

Frequency synthesizer ND 500 S and ND 1000 S



- Frequency range 100 kHz to 500 MHz
- Frequency selection using rotary switch
- Precise reference frequency (OCXO)
- Unwanted swing < 0.1 Hz
- SSB noise < - 126 dBc/Hz
- Fast frequency switching < 1 μ s
- BCD operation
- RS 232 and IEEE bus optional



- Frequency range 10 kHz to 1000 MHz
- Frequency selection using rotary switch
- Precise reference frequency (OCXO)
- Unwanted swing < 0.1 Hz
- SSB noise < - 126/120 dBc/Hz
- Fast frequency switching < 1 μ s
- BCD operation
- RS 232 and IEEE bus optional

The frequency synthesizers ND 500 S and ND 1000 S are designed as instruments on which the frequency is set using rotary switches. The controls prevent an unintentional change to the frequency setting.

The output level on the frequency synthesizers ND 500 S and ND 1000 S is set using a potentiometer on the front of the instrument.

The frequency synthesizers ND 500 S and ND 1000 S can also be used for all ND 500 and ND 1000 applications.

Technical data ND 500 S

Reference oscillator	
Frequency/type:	10 MHz/OCXO
Temperature effect (+ 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 MHz, $\pm 2 \times 10^{-7}$
Input level:	0 dBm ... + 8 dBm
Carrier frequency	
Frequency range:	100 kHz ... 499.999 999 9 MHz
Resolution:	0.1 Hz
Frequency error:	As for reference
Frequency setting:	Parallel BCD RS 232 and IEEE bus (option)
Slew time to a new frequency:	
Frequency step < 1 MHz:	$\leq 1 \mu\text{s}$
Frequency step ≥ 1 MHz:	$\leq 20 \mu\text{s}$
Frequency switching (< 1-MHz step):	Phase contin.
Spectral purity	
Harmonic (P $\leq + 13$ dBm):	$\leq - 30$ dBc
Sub-harmonic:	None
Non-harmonic:	$\leq - 72$ dBc
FM interference (CCITT, eff.):	≤ 0.1 Hz
SSB noise (10 kHz offset):	$\leq - 126$ dBc/Hz
Background noise:	$\leq - 138$ dBc/Hz
Output	
Level setting range:	0 dBm ... + 13 dBm
Frequency response:	$\leq \pm 1$ dB
Internal resistance:	50 Ω
VSWR:	≤ 1.5
Connection:	BNC socket
General	
General	
Power supply:	115 V/130 V, 230 V/250 V ± 10 % 47 Hz ... 63 Hz; 73 VA (stand-by 9 VA)
Electrical safety:	EN 61010
EMC:	CE marking
Operating temperature:	+ 5 °C ... + 45 °C
Dimensions (W x H x D):	19" x 88 mm x 450 mm
Weight:	Approx. 12 kg
Accessories supplied	
1	Power cable
1	Operating manual
1 set	Replacement fuses
Order codes	
Frequency synthesizer ND 500 S	Order no. 86302.000 with BCD interface
Frequency synthesizer ND 500 S	Order no. 86302.001 with BCD, RS 232 and IEEE bus interface
Accessories	
19" adapter	Order no. 86302.101

Technical data ND 1000 S

Reference oscillator	
Frequency/type:	10 MHz/OCXO
Temperature effect (+ 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 MHz, $\pm 2 \times 10^{-7}$
Input level:	0 dBm ... + 8 dBm
Carrier frequency	
Frequency range:	10 kHz ... 999.999 999 8 MHz
Resolution:	f < 500 MHz ... 0.1 Hz f ≥ 500 MHz ... 0.2 Hz
Frequency error:	As for reference
Frequency setting:	Parallel BCD RS 232 and IEEE bus (option)
Slew time to a new frequency:	
Frequency step < 1 MHz:	$\leq 1 \mu\text{s}$
Frequency step ≥ 1 MHz:	$\leq 20 \mu\text{s}$
Frequency switching (< 1-MHz step):	Phase contin.
Spectral purity	
Harmonic (P $\leq + 13$ dBm):	$\leq - 30$ dBc
Sub-harmonic (f ≥ 500 MHz):	$\leq - 65$ dBc
Non-harmonic (f < 500 MHz):	$\leq - 72$ dBc
Non-harmonic (f ≥ 500 MHz):	$\leq - 65$ dBc
FM interference (CCITT, eff.):	≤ 0.1 Hz
SSB noise (10 kHz offset):	f < 500 MHz $\leq - 126$ dBc/Hz f ≥ 500 MHz $\leq - 120$ dBc/Hz
Background noise (f < 500 MHz):	$\leq - 138$ dBc/Hz
Background noise (f ≥ 500 MHz):	$\leq - 135$ dBc/Hz
Output	
Level setting range:	0 dBm ... + 13 dBm
Frequency response:	$\leq \pm 1.5$ dB
Internal resistance:	50 Ω
VSWR:	≤ 1.8
Connection:	BNC socket
General	
Power supply:	115 V/125 V, 230 V/250 V ± 10 % 47 Hz ... 63 Hz; 95 VA (stand-by 9 VA)
Electrical safety:	EN 61010
EMC:	CE marking
Operating temperature:	+ 5 °C ... + 45 °C
Dimensions (W x H x D):	447 mm x 88 mm x 450 mm
Weight:	ca. 13 kg
Accessories supplied:	
1 power cable, 1 operation manual, 1 set replacement fuses	
Order codes	
Frequency synthesizer ND 1000 S	Order no. 86306.000 with BCD interface
Frequency synthesizer ND 1000 S	Order no. 86306.001 with BCD, RS 232 and IEEE bus interface
Accessories	
19" adapter	Order no. 86302.101

Frequency synthesizer ND 500 and ND 1000



- Frequency range 100 kHz to 500 MHz
- Precise reference frequency (OCXO)
- Unwanted swing < 0.1 Hz
- SSB noise < - 126 dBc/Hz
- Fast frequency switching < 1 μ s
- BCD operation
- RS 232 and IEEE bus optional



- Frequency range 10 kHz to 1000 MHz
- Precise reference frequency (OCXO)
- Unwanted swing < 0.1 Hz
- SSB noise < - 126/120 dBc/Hz
- Fast frequency change < 1 μ s
- BCD operation
- RS 232 and IEEE bus optional

The frequency synthesizers ND 500 and ND 1000 are designed as 19" plug-ins for usage in systems. Frequency selection using the BCD interface ensures the fastest possible frequency change. On the usage of the IEEE bus, the slewing to the new frequency takes place as quickly as on the usage of the BCD interface, but the delay involved with the IEEE command is significantly higher.

The output level on the frequency synthesizers ND 500 and ND 1000 is set using a potentiometer on the front of the instrument.

Technical data ND 500

Reference oscillator	
Frequency/type	0 MHz/OCXO
Temperature effect (+ 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 MHz, $\pm 2 \times 10^{-7}$
Input level:	0 dBm ... + 8 dBm
Carrier frequency	
Frequency range:	100 kHz ... 499.999 999 9 MHz
Resolution:	0.1 Hz
Frequency error:	As for reference
Frequency setting:	Rotary switch; parallel BCD RS 232 and IEEE bus (option)
Slew time to a new frequency:	
Frequency step < 1 MHz:	$\leq 1 \mu\text{s}$
Frequency step ≥ 1 MHz:	$\leq 20 \mu\text{s}$
Frequency switching (< 1-MHz step):	Phase contin.
Spectral purity	
Harmonic (P $\leq + 13$ dBm):	≤ -30 dBc
Sub-harmonic:	None
Non-harmonic:	≤ -72 dBc
FM interference (CCITT, eff.):	≤ 0.1 Hz
SSB noise (10 kHz offset):	≤ -126 dBc/Hz
Background noise:	≤ -138 dBc/Hz
Output	
Harmonic (P $\leq + 13$ dBm):	≤ -30 dBc
Sub-harmonic:	None
Non-harmonic:	≤ -72 dBc
FM interference (CCITT, eff.):	≤ 0.1 Hz
SSB noise (10 kHz offset):	≤ -126 dBc/Hz
Background noise:	≤ -138 dBc/Hz
General	
Power supply:	115 V/130 V, 230 V/250 V $\pm 10\%$ 47 Hz ... 63 Hz; 80 VA (stand-by 9 VA)
Electrical safety:	EN 61010
EMC:	CE marking
Operating temperature:	+ 5 °C ... + 45 °C
Dimensions (W x H x D):	447 mm x 88 mm x 450 mm
Weight:	Approx. 12.7 kg
Accessories supplied	
1	Power cable
1	Operating manual
1 set	Replacement fuses
Order codes	
Frequency synthesizer ND 500	Order no. 86301.000 with BCD interface
Frequency synthesizer ND 500 with BCD, RS 232 and IEEE bus interface	Order no. 86301.002

Technical data ND 1000

Reference oscillator	
Frequency/type:	10 MHz/OCXO
Temperature effect (+ 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 MHz, $\pm 2 \times 10^{-7}$
Input level:	0 dBm ... + 8 dBm
Carrier frequency	
Frequency range:	10 kHz ... 999.999 999 8 MHz
Resolution:	f < 500 MHz ... 0.1 Hz f ≥ 500 MHz ... 0.2 Hz
Frequency error:	As for reference
Frequency setting:	Rotary switch; parallel BCD RS 232 and IEEE bus (option)
Slew time to a new frequency:	
Frequency step < 1 MHz:	$\leq 1 \mu\text{s}$
Frequency step ≥ 1 MHz:	$\leq 20 \mu\text{s}$
Frequency switching (< 1-MHz step):	phase contin.
Spectral purity	
Harmonic (P $\leq + 13$ dBm):	≤ -30 dBc
Sub-harmonic (f ≥ 500 MHz):	≤ -65 dBc
Non-harmonic (f < 500 MHz):	≤ -72 dBc
(f ≥ 500 MHz):	≤ -65 dBc
FM interference (CCITT, eff.):	≤ 0.1 Hz
SSB noise 10 kHz offset:	
f < 500 MHz	≤ -126 dBc/Hz
f ≥ 500 MHz	≤ -120 dBc/Hz
Background noise (f < 500 MHz):	≤ -138 dBc/Hz
(f ≥ 500 MHz):	≤ -135 dBc/Hz
Output	
Level setting range:	0 dBm ... + 13 dBm
Frequency response:	$\leq \pm 1.5$ dB
Internal resistance:	50 W
VSWR:	≤ 1.8
Connection:	N socket
General	
Power supply:	115 V/125 V, 230 V/250 V $\pm 10\%$ 47 Hz ... 63 Hz; 95 VA (stand-by 9 VA)
Electrical safety:	EN 61010
EMC:	CE marking
Operating temperature:	+ 5 °C ... + 45 °C
Dimensions (W x H x D):	19" x 88 mm x 450 mm
Weight:	ca. 12.3 kg
Accessories supplied	
1	Power cable
1	Operating manual
1 set	Replacement fuses
Order codes	
Frequency synthesizer ND 1000	Order no. 86305.000 with BCD interface