

# Frequency Synthesizers ND 500 D and ND 1000 D

The Frequency Synthesizers ND 500 D and ND 1000 D are the most intelligent bench top instruments of our synthesizer models. This remarkable design has all the attributes demanded by Research & Development, calibration laboratories and production. All instrument settings are displayed on a LCD and can be stored in a non-volatile memory. Data entry to set frequency and output level is done via numeric keyboard, function keys or rotary control knob. The ND 1000 D is also available with a programmable output attenuator down to - 137 dBm. The excellent high spectral purity of the output signal (SSB-phase noise  $\leq - 126$  dBc/Hz; residual FM  $\leq 0.1$  Hz) allows applications as local oscillator (LO) during the R&D phase of new module designs.

## Frequency Synthesizer ND 500 D

- ◆ Frequency range 100 kHz ... 500 MHz
- ◆ Keyboard entry or rotary control knob to set frequency, output level and LCD
- ◆ Highly-stable refer. frequency (OCXO)
- ◆ Residual FM  $\leq 0.1$  Hz
- ◆ SSB phase noise  $\leq - 130$  dBc/Hz
- ◆ Fast frequency switching  $\leq 1 \mu\text{s}$
- ◆ Output level 0 dBm ... + 13 dBm
- ◆ BCD parallel control
- RS 232 and IEEE-Bus as option

## Frequency Synthesizer ND 1000 D

- ◆ Frequency range 10 kHz ... 1000 MHz
- ◆ Keyboard entry or rotary control knob to set frequency, output level and LCD
- ◆ Highly-stable refer. frequency (OCXO)
- ◆ Residual FM  $\leq 0.1$  Hz
- ◆ SSB phase noise  $\leq - 130/122$  dBc/Hz
- ◆ Fast frequency switching  $\leq 1 \mu\text{s}$
- ◆ Output level - 137 dBm ... + 13 dBm
- ◆ BCD parallel control
- RS 232 and IEEE-Bus as option



## Specifications ND 500 D

### Reference Frequency:

Frequency/Type: ..... 10 MHz/OCXO  
Temperature stability (+ 5 °C ... + 45 °C): .....  $\leq 3 \times 10^{-8}$   
Ageing: .....  $\leq 2 \times 10^{-8}$ /month  
Reference frequency output: ..... 10 MHz; + 10 dBm  
Reference frequency input: .....  $10 \text{ MHz} \pm 2 \times 10^{-7}$   
Input level: ..... 0 dBm ... + 8 dBm

### Synthesizer:

Frequency range: ..... 100 kHz ... 499.999 999 9 MHz  
Resolution: ..... 0.1 Hz

Accuracy: ..... same as reference  
Frequency setting: keyboard, rotary control, BCD-parallel  
RS 232 and IEEE-Bus (option)

Switching time to new frequency:  
steps < 1 MHz: .....  $\leq 1 \mu\text{s}$   
steps  $\geq 1$  MHz: .....  $\leq 5 \mu\text{s}$   
Phase (< 1 MHz step width): ..... phase-continuous

### Spectral purity:

Harmonics (level  $\leq + 13$  dBm): .....  $\leq - 30$  dBc  
Sub-harmonics: ..... none  
Discrete spurious: .....  $\leq - 72$  dBc  
Residual FM (CCITT, rms): .....  $\leq 0.1$  Hz  
SSB-phase noise (10 kHz offset): .....  $\leq - 126$  dBc/Hz  
Noise floor: .....  $\leq - 138$  dBc/Hz

### Output:

Output level range: ..... 0 dBm ... + 13 dBm  
Frequency response: .....  $\leq \pm 1$  dB  
Impedance: ..... 50  $\Omega$   
VSWR: .....  $\leq 1.5$   
Connector: ..... N-socket

### General data:

Display: ..... LCD-graphic display (240 x 64 dots)  
Backlighting: ..... LED's, 4 brightness settings  
Non-volatile memory: ... for 100 compl. Instrument settings  
Power supply: ..... 110 V/120 V, 220 V/240 V  $\pm 10$  %  
47 Hz ... 63 Hz; 101 VA (Stand-by 9 VA)  
Electrical safety: ..... EN 61010  
Operating temperature: ..... + 5 °C ... + 45 °C  
EMC: ..... CE-mark  
Dimensions (W x H x D): ..... 447 mm x 88 mm x 450 mm  
Weight: ..... approx. 13 kg

## Specifications ND 1000 D

### Reference Frequency:

Frequency/Type: ..... 10 MHz/OCXO  
Temperature stability (+ 5 °C ... + 45 °C): .....  $\leq 3 \times 10^{-8}$   
Ageing: .....  $\leq 2 \times 10^{-8}$ /month  
Reference frequency output: ..... 10 MHz; + 10 dBm  
Reference freq. input: .....  $10 \text{ MHz} \pm 2 \times 10^{-7}$   
Input level: ..... 0 dBm ... + 8 dBm

### Synthesizer:

Frequency range: ..... 10 kHz ... 999.999 999 8 MHz  
Resolution: ..... f < 500 MHz ... 0.1 Hz  
f  $\geq 500$  MHz ... 0.2 Hz

Accuracy: ..... same as reference  
Frequency setting: keyboard, rotary control, BCD-parallel  
RS 232 and IEEE-Bus (option)

Switching time to new frequency:  
steps < 1 MHz: .....  $\leq 1 \mu\text{s}$   
steps  $\geq 1$  MHz: .....  $\leq 5 \mu\text{s}$   
Phase (< 1 MHz step width): ..... phase-continuous

### Spectral purity:

Harmonics (level  $\leq + 13$  dBm): .....  $\leq - 30$  dBc  
Sub-harmonics (f  $\geq 500$  MHz): .....  $\leq - 65$  dBc  
(f < 500 MHz): ..... none  
Discrete spurious (f < 500 MHz): .....  $\leq - 72$  dBc  
(f  $\geq 500$  MHz): .....  $\leq - 65$  dBc  
Residual FM (CCITT, rms): .....  $\leq 0.1$  Hz  
SSB-phase noise (10 kHz offset):

f < 500 MHz  $\leq - 126$  dBc/Hz  
f  $\geq 500$  MHz  $\leq - 120$  dBc/Hz  
Noise floor: ..... f < 500 MHz  $\leq - 138$  dBc/Hz  
f  $\geq 500$  MHz  $\leq - 135$  dBc/Hz

### Output:

Output level range: ..... 0 dBm ... + 13 dBm  
Frequency response: .....  $\leq \pm 1.5$  dB  
Impedance: ..... 50  $\Omega$   
VSWR: .....  $\leq 1.8$   
Connector: ..... N-socket

### Variable output attenuator (Version BN 86307.001):

Output level range: ..... - 137 dBm ... + 13 dBm  
Resolution: ..... 0.1 dB  
Accuracy (- 40 dBm ... + 13 dBm): .....  $\leq \pm 0.5$  dB  
(- 137 dBm ... - 40 dBm): .....  $\leq \pm 1.5$  dB  
Output level settable in: ..... dBm, dB $\mu$ V, mV,  $\mu$ V

## Specifications ND 500 D - contin.

### Supplied accessories:

1 ea. .... power cord  
1 ea. .... operating manual  
1 set ..... spare fuses

### Ordering information:

Frequency Synthesizer ND 500 D ..... BN 86303.000  
with BCD-interface

### Option:

RS 232- and IEEE-Bus interface ..... BN 86303.201

### Accessory:

19" adapters for rack-mounting ..... BN 86302.101

## Specifications ND 1000 D - contin.

### General data:

Display: ..... LCD-graphic display (240 x 64 dots)  
Backlighting: ..... LED's, 4 brightness settings  
Non-volatile memory: .... for 100 compl. instrument settings  
Power supply: ..... 110 V/120 V, 220 V/240 V  $\pm$  10 %  
47 Hz ... 63 Hz; 117 VA (Stand-by 9 VA)  
Electrical safety: ..... EN 61010  
Operating temperature: ..... + 5 °C ... + 45 °C  
EMC: ..... CE-mark  
Dimensions (W x H x D): ..... 447 mm x 88 mm x 450 mm  
Weight: ..... approx. 13 kg

### Supplied accessories:

1 ea. .... power cord  
1 ea. .... operating manual  
1 set ..... spare fuses

### Ordering information:

Frequency Synthesizer ND 1000 D ..... BN 86307.000  
with BCD-interface  
Frequency Synthesizer ND 1000 D ..... BN 86307.001  
with BCD-interface and variable output attenuator

### Option:

RS 232- and IEEE-Bus interface ..... BN 86307.201

### Accessory:

19" adapters for rack-mounting ..... BN 86302.101