

# Signal Generator MS 1000

The Signal Generator MS 1000 is an universal RF signal source with wide frequency range and comprehensive modulation capabilities. The RF output frequency is directly derived from the internal highly stable OCXO reference oscillator, which ensures superior frequency accuracy.

All instrument settings can be entered easily by the numeric keyboard and the softkeys. A quasi-continuous rotary control knob allows simply modification of the selected parameters with free selectable delta-steps.

Comprehensive modulation modes are provided for testing all types of receivers. An internal modulation oscillator, an external signal or both of them can be used for modulation. The internal AF source generates a variety of waveforms, sine-wave, square-wave, triangle and saw-tooth.

The MS 1000 provides most of the international tone signalling standards for applications in radio communications. Double-tone, analog sel-call (17 standards), digital sel-call (3 standards) and subaudio-tone encoders are available as options. The POCSAG encoder (option) allows pager testing with various modes, tone-only, numeric and alphanumeric. In the alphanumeric mode all ASCII characters can be generated.

A large dot matrix LCD screen with switchable backlighting offers an excellent contrast to display all instrument parameters. A simple softkey-menu operating system can be used to configure the MS 1000 to the user's required test application. Up to 100 complete instrument settings can be stored in a non-volatile memory.

The IEEE-Bus interface is fitted as standard to remote control all instrument settings over the bus. This allows the application of MS 1000 in ATE-systems.

The instrument can be powered from AC mains supply or from an external DC battery for applications in areas where a stable AC supply is not guaranteed.



## Specifications MS 1000

### Amplitude Modulation:

Modulation frequency range: ..... 0 ... 20 kHz  
Modulation depth m: ..... 0 ... 99.9 %  
Resolution: ..... 0.1 %  
Accuracy: .....  $\leq \pm 5\%$  of m  
(10 % < m < 80 %, AF 20 Hz ... 10 kHz)  
Distortion (m = 50 %, AF = 1 kHz): .....  $\leq 2.5\%$

### Frequency Modulation:

Modulation frequency range: ..... 0 ... 32 kHz  
Carrier frequency/deviation:  
100 kHz .... 125 MHz  $\pm 312.5$  kHz  
125 MHz ... 250 MHz  $\pm 156.0$  kHz  
250 MHz ... 500 MHz  $\pm 312.5$  kHz  
500 MHz ... 1000 MHz  $\pm 625.0$  kHz  
Resolution: ..... 10 Hz  
Accuracy: (deviat. > 5 kHz, 20 Hz ... 32 kHz) .....  $\leq \pm 5\%$   
AF-weighted with LP to 32 kHz  
Distortion: (75 kHz deviat., AF = 20 Hz ... 2 kHz) .....  $\leq 1\%$   
Carrier frequency accuracy at FM-DC: ...  $\leq \pm 200$  Hz + Ref.  
(RF = 999 MHz, deviation  $\pm 625$  kHz)

### Phase Modulation:

Modulation frequency range: ..... 250 Hz ... 2 kHz  
Carrier frequency/deviation:  
100 kHz .... 125 MHz 0 ..... 78 rad  
125 MHz ... 250 MHz 0 ..... 39 rad  
250 MHz ... 500 MHz 0 ..... 78 rad  
500 MHz ... 1000 MHz 0 ..... 156 rad  
Resolution: ..... 0.01 rad  
Accuracy (deviation > 2 rad, AF > 300 Hz): .....  $\leq \pm 5\%$   
Distortion (deviation = 10 rad, AF = 1 kHz): .....  $\leq 1\%$

### External modulation:

Input impedance: ..... 1 M $\Omega$   
Nominal input voltage: ..... 2 V<sub>pp</sub>  
Max. permissible input voltage: ..... 5 V<sub>pp</sub>  
Connector: ..... BNC-socket

### AF-Generator:

Frequency range: ..... 0 ... 32 kHz  
Frequency resolution (f < 3.2 kHz): ..... 0.2 Hz  
(f  $\geq 3.2$  kHz): ..... 2 Hz  
Frequency accuracy: .....  $\leq \pm 0.01\%$   
Output level: ..... 1 mV<sub>rms</sub> ... 2.5 V<sub>rms</sub>  
Level accuracy: .....  $\leq \pm 5\%$   
Distortion (level  $\leq 50$  mV<sub>rms</sub>; 1 kHz): .....  $\leq 0.2\%$   
Wave forms: ..... sine-wave, saw-tooth+, saw-tooth-  
triangle, square wave  
Source impedance: ..... 600  $\Omega$   
Connector: ..... BNC-socket

### Signalling (options):

Encoders: ..... subaudio-tone; double-tone; sel-call;  
digital sel-call; POCSAG

**Double-tone encoder:** ..... tone 1 external, tone 2 internal  
Standards: ..... DTMF, USER  
Tone duration: ..... 1 ms ... 9999 ms  
Delay: ..... 0 ms ... 9999 ms

### Sel-call encoder:

Standards: ZVEI 1; ZVEI 1-3; ZVEI 2; ZVEI 2-3; EIA; EEA;  
CCIR; CCITT; EURO; ZVEIGB; ZVEIGB-6; ZVEIGB-7;  
ZVEIF; ZVEIDP; VDEW; NATEL; AUTOA; USER  
Tone duration: ..... 1 ms ... 999 ms  
Delay between tones: ..... 0 ms ... 999 ms  
Delay repeat call: ..... 0 ms ... 999 ms  
Prolongation 1st tone: ..... 0 ms ... 999 ms  
Call sequence: ..... 1x; 2x; 10x

### Digital sel-call encoder:

Standards: ..... DIN 45013; VDEW; B.O.S. (FMS)  
Data entry: ..... hexadecimal  
Delay repeat call: ..... 0 ms ... 999 ms  
Call sequence: ..... 1x; 2x; 10x

### POCSAG:

Free access to carrier frequency, RF-level, deviation  
Tone-only: ..... tones (A, B, C, D)  
Numeric: ..... tone-II, tone-III, 0 ... 20 digits  
Alphanumeric: tone-II, tone-III, max. lengths 80 characters,  
freely editable text with all ASCII characters

### General data:

Display: ..... LCD-graphic display (256 x 64 dots)  
Backlighting: ..... bright LED's, with switch on/off  
Internal memory: ..... 100 complete instrument settings  
Interface: ..... IEEE-Bus listener  
Power supply: ..... 110 V/120 V, 220 V/240 V  $\pm 10\%$   
47 Hz ... 63 Hz; approx. 50 VA  
DC input: ..... + 11 V ... + 16 V; approx. 36 W  
Battery charging (ext. battery): ..... 14.2 V; max. 500 mA  
Electrical safety: ..... EN 61010  
Operating temperature: ..... + 5 °C ... + 45 °C  
EMC: ..... CE-mark  
Dimensions (W x H x D): ..... 360 mm x 168 mm x 340 mm  
Weight: ..... approx. 11 kg

### Supplied accessories :

1 ea. .... Power cord  
1 ea. .... Battery cord  
1 set ..... Spare fuses  
1 ea. .... Operating manual

### Ordering information:

Signal Generator MS 1000 with IEEE-Bus BN 86203.001

### Options:

Sel-call, double-tone ..... BN 86203.201  
Digital sel-call (VDEW, DIN, B.O.S.) ..... BN 86203.202  
POCSAG ..... BN 86203.207