

CNT-85 & CNT-85R

Frequency Counters/Calibrators

pendulum
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- High resolution: 10 digits in 1s
- Low uncertainty: 0.0001 ppm (Rb)
- Short warm-up time: 10 min to 4×10^{-10}
- Wide frequency range to 8GHz
- Smartest input trigger system
- Measures any type of input signal, incl. bursts, AM, FM and noisy signals
- Displays also input signal strength
- Excellent EMC-immunity
- Easy to use
- Ideal for on-site frequency calibration of the master clock in GSM base stations



With the Pendulum CNT-85 and CNT-85R frequency counters and calibrators, Spectracom offers the ultimate tools for stationary as well as portable calibration of frequency, from DC to over 8GHz. These counters are designed for on-site calibration of the master clock in GSM base stations, offering a TUR of >50 over a 10 year period. They also fit on the R&D bench, in the calibration lab or in manufacturing test systems where fast and accurate frequency measurements are needed. Choose between the economy model CNT-85 and the ultimate CNT-85R including a built-in Rubidium time-base reference.

On-Site Frequency Calibration

The CNT-85 frequency counter brings cal lab accuracy to field measurements. With the (optional) ultra-stable oven timebase and a high 10 digits resolution in just one second, it delivers high-accuracy measurements instantly. An overflow mode displays also the 11th and 12th digits, when needed. The CNT-85 is easy to use, compact and has a unique, smart automatic input triggering for any type of signal. A very short warm-up time of the oven oscillator, gives you ppb-performance after only 10 minutes.

CNT-85R Frequency Counter/Calibrator

The Pendulum CNT-85R is one of the most accurate portable frequency calibrator on the market. It offers all the functionality of the CNT-85, plus the stability and accuracy of a built-in Rubidium atomic reference.

This instrument is ideal for high-accuracy frequency calibration, inside as well as outside the cal lab environment, such as in digital communication systems. The short warm-up time means that the CNT-85R is instantly ready for use after a change of location.

GSM Network Operators

Depending on the internal procedures and budgets of the network operator, the requirement for master clock calibration in base stations, can be fulfilled with the following solutions:

- CNT-85 with oven oscillator (option 40), offers a low initial cost solution. With 3 month calibration intervals the counters margin to

GSM specification is 5:1, and 1 year calibration intervals give a margin of 3:1.

- CNT-85R, provides low cost of ownership, (10 year adjustment interval, for a margin of better than 50:1 to the GSM specification).

Selection Chart	CNT-85	CNT-85R
Frequency, Frequency burst, PRF	yes	yes
Period, Pulse width, Duty cycle, Totalize	yes	yes
Frequency range (standard)	300 MHz	300 MHz
Frequency resolution (1s gate time)	10 digits	10 digits
Pulse width resolution	250 ps	250 ps
Arming delay by time and events	yes	yes
Best timebase stability/month	3×10^{-9}	5×10^{-11}
Frequency deviation after 10 min warm-up	5×10^{-9}	4×10^{-10}
GPIO	Option 80	Option 80
Signal strength indicator (bar graph)	yes	yes
Nulling of display value	yes	yes
Display digit blanking	yes	yes
3GHz HF-input	Option 10	Option 10
8GHz HF-input	Option 13	Option 13
Battery Pack	Option 23/85	no

Measuring modes

Frequency A, C

Range (A): 10 Hz to 300 MHz

Range (C): 100 MHz to 3GHz or 300 MHz to 8GHz (option)

Resolution: 10 digits/s

Burst Frequency A

Frequency/PRF of burst signals down to 1 μ s

Period A

Range: 6ns to 100 ms

Resolution: 10 digits/s

Ratio A/E, C/A

Range: 10^{-7} to 10^{10}

Freq. Range: See specs for input A, C and E

Pulse Width A

Range: 6ns to 10 ms

Resolution: 250 ps

Duty Factor A

Range: 0.000001 to 0.999999

Totalize A

Event counting with manual start and stop

Range: 0 to 10^{17}

Input & Output Specifications

Input A

Coupling: AC

Impedance: 1M Ω or 50 Ω

Sensitivity: 10 Hz to 50 MHz: 10 mVrms

50 to 100 MHz: 15 mVrms

100 to 150 MHz: 20 mVrms

150 to 200 MHz: 30 mVrms

200 to 300 MHz: 50 mVrms

Manual Trigger:

Sensitivity Range: 10 mV to 10 Vrms, in 3dB steps

Trigger Level: High, medium or low duty factors

Trigger Slope: Positive or negative

Auto Trigger: Automatic optimum trigger

Frequency: Minimum 50 Hz

Signal Monitor: A bar graph displays input

signal level in 3dB steps, 10 mVrms to 10 Vrms

Low-pass filter: 100 kHz or OFF.

Max Voltage Without Damage:

350 V (dc + ac peak) to 440 Hz

Input C (Option 10)

Operating input voltage range:

0.1 to 0.3 MHz: 20 mVrms to 12 Vrms

0.3 to 2.5 GHz: 10 mVrms to 12 Vrms

2.5 to 2.7 GHz: 20 mVrms to 12 Vrms

2.7 to 3.0 GHz: 100 mVrms to 12 Vrms

Impedance: 50 Ω nom, VSWR <2.5:1

Connector: N-type, female

Time Base Options

Model:	CNT-85	CNT-85	CNT-85	CNT-85R
Option:	Standard	Option 30	Option 40	Rubidium
Time base type:	UCXO	OCXO	OCXO	
Aging per month:	<5x10 ⁻⁷	1x10 ⁻⁸	<3x10 ⁻⁹	<5x10 ⁻¹¹
Aging per year:	<5x10 ⁻⁶	<5x10 ⁻⁸	<1.5x10 ⁻⁸	<1x10 ⁻⁹ /10 years
Stability vs. temp:				
0°C to 50°C:	<1x10 ⁻⁵	<5x10 ⁻⁹	<2.5x10 ⁻⁹	<3x10 ⁻¹⁰
20°C to 26°C (typ.):	<3x10 ⁻⁶	<6x10 ⁻¹⁰	<4x10 ⁻¹⁰	<2x10 ⁻¹¹
Short term stability: $\tau=1$ s (Allan dev.)	n.s.	1x10 ⁻¹¹	5x10 ⁻¹²	5x10 ⁻¹¹

Input C (Option 13)

Operating input voltage range:

0.3 to 0.5 GHz: -21 to +30dBm (20mVrms to 7Vrms)

0.5 to 3.0 GHz: -27 to +30dBm (10 mVrms to 7Vrms)

3.0 to 4.5 GHz: -21 to +30dBm (20 mVrms to 7Vrms)

4.5 to 6.0 GHz: -15 to +30dBm (40 mVrms to 7Vrms)

6.0 to 8.0 GHz: -9 to +30 dBm (80 mVrms to 7Vrms)

Impedance: 50 Ω nom, VSWR <2:1

Connector: N-type, female

Rear panel inputs and outputs

Ref. Input: 10 MHz; >200 mVrms

Arm Input (E):

10 Hz to 80 MHz; TTL level triggering

Ref. Output: 10 MHz sine, >1Vrms into 50 Ω

Analog output (incl. with GPIB option):

0-5V voltage, proportional to 3 consecutive display digits

Auxiliary Functions

External Arming/External Gate

Arming modes: Start/stop on pos/neg slope

Start Arming Delay: OFF or 200 ns to 1.6 s

Nulling/Frequency Offset

Nulling enable meas to be displayed relative to a previously measured value or any frequency offset value entered via front panel keys

Other Functions

Measuring Time: Single cycle, 800 ns to 26 s

Restart: Starts a new measurement

Display Hold: Freezes measuring result.

Blanking: Unstable digits can be blanked

Save/Recall: 20 instrument set-ups. 10 set-ups can be user protected

GPIB (option 80)

Maximum Measurement Rate*

Via GPIB: 100 readings/s

To internal memory: 1.6k readings/s

Internal memory size*

Up to 2600 readings

Data Output Format

ASCII, IEEE double precision floating point

*) depending on measurement function and internal data format

General Specifications

Display

Type: LCD with back-light

No. of digits: 10 plus exponent

Overflow: Display of the 11th and 12th digits

Bar graph: Displays input signal level or sensitivity setting in 3dB steps from 10 mV to 10 Vrms

Environmental Conditions

Operating temp: 0°C to +50°C

Storage temp: 40°C to +70°C

Safety: EN61010-1, Cat II, Pollution degree 2, CSA 22.2, CE

EMC: EN61326 (1997) + A1 (1998), EN55011-1, EN50082-2, CE

Power Line Requirements (at 25°C)

AC voltage: CNT-85: 90 to 264Vrms, 47 to 440Hz

CNT-85R: 90 to 264 Vrms, 47 to 63 Hz

Power rating: CNT-85: max 30 W

CNT-85R: max 100 W (6min warm-up)

max 47 W (cont. operation)

Battery (option 23/85)

Capacity @25°C:

Stand-by: 20 h typ. w. oven time base

Operating: 2-3h typ. depending on installed options

Re-charge time: 8h typ. in stand-by mode

Battery type: sealed lead-acid cells

Environmental temperature:

Operating: 0°C to +40°C

Storage: -40°C to +50°C

Weight: 1.5 kg (3.3 lb)

Dimensions and Weight

WxHxD:

CNT-85: 210x86x395 mm (8.25x3.4x15.6 in)

CNT-85R: 315x86x395 mm (12.4x3.4x15.6 in)

Weight Net/Shipping:

CNT-85: 3.2 kg (7 lb)/5.5 kg (12 lb)

CNT-85R: 5.5 kg (12 lb)/8.8 kg (19 lb)

Ordering Information

Basic models

CNT-85: 300 MHz Frequency Counter incl.

Standard timebase (5x10⁻⁷/month)

CNT-85R: 300 MHz Frequency Counter/Calibrator incl. Rubidium timebase (5x10⁻¹¹/month)

Included with instrument: 3-year product warranty, power line cord, operators manual on CD-rom, certificate of calibration

RF Input Frequency Option*

Option 10: 3.0 GHz Input C

Option 13: 8.0 GHz Input C

Time Base Options*

Option 30: Very-high stability Oven Time Base (1x10⁻⁸/month)

Option 40: Ultra-high stability Oven Time Base (3x10⁻⁹/month)

Other Options*

Option 23/85: Battery Pack

Option 80: GPIB interface (SCPI)

Optional Accessories

Option 22: Rack-Mount Kit (CNT-85R only)

Option 27: Soft Carrying Case

Option 27H: Heavy Duty Hard Transport

Option 95/03: 3 years extended warranty

Option 95/05: 5 years extended warranty

OM-85: Operators Manual (printed)

PM-85: Programmers Manual (printed)

SM-85: Service Manual

*) Options are factory installed upon order and can not be customer retrofitted.