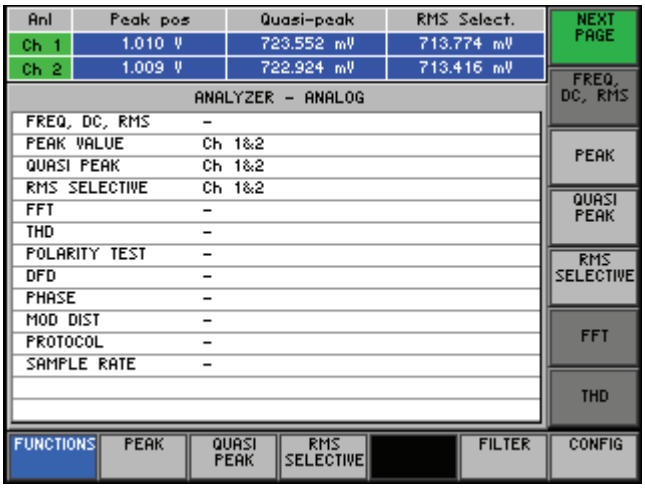
6.3.2.1 Selecting the Measurement Functions

Switching on the measurement function

1. Press a **function key** for a measurement function in the FUNCTIONS **menu**.

   A new menu item (e.g. PEAK) appears in the menu area:

   You can select up to 3 functions at a time. The number of measurement functions depends on the possible combinations of measurement functions (↗ 6-224), e.g. PEAK, QUASI PEAK, RMS SELECTIVE. All other function keys are deactivated (displayed in gray).



Switching off the measurement function

2. Press the **function key** for the desired function in the FUNCTIONS **menu**.

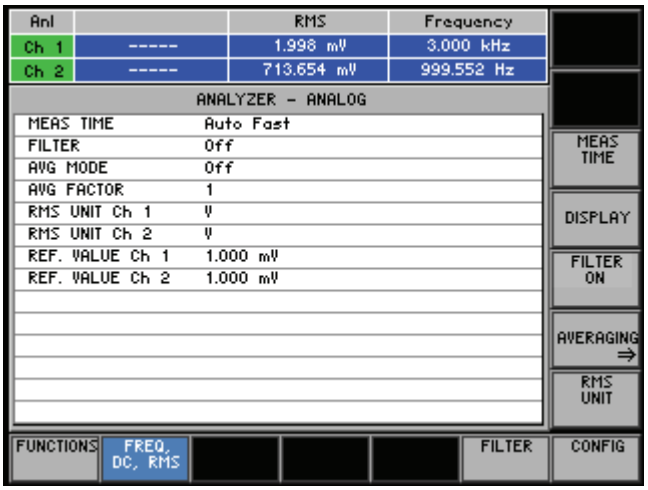
   The menu item disappears from the menu area.

6.3.2.2 Configuring the Measurement Parameters

Use

In the FUNCTIONS menu (↗ 6-226), you can select the analyzer function. The selected measurement function is displayed in a vacant field in the menu bar and is available as a menu key to allow you to enter parameters for the function. At the same time, the appropriate function is activated in the analyzer.

When you have selected a measurement function in the menu bar, the list of available function parameters (e.g. FREQ., DC, RMS) appears on the screen.



Settings for the selected channel

Some parameters of the analyzer functions (FILTER, CONFIG) can be set channel independently (Ch 1, Ch 2), or simultaneously (Ch 1& 2). These parameters are listed in two columns in the parameter field. The function parameters applying to both channels (Ch 1&2) are listed in one column.

To get an overview, refer to the factory default settings (↗ 6-89).

Reference unit

All measurements which return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the reference unit (dBr, dBrFS), the measurement result is displayed taking the entered reference value into consideration. Each measurement function has its own reference value that can be set separately for both channels.

6.3.2.2.1 FREQUENCY, DC, RMS

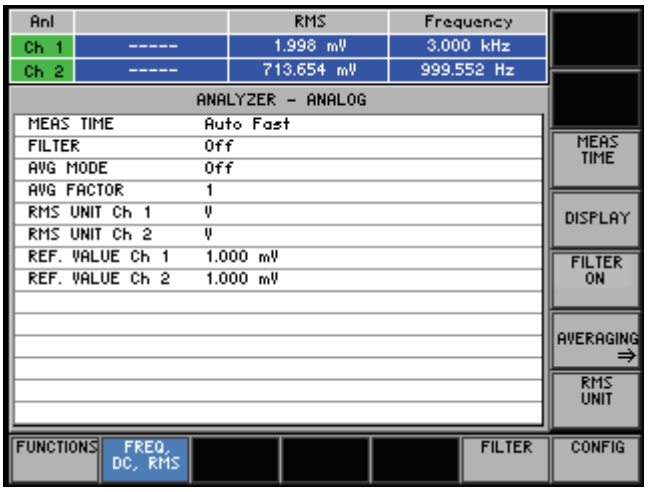
Description

With this function, you can measure the frequency, DC voltage, and RMS component of the input signal.

Setting measurement parameters

1. Call the **FREQ., DC, RMS** measurement function (↗ 6-226).
2. Select the FREQ, DC, RMS **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

MEAS TIME — Select the measurement time. (↗ 6-230)

DISPLAY — Select the measurement result display (RMS & FREQ, or RMS & DC). (↗ 6-232)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

AVERAGING ⇒ — **Open the submenu:** Set the averaging mode. (↗ 6-233)

RMS UNIT — Select the unit of the level display. (↗ 6-235)

Displaying and analyzing measurement results

Measurement display

- Activating the measurement function displays the respective measurement values (↗ 6-232).

Anl		RMS	Frequency
Ch 1	-----	1.998 mV	3.000 kHz
Ch 2	-----	713.654 mV	999.552 Hz

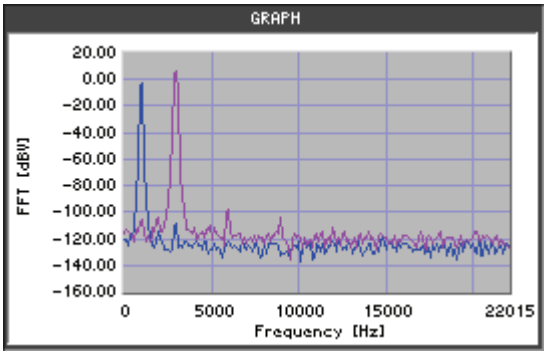
or

Anl		RMS	DC
Ch 1	-----	1.998 V	243.484 µV
Ch 2	-----	713.831 mV	117.602 µV

Frequency spectrum

1. Call the measurement function **FFT** (↗ 6-226).
2. Select the **SPECTRUM** display mode in the Graph menu (↗ 6-288).

   A measurement diagram with the frequency spectrum is shown in the display area.



Note: In the Graph menu you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the Measurement Time

Use

The RMS measurement time is used to adjust the measurement speed of the signal frequency. Short measurement times or a high degree of accuracy can be given priority according to the specific measurement requirements.

You can select different measurement times according to the measurement task:

- **Auto Fast**
  Fast automatic adaptation of the measurement time of the signal frequency with sufficient accuracy
- **Auto**
  Automatic adaptation of the measurement time of the signal frequency with high accuracy
- **Value**
  Manual entry of the measurement time

To prevent measurement errors in case severely noise-corrupted or distorted signals and multi-tone signals, you should set the measurement time manually (A Val). In this case, however, you must know the exact period of the signal.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the measurement time

1. Press the MEAS TIME **function key** in the FREQ, DC, RMS **menu.**

   A selection field containing the available settings is displayed. The default setting is “Auto Fast“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

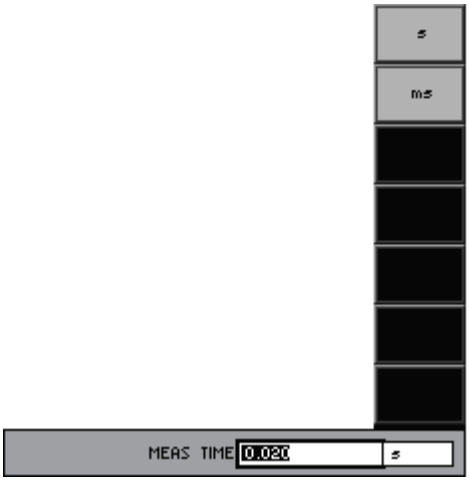
   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS TIME	Auto Fast

Entering the measurement time manually

After you have selected the “A Val” measurement time, an entry field with the current measurement time pops up. The default setting is “20 ms“. At the same time, the function keys are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

1 ms ≤ MEAS TIME ≤ 10 s

The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS TIME	A Val: 20.000 ms

Selecting the Measurement Result Display

Use

You can select which measurement values are to be shown in the display area:

- **RMS & FREQ**
  RMS and frequency are displayed.
- **RMS & DC**
  RMS and DC voltage are displayed.

Selecting the measurement result display

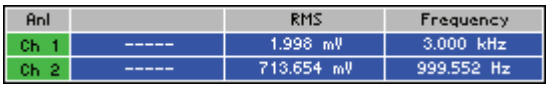
1. Press the DISPLAY **function key** in the FREQ, DC, RMS **menu.**

   A selection field containing the available settings is displayed. The default setting is “RMS & FREQ“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Activating/Deactivating the Filters

Use

You can select up to 3 individual filters in the signal path. This filter is configured in the FILTER menu (↗ 6-282). The filter is identical for all measurements and can be activated or deactivated separately for each measurement function.

Note: The setting is always valid for both channels (Ch 1&2).

Activating filters

1. Press the FILTER ON **function key** in the current **measurement menu**.

   The function key is highlighted and the new setting is stored. After the filter is switched on, the input signal is filtered.

   The current status is displayed in the parameter field.

   Ch 1&2

FILTER	On

Deactivating filters

2. Press the FILTER ON **function key** in the current **measurement menu**.

   The function key is **no longer highlighted**. The input signal is measured without filter.

   The current status is displayed in the parameter field.

   Ch 1&2

FILTER	Off

Setting the Averaging

Description

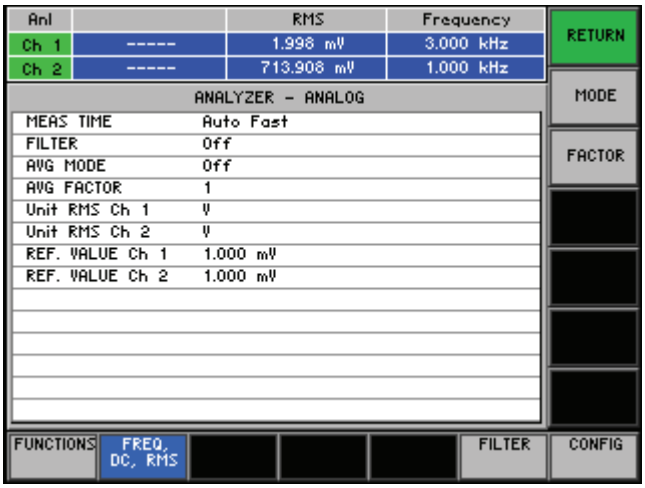
To stabilize the measurement display, you can activate continuous averaging (Cont) in the AVERAGING submenu. The display is then always generated from the most recent measurement values. You can determine the number (Factor) of measurement values which are used for averaging.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the AVERAGING submenu

Press the AVERAGING ⇒ **function key** in the current **measurement menu**.

The submenu is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN — Exit the submenu.

MODE — Activate/Deactivate the averaging. (↗ below)

FACTOR — Enter the averaging factor. (↗ below)

Activating/ Deactivating the averaging

1. Press the MODE **function key** in the AVERAGING ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

AVG MODE	Off

Enter the averaging factor

4. Press the FACTOR **function key** in the AVERAGING ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “1“.

5. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 ≤ AVG FACTOR ≤ 256

   The new setting is stored and displayed in the parameter field.

Ch 1&2

AVG FACTOR	1

Selecting the Unit for the Level Display

Use

All measurements which return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the reference unit (dBr, dBrFS), the measurement result is displayed taking the entered reference value into consideration. Each measurement function has its own reference value that can be set separately for both channels.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

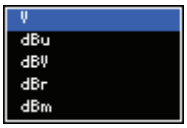
   The selected channel is displayed in green in the channel display.

Selecting the unit

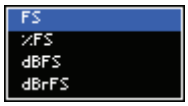
2. Press the RMS UNIT **function key** in the FREQ, DC, RMS **menu.**

   A selection field containing the available settings is displayed. The default setting is “V (FS)”.

Analog



Digital



3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Analog

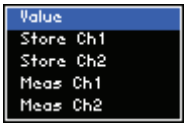
Digital

Selecting the reference value

If you have selected the unit (dBr, dBrFS), a selection field containing various reference values appears.

- **Value**
  Manual reference value entry (↗ below)
- **Store Ch1**
  The current measurement value of channel Ch 1 is stored and used as the reference value for other measurements.
- **Store Ch2**
  The current measurement value of channel Ch 2 is stored and used as the reference value for other measurements.
- **Meas Ch1**
  The current measurement value of channel Ch 1 is used continuously as the reference value.
- **Meas Ch2**
  The current measurement value of channel Ch 1 is used continuously as the reference value.

The default setting is “Value“.



5. Use the **rotary knob** [11] to select a setting.
6. Press the **ENTER key** [5] to close the selection field.

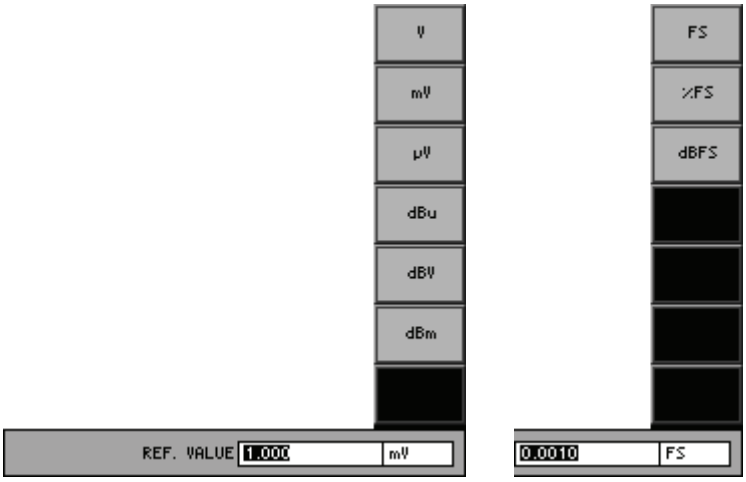
   The new setting is stored and displayed in the display area.

REF. VALUE Ch 1	Meas Ch1
REF. VALUE Ch 2	Meas Ch2

Entering the reference value manually

After you have selected the “Value” setting, an entry field with the current reference value pops up. The default setting is “1 mV (0.001 FS)”. At the same time, the function keys [13] are assigned various units of measurement.

Analog **Digital**



7. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 µV ≤ REF. VALUE ≤ 100 V **(Analog)**

   0.0001 FS ≤ REF. VALUE ≤ 0.999 FS **(Digital)**

   -120 dBFS ≤ REF. VALUE ≤ -0.001 dBFS **(Digital)**

   The new setting is stored and displayed in the parameter field.

   Analog

REF. VALUE Ch 1	1.000 mV
REF. VALUE Ch 2	1.000 mV

   Digital

REF. VALUE Ch 1	0.0010 FS
REF. VALUE Ch 2	0.0010 FS

6.3.2.2.2 PEAK (Peak Value)

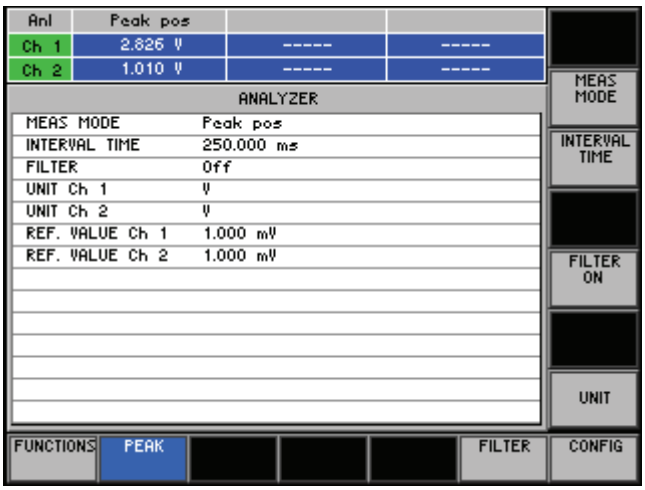
Description

With this function you can measure the peak value of the input signal within a predefined measurement time. The peak detector tracks the signal characteristic without delay.

Setting measurement parameters

1. Call the **PEAK** measurement function (↗ 6-226).
2. Select the PEAK **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

MEAS MODE	Select the measurement mode.	(↗ 6-239)
INTERVAL TIME	Set the interval time.	(↗ 6-240)
FILTER ON	Activate/Deactivate the filter.	(↗ 6-232)
UNIT	Select the unit for the level display.	(↗ 6-241)

Displaying and analyzing measurement results

Measurement display

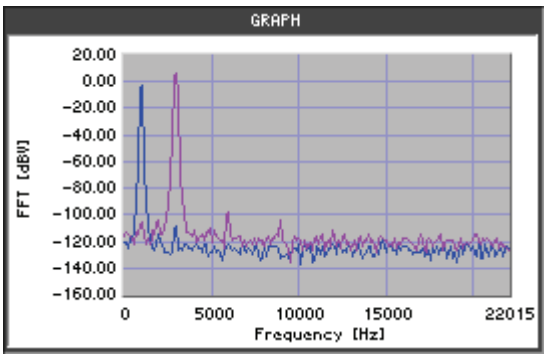
Activating the measurement function displays the measurement values.

Anl	Peak pos		
Ch 1	2.826 V	-----	-----
Ch 2	1.010 V	-----	-----

Frequency spectrum

1. Call the measurement function **FFT** (↗ 6-226).
2. Select the **SPECTRUM** display mode in the Graph menu (↗ 6-288).

   A measurement diagram with the frequency spectrum is shown in the display area.



Note: In the Graph menu, you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

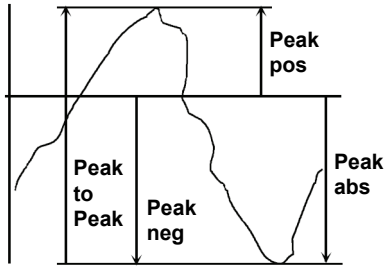
Selecting the Measurement Method

Use

You can select which peak value measurement is to be performed and shown in the display area:

- **Peak pos**
  The highest positive voltage value is measured.
- **Peak neg**
  The (absolutely) highest negative voltage value is measured.
- **Peak to Peak**
  The highest peak-peak voltage is measured.
- **Peak abs**
  The absolutely highest (positive or negative) voltage value is measured.

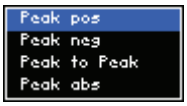
Note: The setting is always valid for both channels (Ch 1&2).



Selecting the measurement method

1. Press the MEAS MODE **function key** in the PEAK **menu.**

   A selection field containing the available settings is displayed. The default setting is “Peak pos“.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Ch 1&2

MEAS MODE	Peak pos

Setting the Interval Time

Use

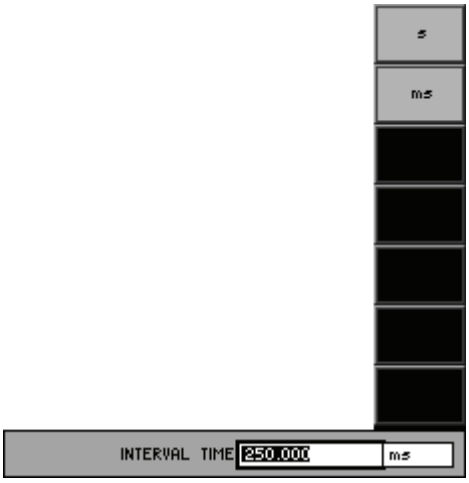
You can enter different interval times according to the measurement task.

Note: The setting is always valid for both channels (Ch 1&2).

Setting the interval time

1. Press the INTERVAL TIME **function key** in the PEAK **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is “250 ms“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

The permissible entry range is:

1 ms ≤ INTERVAL TIME ≤ 10 s

The new setting is stored and displayed in the parameter field.

Ch 1&2

INTERVAL TIME	250.000 ms

Selecting the Unit for the Level Display

Use

All measurements which return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the reference unit (dBr, dBrFS), the measurement result is displayed taking the entered reference value into consideration. Each measurement function has its own reference value that can be set separately for both channels.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

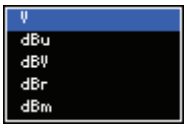
   The selected channel is displayed in green in the channel display.

Selecting the unit

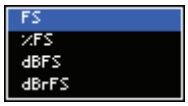
2. Press the UNIT **function key** in the current **measurement menu.**

   A selection field containing the available settings is displayed. The default setting is “V (FS)”.

Analog



Digital



3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Analog

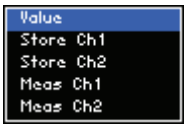
Digital

Selecting the reference value

If you have selected the unit (dBr, dBrFS), a selection field containing various reference values appears.

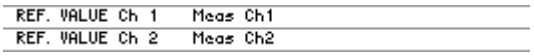
- **Value**
  Manual reference value entry (↗ below)
- **Store Ch1**
  The current measurement value of channel Ch 1 is stored and used as the reference value for other measurements.
- **Store Ch2**
  The current measurement value of channel Ch 2 is stored and used as the reference value for other measurements.
- **Meas Ch1**
  The current measurement value of channel Ch 1 is used continuously as the reference value.
- **Meas Ch2**
  The current measurement value of channel Ch 2 is used continuously as the reference value.

The default setting is “Value“.



5. Use the **rotary knob** [11] to select a setting.
6. Press the **ENTER key** [5] to close the selection field.

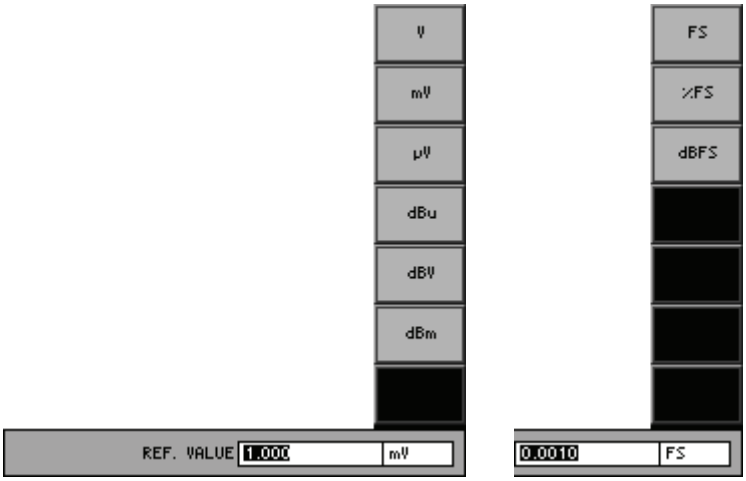
   The new setting is stored and displayed in the display area.



Entering the reference value manually

After you have selected the “Value” setting, an entry field with the current reference value pops up. The default setting is “1 mV (0.001 FS)”. At the same time, the function keys [13] are assigned various units of measurement.

Analog **Digital**



7. Enter a new value (↗ 5-65).

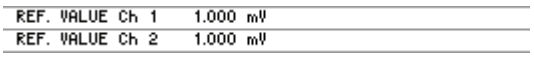
   The permissible entry range is:

   1 µV ≤ REF. VALUE ≤ 100 V **(Analog)**

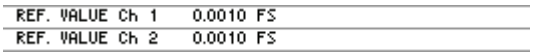
   0.001 FS ≤ REF. VALUE ≤ 0.999 FS **(Digital)**

   The new setting is stored and displayed in the parameter field.

Analog



Digital



6.3.2.2.3 QUASI PEAK (Quasi Peak Value)

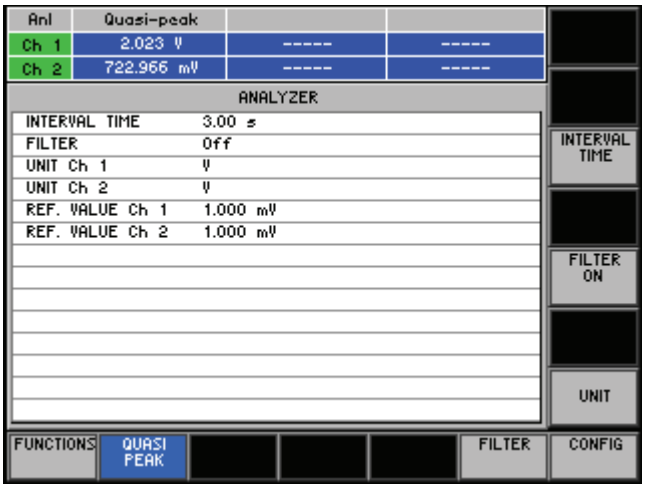
Description

With this function, you can measure the quasi-peak value of the input signal. This is performed by means of peak detection with subsequent defined rise and fall times. The QUASI PEAK measurement is implemented as an RFI voltage measurement according to CCIR 468-4 and DIN 45405.

Setting measurement parameters

1. Call the **QUASI PEAK** measurement function (↗ 6-226).
2. Select the QUASI PEAK **menu** with the aid of the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

INTERVAL TIME — Select the interval time. (↗ 6-245)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

UNIT — Select the unit for the level display. (↗ 6-241)

Displaying and analyzing measurement results

Measurement display

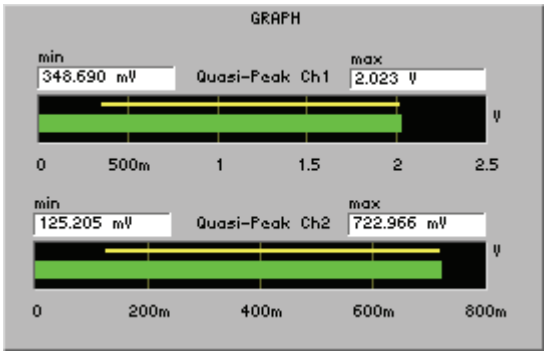
Activating the measurement function displays the measurement values.

Anl	Quasi-peak		
Ch 1	2.023 V	-----	-----
Ch 2	722.966 mV	-----	-----

Bar graph

Select the **Q-PEAK INDICATOR** display mode in the Graph menu (↗ 6-290).

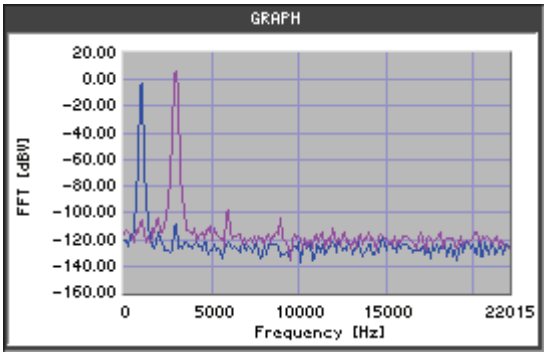
A bar graph is shown for each channel (Ch 1 and Ch 2) in the display area. Each bar graph shows the current measurement value and the lowest and highest measurement value in the active measurement.



Frequency spectrum

1. Call the measurement function **FFT** (↗ 6-226).
2. Select the **SPECTRUM** display mode in the Graph menu (↗ 6-290).

   A measurement diagram with the frequency spectrum is shown in the display area.



Note: In the Graph menu, you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. With the quasi-peak measurement, the last maximum value is always stored and displayed. You can start and stop the measurement manually (↗ 6-285).

Selecting the Interval Time

Use

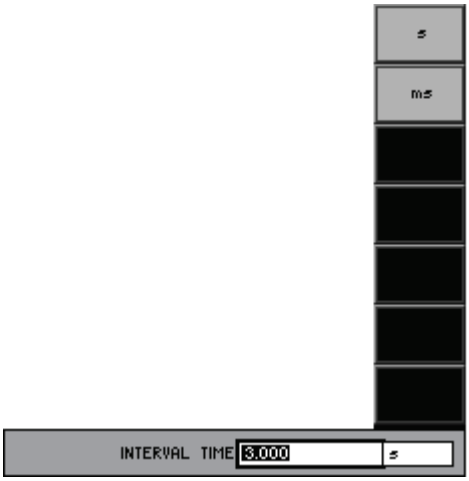
You can enter different interval times according to the measurement task.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the interval time

1. Press the INTERVAL TIME **function key** in the PEAK **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “3 s“. At the same time, the function keys [13] are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   100 ms ≤ INTERVAL TIME ≤ 100 s

   The new setting is stored and displayed in the parameter field.

Ch 1&2

INTERVAL TIME	3.00 s

6.3.2.2.4 RMS SELECTIVE (Selective RMS value)

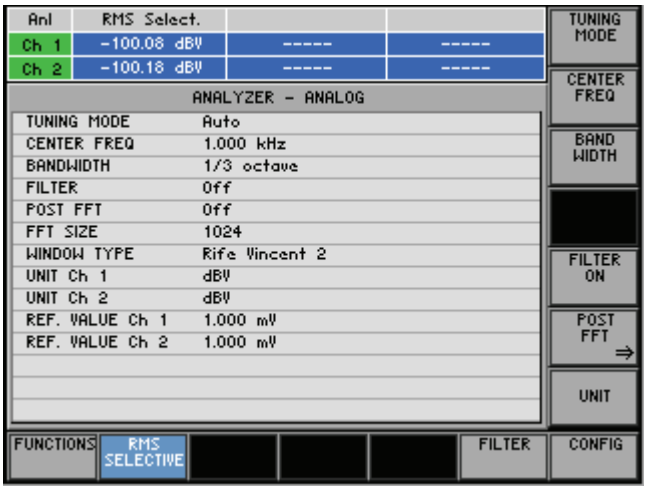
Description

With this function, you can perform a selective RMS measurement with a narrowband band-pass filter.

Setting measurement parameters

1. Call the **RMS SELECTIVE** measurement function (↗ 6-226).
2. Select the RMS SELECTIVE **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

TUNING MODE — Select the tuning mode. (↗ 6-247)

CENTER FREQ — Enter the measurement frequency. (↗ 6-247)

BAND WIDTH — Select the measurement bandwidth. (↗ 6-248)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:** (↗ 6-265)
Set the POST FFT.

UNIT — Select the unit for the level display. (↗ 6-241)

Displaying and analyzing measurement results

Measurement display

Activating the measurement function displays the measurement values.

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the Tuning Mode

Use

You can select between automatic tuning up to the strongest signal, or measurement at fixed frequency.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the tuning mode

1. Press the TUNING MODE **function key** in the RMS SELECTIVE **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

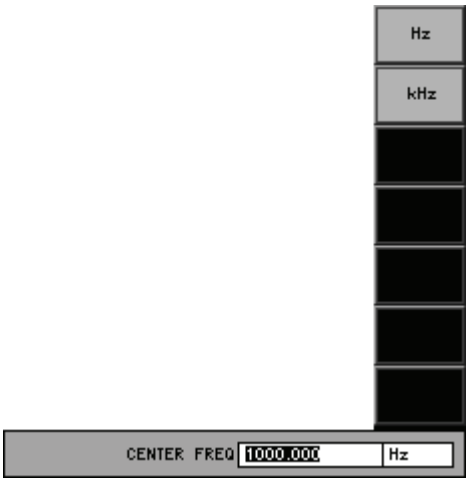
Entering the Measurement Frequency

Note: The setting is always valid for both channels (Ch 1&2). The value is valid only for the fixed frequency mode.

Entering the measurement frequency

1. Press the CENTER FREQ **function key** in the RMS SELECTIVE **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “1 kHz“. At the same time, the function keys [13] are assigned various units of measurement.

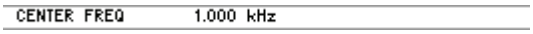
2. Enter a new value (↗ 5-65).

   The permissible entry range depends on the measurement bandwidth:

   $$BW/2 \leq CENTER\ FREQ \leq f_{max} - BW/2$$

   The new setting is stored and displayed in the parameter field.

Ch 1&2



Selecting the Measurement Bandwidth

Use

You can select different measurement bandwidths:

- **1%**
  The Bandwidth is 1 % of the centre frequency.
- **3%**
  The Bandwidth is 3 % of the centre frequency.
- **1/12 octave**
  The Bandwidth is 1/12 octave (5.77 %) of the centre frequency.
- **1/3 octave**
  The Bandwidth is 1/3 octave (23.15 %) of the centre frequency.

ANALYZER - ANALOG	
TUNING MODE	Auto
CENTER FREQ	1.000 kHz
BANDWIDTH	1/3 octave
FILTER	Off
POST FFT	Off
FFT SIZE	1024
WINDOW TYPE	Rife Vincent 2
UNIT Ch 1	dBV
UNIT Ch 2	dBV
REF. VALUE Ch 1	1.000 mV
REF. VALUE Ch 2	1.000 mV

- **Rel.Value**
  The Bandwidth is the entered value in percent [%] of the centre frequency.

ANALYZER - ANALOG	
TUNING MODE	Auto
CENTER FREQ	1.000 kHz
BANDWIDTH	20.000 %
FILTER	Off
POST FFT	Off
FFT SIZE	1024
WINDOW TYPE	Rife Vincent 2
UNIT Ch 1	V
UNIT Ch 2	V
REF. VALUE Ch 1	1.000 mV
REF. VALUE Ch 2	1.000 mV

- **Abs. Value**
  The Bandwidth is constant, referring to the entered value in Hz.

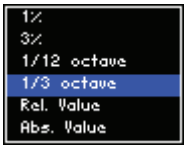
ANALYZER - ANALOG	
TUNING MODE	Auto
CENTER FREQ	1.000 kHz
BANDWIDTH	100.000 Hz
FILTER	Off
POST FFT	Off
FFT SIZE	1024
WINDOW TYPE	Rife Vincent 2
UNIT Ch 1	V
UNIT Ch 2	V
REF. VALUE Ch 1	1.000 mV
REF. VALUE Ch 2	1.000 mV

Note: The setting is always valid for both channels (Ch 1&2). The bandwidth used for measurement is always higher than or equal to 10 Hz, independent of customer bandwitdh settings.

Selecting the measurement bandwidth

1. Press the BAND WIDTH **function key** in the RMS SELECTIVE **menu.**

   A selection field containing the available settings is displayed. The default setting is “1/3 octave“.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	1/3 octave

Entering the relative bandwidth manually

After you have selected the “Rel. Value” item, an entry field with the current relative bandwidth size pops up. The default setting is “1%“.

4. Enter a new value (↗ 5-65).

   The permissible entry range is:

   0.001 % ≤ REL. BANDWIDTH ≤ 100 %

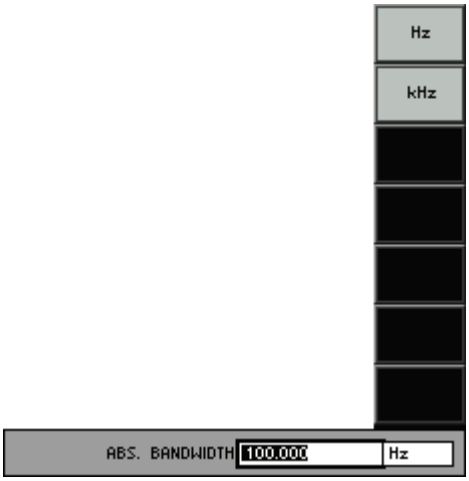
   The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	1.000 %

Entering the absolute bandwidth

After you have selected the “Abs. Value” item, an entry field with the current absolute bandwidth pops up. The default setting is “100 Hz“. At the same time, the function keys [13] are assigned various units of measurement.



5. Enter a new value (↗ 5-65).

The permissible entry range is:

10 Hz ≤ ABS. BANDWIDTH ≤ fs * 0.1

within: fs - current sampling frequency of analyzer type

The new setting is stored and displayed in the parameter field.

Ch 1&2

BANDWIDTH	100.000 Hz

6.3.2.2.5 FFT (Frequency-Domain Display, Spectrum)

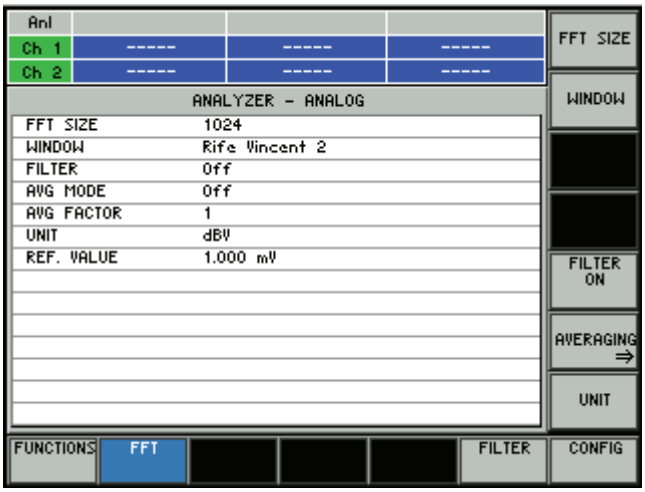
Description

With this function, you can display the input signal as a frequency spectrum. Transformation to the frequency domain is performed by means of Fast Fourier Transformation (FFT).

Setting measurement parameters

1. Call the **FFT** measurement function (↗ 6-226).
2. Select the FFT **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

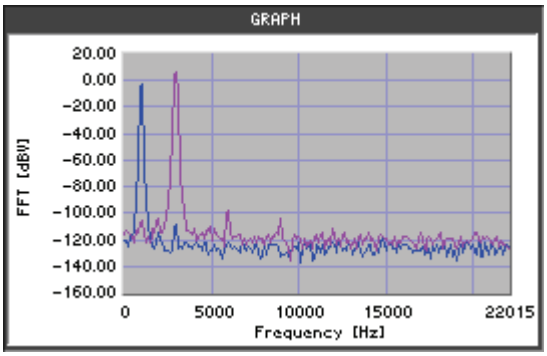
FFT SIZE	Set the FFT size.	(↗ 6-253)
WINDOW	Set the FFT window.	(↗ 6-253)
FILTER ON	Activate/Deactivate the filter.	(↗ 6-232)
AVERAGING ⇒	**Open the submenu:** Set the averaging mode.	(↗ 6-255)
UNIT	Select the unit for the level display.	(↗ 6-257)

Displaying and analyzing measurement results

Frequency spectrum

Select the **SPECTRUM** display mode in the Graph menu (↗ 6-288).

A measurement diagram with the frequency spectrum is shown in the display area.



Note: In the Graph menu, you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

List of measurement values

Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-288).

The FFT frequency and level values are displayed.

GRAPH

FFT

Frequency	Ch1	Ch2
0.00 Hz	-99.55 dBV	-88.98 dBV
110.63 Hz	-96.61 dBV	-106.96 dBV
221.25 Hz	-100.09 dBV	-111.25 dBV
331.88 Hz	-104.72 dBV	-100.55 dBV
442.50 Hz	-107.71 dBV	-101.10 dBV
553.13 Hz	-111.52 dBV	-96.92 dBV
663.76 Hz	-109.46 dBV	-86.78 dBV
774.38 Hz	-112.80 dBV	-59.85 dBV
885.01 Hz	-100.68 dBV	-3.32 dBV
995.64 Hz	-101.83 dBV	-0.01 dBV
1106.26 Hz	-99.73 dBV	-61.02 dBV
1216.89 Hz	-105.08 dBV	-86.26 dBV

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the FFT Size

Use

For a detailed measurement, select a higher FFT resolution. As the FFT size increases, the signal resolution also increases and the noise bandwidth decreases. However, the higher the FFT size is, the lower the measurement speed will be.

You can select FFTs with the following size:

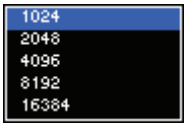
- **1024**
- **2048**
- **4096**
- **8192**
- **16384**

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the FFT size

1. Press the FFT SIZE **function key** in the FFT **menu.**

   A selection field containing the available settings is displayed. The default setting is “1024“.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

FFT SIZE	1024

Selecting the FFT Window

Use

According to system theory, the FFT regards a signal section as being continued infinitely and periodically. Usually, however, infinite continuity is not possible at the section boundary. Discontinuity at the section boundary would be evaluated as a pulse (with white spectrum). This pulse spectrum is superimposed on the actual (useful) signal spectrum ("leakage").

Remedy: The signal section intended for the FFT is attenuated with respect to zero at both ends by a greater or lesser degree by means of the window function. The FFT then regards the signal as continuous. Window functions therefore help to minimize this "leakage" (this is, however, accompanied by a reduction in selectivity).

You can select an FFT window from the following selection of window functions:

- **Rectangular**
  If the signal fits in the section for the FFT exactly with an integer multiple of periods, there is no discontinuity at the section boundaries, and then a window is not required and the maximum frequency resolution is possible.
- **Hamming**
  This window does not provide any significant advantages; it was implemented simply to complete the range.
- **Hann**
  This window combines selectivity with good leakage suppression in the "far-off range" but has a relatively wide bell-shaped curve around the signal lines.
- **Blackman Harris**
  The slope of the bell-shaped curve up to approx. 80 dB is very steep; however, this window has considerable "leakage" for values under 80 dB.
- **Rife Vincent 1**
  Rife Vincent 2
  Rife Vincent 3
  The suppression of far-off interference is very good for all 3 windows. The width of the bell-shaped curve at the bottom of the individual lines drops and the width at the top increases as the Rife Vincent number increases. It is therefore possible to set various compromises between frequency resolution and the suppression of adjacent lines.
- **Flat Top**
  Here, the region around the carrier is deliberately distorted to such an extent that at least two adjacent lines (in the case of excitation with one sinewave line only) always have roughly the same magnitude.
  Advantage: Unlike other window functions, the amplitude can be read off accurately from the graph.
  Disadvantage: The frequency selectivity is poor.
- **Kaiser (β = 12)**
  With this window, the compromise between selectivity, sideband suppression and suppression of far-off interference is good

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the FFT window

1. Press the WINDOW **function key** in the FFT **menu.**

   A selection field containing the available settings is displayed. The default setting is “Rife Vincent 2“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Setting Averaging

Description

To stabilize the measurement display, you can activate an averaging mode in the AVERAGING submenu. You can select the following settings:

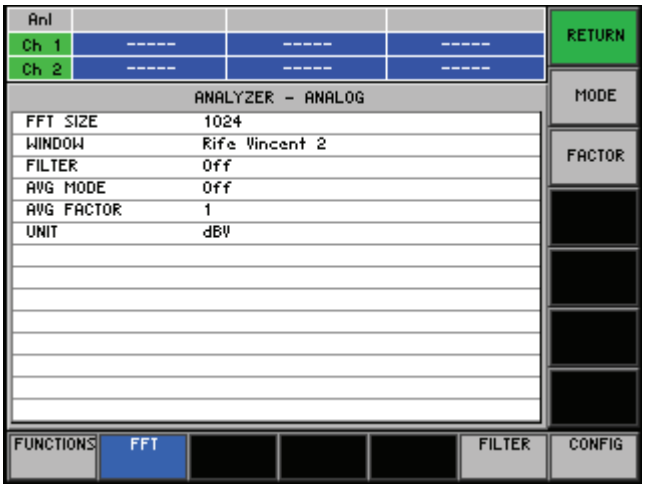
- **Off**
  Averaging is deactivated.
- **Average**
  The display is always generated from the last measurement values. You can determine the number of measurement values (FACTOR) which are used for averaging.
- **Exponential**
  Averaging is performed continuously.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the AVERAGING submenu

Press the AVERAGING ⇒ **function key** in the FFT **menu.**

The submenu is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN — Exit the submenu.

MODE — Activate/Deactivate the averaging mode. (↗ below)

FACTOR — Enter the averaging factor. (↗ below)

Activating the averaging

1. Press the MODE **function key** in the AVERAGING ⇒ **submenu**.

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

AVG MODE	Off

Entering the averaging factor

4. Press the FACTOR **function key** in the AVERAGING ⇒ **submenu**.

   An entry field containing the currently applicable setting is displayed. The default setting is “1“.

5. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 ≤ AVG FACTOR ≤ 256

   The new setting is stored and displayed in the parameter field.

Ch 1&2

AVG FACTOR	1

Selecting the Unit for the Level Display

Use

All measurements which return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the reference unit (dBr, dBrFS), the measurement result is displayed taking the entered reference value into consideration.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the unit

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

   A selection field containing the available settings is displayed. The default setting is “dBV (dBFS)”.

   Analog

   Digital

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

   Ch 1&2

Unit	dBV

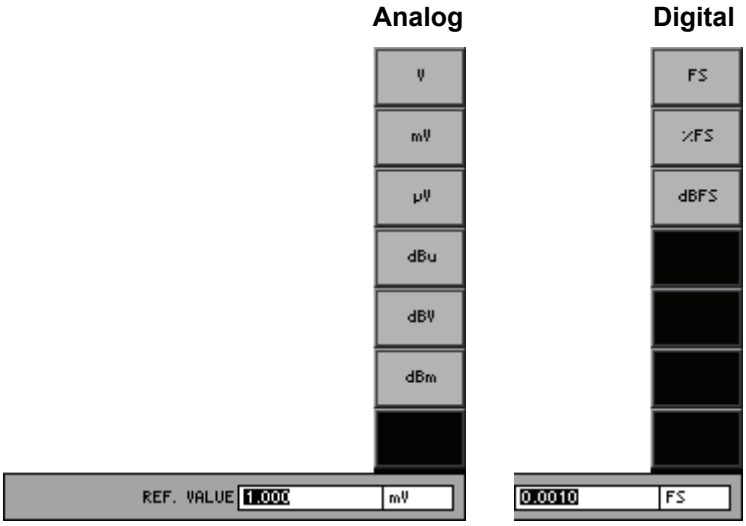
   (Analog)

UNIT	dBFS

   (Digital)

Entering the reference value manually

After you have selected the (dBr, dBrFS) unit, an entry field with the current reference value pops up. The default setting is "1 mV (0.001 FS)". At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

1 µV ≤ REF. VALUE ≤ 100 V **(Analog)**

0.0001 FS ≤ REF. VALUE ≤ 0.999 FS **(Digital)**

The new setting is stored and displayed in the parameter field.

Ch 1&2

UNIT	dBr: 1.000 mV	**(Analog)**
UNIT	dBrFS: 0.0010 FS	**(Digital)**

6.3.2.2.6 THD, THD+N, SINAD (Total Harmonic Distortion)

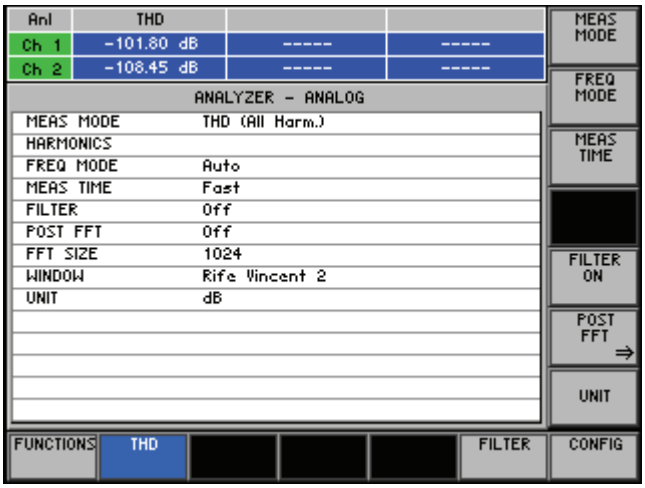
Description

With this function, you can measure the harmonic distortion of the input signal.

Setting measurement parameters

1. Call the **THD** measurement function (↗ 6-226)
2. Select the THD **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

MEAS MODE — Select the measurement mode. (↗ 6-261)

FREQ MODE — Select the frequency search mode. (↗ 6-262)

MEAS TIME — Select the measurement speed. (↗ 6-264)

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:** (↗ 6-265)
Set the POST FFT.

UNIT — Select the unit for the level display. (↗ 6-266)

Displaying and analyzing measurement results

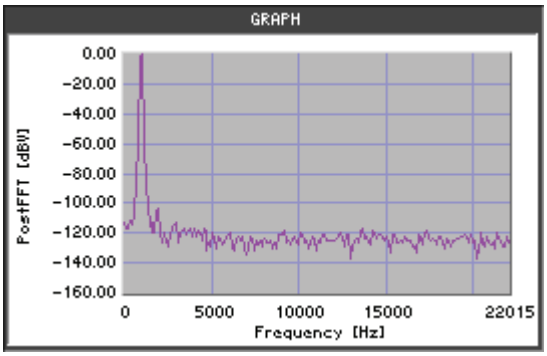
Measurement display

Activating the measurement function displays the harmonic distortion according to measurement mode.

Frequency spectrum

1. Switch on the measurement function **POST FFT** (↗ 6-266).
2. Select the **SPECTRUM** display mode in the Graph menu (↗ 6-290).

   A measurement diagram with the frequency spectrum is shown in the display area.

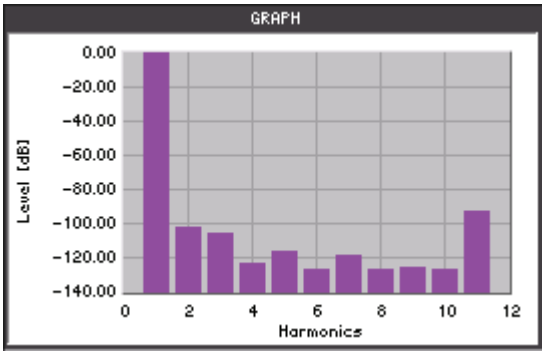


Note: In the Graph menu, you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

Bar graph

Select the **BAR GRAPH** display mode in the Graph menu (↗ 6-288).

A bar graph is shown in the display area. The fundamental (1), harmonics (2-10) (↗ 6-261), and noise component (11) of the measurement signal are displayed depending on the measurement mode.



List of measurement values

Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-288).

The frequency and level values of the first harmonic (fundamental), and the relative level values of the other harmonics (2-10) and of the total noise power for the measurement signal are shown in the display area.

GRAPH

Fundam. Frequency	1.000 kHz	1.000 kHz
Fundam. Amplitude	-0.00 dB	-0.00 dB
2. Harmonic	-112.13 dB	-107.08 dB
3. Harmonic	-113.71 dB	-108.90 dB
4. Harmonic	-127.40 dB	-130.07 dB
5. Harmonic	-118.59 dB	-119.49 dB
6. Harmonic	-132.37 dB	-127.38 dB
7. Harmonic	-129.65 dB	-127.11 dB
8. Harmonic	-128.22 dB	-125.88 dB
9. Harmonic	-132.07 dB	-125.13 dB
10. Harmonic	-126.61 dB	-125.32 dB
Noise	-98.38 dB	-98.34 dB

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the Measurement Mode

Use

All harmonics (with the distortion factor measurement) and the noise power (with THD+N and SINAD) are measured and displayed as a table or graph.

You can select different measurement methods for the distortion factor and the signal/noise ratio.

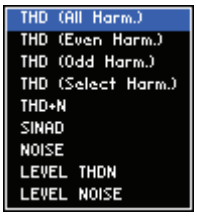
- **THD (All Harm.)**
  All harmonics are measured.
- **THD (Even Harm.)**
  All even harmonics are measured.
- **THD (Odd Harm.)**
  All odd harmonics are measured.
- **THD (Select Harm.)**
  All selected harmonics are measured.
- **THD + N**
  All harmonics and the noise are measured.
- **SINAD**
  All harmonics and the noise are measured.
- **NOISE**
  The noise power is measured.
- **LEVEL THDN**
  The total RMS derived from the fundamental, harmonics, and noise is measured.
- **LEVEL NOISE**
  The total RMS of the noise is measured.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the measurement mode

1. Press the MEAS MODE **function key** in the THD **menu.**

   A selection field containing the available settings is displayed. The default setting is “THD (All Harm.)”.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

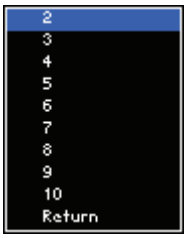
   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS MODE	THD (All Harm.)

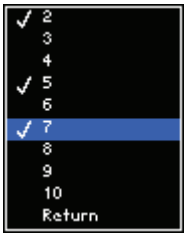
Selecting the harmonics (at measurement mode "Select Harm.")

If you have selected the "THD (Select Harm.)" measurement mode, the selection field is displayed with all harmonics.



4. Use the **rotary knob** [11] to select a setting and press the **ENTER key** [5] to change the selection.

   A check marker "✓" is displayed next to the corresponding number (harmonic), indicating the selection.



   Note: For deactivation of numbers (harmonics with marking) use the same way.

5. Use the **rotary knob** [11] to select the **Return** item.
6. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

	Ch 1&2
HARMONICS	3,4,5,9,10

Selecting the Frequency Search Mode

Note: The lower limit frequency f_{min} of the measurement signal depends on the selected bandwidth of the analyzer.

- Bandwidth 22 kHz: $f_{min} \geq 20$ Hz
- Bandwidth 40 kHz: $f_{min} \geq 40$ Hz
- Bandwidth 80 kHz: $f_{min} \geq 80$ Hz

Use

Depending on the measurement task, you can select different modes for the signal frequency (fundamental) search:

- **Auto**
  Automatic signal frequency search and automatic harmonics measurement
- **Fixed**
  Manual entry of signal frequency and manual harmonics measurement

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the frequency search mode

1. Press the FREQ MODE **function key** in the THD **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

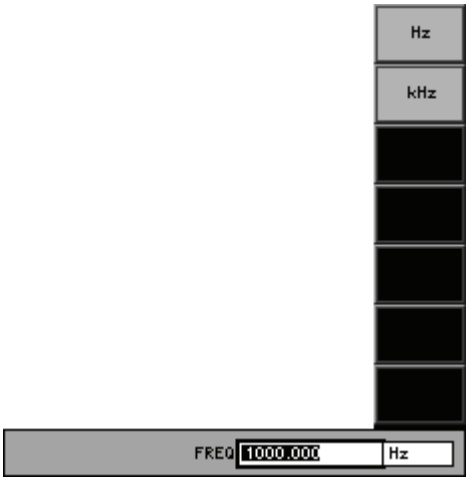
   The new setting is stored and displayed in the parameter field.

Ch 1&2

FREQ MODE	Auto

Entering the signal frequency manually

After you have selected the “Fixed” setting, an entry field with the current setting pops up. The default setting is “1 kHz“. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

   The permissible entry range is:

   $$f_{min} \leq FREQ \leq f_{max}$$

   within: f_{min} - minimum frequency of the analyzer type (↗ above)
   f_{max} - maximum frequency of the analyzer type (↗ 6-216, 6-222)

   The new setting is stored and displayed in the parameter field.

Ch 1&2

FREQ MODE	Fixed: 1.000 kHz

Selecting the Measurement Time

Use

You can select different measurement times according to the measurement task:

- **Fast**
  A fast measurement with a lower dynamic range is performed.
- **Normal**
  Measurement is performed with a higher dynamic range.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the measurement time

1. Press the MEAS TIME **function key** in the THD **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS TIME	Fast

Setting the POST FFT

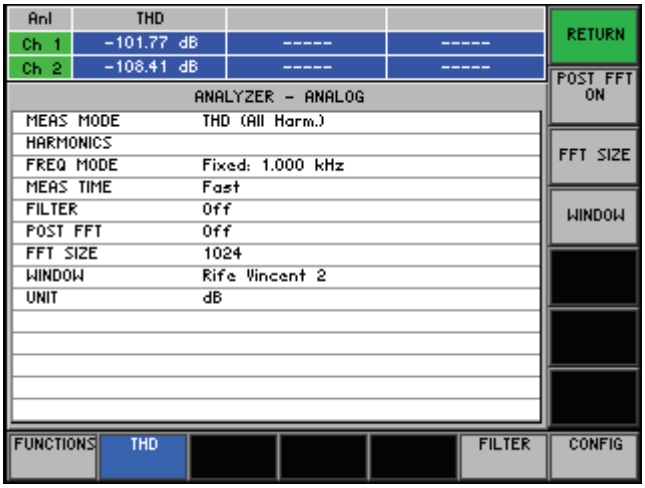
Description

The THD measurement function cannot be activated at the same time as the FFT. You can, however, use the Post FFT to analyze the spectrum of the signal on which the THD measurement is being performed. The stored samples used to calculate the measurement function are also used to calculate the FFT.

Selecting the FFT submenu

Press the POST FFT ⇒ **function key** in the current **measurement menu.**

The submenu is opened and the function keys [13] are assigned the appropriate function.



Function key assignment

RETURN — Exit the submenu.

POST FFT ON — Activate/Deactivate the FFT. (↗ 6-266)

FFT SIZE — Set the FFT size. (↗ 6-253)

WINDOW — Set the FFT window. (↗ 6-253)

Activating/Deactivating the POST FFT

Use

If you want to display the frequency spectrum of the measurement signal in the Graph menu, you must activate the POST FFT.

Note: The setting is always valid for both channels (Ch 1&2).

Activating the FFT

1. Press the POST FFT ON **function key** in the POST FFT ⇒ **submenu**.

   The function key is highlighted and the new setting is stored. After activation, you can view the input signal (↗ 6-259).

   The current status is displayed in the parameter field.

Ch 1&2

POST FFT	On

Deactivating the FFT

2. Press the POST FFT ON **function key** in the POST FFT ⇒ **submenu**.

   The function key is **no longer** highlighted and the Post FFT is switched off.

   The current status is displayed in the parameter field.

Ch 1&2

POST FFT	Off

Selecting the Unit for the Level Display

Use

You can set different units of the level display depending on the measurement task.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the unit

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

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the display area.

Ch 1&2

UNIT	dB

6.3.2.2.7 POLARITY (Polarity Test)

Description

The polarity test is used to check the polarity of the signal transmitted by the DUT.

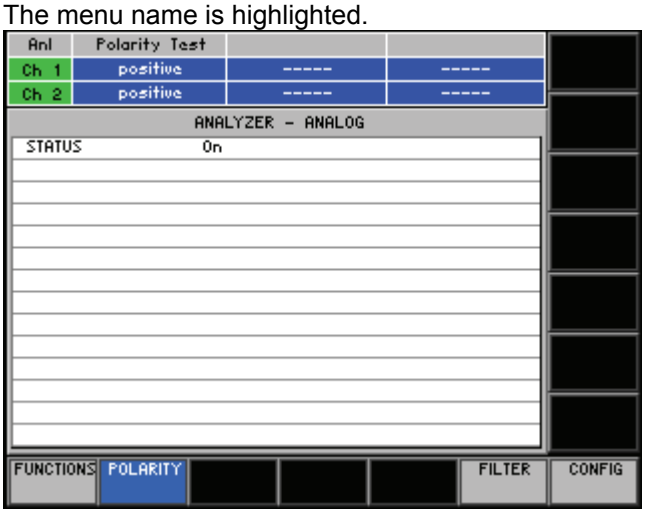
Preparing the measurement

1. Call the generator **POLARITY TEST** f unction (↗ 6-112).
2. Set the signal parameters (↗ 6-150).
3. Switch the DUT between the generator [8] and analyzer [9].

Setting the measurement parameters

4. Call the **POLARITY** measurement function (↗ 6-226).
5. Select the POLARITY **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted.



Displaying and analyzing measurement results

Measurement display

The analyzer performs the polarity check of the output signal from the DUT and displays the polarity:

- **Positive** (correct polarity)
- **Negative** (reversed polarity)

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

6.3.2.2.8 DFD (Difference Frequency Distortion)

Description

With this function, you can measure the 2nd or 3rd order difference frequency distortion. For this measurement a suitable two-tone signal must be supplied to the DUT.

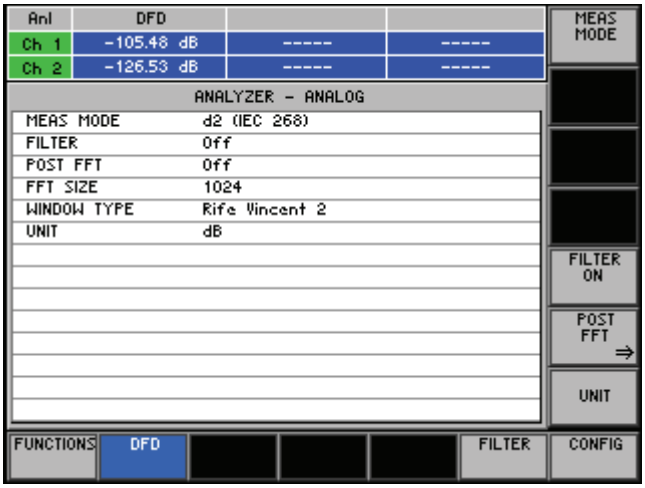
Preparing the measurement

1. Call the generator **DFD** function (↗ 6-112).
2. Set the signal parameters (↗ 6-144).
3. Switch the DUT between the generator [8] and analyzer [9].

Setting measurement parameters

4. Call the **DFD** measurement function (↗ 6-226).
5. Select the DFD **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

MEAS MODE — Select the difference frequency distortions and measurement standard. (↗ 6-271)

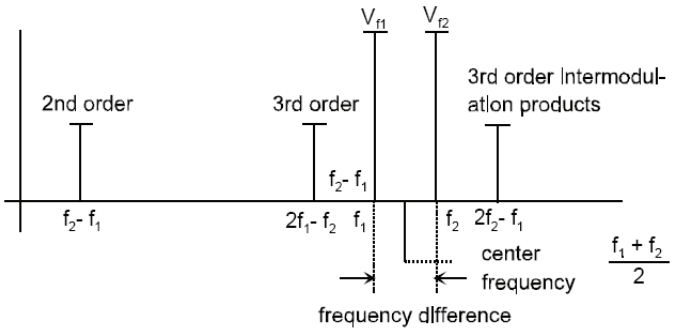
FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:** Set the POST FFT. (↗ 6-265)

UNIT — Select the unit for the level display. (↗ 6-266)

Measurement method

Based on your selection (d2 or d3), the R&S UP300/350 measures the 2nd and 3rd order intermodulation products selectively (measurements are therefore largely unaffected by noise) according to DIN IEC 268, part 3.



Difference frequency distortion of 2nd order:

$$d_2\,[\mathrm{dB}] = 20 \times \lg \frac{\left|V_{(f_2 - f_1)}\right|}{2 \times V_{(f_2)}}$$

$$d_2\,[dB] = 20x \lg \frac{\left|V_{(f_2 - f_1)}\right|}{V_{(f_2)}}$$

Difference frequency distortion of 3rd order:

$$d_3\,[\mathrm{dB}] = 20 \times \lg \frac{\left|V_{(2f_2 - f_1)}\right| + \left|V_{(2f_1 - f_2)}\right|}{2 \times V_{(f_2)}}$$ to IEC 268

$$d_3\,[dB] = 20x \lg \frac{\left|V_{(2f_1 - f_2)}\right|}{V_{(f_2)}}$$ to IEC 118

Displaying and analyzing measurement results

Measurement display

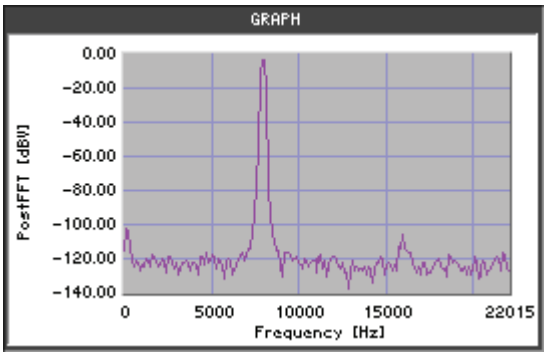
Activating the measurement function displays the measurement values depending on measurement mode (↗ 6-271).

Graph	DFD		
Ch 1	-105.54 dB	-----	-----
Ch 2	-124.63 dB	-----	-----

Frequency spectrum

1. Call the measurement function **POST FFT** (↗ 6-266).
2. Select the **SPECTRUM** display mode in the Graph menu (↗ 6-288).

   A measurement diagram with the frequency spectrum is shown in the display area.

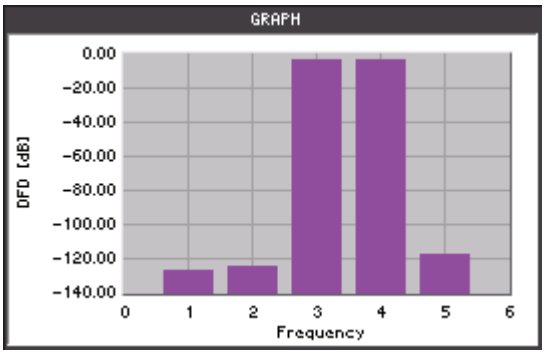


Note: In the Graph menu you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

Bar graph

Select the **BAR GRAPH** display mode in the Graph menu (↗ 6-288).

A bar graph is shown in the display area. Depending on the measurement mode (↗ 6-270) the sinewave signal (measurement signals 3, 4) and the intermodulation products (1, 2, 5) are displayed.



Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the Difference Frequency Distortion and Measurement Standards

Use

You can select the display mode for the difference frequency distortion according to the measurement standards:

- **d2 (IEC 268)**
  Measurement and display of the 2nd order intermodulation product acc. to IEC 268
- **d3 (IEC 268)**
  Measurement and display of the 3rd order intermodulation product acc. to IEC 268
- **d2 (IEC 118)**
  Measurement and display of the 2nd order intermodulation product acc. to IEC 118
- **d3 (IEC118)**
  Measurement and display of the 3rd order intermodulation product acc. to IEC 118

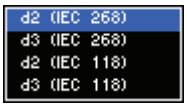
Note: The intermodulation distortion (IMD) tones are not subjected to a level testing case of measurement according to IEC 118. This means that a DFD measurement is possible even if the IMD signal is severely distorted (e.g. as a result of the frequency response of the DUT or of the transmission path). A typical example is the measurement of earpieces.

Note: The setting is always valid for both channels (Ch 1&2).

Selecting measurement standards

1. Press the MEAS MODE **function key** in the DFD **menu.**

   A selection field containing the available settings is displayed. The default setting is “d2 (IEC 268)“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS MODE	d2 (IEC 268)

6.3.2.2.9 PHASE (Measuring the Phase Difference Between Channels)

Description

With this function, you can measure the phase difference between the input signals of channels Ch 1 and Ch 2. The signal from channel Ch 1 is used as the reference signal.

The phase measurement returns values ranging from -179.9° to +180°.

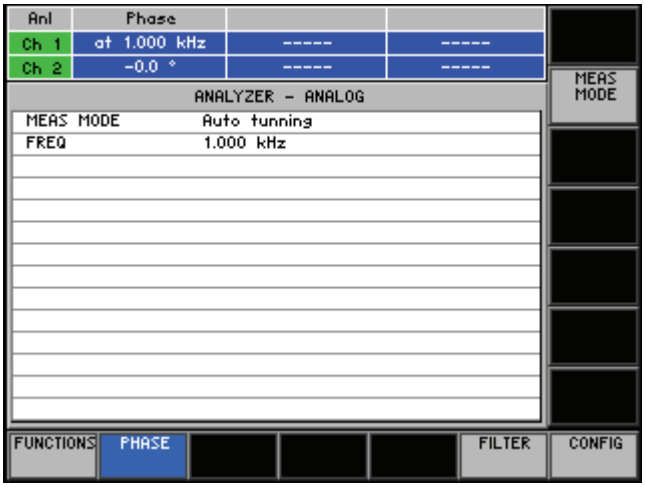
Preparing the measurement

1. Call, for example, the generator **SINE** function (↗ 6-112).
2. Set the signal parameters (**f1 = f2**) (↗ 6-113).
3. Switch the DUT between the generator [8] and analyzer [9].

Setting measurement parameters

4. Call the **PHASE** measurement function (↗ 6-226).
5. Select the PHASE **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function key [13] is assigned the appropriate function.



Function key assignment

MEAS MODE — Select the type of the signal search. (↗ 6-273)

Displaying and analyzing measurement results

Measurement display

Activating the measurement function, the instrument displays the measurement values. The frequency of the reference signal from channel Ch 1 and the phase difference from the signals of channels Ch 1 and Ch 2 are displayed.

Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the Type of Signal Search

Note: The lower limit frequency (f_{min}) of the measurement signal depends on the selected bandwidth of the analyzer.

- Bandwidth 22 kHz: $f_{min} \geq 20$ Hz
- Bandwidth 40 kHz: $f_{min} \geq 40$ Hz
- Bandwidth 80 kHz: $f_{min} \geq 80$ Hz

Use

Depending on the measurement task, you can select different modes for the signal frequency search in channel Ch 1:

- **Auto tuning**
  Automatic signal frequency search and automatic phase measurement
- **Fixed frequency**
  Manual entry of signal frequency and manual phase measurement

Note: The setting is always valid for both channels (Ch 1&2).

Selecting the type of signal search

1. Press the MEAS MODE **function key** in the PHASE **menu.**

   A selection field containing the available settings is displayed. The default setting is “Auto tuning“.

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

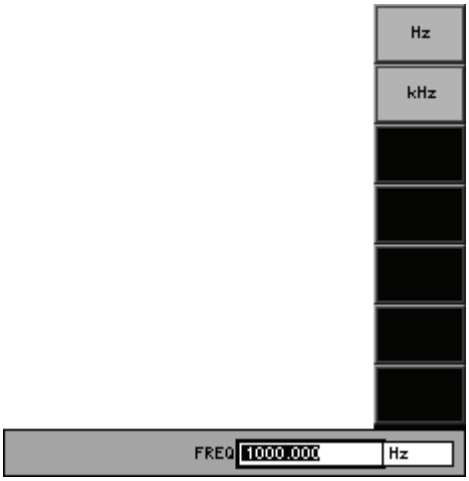
   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS MODE	Auto tuning
FREQ	1.000 kHz

Entering the signal frequency manually

After you have selected the “Fixed frequency” setting, an entry field with the current signal frequency pops up. The default setting is “1 kHz“. At the same time, the function keys are assigned various units of measurement.



4. Enter a new value (↗ 5-65).

The permissible entry range is:

$$\mathbf{f_{min} \leq FREQ \leq f_{max}}$$

within: f_{min} - minimum frequency of the analyzer type (↗ above)
f_{max} - maximum frequency of the analyzer type (↗ 6-216, 6-222)

The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS MODE	Fixed frequency
FREQ	1.000 kHz

6.3.2.2.10 MOD DIST (Modulation Distortion)

Description

With this function, you can measure the modulation factor between different signals. For this modulation factor analysis, a suitable two-tone signal must be supplied to the DUT.

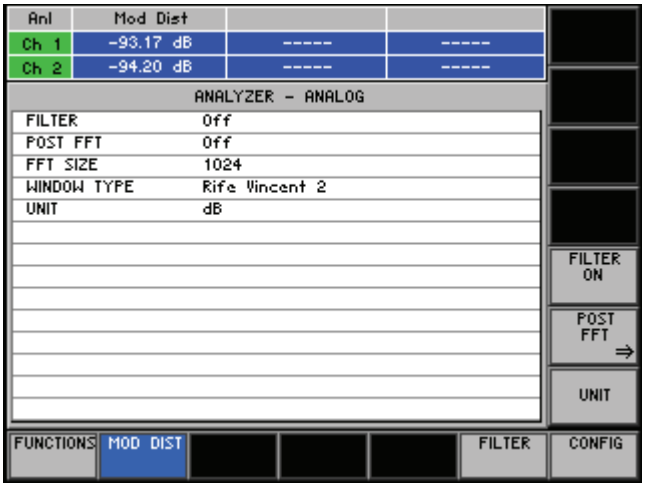
Preparing the measurement

1. Call the generator **MOD DIST** function (↗ 6-112).
2. Set the signal parameters (↗ 6-138).
3. Switch the DUT between the generator [8] and analyzer [9].

Setting measurement parameters

4. Call the **MOD DIST** measurement function (↗ 6-226).
5. Select the MOD DIST **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

FILTER ON — Activate/Deactivate the filter. (↗ 6-232)

POST FFT ⇒ — **Open the submenu:** (↗ 6-265)
Set the POST FFT.

UNIT — Select the unit for the level display. (↗ 6-266)

Measurement method

The R&S UP300/350 measures the 2nd and 3rd order intermodulation products selectively (measurements are therefore unaffected by noise) according to DIN IEC 268, Part 3, and calculates the squared sum of the intermodulation products.

Note: Contrary to the recommendation in DIN IEC 268, the total intermodulation factor is measured to ensure that this measurement method is comparable to the customary SMPTE measurement methods.

d2 = Intermodulation product of 2nd order
d3 = Intermodulation product of 3rd order

Modulation distortion of 2nd order

$$dm2 = \frac{|V_{(f1+f2)}| + |V_{(f2-f1)}|}{V_{(f2)}}$$

Modulation distortion of 3rd order

$$dm3 = \frac{|V_{(f2-2f1)}| + |V_{(f2+2f1)}|}{V_{(f2)}}$$

Square sum:

$$dm(2+3) = \sqrt{dm2^2 + dm3^2}$$

$$\text{MOD DIST [dB]} = 20 * \lg (dm(2+3))$$

Displaying and analyzing measurement results

Measurement display

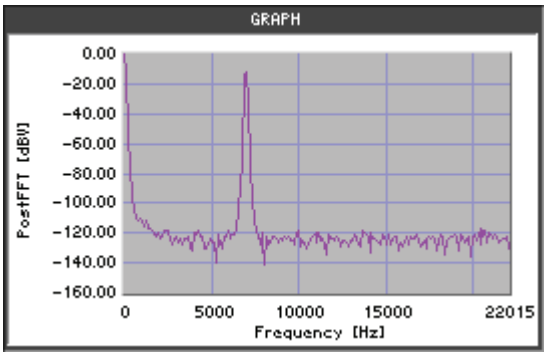
Activating the measurement function, the instrument displays the total intermodulation product.

Graph	Mod Dist		
Ch 1	-92.50 dB	-----	-----
Ch 2	-95.00 dB	-----	-----

Frequency spectrum

1. Call the measurement function **POST FFT** (↗ 6-266).
2. Select the **SPECTRUM** display mode in the Graph menu (↗ 6-288).

   A measurement diagram with the frequency spectrum is shown in the display area.

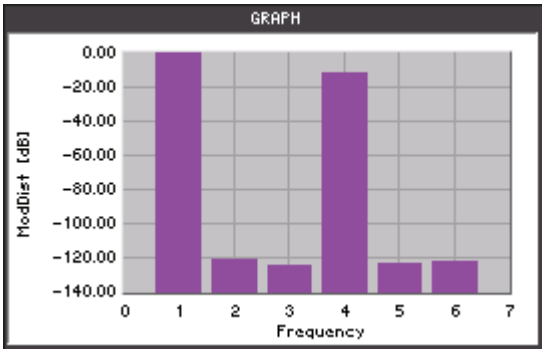


Note: In the Graph menu you can change the graphic display area (↗ 6-292, 6-296) and analyze the trace using the cursors (↗ 6-300).

Bar graph

Select the **BAR GRAPH** display mode in the Graph menu (↗ 6-288).

A bar graph is shown in the display area. Depending on the measurement type, the interference signal (1), useful signal (4), and intermodulation products (2, 3, 5, 6) of the input signal are displayed.



Note: When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

6.3.2.2.11 PROTOCOL (Protocol Analysis), (R&S UP350 only)

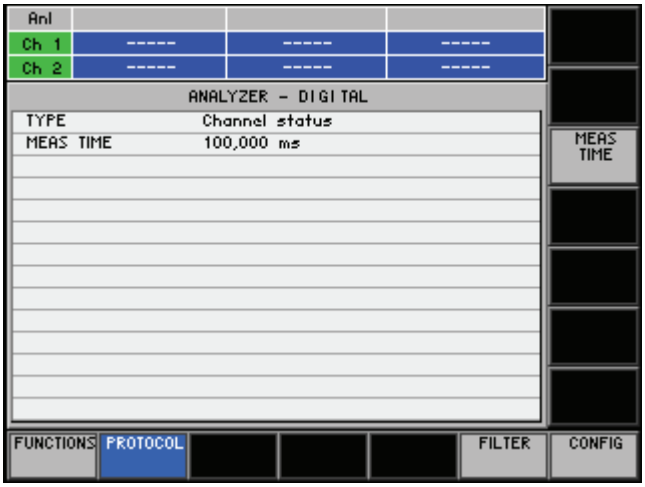
Description

The PROTOCOL function is not a measurement function in the usual sense, but instead allows the channel status data to be displayed for the AES/EBU interface. Other (transission) errors also appear in this protocol analysis.

Setting measurement parameters

1. Switch on the digital analyzer (↗ 6-215).
2. Call the **PROTOCOL** measurement function (↗ 6-226).
3. Select the PROTOCOL **menu** with the ◂ or ▸ **cursor keys**.

   The menu name is highlighted and the function key [13] is assigned the appropriate function.



Function key assignment

MEAS TIME — Enter the measurement time. (↗ 6-280)

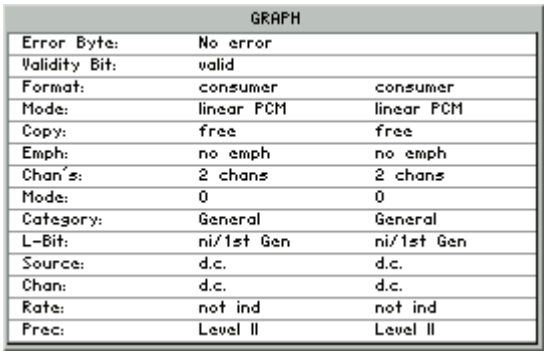
Displaying and analyzing measurement results

List of the protocol analysis

Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-288).

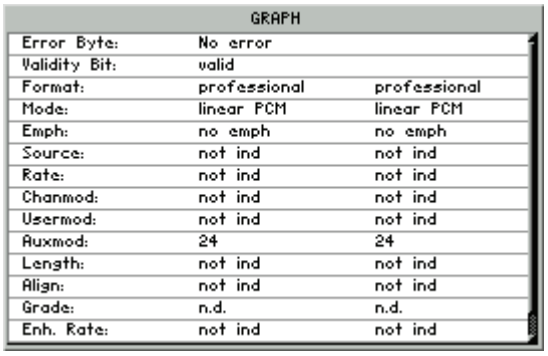
Depending on the protocol recognized, the channel status data of the digital interface is displayed.

Consumer



GRAPH		
Error Byte:	No error	
Validity Bit:	valid	
Format:	consumer	consumer
Mode:	linear PCM	linear PCM
Copy:	free	free
Emph:	no emph	no emph
Chan's:	2 chans	2 chans
Mode:	0	0
Category:	General	General
L-Bit:	ni/1st Gen	ni/1st Gen
Source:	d.c.	d.c.
Chan:	d.c.	d.c.
Rate:	not ind	not ind
Prec:	Level II	Level II

Professional



GRAPH		
Error Byte:	No error	
Validity Bit:	valid	
Format:	professional	professional
Mode:	linear PCM	linear PCM
Emph:	no emph	no emph
Source:	not ind	not ind
Rate:	not ind	not ind
Chanmod:	not ind	not ind
Usermod:	not ind	not ind
Auxmod:	24	24
Length:	not ind	not ind
Align:	not ind	not ind
Grade:	n.d.	n.d.
Enh. Rate:	not ind	not ind

Note: When you activate the measurement function, the R&S UP350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

Selecting the Measurement Time

Use

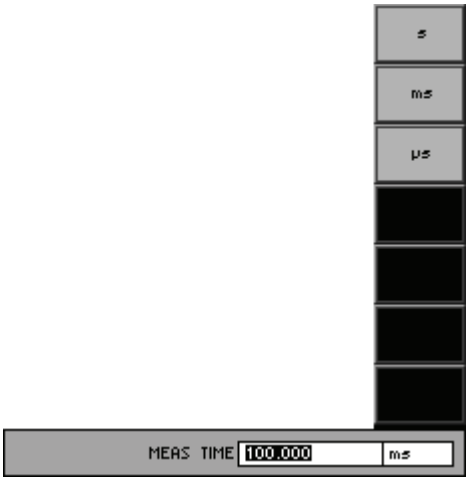
You can enter different measurement times according to the measurement task.

Note: The setting is always valid for both channels (Ch 1&2).

Setting the measurement time

1. Press the MEAS TIME **function key** in the current **measurement menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is “100 ms“. At the same time, the function keys are assigned various units of measurement.



2. Enter a new value (↗ 5-65).

   The permissible entry range is:

   1 ms ≤ MEAS TIME ≤ 10 s

   The new setting is stored and displayed in the parameter field.

Ch 1&2

MEAS TIME	100.000 ms

6.3.2.2.12 SAMPLE RATE (Sample Frequency), (R&S UP350 only)

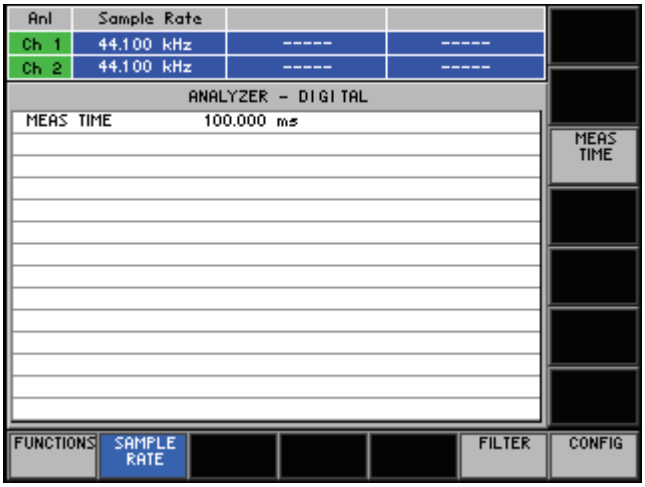
Description

With this function, you can measure the sample frequency on channels Ch 1 and Ch 2.

Setting measurement parameters

1. Switch on the digital analyzer (↗ 6-215).
2. Call the **SAMPLE RATE** measurement function (↗ 6-226).
3. Select the SAMPLE RATE **menu** with the ◂ or ▸ **cursor keys**

   The menu name is highlighted and the function key [13] is assigned the appropriate function.



Function key assignment

MEAS TIME — Enter the measurement time. (↗ 6-280)

Displaying and analyzing measurement results

Measurement display

Activating the measurement function, the instrument displays the sample rate.

Note: When you activate the measurement function, the R&S UP350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-285).

The measurement time affects the resolution precision.

6.3.3 Configuring the Filters (FILTER)

Description

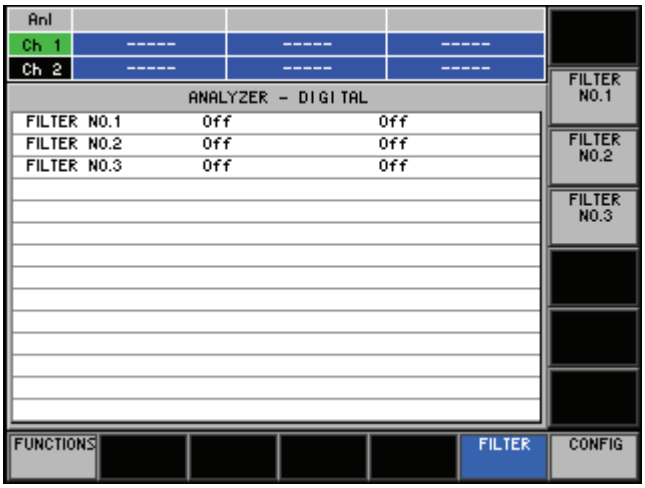
In the analyzer, you can activate up to 3 digital filters. These filters are cascaded.

Standardized filters are available in the FILTER menu. In the individual measurement functions, you can then decide whether or not the selected filters are to be effective on a specific channel.

Selecting the FILTER menu

Select the FILTER **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

FILTER NO.1 Select filter 1. (↗ 6-283)

FILTER NO.2 Select filter 2. (↗ 6-283)

FILTER NO.3 Select filter 3. (↗ 6-283)

6.3.3.1 Selecting the Filters

Use

Activating special weighting filters (e.g. third-octave or octave filters) provides a large number of measurement options. You can select the following weighting filters:

- **Off**
  No weighting filter active
- **A weighting**
  Weighting for RFI voltage measurement
  (acc. to DIN 45412)
- **C message**
  Transmission measurement
  (acc. to IEEE 743-84)
- **CCITT**
  Psophometric measurement
  (acc. to CCITT 0.41, IEEE Rec. 743-84, CISPR 6-76, CCITT Rec. P.53)
- **CCIR 1k wtd**
  Weighting for RFI voltage measurement
  (acc. to CCIR Rec. 468-4, DIN 45405, CCITT Rec. N21, CISPR 6-76)
- **CCIR unwtd**
  Band-pass filter from 20 Hz to 20 kHz for band-limited unweighted measurement according to CCIR
  (acc. to CCIR Rec. 468-4)
- **CCIR 2 k wtd**
  NAB standard
  (acc. to CCIR)
- **deemphasis 50/15**
  Compact disc
  (acc. to CCIR Rec. 651)
- **deemphasis 50**
  Noise and psophometric voltage measurement according to DIN 45405
  (acc. to ARD Spec. 5/3.1)
- **deemphasis 75**
  Noise and psophometric voltage measurement according to DIN 45405
  (acc. to ARD Spec. 5/3.1)
- **deemphasis J.17**
  Noise and psophometric voltage measurement according to DIN 45405
  (acc. to CCITT J.17)
- **Rumble wtd**
  Testing of record players, psophometric voltage measurement
  (acc. to DIN 45539)
- **Rumble unwtd**
  Testing of record players, noise voltage measurement
  (acc. to DIN 368.3, DIN 45539)
- **IEC/IEEE tuner**
  Measurements of tuners (acc. to DIN/IEC 315)
- **1/3 octave**
  Band-pass filter with bandwidth of $^1/_3$ octave

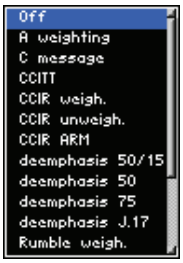
- **1/1 octave**
  Band-pass filter with bandwidth of 1 octave

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.
   The selected channel is displayed in green in the channel display.

Selecting and activating filters

2. Press the FILTER NO.1 **function key** in the FILTER **menu.**
   A selection field containing the available settings is displayed. The default setting is “Off“.



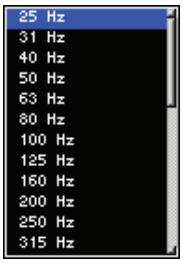
3. Use the **rotary knob** [11] to select a setting.
   Note: The scroll bar indicates that there are more settings available.
4. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
FILTER NO.1	A weighting	Off

5. Press the FILTER NO.2 and FILTER NO.3 **function keys** in the FILTER **menu** if you want to select more filters.
   The selected filters (max. 3) are active and can only be activated together (cascaded) in the individual measurement functions.

Entering the center frequency (for an octave filter)

If you select an octave filter, a selection field containing various center frequencies appears. The default setting is “25 Hz“.



6. Use the **rotary knob** [11] to select a setting.
   Note: The scroll bar indicates that there are more settings available.
7. Press the **ENTER key** [5] to close the selection field.
   The new setting is stored and displayed in the parameter field.

	Ch 1	Ch 2
FILTER NO.1	1/3 octave: 25 Hz	Off

6.3.4 Starting and Stopping the Measurements

Use

When you activate a measurement function, the R&S UP300/350 begins the continuous measurement. You can, however, control the measurement manually. The numeric keys 4, 5, and 6 are provided for this purpose.

- **4: START**
  Measurements are reset and restarted.
  Simple sweeps are reset and restarted. Concatenated sweeps are performed only once and then stopped.

- **5: SINGLE**
  Single measurements are performed. When a single measurement has finished, MEASUREMENT STOPPED appears in the parameter field. Simple sweeps are performed only once. In case of concatenated sweeps, a partial sweep is performed. As soon as the measurement is completed, SWEEP STOPPED is displayed in the status line.

- **6: STOP/CONTINUE**
  Continuous and single measurements or sweeps are stopped. MEASUREMENT STOPPED or SWEEP STOPPED appears in the parameter field.

Note: The sweep is not supported by the **"CONTINUE" function.**

6.4 Graph Menu

Introduction

Apart from displaying measurement results numerically, you can also analyze the measurements graphically. Various display modes are provided for this purpose. In the Graph menu, you can select various display parameters for the individual measurement functions, change the X and Y axises of the measurement diagram and analyze the trace using the X and Y cursors.

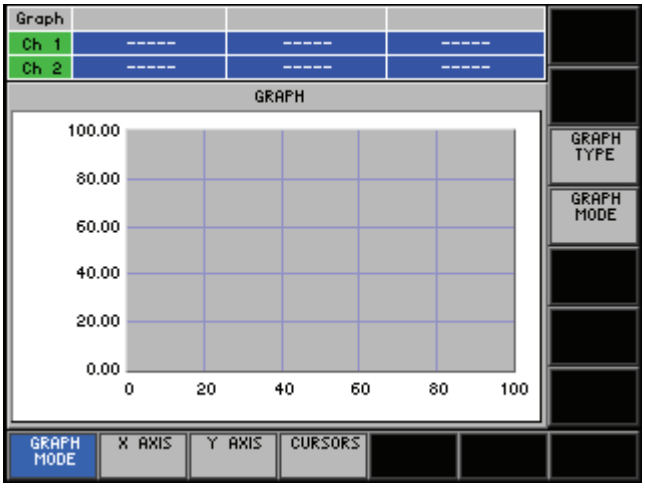
Note: What is measured and how measurement is performed is configured in the Analyzer menu (or in the Generator menu in case of sweeps). The way in which the measurement is displayed can also be changed.

Activating the Graph menu

The instrument has to be in local mode.

1. Close the SYS menu if opened.
2. Close every entry field if opened.
3. Press the **main menu** Graph **selection key**.

The Graph menu is displayed:



Menus for configuring and setting display parameters

The menus used to set the graph are displayed in the menu area.

GRAPH MODE	Set the display mode.	(↗ 6-287)
X AXIS	Scale the X axis.	(↗ 6-292)
Y AXIS	Scale the Y axis.	(↗ 6-296)
CURSORS	Trace analysis using the cursors.	(↗ 6-300)

6.4.1 Selecting the Display Mode (GRAPH MODE)

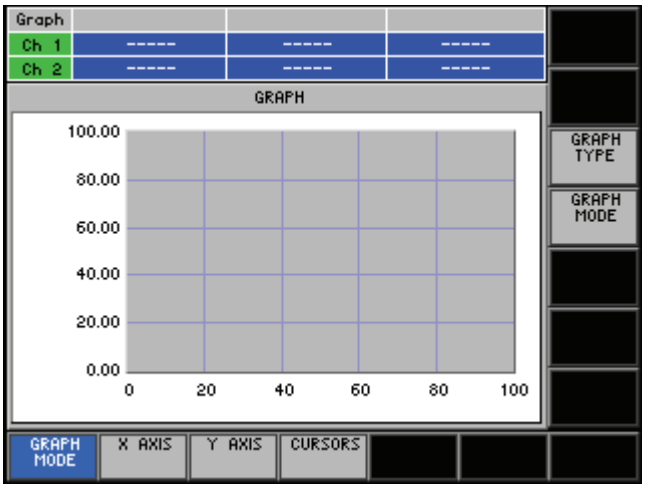
Description

In the GRAPH MODE menu, you can set the display parameters for the corresponding measurement function and the display mode for the traces.

Selecting the GRAPH MODE menu

Select the GRAPH MODE **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

GRAPH TYPE — Select the display parameters. (↗ 6-288)

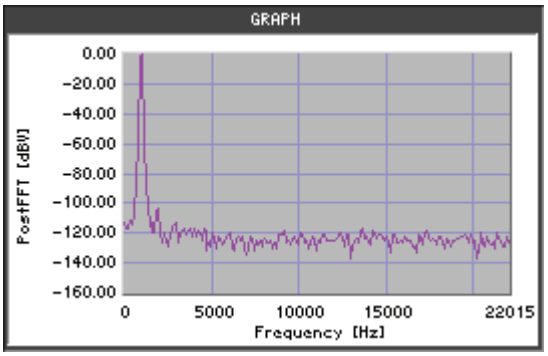
GRAPH MODE — Select the display mode. (↗ 6-290)

6.4.1.1 Selecting the Display Parameters

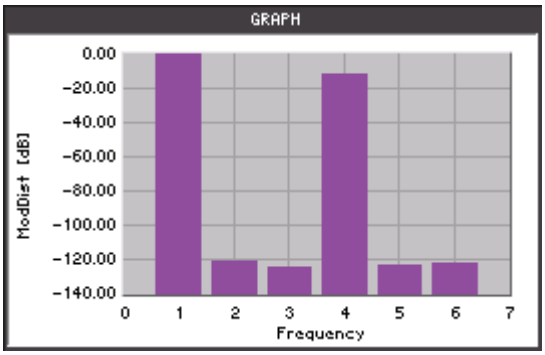
Use

Apart from displaying measurement results numerically, you can also analyze the measurements graphically. Various display parameters are available depending on the measurement function:

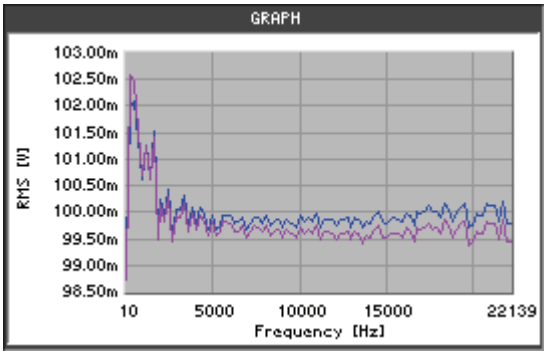
- **Spectrum (FFT, THD, DFD, MOD DIST)**
  If you select the FFT or Post FFT measurement functions, the frequency spectrum calculated by the R&S UP300/350 appears in the display area.



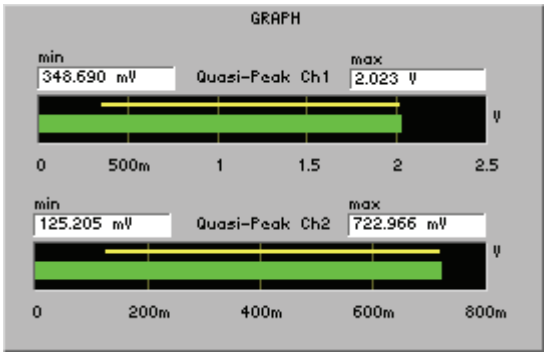
- **Bar graph (THD, DFD, MOD DIST)**
  This display shows the current measurement values in analog form as a bar graph. However, the frequency axis is not true-to-scale because the relative size of harmonics, or their variation, is given priority to the precise value, e.g. measurement function MOD DIST (↗ 6-275).



- **Curve Plot (Sweep)**
  This display shows the X-Y graph of the corresponding sweep.



- **Q-Peak indicator (QUASI PEAK)**
  This display shows the current QUASI-PEAK measurement values in analog form as a bar graph. The MIN and MAX values for the active measurement is also shown.



- **List of values (SWEEP RMS+THD, FFT, THD, protocol analysis)**
  The results of the THD measurement are listed in a table, e.g. THD measurement function (↗ 6-259).

GRAPH

FFT

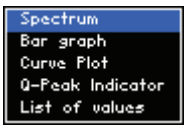
Frequency	Ch1	Ch2
0,00 Hz	-107,88 dBV	-105,66 dBV
110,63 Hz	-106,74 dBV	-105,80 dBV
221,25 Hz	-102,10 dBV	-102,61 dBV
331,88 Hz	-95,47 dBV	-95,63 dBV
442,50 Hz	-90,87 dBV	-91,02 dBV
553,13 Hz	-84,68 dBV	-84,76 dBV
663,76 Hz	-72,43 dBV	-72,43 dBV
774,38 Hz	-58,34 dBV	-58,34 dBV
885,01 Hz	-5,80 dBV	-5,80 dBV
995,64 Hz	-0,15 dBV	-0,14 dBV
1106,26 Hz	-58,98 dBV	-58,98 dBV
1216,89 Hz	-72,86 dBV	-72,84 dBV

Note: If a scroll bar is displayed at the right, you can use the ▲ or ▼ cursor keys [7], or the rotary knob to look at other measurement results.

Selecting display parameters

1. Press the GRAPH TYPE **function key** in the GRAPH MODE **menu.**

   A selection field containing the available settings is displayed. The default setting is dependent on the current measurement function, e.g. “Spectrum“.



2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

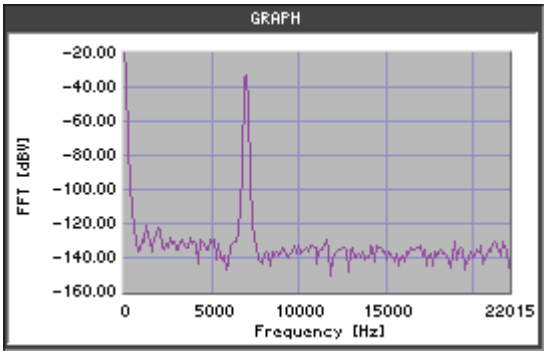
   The new setting is displayed in the measurement diagram.

6.4.1.2 Selecting the Display Mode

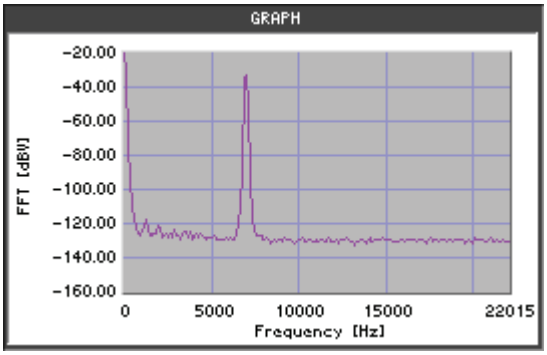
Use

You can select the following settings for displaying the traces:

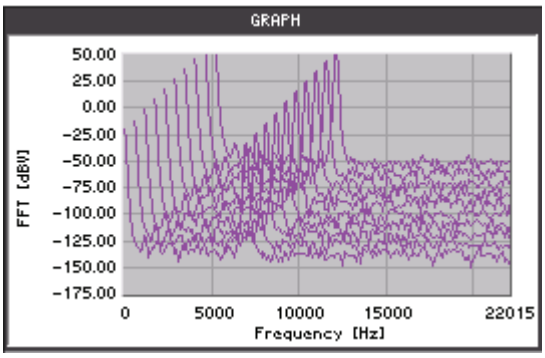
- **Overwrite**
  Overwrites the trace with every measurement run.



- **Max hold**
  Displays the maximum value over several measurement runs. This is particularly useful in case of modulated or pulse-like signals. The mode compares the old and new values of each point and selects the higher value, creating a new curve.



- **Waterfall**
  Offsets the individual traces in the Z axis to give a three-dimensional display. With new values, the actual display of the old data is shifted to the back and the new data are placed to the front of the display. The maximum amount of curves is limited to 10 per channel.



Selecting the display mode

1. Press the GRAPH MODE **function key** in the GRAPH MODE **menu.**

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

2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.

   The new setting is displayed in the measurement diagram.

6.4.2 Scaling the X Axis (X AXIS)

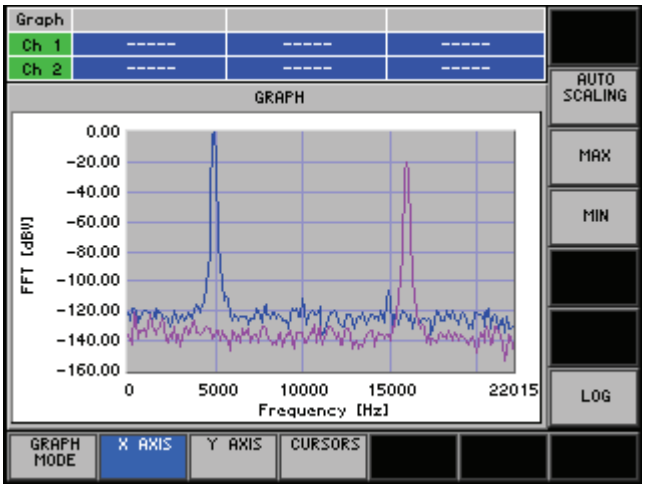
Description

You can scale the X axis of the measurement diagram to allow certain trace sections to be analyzed.

Selecting the X AXIS menu

Select the X AXIS **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

AUTO SCALING — Automatic display area scaling. (↗ 6-293)

MAX — Manual display area scaling:
Enter the upper limit of the display area. (↗ 6-293)

MIN — Manual display area scaling:
Enter the lower limit of the display area. (↗ 6-293)

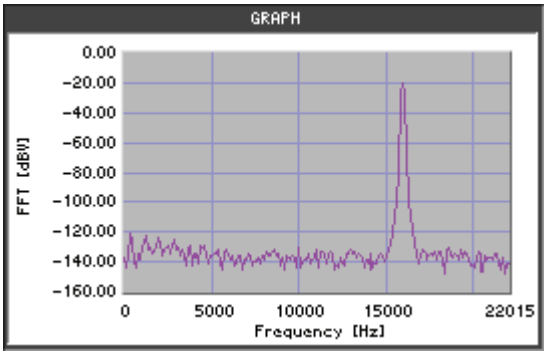
LOG — Select the display mode. (↗ 6-295)

6.4.2.1 Setting the Display Range

Use

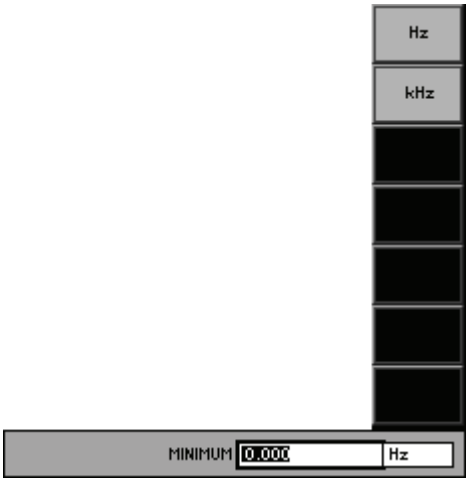
You can modify the display area of the X axis measurement diagram using minimum and maximum values.

Initial position of the X axis

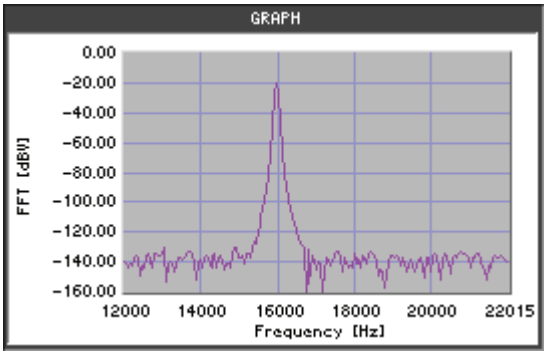


Entering the lower limit of the X axis

1. Press the MIN **function key** in the X AXIS **menu.** An entry field containing the currently applicable setting is displayed. The actual value can be seen on the left end of the axis. At the same time, the function keys [13] are assigned various units of measurement.



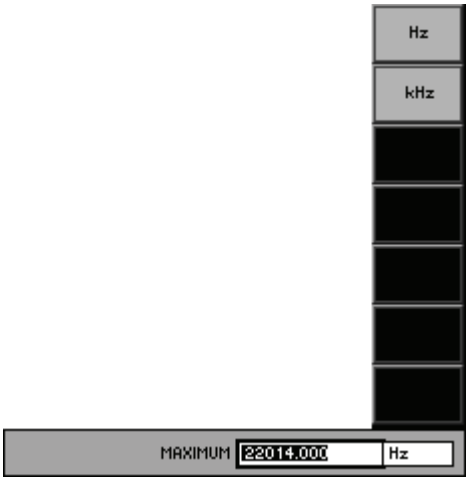
2. Enter a new value, e.g. 12 kHz (↗ 5-65).
   The entry range depends on your measurement task.
   The new setting is displayed in the measurement diagram.



Entering the upper limit of the X axis

3. Press the MAX **function key** in the X AXIS **menu.**

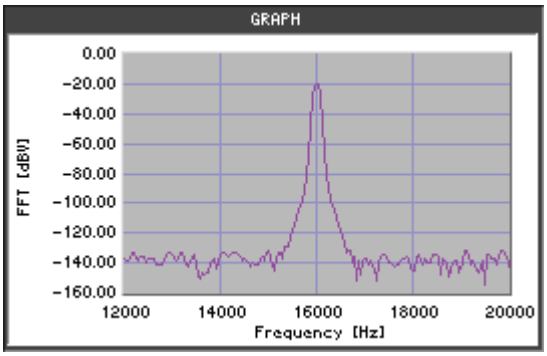
An entry field containing the currently applicable setting is displayed. The actual value can be seen on the right end of the X axis. At the same time, the function keys [13] are assigned various units of measurement.



4. Enter a new value, e.g. 20 kHz (↗ 5-65).

The entry range depends on your measurement task.

The new setting is displayed in the measurement diagram.



Auto scaling of the X axis

Press the AUTO SCALING **function key** in the X AXIS **menu.**

The X axis is automatically set to display the entire data overview (↗ above, initial position of the X axis).

6.4.2.2 Selecting the Display Mode

Use

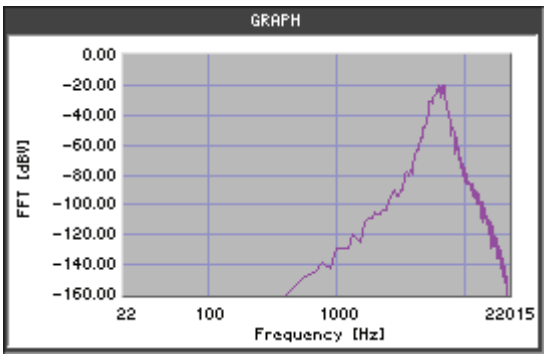
You can select the following settings for scaling the X axis:

- **LIN**
  Linear scaling of the X axis, default setting
- **LOG**
  Logarithmic scaling of the X axis

Activating the logarithmic scaling

1. Press the LOG **function key** in the X AXIS **menu**.

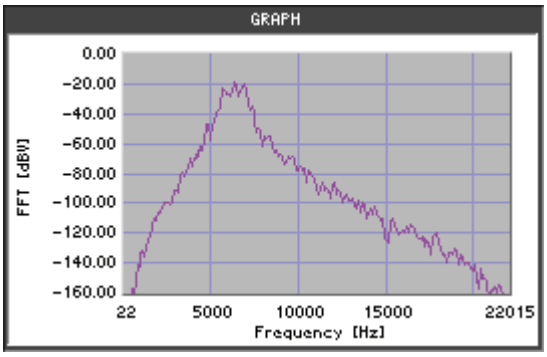
   The function key is **highlighted** and the new setting is stored. When activated, the X axis is displayed logarithmically.



Activating the linear scaling

2. Press the LOG **function key** in the X AXIS **menu**.

   The function key is **no longer highlighted** and the X axis is displayed linearly.



6.4.3 Scaling the Y Axis (Y AXIS)

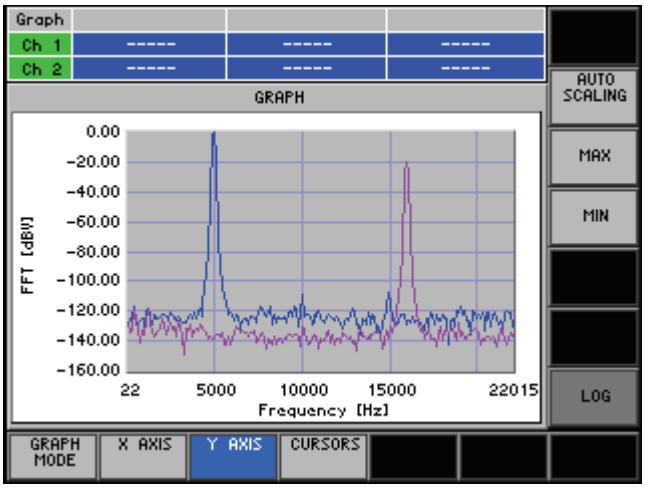
Description

You can scale the Y axis of the measurement diagram to allow certain trace sections to be analyzed.

Selecting the Y AXIS menu

Select the Y AXIS **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

AUTO SCALING — Automatic display area scaling. (↗ 6-297)

MAX — Manual display area scaling:
Enter the upper limit of the display area. (↗ 6-297)

MIN — Manual display area scaling:
Enter the lower limit of the display area. (↗ 6-297)

LOG — Select the display mode. (↗ 6-299)

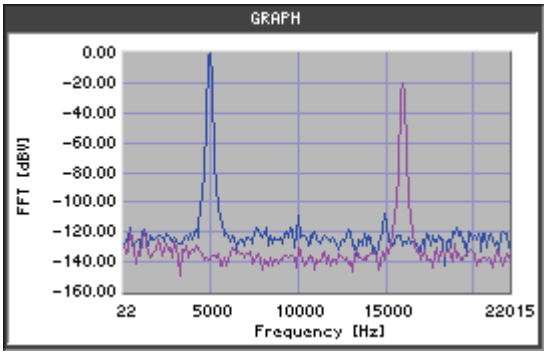
Note: The LOG function key is only available if you have set the unit V, FS, % FS, and % for the Y axis (↗ 6-257).

6.4.3.1 Setting the Display Range

Use

You can modify the display area of the Y axis measurement diagram using minimum and maximum values.

Initial position of the Y axis



Entering the upper limit of the Y axis

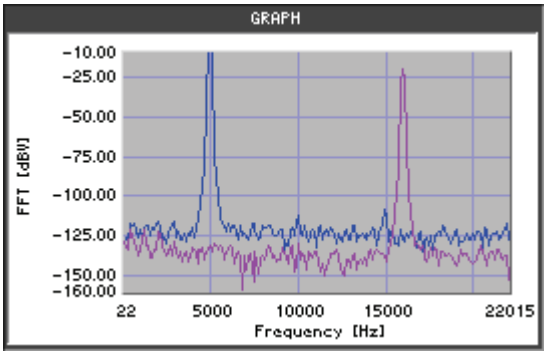
1. Press the MAX **function key** in the Y AXIS **menu.**

   An entry field containing the currently applicable setting is displayed. The default setting is the upper edge of the diagram. If you want to change the unit of measurement, go to the function setting, e.g. FFT menu (↗ 6-251).

2. Enter a new value, e.g. -10 dBV (↗ 5-65).

   The entry range depends on the selected unit of measurement.

   The new setting is displayed in the measurement diagram.



Entering the lower limit of the Y axis

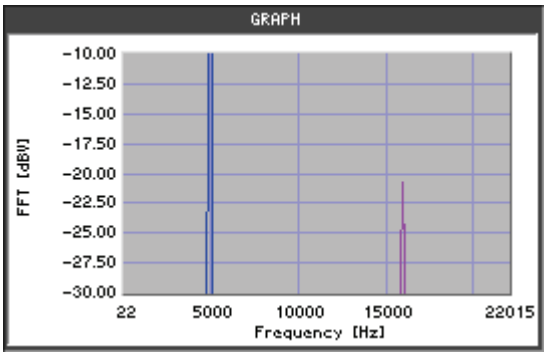
3. Press the MIN **function key** in the Y AXIS **menu.**

An entry field containing the currently applicable setting is displayed. The default setting is the lower edge of the diagram. If you want to change the unit of measurement, go to the function setting, e.g. FFT menu (↗ 6-251).

4. Enter a new value, e.g. -30 dBV (↗ 5-65).

The entry range depends on the selected unit of measurement.

The new setting is displayed in the measurement diagram.



Auto scaling of the Y axis

Press the AUTO SCALING **function key** in the Y AXIS **menu.**

The Y axis is automatically set to display the entire data overview (↗ above, initial position of the Y axis).

6.4.3.2 Selecting the Display Mode

Use

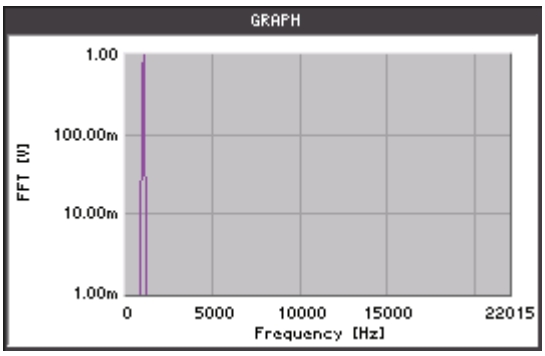
You can select the following settings for scaling the Y axis:

- **LIN**
  Linear scaling of the Y axis, default setting
- **LOG**
  Logarithmic scaling of the Y axis

Activating the logarithmic scaling

1. Press the LOG **function key** in the Y AXIS **menu**.

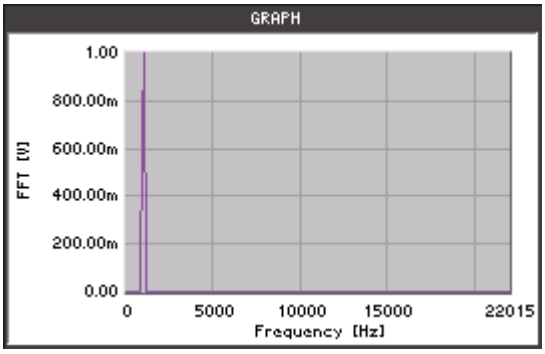
   The function key is **highlighted** and the new setting is stored. When activated, the Y axis is displayed logarithmically.



Activating the linear scaling

2. Press the LOG **function key** in the Y AXIS **menu**.

   The function key is **no longer highlighted** and the Y axis is displayed linearly.



6.4.4 Trace Analysis Using Cursors (CURSORS)

Description

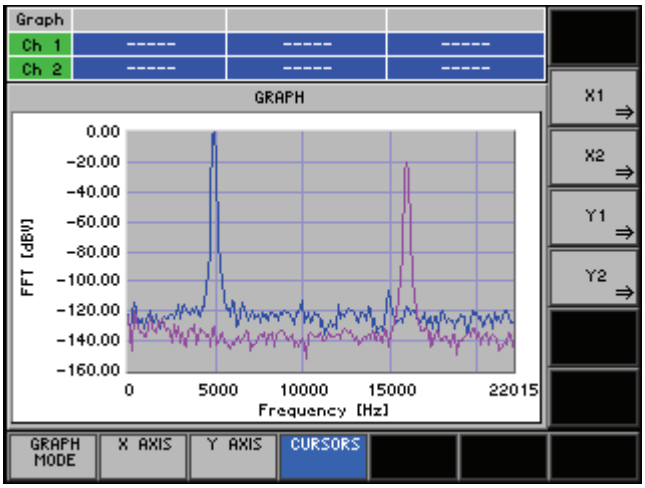
You can position two cursors on the X axis and cursors on the Y axis and move them over the display using the rotary knob or the cursor keys. The measurement values under these cursors are shown in the full-screen display (↗ 6-314).

The cursor moves from one measurement value to another. If there are more measurement values, they can be displayed as points (e.g. with FFT); the maximum value of the measurement values represented by a particular point is displayed.

Selecting the CURSORS menu

Select the CURSORS **menu** with the ◂ or ▸ **cursor keys**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

X1 ⇒ **Open the submenu:** (↗ 6-301)
Configure cursor 1 on the X axis.

X2 ⇒ **Open the submenu:** (↗ 6-301)
Configure cursor 2 on the X axis.

Y1 ⇒ **Open the submenu:** (↗ 6-309)
Configure cursor 1 on the Y axis.

Y2 ⇒ **Open the submenu:** (↗ 6-309)
Configure cursor 2 on the Y axis.

6.4.4.1 Configuring the X Cursors

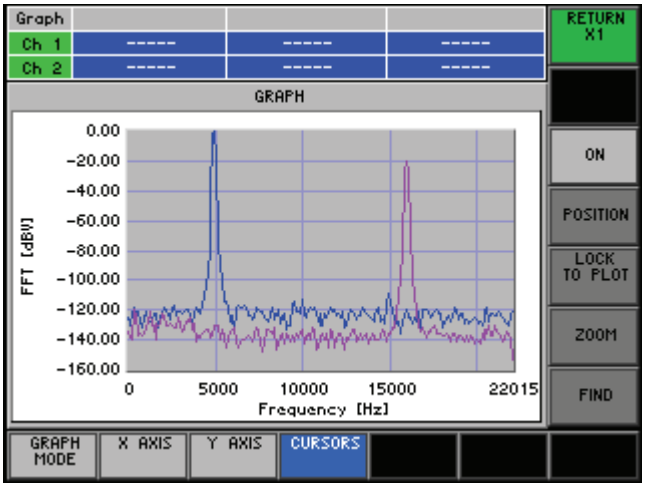
Description

Each X cursor can be configured individually. When activated, they can be moved to any position and used to mark the zoom area on every trace.

Selecting the X1 or X2 submenus

Press the X1 ⇒ or X2 ⇒ **function keys** in the CURSORS **menu**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function, e.g. X1.



Function key assignment

RETURN X1	Exit the submenu.	
ON	Activate/Deactivate the X cursor.	(↗ 6-302)
POSITION	Position the X cursor manually.	(↗ 6-305)
LOCK TO PLOT	Assign an X cursor to a trace (Ch 1 or Ch 2).	(↗ 6-303)
ZOOM	Zoom the display area.	(↗ 6-307)
FIND	Position an X cursor on the maximum value.	(↗ 6-303)

Note: The POSITION, LOCK TO PLOT, ZOOM, and FIND function keys are only available if you have activated the X cursor.

6.4.4.1.1 Activating/Deactivating the X Cursors

Use

When you activate an X cursor, you can move it to any position and use it to mark the zoom area.

Selecting the channel

1. Press the numeric keys **1**, **2**, or **3** to select channel **Ch 1**, **Ch 2**, or both channels **Ch 1&2**.

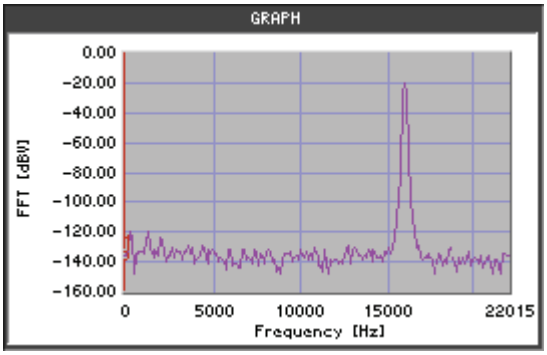
   The selected channel is displayed in green in the channel display.

Activating the X cursors

2. Press the ON **function key** in the **X1, or X2 submenus**.

   The function key is **highlighted** and the new setting is stored. When activated, the X cursor is positioned in the measurement diagram on the left.

   Note: When activated, you can move the X cursor with the **rotary knob** [11] in little steps.



Deactivating the X cursors

3. Press the ON **function key** in the **X1, or X2 submenus**.

   The function key is **no longer highlighted**. The X cursor disappears.

6.4.4.1.2 Assigning the X Cursors to a Trace (Ch 1 or Ch 2)

Use

When activated, the cursor is positioned on the trace of the current channel (Ch 1 or Ch 2). If both channels are active, you can, however, assign the X cursor to a particular trace.

- **Ch 1**
  The X cursor is placed on the trace of channel Ch 1.
- **Ch 2**
  The X cursor is placed on the trace of channel Ch 2.

Assigning X cursors to a trace

1. Activate the X1 cursor, for example (↗ 6-302).
2. Press the LOCK TO PLOT **function key** in the **cursor X1 submenu**.

   A selection field containing the available settings is displayed. The default setting is “Ch 1“. However, the default setting depends on cursors (X1 to Ch1, X2 to Ch2) and channel selection.

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

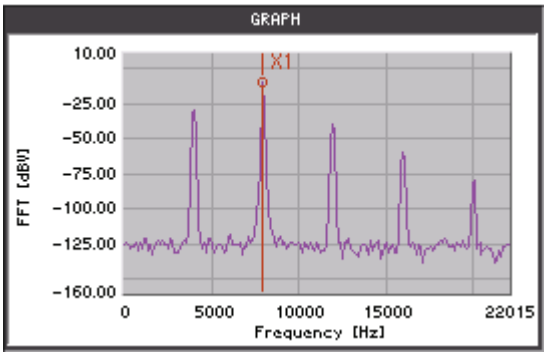
   The new setting is displayed in the measurement diagram.

6.4.4.1.3 Positioning the X Cursors on a Maximum

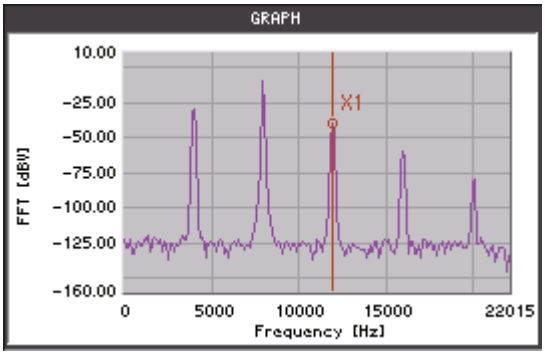
Use

If you have activated an X cursor, you can position it automatically on a maximum:

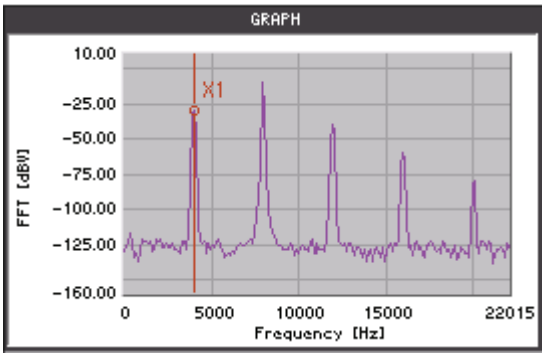
- **Max**
  The X cursor is positioned on the highest maximum in the display area.



- **Max right**
  The X cursor is positioned on the next maximum to the right of the current position in the display area.



- **Max left**
  The X cursor is positioned on the next maximum to the left of the current position in the display area.



Positioning X Cursors automatically

1. Activate the X cursor (↗ 6-302).
2. Press the FIND **function key** in the **cursor X submenu**.
   A selection field containing the available settings is displayed. The default setting is “Max“.

3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.
   The new setting is displayed in the measurement diagram.

Note: The X cursor parameters are shown in the full-screen display (↗ 6-314).

6.4.4.1.4 Manual Positioning the X Cursors

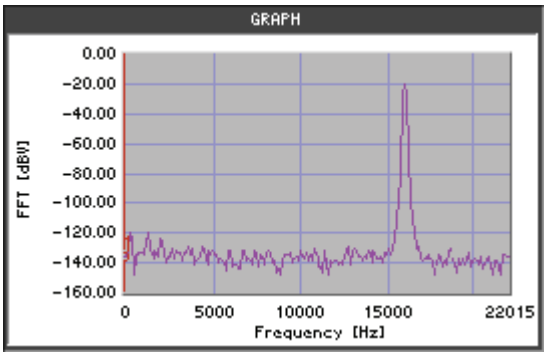
Use

If you have activated an X cursor, you can move it manually on the trace using the cursor keys (applies only to the full-screen display (↗ 6-314), or the rotary knob. You can also enter a specific value if you want to set the cursor at a precise position. The user can control only the cursor selected in the graph menu (X1, X2):

1. Rotary knob → to move the cursor
2. ▸ key → to find max right
3. ◂ key → to find max left

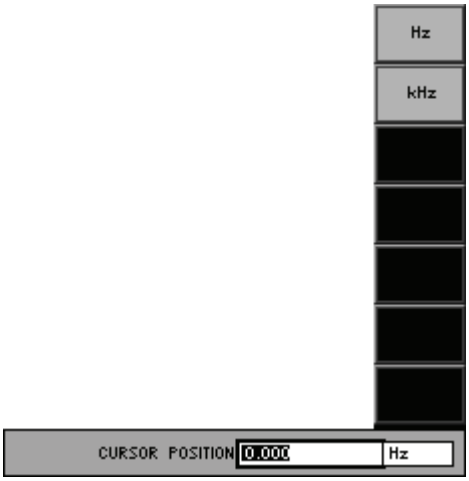
Manual positioning the X cursors

1. Activate the X cursor (↗ 6-302).



2. Press the POSITION **function key** in the **X cursor submenu**.

An entry field containing the currently applicable setting is displayed. At the same time, the function keys [13] are assigned various units of measurement.



3. **a)** Enter a new value (↗ 5-65).

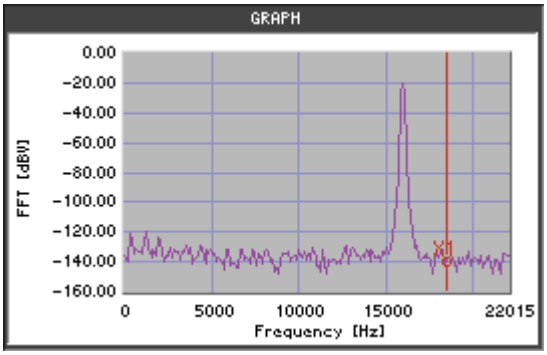
The permissible entry range is:

MIN ≤ CURSOR POSITION ≤ MAX

within: MIN - lower limit of the display range (↗ 6-293)
MAX - upper limit of the display range (↗ 6-293)

b) Use the **rotary knob** [11] to select a setting.

The new position is displayed in the measurement diagram.



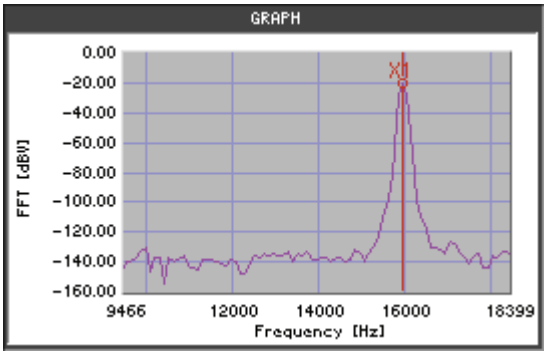
Note: The X cursor parameters are shown in the full-screen display (↗ 6-314).

6.4.4.1.5 Zooming the Display Area

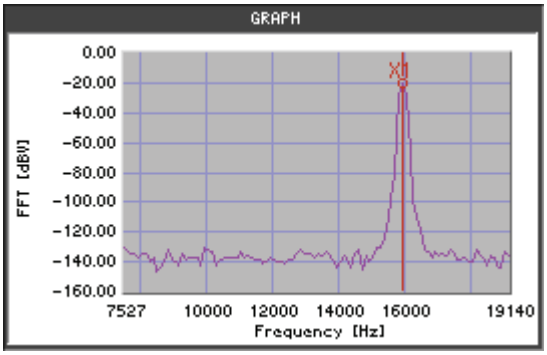
Use

You can zoom the display area in a variety of ways using the cursors:

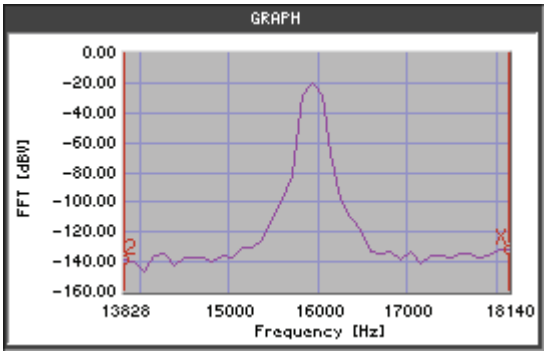
- **Zoom in**
  The size of the displayed section is increased by 1.41.



- **Zoom out**
  The size of the displayed section is decreased by 1.3.



- **Cursor to Cursor**
  If both X cursors are activated, you can use them as the start and end values for the new display area.



Activating and positioning cursors

1. Activate the X cursors (↗ 6-302).
2. Position the X cursors (↗ 6-303, 6-305).

   With the normal zoom modes (Zoom in, Zoom out), the current cursor X1 or X2 marks the zoom area.

   Both cursors X1 and X2 are required to zoom a specific display area (Cursor to Cursor). They are used as the start and end values for the new display area.

Selecting the zoom area

3. Press the ZOOM **function key** in the **X1, or X2 submenus**.

   A selection field containing the available settings is displayed. The default setting is “Zoom in“.

4. Use the **rotary knob** [11] to select a setting.
5. Press the **ENTER key** [5] to close the selection field.

   The new setting is displayed in the measurement diagram.

Note: After activating the AUTO SCALING function (↗ 6-293), the entire display area is shown.

6.4.4.2 Configuring the Y Cursors

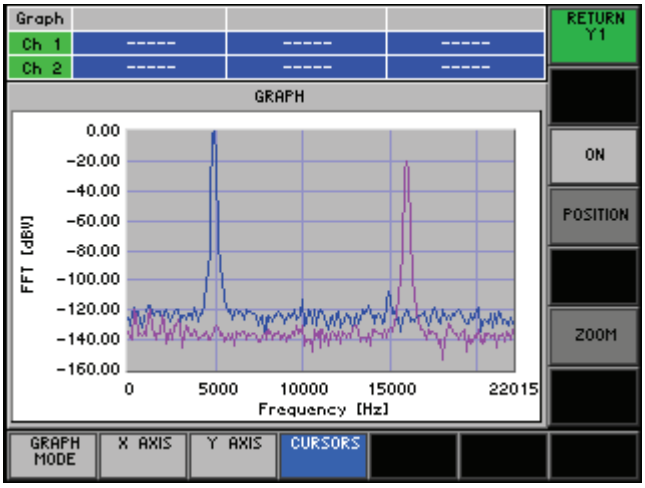
Description

Each Y cursor can be configured individually. When activated, they can be moved to any position and used to mark levels or to zoom the display area.

Selecting the Y1 or Y2 submenus

Press the Y1 ⇒ or Y2 ⇒ **function keys** in the CURSORS **menu**.

The menu name is highlighted and the function keys [13] are assigned the appropriate function, e.g. Y1.



Function key assignment

RETURN Y1 — Exit the submenu.

ON — Activate/Deactivate the Y cursor. (↗ 6-310)

POSITION — Position the Y cursor manually. (↗ 6-311)

ZOOM — Zoom the display area. (↗ 6-312)

Note: The POSITION and ZOOM function keys are only available if you have activated the Y cursor (↗ 6-310).

6.4.4.2.1 Activating/Deactivating the Y Cursors

Use

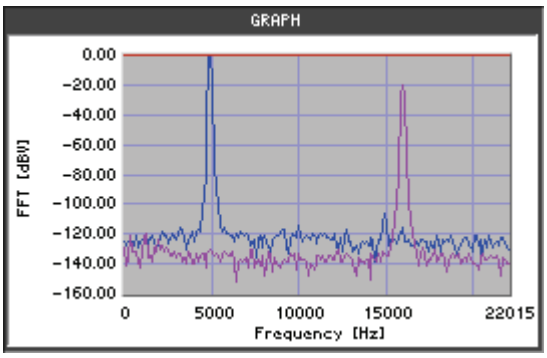
When you activate the Y cursor, you can move it to any position and use it to mark the zoom area.

Activating the Y cursors

1. Press the ON **function key** in the **Y1, or Y2 submenus**.

   The function key is **highlighted** and the new setting is stored. When activated, the Y cursor is positioned in the measurement diagram on the top.

   Note: When activated, you can move the Y cursor with the **rotary knob** [11] in little steps.



Deactivating the Y cursors

2. Press the ON **function key** in the **Y1, or Y2 submenus**.

   The function key is **no longer highlighted**. The Y cursor disappears.

6.4.4.2.2 Manual Positioning the Y Cursors

Use

If you have activated the Y cursor, you can move it manually on the trace using the cursor keys (applies only to the full-screen display, ↗ 6-314), or the rotary knob. You can also enter a specific value if you want to set the cursor at precise position. The user can control only the cursor selected in the graph menu (X1, X2). To move the cursor, use the rotary knob.

Manual positioning the Y cursors

1. Activate the Y cursor (↗ 6-310).
2. Press the POSITION **function key** in the **Y cursor submenu**.

   An entry field containing the currently applicable setting is displayed.

3. **a)** Enter a new value (↗ 5-65).

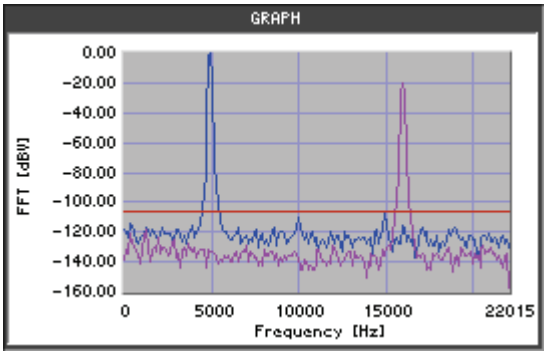
   The permissible entry range is:

   MIN ≤ CURSOR POSITION ≤ MAX

   within: MIN - lower limit of the display range (↗ 6-297)
   MAX - upper limit of the display range (↗ 6-297)

   b) Use the **rotary knob** [11] to select a setting.

   The new position is displayed in the measurement diagram.



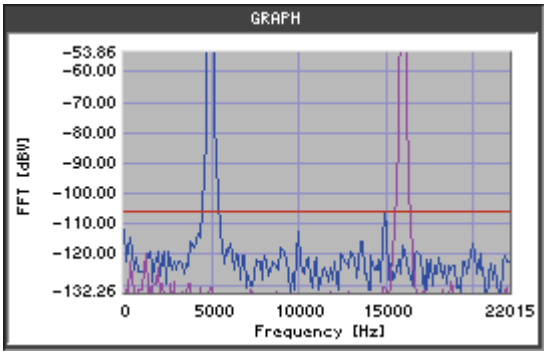
Note: The cursor parameters are shown in the full-screen display (↗ 6-314).

6.4.4.2.3 Zooming the Display Area

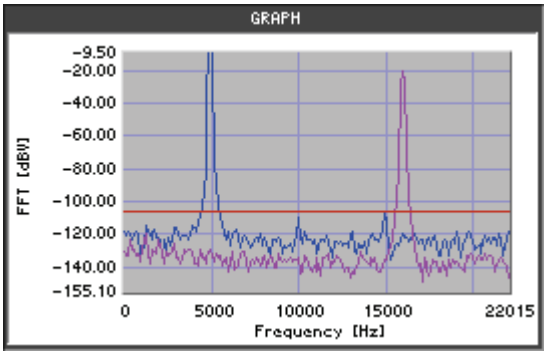
Use

You can zoom the display area in a variety of ways using the Y cursors:

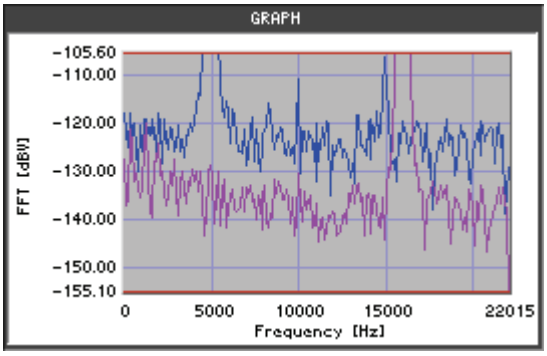
- **Zoom in**
  The size of the displayed section is increased by 1.41.



- **Zoom out**
  The size of the displayed section is decreased by 1.3.



- **Cursor to Cursor**
  If both Y cursors are activated, you can use them as the start and end values for the new display area.



Activating and positioning cursors

1. Activate the Y cursors (↗ 6-310).
2. Position the Y cursors (↗ 6-311).

   With the normal zoom modes (Zoom in, Zoom out), the current cursor Y1 or Y2 marks the zoom area.

   Both cursors, Y1 and Y2, are required to zoom a specific display area (Cursor to Cursor). They are used as the start and end values for the new display area.

Selecting the zoom area

3. Press the ZOOM **function key** in the **Y1, or Y2 submenus**.

   A selection field containing the available settings is displayed. The default setting is “Zoom in“.

4. Use the **rotary knob** [11] to select a setting.
5. Press the **ENTER key** [5] to close the selection field.

   The new setting is displayed in the measurement diagram.

Note: After activating the AUTO SCALING function (↗ 6-293) the entire display area is shown.

6.4.5 Full-Screen Display

Use

The full-screen display mode allows you to visually analyze the graphic measurement values more effectively. It also shows the parameters for cursors X1, X2, X1 and X2, Y1 and Y2 more clearly.

Preparation (adapting the measurement diagram)

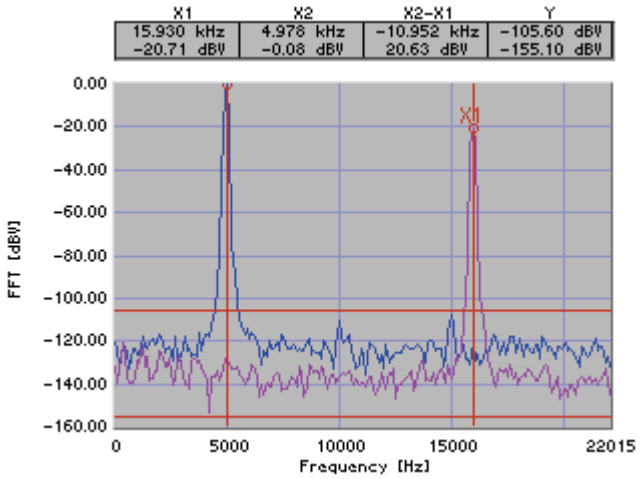
1. Select a display mode (↗ 6-287).
2. Scale the X and Y axes if necessary (↗ 6-292, 6-296).
3. Activate the X and Y cursors if necessary (↗ 6-301, 6-309).

   Note: The cursor last selected can also be positioned in the full-screen display. To do so, you must open the appropriate submenu before you activate the full screen. To change the position of a cursor, you must open the appropriate submenu (X1, X2, Y1, Y2) before you activate the full screen.

Activating the full-screen display

4. The instrument has to be in local mode.
5. Close the SYS menu if opened.
6. Close every entry field if opened.
7. Press the **main menu**  **selection key**.

   The menu area, function area, and parameter field disappear from the screen [14]. The diagram area then fills the whole screen. The scale labels and parameters of the cursors are displayed.

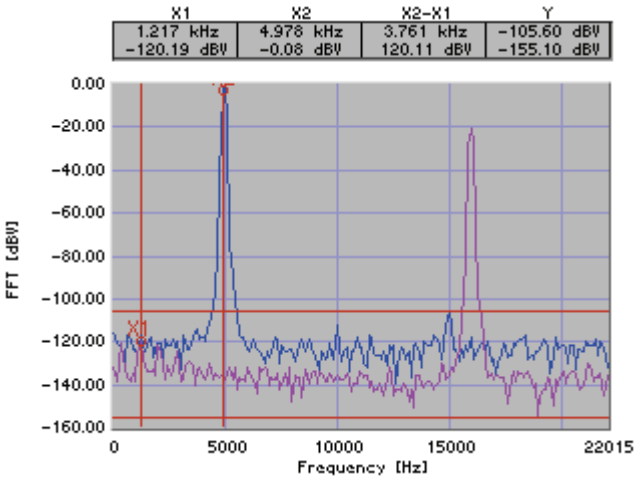


Repositioning the active cursor

8. **a)** Move the cursor to any position using the **rotary knob** [11].

b) Position the cursor at the maximum on the trace using the ◂ or ▸ cursor keys (applies only to cursor X1 and X2).

The new cursor parameters are displayed in the measurement diagram.



Deactivating the full screen

9. Press the **main menu**  **selection key**.

The menu area, function area and the parameter field reappear on the screen [14]. The cursor parameters disappear.

6.5 System Menu (SYS Menu key)

Introduction

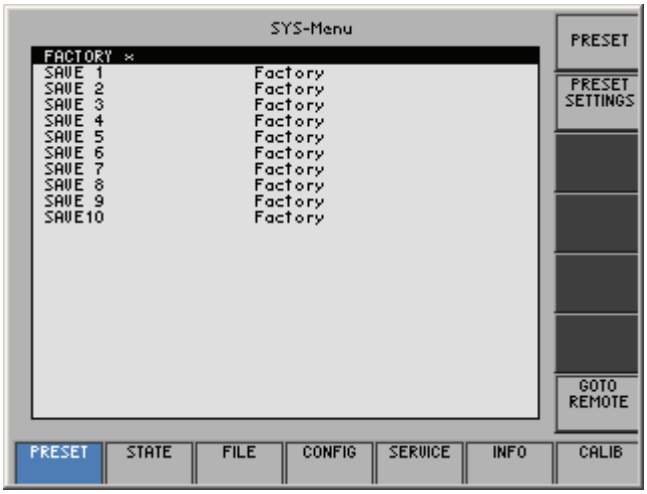
The R&S UP300/350 has generator and analyzer functions as well as the system and service functions.

In this menu, the hardware settings overview is displayed, current settings can be saved, recalled, or printed out (↗ 6-325), a selftest or self calibrations can be performed, the system settings can be configured, and the system and hardware information is provided.

Switching over the user interface

When the R&S UP300/350 has been switched on and the selftest has run without detecting any faults, the audio analyzer's user interface is activated.

1. Press the **BACK/SYS key** [3].
   The menus for the system and service functions are brought up on the screen in the menu area and the functions key [13] are assigned the appropriate functions. Depending on the function key assignment, the associated parameters are listed as tables in the display area.



2. Press the **BACK/SYS key** [3] or **ESC/CANCEL key** [4].
   The audio analyzer's user interface is activated again.

Menus for system and service functions

PRESET	Select and call the instrument's default setting.	(↗ 6-317)
STATE	Display the current instrument settings.	(↗ 6-320)
FILE	Save and load user-defined settings, print functions.	(↗ 6-323)
CONFIG	System settings	(↗ 6-328)
SERVICE	Service functions	(↗ 6-337)
INFO	Information about settings and hardware configuration	(↗ 6-338)
CALIB	Perform the automatic calibration.	(↗ 6-341)

6.5.1 Instrument Default Setting (PRESET Menu)

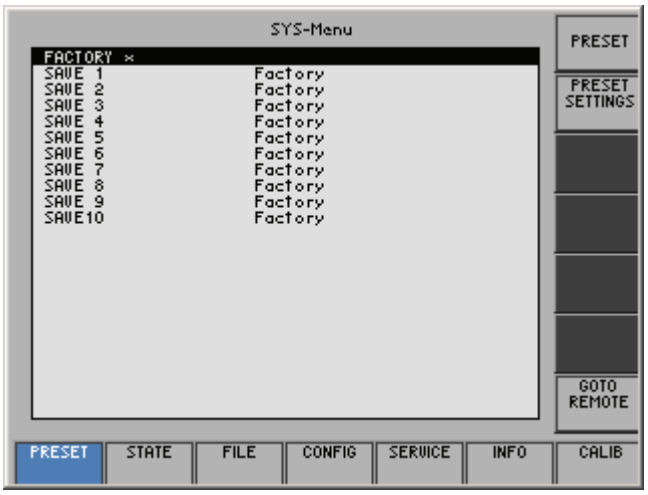
Description

From the PRESET menu, you can specify a user-defined instrument setting as the instrument default setting and call it up.

Selecting the PRESET menu

1. Press the **BACK/SYS key** [3].
2. Select the PRESET **menu** with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the function keys [13] are assigned the appropriate functions.



Function key assignment

PRESET — Call the instrument default setting. (↗ 6-318)

PRESET SETTINGS — Select the instrument default setting. (↗ 6-318)

GOTO REMOTE — Start the remote control manually. (↗ 6-319)

6.5.1.1 Selecting and Calling the Instrument Default Setting

Use

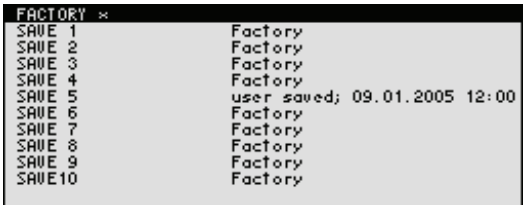
When you switch on the R&S UP300/350, the last settings used are restored.

The R&S UP300/350 also allows you to 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 as the PRESET setting (default setting) and call it directly at any time.

Selecting the user-defined settings

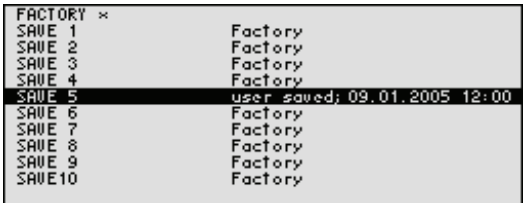
1. Save the user-defined settings (↗ 6-323).
2. Select the PRESET **menu** with the ◂ or ▸ **cursor keys** [6].

   A table containing the available settings is displayed. The current setting is marked with the sign “x”.



3. Select a setting with the ▴ or ▾ **cursor keys** [7].

   The selected option is highlighted.
   The PRESET memory location FACTORY contains the factory setting (↗ 6-89).



4. Press the PRESET SETTINGS **function key**.

   The setting is defined as the instrument default setting and is marked with the sign “x”.

Activating the instrument default setting

Press the PRESET **function key** in the PRESET **menu**.

The current instrument default setting is loaded and the SYS menu is left. The audio analyzer’s user interface is activated again.

Note: The FACTORY PRESET contains the factory default settings which cannot be modified.

6.5.1.2 Start the Remote Control Manually

Use

The R&S UP300/350 can be remote-controlled via the existing USB host interface [16]. The R&S UP300/350 automatically detects an existing connection to a PC and also automatically switches to remote control in the default setting (AUTO) (↗ 6-332).

You can also switch the R&S UP300/350 to remote control manually.

Starting the remote control manually

Press the GOTO REMOTE **function key** in the PRESET **menu.**

The R&S UP300/350 switches to remote control automatically.

Note: With remote control, the local control mode of the R&S UP300/350 is deactivated and can only be reactivated by pressing the BACK/SYS key [3] on the front panel. Switching between remote control and local control takes approx. 20 s.

6.5.2 Displaying the Current Instrument Setting (STATE Menu)

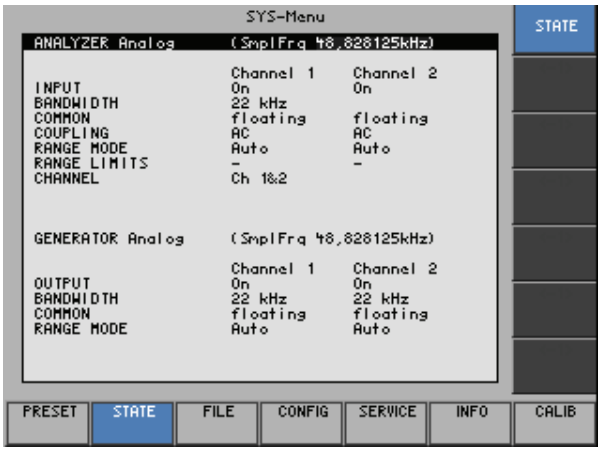
Description

From the STATE menu, you can display an overview of the principal analyzer and generator configuration settings.

Selecting the STATE menu

1. Press the **BACK/SYS key** [3].
2. Select the STATE **menu** with the ◂ or ▸ **cursor keys** [6].

   The principal analyzer and generator configuration settings are listed in a table.



Analog Mode: Explanation of parameters

ANALYZER Analog Active analyzer type (analog) (↗ 6-215)

INPUT Signal source (↗ 6-218)

BANDWIDTH Bandwidth of the analyzer (↗ 6-216)

COMMON Reference potential of the input signal (↗ 6-103)

COUPLING Signal coupling (↗ 6-219)

RANGE MODE Level range switching mode (↗ 6-220)

RANGE LIMITS Level range limits (↗ 6-220)

CHANNEL Selected measurement channel (↗ 6-221)

GENERATOR Analog Active generator type (analog) (↗ 6-101)

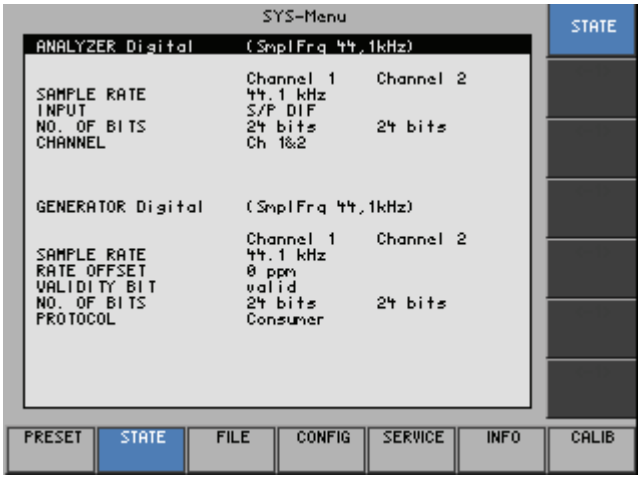
OUTPUT State of the generator output (↗ 6-104)

BANDWIDTH Bandwidth of the generator (↗ 6-102)

COMMON Reference potential of the output signal (↗ 6-103)

RANGE MODE Level range switching mode (↗ 6-105)

Digital Mode: Explanation of parameters



ANALYZER Digital Active analyzer type (digital) (↗ 6-215)

SAMPLE RATE Sample frequency of the input signal (↗ 6-222)

INPUT Input signal (↗ 6-223)

NO. OF BITS Word size of the input signal (↗ 6-223)

CHANNEL Selected measurement channel (↗ 6-221)

GENERATOR Digital Active generator type (digital) (↗ 6-101)

SAMPLE RATE Sample frequency of the output signal (↗ 6-107)

RATE OFFSET Offset of the sample frequency (↗ 6-108)

VALIDITY BIT State of the validity bit (↗ 6-108)

NO. OF BITS Word size of the output signal (↗ 6-109)

PROTOCOL Interface protocol (↗ 6-109)

6.5.3 User-Defined Settings (FILE Menu)

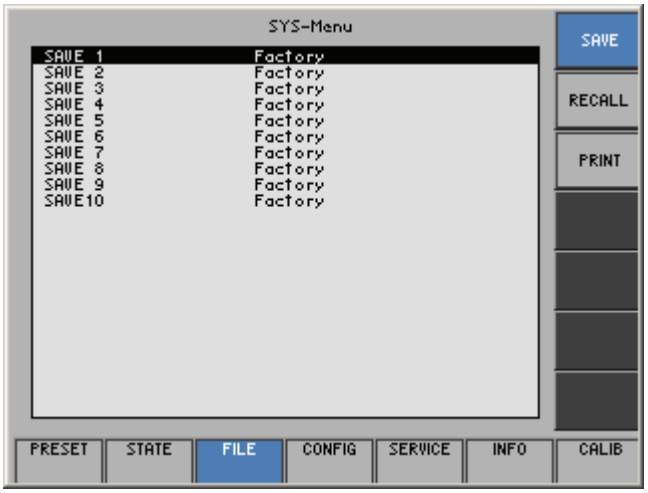
Description

You can save user-defined settings and load them when required from the FILE menu. You can also print out a screenshot.

Selecting the FILE menu

1. Press the **BACK/SYS key** [3].
2. Select the FILE **menu** with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the function keys [13] are assigned the appropriate function.



Function key assignment

SAVE	Save a user-defined setting.	(↗ 6-323)
RECALL	Load a user-defined setting.	(↗ 6-323)
PRINT	Print out a screenshot. Save the measurement results.	(↗ 6-325) (↗ 6-327)

6.5.3.1 Saving and Loading a User-Defined Settings

Use

When you switch on the R&S UP300/350, the last settings used are restored.

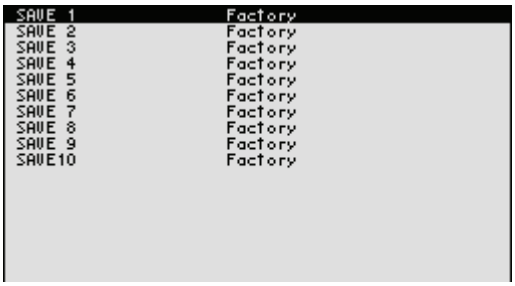
The R&S UP300/350 also allows you to save and load user-defined settings.

You can save 10 different settings (SAVE 1 to 10). When the R&S UP300/350 is delivered, the factory settings (Factory) are loaded in the all SAVE memory locations.

Saving a user-defined settings

1. Set up the R&S UP300/350 for the measurement you want to perform (↗ 6-212).
2. Press the SAVE **function key** in the FILE **menu**.

   A table containing the available settings is displayed (memory locations).



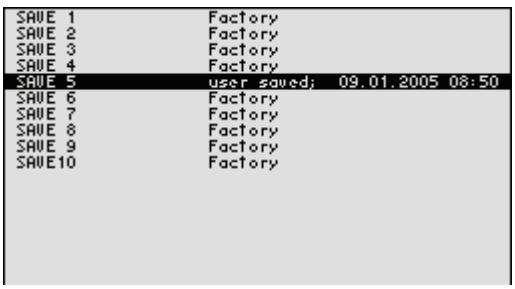
3. Select a setting with the ▲ or ▼ **cursor keys** [7].

   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”.

5. Enter a new file name using the **numeric keys** [12] or an external keyboard (↗ 3-45).
6. Press the **ENTER key** [5].

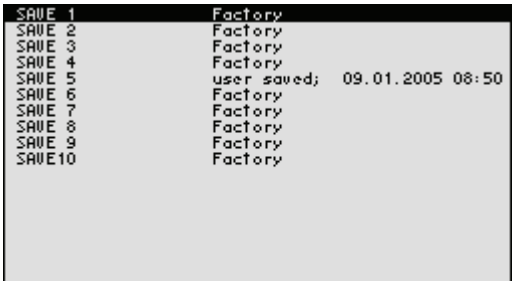
   The current setting is saved and the text “Factory” is replaced by the file name, date, and time.



Loading the user-defined settings

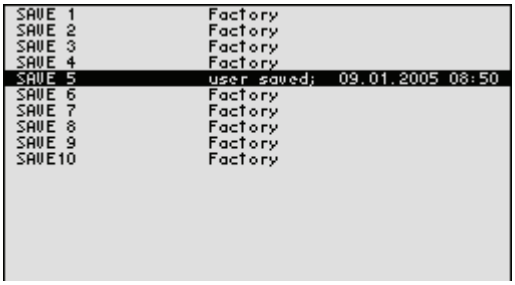
1. Press the RECALL **function key** in the FILE **menu**.

   A table containing the available settings is displayed (memory locations).



2. Select a setting with the ▲ or ▼ **cursor keys** [7].

   The FACTORY memory location contains the factory setting (↗ 6-89).



3. Press the **ENTER key** [5].

   The following message is displayed.

4. Press the **ENTER key** [5].

   The setting you have selected is loaded.

Note: If you frequently use one of the saved settings and want to load it quickly, you can define this setting as the PRESET (default setting) and call it directly at any time (↗ 6-318).

6.5.3.2 Printing out a Screenshot

Use

The R&S UP300/350 can print or save a current screenshot and an overview of the current instrument settings. A printer with a USB connection or a USB stick is required.

For this you need a printer with a USB DEVICE connector or a USB stick.

Selecting the output unit

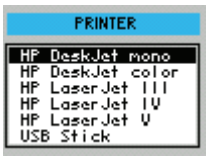
1. Press the PRINT **function key** in the FILE **menu**.

   A table containing the available parameters is displayed.

2. Select the **PRINTER** parameter with the ▲ or ▼ **cursor keys** [7].

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** [11].
5. Press the **ENTER key** [5] to close the selection field.

   The setting is saved and the printer driver is loaded.

Printing out/Saving screenshots only

1. Connect a printer to the **connector for an external USB device** [17].
2. Select an output unit (printer, USB stick) (↗ above).
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 keys** [7].

5. Press the **ENTER key** [5].

   The following message is displayed.

   A current screenshot is printed out/saved.

Printing out/Saving screenshots and parameters

1. Connect a printer to the **connector for an external USB device** [17].
2. Select an output unit (printer, USB stick) (↗ 6-325).
3. Press the PRINT **function key** in the FILE **menu**.

   A table containing the available parameters is displayed.
4. Select the **PRINT SCREEN + PARAM** parameter with the ▲ or ▼ **cursor keys** [7].

5. Press the **ENTER key** [5].

   The following message is displayed.

   A current screenshot and an overview of the current instrument and functions settings (↗ 6-320) are printed out/saved.

Note: When the printer is not connected, the following message is displayed:

Connect the USB printer to the **connector for an external USB device** [17] and confirm the message by pressing the **ENTER key** [5].

When the USB stick is not connected, the following message is displayed:

Connect the USB stick to the **connector for an external USB device** [17] and confirm the message by pressing the **ENTER key** [5].

6.5.3.3 Saving the Measurement Results

Use

The R&S UP300/350 allows you to store the results of different measurements as a list on a USB stick.

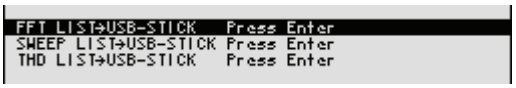
- **FFT LIST->USB STICK**
  Value pairs of the FFT measurement (↗ 6-252) are stored.
- **SWEEP LIST->USB STICK**
  Value pairs of the SWEEP measurement (↗ 6-155) are stored.
- **THD LIST->USB STICK**
  Value pairs of the THD measurement (↗ 6-260) are stored.

For this you need a USB stick.

Saving the measurement results on the USB stick (ASCII format)

1. Connect the USB stick to the **connector for an external USB device** [17].
2. Select the USB stick for the output unit (↗ 6-325).
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 keys** [7].



5. Press the **ENTER key** [5].

   An entry field for entering a file name is displayed. The default setting is “UP300_Date_Time”.

   Note: You can enter a new file name using the **numeric keys** [12], or an external keyboard (↗ 3-45).
6. Press the **ENTER key** [5].

   Before you press the BACK/SYS key, the current measurement results are saved in ASCII format on the USB stick.

Note: When the USB stick is not connected, the following message is displayed:

Connect the USB stick to the **connector for an external USB device**[17] and confirm the message by pressing the **ENTER key** [5].

6.5.4 System Settings (CONFIG Menu)

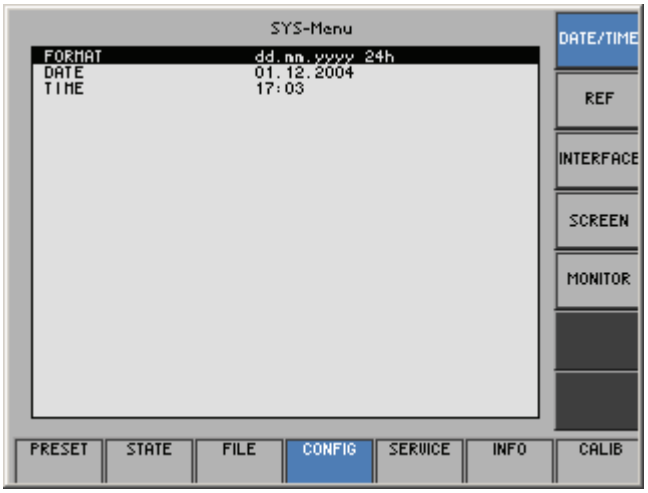
Description

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 **BACK/SYS key** [3].
2. Select the CONFIG **menu** with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the function keys [13] are assigned the appropriate functions



Function key assignment

DATE/TIME	Set the date and time.	(↗ 6-329)
REF	Select an internal or external reference sources.	(↗ 6-331)
INTERFACE	Configure the instrument interfaces.	(↗ 6-332)
SCREEN	Set the screen saver mode.	(↗ 6-334)
MONITOR	Select an internal or external monitor.	(↗ 6-336)

6.5.4.1 Setting the Date and Time

Use

The saved setting is time-stamped, using the time provided by the internal real-time clock (↗ 6-323).

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**

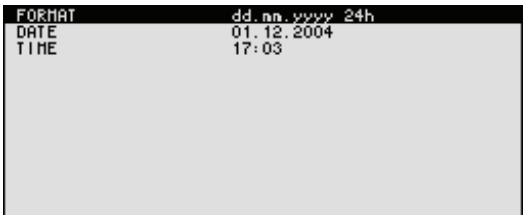
where: dd - day
mm - month
yy - year

Selecting the display format

1. Press the DATE/TIME **function key** in the CONFIG **menu**.

   A table containing the available parameters is displayed.

2. Select the **FORMAT** parameter with the ▲ or ▼ **cursor keys** [7].



3. Press the **ENTER key** [5].

   A selection field containing the available settings is displayed. The default setting is “dd.mm.yyyy 24h”.

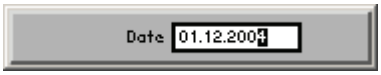
4. Select a setting with the **rotary knob** [11].
5. Press the **ENTER key** [5] to close the selection field.

   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 keys** [7].

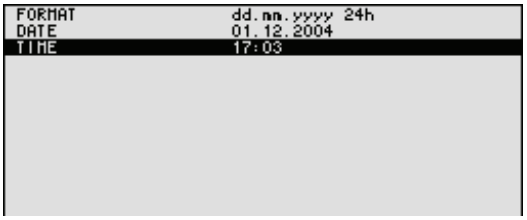
3. Press the **ENTER key** [5].
   An entry field containing the current setting is displayed.



4. Enter a new value (↗ 5-65).
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 keys** [7].



3. Press the **ENTER key** [5].
   An entry field containing the current setting is displayed.

4. Enter a new value (↗ 5-65).
5. Press the **ENTER key** [5].
   The setting is saved and displayed.

6.5.4.2 Selecting an Internal or External Reference Sources

Use

The R&S UP300/350 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 UP300/350 reference frequency, for example.

When the "REFERENCE external" setting is activated, the REF IN connector [23] is used as the input for an external frequency standard. All the R&S UP300/350'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 [23].
2. Press the REF **function key** in the CONFIG **menu**.

   The current reference source setting is displayed.

3. Press the **ENTER key** [5].

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

4. Select a reference source with the **rotary knob** [11].
5. Press the **ENTER key** [5].

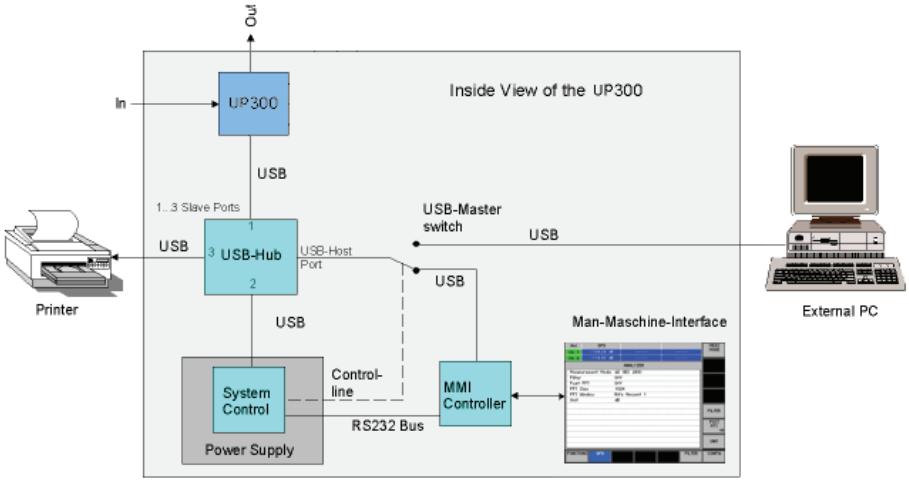
   The setting is saved and the R&S UP300/350 frequency standard is taken from a new source.

Note: If there is no reference signal when you switch over to the external reference, the message PLL appears in the status line of the main menu after a short delay to indicate that there is no synchronisation.

6.5.4.3 Configuring the Instrument Interfaces

Use

The R&S UP300/350 can be remote-controlled via the existing USB host interface [16]. The R&S UP300/350 automatically detects an existing connection to a PC and also automatically switches to remote control in the default setting (AUTO).
Switchover between an internal USB master (local control on the instrument) and external USB master (remote control via PC) is affected by means of a USB master switch.



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 UP300/350 and remote control via PC. This setting allows the instrument to automatically find a connected PC and switch immediately to “remote control”.

  When you press the BACK/SYS key [3], the R&S UP300/350 can be switched to “local mode” at any time. The PC and the R&S UP300/350 are thus disconnected. To reactivate the AUTO setting, switch the R&S UP300/350 again to “remote control”. You can also switch the R&S UP300/350 to remote control manually (↗ **Chyba! Záložka není definována.**).

- **INSTRUMENT**
  The INSTRUMENT setting is required if the R&S UP300/350 is to be controlled only via the front panel (local control), regardless 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 UP300/350 automatically switches to “remote control”. You can also switch the R&S UP300/350 to remote control manually (↗ **Chyba! Záložka není definována.**).

- **EXTERN**
  The EXTERNAL sets the USB master switch to the remote control mode and the R&S UP300/350 can only be controlled via a PC.

  When you press the BACK/SYS key [3], the R&S UP300/350 can be switched again to “local mode” at any time, for example, for changing the settings. Reactivate the EXTERNAL setting to switch the R&S UP300/350 again to “remote control”. You can also switch the R&S UP300/350 to remote control manually (↗ **Chyba! Záložka není definována.**).

Setting the USB master selector

1. Press the INTERFACE **function key** in the CONFIG **menu.**

   The current USB master setting is displayed.

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 the **rotary knob** [11].
4. Press the **ENTER key** [5] to close the selection field.

   The setting is saved.

Note: If the remote control is active, the local control mode of the R&S UP300/350 is deactivated and can only be reactivated by pressing the BACK/SYS key [3] on the front panel, or disconnecting the USB cabel. Switching between remote control and local control takes approx. 20 s.

6.5.4.4 Setting the Screen Saver Mode

Activating the screen saver

The R&S UP300/350 has a screen-saver function that turns the screen off [14] after a certain time. There are a number of timing options for the screen turn-off:

- **None**
  The screen remains switched on.
- **5 min**
  The screen is turned off after 5 minutes.
- **30 min**
  The screen is turned off after 30 minutes.

1. Press the SCREEN **function key** in the CONFIG **menu.**

   A table listing the available parameters is displayed.

2. Select the **SREEN SAVER** parameter with the ▲ or ▼ **cursor keys** [7].

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 the **rotary knob** [11].
5. Press the **ENTER key** [5].

   The setting is saved and the screen saver is activated or deactivated.

Activating the screen saver in remote-control mode

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:

- **Black**
  The screen is switched off.
- **Picture**
  The picture is displayed on the screen when the instrument is in remote-control mode.

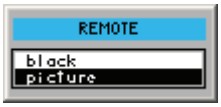
1. Press the SCREEN **function key** in the CONFIG **menu.**

   A table listing the available parameters is displayed.

2. Select the **REMOTE** parameter with the ▲ or ▼ **cursor keys** [7].

3. Press the **ENTER key** [5].

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



4. Select a setting with the **rotary knob** [11].
5. Press the **ENTER key** [5].

   The setting is saved and the screen saver in the remote-control mode is activated or deactivated.

   With the “black” setting, the screen is, of course, black, and only the green LED [2] indicates that the R&S UP300/350 is in remote-control mode.

   With the “picture” setting, the following message is displayed on the screen with the R&S UP300/350 in remote-control mode:

Note: With remote control, the local control mode of the R&S UP300/350 is deactivated and can only be reactivated by pressing the BACK/SYS key [3] on the front panel, or dicsconnecting the USB cabel. Switching between remote control and local control takes approx. 20 s.

6.5.4.5 Selecting the Internal or External Monitors

Use

Screen display is possible via the internal monitor or external monitor:

- **Intern**
  Screen display is shown on the internal monitor via the built-in colour TFT display.
- **Extern**
  Screen display is shown on the external monitor via the connected monitor, and the built-in colour TFT display is deactivated.

Selecting the monitor

1. If required, connect a monitor to the MONITOR connector [21].
2. Press the MONITOR **function key** in the CONFIG **menu.**

   The current screen setting is displayed.

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 a **rotary knob** [11].
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.

6.5.5 Service Functions (SERVICE Menu)

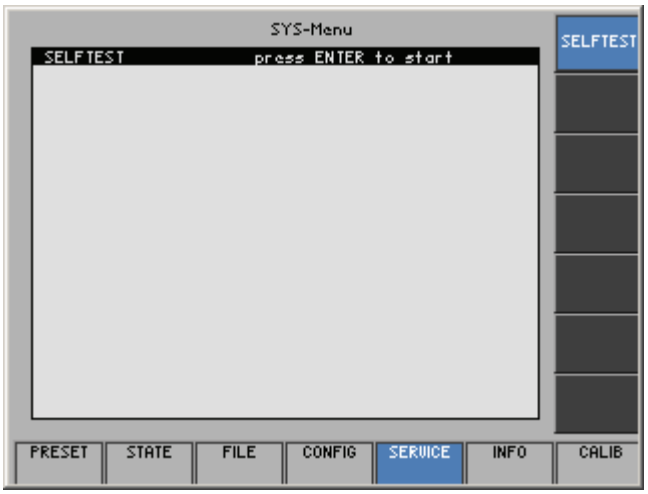
Description

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 UP300/350.

Selecting the SERVICE menu

1. Press the **BACK/SYS key** [3].
2. Select the SERVICE **menu** with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the function key [13] is assigned the appropriate function.



Function key assignment

SELFTEST — Perform the selftest when the ENTER key is pressed. (↗ 6-337)

6.5.5.1 Performing the Selftests

ATTENTION

No external cables may be connected during the selftest.

Use

The R&S UP300/350 can perform a module selftest. If there is an error, the R&S UP300/350 is capable of localizing the defective module.

The test results help the service personnel to analyze the instrument and perform troubleshooting.

Starting selftests

1. Press the SELFTEST **function key** in the SERVICE **menu**.

   The SELFTEST text is displayed (↗ below).
2. Press the **ENTER key** [5].

   The selftest starts. All module parts and software procedures are checked one after another and the result list with “passed”, or “error” status is displayed.

6.5.6 System Information (INFO Menu)

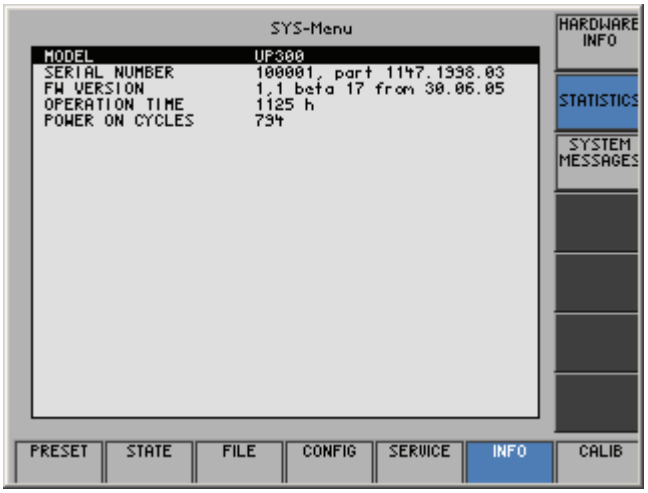
Description

You can obtain information such as module data, instrument statistics and system messages from the INFO menu.

Selecting the INFO menu

1. Press the **BACK/SYS key** [3].
2. Select the INFO **menu** with the ◂ or ▸ **cursor keys** [3].

   The menu name is highlighted and the function keys [13] are assigned the appropriate functions.



Function key assignment

HARDWARE INFO	Display module data.	(↗ 6-339)
STATISTICS	Display instrument statistics.	(↗ 6-339)
SYSTEM MESSAGES	Display system messages.	(↗ 6-340)

6.5.6.1 Displaying the Module Data

Use

You can display the serial number of the modules installed in the R&S UP300/350.

Calling the module data

Press the HARDWARE INFO **function key** in the INFO **menu**.

A table listing the current modules and the serial number is displayed.

6.5.6.2 Displaying the Instrument Statistics

Use

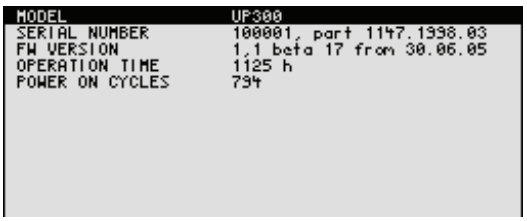
You can display the following R&S UP300/350 statistics:

- **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.



6.5.6.3 Displaying the System Messages

Use

You can display the most recent R&S UP300/350 system messages in their order of occurrence. Operating errors are neither saved nor displayed.

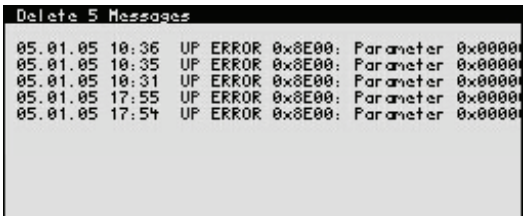
System messages help the service personnel to analyze the instrument and handle errors.

Displaying the 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 keys** [7].



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.

4. Press the **ENTER key** [5] for closing the display.

6.5.7 Adjustment Functions (CALIB Menu)

Description

Via the CALIB menu, you can call up an automatic adjustment of the generator and analyzer modules, especially to reduce the influence of DC offset. You can adjust the generator and analyzer separately, or adjust the entire instrument.

Selecting the CALIB menu

1. Press the **BACK/SYS key** [3].
2. Select the CALIB **menu** with the ◂ or ▸ **cursor keys** [6].

   The menu name is highlighted and the function key [13] is assigned the appropriate function.

Function key assignment

CALIB

Perform the auto adjustment when the enter key is pressed (↗ 6-342, 6-343).

6.5.7.1 Starting the Auto Adjustment of the Generator Module

Use

The R&S UP300/350 can perform an auto adjustment of the generator modules.

Adjusting the generator

1. Press the CALIB **function key** in the SERVICE **menu**.

   A table listing the available start options is displayed.

2. Select the **AUTOCAL GENERATOR** parameter with the ▲ or ▼ **cursor keys** [7].

3. Press the **ENTER key** [5].

   The auto adjustment starts. The generator modules are adjusted and the message „Calibrating, please wait“ appears. After adjustment, the result “Success”, or “Error” is present after approx. 25 seconds.

   Note: If the results are erroneous, you should perform the selftest of the instrument (↗ 6-337) and repeat the adjustment. If the error occurs again, contact Customer Service (↗ 1-33).

4. Press the **ESC/CANCEL key** [4] to cancel the adjustment.

   The old adjustment state is retained.

6.5.7.2 Starting the Auto Adjustment of the Analyzer Module

Use

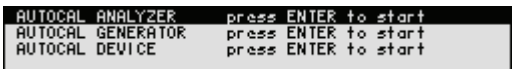
The R&S UP300/350 can perform an automatic adjustment of the analyzer modules.

Adjusting the analyzer

1. Press the CALIB **function key** in the SERVICE **menu**.

   A table listing the available start options is displayed.

2. Select the **AUTOCAL ANALYZER** parameter with the ▲ or ▼ **cursor keys** [7].

3. Press the **ENTER key** [5].

   The auto adjustment starts. The analyzer modules are adjusted and the message „Calibrating, please wait“ appears. After adjustment, the result “Success”, or “Error” is present after approx. 25 seconds.

   Note: If the results are erroneous, you should perform the selftest of the instrument (↗ 6-337) and repeat the adjustment. If the error occurs again, contact Customer Service (↗ 1-33).

4. Press the **ESC/CANCEL key** [4] to cancel the adjustment.

   The old adjustment state is retained.

6.5.7.3 Starting the Auto Adjustment of the R&S UP300/350

Use

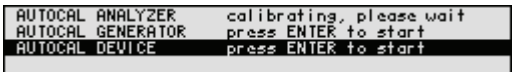
The R&S UP300/350 can perform an automatic adjustment of all instrument modules.

Adjusting the instrument

1. Press the CALIB **function key** in the SERVICE **menu**.

   A table listing the available start options is displayed.

2. Select the **AUTOCAL DEVICE** parameter with the ▲ or ▼ **cursor keys** [7].

3. Press the **ENTER key** [5].

   The auto adjustment starts. All instrument modules are adjusted and the message „Calibrating, please wait“ appears. After adjustment, the result “Success”, or “Error” is present after approx. 25 seconds.

   Note: If the results are erroneous, you should perform the selftest of the instrument (↗ 6-337) and repeat adjustment. If the error occurs again, contact Customer Service (↗ 1-33).

4. Press the **ESC/CANCEL key** [4] to cancel the adjustment.

   The old adjustment state is retained.

7 Instrument Interfaces

This chapter The chapter 7 contains a description of the R&S UP300/350's interfaces.

Further information The address of our Support Center and a list of Rohde & Schwarz service centers can be found at the front of this manual.

7.1 Keyboard Connector (KEYB)

Connector There is a 6-pin PS/2 KEYB connector [22] on the rear panel of the R&S UP300/350 for an external keyboard.

Pin assignment

Pin	Signal
1	KEYBOARDDATA
2	MOUSEDATA
3	GND
4	5V, KEYBOARD
5	KEYBOARDCLK
6	MOUSECLK

7.2 Monitor Connector (MON)

Connector There is a MON connector [21] on the rear panel of the R&S UP300/350 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)

7.3 Reference Input and Output (10 MHz In/Out)

External reference

If an external reference is used, the internal reference oscillator is synchronized to the 10 MHz reference signal at REF IN/OUT connector [23]. 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 IN/OUT connector [23] so that other devices can be synchronized to the R&S UP300/350. The output level is 7 dBm.

Instrument setting

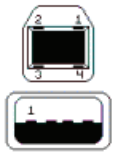
You can switch over between the internal and external reference in the CONFIG menu (↗ 6-331).

7.4 USB Interface (PC, DEV)

Connector

The USB-Host [16] and USB-Device [17] connectors on the rear panel of the R&S UP300/350 are for a USB device.

Pin assignment



Pin	Signal
1	Vbus (Vcc)
2	D-
3	D+
4	GND
Shell	Shield

7.5 Audio Monitoring Output (MON OUT)

Connector

At the audio monitoring output [15], you can use headphones to monitor signals which can be tapped at various points in the R&S UP300/350.

Specification

Connector:	Mini jack 3.5 mm
Output impedance:	10 Ω
Voltage:	Max. 2 V (without load)

Instrument setting

The MONITOR menu allows you to make the settings when an external headphone is used (↗ 6-209).

8 Error Messages

This chapter

You can find a description of errors that may occur in the R&S UP300/350 and you will also find notes on troubleshooting.

The R&S UP300/350 displays detected errors and warnings on the screen. The various types of messages are described as the following:

- System messages
- Warnings indicating impermissible operating states

Further information

Chapter 6 describes all the R&S UP300/350's menus and the associated functions in detail.

8.1 System Messages

System messages

System messages inform you about internally detected errors. The following information are displayed, e. g.:

- Type of error (**x**)
- Four-digit error number (**y**)
- Request for closing the system messages (**z**)

The error number allows the service shop to determine the type of error. In the event of a 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 (↗ 1-34). 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 UP300/350 is automatically switched off to prevent further overheating.

The overtemperature could be caused by too high an ambient temperature and/or a reduced air circulation.

1. Allow the instrument to cool off for a while and remove any obstructions that could prevent the R&S UP300/350 from air circulation.
2. If this does not 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 a system message occurs, an entry is made under SYSTEM MESSAGES (↗ 6-340).

8.2 Warnings Indicating Impermissible Operating States

Warnings

Red labels in the status line 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 several types of messages that can be displayed on the screen.

OVL G The output current of the R&S UP300/350 is too high. This can be caused by the following:

1. The load impedance is too low at high output levels. Eliminate any short circuits.
2. A noise voltage is being supplied at the output connector. Remove the voltage source.

The output concerned switches off if the error lasts for longer than 2 seconds. The output should be switched on again after the error has been eliminated (↗ 6-104).

OVL A The input level of the R&S UP300/350 is too high. This can be caused by the following:

1. The input level changes rapidly by 1 to 2 measurement ranges. The warning disappears after the measurement range has been reconfigured.
2. The input level exceeds the fixed level range (Fixed Range). Readjust the level range (↗ 6-105).
3. The input level exceeds the value V_{rms} > 33 V. Reduce the input level.

PLL The control loop, which is used to set the frequency of the internal reference oscillator with crystal accuracy, is not locked. This causes a frequency error, and the audio 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 [23] input or switch the reference to “internal” (↗ 6-331).
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.

OVT An impermissibly high temperature was detected in the instrument. The internal fans are switched to full power for approx. 2 minutes, and then the R&S UP300/350 is automatically switched off to prevent further overheating.

The overtemperature could be caused by too high an ambient temperature and/or a reduced air circulation.

1. Allow the instrument to cool off for a while and remove any obstructions that could prevent the R&S UP300/350 from air circulation.
2. If this does not 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 a system message occurs, an entry is made under SYSTEM MESSAGES (↗ 6-340).

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