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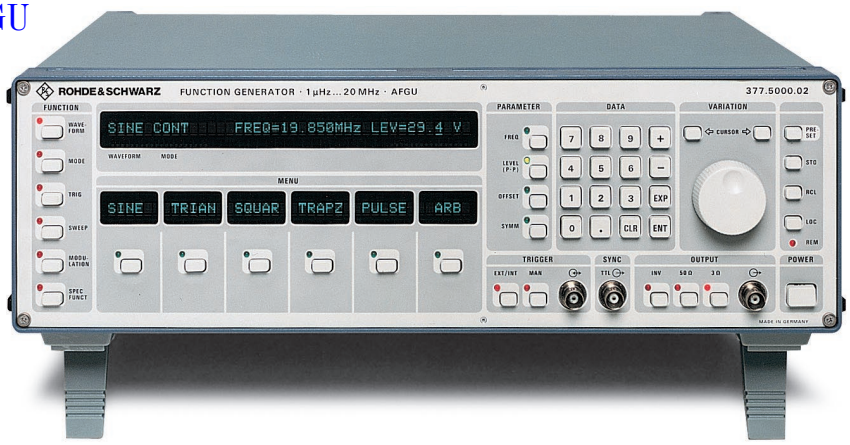
Function Generators AFG, AFGU

AFG: 10 mHz to 20 MHz

AFGU: 1 µHz to 20 MHz

Generation of standard waveforms, versatile operating and modulation modes



AFGU (photo 35573)

Brief description

AFG and AFGU provide practically all signals that are required in electronics, electroacoustics, vibration measurements, material testing and control engineering. Modulation modes include AM, FM, PM (pulse), FSK (frequency shift keying) and VCO operation. FSK and PM can be triggered internally or externally. AM and FM can be produced with the aid of external modulation signals.

Typical applications

- Analog and digital techniques
- All broadband applications such as frequency response/filter measurements
- Acoustic measurements
- Frequency divider and multiplier (AFGU)
- Waveform regeneration, transformation
- On/off ratio variation, level shift keying
- Stimulating source in test systems
- Tests on sonar equipment
- Control engineering
- Triggering of pressure, tension and torsion testing machines in material testing
- Triggering of test equipment for vibration testing and operational load simulation

Main features

- Ramp and sine^2 pulse through variation of symmetry, start/stop phase and DC offset
- Single pulses, pulse trains – internally /externally triggered, adjustable edges
- Linear/logarithmic sweep (phase-continuous steps)
- AM, FM, VCO, pulse modulation and frequency shift keying

Additional features of AFGU

- Synthesizer-accurate signals
- Arbitrary (ARB) waveforms
- Use of special ARB software (AWD-K1; page 245) on a PC
- F/N and FxN mode
- Arbitrary (ARB) sweep
- Enhanced level range, selectable source impedance 5/50 Ω

Operating modes

Continuous
Low-distortion sine, linear triangle and precise squarewave signals with adjustable symmetry.

Arbitrary waveform ARB (AFGU)
Any user-specific waveforms; for the definition of such waveforms a memory providing a resolution of 4096 x 1024 points is available.

Pulse
Pulses up to 20 MHz with rise/fall times of 10 ns and minimum pulse widths of 25 ns. In the BURST MODE, single pulses, double pulses or pulse trains can be generated.

Burst
Preselected number of full cycles, internally or externally triggered. The BURST MODE can be selected for sine, triangle and square waveforms – even with variable symmetry.

$^1/_2$-CYCLE BURST MODE
Half cycles of the selected waveform.

GATE MODE
Signal switched on for the duration of the internal or external GATE signal.

SWEEP MODE
Periodic sweep, single-shot sweep and externally triggered sweep; the sweep can take the form of a ramp, triangle or trapeze, with linear or logarithmic frequency steps. AFGU additionally provides a digital, arbitrary sweep (the arbitrary sweep trace is defined by the ARB waveform).

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FxN MODE and F/N MODE (AFGU)
Output signal synchronized to internal or external trigger signal; the ratio of output signal (sine, triangle and square) to trigger signal is determined by the factor N or 1/N.

Modulation

Amplitude modulation
Level control and level keying are possible through DC coupling of the AM input.

Frequency modulation/VCO mode
The maximum deviation depends on the carrier frequency selected. The VCO mode is suitable for analog sweep applications.

Pulse modulation
Allows internally or externally triggered signal blanking.

FSK modulation
The two frequencies may have any relative values up to a ratio of 1:10 (switchover by internal or external triggering).

Option, software

50 MHz frequency extension
Frequency range extension from 20 to 50 MHz for the sync output (TTL/HCMOS) of the AFGU.

Arbitrary Waveform Designer AWD-K1
Software for generating complex waveforms.

Specifications in brief: AFG

Frequency	
Sine, triangle, square	10 mHz to 20 MHz (symm. 50%) 2 Hz to 2 MHz (symm. 5 to 95%)
Trapeze	666 µHz to 500 kHz
Pulse/sin² pulse	666 µHz to 1 MHz
Ramp	2 Hz to 2 MHz
Resolution	3.5 digits
Signal output	
Output voltage (AC)	can be set independently of DC offset
Range	0 to 10 V pp into 50 Ω
DC offset voltage	can be set independently of AC
Range	+5 to –5 V into 50 Ω
SYNC output	TTL, 50 Ω, symmetry and frequency same as signal output
Waveforms	
Standard functions	sine, triangle, square, trapeze, pulse
Derived functions	ramp, sin² pulse by symmetry setting
Symmetry setting	for sine, triangle, square
Range	5 to 95% (of cycle)
Operating modes	(sine, triangle, square)
CONT	
BURST	
½-CYCLE BURST	
GATE	
SWEEP	
Modes	periodic, single-shot, externally triggered, manually triggered sweeps
Functions	lin/log, ramp up/down, triangle, trapeze
Trigger input/output	
Modes	internal, external
Internal	TTL/HCMOS, 1 kΩ
External	Z_{out} =1 kΩ, DC to 20 MHz
Modulation	
Modes	AM, FM, VCO external, PM internal/external, FSK internal/external
Carrier frequency	10 mHz to 20 MHz
General data	
Remote control	IEC 625-1/IEEE 488
Power supply	100/120/220/240 V ±10%, 47 to 63 Hz, 65 VA

Specifications in brief: AFGU

Data differing from that of Function Generator AFG

Frequency	
Sine, triangle, square, pulse	1 µHz to 20 MHz
Ramp, trapeze	1 µHz to 2 MHz
Signal sync output:	
Square (TTL/HCMOS)	1 µHz to 20 MHz
with option AFGU-B1	1 µHz to 50 MHz
Frequency resolution	6-digit, min. 1 µHz (continuous) 3.5-digit, min. 1 µHz (burst, gate)
Frequency error in synthesizer mode	setting error + error of reference
Setting error (2 kHz to 20 MHz)	$\pm 6 \times 10^{-7}$
Signal output	
Output impedance	50 Ω/<5 Ω selectable (f = 10 kHz)
Output voltage (AC)	
Range (V pp), EMF	0 to 30 V (I_{max} = 200 mA) 0 to 15 V (into 50 Ω with Z_s = 50 Ω)
DC offset voltage (Z_s = 50 Ω)	
Range	$\lvert V_{offset} \rvert \leq 10$ V–0.5 V pp
Waveforms	same as AFG, plus arbitrary waveforms
Operating modes	same as AFG, plus:
F/N and FxN	
DIGITAL SWEEP	
Optional 50 MHz TTL/CMOS Output AFGU-B1	
Frequency range	1 µHz to 50 MHz
Output signal	TTL, HCMOS into 50 Ω
General data	
Power supply	100/120/220/240 V ±10%, 47 to 63 Hz, 120 VA
Dimensions (W x H x D)	435 mm x 147 mm x 350 mm
Weight for fully equipped unit	10.5 kg (AFG), 14 kg (AFGU)

Ordering information

Function Generator	AFG	0377.2100.02
	AFGU	0377.5000.02
Extras		
Optional 50 MHz Frequency Extension, TTL/CMOS Output for AFGU	AFGU-B1	0351.8018.02
Service Kit	AZ-1	0377.4810.02
Arbitrary Waveform Designer (application software for AFGU)	AWD-K1	1026.4500.03