



# Operating Manual

## Audio Analyzer

### R&S®UP300/UP350

Order-No.. 1147.2494.03 (UP300)  
1147.2507.03 (UP350)



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ROHDE & SCHWARZ GmbH & Co. KG  
Test and Measurement Division  
Mühl Dorfstraße 15  
81671 München, Germany

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## **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

By way of an 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

<b>Analog audio inputs</b>		
<b>Frequency range</b>		DC/10 Hz to 80 kHz
<b>Frequency response</b>	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
<b>BNC connectors</b>	2 channels, floating, selectable AC/DC coupling, channel 1 on front panel, channel 2 on rear pane	
Maximum input voltage	rms, sinewave	33 V
Measurement ranges	in steps of 6 dB	390 mV 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
<b>Generator output</b>	each input channel switchable to the other generator output channel	
<b>Digital audio inputs (model R&amp;S UP350 only)</b>		
<b>BNC connector</b>	unbalanced, grounded, on rear panel	
Impedance		75 Ω
Input level ( $V_{pp}$ )		100 mV to 5 V
<b>Optical input</b>		TOSLINK
<b>Channels</b>		1, 2, or both
<b>Audio bits</b>		16 to 24
<b>Sampling rate</b>		32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz

<b>Format</b>		professional and consumer
<b>Measurement functions</b>		
<b>RMS value, wideband</b>		
Error limits	measurement speed AUTO, at 1 kHz sine, AC coupling measurement speed AUTO FAST	$\pm 0.1$ dB, additional error with DC coupling $\pm 0.1$ % of measurement range $\pm 0.1$ 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 $\Omega$ source impedance with CCIR unweighting filter, 600 $\Omega$ source impedance	< 2 $\mu$ V < 4 $\mu$ V
Filters	weighting filters and sets of predefined octave and third-octave filters; up to 3 filters can be combined	
<b>RMS value, selective</b>		
Error limits		$\pm 0.2$ dB
Bandwidth (-0.1 dB)	fixed bandwidth filters	3 Hz, 10 Hz, 30 Hz, 100 Hz or 300 Hz
Selectivity		100 dB
Frequency setting		fixed through entered value
<b>Peak value</b>		
Measurement		pos. peak, neg. peak, peak-to-peak, absolute peak
Error limits	at 1 kHz	$\pm 0.2$ 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	
<b>Quasi-peak</b>		
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 $\Omega$ source impedance	< 12 $\mu$ V
Filters	weighting filters and sets of predefined octave and third-octave filters; up to 3 filters can be combined	
<b>DC voltage</b>		
Voltage range		0 V to $\pm 33$ V

Error limits		± (1 % of measured value + 0.5 % of measurement range)
<b>Total harmonic distortion (THD)</b>		
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	
<b>THD+N and SINAD</b>		
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	
<b>Difference frequency distortion (DFD)</b>		
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	$f_{\text{center}} < 20 \text{ kHz}$	±0.5 dB
Inherent distortion	DFD d2, $f_{\text{center}} < 20 \text{ kHz}$ DFD d3, $5 \text{ kHz} < f_{\text{center}} < 20 \text{ kHz}$	< -105 dB < -90 dB
Spectrum	bar graph showing signal and distortion	

<b>Modulation distortion (MOD DIST)</b>		
Frequency range	lower frequency upper frequency	30 Hz to 2.7 kHz $8 \times f_{\text{lower}}$ to 20 kHz
Error limits		$\pm 0.5$ dB
Inherent distortion	$f_{\text{lower}} = 60$ Hz, $4$ kHz $< f_{\text{upper}} < 15$ kHz $f_{\text{lower}} = 60$ Hz, $15$ kHz $< f_{\text{upper}} < 20$ kHz input voltage $\leq 4$ V input voltage $> 4$ V	$< -85$ dB  $< -80$ dB $< -75$ dB
Spectrum	bar graph showing signal and distortion	
<b>Frequency</b>		
Frequency range		20 Hz to 80 kHz
Error limits	measurement time 10 s measurement time 1 s	$\pm 10$ ppm $\pm 100$ ppm
<b>Phase</b>		
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	$\pm 1^\circ$
<b>Polarity test</b>		
Measurement		polarity of unsymmetrical input signal
Display		positive/negative
<b>Filters</b>		
Weighting filters	A weighting C messageCCIR 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		

<b>FFT analyzer</b>		
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 ( $\beta = 12$ )
Resolution	16 k points, bandwidth 22 kHz	2.93 Hz
Averaging	exponential or normal	1 to 256

## Generator

<b>Analog audio inputs</b>		
<b>BNC connectors</b>	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 $\Omega$
Crosstalk attenuation	$f < 20$ kHz	> 100 dB
Load impedance		> 200 $\Omega$
Common-mode rejection	at 1 kHz	> 50 dB
<b>Digital audio outputs (model R&amp;S UP350 only)</b>	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: $f_{new} = f_{48kHz} \times \text{sampling rate}/48 \text{ kHz}$ .	
<b>BNC connectors</b>	unbalanced, transformer coupling, on rear panel	
Impedance		75 $\Omega$ , short-circuit-proof
Output level ( $V_{pp}$ )	into 75 $\Omega$	0.5 V
<b>Optical output</b>		TOSLINK
<b>Channels</b>		1, 2, or both
<b>Audio bits</b>		16 to 24
<b>Sampling rate</b>		32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
<b>Format</b>		professional and consumer
<b>Signals</b>		
<b>Sine</b>		

Frequency range		2 Hz to 80 kHz
Error limits	at 1 kHz	$\pm 0.1$ dB
Frequency response (ref. to 1 kHz)	20 Hz to 20 kHz	$\pm 0.05$ dB
Inherent distortion THD+N	measurement bandwidth 20 Hz to 22 kHz	< -90 dB
Sweep parameters		frequency, level
<b>MOD DIST</b>		
	for measuring modulation distortion	
Frequency range	lower frequency upper frequency	30 Hz to 2700 Hz $8 \times f_{\text{lower}}$ to 39.95 kHz
Level ratio (LF:UF)	selectable	from 10:1 to 1:1
Error limits		$\pm 0.5$ dB
Inherent distortion	at 60 Hz, 7 kHz, level ratio 4:1 other settings; $f_{\text{upper}} < 20$ kHz	< -90 dB < -84 dB
<b>DFD</b>		
	for measuring difference frequency distortion	
Frequency range	difference frequency center frequency	80 Hz to 2 kHz 200 Hz to 39.95 kHz
Error limits		$\pm 0.5$ dB
Inherent distortion	DFD d2, $7 \text{ kHz} < f_{\text{center}} < 20 \text{ kHz}$ DFD d3, $7 \text{ kHz} < f_{\text{center}} < 20 \text{ kHz}$	< -105 dB < -90 dB
<b>Multisine</b>		
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
<b>Sine burst</b>		
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
<b>Noise</b>		
Distribution		Gaussian, triangular, rectangular
<b>Polarity test signal</b>		
SINE <sup>2</sup> BURST signal		1.2 kHz



ON-TIME		1 cycle
INTERVAL		2 cycles
<b>Sweep</b>		
Parameters	frequency and/or level	
Sweep	linear, logarithmic, single, continuous	

## Display of results

<b>Units</b>		
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	
<b>Graphical display of results</b>		
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	
<b>Audio monitor</b>		
Headphone connector		3.5 mm jack
Output voltage		< 2 V
Output current		< 20 mA
Source impedance		10 $\Omega$ , short-circuit-proof
Recommended headphone impedance		600 $\Omega$

<b>Digital audio protocol (model R&amp;S UP350 only)</b>		
<b>Generator</b>		
Validity bit		NONE, L+R
Channel status data		predefined masks for professional or consumer format in acc. with IEC 60958
<b>Analyzer</b>		
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
<b>General specifications</b>		
<b>Interfaces</b>		
USB host	printer; USB stick	A plug, protocol version 1.1
USB device	device-specific command set, remote control via supplied 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
<b>Display</b>		
Type		5.4" active TFT color display
Resolution		320 × 240 pixels
Max. refresh rate		10 pictures/s, nominal
<b>Power supply</b>		
Input voltage range	autoranging	100 V to 240 V (AC), 50 Hz to 60 Hz
Power consumption		< 120 VA
<b>Ambient conditions</b>		
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 60068-2-3 (non-condensing)	95 % at +40 °C
<b>Mechanical resistance</b>		
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
<b>Electromagnetic compatibility</b>		
		meets EN 55011 class B and EN 61326 (EMC Directive of EU (89/336/EEC))
<b>EMI field strength</b>		
		10 V/m
<b>Safety</b>		
		EN 61010-1/IEC 61010-1, UL 3111-1; CSA C22.2 No. 1010.1
<b>Dimensions (W × H × D)</b>		
		219 mm × 147 mm × 350 mm
<b>Weight</b>		
		9 kg





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



## Safety Instructions

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

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

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

### Symbols and safety labels

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

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

## Safety Instructions

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

### Tags and their meaning

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

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

### Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m. Unless specified otherwise in the data sheet, a tolerance of  $\pm 10\%$  shall apply to the nominal voltage and of  $\pm 5\%$  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

## Safety Instructions

- 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 thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
  5. If handling the product yields hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation.
  6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.
  7. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.
  8. Prior to switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
  9. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
  10. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

## Safety Instructions

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



## Safety Instructions

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



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



## **Informaciones de seguridad**







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

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

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

## Símbolos y definiciones de seguridad

							
Ver manual de instrucciones del uso	Informaciones para maquinaria con un peso de > 18 kg	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 electrostática

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

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

### Palabras de señal y su significado

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

## Informaciones de seguridad

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

### Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue: como posición de funcionamiento se define principalmente la posición con el suelo de la caja para abajo, modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar. A menos que se especifique otra cosa en la hoja de datos, se aplicará una tolerancia de  $\pm 10\%$  sobre el voltaje nominal y de  $\pm 5\%$  sobre la frecuencia nominal.  
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. Después 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).
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la
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 produjeran 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 averiguar los motivos de estas reacciones.

## Informaciones de seguridad

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, deberán ser tenidas en cuenta las prescripciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescripciones de seguridad especiales en la descripción del producto.
6. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar áreas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.
7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.
8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del prodcuto.
9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.

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

## Informaciones de seguridad

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

## Informaciones de seguridad

32. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo y el fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
33. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.



## Certified Quality System

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

**DQS REG. NO 001954 QM/ST UM**

### QUALITÄTSZERTIFIKAT

*Sehr geehrter Kunde,*

Sie haben sich für den Kauf eines Rohde & Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Managementsystems entwickelt, gefertigt und geprüft.

Das Rohde & Schwarz Managementsystem ist zertifiziert nach:

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

### CERTIFICATE OF QUALITY

*Dear Customer,*

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

The Rohde & Schwarz quality management system is certified according to:

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

### CERTIFICAT DE QUALITÉ

*Cher Client,*

vous avez choisi d'acheter un produit Rohde & Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité.

Le système de gestion qualité de Rohde & Schwarz a été homologué conformément aux normes:

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



**ROHDE & SCHWARZ**



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**  
**Mühl Dorfstr. 15, D-81671 München**

Munich, 2005-11-03

Central Quality Management MF-QZ / Radde

# Support Center Address

## Technical support – where and when you need it

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

## Up-to-date information and upgrades

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

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

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

## Feedback

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

[CustomerSupport.Feedback@rohde-schwarz.com](mailto:CustomerSupport.Feedback@rohde-schwarz.com)

## Customer support center

### USA & Canada

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

USA: 888-test-rsa (888-837-8772) (opt 2)  
From outside USA: +1 410 910 7800 (opt 2)  
Fax: 410 910 7801

E-Mail: [Customer.Support@rsa.rohde-schwarz.com](mailto:Customer.Support@rsa.rohde-schwarz.com)

### Rest of World

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

Europe: +49 (0) 180 512 42 42  
From outside Europe: +49 89 4129 13776  
Fax: +49 (0) 89 41 29 637 78

E-Mail: [CustomerSupport@rohde-schwarz.com](mailto:CustomerSupport@rohde-schwarz.com)

# Adressen/Addresses

## FIRMENSITZ/HEADQUARTERS

(Tel) Phone  
(Fax) Fax  
E-mail

Rohde & Schwarz GmbH & Co. KG  
Mühlendorfstraße 15 · D-81671 München  
Postfach 80 14 69 · D-81614 München

(Tel) +49 (89) 41 29-0  
(Fax) +49 89 4129-121 64  
info@rohde-schwarz.com

## WERKE/PLANTS

Rohde & Schwarz Messgerätebau GmbH  
Riedbachstraße 58 · D-87700 Memmingen  
Postfach 1652 · D-87686 Memmingen

(Tel) +49 (8331) 108-0  
(Fax) +49 (8331) 108-11 24  
info.rsdmb@rohde-schwarz.com

Rohde & Schwarz GmbH & Co. KG  
Werk Teisnach  
Kaikenrieder Straße 27 · D-94244 Teisnach  
Postfach 1149 · D-94240 Teisnach

(Tel) +49 (9923) 857-0  
(Fax) +49 (9923) 857-11 74  
info.rsdts@rohde-schwarz.com

Rohde & Schwarz GmbH & Co. KG  
Dienstleistungszentrum Köln  
Graf-Zeppelin-Straße 18 · D-51147 Köln  
Postfach 98 02 60 · D-51130 Köln

(Tel) +49 (2203) 49-0  
(Fax) +49 (2203) 49 51-229  
info.rsd@rohde-schwarz.com  
schwarz.com-service.rsd@rohde-schwarz.com

## TOCHTERUNTERNEHMEN/SUBSIDIARIES

Rohde & Schwarz Vertriebs-GmbH  
Mühlendorfstraße 15 · D-81671 München  
Postfach 80 14 69 · D-81614 München

(Tel) +49 (89) 41 29-137 74  
(Fax) +49 (89) 41 29-137 77  
customersupport@rohde-schwarz.com

Rohde & Schwarz International GmbH  
Mühlendorfstraße 15 · D-81671 München  
Postfach 80 14 60 · D-81614 München

(Tel) +49 (89) 41 29-129 84  
(Fax) +49 (89) 41 29-120 50  
info.rusis@rohde-schwarz.com

Rohde & Schwarz Engineering and Sales GmbH  
Mühlendorfstraße 15 · D-81671 München  
Postfach 80 14 29 · D-81614 München

(Tel) +49 (89) 41 29-137 11  
(Fax) +49 (89) 41 29-137 23  
info.rse@rohde-schwarz.com

R&S BICK Mobilfunk GmbH  
Fritz-Hahne-Str. 7 · D-31848 Bad Münder  
Postfach 2062 · D-31844 Bad Münder

(Tel) +49 (5042) 998-0  
(Fax) +49 (5042) 998-105  
info.rsbeck@rohde-schwarz.com

Rohde & Schwarz FTK GmbH  
Wendenschlossstraße 168, Haus 28  
D-12557 Berlin

(Tel) +49 (30) 658 91-122  
(Fax) +49 (30) 655 50-221  
info.ftk@rohde-schwarz.com

Rohde & Schwarz SIT GmbH  
Agastraße 3  
D-12489 Berlin

(Tel) +49 (30) 658 84-0  
(Fax) +49 (30) 658 84-183  
info.sit@rohde-schwarz.com

R&S Systems GmbH  
Graf-Zeppelin-Straße 18 · D-51147 Köln  
Postfach 98 02 60 · D-51130 Köln

(Tel) +49 (2203) 49-5 23 25  
(Fax) +49 (2203) 49-5 23 36  
info.rssys@rohde-schwarz.com

## ADRESSEN WELTWEIT/ADDRESSES WORLDWIDE

**Albania** siehe/see Austria

**Algeria** Rohde & Schwarz  
Bureau d'Alger  
5B Place de Laperrine  
16035 Hydra-Alger

(Tel) +213 (21) 48 20 18  
(Fax) +213 (21) 69 46 08

**Antilles (Neth.)** siehe / see Mexico

**Argentina** Precision Electronica S.R.L.  
Av. Pde Julio A. Roca 710 - 6° Piso  
1067 Buenos Aires

(Tel) +541 (14) 331 10 67  
(Fax) +541 (14) 334 51 11  
alberto.lombardi@prec-elec.com.ar

**Australia** Rohde & Schwarz (Australia) Pty. Ltd.  
Sales Support  
Unit 6  
2-8 South Street  
Rydalmere, N.S.W. 2116

(Tel) +61 (2) 88 45 41 00  
(Fax) +61 (2) 96 38 39 88  
sales@rsaus.rohde-schwarz.com

**Austria** Rohde & Schwarz-Österreich Ges.m.b.H.  
Am Europlatz 3  
Gebäude B  
1120 Wien

(Tel) +43 (1) 602 61 41-0  
(Fax) +43 (1) 602 61 41-14  
rs-austria@rsoe.rohde-schwarz.com

**Azerbaijan** Rohde & Schwarz Azerbaijan  
Liaison Office Baku  
ISR Plaza, 5th floor  
340 Nizami Str.  
370000 Baku

(Tel) +994 (12) 93 31 38  
(Fax) +994 (12) 93 03 14  
rs-azerbaijan@rsd.rohde-schwarz.com

**Bangladesh** BIL Consortium Ltd.  
Corporate Office  
House-33, Road-4, Block-F  
Banani, Dhaka-1213

(Tel) +880 (2) 881 06 53  
(Fax) +880 (2) 882 82 91

**Barbados** siehe / see Mexico

**Belarus** siehe/see Ukraine

**Belgium** Rohde & Schwarz Belgium N.V.  
Excelsiorlaan 31 Bus 1  
1930 Zaventem

(Tel) +32 (2) 721 50 02  
(Fax) +32 (2) 725 09 36  
info@rsb.rohde-schwarz.com

**Belize** siehe / see Mexico

**Bermuda** siehe/see Mexico

**Bosnia-Herzegovina** siehe/see Slovenia

**Brazil** Rohde & Schwarz Do Brasil Ltda.  
Av. Alfredo Egídio de Souza Aranha (Rod. Anacleto)  
1° andar - Santo Amaro  
04726-170 Sao Paulo - SP

(Tel) +55 (11) 56 44 86 11  
(Fax) +55 (11) 56 44 86 25 (sales)  
(Fax) +55 (11) 56 44 86 36  
sales-brazil@rsdb.rohde-schwarz.com

**Brunei** George Keen Lee Equipment Pte Ltd.  
#11-01 BP Tower  
396 Alexandra Road  
Singapore 119954

(Tel) +656 276 06 26  
(Fax) +656 276 06 29  
gkleqpt@singnet.com.sg

**Bulgaria** Rohde & Schwarz  
Representation Office Bulgaria  
39, Fridtjof Nansen Blvd.  
1000 Sofia

(Tel) +359 (2) 96 343 34  
(Fax) +359 (2) 963 21 97  
rs-bulgaria@rsbg.rohde-schwarz.com

**Canada** Rohde & Schwarz Canada Inc.  
555 March Rd.  
Kanata, Ontario K2K 2M5

(Tel) +1 (613) 592 80 00  
(Fax) +1 (613) 592 80 09  
sales@rscanada.ca

**Chile** Dymeq Ltda.  
Av. Larrain 6666  
Santiago

(Tel) +56 (2) 339 20 00  
(Fax) +56 (2) 339 20 10  
dymeq@dymeq.com

**China** Rohde & Schwarz China Ltd.  
Representative Office Beijing  
6F, Parkview Center  
2 Jiangtai Road  
Chao Yang District  
Beijing 100016

(Tel) +86 (10) 64 31 28 28  
(Fax) +86 (10) 64 37 98 88  
info.rschina@rsbp.rohde-schwarz.com

Rohde & Schwarz China Ltd.  
Representative Office Shanghai  
Room 807-809, Central Plaza  
227 Huangpi North Road  
Shanghai 200003

(Tel) +86 (21) 63 75 00 18  
(Fax) +86 (21) 63 75 91 70  
May.Zhu@rsbp.rohde-schwarz.com

Rohde & Schwarz China Ltd.  
Representative Office Guangzhou  
Room 2903, Metro Plaza  
183 Tian He North Road  
Guangzhou 510075

(Tel) +86 (20) 87 55 47 58  
(Fax) +86 (20) 87 55 47 59  
Winnie.Lin@rsbp.rohde-schwarz.com



# Adressen/Addresses

<b>India</b>	Rohde & Schwarz India Pvt. Ltd. Mumbai Office B-603, Remi Bizcourt, Shah Industrial Estate, Off Veera Desai Road Andheri West Mumbai - 400 058	(Tel) +91 (22) 26 30 18 10 (Fax) +91 (22) 26 73 20 81 rsindiam@rsnl.net	<b>Kazakhstan</b>	Rohde & Schwarz Kazakhstan Representative Office Almaty Pl. Respubliki 15 480013 Almaty	(Tel) +7 (32) 72 67 23 54 (Fax) +7 (32) 72 67 23 46 rs-kazakhstan@rsd-rohde-schwarz.com
<b>Indonesia</b>	PT Rohde & Schwarz Indonesia Graha Paramita 5th Floor Jln. Denpasar Raya Blok D-2 Jakarta 12940	(Tel) +62 (21) 252 36 08 (Fax) +62 (21) 252 36 07 sales@rsbj.rohde-schwarz.com-services@rsbj.rohde-schwarz.com	<b>Kenya</b>	Excel Enterprises Ltd Dunga Road P.O.Box 42 788 Nairobi	(Tel) +254 (2) 55 80 88 (Fax) +254 (2) 54 46 79
<b>Iran</b>	Rohde & Schwarz Iran Liaison Office Tehran Groundfloor No. 1, 14th Street Khaled Eslamboli (Vozara) Ave. 15117 Tehran	(Tel) +98 (21) 872 42 96 (Fax) +98 (21) 871 90 12 alfred.korff@rsd.rohde-schwarz.com	<b>Korea</b>	Rohde & Schwarz Korea Ltd. 83-29 Nonhyun-Dong, Kangnam-Ku  Seoul 135-010	(Tel) +82 (2) 34 85 19 00 (Fax) +82 (2) 547 43 00 sales@rskor.rohde-schwarz.com-service@rskor.rohde-schwarz.com
<b>Ireland</b>	siehe/see United Kingdom		<b>Kuwait</b>	Group Five Trading & Contracting Co. Mezzanine Floor Al-Bana Towers Ahmad Al Jaber Street Sharq	(Tel) +965 (244) 91 72/73/74 (Fax) +965 (244) 95 28 jk_agarwal@yahoo.com
<b>Israel</b>	Eastronics Ltd. Measurement Products 11 Rozanis St. P.O.Box 39300 Tel Aviv 61392	(Tel) +972 (3) 645 87 77 (Fax) +972 (3) 645 86 66 david_hasky@easx.co.il	<b>Latvia</b>	Rohde & Schwarz Danmark A/S Latvian Branch Office Merkela iela 21-301 1050 Riga	(Tel) +371 (7) 50 23 55 (Fax) +371 (7) 50 23 60 latvia@rsdk.rohde-schwarz.com
	J.M. Moss (Engineering) Ltd. Communications Products 9 Oded Street P.O.Box 967 52109 Ramat Gan	(Tel) +972 (3) 631 20 57 (Fax) +972 (3) 631 40 58 jmoss@zahav.net.il	<b>Lebanon</b>	Rohde & Schwarz Liaison Office Riyadh P.O.Box 361 Riyadh 11411	(Tel) +966 (1) 465 64 28 Ext. 303 (Fax) +966 (1) 465 64 28 Ext. 229 chris.porzky@rsd.rohde-schwarz.com
<b>Italy</b>	Rohde & Schwarz Italia S.p.a. Centro Direzionale Lombardo Via Roma 108 20060 Cassina de Pecchi (MI)	(Tel) +39 (02) 95 70 41 (Fax) +39 (02) 95 30 27 72 rsi.info@rsi.rohde-schwarz.com		Netcom P.O.Box 55199 Op. Ex-Presidential Palace Horch Tabet Beirut	(Tel) +961 (1) 48 69 99 (Fax) +961 (1) 49 05 11 tohme.sayar@netcomm.tv
	Rohde & Schwarz Italia S.p.a. Via Tiburtina 1182 00156 Roma	(Tel) +39 (06) 41 59 81 (Fax) +39 (06) 41 59 82 70 rsi.info@rsi.rohde-schwarz.com	<b>Liechtenstein</b>	siehe/see Switzerland	
<b>Jamaica</b>	siehe / see Mexico		<b>Lithuania</b>	Rohde & Schwarz Danmark A/S Lithuanian Branch Office Lukiskiu 5-228 2600 Vilnius	(Tel) +370 (5) 239 50 10 (Fax) +370 (5) 239 50 11 lithuania@rsdk.rohde-schwarz.com
<b>Japan</b>	Rohde & Schwarz Japan K.K. Tokyo Office 711 Bldg., Room 501 (5th floor) 7-11-18 Nishi-Shinjuku Shinjuku-ku Tokyo 160-0023	(Tel) +81 (3) 59 25 12 88 (Fax) +81 (3) 59 25 12 90 scj.support@rsjp.rohde-schwarz.com	<b>Luxembourg</b>	siehe/see Belgium	
	Rohde & Schwarz Japan K.K. Shin-Yokohama Office KM Daiichi Bldg., 8F 2-13-13 Kouhoku-ku Yokohama-shi Kanagawa 222-0033	(Tel) +81 (4) 54 77 35 70	<b>Macedonia</b>	NETRA Sarski odred 7 1000 Skopje	(Tel) +389 (2) 329 82 30 (Fax) +389 (2) 317 74 88 netra@netra.com.sk
	Rohde & Schwarz Japan K.K. Osaka Office TEK Dai 2 Bldg., 8F 1-13-20 Esaka-shi Suita-shi Osaka-fu 564-0063	(Tel) +81 (6) 63 10 96 51	<b>Malaysia</b>	Rohde & Schwarz Malaysia Sdn Bhd Suite 10.04, Level 10, Wisma E&C No. 2 Lorong Dungun Kiri Damansara Heights 50490 Kuala-Lumpur	(Tel) +60 (3) 20 94 00 33 (Fax) +60 (3) 20 94 24 33 sales.malaysia@rohde-schwarz.com
<b>Jordan</b>	Jordan Crown Engineering & Trading Co. Jabal Amman, Second Circle Youssef Ezzideen Street P.O.Box 830414 Amman, 11183	(Tel) +962 (6) 462 17 29 (Fax) +962 (6) 465 96 72 jocrown@go.com.jo	<b>Malta</b>	Tektraco International Technology Ltd. 121, B'Kara Road San Gwann SGN 08	(Tel) +356 (21) 37 43 00 or 37 80 88 (Fax) +356 (21) 37 66 67 sales@tektraco.com
			<b>Mexico</b>	Rohde & Schwarz de Mexico S. de R.L. de C.V. German Centre Oficina 4-2-2 Av. Santa Fé 170 Col. Lomas de Santa Fé 01210 Mexico D.F.	(Tel) +52 (55) 85 03 99 13 (Fax) +52 (55) 85 03 99 16 latinoamerica@rsd.rohde-schwarz.com
			<b>Moldava</b>	siehe/see Austria	
			<b>Nepal</b>	ICTC Pvt. Ltd. Hattisar, Post Box No. 660 Kathmandu	(Tel) +977 (1) 443 48 95 (Fax) +977 (1) 443 49 37 ictc@mos.com.np

# Adressen/Addresses

<b>Netherlands</b>	Rohde & Schwarz Nederland B.V. Perkinsbaan 1 3439 ND Nieuwegein	(Tel) +31 (30) 600 17 00 (Fax) +31 (30) 600 17 99 info@rsn.rohde-schwarz.com	<b>Saudi Arabia</b>	Gentec Haji Abdullah Alireza & Co. Ltd. P.O.Box 43054 Riyadh	(Tel) +966 (1) 293 20 35 (Fax) +966 (1) 466 16 57 akanbar@gentec.com.sa
<b>New Zealand</b>	Nichecom 1 Lincoln Ave. Tawa, Wellington	(Tel) +64 (4) 232 32 33 (Fax) +64 (4) 232 32 30 rob@nichecom.co.nz	<b>Serbia-Montenegro</b>	Rohde & Schwarz Representative Office Belgrade Tose Jovanovica 7 11030 Beograd	(Tel) +381 (11) 305 50 25 (Fax) +381 (11) 305 50 24 rs-scg@rscs.rohde-schwarz.com
<b>Nicaragua</b>	siehe/see Mexico		<b>Singapore</b>	Rohde & Schwarz Regional Headquarters Singapore Pte. Ltd. 1 Kaki Bukit View #05-01/02 Techview Singapore 415 941	(Tel) +65 68 46 18 72 (Fax) +65 68 46 12 52
<b>Nigeria</b>	Ferrostaal Abuja Plot 3323, Barada Close P.O.Box 8513, Wuse Off Amazon Street Maitama, Abuja	(Tel) +234 (9) 413 52 51 (Fax) +234 (9) 413 52 50 fsabuja@rosec.com.net			
<b>Norway</b>	Rohde & Schwarz Norge AS Enebakkeveien 302 B 1188 Oslo	(Tel) +47 (23) 38 66 00 (Fax) +47 (23) 38 66 01 firmapost@rsnor.rohde-schwarz.com		Rohde & Schwarz Systems & Communications Asia Pte Ltd Service 1 Kaki Bukit View #04-01/07 Techview Singapore 415 941	(Tel) +65 68 46 37 10 (Fax) +65 68 46 00 29 info@rssg.rohde-schwarz.com
<b>Oman</b>	Mustafa Sultan Science & Industry Co.LLC. Test & Measurement Products Way No. 3503 Building No. 241 Postal Code 112 Al Khuwair, Muscat	(Tel) +968 63 60 00 (Fax) +968 60 70 66 m-aziz@mustafasultan.com	<b>Slovak Republic</b>	Specialne systemy a software, a.s. Svrca ul. 3 841 04 Bratislava 4	(Tel) +421 (2) 65 42 24 88 (Fax) +421 (2) 65 42 07 68 3s@special.sk
<b>Pakistan</b>	Siemens Pakistan 23, West Jinnah Avenue Islamabad	(Tel) +92 (51) 227 22 00 (Fax) +92 (51) 227 54 98 reza.bokhary@siemens.com.pk	<b>Slovenia</b>	Rohde & Schwarz Representative Office Ljubljana Tbilisjska 89 1000 Ljubljana	(Tel) +386 (1) 423 46 51 (Fax) +386 (1) 423 46 11 rs-slovenia@rssi.rohde-schwarz.com
<b>Panama</b>	siehe/see Mexico		<b>South Africa</b>	Protea Data Systems (Pty.) Ltd. Communications and Measurement Division Private Bag X19 Bramley 2018	(Tel) +27 (11) 719 57 00 (Fax) +27 (11) 786 58 91 unicm@protea.co.za
<b>Papua New Guinea</b>	siehe/see Australia			Protea Data Systems (Pty.) Ltd. Cape Town Branch Unit G9, Centurion Business Park Bosmandam Road Milnerton Cape Town, 7441	(Tel) +27 (21) 555 36 32 (Fax) +27 (21) 555 42 67 unicm@protea.co.za
<b>Paraguay</b>	siehe/see Argentina		<b>Spain</b>	Rohde & Schwarz Espana S.A. Salcedo, 11 28034 Madrid	(Tel) +34 (91) 334 10 70 (Fax) +34 (91) 729 05 06 rses@rses.rohde-schwarz.com
<b>Philippines</b>	Rohde & Schwarz (Philippines) Inc. Unit 2301, PBCOM Tower 6795, Ayala Ave. cor. Herrera St. Makati City	(Tel) +63 (2) 753 14 44 (Fax) +63 (2) 753 14 56		Rohde & Schwarz Espana S.A. Av. Príncipe d'Astúries, 66 08012 Barcelona	(Tel) +34 (93) 415 15 68 (Fax) +34 (93) 237 49 95 bcn@rses.rohde-schwarz.com
<b>Poland</b>	Rohde & Schwarz SP.z o.o. Przedstawicielstwo w Polsce ul. Stawki 2, Pietro 28 00-193 Warszawa	(Tel) +48 (22) 860 64 94 (Fax) +48 (22) 860 64 99 rs-poland@rspl.rohde-schwarz.com	<b>Sri Lanka</b>	Dynatel Communications (PTE) Ltd. 451/A Kandy Road Kelaniya	(Tel) +94 (112) 90 80 01 (Fax) +94 (112) 91 04 69 69 dynatel@dyanet.lk
<b>Portugal</b>	Rohde & Schwarz Portugal, Lda. Alameda Antonio Sergio 7-R/C - Sala A 2795-023 Linda-a-Velha	(Tel) +351 (21) 415 57 00 (Fax) +351 (21) 415 57 10 info@rspt.rohde-schwarz.com	<b>Sudan</b>	SolarMan Co. Ltd. P.O.Box 11 545 North of Fraouq Cementry 6/7/9 Bldg. 16 Karthoum	(Tel) +249 (183) 47 31 08 (Fax) +249 (183) 47 31 38 solarman29@hotmail.com
<b>Republic Dominican</b>	siehe/see Mexico		<b>Sweden</b>	Rohde & Schwarz Sverige AB Flygfältsgatan 15 128 30 Skarpnäck	(Tel) +46 (8) 605 19 00 (Fax) +46 (8) 605 19 80 info@rss.rohde-schwarz.com
<b>Romania</b>	Rohde & Schwarz Representation Office Bucharest 89 Eroii Sanitari Blvd., sector 5 050472 Bucuresti	(Tel) +40 (21) 411 20 13 (Fax) +40 (21) 410 68 46 rs-romania@rsro.rohde-schwarz.com	<b>Switzerland</b>	Roschi Rohde & Schwarz AG Mühlestr. 7 3063 Ittigen	(Tel) +41 (31) 922 15 22 (Fax) +41 (31) 921 81 01 support@roschi.rohde-schwarz.com
<b>Russian Federation</b>	Rohde & Schwarz International GmbH 119180, Yakimanskaya nab., 2 Moscow	(Tel) +7 (095) 745 88 50 to 53 (Fax) +7 (095) 745 88 54 rs-russia@rsru.rohde-schwarz.com	<b>Syria</b>	Electro Scientific Office Baghdad Street Dawara Clinical Lab. Bldg P.O.Box 8162 Damascus	(Tel) +963 (11) 231 59 74 (Fax) +963 (11) 231 88 75 memo@hamshointl.com
<b>Saudi Arabia</b>	Rohde & Schwarz International GmbH - Liaison Office Riyadh c/o Haji Abdullah Alireza Co. Ltd. P.O.Box 361 Riyadh 11411	(Tel) +966 (1) 293 2035 (Fax) +966 (1) 466 1657 chris.porzky@rsd.rohde-schwarz.com			

# Adressen/Addresses

<b>Taiwan</b>	Rohde & Schwarz Taiwan (Pvt.) Ltd. Floor 14, No. 13, Sec. 2, Pei-Tou Road Taipei 112	(Tel) +886 (2) 28 93 10 88 (Fax) +886 (2) 28 91 72 60 celine.tu@rstw.rohde-schwarz.com	<b>United Kingdom</b>	Rohde & Schwarz UK Ltd. 3000 Manchester Business Park Aviator Way Manchester M22 5TG	(Tel) +44 (870) 735 16 42 (Fax) +44 (1252) 81 14 77 sales@rsuk.rohde-schwarz.com
<b>Tanzania</b>	SSTL Group P.O. Box 7512 Dunga Street Plot 343/345 Dar Es Salaam	(Tel) +255 (22) 276 00 37 (Fax) +255 (22) 276 02 93 sstl@ud.co.tz	<b>Uruguay</b>	Aeromarine S.A. Cerro Largo 1497 11200 Montevideo	(Tel) +598 (2) 400 39 62 (Fax) +598 (2) 401 85 97 cs@aeromarine.com.uy
<b>Thailand</b>	Rohde & Schwarz International Thailand 2nd floor Gems Tower Bangrak, Suriyawong Bangkok 10600	(Tel) +66 (2) 200 07 29 (Fax) +66 (2) 267 00 79	<b>USA</b>	Rohde & Schwarz, Inc. Eastern Regional Office (US Headquarters) 8661A Robert Fulton Drive Columbia, MD 21046-2265	(Tel) +1 (410) 910 78 00 (Fax) +1 (410) 910 78 01 info@rsa.rohde-schwarz.com
	Schmidt Electronics (Thailand) Ltd. Messtechnik 202 Le Concorede Tower, 23rd Fl. Ratchadaphisek Rd. Huay kwang Bangkok 10320	(Tel) +66 (2) 69 41 47 05 (Fax) +66 (2) 69 41 47 06 salestm@schmidtelectronics.com		Rohde & Schwarz, Inc. Central Regional Office / Systems & EMI Products 8080 Tristar Drive Suite 120 Irving, TX 75063	(Tel) +1 (469) 713 53 00 (Fax) +1 (469) 713 53 01 info@rsa.rohde-schwarz.com
	TPP Operation Co. Ltd. Kommunikationstechnik 41/5 Mooban Tarinee Boromrajchonnee Road Talingchan Bangkok 10170	(Tel) +66 (2) 880 93 47 (Fax) +66 (2) 880 93 47		Rohde & Schwarz, Inc. R&D and Application Support 8905 SW Nimbus Ave Suite 240 Beaverton, OR 97008	(Tel) +1 (503) 403 47 00 (Fax) +1 (503) 403 47 01 info@rsa.rohde-schwarz.com
<b>Trinidad &amp; Tobago</b>	siehe/see Mexico	(Tel) (Fax)		Rohde & Schwarz, Inc. Western Regional Office 7700 Irvine Center Drive Suite 100 Irvine, CA 92618	(Tel) +1 (949) 885 70 00 (Fax) +1 (949) 885 70 01 info@rsa.rohde-schwarz.com
<b>Tunisia</b>	Teletek 71, Rue Alain Savary Residence Alain Savary (C64) Cit� el Khadra 1003 Tunis	(Tel) +216 (71) 77 33 88 (Fax) +216 (71) 77 05 53 teletek@gnet.tn		Rohde & Schwarz, Inc. Service & Calibration Center 8661A Robert Fulton Drive Columbia, MD 21046-2265	(Tel) +1 (410) 910 50 02 (Fax) +1 (410) 910 79 31 service.rsa@rsa.rohde-schwarz.com
<b>Turkey</b>	Rohde & Schwarz International GmbH Liaison Office Istanbul Bagdat Cad. 191/3, Arda Apt. B-Blok 81030 Selamicesme-Istanbul	(Tel) +90 (216) 385 19 17 (Fax) +90 (216) 385 19 18 nadir.guerelman@rsd.rohde-schwarz.com	<b>Vietnam</b>	Rohde & Schwarz Representative Office Vietnam Unit 807, 8/F, Schmidt Tower 239 Xuan Thuy Road Cau Giay District Hanoi	(Tel) +84 (4) 834 20 46
<b>Ukraine</b>	Rohde & Schwarz Representative Office Kiev 4, Patris Loumoumba ul. 01042 Kiev	(Tel) +38 (044) 268 60 55 (Fax) +38 (044) 268 83 64 rsbkiev@public.ua.net	<b>West Indies</b>	siehe/see Mexico	
<b>United Arab Emirates</b>	Rohde & Schwarz International GmbH Liaison Office Middle East Vertrieb P.O. Box 31156 Abu Dhabi	(Tel) +971 (2) 6335 670 (Fax) +971 (2) 6335 671 Dario Barisoni@rsd.rohde-schwarz.com			
	Rohde & Schwarz Bick Mobile Communication P.O.Box 17466 JAFZ, PPU ZG-07 Dubai	(Tel) +971 (4) 883 71 35 (Fax) +971 (4) 883 71 36			
	Rohde & Schwarz Emirates L.L.C. ESNAAD Premisses at Mussafah, P.O.Box 31156 Abu Dhabi	(Tel) +971 (2) 55 49 411 (Fax) +971 (2) 55 49 433 rsuaeam@emirates.net.ae			
<b>United Kingdom</b>	Rohde & Schwarz UK Ltd. Ancells Business Park Fleet Hampshire GU51 2UZ	(Tel) +44 (1252) 81 88 88 (sales)+44 (1252) 81 88 18 (service) (Fax) +44 (1252) 81 14 47 sales@rsuk.rohde-schwarz.com			



# 1 Introduction

<b>This chapter</b>	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.
<b>Further information</b>	Chapter 2 contains an overview of R&S UP300/350 control elements, indicators, etc.  Chapter 3 describes how to put the instrument into operation.

## 1.1 Application Range of the R&S UP300/350

<b>Use</b>	<p>The R&amp;S UP300/350 is a two-channel audio analyzer which provides a large number of functions and measurement features at a favorable price. The R&amp;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 88 kHz permits a large number of other T &amp; M applications (e.g. in ultrasonic technology, RFI voltage analysis, etc) in addition to classic audio measurements.</p> <p>The R&amp;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&amp;S UP350 also has digital inputs and outputs.</p>
<b>Performance features</b>	<p>The key features are:</p> <ul style="list-style-type: none"> <li>▪ Frequency range from DC to 80 kHz</li> <li>▪ Two-channel generator with separate amplitude, phase and frequency settings for sinewave signal</li> <li>▪ Generator generates all signals required for audio measurements: sinewave, two-tone (DFD and Mod Dist), multi-tone, noise, polarity, burst sinewave)</li> <li>▪ Generator sweep with up to 2 function parameters</li> <li>▪ Intrinsic distortion of 0.0003 % at 1 kHz</li> <li>▪ Simultaneous numeric display of up to 3 measurement values</li> <li>▪ Clearly structured, graphical representation of measurement results</li> <li>▪ FFT up to 16 K</li> <li>▪ Up to 3 digital filters can be activated</li> <li>▪ All filters commonly used for audio measurements are predefined</li> <li>▪ USB interface for remote control and for connecting a USB stick</li> </ul>
<b>Operation from keypad</b>	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.
<b>Remote control from a PC</b>	The R&S UP300/350 are equipped as standard 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**

<b>Content</b>	1 power cord Europe 1 country specific power cord (if different from Europe) 1 manual German/English
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## **1.3 Warranty**

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### **ATTENTION**



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

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#### **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 R&S representative and of the support center at the front of the manual.

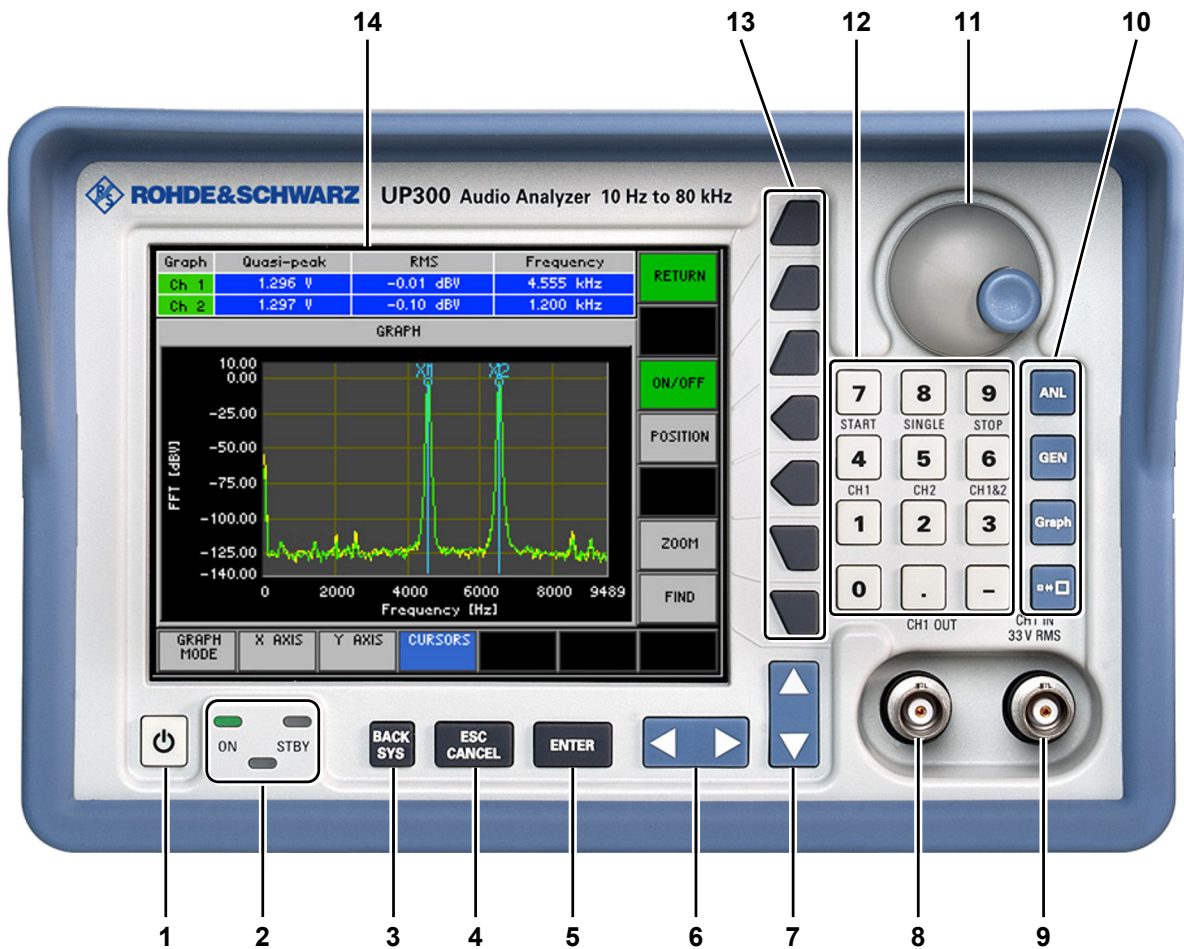
#### **Indicating claims under the warranty**

We would also ask you to state clearly if you are making a claim for repairs under warranty, preferably by including your delivery note. Repair requests that do not explicitly refer to the warranty will, in the first instance, incur charges.

If your warranty has expired, we will, of course, repair your R&S UP300/350 in accordance with our general installation and service conditions.

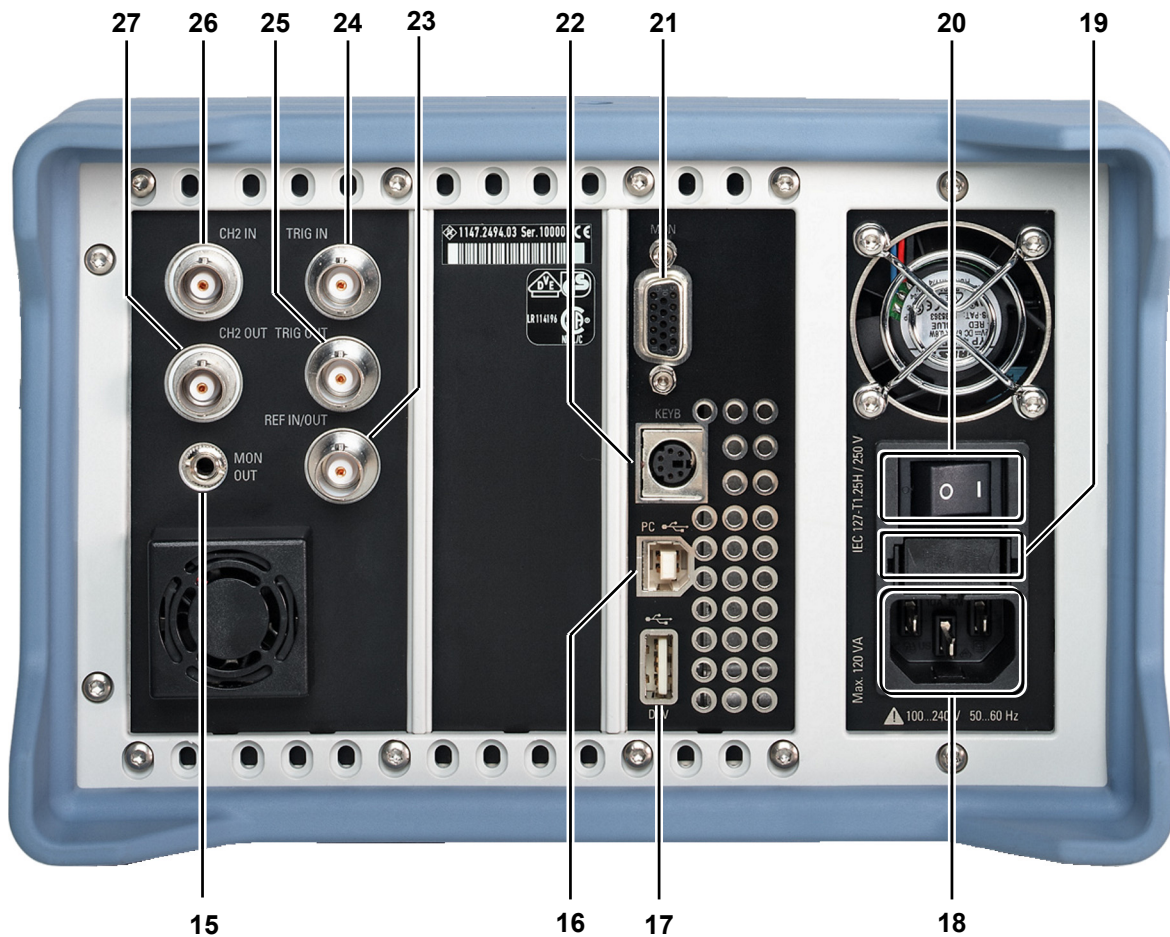
## 2 Control Elements

### 2.1 Front View



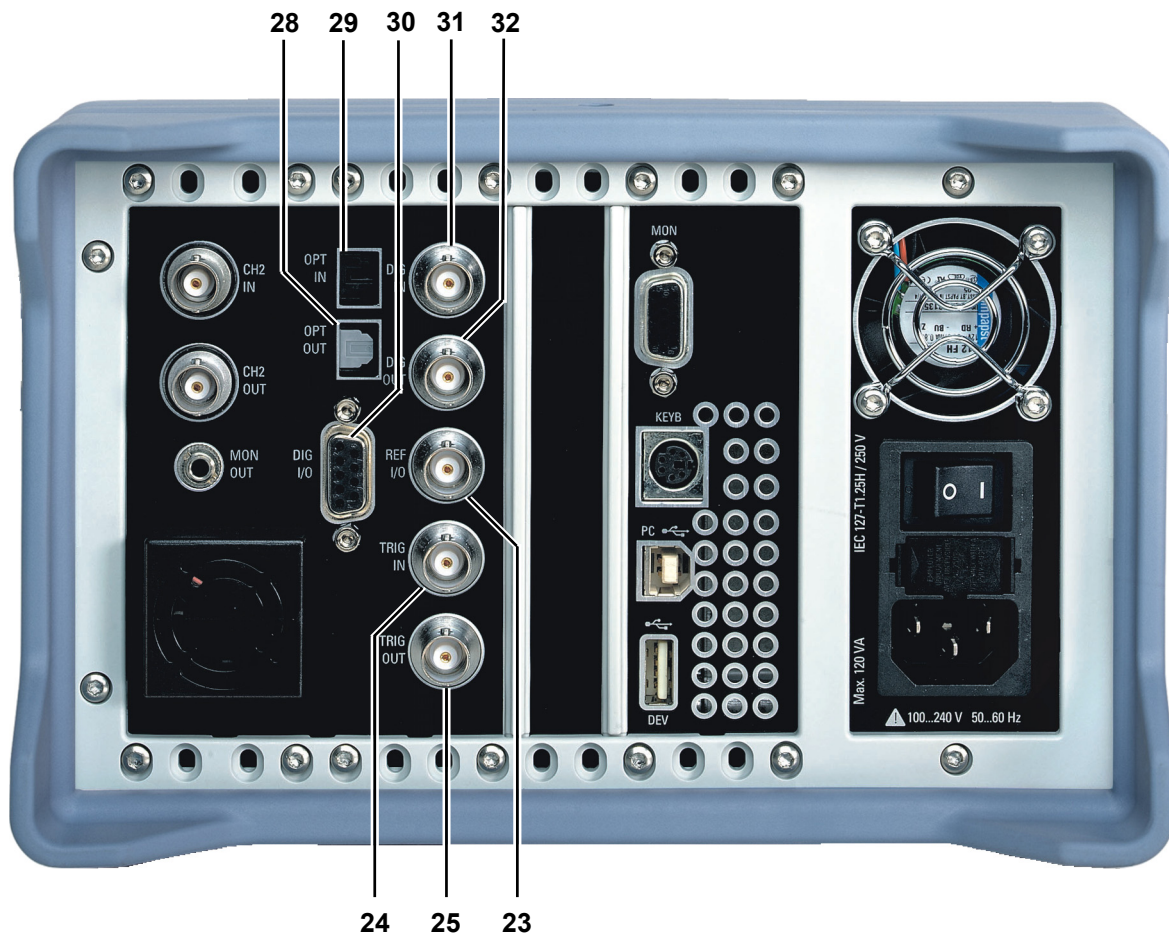
- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1 ON/STANDBY switch</li> <li>2 ON/STANDBY indicator</li> <li>3 BACK/SYS key</li> <li>4 ESC/CANCEL key</li> <li>5 ENTER key</li> <li>6 Cursor keys ◀ / ▶</li> <li>7 Cursor keys ▼ / ▲</li> </ul> | <ul style="list-style-type: none"> <li>8 Signal output Ch 1 (BNC connector)</li> <li>9 Signal input Ch 1 (BNC connector)</li> <li>10 Main menu selection keys</li> <li>11 Rotary knob</li> <li>12 Numerical keys</li> <li>13 Function keys</li> <li>14 Screen</li> </ul> |
|--|--|

## 2.2 Rear View: R&S UP300/350



- |    |                                   |    |  |
|----|-----------------------------------|----|--|
| 15 | Audio monitoring output (jack)    | 22 | Connector for external keyboard              |
| 16 | Connector for external USB host   | 23 | Input/output for external reference (10 MHz) |
| 17 | Connector for external USB device | 24 | Reserved                                     |
| 18 | AC supply connector               | 25 | Reserved                                     |
| 19 | AC line fuses                     | 26 | Signal input Ch 2 (BNC connector)            |
| 20 | AC line switch                    | 27 | Signal output Ch 2 (BNC connector)           |
| 21 | Connector for external monitor    |    |  |

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



- 23** Input/output for external reference (10 MHz)
- 24** Reserved
- 25** Reserved

- 28** Optical output TOSLINK
- 29** Optical input TOSLINK
- 30** Reserved
- 31** Digital input S/P DIF
- 32** Digital output S/P DIF

## 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 connecting an external keyboard.

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 (➤ 1-42).
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

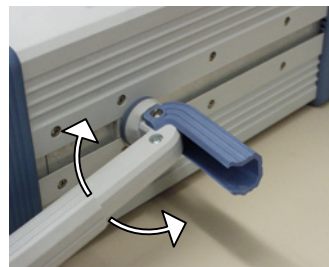
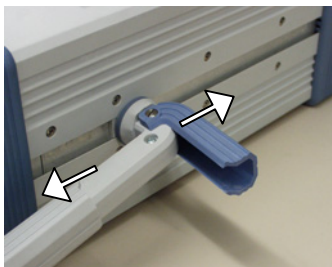
The R&S UP300/350 must be assembled on a firm, level surface only. The instrument has a carrying handle which is also used for various setup options. This handle can be moved into any position, depending on the particular field of application.

Setting the handle

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



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



3. Close the setting lever by pressing on the outer surface.  
**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:** Use no 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 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]. 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 the R&S UP300/350 by means of the AC line switch [20] at the rear panel, it is in standby mode and the yellow LED [2] comes on. If you press the ON/STANDBY switch [1], the instrument is switched on and the green LED [2] comes on.

##### STANDBY operating state

To switch the R&S UP300/350 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 ON LED [2] should come 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 (➔ 3-48), 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 (➔ 5-62) appear.

#### In error case

If the application display (➔ 5-62) does not appear and the red or 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 LED's [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 R&S UP300/350 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.

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## 3.7 Connecting a DUT

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### ATTENTION



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

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#### Generator output

Via the generator outputs Ch 1 [8] and Ch 2 [27], you can stimulate the DUT with high-end test signals (↗ 6-99).

#### Analyzer input

Via the analyzer inputs Ch 1 [9] and Ch 2 [26], you can measure and evaluate the output signals of your DUT (↗ 6-171).

#### 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 (↗ 6-216, 6-224, 6-226, 6-230, 6-233).

### 3.8 Connecting an External Keyboard

#### ATTENTION



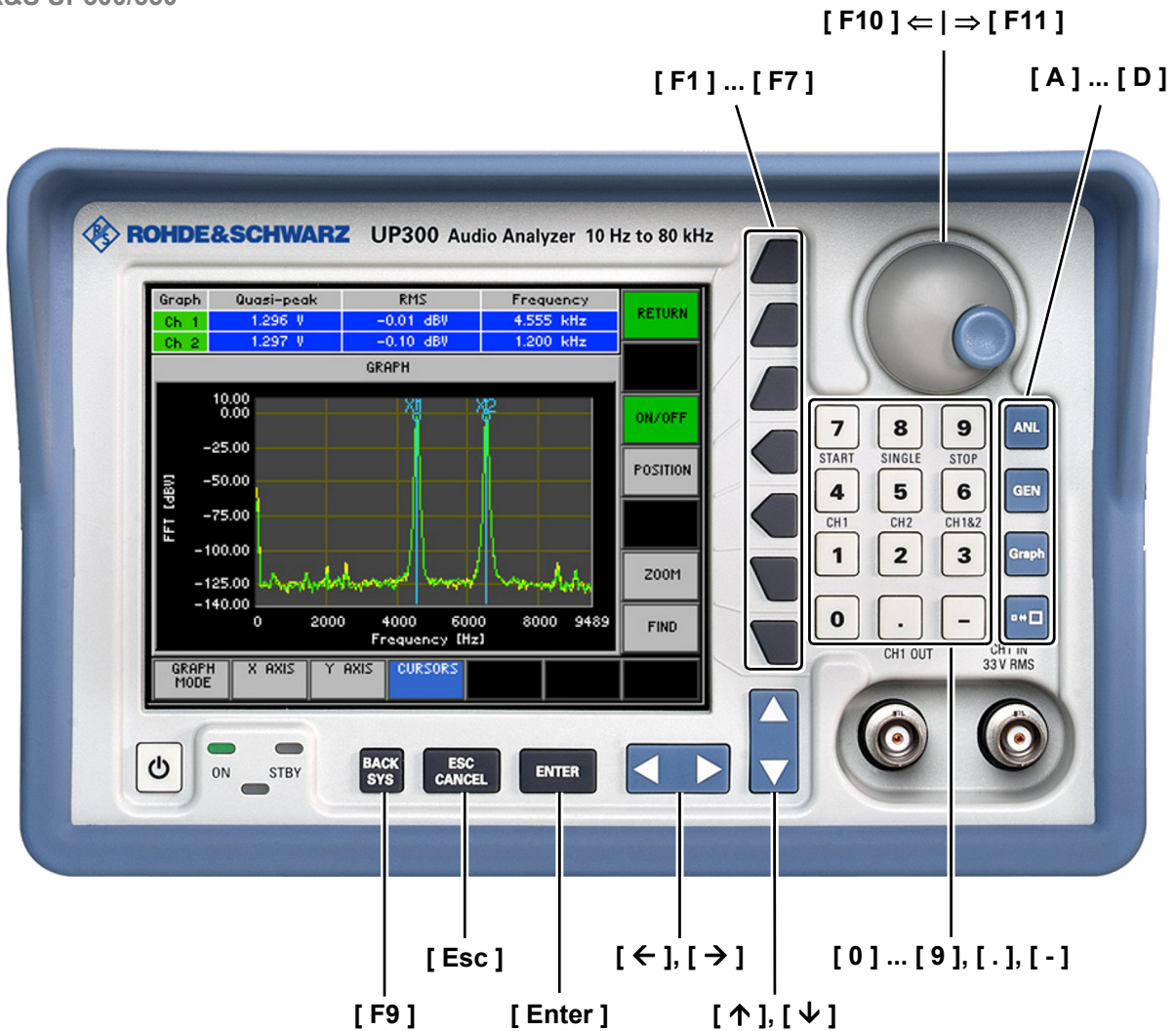
Only connect the keyboard when the R&S UP300/350 is off or in the STANDBY mode, otherwise malfunctions may occur at a later date.

#### Use

You can connect an external PC keyboard via the 6-pin PS/2 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

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### 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.

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### 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 setting for instrument is the default setting (factory). This is set in the menu PRESET (↗ 6-276). 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 SINUS 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  $V_{rms} = 1 V$ . The measurement function RMS FREQ DC 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  key.
- Using the  cursor keys select  from the bottom menu bar.
- Press the  key.

#### 2. Set the sine signal at the generator.

- Press the main menu selection key .
- Using the  cursor keys select  from the bottom menu bar.
- Press the  key.
- Using the  cursor keys select  from the bottom menu bar.

### 3. Set the signal frequency at 960 Hz in Ch 1 and at 2 kHz in Ch 2.


- Press the numeric key **1** to select the channel Ch 1.
- Press the **FREQ**.
- Use the numeric keys to enter the value **9** **6** **0**. Finish the entry with the **Hz** unit key.
- Press the numeric key **2** to select the channel Ch 2.
- Press the **FREQ**.
- Use the numeric keys to enter the value **2**. Finish the entry with the **kHz** unit key.

### 4. Set signal amplitude $V_{pp} = 1$ V.

- Press the numeric key **3** to select the channels Ch 1 and Ch 2.
- Stay in the **SINUS** menu.
- Press the **AMPL**.
- Use the numeric keys to enter the value **1**. Finish the entry with the **V** key.

## Analyzer settings

### 5. Set the analyzer input to generator.

- Press the main menu selection key **ANL**.
- Using the **◀ ▶** cursor keys select **CONFIG** from the bottom menu bar.
- Press the **INPUT**.
- Use the  to select the **Gen Meas** setting.  
Finish the selection procedure with **ENTER**.

### 6. Switching on the measurement function RMS FREQ DC and FFT.

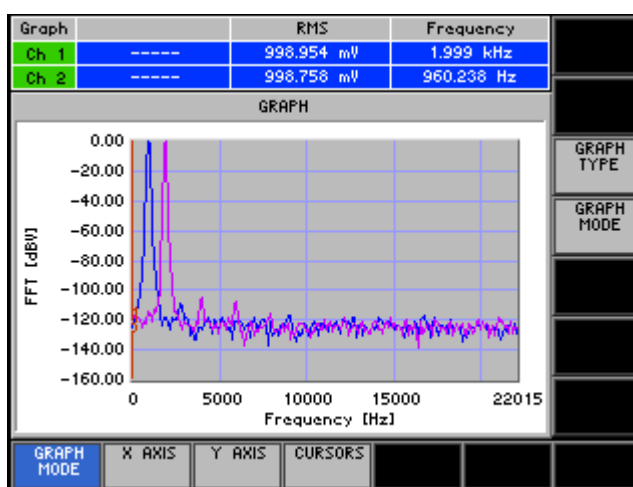
- Using the **◀ ▶** cursor keys select **FUNCTIONS** from the bottom menu bar.
- Press the **FREQ. DC, RMS**.
- Press the **FFT**.

Graphical display

7. Graphical display of the measurement results.

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

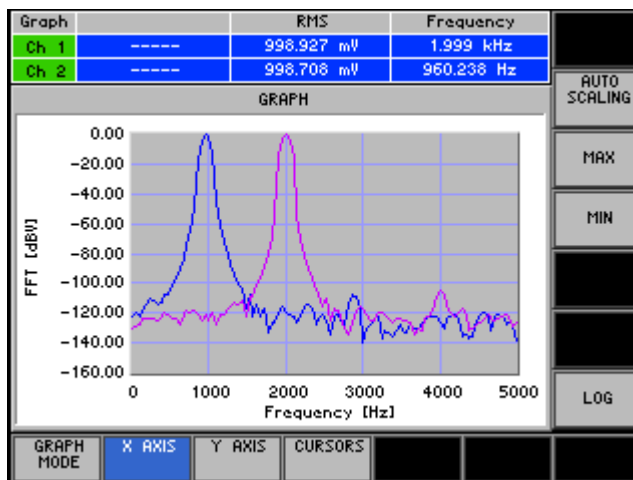
Display at the R&S UP300/350











8. 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**.
- Use the numeric keys to enter the value **5**. Finish the entry with the **↵** key.

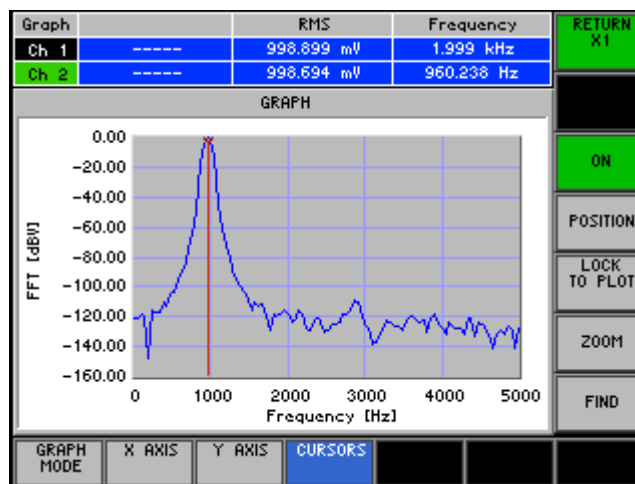
Display at the R&S UP300/350



9. Position the cursor 1 on trace 2.




- Using the  cursor keys select  from the bottom menu bar.
  - Press the numeric key  to select the channel Ch 2.
  - Press the .
  - Press the  to switch on the cursor.
  - Press the .
  - Use the  to select the **Max** setting.
- Finish the selection procedure with .

Display at the R&S UP300/350

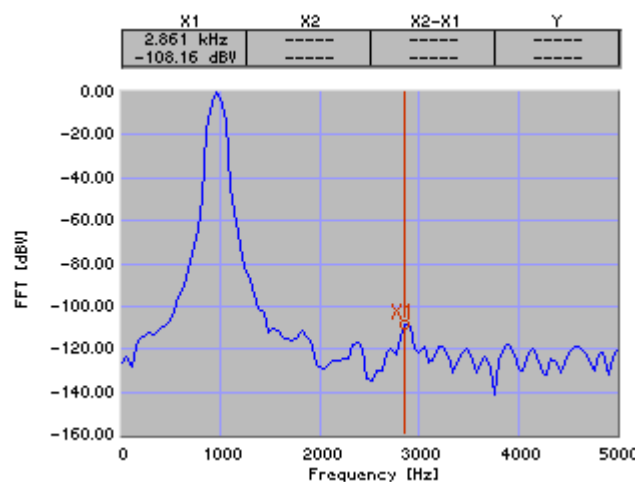


Full-screen display

10. Set the full-screen display.

- Press the main menu selection key .
- Use the  to move the cursor in little steps.
- Use the  cursor keys to position the cursor on the maximum value.

Display at the R&S UP300/350





# 5 Manual Operating Concept

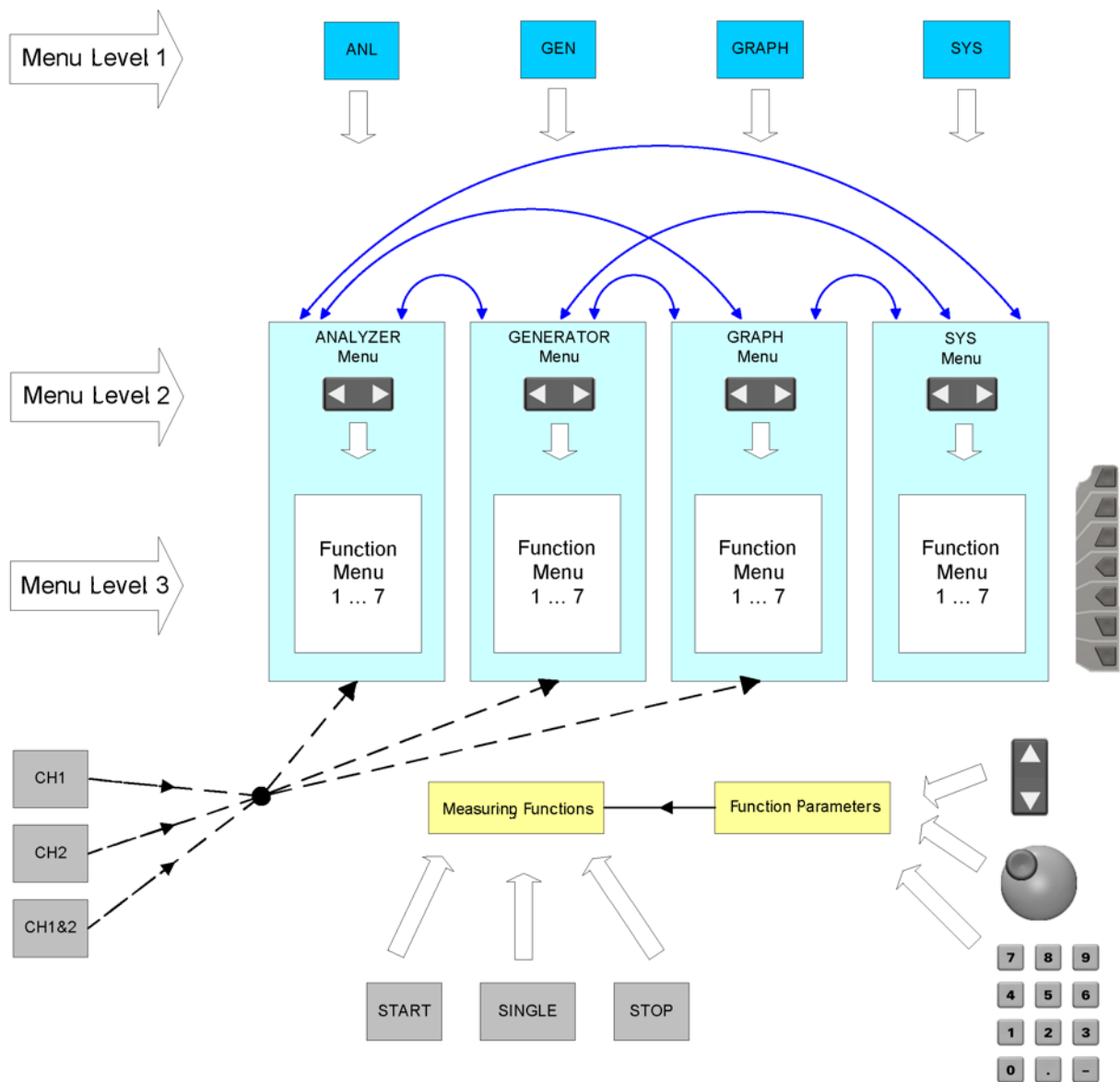
**This chapter**

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

**Further information**

Chapter 6 contains an in-depth description of the menu functions .  
Chapter 4 contains a brief introduction that takes you step-by-step through some simple settings.

## 5.1 Overview of Operating Steps



<b>First hierarchical level</b>	<p>The R&amp;S UP300/350 is basically operated via hierarchically arranged menus. The following four <b>main menus</b> are simultaneously available at the first hierarchical level:</p> <ul style="list-style-type: none"> <li>▪ <b>Analyzer</b></li> <li>▪ <b>Generator</b></li> <li>▪ <b>Graph</b></li> <li>▪ <b>System</b></li> </ul> <p>Using the four keys <b>ANL</b>, <b>GEN</b>, <b>GRAPH</b> and <b>SYS</b>, you can switch between these menus. Each menu is called at the position where it has been quit.</p>
<b>Second hierarchical level</b>	<p>Within the main menu, the corresponding <b>function menus</b> 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.</p>
<b>Third hierarchical level</b>	<p>The <b>parameter menus</b> for each function menu are displayed on the vertical softkey bar at the third hierarchical level.</p> <p>Some parameter menus include further submenus (fourth level).</p>
<b>Channel selection keys</b>	<p>The keys <b>Ch 1</b>, <b>Ch 2</b> and <b>Ch 1&amp;2</b> (the numerical keys 1, 2 and 3 are assigned twice) affect the Analyzer, Generator and Graph menus. They control which channel is affected by a setting.</p>
<b>Measurement control keys</b>	<p>The keys <b>START</b>; <b>SINGLE</b> and <b>STOP</b> (the numerical keys 4, 5, and 6 are assigned twice) control the sequence of the measurement functions.</p>
<b>Entry possibilities</b>	<p>Enter a parameter value by using the <b>numeric keypad</b>, the <b>rotary knob</b> or the vertical <b>cursor keys</b>.</p>

## **5.2 Making Entries from the Keypad**

<b>Introduction</b>	<p>The R&amp;S UP300/350 is operated using menus in conjunction with a keypad and a rotary knob. The keypad comprises the following sections:</p> <ul style="list-style-type: none"> <li>▪ Numerical keys [12]</li> <li>▪ Main menu selection keys [10]</li> <li>▪ Cursor keys [6, 7]</li> <li>▪ Function keys [13]</li> <li>▪ Action keys [4, 5]</li> <li>▪ BACK/SYS key [3]</li> </ul>
---------------------	--

## 5.2.1 Numerical 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.



- Changes to the Analyzer menu.
- Changes to the Generator menu.
- Changes 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 numerical keys and the cursor keys, the rotary knob is also used to set parameters.



The rotary knob has several functions:

- **Incrementing** (turn clockwise) or **decrementing** (turn counter-clockwise) numerical instrument parameters using a specified step size.
- **Navigating** through selection fields to above (turn clockwise) or to below (turn counter-clockwise).
- **Positioning** markers, limits, etc on the screen.

### 5.2.4 Cursor Keys

#### Function

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



The cursor keys have the following functions:

- **Navigating** through menus and selection fields
- The ◀ and ▶ cursor keys **move** the arrow to the position you want within the numeric editing line.
- The ◀ or ▶ cursor keys **move** the cursor to the position you want within the numerical editing line.
- The ▼ or ▲ cursor keys **increment** or **decrement** numerical parameter entries.

### 5.2.5 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 (↗ 5-65).



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

## 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 on the R&S UP300/350.



- **NOTE:** Pressing a unit key will also terminate the entry of setting data.
- This key is for **closing the entry field** or selection field, but the data that has been entered is not saved - in other words the **old value** is retained.

## 5.2.7 BACK/SYS Key

### Function 2: BACK

If the **entry field is open** the BACK/SYS [3] key can be used to correct numerical inputs (**BACK**).



- If the parameter entry field is open, the key functions as a 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 an entry field was changed using the cursor keys or rotary knob.

### Function 1: SYS

If the **entry field is closed** the BACK/SYS [3] key 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 repeatedly pressing the key, you can quit the SYS menu and accept the new settings.

## 5.3 Screen Display

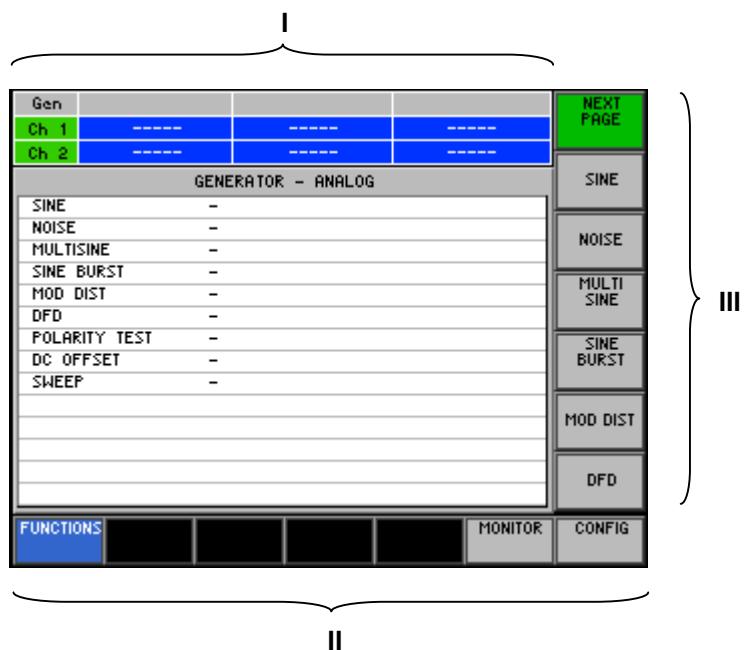
### Introduction

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

### Screen layout

The screen is divided into three areas:

- I 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 menu, 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 in the:**

The display window contains:

- Parameter list / measurement diagram (a) (↗ 6-99, 6-171, 6-245)
- Channel display (b) (↗ 6-116)
- Measurement displays / cursor parameters (c) (↗ 6-186, 6-259, 6-273)
- Status line with error messages (d) (↗ 6-244, 8-306)
- Selection fields that appear on screen (e) (↗ 5-69)
- Entry fields that appear on screen (f) (↗ 5-70)
- Traces (g) (channel Ch 1: green, channel Ch 2: yellow) (↗ 6-186)
- X cursors (h) and Y cursors (i) (↗ 6-259)

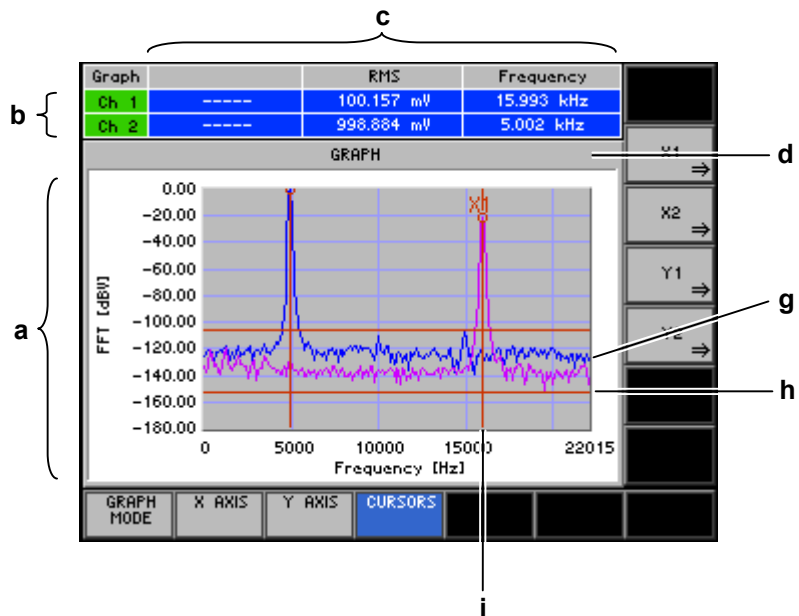
**Generator menu**


(call with )

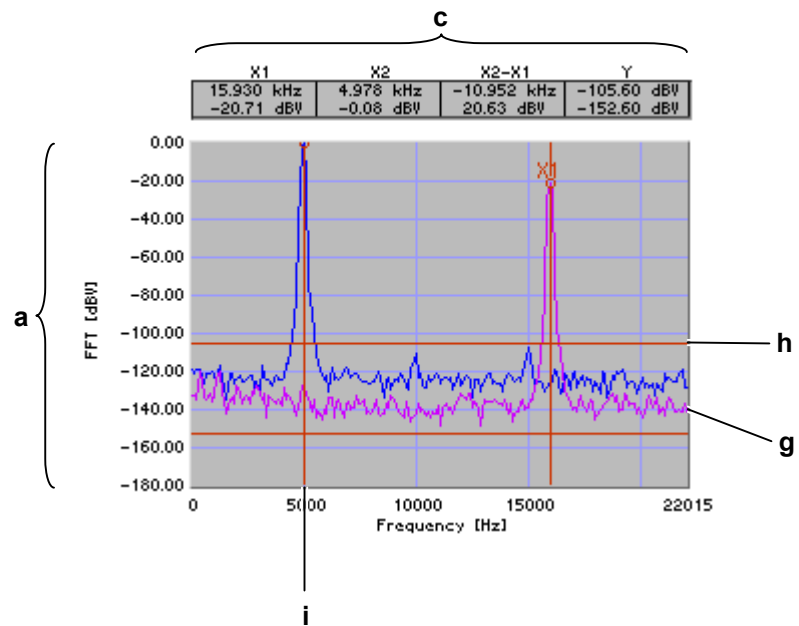
**Analyzer menu**

(call with )

Graph menu  
(call with )



Full screen  
(call with )





### 5.3.2 Menu Area

**Menu display**

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

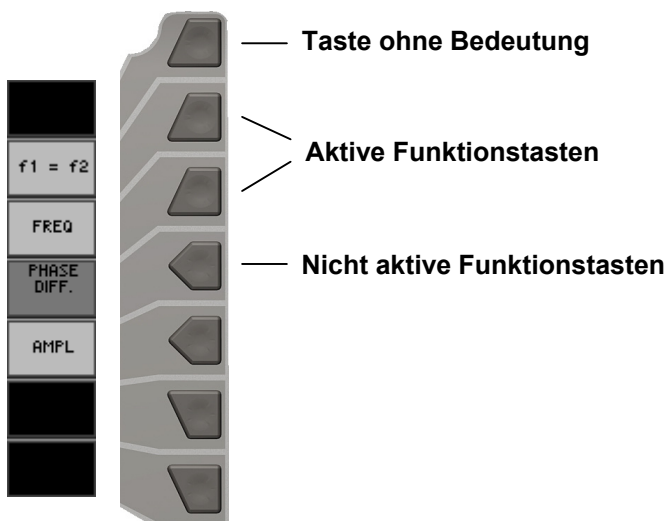


### 5.3.3 Function Area

**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 key has not been assigned a function in the menu in question. If a key has lettering, but not in full brightness, the key has temporarily (current setting) not been assigned a function.



## 5.4 Calling and Changing Menus

### Introduction



Operating the R&S UP300/350 is menu-guided. All the menus used to set the generator and analyzer functions. The instrument functions associated with any menu you select are displayed in the function area.

Pressing a function key has one of the following effects:

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




The ◀ or ▶ cursor keys [6] are used for menu navigation.

### Calling or changing menus

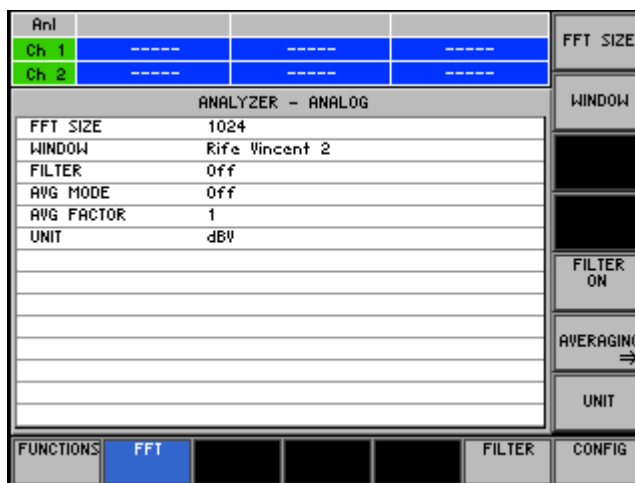
1. Press the **main menu selection key** .
2. Select a **menu**, e.g. , with the ◀ or ▶ [6] **cursor keys**.

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


Anl					NEXT PAGE
Ch 1	----	----	----		FREQ, DC, RMS
Ch 2	----	----	----		PEAK
ANALYZER - ANALOG					
FREQ, DC, RMS					
PEAK VALUE					
QUASI PEAK					
RMS SELECTIVE					
FFT					
THD					
POLARITY TEST					
DFD					
PHASE					
MOD DIST					
PROTOCOL					
SAMPLE RATE					
FUNCTIONS				FILTER	CONFIG

3. Press the  **function key** in the  **menu**.
4. Select the **menu**  with the ◀ or ▶ [6] **cursor keys**.

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



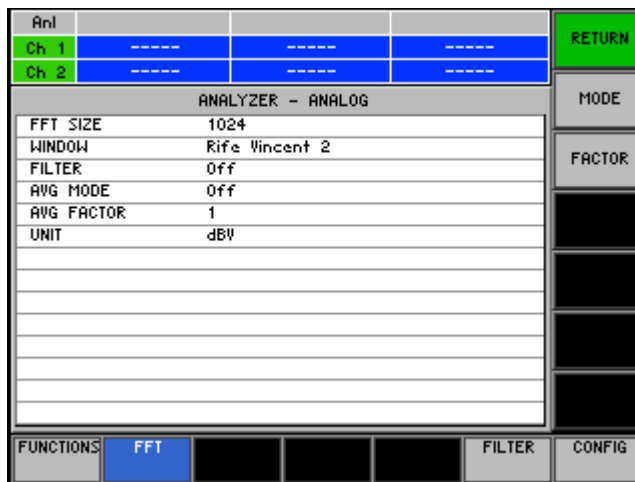
**NOTE**

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

**Calling/quitting submenus**

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

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



2. Press the  **function key** in the  **submenu**.

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

**NOTE**

You can also exit the submenu by using the **ESC/CANCEL key** [4].

## 5.5 Setting Parameters

There is a choice of methods

Parameters can be set in a number of ways:

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





The numerical keys [12], the main menu selection keys [10], the rotary knob [11], the cursor keys [6, 7] and the 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.

e. g.:  
Scaling the X axis  
(↗ 6-251)

1. Press the **main menu selection key** .
2. Select the **menu**  with the ◀ or ▶ [6] **cursor keys**.
3. Press the  **function key** in the  **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.

e. g.:  
Activating/  
deactivating the  
channel output Ch 1  
(↗ 6-105)

1. Press the **main menu selection key** .
2. Select the **menu**  with the ◀ or ▶ [6] **cursor keys**.
3. Press the numerical key **1** to select the channel **Ch 1**.
4. Press the  **function key** in the  **menu**.  
The function key is **highlighted** and new setting is saved. After switching on the output signal with the currently set parameters is present at output [8].
5. To deactivate the channel output Ch 1, press the  **function key** in the  **menu**.

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

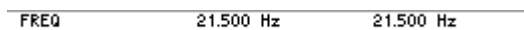




Terminating entries

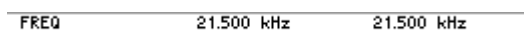
7. a) Press the  function key to terminate the entry.

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  key [5] to terminate the entry.

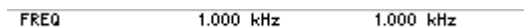
The R&S UP300/350 sets the value that has been set numerically, but with the **old unit**. The entry window is closed.



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

- c) Press the  key [4] to abort 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 set and the message **Value is out of range** appears in the status line.

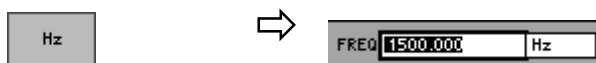
Using another unit of measure to display a value

1. Press the  function key in the  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 a **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**

When numbers are displayed, only the digit sequences 1 to 999 appear before the decimal point. In other words, if the digit sequence <5000> and the unit <Hz> are entered, <5.000 kHz> appears in the display.

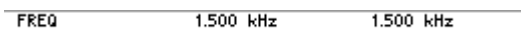




Terminating entries

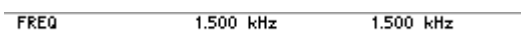
8. a) Press the  function key to terminate the entry.

The numerically set value is displayed using the **new unit**. The input window is closed.



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

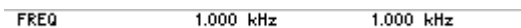
The R&S UP300/350 sets the value that has been set numerically but with the **old unit**. The entry window is closed.



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

- c) Press the  key [4] to abort 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.

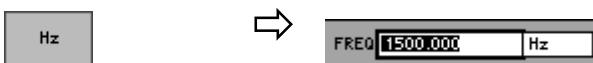
Using another unit of measure to display a value

1. Press the  function key in the  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 a **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**












When numbers are displayed, only the digit sequences 1 to 999 appear before the decimal point. In other words, if the digit sequence <5000> and the unit <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

	Display the next set of functions	
	Sinewave signal	(↗ 6-115)
	Noise signal	(↗ 6-119)
	Multi-sinewave signal	(↗ 6-122)
	Sine burst signal	(↗ 6-131)
	Two-tone signal for measurement of modulation distortions	(↗ 6-137)
	Difference frequency signal	(↗ 6-143)
	Display the previous set of functions	
	Polarity test signal	(↗ 6-149)
	DC voltage component	(↗ 6-151)
	Swept sinewave signal	(↗ 6-153)



#### 5.6.1.2 SINE Menu

##### Function key assignment

	Activate/deactivate frequency coupling of the channels	(↗ 6-117)
	Enter the signal frequency of the active channel	(↗ 6-116)
	Enter the phase difference between the channels	(↗ 6-117)
	Enter the signal amplitude	(↗ 6-118)












### 5.6.1.3 NOISE Menu

#### Function key assignment

	Select the amplitude distribution function	(↗ 6-120)
	Enter the signal amplitude	(↗ 6-120)






### 5.6.1.4 MULTISINE Menu

#### Function key assignment

	Enter the number of sinewave tones	(↗ 6-123)
	<b>Open the submenu:</b> Configuration of signal parameters	
	Exit submenu	
	Enter the frequency	(↗ 6-124)
	Enter the start phase	(↗ 6-125)
	Enter the relative signal amplitude	(↗ 6-125)
	Enter the frequency resolution	(↗ 6-126)
	Enter the reference value for the sum of all amplitudes	(↗ 6-127)
	Activate/deactivate amplitude modulation	(↗ 6-128)
	Enter the AM frequency	(↗ 6-129)
	Enter the AM modulation depth	(↗ 6-130)





### 5.6.1.5 SINE BURST Menu

#### Function key assignment

	Enter the signal frequency	(↗ 6-132)
	Enter the high-level time	(↗ 6-133)
	Enter the interval time	(↗ 6-134)
	Enter the high-level amplitude	(↗ 6-135)
	Enter the low-level amplitude	(↗ 6-136)





### 5.6.1.6 MOD DIST Menu

#### Function key assignment

	Enter the useful signal frequency	(↗ 6-139)
	Enter the interference signal frequency	(↗ 6-139)
	Enter the ratio between interference amplitude and useful amplitude	(↗ 6-141)
	Enter the total RMS of the signal	(↗ 6-142)

### 5.6.1.7 DFD Menu

#### Function key assignment

	Measurement to IEC 118: Enter the upper DFD frequency	(↗ 6-144)
	Measurement to IEC 268: Enter the center frequency	(↗ 6-144)
	Enter the difference frequency	(↗ 6-144, 6-146)
	Enter the total RMS of the signal	(↗ 6-148)

### 5.6.1.8 POLARITY TEST Menu

Function key  
assignment



Enter the signal amplitude

(↗ 6-149)

### 5.6.1.9 DC OFFSET Menu

Function key  
assignment























Enter the DC offset

(↗ 6-152)




### 5.6.1.10 SWEEP Menu

Function key assignment

	Select sweep mode	(↗ 6-155)
	Set the measurement time	(↗ 6-156)
	<b>Open the submenu:</b> Set the sweep parameters for frequency	
	Exit submenu	
	Enter the start value	(↗ 6-158)
	Enter the stop value	(↗ 6-158)
	Enter the number of reference values	(↗ 6-160)
	Enter the step size	(↗ 6-160)
	Select scaling of sweep steps (Lin/Log)	(↗ 6-162)
	Enter the measurement delay	(↗ 6-162)
	<b>Open the submenu:</b> Set the sweep parameters for amplitude	
	Exit submenu	
	Enter the start value	(↗ 6-164)
	Enter the stop value	(↗ 6-164)
	Enter the number of reference values	(↗ 6-166)
	Enter the step size	(↗ 6-166)
	Select scaling of sweep steps (Lin/Log)	(↗ 6-162)
	Enter the measurement delay	(↗ 6-167)
	Activate/deactivate the filter	(↗ 6-191)
	Select the unit for level display	(↗ 6-167)












### 5.6.1.11 MONITOR Menu

#### Function key assignment

	Switch the audio monitoring output on/off	(↗ 6-169)
	Select the signal source	(↗ 6-170)
	Enter the volume	(↗ 6-170)

### 5.6.1.12 CONFIG Menu















#### Function key assignment

	Select the generator type (digital) (R&S UP350 only)	(↗ 6-102)
	Select the bandwidth of the generator	(↗ 6-103)
	Select the reference potential of the output signal	(↗ 6-104)
	Switch the generator output on/off	(↗ 6-104)
	Select the level range switching mode	(↗ 6-106)
	Select the generator type (digital) (R&S UP350 only)	(↗ 6-102)
	Select the sample frequency of the output signal	(↗ 6-108)
	Enter the offset of the sample frequency	(↗ 6-109)
	Set the validity bit	(↗ 6-109)
	Select the wordwidth of the input signal	(↗ 6-110)
	Select the interface protocol	(↗ 6-110)

## 5.6.2 Analyzer

### 5.6.2.1 FUNCTIONS Menu









#### Function key assignment

	Display the next set of functions	
	Measure the RMS, frequency and DC voltage	(↗ 6-187)
	Measure the peak value	(↗ 6-196)
	Measure the quasi-peak value	(↗ 6-202)
	Selective RMS measurement	(↗ 6-205)
	Frequency-domain display mode of the input signal	(↗ 6-208)
	Measure distortion (THD, THD+N, SINAD, Noise)	(↗ 6-216)
	Display the previous set of functions	
	Perform the polarity test	(↗ 6-224)
	Measure the difference frequency distortion	(↗ 6-226)
	Measure the phase difference between channels Ch 1 and Ch 2	(↗ 6-230)
	Measure modulation distortion	(↗ 6-233)
	Protocol analysis (R&S UP350)	(↗ 6-236)
	Measure the sample frequency (R&S UP350)	(↗ 6-239)







### 5.6.2.2 FREQ., DC, RMS Menu

#### Function key assignment

	Select the measurement time	(↗ 6-189)
	Select the measurement result display (RMS & FREQ or RMS & DC)	(↗ 6-191)
	Activate/deactivate the filter	(↗ 6-191)
	<b>Open the submenu:</b> Set the averaging mode	
	Exit submenu	
	Activate/deactivate the averaging	(↗ 6-192)
	Enter the averaging factor	(↗ 6-192)
	Select the unit of the level display	(↗ 6-194)




### 5.6.2.3 PEAK Menu

#### Function key assignment

	Select the measurement mode	(↗ 6-198)
	Set the interval time	(↗ 6-199)
	Activate/deactivate the filter	(↗ 6-191)
	Select the unit of the level display	(↗ 6-200)









### 5.6.2.4 QUASI PEAK Menu

#### Function key assignment

	Select the interval time	(↗ 6-204)
	Activate/deactivate the filter	(↗ 6-204)
	Select the unit of the level display	(↗ 6-200)









### 5.6.2.5 RMS SELECTIVE Menu

#### Function key assignment

	Enter the measurement frequency	(↗ 6-206)
	Select the measurement bandwidth	(↗ 6-207)
	Activate/deactivate the filter	(↗ 6-191)
	<b>Open the submenu:</b> Set the averaging mode	
	Exit submenu	
	Activate/deactivate the averaging	(↗ 6-192)
	Enter the averaging factor	(↗ 6-192)
	Select the unit of the level display	(↗ 6-200)











### 5.6.2.6 FFT Menu

#### Function key assignment

	Set the FFT size	(↗ 6-210)
	Set the FFT window	(↗ 6-210)
	Activate/deactivate the filter	(↗ 6-191)
	<b>Open the submenu:</b> Set the averaging mode	
	Exit submenu	
	Activate/deactivate the averaging	(↗ 6-212)
	Enter the averaging factor	(↗ 6-212)
	Select the unit of the level display	(↗ 6-214)









### 5.6.2.7 THD Menu

#### Function key assignment

	Select the measurement mode	(↗ 6-218)
	Select the frequency search mode	(↗ 6-219)
	Select the measurement speed	(↗ 6-221)
	Activate/deactivate the filter	(↗ 6-191)
	<b>Open the submenu:</b> Set the POST FFT	
	Exit submenu	
	Activate/deactivate the FFT	(↗ 6-223)
	Set the FFT size	(↗ 6-210)
	Set the FFT window	(↗ 6-210)
	Select the unit of the level display	(↗ 6-223)


### 5.6.2.8 DFD Menu

#### Function key assignment

	Select the difference frequency distortions and measurement standard	(↗ 6-229)
	Activate/deactivate the filter	(↗ 6-191)
	<b>Open the submenu:</b> Set the POST FFT	
	Exit submenu	
	Activate/deactivate the FFT	(↗ 6-223)
	Set the FFT size	(↗ 6-210)
	Set the FFT window	(↗ 6-210)
	Select the unit of the level display	(↗ 6-223)








### 5.6.2.9 PHASE Menu

#### Function key assignment

	Select the type of signal search	(↗ 6-231)
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### 5.6.2.10 MOD DIST Menu

#### Function key assignment

	Activate/deactivate the filter	(↗ 6-191)
	<b>Open the submenu:</b> Set the POST FFT	
	Exit submenu	
	Activate/deactivate the FFT	(↗ 6-223)
	Set the FFT size	(↗ 6-209)
	Set the FFT window	(↗ 6-210)
	Select the unit of the level display	(↗ 6-223)

### 5.6.2.11 PROTOCOL Menu

#### Function key assignment

	Enter the measurement time	(↗ 6-238)
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### 5.6.2.12 SAMPLE RATE Menu

#### Function key assignment

	Enter the measurement time	(↗ 6-238)
---	----------------------------	-----------













**5.6.2.13 FILTER Menu**

## Function key assignment

	Select the filter 1	(↗ 6-241)
	Select the filter 2	(↗ 6-241)
	Select the filter 3	(↗ 6-241)

**5.6.2.14 CONFIG Menu**



## Function key assignment

	Select the analyzer type (digital)	(↗ 6-174)
	Select the bandwidth of the analyzer	(↗ 6-175)
	Select the reference potential of the input signal	(↗ 6-176)
	Select the signal source	(↗ 6-177)
	Select signal coupling	(↗ 6-178)
	Select the measurement range selection mode	(↗ 6-179)
	Select the measurement channel	(↗ 6-180)
	Select the analyzer type (analog)	(↗ 6-174)
	Select the sample frequency of the input signal	(↗ 6-181)
	Select the input signal	(↗ 6-182)
	Select the useful data transmission format of the input signal	(↗ 6-182)
	Select the measurement channel	(↗ 6-180)

## 5.6.3 Graph





### 5.6.3.1 GRAPH MODE Menu

#### Function key assignment

	Select the display parameters	(↗ 6-247)
	Select the display mode	(↗ 6-249)





### 5.6.3.2 X AXIS Menu

#### Function key assignment

	Activate automatic display area scaling	(↗ 6-252)
	Manual display area scaling: Enter the upper limit of the display area	(↗ 6-252)
	Manual display area scaling: Enter the lower limit of the display area	(↗ 6-252)
	Select the display mode	(↗ 6-254)

### 5.6.3.3 Y AXIS Menu

#### Function key assignment

	Activate automatic display area scaling	(↗ 6-256)
	Manual display area scaling: Enter the upper limit of the display area	(↗ 6-256)
	Manual display area scaling: Enter the lower limit of the display area	(↗ 6-256)
	Select the display mode	(↗ 6-258)

### 5.6.3.4 CURSORS Menu

Function key assignment



**Open the submenu:**  
Configure cursor 1 on the X axis



Exit the submenu



Activate/deactivate the cursor (↗ 6-261)



Position the cursor manually (↗ 6-264)



Assign a cursor to a trace (Ch 1 or Ch 2) (↗ 6-262)



Zoom the display area (↗ 6-266)



Position a cursor on the maximum value (↗ 6-262)



**Open the submenu:**  
Configure cursor 2 on the X axis



Exit the submenu



Activate/deactivate the cursor (↗ 6-261)



Position the cursor manually (↗ 6-264)



Assign a cursor to a trace (Ch 1 or Ch 2) (↗ 6-262)



Zoom the display area (↗ 6-266)



Position a cursor on the maximum value (↗ 6-262)



**Open the submenu:**  
Configure cursor 1 on the Y axis



Exit the submenu



Activate/deactivate the cursor (↗ 6-269)



Y position the cursor manually (↗ 6-270)



Zoom the display area (↗ 6-271)





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



Exit the submenu



Activate/deactivate the cursor

(↗ 6-269)



Y position the cursor manually

(↗ 6-270)






Zoom the display area

(↗ 6-271)

## 5.6.4 SYSTEM Functions


### 5.6.4.1 PRESET Menu

Function key  
assignment

	Call an instrument default setting	(↗ 6-277)
	Select an instrument default setting	(↗ 6-277)
	Start the remote control manually	(↗ 6-276)




### 5.6.4.2 STATE Menu

Function key  
assignment

	Configuration settings of analyzer and generator	(↗ 6-278)
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


### 5.6.4.3 FILE Menu

Function key  
assignment

	Save a user-defined setting	(↗ 6-282)
	Load a user-defined setting	(↗ 6-282)
	Print out a screenshot, saves the measurement results	(↗ 6-284)

#### 5.6.4.4 CONFIG Menu

##### Function key assignment

	Set the date and time	(↗ 6-288)
	Select an internal or external reference source	(↗ 6-290)
	Configure the instrument interfaces	(↗ 6-291)
	Set the screen saver mode	(↗ 6-293)
	Select an internal or external monitor	(↗ 6-295)
	Enter the date and time	(↗ 6-288)




#### 5.6.4.5 SERVICE Menu

##### Function key assignment

	Perform a selftest	(↗ 6-296)
---	--------------------	-----------


#### 5.6.4.6 INFO Menu

##### Function key assignment

	Display module data	(↗ 6-298)
	Display instrument statistics	(↗ 6-298)
	Display system messages	(↗ 6-299)

#### 5.6.4.7 CALIB Menu

##### Function key assignment

	Perform the automatically calibration	(↗ 6-300)
---	---------------------------------------	-----------

## 6 Working with the R&S UP300/350

### In 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 (↗ 3-48) 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 (↗ 6-282), 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 by channel (Ch 1, Ch 2). These parameters are listed in two columns in the table below "Setting". The function parameters applying to both channels (Ch 1&2) are listed in one column.

Function	Parameter	Settings	
		Channel Ch 1	Channel Ch 2
<b>SINE</b>	f1 = f2	Off	
	FREQ	1 kHz	1 kHz
	AMPL	100 mV (0.1 FS)	100 mV (0.1 FS)
	PHASE DIFF	0 grd	
<b>NOISE</b>	PDF	Rectangular	
	AMPL	100 mV (0.1 FS)	100 mV (0.1 FS)
<b>MULTISINUS</b>	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	0 %	
<b>SINE BURST</b>	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
<b>MOD DIST</b>	UPPER FREQ	7 kHz	
	LOWER FREQ	60 Hz	
	AMPL RATIO	4	4
	TOTAL RMS	100 mV (0.1 FS)	100 mV (0.1 FS)
<b>DFD</b>	UPPER FREQ	8.100 kHz	
	MAIN FREQ	8.000 kHz	

Function	Parameter	Settings	
		Channel Ch 1	Channel Ch 2
	DIFF FREQ	200 Hz	
	TOTAL RMS	100 mV (0.1 FS)	100 mV (0.1 FS)
<b>POLARITY TEST</b>	PEAK	100 mV (0.1 FS)	100 mV (0.1 FS)
<b>DC OFFSET</b>	DC OFFSET	100 mV (0.1 FS)	100 mV (0.1 FS)
<b>SWEEP</b>	MODE	FREQ->RMS	
	MEAS TIME	10 ms	
	PARAM FREQ		
	START	10 Hz	
	STOP	22.139 kHz	
	POINTS	100	
	STEP SIZE	224 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	
	FILTER	Off	
	UNIT	V (FS)	
<b>MONITOR</b>	STATE	Off	
	SOURCE	None	
	VOLUME	20 %	20 %
<b>CONFIG ANALOG</b>	BANDWIDTH	22 kHz	
	COMMON	Floating	Floating
	OUTPUT	On	On
	RANGE MODE	Auto	Auto

Function	Parameter	Settings	
		Channel Ch 1	Channel Ch 2
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 by channel (Ch 1, Ch 2). These parameters are listed in two columns in the table below "Setting". 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)	

Function	Parameter	Settings	
		Channel Ch 1	Channel Ch 2
	UNIT Ch2	V (FS)	
	REF: VALUE Ch1	1 mV (0.001 FS)	
	REF: VALUE Ch2	1 mV (0.001 FS)	
<b>RMS SELECTIVE</b>	CENTER FREQ	1 kHz (BW = 3 Hz)	
	BANDWIDTH	100 Hz	
	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)	
<b>FFT</b>	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	FILTER	Off	
	AVG MODE	Off	
	AVG FACTOR	1	
	UNIT	dBV (dBFS)	
<b>THD</b>	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	
<b>POLARITY</b>	STATUS	On	
<b>DFD</b>	MEAS MODE	d2 (IEC 268)	
	FILTER	Off	



Function	Parameter	Settings	
		Channel Ch 1	Channel Ch 2
	POST FFT	Off	
	FFT SIZE	1024	
	WINDOW TYPE	Rife Vincent 2	
	UNIT	dB	
PHASE	MEAS MODE	Auto tuning	
	FILTER	Off	
	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 TYP	Spectrum
	GRAPH MODE	Overwrite
X AXIS	AUTO SCALING	On
Y AXIS	AUTO SCALING	On
CURSORS	X1, X2, Y1, Y2	Off

### 6.1.4 System

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



### 6.2.1 Configuring Generator Parameters (CONFIG)

What the settings are for

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

- Switchover between analog and digital generator (R&S UP350)
- Configuration of parameters for digital interface (R&S UP350)
- Switchover between bandwidths (sample rate)
- Activation/deactivation of analog generator output
- Configuration of output
- Selection of range switching and setting of level range
- Use the ◀ or ▶ **cursor key** to select the **CONFIG** menu.

Selecting the CONFIG Menu

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

Analog generator

Gen				DIGITAL
Ch 1	----	----	----	BAND WIDTH
Ch 2	----	----	----	COMMON
GENERATOR - ANALOG				OUTPUT ON
OUTPUT	On	On		RANGE MODE
BANDWIDTH	22 kHz			
COMMON	floating	floating		
RANGE MODE	Auto	Auto		
FUNCTIONS			MONITOR	CONFIG

- |            |  |           |
|------------|--|-----------|
| DIGITAL    | Select the generator type (digital) (R&S UP350 only) | (↗ 6-101) |
| BAND WIDTH | Select the bandwidth of the generator                | (↗ 6-103) |
| COMMON     | Select the reference potential of the output signal  | (↗ 6-104) |
| OUTPUT ON  | Switch the generator output on/off                   | (↗ 6-104) |
| RANGE MODE | Select the level range switching mode                | (↗ 6-106) |





## 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 become less favorable 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 every valid for both channels (Ch 1&2).

#### Selecting the bandwidth

1. Press the  function key in the  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
-----------	--------

### 6.2.1.2.2 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 just 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, ↗ 6-176):

- **grounded**  
referenced 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.

The generator output is active 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 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 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 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".



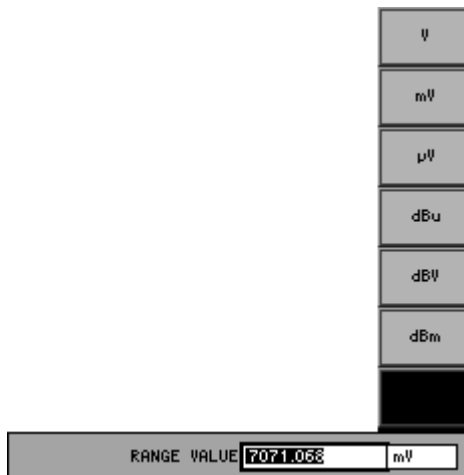
3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.

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 (↗ 5-70).  
The permissible entry range is:

$$0 \text{ V} \leq \text{RANGE VALUE} \leq 7.5 \text{ V}$$

The new setting is stored and displayed in the parameter field. The R&S UP300/350 can only switch to the level ranges actually available to it. The entry value is a guide value and is used for internal 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** ( $f_{\max} = 14.51 \text{ kHz}$ )
- **44.1 kHz** ( $f_{\max} = 19.999 \text{ kHz}$ )
- **48 kHz** ( $f_{\max} = 21.768 \text{ kHz}$ )
- **96 kHz** ( $f_{\max} = 43.536 \text{ kHz}$ )
- **192 kHz** ( $f_{\max} = 87.07 \text{ kHz}$ )

**NOTE:** The setting is every valid for both channels (Ch 1&2).

##### Selecting the sample frequency

1. Press the  function key in the  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 Offset of the Sample Frequency

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

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Entering the rate offset**

1. Press the  function key in the  menu.

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



2. Enter a new value (↗ 5-70).  
The permissible entry range is:

$$-1000 \text{ ppm} \leq \text{RATE OFFSET} \leq 1000 \text{ ppm}$$

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 every valid for both channels (Ch 1&2).

**Selecting the validity bit**

1. Press the  function key in the  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 Wordwidth of the Output Signal

**Use** You use the wordwidth to determine the resolution of the output signal. You can generate wordwidths 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**.

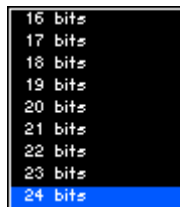
The selected channel is displayed in green in the channel display.



**Selecting the wordwidth**

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 every valid for both channels (Ch 1&2).

**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)

What the settings are for

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 to enter parameters for the function. At the same time, the appropriate function is activated in the generator.

With the generator, one signal type can be activated in combination with NOISE and DC OFFSET. All other function keys are deactivated (displayed in gray).

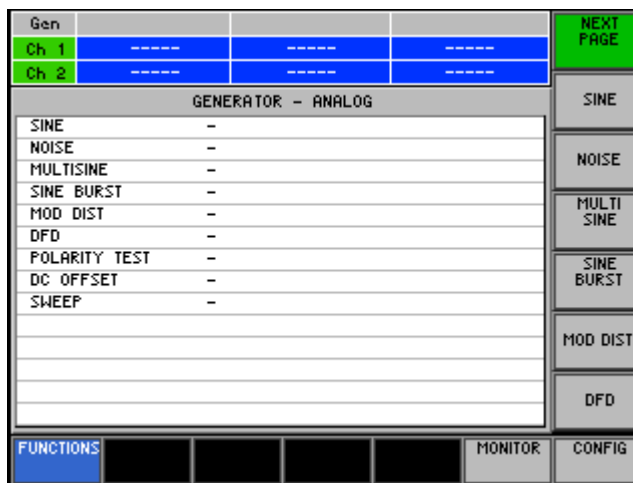
When you have selected a function in the menu bar, the list of available signal parameters appears on the screen (↗ 6-114).

Selecting the FUNCTIONS menu

- Select the **FUNCTIONS** menu with the aid of the ◀ or ▶ cursor key.

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

1<sup>st</sup> function key assignment



Display the next set of functions



Sinewave signal

(↗ 6-115)



Noise signal

(↗ 6-119)



Multi-sinewave signal

(↗ 6-122)



Sine burst signal

(↗ 6-131)



Two-tone signal for measurement of modulation distortions

(↗ 6-137)



Difference frequency signal

(↗ 6-143)





### 6.2.2.1 Selecting Generator Functions

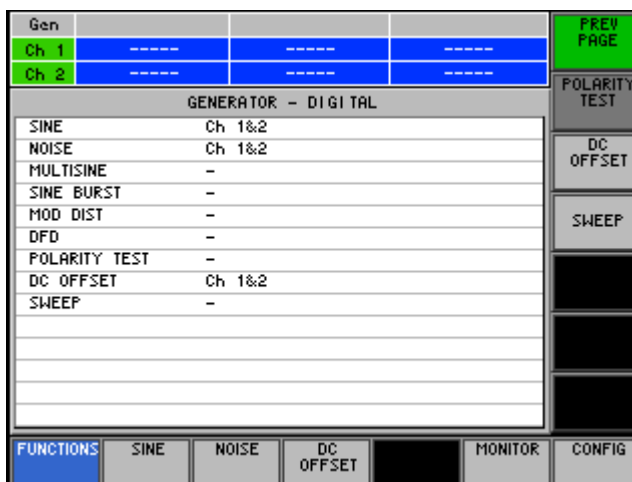
Switching on the function

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

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



You can select a maximum of 3 functions at the same 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.

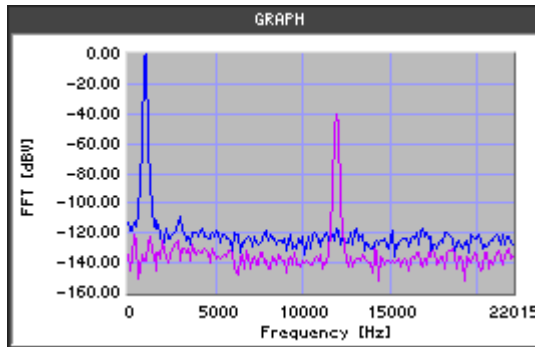
The menu item disappears in the menu area.



6.2.2.2.1 SINE (Sinewave Signal)

What the settings are for

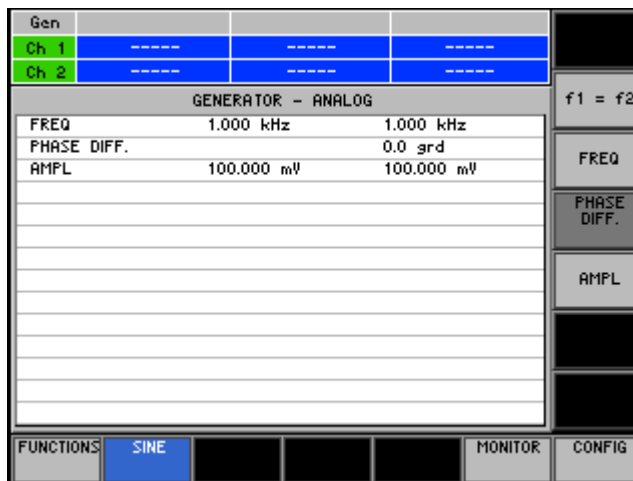
In the SINUS menu you can set the function parameters for the sinewave signal.



Selecting the SINE menu

1. Call the generator function **SINE** (↗ 6-113).
2. Select the **SINUS** menu with the aid of the ◀ or ▶ cursor key.

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



Function key assignment

<b>f1 = f2</b>	Activate/deactivate frequency coupling of the channels	(↗ 6-117)
<b>FREQ</b>	Enter the signal frequency of the active channel	(↗ 6-116)
<b>PHASE DIFF.</b>	Enter the phase difference between the channels	(↗ 6-117)
<b>AMPL</b>	Enter the signal amplitude	(↗ 6-118)

**NOTE**

The function key **PHASE DIFF.** is only available if frequency coupling of the channels is activated (↗ 6-117).

**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.

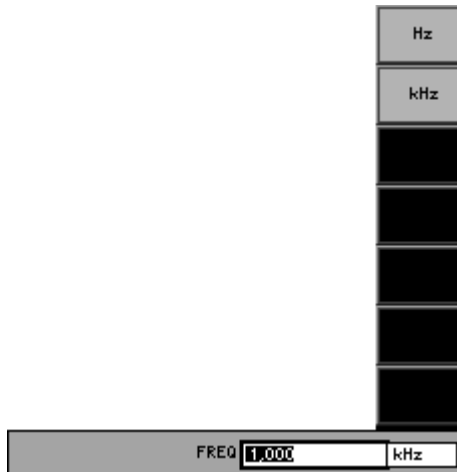


**NOTE:** You can also activate frequency coupling of the channels (↗ 6-117). The frequency setting for channel Ch 1 then also applies to channel Ch 2.

**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 are assigned various units of measurement.



3. Enter a new value (↗ 5-70).

The permissible entry range is:

$$0.001 \text{ Hz} \leq \text{FREQ} \leq f_{\text{max}}$$

within:  $f_{\text{max}}$  - maximum frequency of generator type (↗ 6-103, 6-108)

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 and the frequency setting of channel Ch 1 is also applicable for channel Ch 2.

#### 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 function key PHASE DIFF. is only available if the function key f1=f2 is activated (↗ 6-117) as definition of the phase position is only possible for signals of the same frequency.

#### Use

The phase of the signal of channel CH 2 can be offset by entering a phase difference with respect to channel CH 1 (0°). Channel Ch 1 serves as the reference.

#### Activating channel frequency couplings

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

The function key is highlighted and the frequency setting of channel Ch 1 is also applicable for channel Ch 2.

#### Entering the phase difference

- 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".



- Enter a new value (↗ 5-70).

The permissible entry range is:

$$-180 \text{ grd} \leq \text{PHASE DIFF} \leq +180 \text{ grd}$$

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.



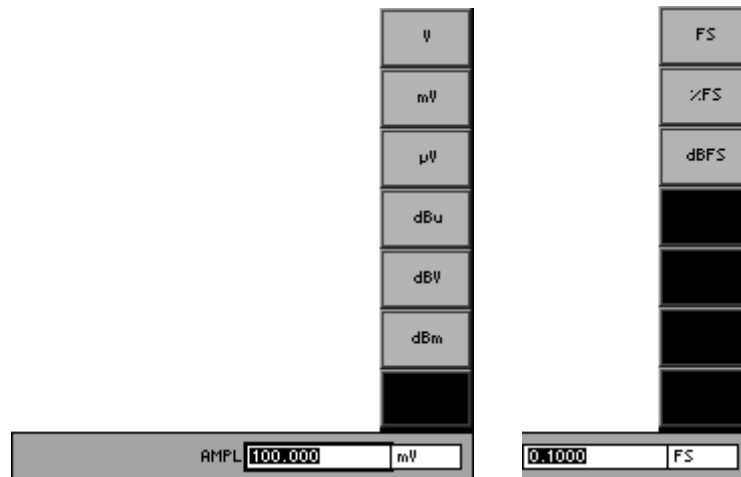
**Entering the signal amplitude**

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 are assigned various units of measurement.

**Analog**

**Digital**



3. Enter a value (↗ 5-70) 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)

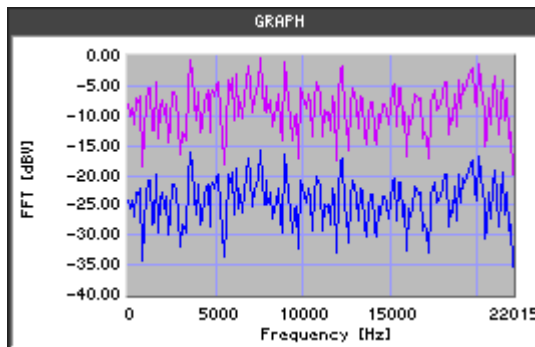
**NOTE**

The maximum signal amplitude only applies if just the SINUS 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.

6.2.2.2.2 NOISE (Noise Signal)

What the settings are for

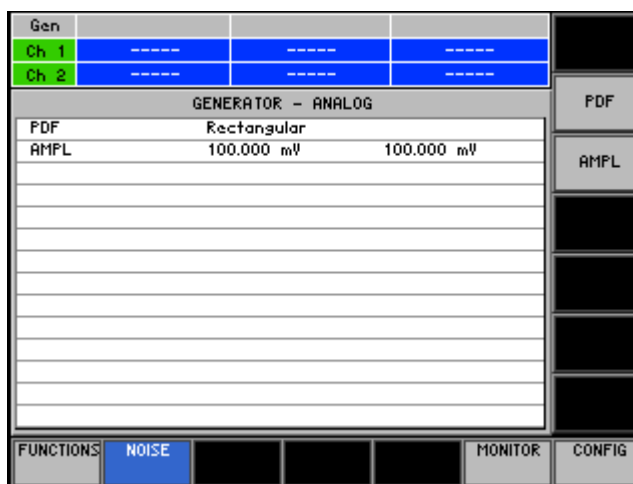
In the SINUS menu you can set the function parameters for the noise signal.





Selecting the NOISE menu

1. Call the generator function **NOISE** (↗ 6-113).
2. Select the **NOISE** menu with the aid of the ◀ or ▶ cursor key.

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



Function key assignment

-  Select the amplitude distribution function (↗ 6-120)
-  Enter the signal amplitude (↗ 6-120)

### 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 favorable ratio between RMS and peak value (crest factor = 1.732)
- **Triangular**  
Triangular distribution functions, crest factor = 2.450

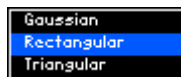
This setting always applies to both channels and does not depend on the channels selected.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

Selecting the amplitude distribution function

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

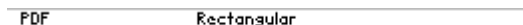
A selection field containing the available settings is displayed. The default setting is "Rectangular".



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.

#### Ch 1&2



### 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.

This setting can be different in the two 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.

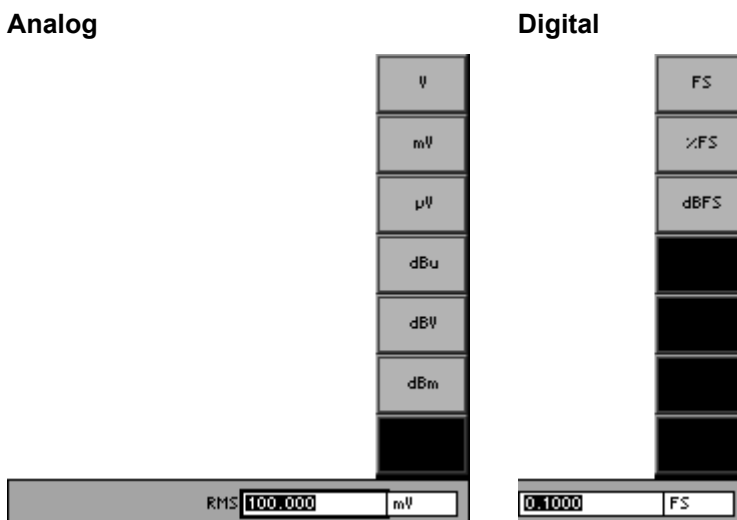


Entering the signal amplitude

2. Press the  **function key** in the  **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.





- Enter a new value (↗ 5-70) and complete the entry by selecting a unit of measurement (function key).  
The permissible entry range depends on the distribution function (↗ 6-120):

**Analog:**

- $0 \leq \text{RMS} \leq 2.736 \text{ V}$  (Gaussian)
- $0 \leq \text{RMS} \leq 6.119 \text{ V}$  (Rectangular)
- $0 \leq \text{RMS} \leq 4.327 \text{ V}$  (Triangular)

**Digital:**

- $0 \leq \text{RMS} \leq 0,3647 \text{ FS}$  (Gaussian)
- $0 \leq \text{RMS} \leq 0,8156 \text{ FS}$  (Rectangular)
- $0 \leq \text{RMS} \leq 0,5767 \text{ FS}$  (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)

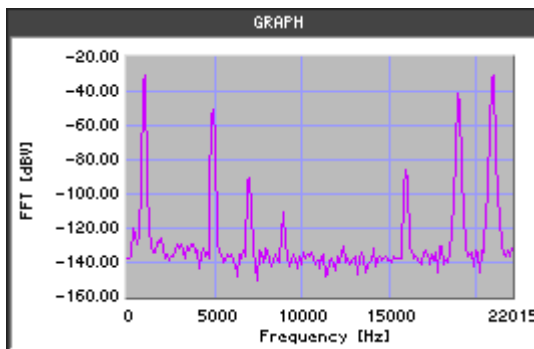
**NOTE**

The maximum signal amplitude only applies if just 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)

What the settings are for

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



Selecting the MULTISINE menu

1. Call the generator function **MULTISINE** (↗ 6-113).
2. Select the **MULTI SINE** menu with the aid of the ◀ or ▶ cursor key.

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

Gen				NUMBER OF SINE
Ch 1	----	----	----	COMPON LIST →
Ch 2	----	----	----	SPACING
GENERATOR				
NUMBER OF SINE		1		
SPACING		100.058 Hz		
REF. VALUE		100.000 mV	100.000 mV	
AM		Off	Off	
AM FREQ		10.000 Hz		
AM DEPTH		0.0 %	0.0 %	
FUNCTIONS	MULTI SINE			MONITOR CONFIG

Function key assignment

NUMBER OF SINE	Enter the number of sinewave tones	(↗ 6-123)
COMPON LIST →	<b>Open the submenu:</b> 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	(↗ 6-127)
AM ON	Activate/deactivate amplitude modulation	(↗ 6-128)
AM FREQ	Enter the AM frequency	(↗ 6-129)
AM DEPTH	Enter the AM modulation depth	(↗ 6-130)

**Entering the Number of Sinewave Tones**

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

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Entering the number**

1. Press the  function key in the  menu.

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



2. Enter a new value, e.g. 7 (↗ 5-70).

The permissible entry range is:

$$1 \leq \text{NUMBER OF SINE} \leq 17$$

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

**Ch 1&2**

NUMBER OF SINE 7

**Configuring the Signal Parameters**

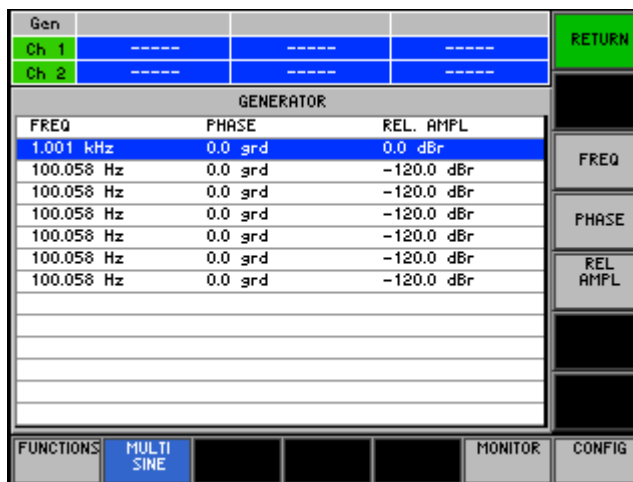
**What the settings are for**

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

**Selecting the COMPONENT LIST submenu**

- Press the  function key in the  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**



- Exit submenu
- Enter the frequency (↗ 6-124)
- Enter the start phase (↗ 6-125)
- Enter the relative signal amplitude (↗ 6-125)

Entering the Frequency

Use

You can enter the frequency of the individual signal components. The frequency must 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 every valid for both channels (Ch 1&2).

Selecting the signal component

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

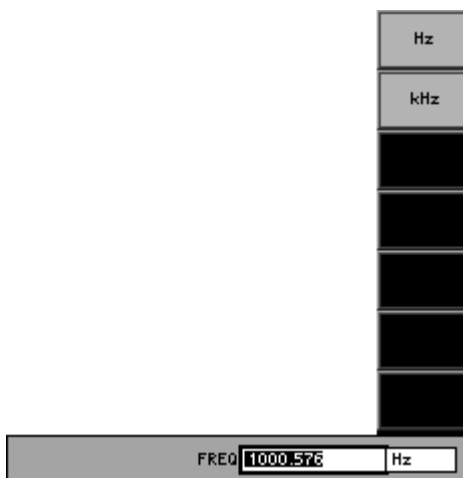
The line (signal component) is highlighted.

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 (↗ 5-70).

The permissible entry range is:

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

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

$f_{\text{max}}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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 every valid for both channels (Ch 1&2).

**Selecting the signal component**

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

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 (↗ 5-70).

The permissible entry range is:

$$-180 \text{ grd} < \text{PHASE} < +179.9 \text{ grd}$$

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 dB referenced to the reference value (↗ 6-127). It is advisable to define the amplitude of the reference tone at 0 dB.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Selecting the signal component**

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

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

- 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".



- Enter a new value (↗ 5-70).  
The permissible entry range depends on the reference value (↗ 6-127) and the total signal amplitude (↗ 0-11).  
The new setting is stored and displayed in the parameter field.

**Ch 1&2**



Entering the Frequency Resolution

Use

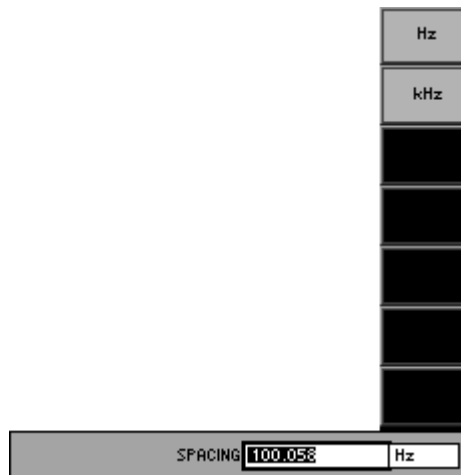
You use the frequency resolution to determine the smallest step size for the frequency setting (↗ 6-124) of the individual signal components. The frequency must always be an integer multiple of the frequency resolution.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

Entering the frequency resolution

- 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 are assigned various units of measurement.



- Enter a new value (↗ 5-70).  
The permissible entry range is:

<b>2.4 Hz &lt; SPACING &lt; 12200 Hz</b>	<b>BW = 22 kHz</b>
<b>4.8 Hz &lt; SPACING &lt; 24400 Hz</b>	<b>BW = 40 kHz</b>
<b>9.6 Hz &lt; SPACING &lt; 48800 Hz</b>	<b>BW = 80 kHz</b>

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

**Ch 1&2**



**Entering the Reference Value for the Individual Amplitudes**

**Use** You can enter the amplitudes of the individual signal components in dB<sub>r</sub>, referenced to the reference value ( $V_{ref}$ ). The absolute amplitude of each component ( $V_{abs}$ ) is derived from:

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

**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.



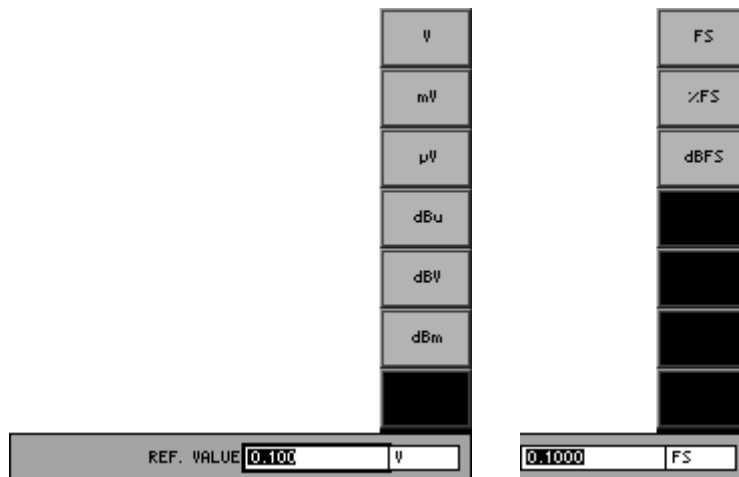
**Entering the reference value**

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 are assigned various units of measurement.

**Analog**

**Digital**



3. Enter a new value (↗ 5-70) and complete the entry by selecting a unit of measurement (function key).

The permissible entry range depends on the total signal amplitude (↗ 0-11).

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 signal amplitude only applies if just 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 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.

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  function key in the  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  function key in the  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**

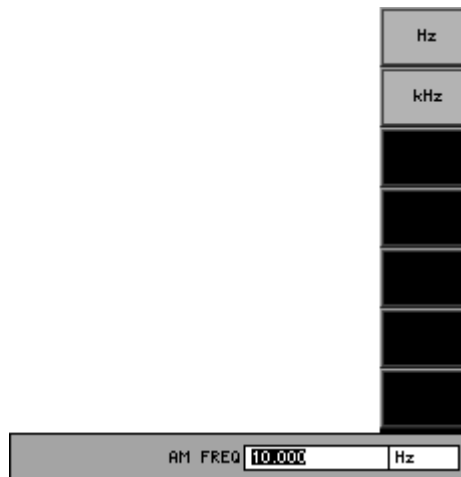
**Use** You can enter a specific modulation frequency for amplitude modulation of the multi-tone signal.

**NOTE:** The setting is every 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 (↗ 5-70).

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)**

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 of 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 "0 %".



3. Enter a new value (↗ 5-70).

The permissible entry range is:

$$0 \% \leq \text{AM DEPTH} \leq 100 \%$$

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

	Ch 1	Ch 2
AM DEPTH	0.0 %	0.0 %



## Entering the Signal Frequency

### Use

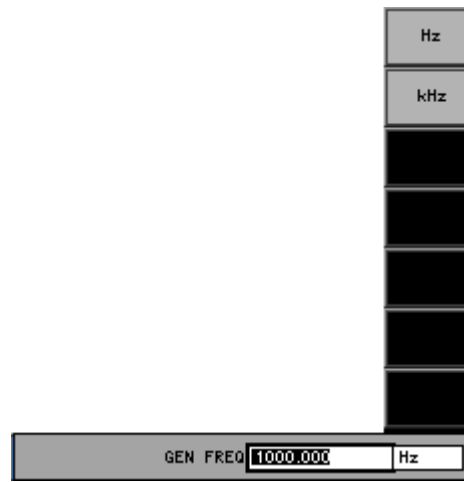
You can enter a specific frequency for the sine burst signal.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

### Entering the signal frequency

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

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



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$0.001 \text{ Hz} \leq \text{GEN FREQ} \leq f_{\text{max}}$$

within:  $f_{\text{max}}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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

### Ch 1&2

GEN FREQ	1.000 kHz
----------	-----------

**Entering High-Level Time**

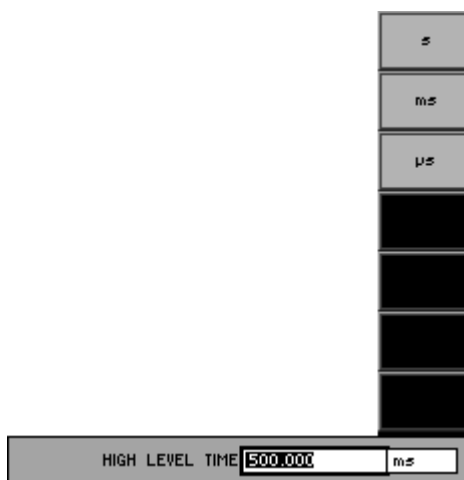
**Use** You use the high-level time (burst duration) to determine the time during which the sinewave has its high level.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Entering the high-level time**

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

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



2. Enter a new value (↻ 5-70).

The permissible entry range is:

$$0.001 \text{ s} \leq \text{HIGH LEVEL TIME} \leq 10000 \text{ s}$$

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

**Ch 1&2**

HIGH LEVEL TIME	500.000 ms
-----------------	------------

## Entering Interval Time

### Use

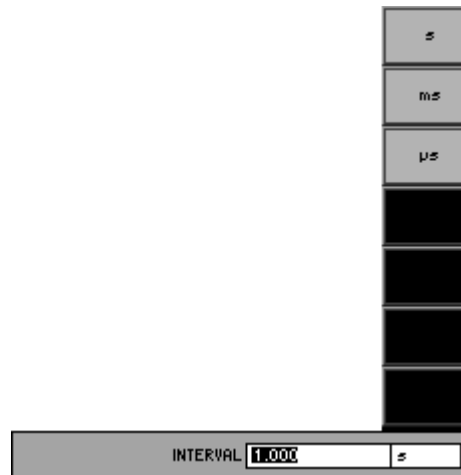
Using the interval time, you define the overall time of the sine burst signal (high-level time + low-level time).

**NOTE:** The setting is every valid for both channels (Ch 1&2).

### Entering the interval time

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

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



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$0.5 \text{ s} \leq \text{INTERVAL} \leq 10000 \text{ s}$$

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

### Ch 1&2

INTERVAL	1.000 s
----------	---------

**Entering the High-Level Amplitude**

**Use** You 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.



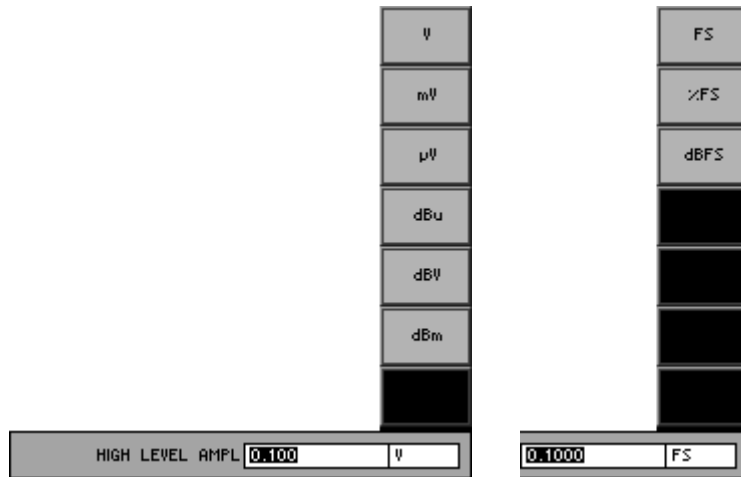
**Entering the high-level amplitude**

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

**Analog**

**Digital**



3. Enter a new value (↗ 5-70).

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 signal amplitude only applies if just 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 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.

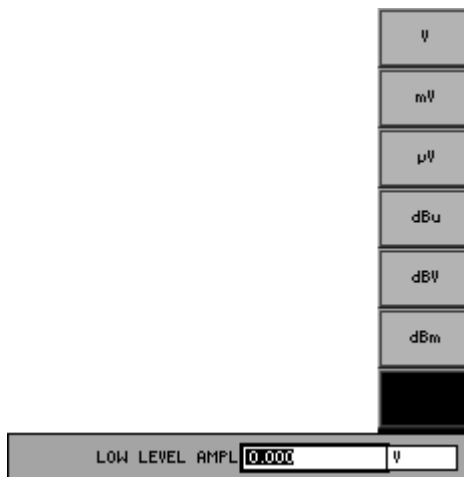


**Entering the low-level amplitude**

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

**Analog**



**Digital**



3. Enter a new value (↗ 5-70).

The permissible entry range is:

$$0 \leq \text{LOW LEVEL AMPL} \leq \text{HIGH LEVEL AMPL} \quad (\text{Analog})$$

$$0 \leq \text{LOW LEVEL AMPL} \leq \text{HIGH LEVEL AMPL} \quad (\text{Digital})$$

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

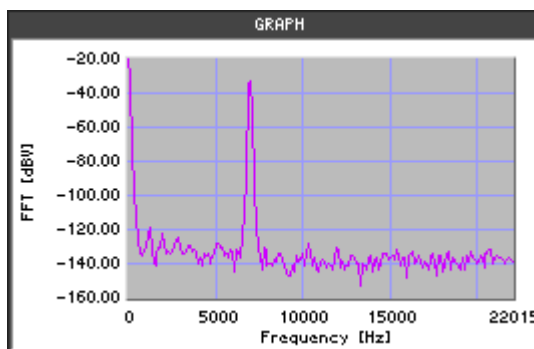
	Ch 1	Ch 2	
LOW LEVEL AMPL	0.000 V	0.000 V	(Analog)
LOW LEVEL AMPL	0.0000 FS	0.0000 FS	(Digital)



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

#### What the settings are for

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 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:

$$f_u + 0.5 \text{ octaves} = f_1 = f_u + 1.5 \text{ octaves}$$

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

$$f_o - 1.5 \text{ octaves} = f_2 = f_o - 0.5 \text{ octaves}$$

$$f_2 = 8 \times f_1$$

#### SMPTE standard:

Interference signal:  $f_1 = 60 \text{ Hz}$

Useful signal:  $f_2 = 7 \text{ kHz}$

Amplitude ratio of interference signal to useful signal:

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



**Entering the Frequencies of the Two-Tone Signal**

**Use**

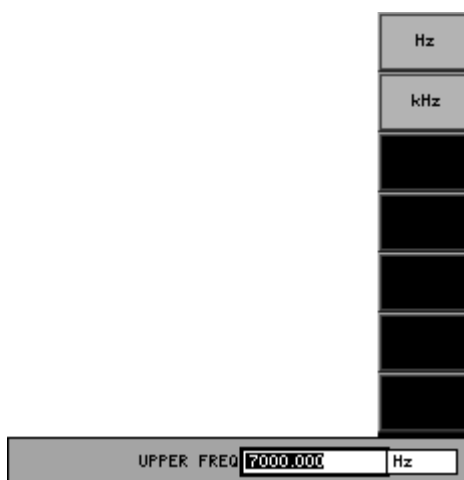
The two-tone signal is produced by superimposing 2 sinewave signals: low-frequency interference signal and high-frequency useful signal. You can change the frequencies of the interference and useful signals to allow measurements to be performed to various standards.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Entering the useful signals 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 are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range is:

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

within:  $f_{\text{max}}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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

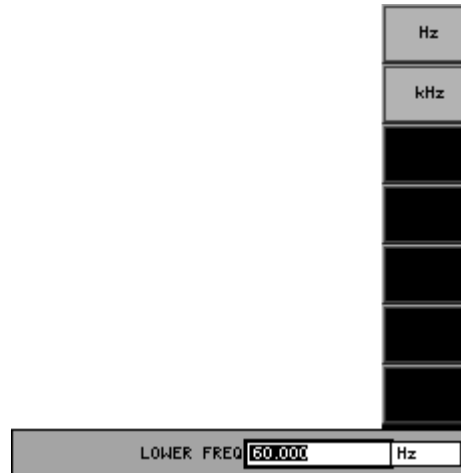
**Ch 1&2**

UPPER FREQ	7.000 kHz
------------	-----------

Entering the  
interference signals  
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 are assigned various units of measurement.



4. Enter a new value (↗ 5-70).

The permissible entry range is:

$$30 \text{ Hz} \leq \text{LOWER FREQ} \leq 875 \text{ Hz}$$

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 (↗ 5-70).

The permissible entry range is:

$$1 \leq \text{AMPL RATIO} \leq 10$$

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

	Ch 1	Ch 2
AMPL RATIO	4.00	4.00

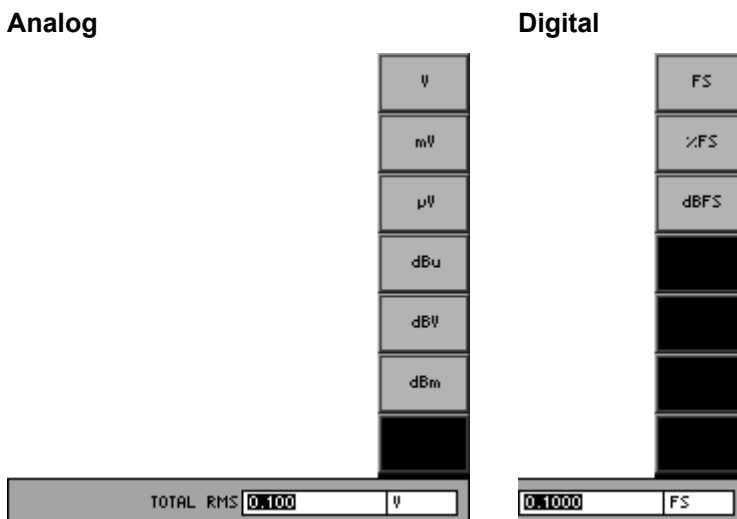
**Entering the Total Signal RMS**

**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 are assigned various units of measurement.



3. Enter a new value (↗ 5-70).  
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)

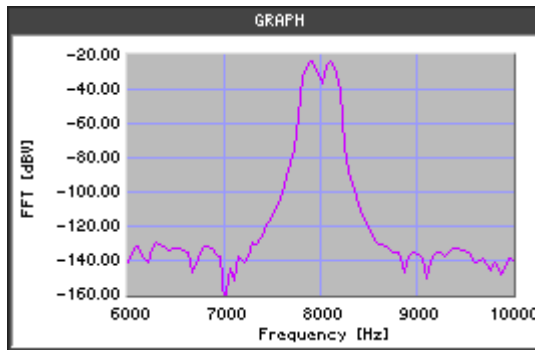
**NOTE**

The maximum signal amplitude only applies if just 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)

What the settings are for

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.

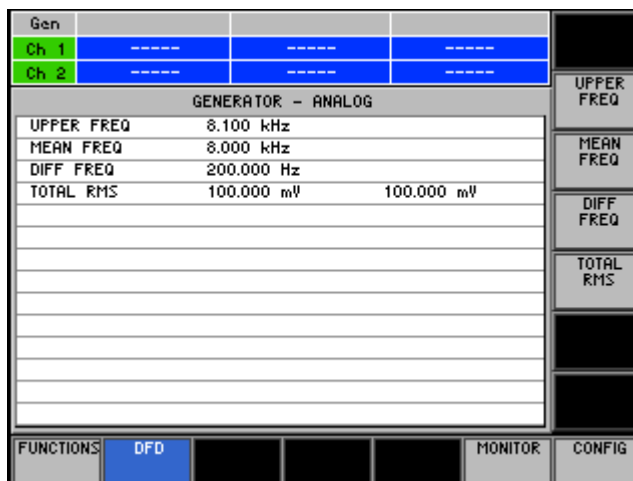


The signal is used for intermodulation measurements to IEC 118 and IEC 268 (↗ 6-226).

Selecting the DFD menu

1. Call the generator function **DFD** (↗ 6-113).
2. Select the **SWEEP** menu with the aid of the ◀ or ▶ cursor key.

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



Function key assignment

UPPER FREQ	Measurement to IEC 118: Enter the upper DFD frequency	(↗ 6-144)
MEAN FREQ	Measurement to IEC 268: Enter the center frequency	(↗ 6-144)
DIFF FREQ	Enter the difference frequency	(↗ 6-144, 6-146)
TOTAL RMS	Enter the total RMS of the signal	(↗ 6-148)

**NOTE**

To be able to measure the intermodulation for DFD, you must set an appropriate measurement function in the Analyzer menu (↗ 6-226).

## Entering Frequencies for Measurements in Accordance with IEC 118

### Use

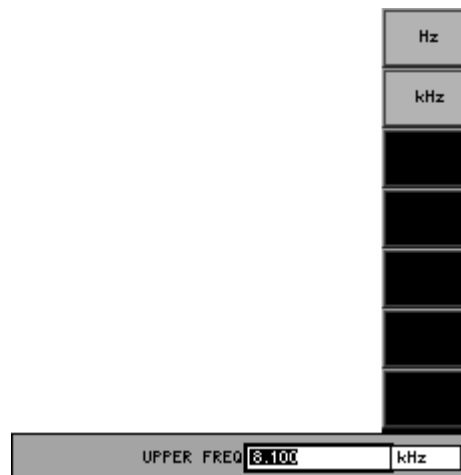
For measurements to IEC 118 (↗ 6-226), you enter the frequency parameters of the sinewave signals under the upper DFD frequency and difference frequency.

**NOTE:** The setting is every 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 are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$480 \text{ Hz} \leq \text{UPPER FREQ} \leq f_{\max}$$

within:  $f_{\max}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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

### Ch 1&2

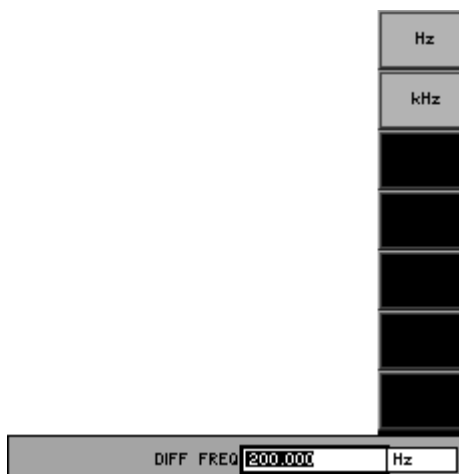
UPPER FREQ	8.100 kHz
------------	-----------



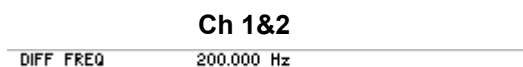
Entering the difference frequency

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 are assigned various units of measurement.



4. Enter a new value (↗ 5-70).  
The permissible entry range depends on the bandwidth (↗ 6-103, 6-108).  
The new setting is stored and displayed in the parameter field.



**Entering Frequencies for Measurements in Accordance with IEC 268**

**Use**

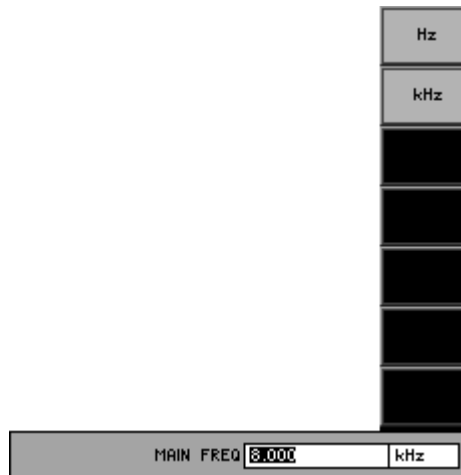
For measurements to IEC 268 (↗ 6-226), you enter the frequency parameters of the sinewave signals under the center frequency and difference frequency.

**NOTE:** The setting is every 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 are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$200 \text{ Hz} \leq \text{MAIN FREQ} \leq f_{\text{max}} - 2 * \text{DF}$$

within:  $f_{\text{max}}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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

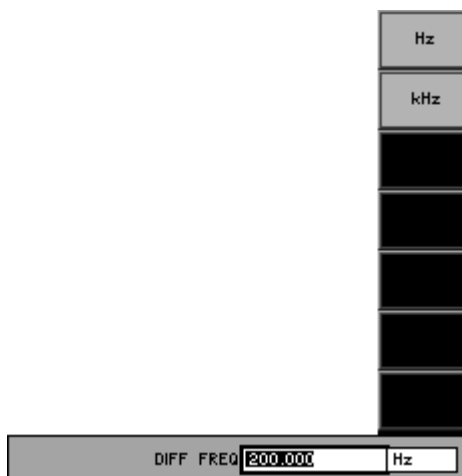
**Ch 1&2**

MAIN FREQ	8.000 kHz
-----------	-----------

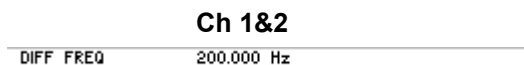
Entering the difference frequency

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 are assigned various units of measurement.



4. Enter a new value (↗ 5-70).  
The permissible entry range depends on the bandwidth (↗ 6-103, 6-108).  
The new setting is stored and displayed in the parameter field.



**Entering the Total RMS of the Signal**

**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.



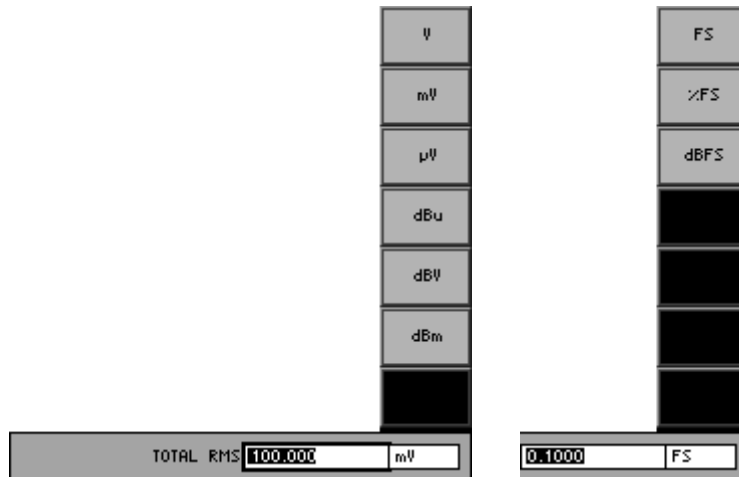
**Entering the total RMS**

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 are assigned various units of measurement.

**Analog**

**Digital**



3. Enter a new value (↗ 5-70).

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)

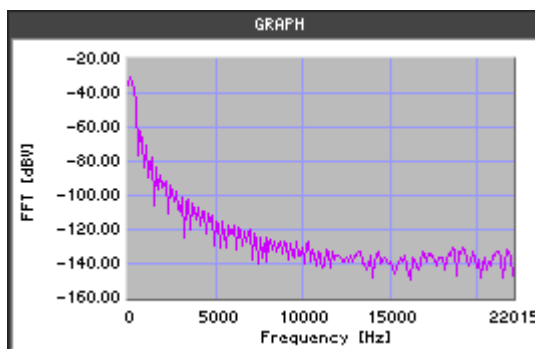
**NOTE**

The maximum signal amplitude only applies if just the SINE MOD DFD generator function is set. 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)

What the settings are for

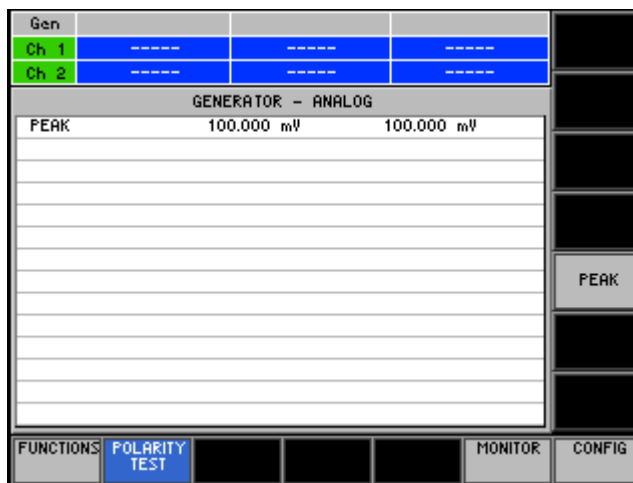
In the POLARITY TEST menu you can set the function parameters for the polarity test signal. This signal is a special SINE<sup>2</sup> BURST signal and is used to detect polarity reversal of loudspeakers. You can only set the amplitude of the signal.



Selecting the POLARITY TEST menu

1. Call the generator function **POLARITY TEST** (↗ 6-113).
2. Select the **POLARITY TEST** menu with the aid of the ◀ or ▶ cursor key.

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



Function key assignment



Enter the signal amplitude (↗ 6-149)

**NOTE**

To perform a polarity test, you have to set the relevant measurement function in the Analyzer menu (↗ 6-224).

**Entering the Signal Amplitude**

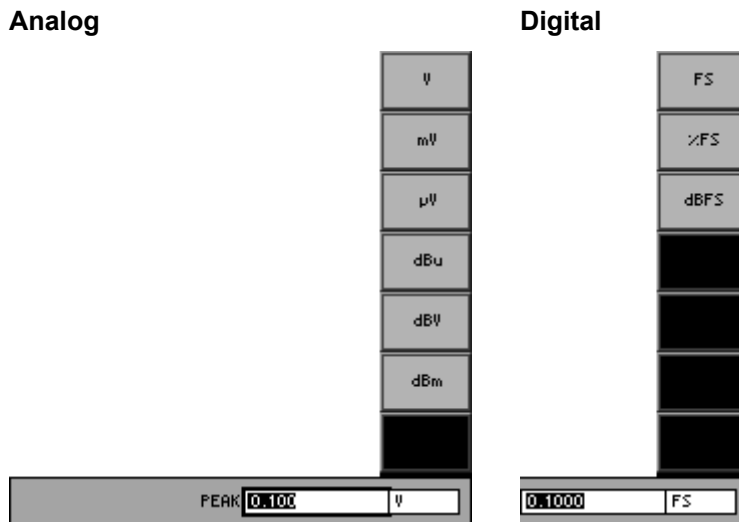
**Use** You can set the amplitude of the polarity test signal.

- 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 are assigned various units of measurement.



3. Enter a new value (↗ 5-70).  
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 OFFSET (DC Voltage Component)

What the settings are for

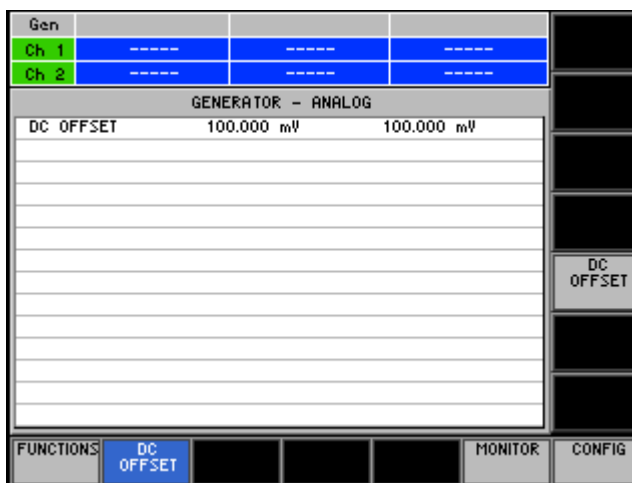
In the DC OFFSET menu you can set a DC voltage component at the generator output.

**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 function **DC OFFSET** (↗ 6-113).
2. Select the  menu with the aid of the ◀ or ▶ **cursor key**.

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



Function key assignment



Enter the DC offset

(↗ 6-152)

**Entering the DC 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.

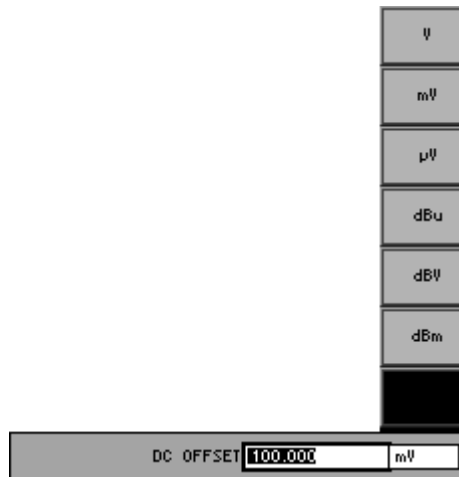


**Entering the DC offset**

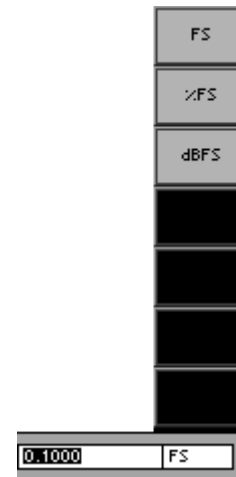
2. Press the **DC OFFSET** function key in the **DC OFFSET** menu.

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 are assigned various units of measurement.

**Analog**



**Digital**



3. Enter a new value (↗ 5-70).

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

What the settings are for

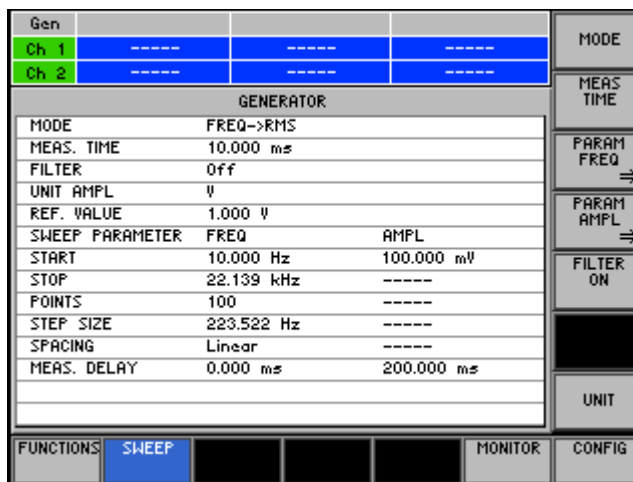
You can set the function parameters for a swept sinewave signal in the SWEEP menu. Frequency and/or amplitude may change in this case. The associated measurement function is automatically activated in the analyzer.

**NOTE:** The sweep can be combined with only a few analyzer functions (Peak, RMS Selective). You have to switch off all other analyzer functions before you can activate the sweep. Set the analyzer to “Fixed” (↗ 6-179) to speed up the measurement and to reduce the settling time with AC coupling.







Selecting the SWEEP menu

1. Call the generator function **SWEEP** (↗ 6-113).
2. Select the **SWEEP** menu with the aid of the ◀ or ▶ cursor key.

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



Function key assignment

-  Select sweep mode (↗ 6-155)
-  Set the measurement time (↗ 6-156)
-  **Open submenu:** Set the sweep parameters for frequency (↗ 6-157)
-  **Open submenu:** Set the sweep parameters for amplitude (↗ 6-163)
-  Activate/deactivate the filter (↗ 6-191)
-  Select the unit for level display (↗ 6-168)

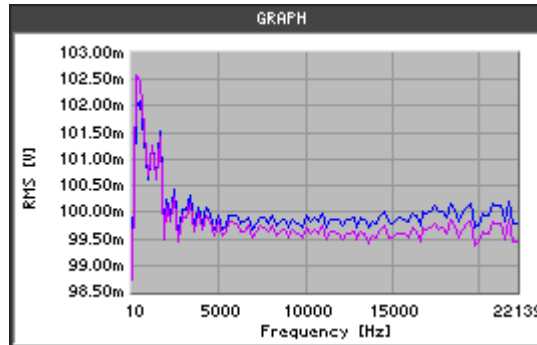
Displaying and analyzing measurement results (↗ 6-154)

Displaying and analyzing measurement results

Graphical display

- Switch the DUT between generator [8] and analyzer [9] **or** switch the Generator output to Analyzer input internally (↗ 6-177).
- Select the **CURVE PLOT** display mode in the Graph menu (↗ 6-247).
- Press the numerical key 4 to start sweeping (↗ 6-244).

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 (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259). For activating the cursors you must stop the sweep.

List of measurement values

- Switch the DUT between generator [8] and analyzer [9] **or** switch the Generator output to Analyzer input internally (↗ 6-177).
- Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-247).
- Press the numerical key 4 to start sweeping (↗ 6-244).

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

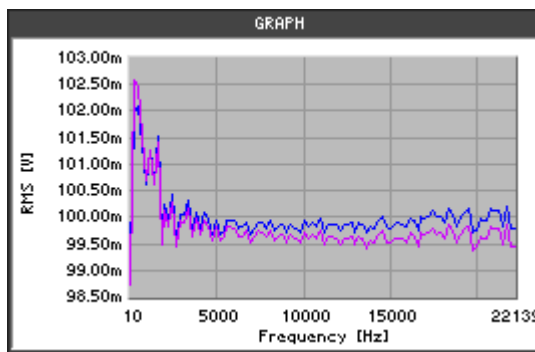
Selecting the Sweep Mode

Use

You can select the parameters to be swept:

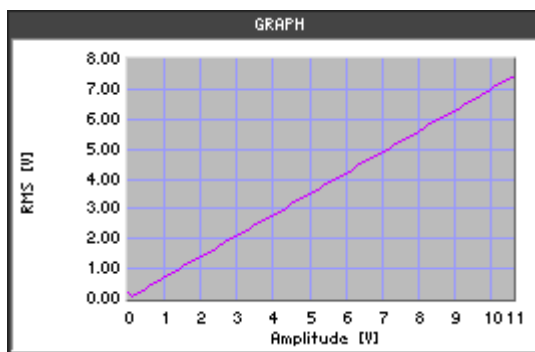
- **FREQ->RMS**

The generator sweeps the frequency with a fixed amplitude. The measured RMS level versus the FREQ generator frequency is displayed.



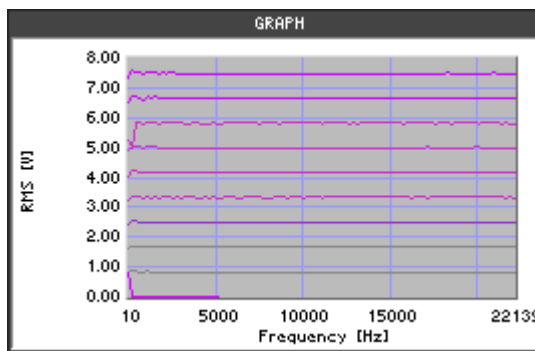
- **AMPL->RMS**

The generator sweeps the amplitude with a fixed frequency. The measured RMS level versus the AMPL generator amplitude is displayed.



- **FREQ&AMPL->RMS**

The generator sweeps the frequency at different amplitudes. The measured RMS levels versus the FREQ generator frequency are displayed.



**NOTE:** The setting is every valid for both channels (Ch 1&2).

Selecting the sweep mode

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

A selection field containing the available settings is displayed. The default setting is "FREQ->RMS".



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**



Setting the Measurement Time

Use

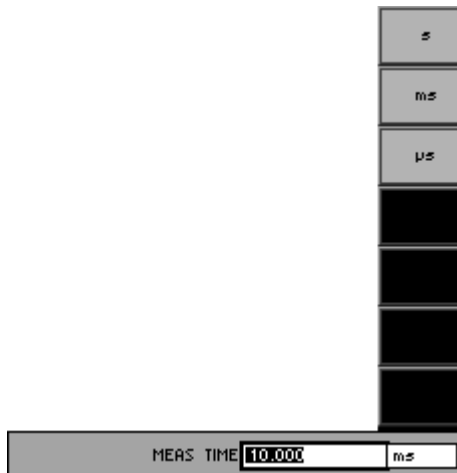
You can set the measurement time dependent on the task.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

Setting the measurement time

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

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



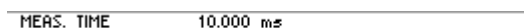
2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$1 \text{ ms} \leq \text{MEAS TIME} \leq 10 \text{ s}$$

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

**Ch 1&2**



**Setting the Sweep Parameters for Frequency**

What the settings are for

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








Selecting the PARAM FREQ submenu

- Press the  function key in the  menu.



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

Gen				RETURN FREQ
Ch 1	----	----	----	START
Ch 2	----	----	----	
GENERATOR				STOP
MODE	FREQ->RMS			POINTS
MEAS. TIME	10.000 ms			
FILTER	Off			STEP SIZE
UNIT AMPL	V			
REF. VALUE	1.000 V			SPACING
SWEEP PARAMETER	FREQ	AMPL		
START	10.000 Hz	100.000 mV		MEAS DELAY
STOP	22.139 kHz	----		
POINTS	100	----		
STEP SIZE	223.522 Hz	----		
SPACING	Linear	----		
MEAS. DELAY	0.000 ms	200.000 ms		
FUNCTIONS	SWEEP			MONITOR CONFIG

**Function key assignment**

	Exit submenu	
	Enter the start value	(↗ 6-158)
	Enter the stop value	(↗ 6-158)
	Enter the number of reference values	(↗ 6-160)
	Enter the step size	(↗ 6-160)
	Select sweep scaling of sweep steps (Lin/Log)	(↗ 6-162)
	Enter the measurement delay	(↗ 6-162)

**NOTE**

With the AMPL->RMS sweep mode (↗ 6-155) only the function keys  and  are available. By using START, 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 are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$10 \text{ Hz} \leq \text{Start} \leq f_{\text{max}}$$

within:  $f_{\text{max}}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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

SWEEP PARAMETER	FREQ	AMPL
START	10.000 Hz	

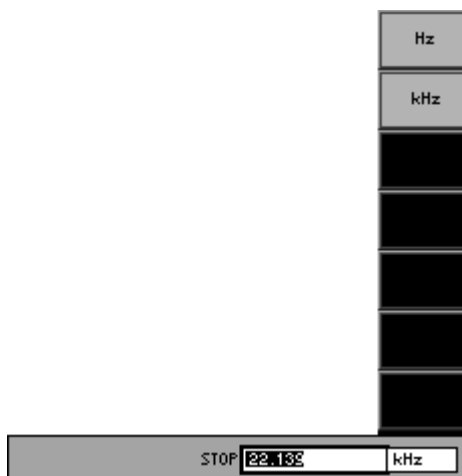
**NOTE**

If the start value is bigger than the stop value, the stop value is adjusted automatically.

- 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 are assigned various units of measurement.

Entering the stop value



- Enter a new value (↗ 5-70).  
The permissible entry range is:

$$10 \text{ Hz} \leq \text{Stop} \leq f_{\text{max}}$$

within:  $f_{\text{max}}$  - maximum frequency of generator typ (↗ 6-103, 6-108)

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 bigger than the stop value, the start value is adjusted automatically.

## Entering the Frequency Resolution

### Use

You can enter the frequency resolution in two different ways:

- **POINTS**

Enter the number of reference values.

Based on the frequency range, the generator calculates the position of the reference points and automatically determines the step size.

- **STEP SIZE**

Enter the step size.

Based on the frequency range, the generator calculates the number of reference points and automatically determines their position.

**First possibility:  
Entering the number  
of reference values**

1. Press the  function key in the  submenu.

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



2. Enter a new value (↗ 5-70).

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

$$2 \leq \text{POINTS} \leq 1024$$

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

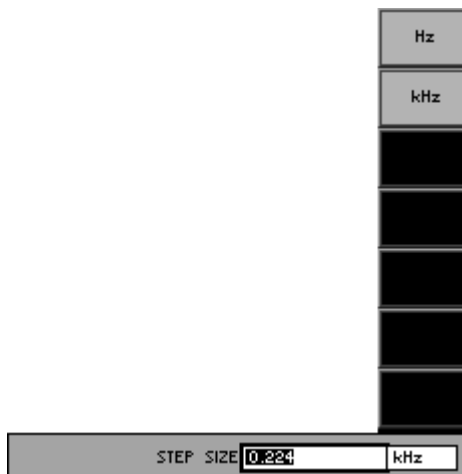
SWEEP	PARAMETER	FREQ	AMPL
	START		
	STOP		
	POINTS	100	



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. The default setting is "224 Hz". At the same time, the function keys are assigned various units of measurement.



4. Enter a new value (↗ 5-70).

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

$$21.631 \text{ Hz} \leq \text{STEP SIZE} \leq 22.128 \text{ kHz}$$




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

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
POINTS		
STEP SIZE	223.522 Hz	

**Selecting the Scaling of Sweep Steps (Lin/Log)**

**Use** The scaling of the diagram axis is selectable. You can decide if the distance between the values that are set one after the other is to be displayed in linear (**Linear**) or in logarithmic (**Logarithmic**) form.

**Selecting the scaling**

1. Press the  **function key** in the respective  or  **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		
POINTS		
STEP SIZE		
SPACING	Linear	Linear

**Entering the Measurement Delay**

**Use** You can set a delay for the level measurement. This delay is referenced to the point of time of frequency switchover and the start of the amplitude measurement.

**Entering the measurement delay**

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

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



2. Enter a new value (↻ 5-70).

The permissible entry range is:

$$0 \text{ ms} \leq \text{MEAS DELAY} \leq 5 \text{ s}$$

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

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
POINTS		
STEP SIZE		
SPACING		
MEAS. DELAY	0.000 ms	

**Setting the Amplitude Sweep Parameters**

What the settings are for

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








Selecting the PARAM AMPL submenu

- Press the  function key in the  menu.



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

Gen				RETURN AMPL
Ch 1	----	----	----	START
Ch 2	----	----	----	
GENERATOR				STOP
MODE	AMPL->RMS			POINTS
MEAS. TIME	10.000 ms			
FILTER	Off			STEP SIZE
UNIT AMPL	V			
REF. VALUE	1.000 V			SPACING
SWEEP PARAMETER	FREQ	AMPL		
START	10.000 Hz	100.000 mV		MEAS DELAY
STOP	----	7.495 V		
POINTS	100			MONITOR
STEP SIZE	----	74.700 mV		
SPACING	Linear			CONFIG
MEAS. DELAY	0.000 ms	200.000 ms		
FUNCTIONS	SWEEP			

**Function key assignment**

	Exit submenu	
	Enter the start value	(↗ 6-164)
	Enter the stop value	(↗ 6-164)
	Enter the number of reference values	(↗ 6-166)
	Enter the step size	(↗ 6-166)
	Select scaling of sweep steps (Lin/Log)	(↗ 6-162)
	Enter the measurement delay	(↗ 6-167)

**NOTE**

With the FREQ->RMS sweep mode (↗ 6-155) only the function keys  and  are available. By using START, you can enter an amplitude value; MEAS DELAY determines the start delay of a new sweep.

### Entering the Amplitude Range

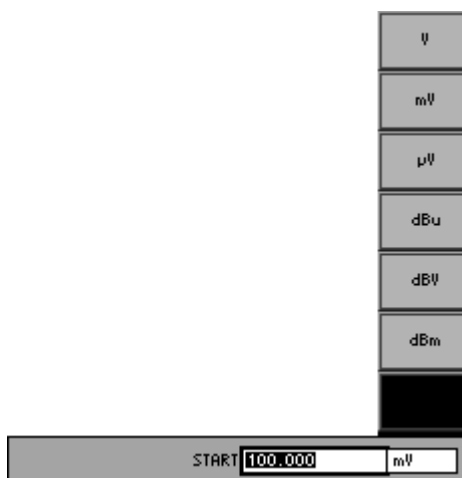
**Use** To set the amplitude range, enter the start (START) and stop (STOP) values of the amplitude sweep.

#### Entering the start value

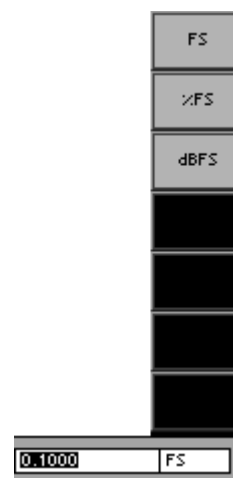
1. Press the **START** function key in the **PARAM AMPL** submenu.

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.

#### Analog



#### Digital



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$1 \mu\text{V} \leq \text{Start} \leq V_{\text{Stop}} \quad \text{(Analog)}$$

$$0.001 \text{ FS} \leq \text{Start} \leq V_{\text{Stop}} \quad \text{(Digital)}$$

within:  $V_{\text{Stop}}$  - 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

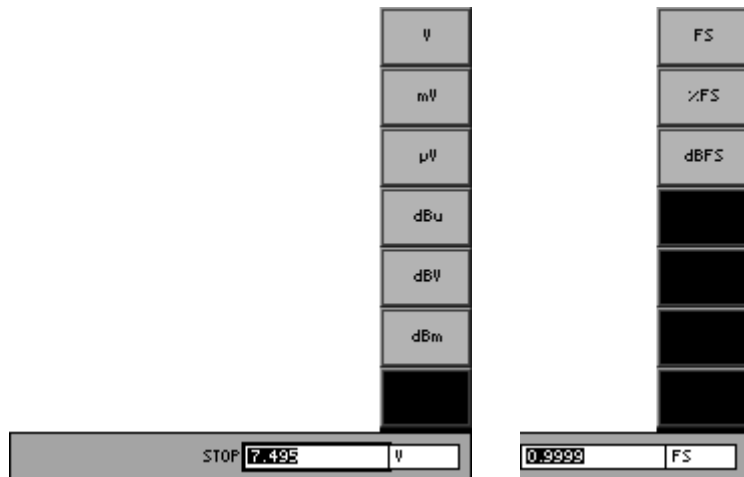
#### Entering the stop value

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.

#### Analog

#### Digital



4. Enter a new value (↗ 5-70).

The permissible entry range is:

$$V_{\text{Start}} \leq \text{Stop} \leq 7.495 \text{ V} \quad (\text{Analog})$$

$$V_{\text{Start}} \leq \text{Stop} \leq 0.9999 \text{ FS} \quad (\text{Digital})$$

within:  $V_{\text{Start}}$  - 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		0,9990 FS

**Entering the Amplitude Resolution**

**Use**

You can enter the amplitude resolution in two different ways:

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

**First possibility:  
Entering the number  
of reference values**

1. Press the  function key in the  submenu.

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



2. Enter a new value (↗ 5-70).

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

$$2 \leq \text{POINTS} \leq 10 \quad \text{for concatenated sweep}$$

$$2 \leq \text{POINTS} \leq 1024 \quad \text{for amplitude sweep}$$

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

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
POINTS		100

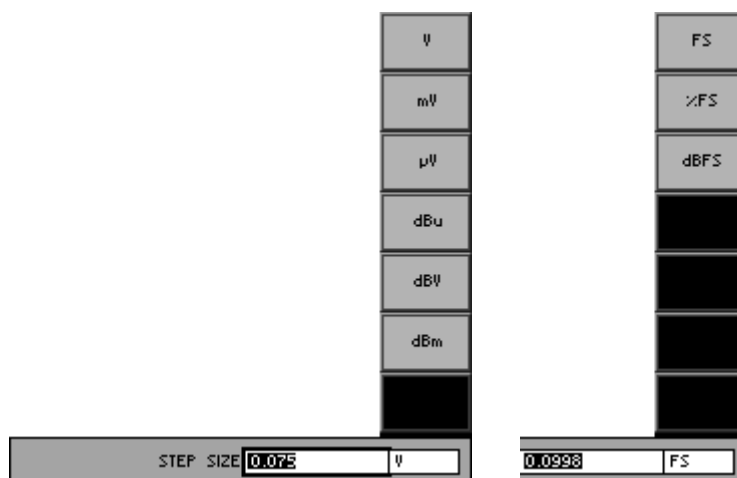
**Second possibility:  
Entering the step  
size**

3. Press the  function key in the  submenu.

An entry field containing the currently applicable setting is displayed. The default setting is "74,7 mV". At the same time, the function keys are assigned various units of measurement.

**Analog**

**Digital**



The Analog section shows a vertical stack of unit selection keys: V, mV, μV, dBu, dBV, and dBm. The Digital section shows a vertical stack of unit selection keys: FS, 1/2FS, and dBFS. Below each stack is a parameter field. The Analog field shows 'STEP SIZE 0.075 V' and the Digital field shows '0.0998 FS'.

- Enter a new value (↗ 5-70).

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

$$8 \text{ mV} \leq \text{STEP SIZE} \leq 7.494 \text{ V} \quad (\text{Analog})$$

$$0,0010 \text{ FS} \leq \text{STEP SIZE} \leq 0,9980 \text{ FS} \quad (\text{Digital})$$

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

**Analog**

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
POINTS		
STEP SIZE		74.700 mV

**Digital**

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
POINTS		
STEP SIZE		0,0998 FS

**Entering the Measurement Delay**

**Use**

You can set a delay for the level measurement. This delay is referenced to the point of time of frequency switchover and the start of the amplitude measurement.

**Entering the measurement delay**

- 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"



- Enter a new value (↗ 5-70).

The permissible entry range is:

$$0 \text{ ms} \leq \text{MEAS DELAY} \leq 5 \text{ s}$$

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

SWEEP PARAMETER	FREQ	AMPL
START		
STOP		
POINTS		
STEP SIZE		
SPACING		
MEAS. DELAY		200.000 ms

**Selecting a Unit for Level Display**

**Use**

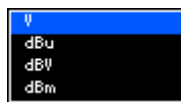
All measurements that return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the referenced unit (dBr), the measurement result is displayed taking the entered reference value into consideration.

**Selecting a unit**

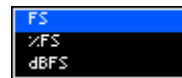
1. Press the **UNIT** function key in the **SWEEP** menu.

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**





6.2.2.2.10 Audio Monitoring Output (MONITOR)

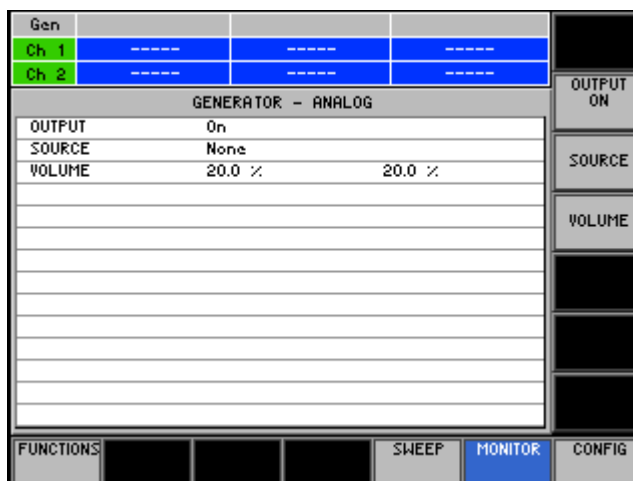
What the settings are for

In the MONITOR menu you can configure the audio monitoring input of the R&S UP300/350. This includes selection of the signal source and adjustment of the volume.

Selecting the MONITOR menu

- Select the **MONITOR** menu with the aid of the **◀** or **▶** cursor key.

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 (↗ 6-169)
- SOURCE** Select the signal source (↗ 6-170)
- VOLUME** Enter the volume (↗ 6-170)

Activating/Deactivating the Audio Monitoring Output

Use

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. To do so, you must first switch on the audio monitoring output.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

Activating the audio monitoring output

- 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.

STATE On

After you switch on the audio monitoring output, the generator signal is applied at the output [8].

Deactivating the audio monitoring output

- 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.

STATE Off

Amplitude modulation is deactivated.

**Selecting the Signal Source**

**Use**

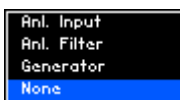
You can monitor signals at the audio monitoring output [15] using headphones. You can select the following signal sources:

- **Anl. Input**  
Analyzer input signal
- **Anl. Filter**  
Analyzer signal downstream of the filter stage
- **Generator**  
Generator output signal
- **None**  
No signal source

**Selecting the Signal source**

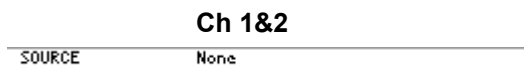
1. Press the **SOURCE** function key in the **MONITOR** menu.

A selection field containing the available settings is displayed. The default setting is "None".



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 the Volume**

**Use**

You can enter the volume of the signal at the audio monitoring input. The setting is made in percent and is referenced to the respective 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 %".

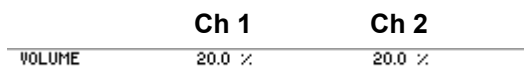


3. Enter a new value (↗ 5-70).

The permissible entry range is:

$$0 \% \leq \text{VOLUME} \leq 100 \%$$

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



## 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.

The generator (↗ 6-99) provides a large number of functions and measurement features.

Apart from displaying measurement results numerically, you can also analyze the measurements graphically (↗ 6-245).

### Activating Analyzer menu

The Analyzer menu is activated after you switch on the R&S UP300/350.




- Press the **main menu selection key** , if an other main menu is active.

The Analyzer menu is displayed:

Anl				DIGITAL
Ch 1	----	----	----	BAND WIDTH
Ch 2	----	----	----	COMMON
ANALYZER - ANALOG				INPUT
INPUT	Gen Meas	Gen Meas		COUPLING
BANDWIDTH	22 kHz			RANGE MODE
COMMON	floating	floating		CHANNEL
COUPLING	AC			
RANGE MODE	Auto	Auto		
RANGE LIMITS	-	-		
CHANNEL	Ch 1&2			
FUNCTIONS				FILTER
				CONFIG

### Menus for configuring and setting measurement parameters

The menus used to set the generator functions are displayed in the menu area. The order of the menu mirrors that of the procedure for configuring and setting the measurement parameters:

-  Select the measurement functions (↗ 6-179)
-  Configure the filter (↗ 6-240)
-  Configure the input parameter (↗ 6-172)

### 6.3.1 Configuring the Analyzer (CONFIG)

What the settings are for

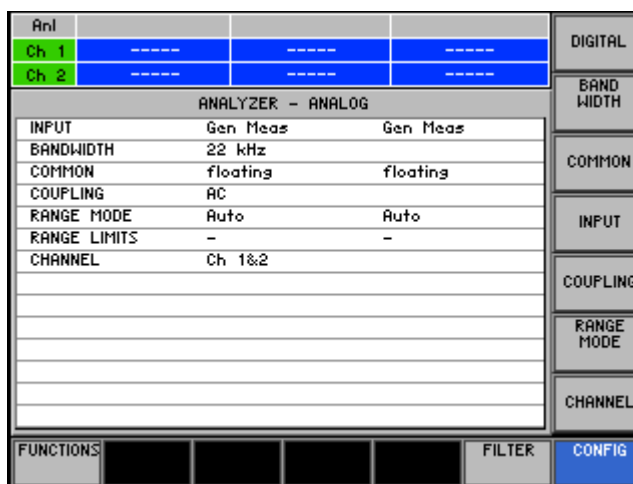
The CONFIG menu is used for basic configuration of the analyzer. The following settings are made in the CONFIG menu:

- Switchover between analog and digital analyzer (UP350)
- Switchover of input on digital analyzer (UP350)
- Switchover between bandwidths (sample rate)
- Activation/deactivation of analog input and switchover to generator output
- Configuration of input
- Selection of range switching and of measurement range
- Selection of measurement channel
- Select the **CONFIG** menu with the aid of the ◀ or ▶ cursor key.

Selecting the CONFIG menu

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

Analog analyzer



- DIGITAL** Select the analyzer type (digital) (↗ 6-174)
- BAND WIDTH** Select the bandwidth of the analyzer (↗ 6-175)
- COMMON** Select the reference potential of the input signal (↗ 6-176)
- INPUT** Select the signal source (↗ 6-177)
- COUPLING** Select signal coupling (↗ 6-178)
- RANGE MODE** Select the measurement range selection mode (↗ 6-179)
- CHANNEL** Select the measurement channel (↗ 6-180)

Digital analyzer  
(R&S UP350)

Anl					ANALOG
Ch 1	----	----	----		SAMPLE RATE
Ch 2	----	----	----		
ANALYZER - DIGITAL					
SAMPLE RATE	44.1 kHz				INPUT
INPUT	S/P DIF				
NO. OF BITS	24 bits	24 bits			NO. OF BITS
CHANNEL	Ch 1&2				
					CHANNEL
FUNCTIONS				FILTER	CONFIG

- |        |
|--------|
| ANALOG |
|--------|

Select the analyzer type (analog) (↗ 6-174)
  
- |             |
|-------------|
| SAMPLE RATE |
|-------------|

Select the sample frequency of the input signal (↗ 6-181)
  
- |       |
|-------|
| INPUT |
|-------|

Select the input signal (↗ 6-182)
  
- |             |
|-------------|
| NO. OF BITS |
|-------------|

Select the useful data transmission format of the input signal (↗ 6-182)
  
- |         |
|---------|
| CHANNEL |
|---------|

Select the measurement channel (↗ 6-180)

### 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.

The analog analyzer is active in the factory default settings.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Selecting the Analog analyzer**

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

Pressing this switches over the key to DIGITAL and displays the menu for the analog analyzer. You can then use all of the function keys that then appear to configure the input parameters and the basic conditions of the analyzer.

Anl				DIGITAL
Ch 1	----	----	----	BAND WIDTH
Ch 2	----	----	----	
ANALYZER - ANALOG				COMMON
INPUT	Gen Meas	Gen Meas		INPUT
BANDWIDTH	22 kHz			COUPLING
COMMON	floating	floating		
COUPLING	AC			RANGE MODE
RANGE MODE	Auto	Auto		CHANNEL
RANGE LIMITS	-	-		
CHANNEL	Ch 1&2			
FUNCTIONS				FILTER
				CONFIG

**Selecting the Digital analyzer**

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

Pressing this key switches over the key to ANALOG and displays the menu for the digital analyzer. You can then use all of the function keys that then appear to configure the input parameters and the basic conditions of the analyzer.

Anl				ANALOG
Ch 1	----	----	----	SAMPLE RATE
Ch 2	----	----	----	
ANALYZER - DIGITAL				INPUT
SAMPLE RATE	44.1 kHz			
INPUT	S/P DIF			NO. OF BITS
NO. OF BITS	24 bits	24 bits		
CHANNEL	Ch 1&2			CHANNEL
FUNCTIONS				FILTER
				CONFIG

## 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 every valid for both channels (Ch 1&2).

#### Selecting the analyzer bandwidth

1. Press the  function key in the  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 just 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, ↗ 6-104):

- **grounded**  
referenced 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 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 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.



**NOTE**

When the signal inputs are switched off, INPUT OFF is displayed.

6.3.1.2.4 Selecting Signal Coupling

**Use** You use the signal coupling function to select between DC voltage coupling (**DC**) and AC voltage coupling (**AC**). Owing to the capacitive signal coupling associated with AC coupling, a digital high-pass filter is additionally Ensure effective suppression of DC offset.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

Selecting signal coupling

1. Press the  function key in the  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** You use the measurement range selection mode to determine 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**  
The selected measurement range is set. If the input voltage exceeds the maximum value of the measurement range, the automatic measurement range function selects the higher range and returns to the selected measurement range after the overload has decayed.

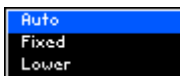
**Selecting the channel**

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".

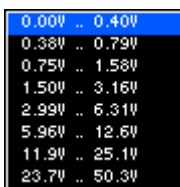


3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.  
The new setting is stored and displayed in the parameter field.

	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 "0.00V .. 0.40V". At the same time, the function keys are assigned various units of measurement.



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

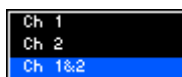
Before activating the measurement functions, you must first select the channel that you want to use for measurements. You can choose between the following settings:

- **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  function key in the  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.

CHANNEL	Ch 1&2
---------	--------

### 6.3.1.3 Digital Analyzer (R&S UP350)

#### 6.3.1.3.1 Selecting the Sample Frequency of the Input Signal

##### Use

You must set the sample rate of the input signal. If the sample frequency of the analyzer does not correspond to that of the signal, many measurement functions will return incorrect measurements (especially if filters are activated).

The sample frequency  $f_{\text{sample}}$  determines the maximum analyzer frequency  $f_{\text{max}}$ . You can select the following sample frequencies:

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

**NOTE:** The setting is every valid for both channels (Ch 1&2).

##### Selecting the sample frequency

1. Press the  function key in the  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 every 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 Useful Data Transmission Format of the Input Signal

**Use** If the wordwidth of the input signal is reduced, the audio data is cropped 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**.

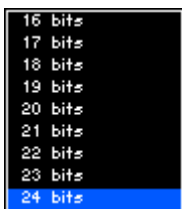
The selected channel is displayed in green in the channel display.



Selecting the useful data transmission format

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
-------------	---------	---------



Anl										PREV PAGE
Ch 1	----	----	----	----	----	----	----	----	----	
Ch 2	----	----	----	----	----	----	----	----	----	
ANALYZER - DIGITAL										POLARITY
FREQ, DC, RMS	-									DFD
PEAK VALUE	-									PHASE
QUASI PEAK	-									MOD DIST
RMS SELECTIVE	-									PROTOCOL
FFT	-									SAMPLE RATE
THD	-									
POLARITY TEST	-									
DFD	-									
PHASE	-									
MOD DIST	-									
PROTOCOL	-									
SAMPLE RATE	-									
FUNCTIONS									FILTER	CONFIG

2<sup>nd</sup> function key assignment

- |           |
|-----------|
| PREV PAGE |
|-----------|

Display the previous set of functions
  
- |          |
|----------|
| POLARITY |
|----------|

Perform the polarity test
(↗ 6-224)
  
- |     |
|-----|
| DFD |
|-----|

Measure the difference frequency distortion
(↗ 6-226)
  
- |       |
|-------|
| PHASE |
|-------|

Measure the phase difference between channels Ch 1 and Ch 2
(↗ 6-230)
  
- |          |
|----------|
| MOD DIST |
|----------|

Measure modulation distortion
(↗ 6-233)
  
- |          |
|----------|
| PROTOCOL |
|----------|

Protocol analysis (R&S UP350)
(↗ 6-236)
  
- |             |
|-------------|
| SAMPLE RATE |
|-------------|

Measure the sample frequency (R&S UP350)
(↗ 6-239)



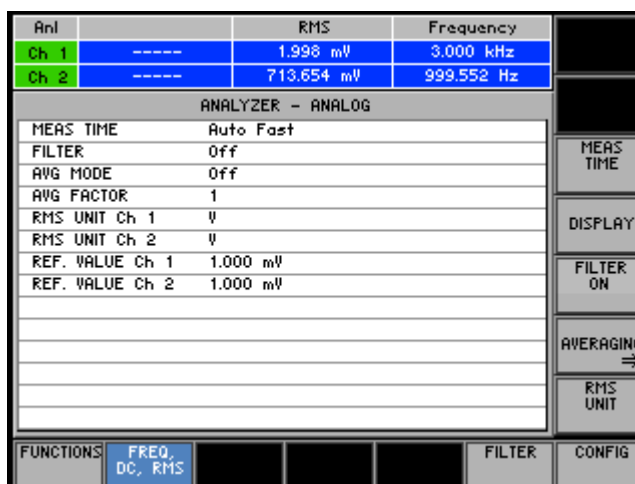


### 6.3.2.2 Configuring the Measurement Parameters

**Use**

In the FUNCTIONS menu (↗ 6-185) 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 selected channel**

Some parameters of the analyzer functions (FILTER, CONFIG) can be set channel by channel (Ch 1, Ch 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 (↗ 6-92).

**Referenced unit**

All measurements that return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the referenced unit (dBr(FS)), 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 the two channels.

6.3.2.2.1 (RMS Value) **FREQ., DC, RMS**

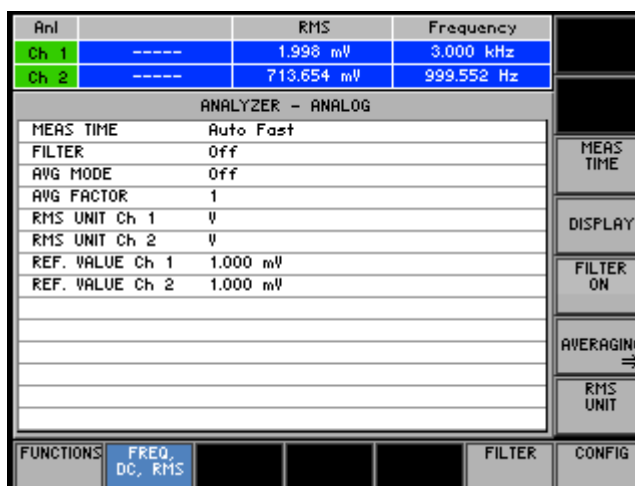
What the measurement is for






With this function you can measure the RMS, frequency and DC voltage component of the input signal.

Setting measurement parameters

1. Call the measurement function **FREQ., DC, RMS** (↗ 6-185).
2. Select the **FREQ., DC, RMS** menu with the aid of the ◀ or ▶ cursor key.

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



-  Select the measurement time (↗ 6-189)
-  Select the measurement result display (RMS & FREQ or RMS & DC) (↗ 6-191)
-  Activate/deactivate the filter (↗ 6-191)
-  **Open the submenu:** Set the averaging mode (↗ 6-192)
-  Select the unit of the level display (↗ 6-194)

Displaying and analyzing measurement results (↗ 6-188)

Displaying and analyzing measurement results

Measurement display

- Activating the measurement function displays the respective measurement values (↗ 6-191).

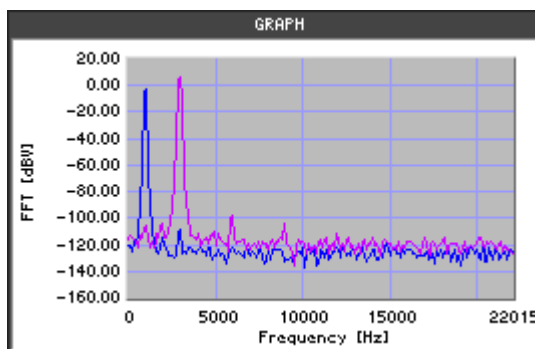
Anl		RMS	Frequency
Ch 1	-----	1.998 mV	3.000 kHz
Ch 2	-----	713.654 mV	999.552 Hz

or

Anl		RMS	DC
Ch 1	-----	1.998 V	243.484 μV
Ch 2	-----	713.831 mV	117.602 μV

Frequency spectrum

- Call the measurement function **FFT** (↗ 6-208).
- Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).  
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 (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

**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 (↗ 6-244).

## Selecting the Measurement Time

### Use

The RMS measurement time is used to adjust the measurement speed to 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 to the signal frequency with sufficient accuracy.
- **Auto**  
Automatic adaptation of the measurement time to the signal frequency with high accuracy.
- **Value**  
Manual entry of the measurement time

With swept measurement signals, you should select "Auto Fast". You should select "Auto" for the other measurements.

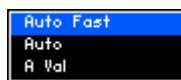
To prevent measurement errors in the case severely noise-corrupted or distorted signals and multi-tone signals, you should set the measurement time manually (A Val). In this case, however, you must know the exact period of the signal.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

### Selecting the measurement time

1. Press the  function key in the  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 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 (↗ 5-70).

The permissible entry range is:

$$1 \text{ ms} \leq \text{MEAS TIME} \leq 10 \text{ s}$$

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 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  **function key** in the  **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.

Anl		RMS	Frequency
Ch 1	-----	1.998 mV	3.000 kHz
Ch 2	-----	713.65+ mV	999.552 Hz

## Activating/Deactivating Filters

**Use** You can select up to 3 individual filters in the signal path. This filter is configured in the FILTER menu (➔ 6-240). The filter is identical for all measurements and can be activated or deactivated separately for each measurement function.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Activating filters**

1. Press the  **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  **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
--------	-----





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



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 (↗ 5-70).  
The permissible entry range is:  
**1 ≤ AVG FACTOR ≤ 256**  
The new setting is stored and displayed in the parameter field.

Ch 1&2



### Selecting a Unit for 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 referenced unit (dBr(FS)), 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 the two 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.

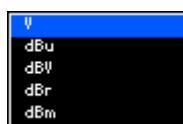


**Selecting a unit**

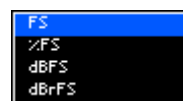
2. Press the  function key in the  menu.

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**

RMS UNIT Ch 1	V
RMS UNIT Ch 2	V

**Digital**

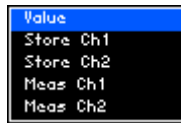
RMS UNIT Ch 1	FS
RMS UNIT Ch 2	FS

**Selecting the reference value**

If you have selected the unit dBr(FS), 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.

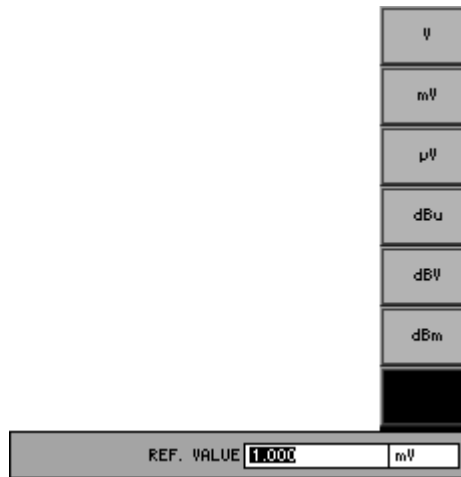
The new setting is stored and displayed in the display area.

REF. VALUE Ch 1	Meas Ch1
REF. VALUE Ch 2	Meas Ch2

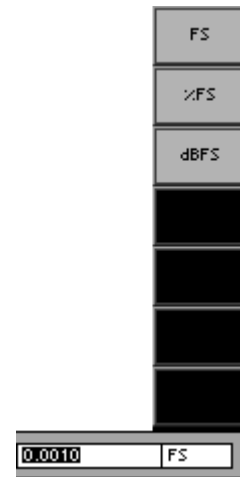
**Entering the reference value manually**

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 are assigned various units of measurement.

**Analog**



**Digital**



7. Enter a new value (↷ 5-70).

The permissible entry range is:

**1 μV ≤ REF. VALUE ≤ 33 V (Analog)**

**0,001 FS ≤ REF. VALUE ≤ 0,999 FS (Digital)**

**-120 dBFS ≤ REF. VALUE ≤ 120 dBFS**

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



Displaying and analyzing measurement results

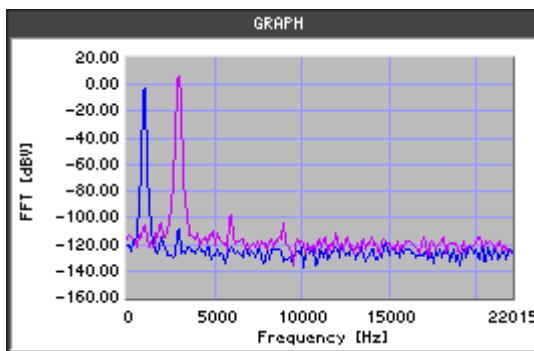
Measurement display

- Activating the measurement function displays the measurement values.

Anl	Peak pos		
Ch 1	2.826 V	-----	-----
Ch 2	1.010 V	-----	-----

Frequency spectrum

- Call the measurement function **FFT** (↗ 6-208).
  - Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).
- 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 (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

**NOTE**

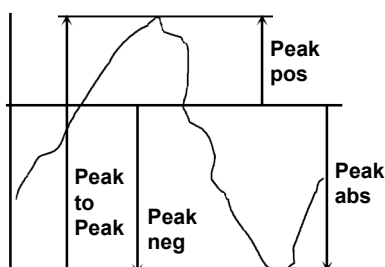
When you activate the measurement function, the R&S UP300/350 begins the continuous measurement. However, you can also start and stop the measurement manually (↗ 6-244).

### 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 (numerically) highest negative voltage value is measured.
- **Peak to Peak**  
The highest peak-peak voltage is measured.
- **Peak abs**  
The numerically highest (positive or negative) voltage value is measured.

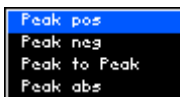
**NOTE:** The setting is every valid for both channels (Ch 1&2).



### 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**

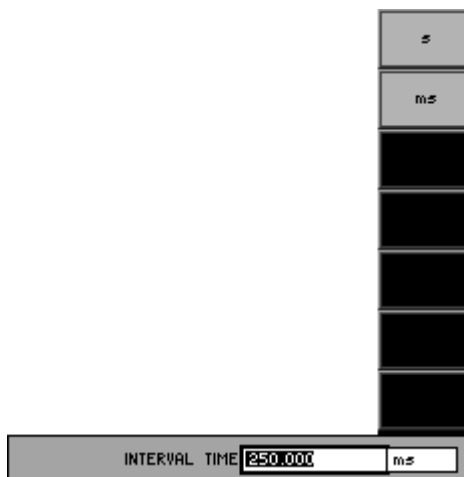
You can enter different interval times according to the measurement task.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Setting the interval time**

1. Press the  function key in the  menu.

An entry field containing the currently applicable setting is displayed. The default setting is "250 ms". At the same time, the function keys are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$1 \text{ ms} \leq \text{INTERVAL TIME} \leq 10 \text{ s}$$

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 that return results with dimensions can be displayed either as absolute measurements or relative to a reference value. If you select the referenced unit (dBr), 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 the two 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.

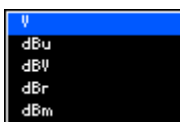


**Selecting the unit**

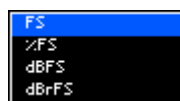
2. Press the  **function key** in the current **measurement menu**.

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**

UNIT Ch 1	V
UNIT Ch 2	V

**Digital**

UNIT Ch 1	FS
UNIT Ch 2	FS

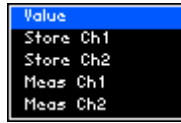
**Selecting the reference value**

If you have selected the unit dBr(FS), 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".





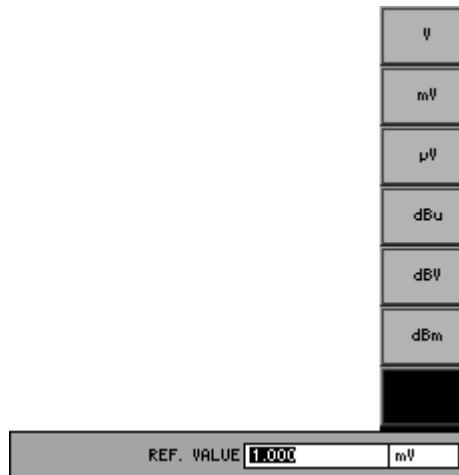
5. Use the **rotary knob** [11] to select a setting.
6. Press the **ENTER key** [5] to close the selection field.  
The new setting is stored and displayed in the display area.

REF. VALUE Ch 1	Meas Ch1
REF. VALUE Ch 2	Meas Ch2

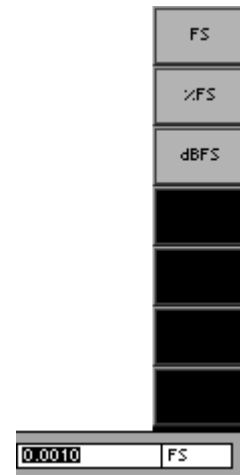
**Entering the reference value manually**

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 are assigned various units of measurement.

**Analog**



**Digital**



7. Enter a new value (↻ 5-70).  
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 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

6.3.2.2.3 QUASI PEAK (Quasi Peak Value)

What the measurement is for




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 to CCIR 468-4 and DIN 45405.

Setting measurement parameters

1. Call the measurement function **QUASI PEAK** (↗ 6-185).
2. Select the **QUASI PEAK** menu with the aid of the ◀ or ▶ cursor key.

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

Anl	Quasi-peak			
Ch 1	2.023 V	-----	-----	
Ch 2	722.966 mV	-----	-----	
ANALYZER				
INTERVAL TIME	3.00 s			INTERVAL TIME
FILTER	Off			FILTER ON
UNIT Ch 1	V			UNIT
UNIT Ch 2	V			
REF. VALUE Ch 1	1.000 mV			
REF. VALUE Ch 2	1.000 mV			
FUNCTIONS	QUASI PEAK			
			FILTER	CONFIG

-  Select the interval time (↗ 6-204)
-  Activate/deactivate the filter (↗ 6-204)
-  Select the unit of the level display (↗ 6-200)

Displaying and analyzing measurement results (↗ 6-203)

### Displaying and analyzing measurement results

#### Measurement display

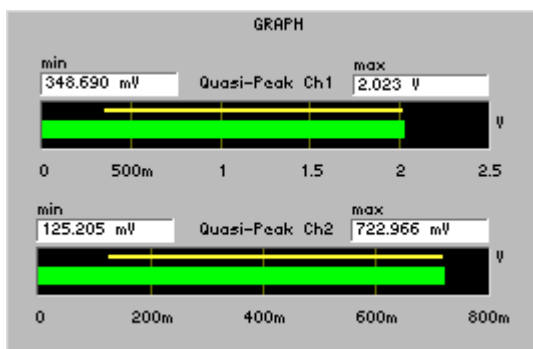
- Activating the measurement function displays the measurement values.

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 (↗ 6-247).

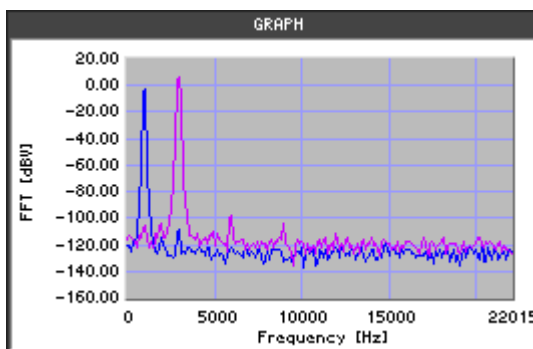
A bar graph is shown for each channel (Ch 1 and Ch 2) in the display area. Each bar graph shows the current measurement value and the lowest and highest measurement value in the active measurement.



#### Frequency spectrum

- Call the measurement function **FFT** (↗ 6-208).
- Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).

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 (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

## 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 (↗ 6-244).

**Setting the Interval Time**

**Use**

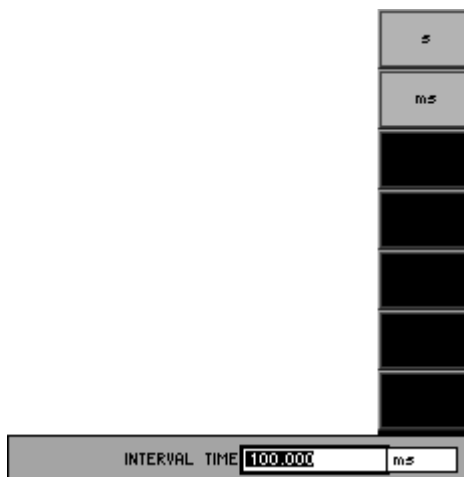
You can enter different interval times according to the measurement task.

**NOTE:** The setting is every 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 "3 s". At the same time, the function keys are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range is:

$$100 \text{ ms} \leq \text{INTERVAL TIME} \leq 100 \text{ s}$$

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

**Ch 1&2**

INTERVAL TIME	3.00 s
---------------	--------



Entering the Measurement frequency

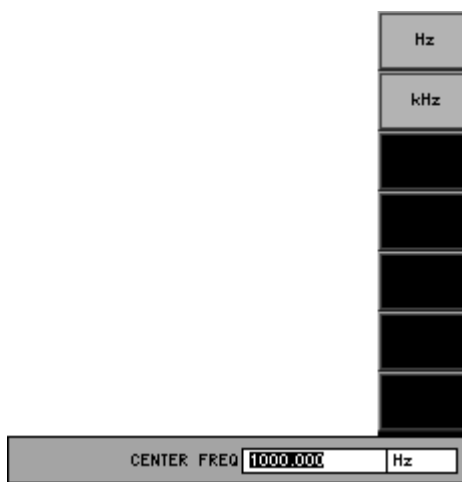
**NOTE**

The setting is every valid for both channels (Ch 1&2).

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 are assigned various units of measurement.



2. Enter a new value (↗ 5-70).

The permissible entry range depends on the measurement bandwidth:

- $10 \text{ Hz} \leq \text{CENTER FREQ} \leq f_{\text{max}} - 10 \text{ Hz}$  (BW = 3 Hz)
- $10 \text{ Hz} \leq \text{CENTER FREQ} \leq f_{\text{max}} - 10 \text{ Hz}$  (BW = 10 Hz)
- $24 \text{ Hz} \leq \text{CENTER FREQ} \leq f_{\text{max}} - 24 \text{ Hz}$  (BW = 30 Hz)
- $80 \text{ Hz} \leq \text{CENTER FREQ} \leq f_{\text{max}} - 80 \text{ Hz}$  (BW = 100 Hz)
- $240 \text{ Hz} \leq \text{CENTER FREQ} \leq f_{\text{max}} - 240 \text{ Hz}$  (BW = 300 Hz)

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

**Ch 1&2**

CENTER FREQ	1.000 kHz
-------------	-----------

## Selecting the Measurement Bandwidth

### Use

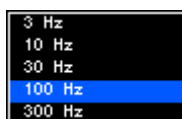
You can select different measurement bandwidth.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

### Selecting the measurement bandwidth

1. Press the  function key in the  menu.

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



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	100 Hz
-----------	--------

6.3.2.2.5 FFT (Frequency-Domain Display, Spectrum)

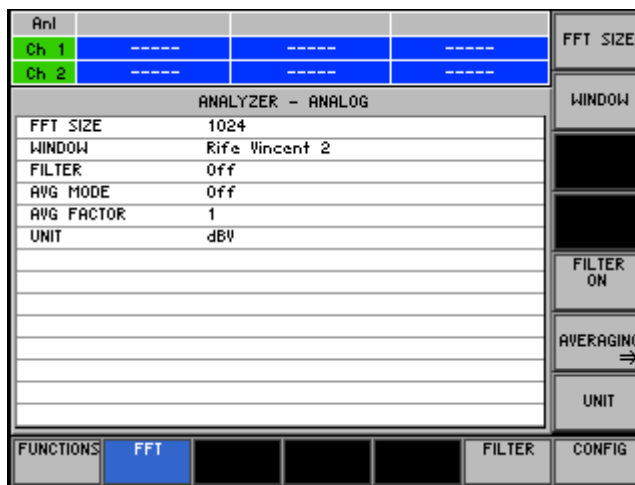
What the measurement is for

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 measurement function **FFT** (↗ 6-185).
2. Select the **FFT** menu with the aid of the ◀ or ▶ cursor key.

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



- FFT SIZE** Set the FFT size (↗ 6-210)
- WINDOW** Set the FFT window (↗ 6-210)
- FILTER ON** Activate/deactivate the filter (↗ 6-191)
- AVERAGING ⇒** **Open the submenu:** Set the averaging mode (↗ 6-212)
- UNIT** Select the unit of the level display (↗ 6-214)

Displaying and analyzing measurement results (↗ 6-209)

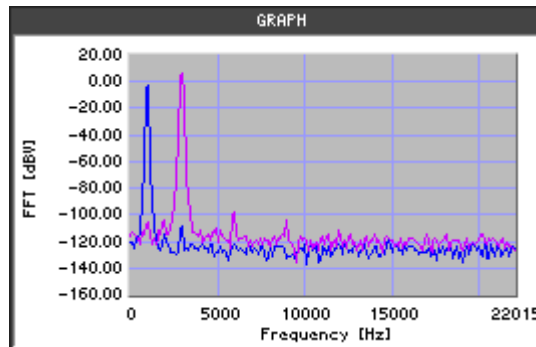


### Displaying and analyzing measurement results

#### Frequency spectrum

- Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).

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 (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

#### List of measurement values

- Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-247).

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 (↗ 6-244).

**Selecting the FFT Size**

**Use**

If you want more detail, you must select a high 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:

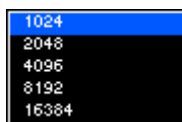
- 1024
- 2048
- 4096
- 8192
- 16384

**NOTE:** The setting is every 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 a 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. A window is then 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 ( $\beta = 12$ )**  
With this window, the compromise between selectivity, sideband suppression and suppression of far-off interference is good.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

### Selecting the FFT window

1. Press the  function key in the  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.

### Ch 1&2

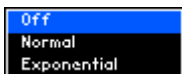
WINDOW	Rife Vincent 2
--------	----------------



## 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&amp;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 (↗ 5-70).

The permissible entry range is:

$$1 \leq \text{AVG FACTOR} \leq 256$$

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

## Ch 1&amp;2

AVG FACTOR	1
------------	---

**Selecting the Unit for 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 referenced unit (dBr(FS)), the measurement result is displayed taking the entered reference value into consideration.

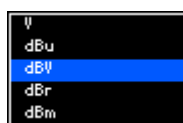
**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Selecting the unit**

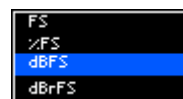
1. Press the **UNIT** function key in the **FFT** menu.

A selection field containing the available settings is displayed. The default setting is "dBV (dBFS)".

**Analog**



**Digital**



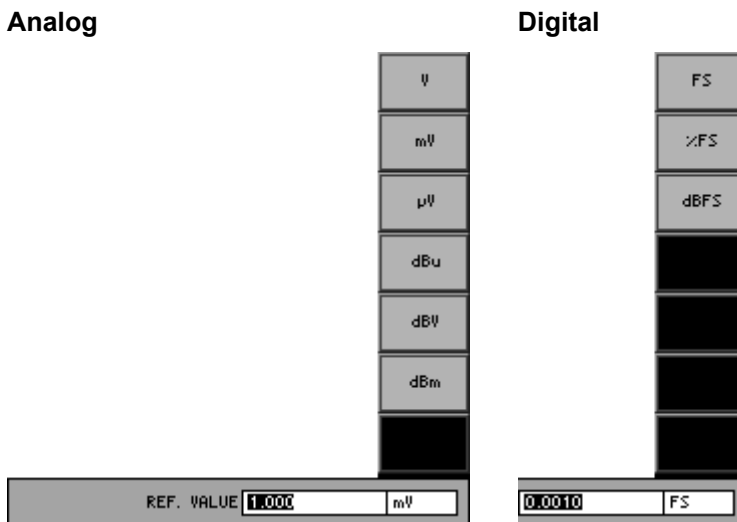
2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER** key [5] to close the selection field.

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(FS) 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 are assigned various units of measurement.



4. Enter a new value (↗ 5-70).

The permissible entry range is:

$$1 \mu\text{V} \leq \text{REF. VALUE} \leq 100 \text{ V} \quad (\text{Analog})$$

$$0.001 \text{ FS} \leq \text{REF. VALUE} \leq 0.999 \text{ FS} \quad (\text{Digital})$$

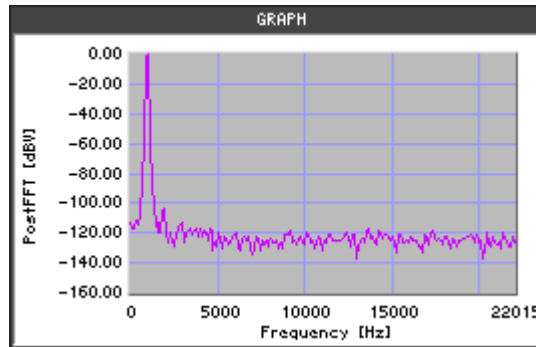
The new setting is stored and displayed in the parameter field.

**Ch 1&2**

UNIT	dBr: 1.000 mV	(Analog)
UNIT	dBrFS: 0.0010 FS	(Digital)





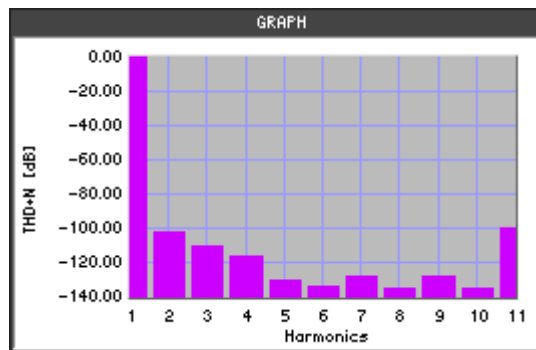


**NOTE:** In the Graph menu you can change the graphic display area (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

### Bar graph

- Select the **BAR GRAPH** display mode in the Graph menu (↗ 6-247).

A bar graph is shown in the display area. The fundamental (1), the harmonics (↗ 6-218) and the 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 (↗ 6-247).

The frequency and level values of the fundamental, and the relative level values of the harmonics (2-10) and of the total noise power for the measurement signal are shown in the display area.

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

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 (↗ 6-244).

**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.

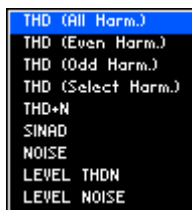
- **THD (All Harm.)**  
All harmonics are measured.
- **THD (Even Harm.)**  
All even harmonics are measured.
- **THD (Odd Harm.)**  
All odd harmonics are measured.
- **THD (Select Harm.)**  
All selected harmonics are measured.
- **THD + N**  
All harmonics and the noise are measured.
- **SINAD**  
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 every valid for both channels (Ch 1&2).

**Selecting the measurement mode**

1. Press the  function key in the  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.

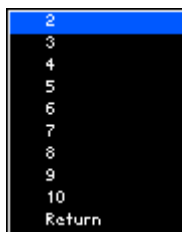
The new setting is stored and displayed in the parameter field.

**Ch 1&2**

MEAS MODE	THD (All Harm.)
-----------	-----------------

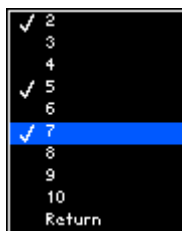
**Selecting the harmonics (at measurement mode "Select Harm.")**

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 close the selection field.

A checkmark is displayed at the respective number (harmonic) and indicates the selection.



**NOTE:** For deactivation of numbers (harmonics with marking) use the same way.

5. Use the **rotary knob** [11] to select the setting **Return** and 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**

The lower limit frequency  $f_{min}$  of the measurement signal depends on the selected bandwidth of the analyzer.

**NOTE**

- 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 every valid for both channels (Ch 1&2).

Selecting the frequency search mode

1. Press the **FREQ MODE** function key in the **PHASE** menu.  
A selection field containing the available settings is displayed. The default setting is "Auto".



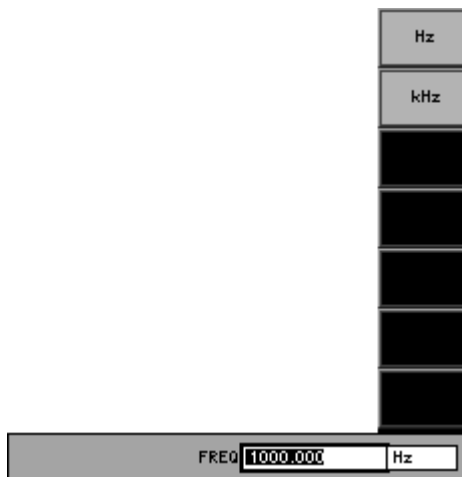
2. Use the **rotary knob** [11] to select a setting.
3. Press the **ENTER key** [5] to close the selection field.  
The new setting is stored and displayed in the parameter field.

**Ch 1&2**



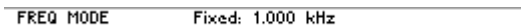
Entering the signal frequency manually

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 are assigned various units of measurement.



4. Enter a new value (↗ 5-70).  
The permissible entry range is:  
$$f_{\min} \leq \text{FREQ} \leq f_{\max}$$
  
within:  $f_{\min}$  - minimum frequency of the analyzer typ (↗ above)  
 $f_{\max}$  - maximum frequency of the analyzer typ (↗ 6-175, 6-181)  
The new setting is stored and displayed in the parameter field.

**Ch 1&2**



### Selecting the Measurement Time

#### Use

You can select different measurement times according to the measurement task:

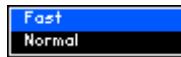
- **Fast**  
A fast measurement with low dynamic range is performed.
- **Precision**  
Measurement is performed with a higher dynamic range.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

#### Selecting the measurement time

1. Press the  function key in the  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

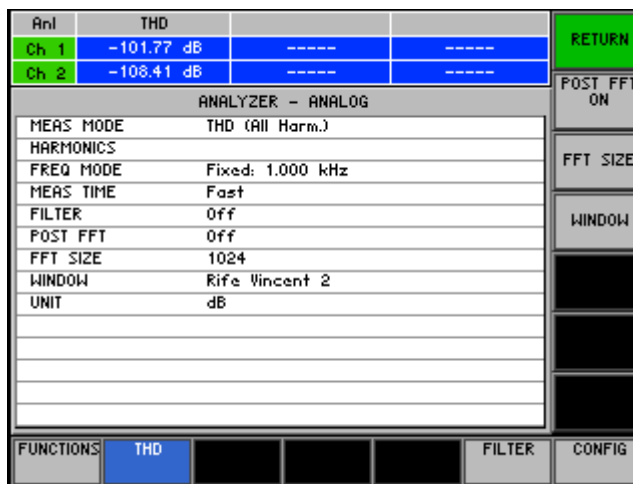
What the settings are for

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 FFT.

Selecting the FFT submenu

- Press the  function key in the current measurement menu.

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



Function key assignment

-  Exit submenu
-  Activate/deactivate the FFT (↗ 6-223)
-  Set the FFT size (↗ 6-210)
-  Set the FFT window (↗ 6-210)

### 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 every valid for both channels (Ch 1&2).

#### Activating the FFT

1. Press the  **function key** in the  **submenu**.

The function key is highlighted and the new setting is stored. After activation, you can view the input signal (↗ 6-216).

The current status is displayed in the parameter field.

#### Ch 1&2

POST FFT	On
----------	----

#### Deactivating the FFT

2. Press the  **function key** in the  **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 Level Display

**Use** You can set different units of the level display depending on measurement task.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

#### Selecting the unit

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

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

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)

What the measurement is for

The polarity test is used to check the polarity of the signal transmitted by the DUT.

The generator of the R&S UP300/350 provides the POLARITY TEST signal function for this purpose.

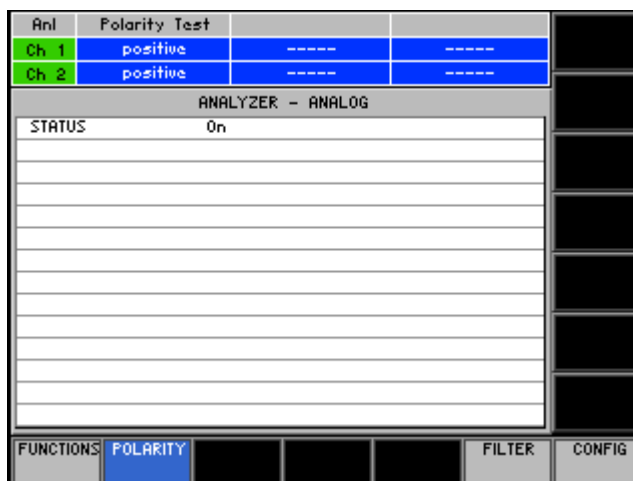
Preparing the measurement

1. Call the generator function **POLARITY TEST** (↗ 6-113).
2. Set the signal parameters (↗ 6-149).
3. Switch the DUT between generator [8] and analyzer [9].

Setting measurement parameters

4. Call the measurement function **POLARITY** (↗ 6-185).
5. Select the **POLARITY** menu with the aid of the ◀ or ▶ cursor key.

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



Displaying and analyzing measurement results

(↗ 6-225)



### Displaying and analyzing measurement results

#### Measurement display

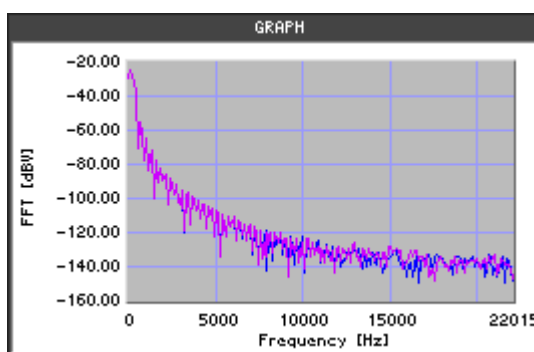
The analyzer analyzes the polarity of the output signal from the DUT and displays the polarity:

- **positive** (correct polarity)
- **negative** (reversed polarity)

Anl	Polarity Test		
Ch 1	positive	----	----
Ch 2	positive	----	----

#### Frequency spectrum

- Call the measurement function **FFT** (↗ 6-207).
- Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).  
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 (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

### 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 (↗ 6-244).

6.3.2.2.8 DFD (Difference Frequency Distortion)

What the measurement is for

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.

The generator of the R&S UP300/350 provides the DFD signal function for this purpose.

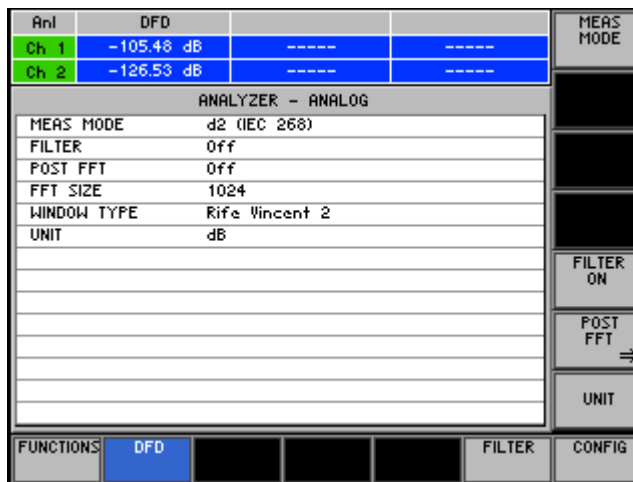
Preparing the measurement





1. Call the generator function **DFD** (↗ 6-113).
2. Set the signal parameters (↗ 6-143).
3. Switch the DUT between generator [8] and analyzer [9].

Setting measurement parameters

4. Call the measurement function **DFD** (↗ 6-185).
5. Select the **DFD** menu with the aid of the ◀ or ▶ cursor key.

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



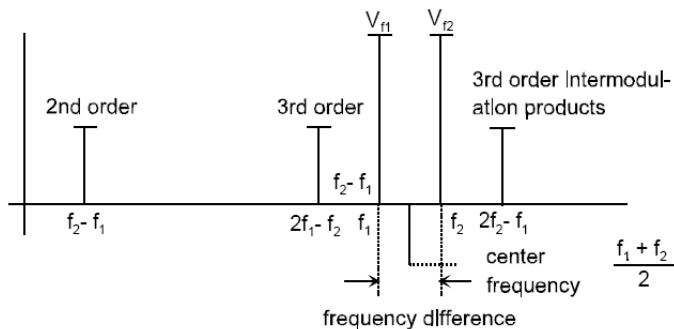
-  Select the difference frequency distortions and measurement standard (↗ 6-229)
-  Activate/deactivate the filter (↗ 6-191)
-  **Open the submenu:**  
Set the POST FFT (↗ 6-222)
-  Select the unit of the level display (↗ 6-223)

Measurement method (↗ 6-227)

Displaying and analyzing measurement results (↗ 6-228)

**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) to DIN IEC 268 part 3.



Difference frequency distortion of 2nd order:

Difference frequency distortion of 3rd order:

$$d_2 [dB] = 20 \times \lg \frac{|V_{(f_2 - f_1)}|}{2 \times V_{(f_2)}}$$

$$d_3 [dB] = 20 \times \lg \frac{|V_{(2f_2 - f_1)}| + |V_{(2f_1 - f_2)}|}{2 \times V_{(f_2)}} \quad \text{to IEC 268}$$

$$d_2 [dB] = 20 \times \lg \frac{|V_{(f_2 - f_1)}|}{V_{(f_2)}}$$

$$d_3 [dB] = 20 \times \lg \frac{|V_{(2f_1 - f_2)}|}{V_{(f_2)}} \quad \text{to IEC 118}$$

Displaying and analyzing measurement results

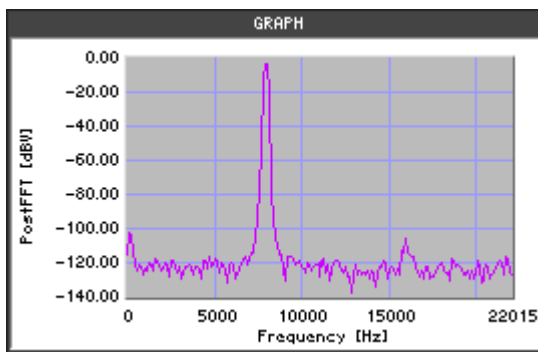
Measurement display

- Activating the measurement function displays the measurement values depending on measurement mode (↗ 6-229).

Graph	DFD		
Ch 1	-105.54 dB	-----	-----
Ch 2	-124.63 dB	-----	-----

Frequency spectrum

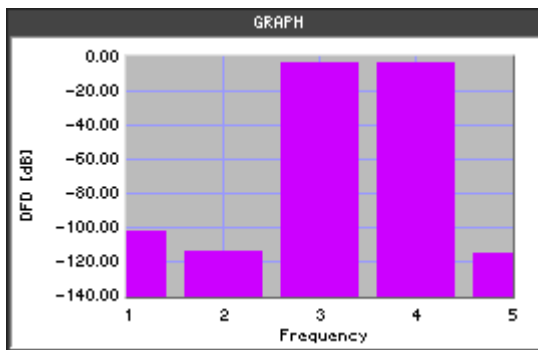
- Call the measurement function **POST FFT** (↗ 6-223).
  - Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).
- A measurement diagram with the frequency spectrum is shown in the display area.



**NOTE:** In the Graph menu you can change the graphic display area (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

Bar graph

- Select the **BAR GRAPH** display mode in the Graph menu (↗ 6-247).
- A bar graph is shown in the display area. Depending on the measurement mode (↗ 6-228) 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 (↗ 6-244).

## Selecting 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 2nd order intermodulation product to IEC 268
- **d3 (IEC 268)**  
Measurement and display of 3rd order intermodulation product to IEC 268
- **d2 (IEC 118)**  
Measurement and display of 2nd order intermodulation product to IEC 118
- **d3 (IEC118)**  
Measurement and display of 3rd order intermodulation product to IEC 118

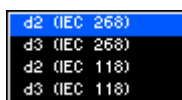
**NOTE:** The IMD tones are not subjected to a level test in the case of measurement to IEC 118. This means that a DFD measurement is possible even if the IMD signal is severely distorted (e.g. as a result of the frequency response of the DUT or of the transmission path). A typical example is the measurement of hearing aids.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

### Selecting measurement standards

1. Press the  function key in the  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)

What the measurement is for

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°.

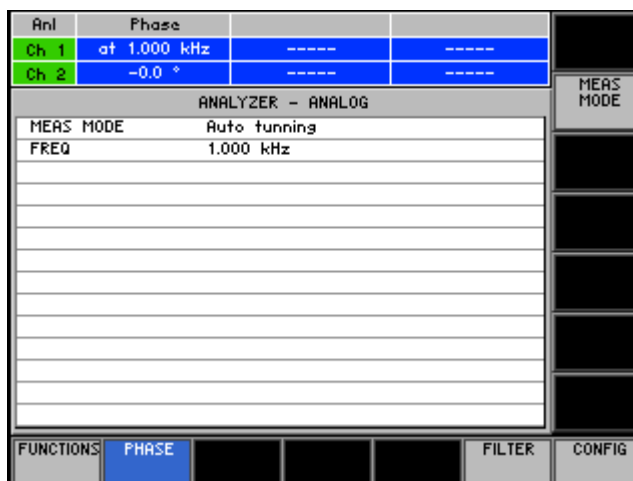
Preparing the measurement

1. Call the, e.g., generator function **SINE** (↗ 6-113).
2. Set the signal parameters (**f1 = f2**) (↗ 6-115).
3. Switch the DUT between generator [8] and analyzer [9].

Setting measurement parameters

4. Call the measurement function **PHASE** (↗ 6-185).
5. Select the **PHASE** menu with the aid of the ◀ or ▶ cursor key.

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



Select the type of signal search (↗ 6-231)

Displaying and analyzing measurement results

Measurement display

- Activating the measurement function 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.

Anl	Phase		
Ch 1	at 1.000 kHz	----	----
Ch 2	-0.0 °	----	----

**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 (↗ 6-244).

### 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:

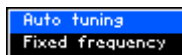
- **Auto tuning**  
Automatic signal frequency search and automatic phase measurement
- **Fixed frequency**  
Manual entry of signal frequency and manual phase measurement

**NOTE:** The setting is every valid for both channels (Ch 1&2).

#### Selecting the type of signal search

1. Press the  function key in the  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.

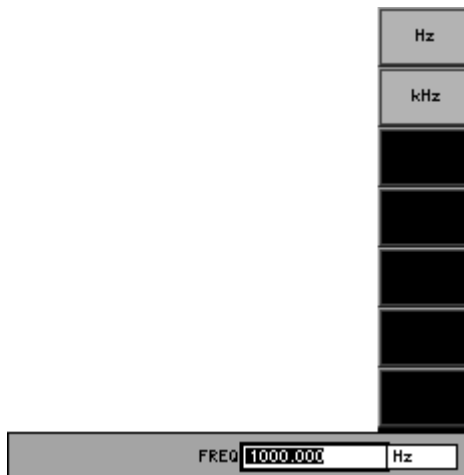
The new setting is stored and displayed in the parameter field.

#### 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 (↗ 5-70).

The permissible entry range is:

$$f_{\min} \leq \text{FREQ} \leq f_{\max}$$

within:  $f_{\min}$  - minimum frequency of the analyzer typ (↗ above)  
 $f_{\max}$  - maximum frequency of the analyzer typ (↗ 6-175, 6-181)

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)

What the measurement is for

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.

The generator of the R&S UP300/350 provides the MOD DIST signal function for this purpose.

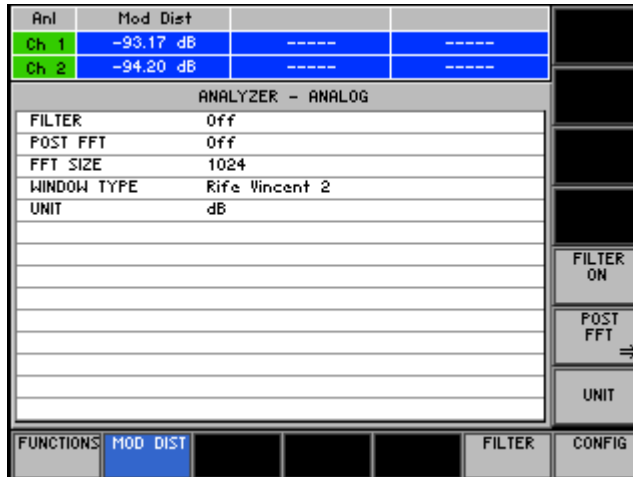
Preparing the measurement

1. Call the generator function **MOD DIST** (↗ 6-113).
2. Set the signal parameters (↗ 6-137).
3. Switch the DUT between generator [8] and analyzer [9].

Setting measurement parameters

4. Call the measurement function **MOD DIST** (↗ 6-185).
5. Select the **MOD DIST** menu with the aid of the ◀ or ▶ cursor key.

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



Activate/deactivate the filter

(↗ 6-191)



**Open the submenu:**  
Set the POST FFT

(↗ 6-222)



Select the unit of the level display

(↗ 6-223)

Measurement method

(↗ 6-234)

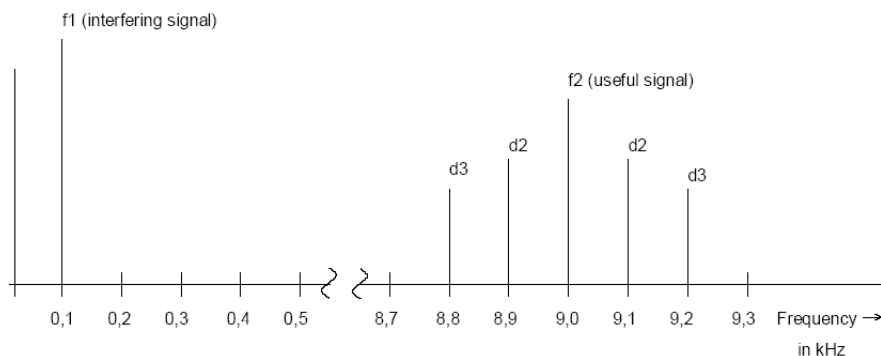
Displaying and analyzing measurement results

(↗ 6-235)

**Measurement method**

The R&S UP300/350 measures the 2nd and 3rd order intermodulation products selectively (measurements are therefore unaffected by noise) 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:

$$dm(2+3) = \sqrt{dm2^2 + dm3^2}$$

$$MOD\ DIST\ [dB] = 20 * \lg (dm(2+3))$$

Displaying and analyzing measurement results

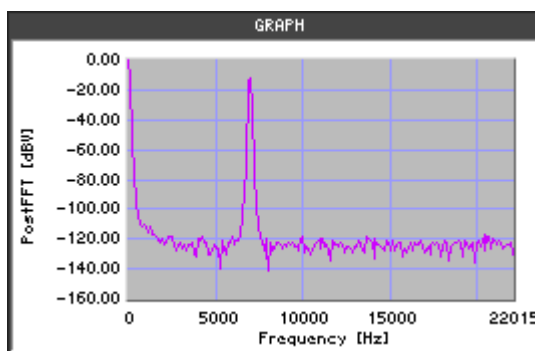
Measurement display

- Activating the measurement function displays the total intermodulation product.

Graph	Mod Dist		
Ch 1	-92.50 dB	-----	-----
Ch 2	-95.00 dB	-----	-----

Frequency spectrum

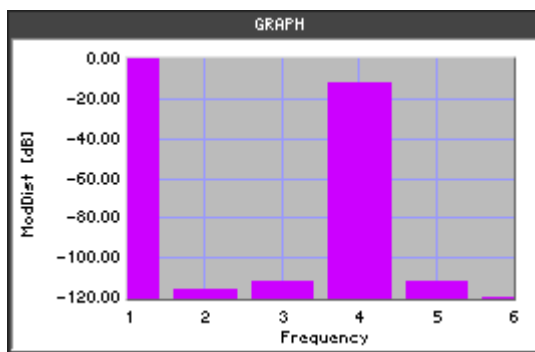
- Call the measurement function **POST FFT** (↗ 6-223).
  - Select the **SPECTRUM** display mode in the Graph menu (↗ 6-247).
- A measurement diagram with the frequency spectrum is shown in the display area.



**NOTE:** In the Graph menu you can change the graphic display area (↗ 6-251, 6-255) and analyze the trace using the cursors (↗ 6-259).

Bar graph

- Select the **BAR GRAPH** display mode in the Graph menu (↗ 6-247).
- A bar graph is shown in the display area. Depending on the measurement type, the interference signal (1), the useful signal (4) and the intermodulation products (2, 3, 5, 6) of the measurement 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 (↗ 6-244).

6.3.2.2.11 PROTOCOL (Protocol Analysis)

What the measurement is for

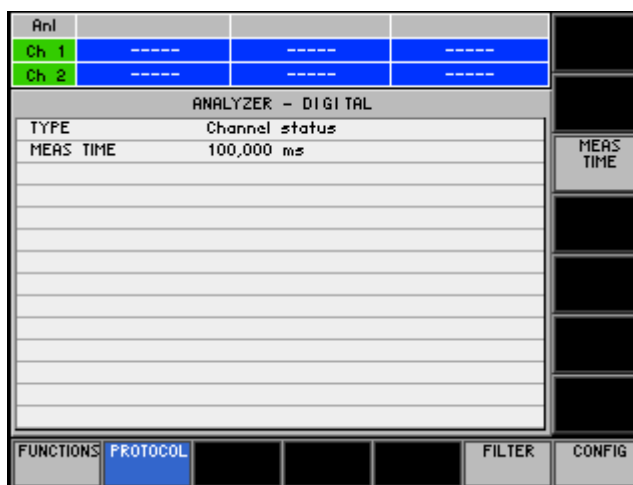
This measurement function is only available for the R&S UP350.

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 (transmission) errors also appear in this protocol analysis.

Setting measurement parameters

1. Switch on the digital analyzer (↗ 6-174).
2. Call the measurement function **PROTOCOL** (↗ 6-185).
3. Select the **PROTOCOL** menu with the aid of the ◀ or ▶ cursor key.

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



Enter the measurement time (↗ 6-238)

Displaying and analyzing measurement results

(↗ 6-238)

### Displaying and analyzing measurement results

#### List of the protocol analysis

- Select the **LIST OF VALUES** display mode in the Graph menu (↗ 6-247).

Depending on the protocol recognized, the channel status data of the digital interface is displayed.

#### Consumer

GRAPH		
Error Bit:	No error	
Validity Bit:	valid	
0:	Format:	consumer
	Mode:	linear PCM
	Copy:	free
	Emph:	no emph
	Chan's:	2 chans
	Mode:	0
1:	Category:	General
	L-Bit:	ni/1st Gen
2:	Source:	d.c.
	Chan:	D.C.
3:	Rate:	not ind.
	Prec:	1000 ppm

#### Professional

GRAPH		
Error Bit:	No error	
Validity Bit:	valid	
0:	Format:	professional
	Mode:	linear PCM
	Emph:	no emph
	Source:	not ind
	Rate:	not ind
1:	Chanmod:	not ind
	Usermod:	not ind
2:	Auxmod:	20 + ni
	Length:	21/17
3-5:	Grade:	n.d.
	enh. Rate:	not ind.
	Scaling:	off

## 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 (↗ 6-244).

**Selecting the Measurement Time**

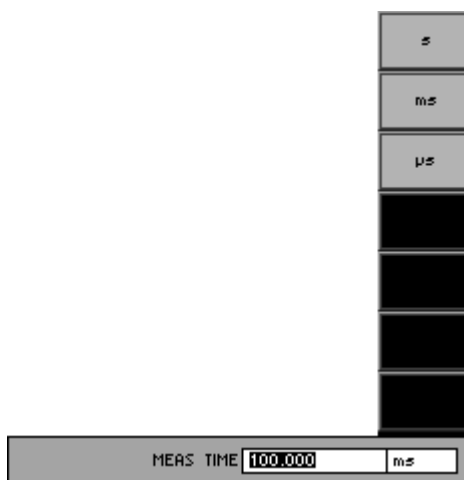
**Use** You can enter different measurement times according to the measurement task.

**NOTE:** The setting is every valid for both channels (Ch 1&2).

**Setting the measurement time**

1. Press the  **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 (↗ 5-70).

The permissible entry range is:

$$1 \text{ ms} \leq \text{MEAS TIME} \leq 10 \text{ s}$$

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

**Ch 1&2**

MEAS TIME	100.000 ms
-----------	------------







### 6.3.3.1 Selecting 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  
(to DIN 45412)
- **C message**  
Transmission measurement  
(to IEEE 743-84)
- **CCITT**  
Psophometric measurement  
(to CCITT 0.41, IEEE Rec. 743-84, CISPR 6-76, CCITT Rec. P.53)
- **CCIR 1k wtd**  
Weighting for RFI voltage measurement  
(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 to CCIR  
(to CCIR Rec. 468-4)
- **CCIR 2 k wtd**  
NAB standard  
(to CCIR)
- **deemphasis 50/15**  
Compact disc  
(to CCIR Rec. 651)
- **deemphasis 50**  
Noise and psophometric voltage measurement to DIN 45405  
(to ARD Spec. 5/3.1)
- **deemphasis 75**  
Noise and psophometric voltage measurement to DIN 45405  
(to ARD Spec. 5/3.1)
- **deemphasis J.17**  
Noise and psophometric voltage measurement to DIN 45405  
(to CCITT J.17)
- **Rumble wtd**  
Testing of record players, psophometric voltage measurement  
(to DIN 45539)
- **Rumble unwtd**  
Testing of record players, noise voltage measurement  
(to DIN 368.3, DIN 45539)
- **DC noise HP**  
Highpass filter for measuring the DC noise (tape recorders)  
(in accordance with ARD specifications 3/4, ARD specifications 12/2)
- **IEC/IEEE tuner**  
Measurements on tuners

(in accordance with DIN/IEC 315)

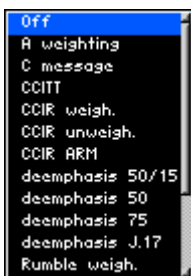
Selecting the channel

- **1/3 octave**  
Band-pass filter with bandwidth of 1/3 octave
  - **1/1 octave**  
Band-pass filter with bandwidth of one octave
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".



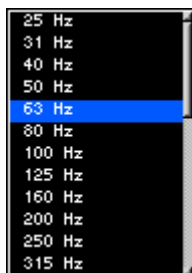
3. Use the **rotary knob** [11] to select a setting.  
**NOTE:** The scroll bar indicates that there are more settings available.
4. Press the **ENTER key** [5] to close the selection field.  
The new setting is stored and displayed in the parameter field.

	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 center frequency  
(for octave filter)**

If you select an octave filter, a selection field containing various center frequencies appears. The default setting is "25 Hz".



1. Use the **rotary knob** [11] to select a setting.  
**NOTE:** The scroll bar indicates that there are more settings available.
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
FILTER NO.1	1/3 octave: 63 Hz	Off

### 6.3.4 Starting and Stopping 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 the 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**  
Continuous and single measurements or sweeps are stopped. MEASUREMENT STOPPED or SWEEP STOPPED appears in the parameter field.

## 6.4 Graphical Result Display

### 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 axis of the measurement diagram and analyze the trace using the X and Y cursors.

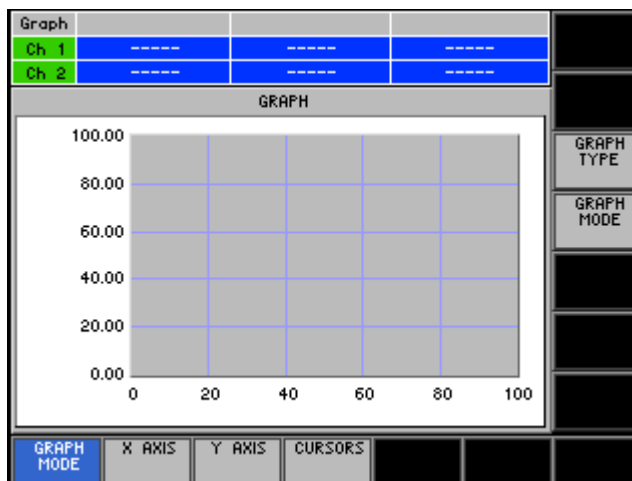
**NOTE:** What is measured and how measurement is performed is configured in the Analyzer menu (or in the Generator menu in the case of sweeps). The way in which the measurement is displayed can also be changed.

### Activating Graph menu

The Analyzer menu is activated after you switch on the R&S UP300/350.





- Press the **main menu 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. The order of the menus mirrors that of the procedure for configuring and setting the display parameters:


	Set the display mode	(↗ 6-246)
	Scale the X axis	(↗ 6-251)
	Scale the Y axis	(↗ 6-255)
	Trace analysis using cursors	(↗ 6-259)

### 6.4.1 Selecting the Display Mode (GRAPH MODE)

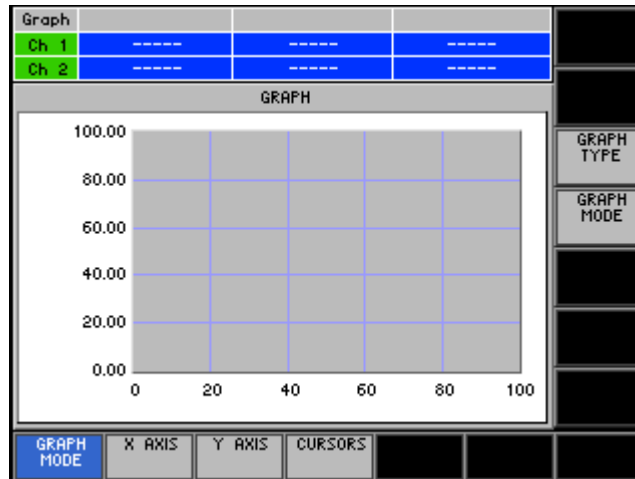
What the settings are for

Selecting the GRAPH MODE menu

In the GRAPH MODE menu you can set the display parameters for the respective measurement function and the display mode for the traces.

- Select the  menu with the aid of the ◀ or ▶ cursor key.

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



Function key assignment



Select the display parameters

(↗ 6-247)



Select the display mode

(↗ 6-249)

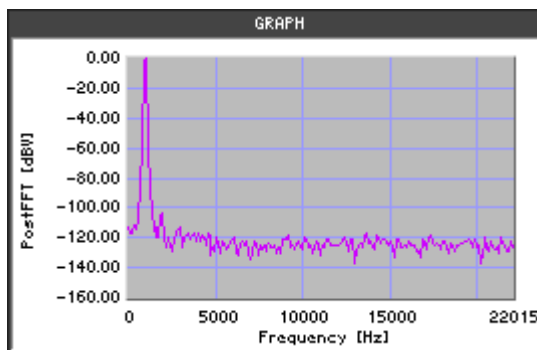
### 6.4.1.1 Selecting the Display Parameters

#### Use

Apart from displaying measurement results numerically, you can also analyze the measurements graphically. Various display parameters are available depending on the measurement function:

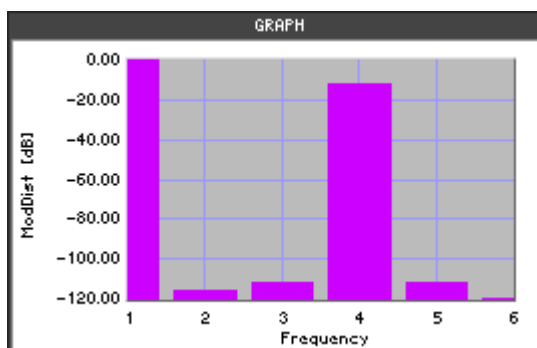
- **Spectrum (FFT, THD, DFD, MOD DIST)**

If you select the measurement function FFT or a Post FFT, the frequency spectrum calculated by the R&S UP300/350 appears in the display area.



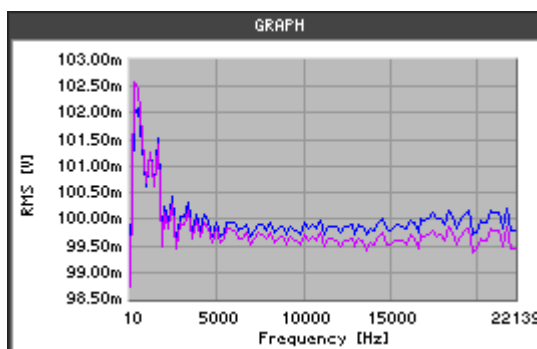
- **Bar graph (THD, DFD, MOD DIST)**

This display shows the current measurement values in analog form as a bar graph. You should select this display if the relative size or variation is important and not the precise value. The frequency axis is not true-to-scale, e.g. measurement function MOD DIST, ↗ 6-233.



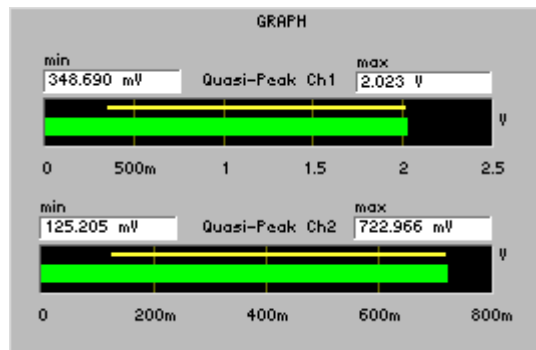
- **Curve Plot (Sweep)**

This display shows the X-Y graph of the respective 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 value for the active measurement is also shown.



- **List of values (SWEEP, FFT, THD, protocol analysis)**

The results of the THD measurement are listed in a table, e.g. measurement function THD, ↗ 6-216.

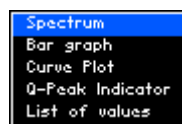
GRAPH		
FFT		
Frequency	Ch1	Ch2
0,00 Hz	-107,88 dBV	-105,66 dBV
110,63 Hz	-106,74 dBV	-105,80 dBV
221,25 Hz	-102,10 dBV	-102,61 dBV
331,88 Hz	-95,47 dBV	-95,63 dBV
442,50 Hz	-90,87 dBV	-91,02 dBV
553,13 Hz	-84,68 dBV	-84,76 dBV
663,76 Hz	-72,43 dBV	-72,43 dBV
774,38 Hz	-58,34 dBV	-58,34 dBV
885,01 Hz	-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 cursor keys ▲ or ▼ [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.

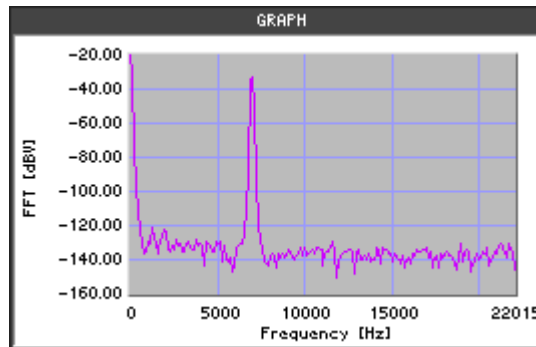


### 6.4.1.2 Selecting the Display Mode

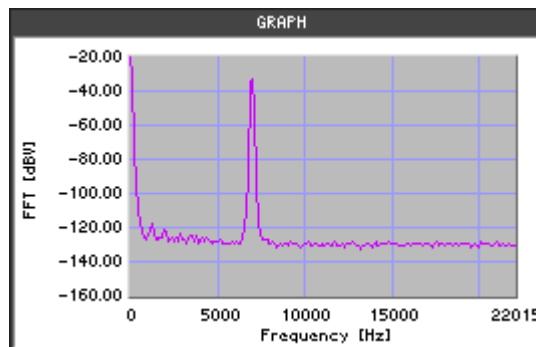
#### Use

You can select the following settings for displaying the traces:

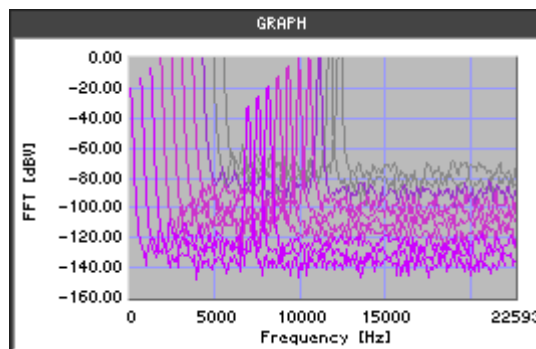
- **Overwrite**  
Overwrites the trace with every measurement run.



- **Max hold**  
Displays the maximum value over several measurement runs. This is particularly useful in the case of modulated or pulse-like signals. With every measurement run, more data is added to the signal spectrum until all the signal components are displayed using a type of envelope curve.



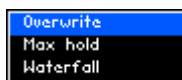
- **Waterfall**  
Offsets the individual traces in the Z axis to give a three-dimensional display. To provide a readable display, you should scale the graph in such a way that half of the co-ordinate system remains empty. The noise component should remain invisible while the spectral components of particular interest should be highlighted.



**Selecting the display mode**

1. Press the  **function key** in the  **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)

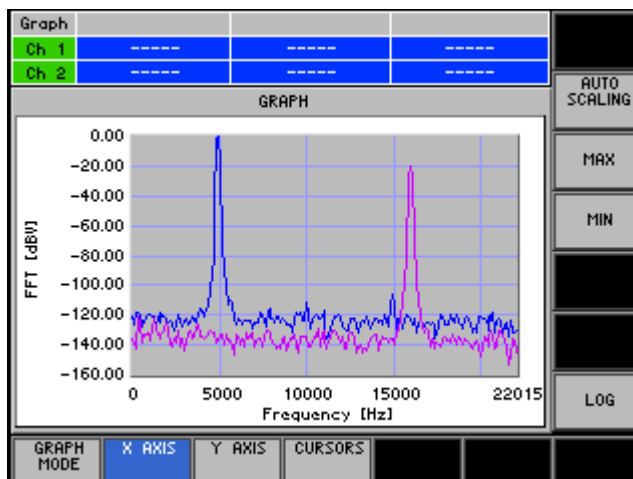
What the settings are for

Selecting the X AXIS menu

You can scale the X axis of the measurement diagram to allow certain trace sections to be analyzed.

- Select the **X AXIS** menu with the aid of the **◀** or **▶** cursor key.

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



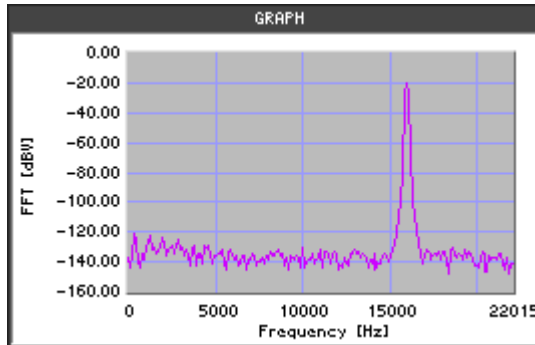
Function key assignment

<b>AUTO SCALING</b>	Activate automatic display area scaling	(↗ 6-252)
<b>MAX</b>	Manual display area scaling: Enter the upper limit of the display area	(↗ 6-252)
<b>MIN</b>	Manual display area scaling: Enter the lower limit of the display area	(↗ 6-252)
<b>LOG</b>	Select the display mode	(↗ 6-254)

### 6.4.2.1 Setting the Display Range

**Use** You can adapt the display area of the measurement diagram X axis using a minimum and maximum value.

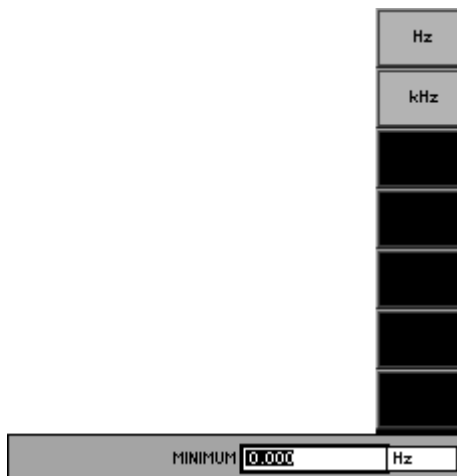
**Initial position of the X axis**



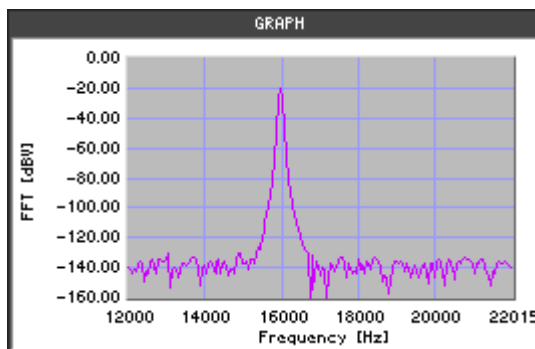
**Entering the lower limit of the X axis**

1. Press the **MAX** function key in the **X AXIS** menu.

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



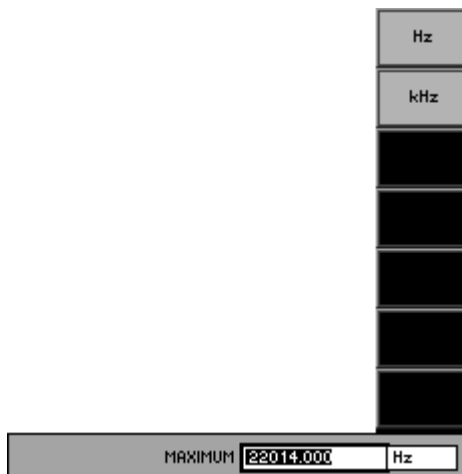
2. Enter a new value, z. B. 12 kHz (↗ 5-70).  
The entry range depends on your measurement task.  
The new setting is displayed in the measurement diagram.



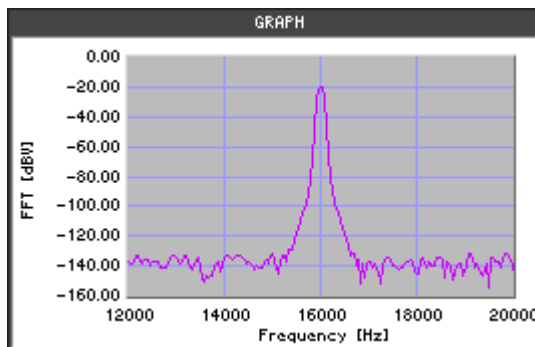
Entering the upper limit of the X axis

3. Press the **MAX** function key in the **X AXIS** menu.

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



4. Enter a new value, z. B. 20 kHz (↗ 5-70).  
The entry range depends on your measurement task.  
The new setting is displayed in the measurement diagram.



Activating the auto scaling of the X axis

- Press the **AUTO SCALING** function key in the **X AXIS** menu.  
The entire display area is shown. (↗ above, initial position of the X axis).

### 6.4.2.2 Selecting the Display Mode

#### Use

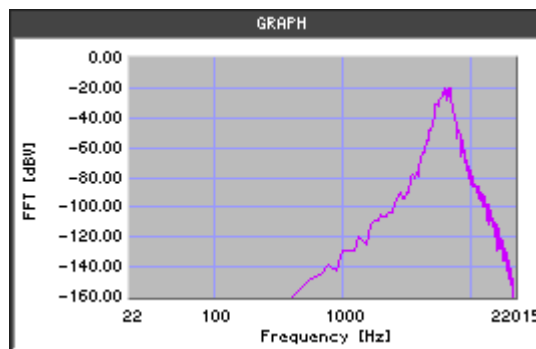
You can select the following settings for scaling the X axis:

- **LIN**  
Linear scaling of the X axis
- **LOG**  
Logarithmic scaling of the X axis, default setting

#### Activating the logarithmic scaling

1. Press the  function key in the  menu.

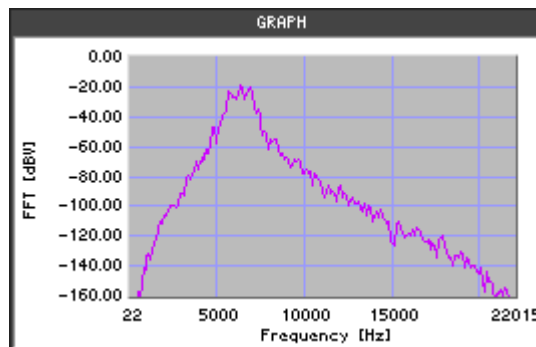
The function key is **highlighted** and the new setting is stored. When activated, the X axis is displayed logarithmically.



#### Activating the linear scaling

2. Press the  function key in the  menu.

The function key is **no longer highlighted** and the X axis is displayed linearly.



### 6.4.3 Scaling the Y Axis (Y AXIS)

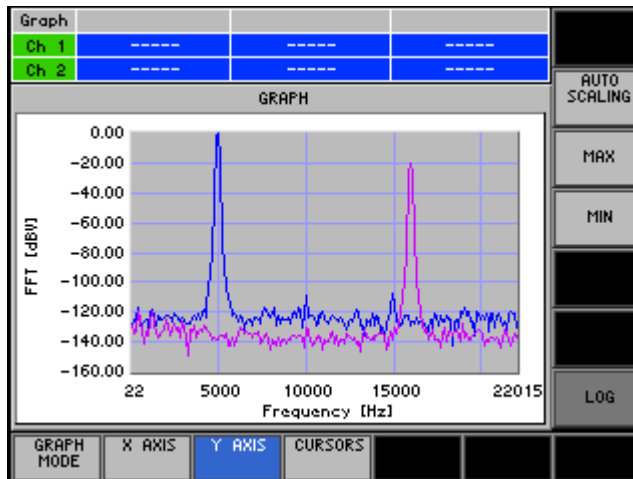
What the settings are for

Selecting the Y AXIS menu

You can scale the Y axis of the measurement diagram to allow certain trace sections to be analyzed.

- Select the **Y AXIS** menu with the aid of the **◀** or **▶** cursor key.

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



Function key assignment

<b>AUTO SCALING</b>	Activate automatic display area scaling	(↗ 6-256)
<b>MAX</b>	Manual display area scaling: Enter the upper limit of the display area	(↗ 6-256)
<b>MIN</b>	Manual display area scaling: Enter the lower limit of the display area	(↗ 6-256)
<b>LOG</b>	Select the display mode	(↗ 6-258)

#### NOTE

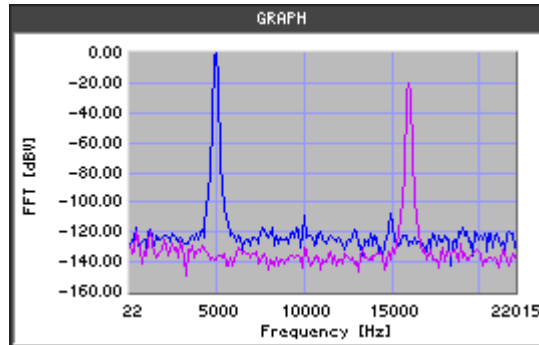
The **LOG** function key is only available if you have set the unit V, FS, %FS and % for the Y axis (↗ 6-214).

### 6.4.3.1 Setting the Display Range

#### Use

You can adapt the display area of the measurement diagram Y axis using a minimum and maximum value.

#### 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.

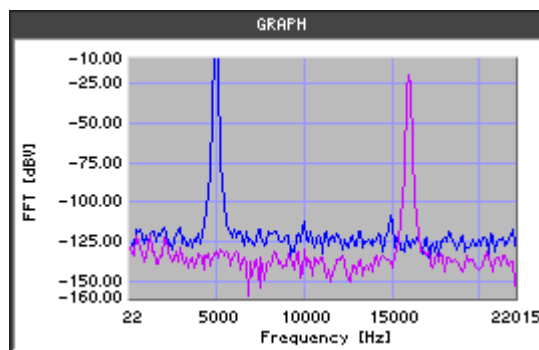
An entry field containing the currently applicable setting is displayed. The default setting is the upper edge of the diagram. At the same time, the function keys are assigned various units of measurement.



2. Enter a new value, e.g. -10 dBV (↵ 5-70).

The entry range depends on the selected unit of measurement.

The new setting is displayed in the measurement diagram.





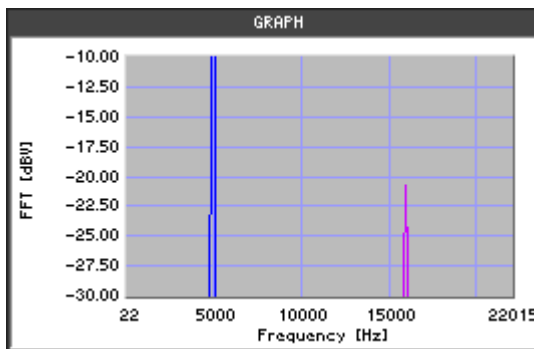
Entering the lower limit of the Y axis

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. At the same time, the function keys are assigned various units of measurement.



4. Enter a new value, -30 dBV (↗ 5-70).  
The entry range depends on the selected unit of measurement.  
The new setting is displayed in the measurement diagram.



Activating the auto scaling of the Y axis

- Press the **AUTO SCALING** function key in the **Y AXIS** menu.  
The entire display area is shown. (↗ above, initial position of the Y axis).

### 6.4.3.2 Selecting the Display Mode

#### Use

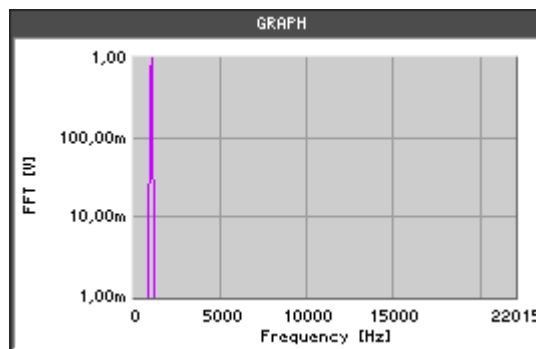
You can select the following settings for scaling the Y axis:

- **LIN**  
Linear scaling of the Y axis
- **LOG**  
Logarithmic scaling of the Y axis, default setting

#### Activating the logarithmic scaling

1. Press the **LOG** function key in the **Y AXIS** menu.

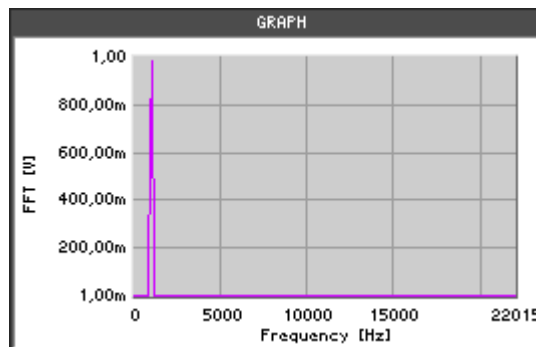
The function key is **highlighted** and the new setting is stored. When activated, the Y axis is displayed logarithmically.



#### 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)

What the settings are for

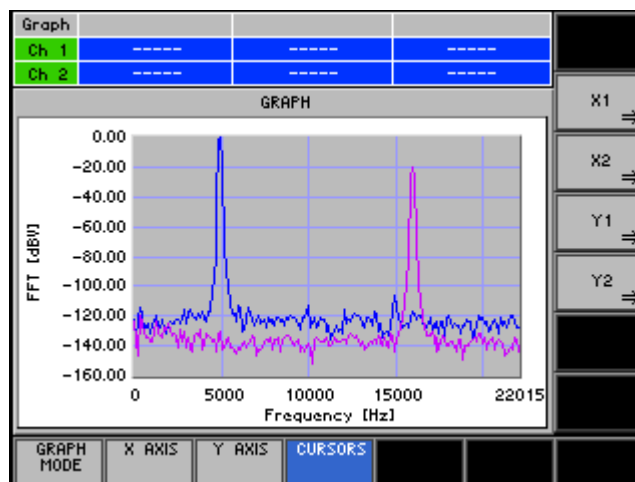
You can position two cursors on the X axis and cursors on the Y axis and move them on the display using the rotary knob or the cursor keys. The measurement values under these cursors are shown in the full-screen display (↗ 6-273).

The cursor moves from measurement value to measurement value. If there are more measurement values than 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 aid of the ◀ or ▶ cursor key.

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



Function key assignment



**Open the submenu:**  
Configure cursor 1 on the X axis

(↗ 6-260)



**Open the submenu:**  
Configure cursor 2 on the X axis

(↗ 6-260)



**Open the submenu:**  
Configure cursor 1 on the Y axis

(↗ 6-268)



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

(↗ 6-268)

### 6.4.4.1 Configuring X Cursors

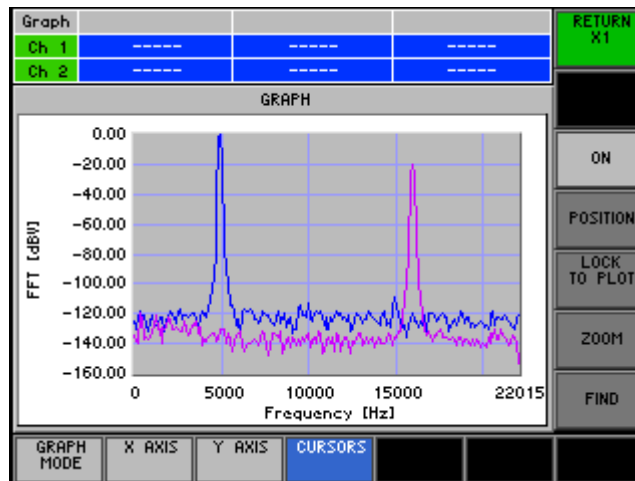
What the settings are for

Selecting the X1 or X2 submenu

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.

- Press the **X1** or **X2** function key 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

<b>RETURN X1</b>	Exit the submenu	
<b>ON</b>	Activate/deactivate the X cursor	(↗ 6-261)
<b>POSITION</b>	Position the X cursor manually	(↗ 6-264)
<b>LOCK TO PLOT</b>	Assign a X cursor to a trace (Ch 1 or Ch 2)	(↗ 6-262)
<b>ZOOM</b>	Zoom the display area	(↗ 6-266)
<b>FIND</b>	Position a X cursor on the maximum value	(↗ 6-262)

#### NOTE

The **POSITION**, **ZOOM** and **FIND** function keys are only available if you have activated a X cursor.

**Activating/Deactivating X Cursors**

**Use** When you activate a 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.

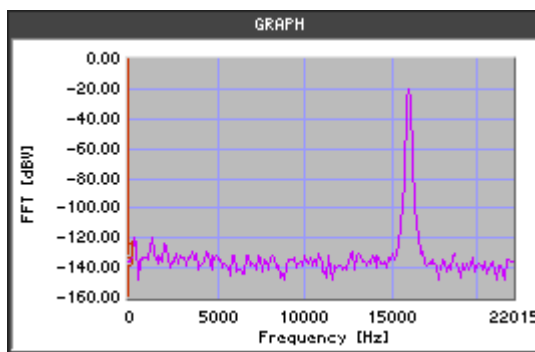


**Activating X cursors**

2. Press the  **function key** in the **X1 or X2 submenu**.

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 moved the X cursor with the **rotary knob** [11] in little steps.



**Deactivating X cursors**

3. Press the  **function key** in the **X1 or X2 submenu**.

The function key is no longer highlighted. The X cursor disappears.

#### 6.4.4.1.1 Assigning 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, the cursor is positioned on one of the traces of channel Ch 1 or Ch 2. You can, however, assign the X cursor to a particular trace.

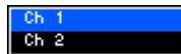
- **Ch 1**  
The X cursor is placed on the trace of the channel Ch 1.
- **Ch 2**  
The X cursor is placed on the trace of the channel Ch 2.

##### Assigning X cursors to a trace

1. Activate the X cursor (➤ 6-261).

2. Press the  function key in the **cursor X1 submenu**.

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



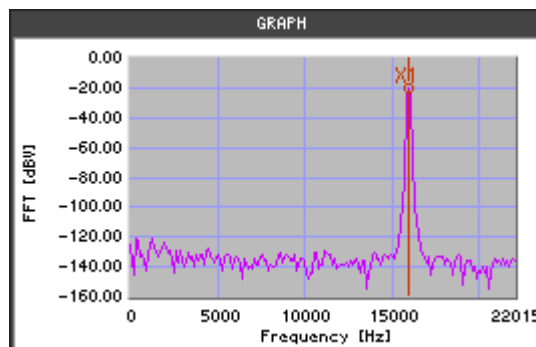
3. Use the **rotary knob** [11] to select a setting.
4. Press the **ENTER key** [5] to close the selection field.  
The new setting is displayed in the measurement diagram.

#### 6.4.4.1.2 Positioning X Cursors on a Maximum

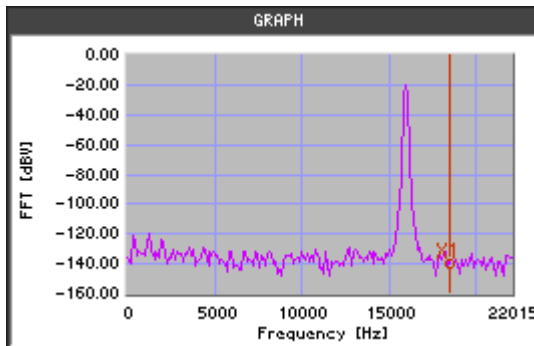
##### Use

If you have activated a X cursor, you can position it automatically on a maximum.

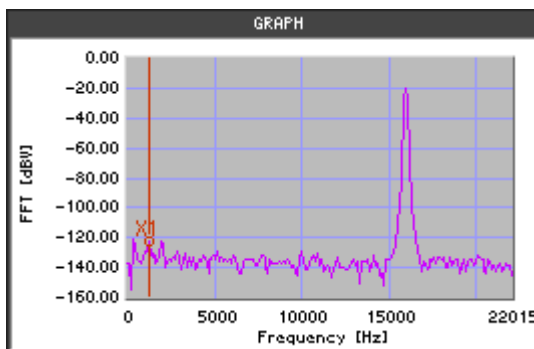
- **Max**  
The X cursor is positioned on the highest maximum in the display area.



- Max right**  
 The X cursor is positioned on the next maximum to the right of the current position in the display area.

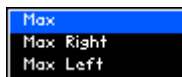


- Max left**  
 The X cursor is positioned on the next maximum to the left of the current position in the display area.



Positioning X Cursors automatically

1. Activate the X cursor (↗ 6-261).
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 (↗ 6-273).

---

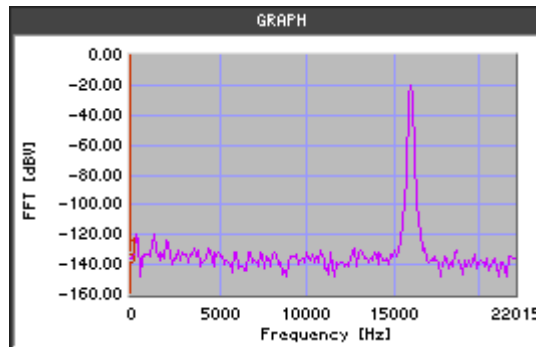
### 6.4.4.1.3 Manually Positioning X Cursors

#### Use

If you have activated a X cursor, you can move it manually on the trace using the rotary knob or the cursor keys (applies only to full-screen display, ↗ 6-273). You can also enter a specific value if you want to set the cursor at a precise position.

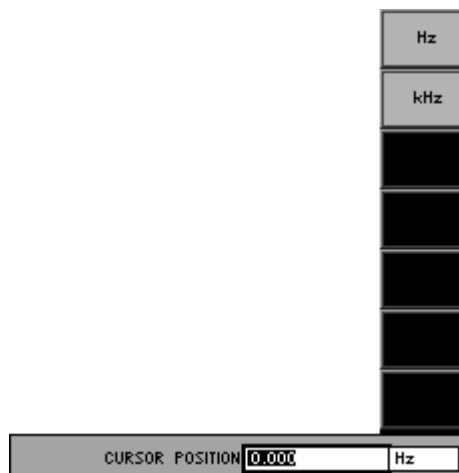
#### Manually positioning X Cursors

1. Activate the X cursor (↗ 6-261).



2. Press the **POSITION** function key in the X cursor submenu.

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



3. a) Enter a new value (↗ 5-70).

The permissible entry range is:

$$\text{MIN} \leq \text{CURSOR POSITION} \leq \text{MAX}$$

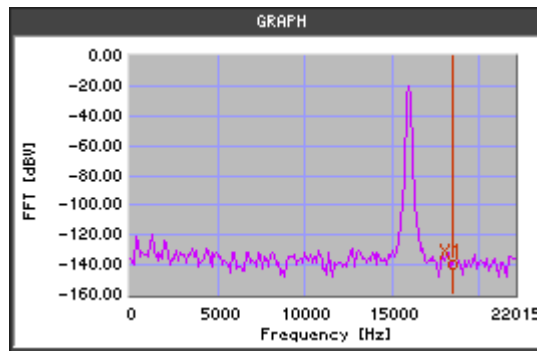
within: MIN - lower limit of the display range (↗ 6-252)

MAX - upper limit of the display range (↗ 6-252)

- 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 (↗ 6-273).

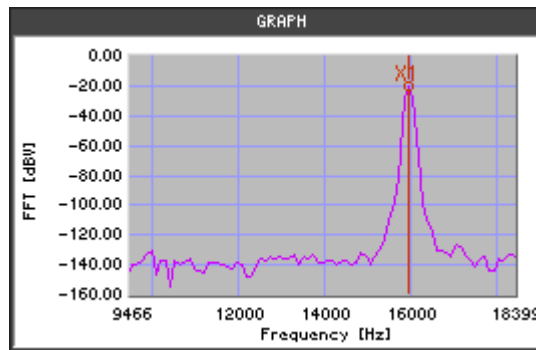
#### 6.4.4.1.4 Zooming the Display Area

##### Use

You can zoom the display area in a variety of ways using the cursors:

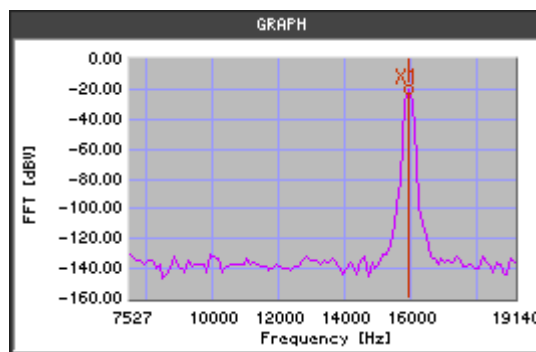
- **Zoom in**

The size of the displayed section is increased by a factor of 2. The X cursor marks the zoom area.



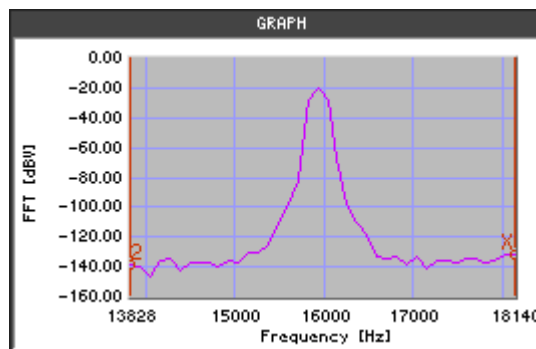
- **Zoom out**

The size of the displayed section is reduced by a factor of 2. The X cursor marks the zoom area.



- **Cursor to Cursor**

If both X cursors are activated, you can use them as the start and end value for the new display area.



**Activating and positioning cursors**

1. Activate the X cursor (↗ 6-261).
2. Position the cursors (↗ 6-262, 6-264).

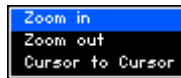
With the normal zoom modes (Zoom in, Zoom out), the current cursor X1 or X2 marks the zoom area.

Both cursor X1 and X2 are required to zoom a specific display area (Cursor to Cursor). They are used as the start and end value for the new display area.

**Selecting zoom area**

3. Press the  **function key** in the **X1 or X2 submenu**.

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 function AUTO SCALING (↗ 6-252) the entire display area is shown.

### 6.4.4.2 Configuring Y Cursors

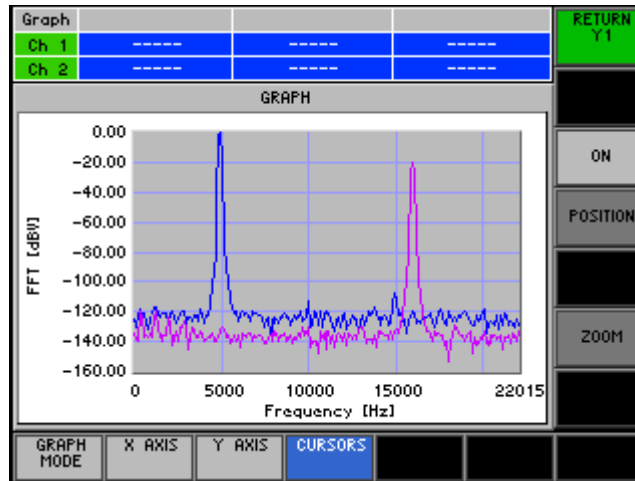
What the settings are for

Selecting the Y1 or Y2 submenu

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.

- Press the **Y1** or **Y2** function key 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

<b>RETURN Y1</b>	Exit the submenu	
<b>ON</b>	Activate/deactivate the Y cursor	(↗ 6-269)
<b>POSITION</b>	Position the Y cursor manually	(↗ 6-270)
<b>ZOOM</b>	Zoom the display area	(↗ 6-271)

#### NOTE

The **POSITION** and **ZOOM** function keys are only available if you have activated a Y cursor (↗ 6-269).

#### 6.4.4.2.1 Activating/Deactivating Y Cursors

##### Use

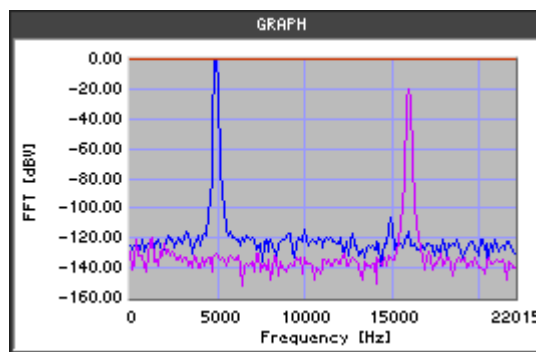
When you activate a Y cursor, you can move it to any position and use it to mark the zoom area.

##### Activating Y cursors

1. Press the  function key in the Y1 or Y2 submenu.

The function key is highlighted and the new setting is effective. When activated, the Y cursor is positioned in the measurement diagram on the top.

**NOTE:** When activated, you can moved the Y cursor with the **rotary knob** [11] in little steps.



##### Deactivating Y cursors

2. Press the  function key in the Y1 or Y2 submenu.

The function key is no longer highlighted. The Y cursor disappears.

### 6.4.4.2.2 Manually Positioning Y Cursors

#### Use

If you have activated a Y cursor, you can move it manually on the trace using the rotary knob or the cursor keys (applies only to full-screen display, ↗ 6-273). You can also enter a specific value if you want to set the cursor at a precise position.

#### Manually positioning Y cursors

1. Activate the Y cursor (↗ 6-269).
2. Dr Press the **POSITION** function key in the **cursor Y submenu**.

An entry field containing the currently applicable setting is displayed. The default setting is the upper diagram edge.



3. a) Enter a new value (↗ 5-70).

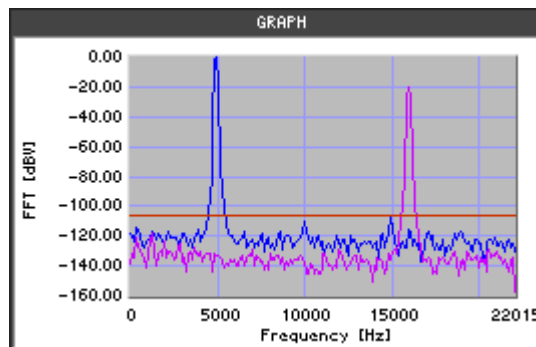
The permissible entry range is:

$$\text{MIN} \leq \text{CURSOR POSITION} \leq \text{MAX}$$

within: MIN - lower limit of the display range (↗ 6-256)  
 MAX - upper limit of the display range (↗ 6-256)

- 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 (↗ 6-273).

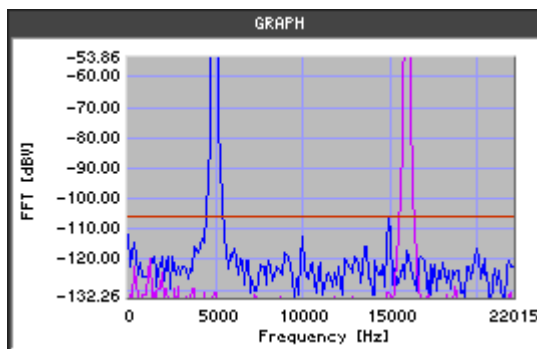
### 6.4.4.2.3 Zooming the Display Area

#### Use

You can zoom the display area in a variety of ways using the Y cursors:

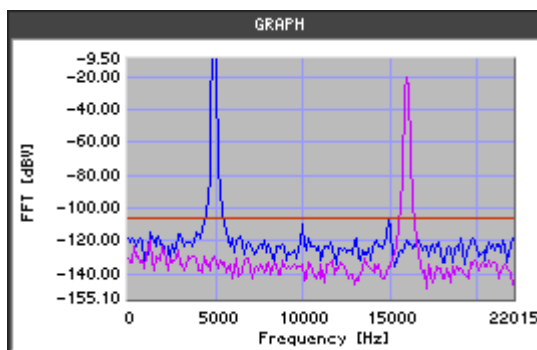
- **Zoom in**

The size of the displayed section is increased by a factor of 2. The Y cursor marks the zoom area.



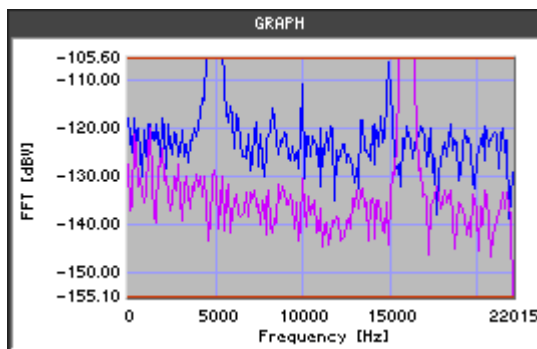
- **Zoom out**

The size of the displayed section is reduced by a factor of 2. The Y cursor marks the zoom area.



- **Cursor to Cursor**

If both Y cursors are activated, you can use them as the start and end value for the new display area.



**Activating and positioning cursors**

1. Activate the Y cursor (↗ 6-269).
2. Position the Y cursors (↗ 6-270).

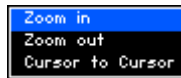
With the normal zoom modes (Zoom in, Zoom out), the current cursor Y1 or Y2 marks the zoom area.

Both cursor Y1 and Y2 are required to zoom a specific display area (Cursor to Cursor). They are used as the start and end value for the new display area.

**Selecting zoom area**

3. Press the  **function key** in the **Y1 or Y2 submenu**.

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 function AUTO SCALING (↗ 6-252) 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-X2, Y1 and Y2 more clearly.

**Preparation**  
(adapting measurement diagram)

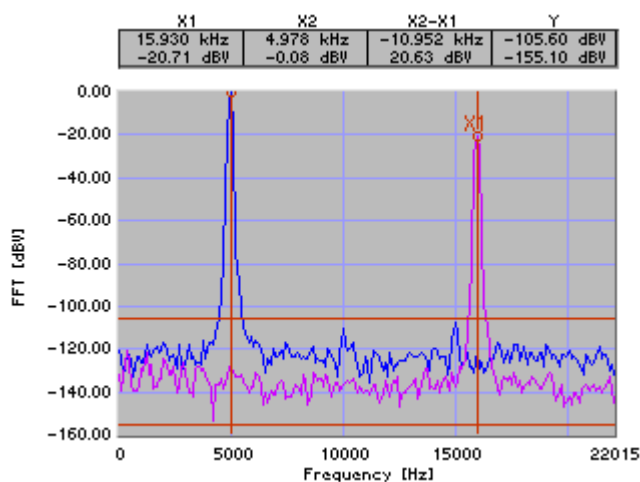
1. Select a display mode (↗ 6-246).
2. Scale the X and Y axes if necessary (↗ 6-251, 6-255).
3. Activate cursors X and Y if necessary (↗ 6-260, 6-268).

**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.

**Activating full screen**

1. Press the **main menu selection key** .

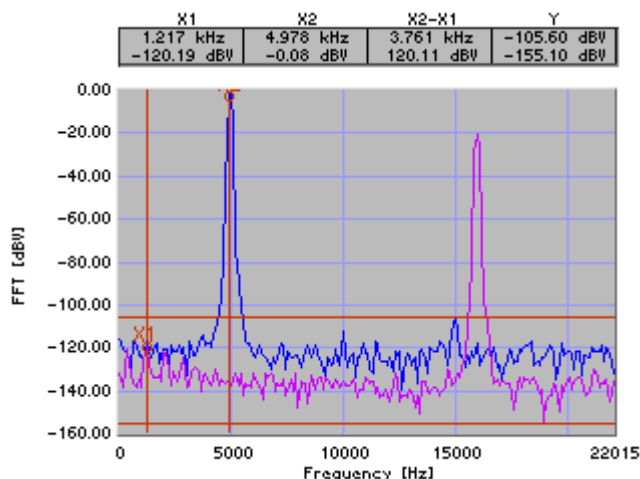
The menu area, the function area and the parameter field disappear on the screen [14]. The diagram area then fills the whole screen. The scale labels and parameters of the cursors are displayed.



**Repositioning active cursor**

2. **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  
full screen**

3. Press the **main menu selection key** .

The menu area, the function area and the parameter field reappear on the screen [14]. The cursor parameters disappear.

## 6.5 SYSTEM Functions (Taste BACK/SYS)

### Introduction

The R&S UP300/350 has system and service functions as well as the generator and analyzer functions.

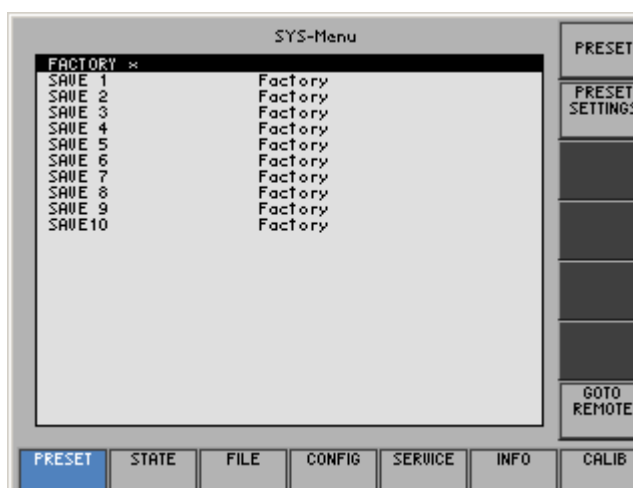
All current settings can be called so that they can be viewed at a glance, and saved for use at a later date, a selftest can be run on the R&S UP300/350 and the system settings configured. Furthermore, the R&S UP300/350 switched over from remote control to local mode.

### 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 measurement displays and parameter lists are blanked out. The menus for the system and service functions are brought up on the screen in the menu area and the appropriate functions are assigned to the function keys [13]. Depending on the function key assignment, the associated parameters are listed as tables in the diagram area.



2. Press the **BACK/SYS key** [3] or Taste **ESC/CANCEL** [4].

The audio analyzer's user interface is activated again.

### Menus for system and service functions


PRESET	Selects and calls the instrument's default setting	(↗ 6-276)
STATE	Displays the current instrument settings	(↗ 6-278)
FILE	Saves and loads user-defined settings	(↗ 6-280)
CONFIG	System settings	(↗ 6-287)
SERVICE	Service functions	(↗ 6-296)
INFO	System information	(↗ 6-297)
CALIB	Perform the automatically calibration	(↗ 6-300)

### 6.5.1 Instrument Default Setting (Menu PRESET)

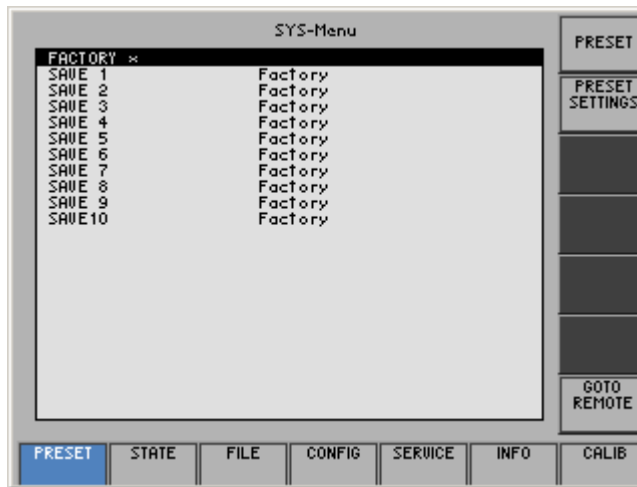
What the settings are for

From the PRESET menu, you can specify a user-defined instrument setting as the instrument default setting and directly call it.




Selecting the PRESET menu

1. Press the **BACK/SYS key** [3].
2. Select the menu  with the **◀** or **▶** **cursor key** [6].

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



Function key assignment

	Call an instrument default setting	(↗ 6-277)
	Select an instrument default setting	(↗ 6-277)
	Start the remote control manually	(↗ 6-280)


### 6.5.1.1 Selecting and Calling the Instrument Default Setting

#### Use

When you switch on the R&S UP300/350, those settings that were valid when the R&S UP300/350 was last switched off are restored.

The R&S UP300/350 also lets you save and call user-defined instrument settings. If you frequently use one of these settings and want to load it quickly, you can define this setting to be the PRESET (default setting) and call it directly at any time.

#### Selecting user-defined settings


1. Save the user-defined settings (➤ 6-282).
2. Select the menu  with the ◀ or ▶ cursor key [6].

A table containing the available settings is displayed. The current setting is marked with the sign x.



FACTORY x	
SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 09.01.2005 12:00
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE 10	Factory

3. Select a setting with the ▲ or ▼ cursor key [7].  
The selected option is highlighted.  
The PRESET memory location FACTORY contains the factory setting (➤ 6-92).


FACTORY x	
SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 09.01.2005 12:00
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE 10	Factory

4. Press the function key .  
The setting is defined to be the instrument default setting and is marked with the sign x.

#### Activating the instrument default setting

- Press the  function key in the  menu.  
The current instrument default setting is loaded and the SYS menu is left. The audio analyzer's user interface is activated again.

## NOTE

If no user-defined settings have been defined, the PRESET function key  is assigned the FACTORY PRESET, e.g. the factory default setting (➤ 6-92).

### 6.5.2 Displaying the Current Instrument Setting (Menu STATE)

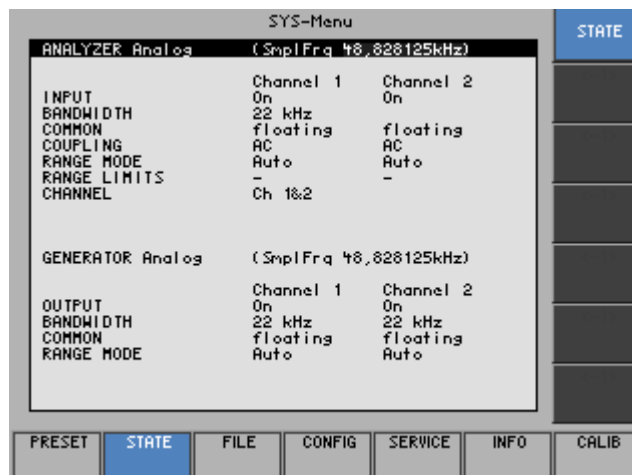
What the settings are for

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** [3].
2. Select the **STATE** menu with the **◀** or **▶** cursor key [6].

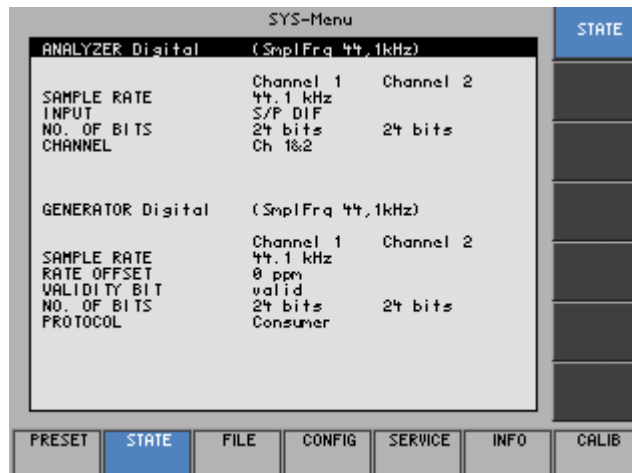
The principal analyzer and generator configuration settings are listed in a table.



Analog:  
Explanation of parameters

<b>ANALYZER Analog</b>	Active analyzer typ (analog)	(↗ 6-174)
<b>INPUT</b>	Signal source	(↗ 6-177)
<b>BANDWIDTH</b>	Bandwidth of the analyzer	(↗ 6-175)
<b>COMMON</b>	Reference potential of the output signal	(↗ 6-104)
<b>COUPLING</b>	Signal coupling	(↗ 6-178)
<b>RANGE MODE</b>	Level range switching mode	(↗ 6-179)
<b>RANGE LIMITS</b>	Level range limits	(↗ 6-179)
<b>CHANNEL</b>	Selected measurement channel	(↗ 6-180)
<b>GENERATOR Analog</b>	Active generator typ (analog)	(↗ 6-102)
<b>OUTPUT</b>	State of the generator output	(↗ 6-105)
<b>BANDWIDTH</b>	Bandwidth of the generator	(↗ 6-103)
<b>COMMON</b>	Reference potential of the output signal	(↗ 6-104)
<b>RANGE MODE</b>	Level range switching mode	(↗ 6-106)

Digital:  
Explanation of  
parameters



<b>ANALYZER Digital</b>	Active analyzer typ (digital)	(↗ 6-174)
<b>SAMPLE RATE</b>	Sample frequency of the input signal	(↗ 6-181)
<b>INPUT</b>	Input signal	(↗ 6-182)
<b>NO. OF BITS</b>	Wordwidth of the input signal	(↗ 6-182)
<b>CHANNEL</b>	Selected measurement channel	(↗ 6-180)
<b>GENERATOR Digital</b>	Active generator typ (digital)	(↗ 6-102)
<b>SAMPLE RATE</b>	Sample frequency of the output signal	(↗ 6-108)
<b>RATE OFFSET</b>	Offset of the Sample frequency	(↗ 6-109)
<b>VALIDITY BIT</b>	State of the validity bit	(↗ 6-109)
<b>NO. OF BITS</b>	Wordwidth of the output signal	(↗ 6-110)
<b>PROTOCOL</b>	Interface protocol	(↗ 6-110)

### 6.5.2.1 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) (↗ 6-291).

You can also switch the R&S UP300/350 to remote control manually.

#### Start the remote control manually

- Press the  function key in the  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.

---



### 6.5.3 User-Defined Settings (FILE Menu)

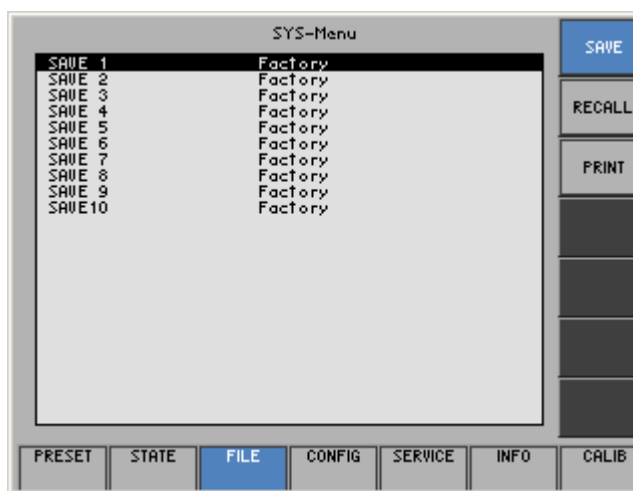
What the settings are for

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 key [6].

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



Function key assignment

	Save a user-defined setting	(↗ 6-282)
	Load a user-defined setting	(↗ 6-282)
	Print out a screenshot	(↗ 6-284)
	Save the measurement results	(↗ 6-286)

### 6.5.3.1 Saving and Loading User-Defined Settings

#### Use

When you switch on the R&S UP300/350, those settings that were valid when the R&S UP300/350 was last switched off are restored.

The R&S UP300/350 also lets you 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 SAVE memory locations.

#### Saving user-defined settings

1. Set up the R&S UP300/350 for the measurement you want to perform (↗ 6-171).

2. Press the **SAVE** function key in the **FILE** menu.

A table containing the available settings is displayed (memory locations).

SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	Factory
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory

3. Select a setting with the **▲** or **▼** cursor key [7].

The selected option is highlighted.

4. Press the **ENTER** key [5].

An entry field for entering a file name is displayed. The default setting is "user saved".



5. Enter a new file name from the **numerical keys** [12] or from an external keyboard (↗ 3-46).

6. Press the **ENTER** key [5].

The current setting is saved and the text "Factory" is replaced by the file name, the date and time.

SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 09.01.2005 08:50
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory

## Loading user-defined settings

1. Press the **RECALL** function key in the **FILE** menu.

A table containing the available settings is displayed (memory locations).

SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 09.01.2005 08:50
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory

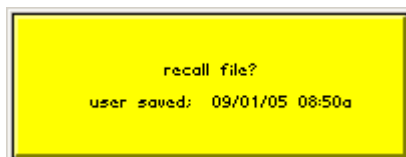
2. Select a setting with the **▲** or **▼** cursor key [7].

The FACTORY memory location contains the factory setting (↗ 6-92).

SAVE 1	Factory
SAVE 2	Factory
SAVE 3	Factory
SAVE 4	Factory
SAVE 5	user saved; 09.01.2005 08:50
SAVE 6	Factory
SAVE 7	Factory
SAVE 8	Factory
SAVE 9	Factory
SAVE10	Factory

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 to be the PRESET (default setting) and call it directly at any time (↗ 6-277).

### 6.5.3.2 Printing out a Screenshot

#### Use

The R&S UP300/350 prints out (printer) or saves (USB stick) a current screenshot when you press the BACK/SYS key and an overview of the principal current instrument settings. A printer with a USB device connector or a USB stick is required.

For this you need a printer with USB DEVICE connector or a USB stick.

#### Selecting an output unit

1. Press the **PRINT** function key in the **FILE** menu.

A table containing the available parameters is displayed.

2. Select the **PRINTER** parameter with the **▲** or **▼** cursor key [7].

PRINT SCREEN	Press Enter
PRINT SCREEN + PARAM	
PRINTER	HP DeskJet mono

3. Press the **ENTER** key [5].

A selection field containing the available settings is displayed. The default setting is "HP DeskJet mono".

PRINTER	
HP DeskJet mono	
HP DeskJet color	
HP LaserJet 111	
HP LaserJet 1V	
HP LaserJet V	
USB Stick	

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 a screenshot only

1. Connect a printer to the **USB connector DEV** [17].
2. Select a output unit (printer, USB stick) (↗ 6-284).

3. Press the **PRINT** function key in the **FILE** menu.

A table containing the available parameters is displayed.

4. Select the **PRINT SCREEN** parameter with the **▲** or **▼** cursor key [7].

PRINT SCREEN	Press Enter
PRINT SCREEN + PARAM	
PRINTER	HP DeskJet mono

5. Press the **ENTER** key [5].

The following message is displayed.

Printing
----------

A current screenshot is printed out/saved.

### Printing out/saving a screenshot and parameters

1. Connect a printer to the **USB connector DEV** [17].
2. Select a output unit (printer, USB stick) (↗ 6-284).
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 key [7].

PRINT SCREEN	Press Enter
PRINT SCREEN + PARAM	
PRINTER	HP DeskJet mono

5. Press the **ENTER** key [5].  
The following message is displayed.

Printing

A current screenshot and an overview of the principal current instrument settings (↗ 6-278) is printed out/saved.

When the USB stick is not connected the following message is displayed:

usb printer not found  
please connect it!

- Connect the USB stick to the **USB connector DEV** [17] and confirm the message by pressing the **ENTER** key [5].

### NOTE

When the USB stick is not connected the following message is displayed:

No Stick!  
Please plug usb stick on device.  
Confirm Message with ENTER

- Connect the USB stick to the **USB connector DEV** [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 (↗ 6-209) are stored.
- **SWEEP LIST->USB STICK**  
Value pairs of the SWEEP measurement (↗ 6-154) are stored.
- **THD LIST->USB STICK**  
Value pairs of the THD measurement (↗ 6-217) are stored.

For this you need a USB stick.

#### Saving the measurement results in the USB stick (ASCII format)

1. Connect the USB stick to the **USB connector DEV** [17].
2. Select the USB stick for the output unit (↗ 6-284).
3. Press the **PRINT** function key in the **FILE** menu.  
A table containing the available parameters is displayed.
4. Select the **PRINT SCREEN** parameter with the **▲** or **▼** cursor key [7].

```
PRINT SCREEN          Press Enter
PRINT SCREEN + PARAM
PRINTER              HP DeskJet mono
```

5. Press the **ENTER** key [5].

An entry field for entering a file name is displayed. The default setting is "UP300\_Date\_Time".

```
file name  UP300_050105_1108
```

**NOTE:** If you wish you can enter a new file name from the **numerical keys** [12] or from an external keyboard (↗ 3-51).

6. Press the **ENTER** key [5].

The current measurement results before you press the BACK/SYS key is saved in ASCII format in the USB stick.

When the USB stick is not connected the following message is displayed:

```
No Stick!
Please plug usb stick on device.
Confirm Message with ENTER
```

#### NOTE

- Connect the USB stick to the **USB connector DEV** [17] and confirm the message by pressing the **ENTER** key [5].

## 6.5.4 System Settings (CONFIG Menu)

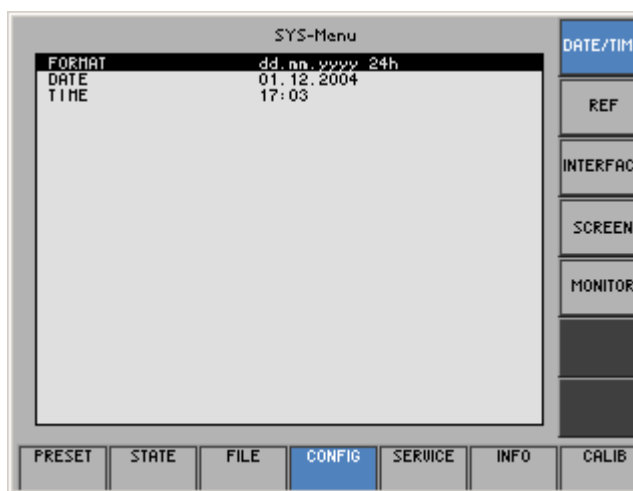
What the settings are for

You can configure the general system parameters for time/date, reference source, instrument interface and screen saver from the CONFIG menu.

Selecting the CONFIG menu

1. Press the **BACK/SYS key** [3].
2. Select the **CONFIG** menu with the **◀** or **▶** cursor key [6].

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



Function key assignment

<b>DATE/TIME</b>	Sets the date and time	(↗ 6-288)
<b>REF</b>	Selects an internal or external reference source	(↗ 6-290)
<b>INTERFACE</b>	Configures the instrument interfaces	(↗ 6-291)
<b>SCREEN</b>	Sets the screen saver mode	(↗ 6-293)
<b>MONITOR</b>	Selects an internal or external monitor	(↗ 6-295)

### 6.5.4.1 Setting the Date and Time of Day

#### Use

When you save a setting, it is time-stamped using the time provided by the internal real-time clock (➔ 6-282).

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** functions key in the **CONFIG** menu.  
 A table containing the available parameters is displayed.
2. Select the **FORMAT** parameter with the **▲** or **▼** cursor key [7].

FORMAT	dd.mm.yyyy	24h
DATE	01.12.2004	
TIME	17:03	

3. Press the **ENTER** key [5].

A selection field containing the available settings is displayed. The default setting is "dd.mm.yyyy".

FORMAT		
dd.mm.yyyy	24h	
mm/dd/yyyy	12h	

4. Select a setting with the **rotary knob** [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 key [7].

FORMAT	dd.mm.yyyy 24h
DATE	01.12.2004
TIME	17:03

3. Press the **ENTER** key [5].  
An entry field containing the current setting is displayed.

Date	01.12.2004
------	------------

4. Enter a new value (↻ 5-70).
5. Press the **ENTER** key [5].  
The setting is saved and displayed.

Setting  
the time

1. Press the **DATE/TIME** function key in the **CONFIG** menu.  
A table listing the available parameters is displayed.
2. Select the **TIME** parameter with the **▲** or **▼** cursor key [7].

FORMAT	dd.mm.yyyy 24h
DATE	01.12.2004
TIME	17:03

3. Press the **ENTER** key [5].  
An entry field containing the current setting is displayed.

Time	17:13
------	-------

4. Enter a new value (↻ 5-70).
5. Press the **ENTER** key [5].  
The setting is saved and displayed.

### 6.5.4.2 Selecting an Internal or External Reference Source

#### 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.

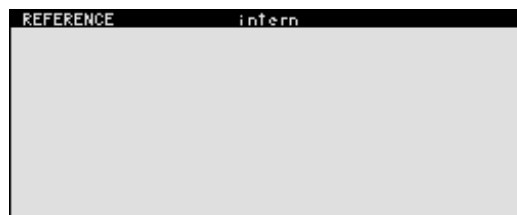
When the “REFERENCE external” setting is activated, the REF IN connector [23] is used as the input for an external frequency standard. All the R&S UP300/350’s internal oscillators are synchronized to this external reference frequency (also 10 MHz).

#### Selecting the reference source

1. When required, connect the external reference source to the REF IN connector [23].

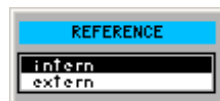
2. Press the  function key in the  menu.

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 “internal”.



4. Select a reference source with **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

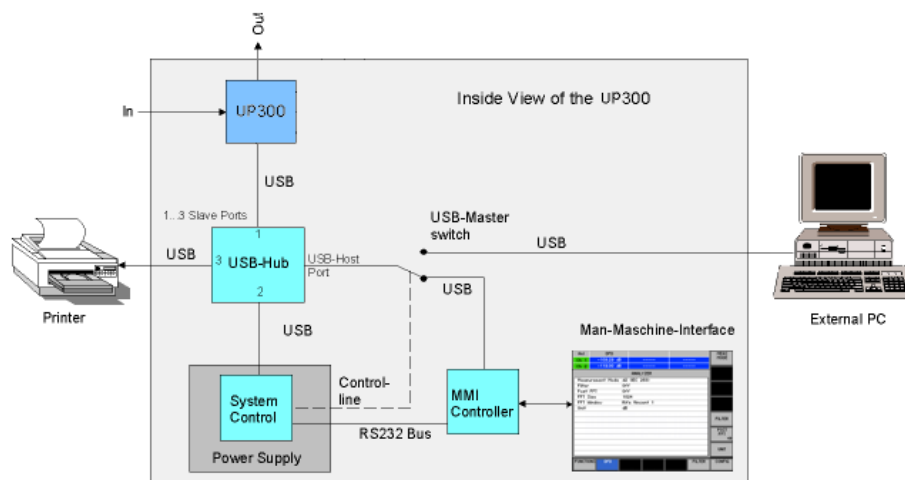
If there is no reference signal when you switch over to an external reference, the message PLL is output in the status line of the main menu after a short delay to indicate that there is no sync.

### 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 internal USB master (local control on the instrument) and external USB master (remote control via PC) is effected by means of a USB master switch.



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”. Under Windows™, the R&S UP300/350 is recognized as a new USB device, and is thus available for software applications on the PC.

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 physically disconnected. Reactivate the AUTO 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 (↗ 6-280).

- **INSTRUMENT**

The INSTRUMENT setting is required if the R&S UP300/350 is to be controlled only via the front panel (local control), irrespective of a PC connection. This setting avoids automatic switchover to “remote control”.

When you switch the INSTRUMENT setting to AUTO, an existing PC is recognized, and the R&S UP300/350 automatically switches to “remote control”. You can also switch the R&S UP300/350 to remote control manually (↗ 6-280).

Setting the  
USB master selector

- **EXTERN**

If EXTERNAL is set, the USB master switch is in 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 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 (↗ 6-280).

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

The setting is saved.

**NOTE**

With remote control, the local control mode of the R&S 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.

### 6.5.4.4 Setting the Screen Saver Mode

#### Activating the screen saver

The R&S UP300/350 has a screen-saver function that turns off the screen [14] after a certain time. There are a number of timing options for screen turn-off:

- **none**  
The screen is always on.
- **5 min**  
The screen is turned off after 5 minutes.
- **30 min**  
The screen is turned off after 30 minutes.

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

A table listing the available parameters is displayed.

2. Select the **SCREEN SAVER** parameter with the **▲** or **▼** cursor key [7].

SCREEN SAVER	none
REMOTE	picture

3. Press the **ENTER** key [5].

A selection field containing the available settings is displayed. The default setting is "none".

SCREEN SAVER	
none	
5 min	
30 min	

4. Select a setting with **rotary knob** [11].
5. Press the **ENTER** key [5].

The setting is saved and the screen saver is activated or de-activated.

### Activating the Screen saver in remote-control mode

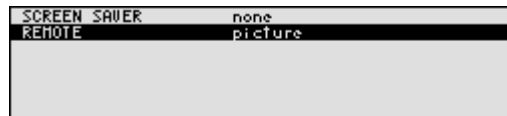
If the instrument is in remote-control mode and the results are being displayed on the controller (PC monitor) the screen can be switched off.

- **picture**  
The screen displays when the instrument is in remote-control mode.
- **black**  
The screen is switched off.

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

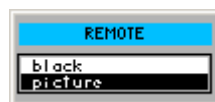
A table listing the available parameters is displayed.

2. Select the **REMOTE** parameter with the **▲** or **▼** cursor key [7].



3. Press the **ENTER** key [5].

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



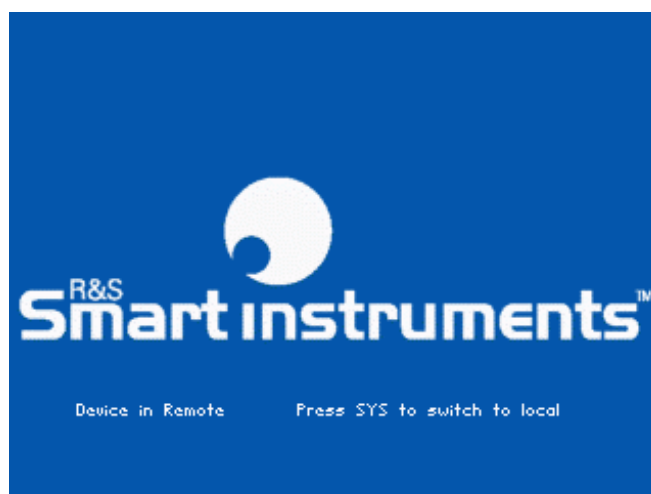
4. Select a setting with **rotary knob** [11].

5. Press the **ENTER** key [5].

The setting is saved and the screen disconnection in the remote-control mode is activated or de-activated.

With the “black” setting, the screen is, of course, black, and only the green LED [2] indicates that the R&S 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. Switching between remote control and local control takes approx. 20 s.

### 6.5.4.5 Selecting an Internal or External Monitor

**Use** Screen display is possible via the internal monitor or an external monitor.

- **intern**  
Screen display is via the built-in colour TFT display.
- **extern**  
Screen display is via the connected monitor 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  **function key** in the  **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 **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)

What the settings are for

You can call a number of auxiliary functions to be used for servicing or troubleshooting from the SERVICE menu. These functions are not required for normal measurements with the R&S UP300/350.

Selecting the SERVICE menu

1. Press the **BACK/SYS key** [3].
2. Select the **SERVICE** menu with the **◀** or **▶** cursor key [6].

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



Function key assignment



Perform a selftest

(↗ 6-296)

### 6.5.5.1 Performing Selftests

Use

The R&S UP300/350 can perform a module selftest. If there is a fault, the R&S UP300/350 itself 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 text SELFTEST is displayed (↗ below).

2. Press the **ENTER key** [5].

The selftest starts. All modules are checked one after the other and the result, "passed" or "failed", is output.




### 6.5.6 System Information (INFO Menu)

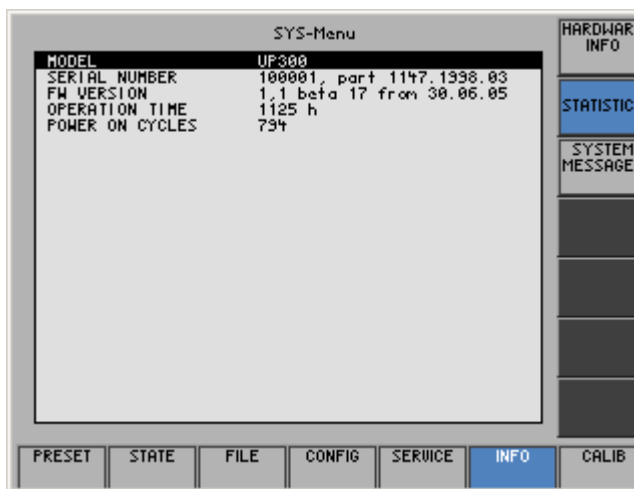
What the settings are for

You can obtain information such as module data, instrument statistics and system messages from the INFO menu.




Selecting the INFO menu

1. Press the **BACK/SYS key** [3].
2. Select the  menu with the **◀** or **▶** cursor key [3].

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



Function key assignment

	Displays module data	(↗ 6-298)
	Displays instrument statistics	(↗ 6-298)
	Displays system messages	(↗ 6-299)

### 6.5.6.1 Displaying Module Data

**Use** You can display the serial number of the modules installed in the R&S UP300/350.

**Calling module data**

- Press the  function key in the  menu.

A table listing the current modules and the serial number is displayed.

### 6.5.6.2 Displaying 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  function key in the  menu.

A table listing the current data is displayed.

<b>MODEL</b>	<b>UP300</b>
SERIAL NUMBER	100001, part 1147.1338.03
FW VERSION	1.1 beta 17 from 30.06.05
OPERATION TIME	1125 h
POWER ON CYCLES	734

### 6.5.6.3 Displaying 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 system messages

1. Press the **SYSTEM MESSAGES** function key in the **INFO** menu.

A table listing the current system messages is displayed.

2. Select a system message with the **▲** or **▼** cursor key [7].

Delete 5 Messages				
05.01.05	10:36	UP	ERROR 0x8E00	Parameter 0x0000
05.01.05	10:35	UP	ERROR 0x8E00	Parameter 0x0000
05.01.05	10:31	UP	ERROR 0x8E00	Parameter 0x0000
05.01.05	17:55	UP	ERROR 0x8E00	Parameter 0x0000
05.01.05	17:54	UP	ERROR 0x8E00	Parameter 0x0000

3. Press the **ENTER** key [5].

The current system message is clearly displayed with the date and time of their occurrence and the error code.

MESSAGE	
Date:	05.01.05
Time:	10:35
Message:	UP ERROR 0x8E00
	Parameter 0x00000010 and 0x0000


4. Press the **ENTER** key [5] for closing the display.

## 6.5.7 Calibration Functions (Menu CALIB)

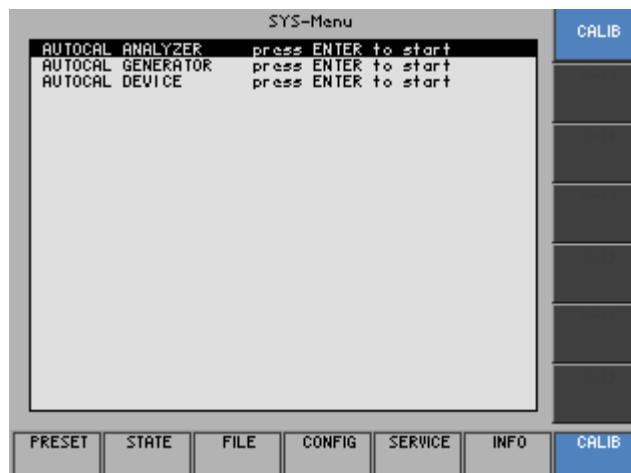
What the settings are for

Via the CALIB menu, you can call up automatic calibration of the generator and analyzer modules, especially to reduce the influence of DC offset. You can calibrate the generator and analyzer separately, or calibrate the entire instrument.

Selecting the CALIB menu

1. Press the **BACK/SYS** key [3].
2. Select the  menu with the ◀ or ▶ **cursor key** [6].

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



Function key assignment



Perform auto calibration

(↗ 6-301, 6-301, 6-302)

### 6.5.7.1 Starting the Auto Calibration of Analyzer Modules

#### Use

The R&S UP300/350 can perform a auto calibration of the analyzer modules.

#### Calibrating 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 key [7].

AUTOCAL ANALYZER	press ENTER to start
AUTOCAL GENERATOR	press ENTER to start
AUTOCAL DEVICE	press ENTER to start

3. Press the **ENTER** key [5].

The auto calibration starts. The analyzer modules are calibrated and the message „Calibrating, please wait“ appears. After calibration the result, “Success” or “Error”, is output after approx. 25 s.

**NOTE:** If the results are erroneous, you should perform the selftest of the instrument (↗ 6-296) and repeat calibration. If the error occurs again, contact Customer Service (↗ 0-35).

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

The old calibration state is retained.

### 6.5.7.2 Starting the Auto Calibration of Generator Modules

#### Use

The R&S UP300/350 can perform a auto calibration of the generator modules.

#### Calibrating 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 key [7].

AUTOCAL ANALYZER	calibrating, please wait
AUTOCAL GENERATOR	press ENTER to start
AUTOCAL DEVICE	press ENTER to start

3. Press the **ENTER** key [5].

The auto calibration starts. The generator modules are calibrated and the message „Calibrating, please wait“ appears. After calibration the result, “Success” or “Error”, is output after approx. 25 s.

**NOTE:** If the results are erroneous, you should perform the selftest of the instrument (↗ 6-296) and repeat calibration. If the error occurs again, contact Customer Service (↗ 0-35).

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

The old calibration state is retained.

### 6.5.7.3 Starting the Auto Calibration of R&S UP300/350

**Use** The R&S UP300/350 can perform a auto calibration of all instrument modules.

**Calibrating  
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 key [7].

```
AUTOCAL ANALYZER  calibrating, please wait
AUTOCAL GENERATOR press ENTER to start
AUTOCAL DEVICE    press ENTER to start
```

3. Press the **ENTER** key [5].

The auto calibration starts. All instrument modules are calibrated and the message „Calibrating, please wait“ appears. After calibration the result, “Success” or “Error”, is output after approx. 25 s.

**NOTE:** If the results are erroneous, you should perform the selftest of the instrument (↗ 6-296) and repeat calibration. If the error occurs again, contact Customer Service (↗ 0-35).

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

The old calibration 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 will be found at the front of this manual.

### 7.1 Keyboard Connector (KEYB)

**Connector** There is a 6-pin PS/2 connector KEYB [22] on the R&S UP300/350's rear panel 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 connector MON [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)

<b>External reference</b>	If an external reference is used, the internal reference oscillator is synchronized to the 10 MHz reference signal at connector REF IN/OUT [23]. The input level must be 0.5 to 2 V.
<b>Internal reference</b>	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.
<b>Instrument setting</b>	You can switch over between the internal and external reference in the CONFIG menu (➤ 6-290).

## 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)

<b>Connector</b>	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.	
<b>Specification</b>	Connector:	mini jack 3,5 mm
	Output impedance:	15 Ohm
	Voltage:	1 V (without load)
<b>Instrument setting</b>	The MONITOR menu allows you to make the settings when an external headphone is used (➤ 6-169).	



## 8 Error Messages

### This chapter

Refer to chapter 8 for a description of errors that may occur in the R&S UP300/350. 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 in 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 of internally detected errors. The following informs are displayed, e. g.:

- Type of error (**x**)
- Four-digit error number (**y**)
- Request for closing the system messages (**z**)



The error number allows the service shop to determine the type of error. In the event of an system message, please write down the error number and proceed according to the following steps.

#### Device Error "Error number"

A system error was detected in the instrument.

1. Please write down the error number and the corresponding instrument settings.
2. Contact your nearest Rohde & Schwarz representative (☎ 0-36). 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 reduced air circulation.

1. Let the instrument cool off for a while and remove any obstructions that could hinder air circulation.
2. If this doesn't eliminate the overtemperature, have the instrument checked by the service shop.

### NOTE

Some errors can cause the instrument or parts of the instrument to be switched off immediately in order to avoid destruction of components. Whenever an system message occurs, an entry is made under SYSTEM MESSAGES (☞ 6-299).

## 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 at the output 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 the causes of 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 fault lasts for longer than 2 seconds. The output should be switched on again after the fault has been rectified (↗ 6-104).

**OVL A** The level at the input 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 (↗ 6-106).
3. The input level exceeds the value  $V_{\text{rms}} > 33 \text{ V}$ . Reduce the input level.

**PLL unlock** The control loop, which is used to set the frequency of the internal reference oscillator with crystal accuracy, does not lock. This causes a frequency error, and the spectrum analyzer no longer operates according to specifications. The cause for this may be an internal instrument error or the absence of the 10 MHz reference signal at the external input REF IN. The absence of the reference signal, however, is not indicated unless the reference has been switched to "external".

1. If the missing external reference signal is the cause of this error message, connect a 10 MHz signal to the REF IN [23] input or switch the reference to "internal" (↗ 6-290).
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 reduced air circulation.

1. Let the instrument cool off for a while and remove any obstructions that could hinder air circulation.
2. If this doesn't eliminate the overtemperature, have the instrument checked by the service shop.

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