

# CNT-66 and CNT-69

## High-quality budget Counters

### Outstanding value for money

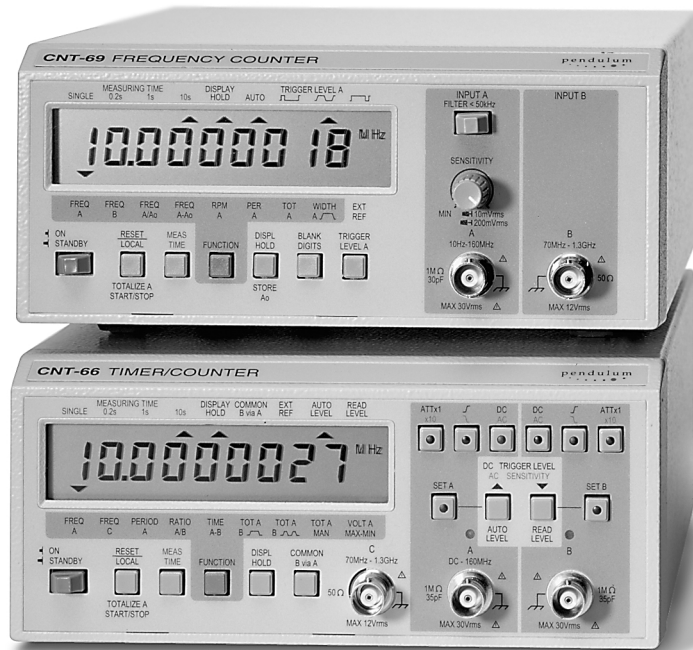
- 1.3 GHz frequency range
- GPIB interface
- 0.1ppm MTCXO time base
- Error-free triggering for any input signal
- Rugged, portable, reliable
- MTBF 70 000 h
- EMI-proof metal cabinet (CE)

### CNT-66 timer/counter:

- Full GPIB programmability
- Auto trigger, auto sensitivity
- Voltage measurements

### CNT-69 frequency counter:

- Ease of operation
- Auto triggering
- Noise suppression filter



The CNT-66 and CNT-69 are high-quality, easy-to-use budget counters for accurate and reliable measurements. The units use reciprocal frequency counting, giving 7-8 digits resolution even on low frequency measurements. The optional high-stability MTCXO time base has a stability in the order of 0.1 ppm.

The no-compromise input design of these counters, provide smart auto triggering to handle any type of input signal,

plus variable sensitivity and other noise immunity functions. The counters are rugged, input-protected and reliable with exceptional MTBF figures of up to 70000h. They have excellent EMC performance.

The optional GPIB interface turns CNT-66 into the lowest cost, fully programmable timer/counter available from any quality manufacturer.

### CNT-66 Timer/Counter

The CNT-66 is a 100% GPIB-programmable timer/counter. All counter functions including also trigger level and sensitivity settings are GPIB-controlled. The bus-learn mode makes programming faster and easier.

### Error-Free Triggering

Trigger level setting can be automatic on all input signals. The trigger level can be displayed immediately with one keystroke, and input triggering is instantly checked with the tri-state LED trigger indicators. Input sensitivity (noise immunity) is selectable from 20 mV to 1V.

### V p-p measurements up to 50 MHz

The CNT-66 has Volt peak measurements up to 50 MHz. Both the minimum and maximum signal peaks are displayed simultaneously.

### CNT-69 Frequency Counter

The multi-function CNT-69 performs frequency, period, totalize, pulse width and frequency ratio or difference measurements. The CNT-69 can be used for frequency measurements on the bench or in the field. It is easy to operate including a.o. also blanking of irrelevant display digits to make it easy to read results.

### MTCXO Time Base

(Mathematically Temperature Compensated Crystal Oscillator)

The optional high stability MTCXO time-base offers a stability, comparable to standard oven oscillators, but at a much lower cost. The temperature dependency of the individual crystal is stored in a non-volatile memory and used for immediate compensation of the displayed value. Unlike oven oscillators, an MTCXO gives high accuracy instantly, without long warm-up times.

Calibration and adjustment is very easy. Just connect the frequency standard and push a button. There is no trimmer to be turned.

# CNT-66 and CNT-69 Specifications

## Measuring Modes CNT-66

<b>Frequency</b>	
<i>Freq. A:</i>	0.1 Hz to 160 MHz
<i>Freq. C:</i>	70 MHz to 1.3 GHz
<i>Resolution:</i>	7 digits in 1s measuring time
<b>Period A</b>	
<i>Range:</i>	8 ns to $2 \times 10^8$ s
<i>Resolution:</i>	100 ns (Single) or 7 digits in 1s (Average)
<b>Ratio A/B, C/B</b>	
<i>Range:</i>	0 and $1 \times 10^{-7}$ to $2 \times 10^9$ (A/B) 0 to $1 \times 10^{15}$ (A/B Single) 8 to $6 \times 10^{10}$ (C/B)
<b>Time interval A-B)</b>	
<i>Range:</i>	100 ns to $2 \times 10^8$ s (Single) 0 ns to 20 s (Average)
<i>Resolution:</i>	100 ns / $\sqrt{N}$
<i>Number of Intervals averaged N:</i>	$N = \text{Measuring time} / \text{Signal repetition rate}$ .
<i>Min dead time from stop to start:</i>	250 ns
<b>Totalize A</b>	
<i>Range:</i>	0 to $1 \times 10^{15}$ (0 Hz to 16 MHz)
<i>Modes:</i>	Counting on A, gated by B signal OR started/stopped by B signal OR manually controlled by START/STOP button.
<b>Volt Max/Min A</b>	
<i>Range:</i>	-5.1V to +5.1V / -51V to +51V
<i>Frequency range:</i>	DC; 100 Hz to 50 MHz
<i>Resolution:</i>	20mV / 200 mV

## Measuring Modes CNT-69

<b>Frequency A or B, Period A</b>	See specs for CNT-66
<b>Totalize A</b>	See specs for CNT-66 (only manual gating)
<b>Frequency A/Ao and A-Ao</b>	The Freq. A value is divided by, or subtracted with, the constant Ao before display.
<b>RPM A</b>	Display value = Freq. A value x 60
<i>Range:</i>	6 RPM... $720 \times 10^6$ RPM
<b>Width A</b>	
<i>Range:</i>	100 ns... $2 \times 10^8$ s
<i>Resolution:</i>	100 ns (always Single)
<b>Input A and Input B CNT-66</b>	
<i>Frequency range:</i>	DC to 160 MHz (120 MHz to 160 MHz with limited temperature range; typ. $+23^\circ\text{C} \pm 5^\circ\text{C}$ )
<i>Coupling:</i>	DC or AC (-3dB at 20 Hz sine)
<i>Max. sensitivity</i>	20 mV rms, 0 Hz to 30 MHz 40 mV rms, 30 MHz to 120 MHz 60 mV rms, 120 MHz to 160 MHz Sensitivity is selectable in 1-2-5 steps from 20 mV through 1V rms; nominal (LF-signals)
<i>Impedance:</i>	1 M $\Omega$ // 35 pF
<i>Attenuation:</i>	x1 or x10, or AUTO
<i>Max. Voltage without damage:</i>	350 V (DC+AC peak) between 0 and 440 Hz, falling to 8 V rms at 1 MHz.

## Triggering

<i>Trigger level range (x1 attenuation):</i>	DC: +5.1V to -5.1V, 20 mV resolution AC: 0 V fixed or AUTO level. Uncertainty: $\pm 10$ mV $\pm 1\%$ of setting
<i>AUTO level:</i>	Set to 50% of input signal amplitude. Frequency range: >100 Hz
<i>Trigger indicators:</i>	Tri state LED;
<i>Trigger slopes:</i>	Positive or negative.

## Input-A CNT-69

<i>Frequency range:</i>	10 Hz to 160 MHz (120 MHz to 160 MHz with limited temperature range; typ. $+23^\circ\text{C} \pm 5^\circ\text{C}$ )
<i>Impedance:</i>	1 M $\Omega$ // 30 pF; AC-coupled
<i>Max. Sensitivity</i>	10 mV rms, 10 Hz to 120 MHz 30 mV rms, 120 to 160 MHz
<i>Attenuation:</i>	Continuously variable in two ranges between x1 and x400
<i>Filter:</i>	50 kHz low pass noise filter
<i>Max. voltage without damage:</i>	350 V (DC + AC peak) between 0 and 440 Hz, falling to 11 rms at 1 MHz.
<i>Trigger levels:</i>	3 fixed levels: symmetrical, high/low duty factor and AUTO (repetition rate > 100 Hz)

## RF Input 1.3 GHz

<i>Freq. range:</i>	70 MHz to 1.3 GHz
<i>Coupling:</i>	AC
<i>Operating input voltage range:</i>	10 mV to 12 V rms, 70 MHz to 900 MHz 15 mV to 12 V rms, .0.9 to 1.1 GHz 40 mV to 12 V rms, 1.1 to 1.3 GHz
<i>Impedance:</i>	50 $\Omega$ nominal, VSWR <2:1
<i>Max. voltage without damage:</i>	12 Rms, PIN diode protected

## Auxiliary functions

<i>Measuring time:</i>	0.2s, 1s, 10s or Single
<i>Blank digits (CNT-69 only):</i>	Blanking least significant display digits, to hide unstable digits on the display

## External reference input D

<i>Input:</i>	10 MHz $\pm$ 0.1 MHz, >500 mV rms
<i>Max input voltage:</i>	15 V rms

## GPIB interface (Option 04)

<i>Programmable device Functions for:</i>	
CNT-66:	Full GPIB programmability
CNT-69:	All front panel settings except Sensitivity and Filter
<i>Max Data Output Rate:</i>	
Normal Mode:	Approx. 5 readings/s
High-Speed Dump:	Approx. 100/s.

## General

<i>Line voltage:</i>	115 / 230 V; 46 to 440 Hz, (<24 VA incl. all options).
<i>Safety:</i>	EN61010 Cat II, pollution degree 2; CSA 22.2; CE
<i>EMC:</i>	EN55011, group 1, class B; EN50082-1; CE
<i>MTBF:</i>	70000h (CNT-69), 50000 h (CNT-66)

## Mechanical Data

<i>WxHxD:</i>	186x88x270 mm
<i>Weight:</i>	CNT-66 Net: 2.4 kg, Shipping: 3.2 kg CNT-69 Net: 2.1 kg, Shipping: 3.0 kg
<i>Temperature:</i>	Operating: 0 $^\circ$ C to +50 $^\circ$ C Storing: -40 $^\circ$ C to +70 $^\circ$ C

## Time base Oscillators

### Standard crystal

<i>Aging:</i>	< $5 \times 10^{-7}$ /month; $5 \times 10^{-6}$ /year
<i>Temp. 0 to 50<math>^\circ</math>C:</i>	< $1 \times 10^{-5}$
<i>Total uncertainty (2<math>\sigma</math>):</i>	- 1 year after calibration < $1.2 \times 10^{-5}$ - 2 years after calibration < $1.5 \times 10^{-5}$

### MTCXO (option 07).

<i>Aging:</i>	< $1 \times 10^{-7}$ /month; $5 \times 10^{-7}$ /year
<i>Temp. 0 to 50<math>^\circ</math>C:</i>	< $2 \times 10^{-7}$
<i>Total uncertainty (2<math>\sigma</math>):</i>	- 1 year after calibration < $6 \times 10^{-7}$ - 2 years after calibration < $1 \times 10^{-6}$

## Ordering information

<i>CNT-66:</i>	Basic timer/counter 1.3 GHz, standard time base
<i>CNT-69:</i>	Basic frequency counter 1.3 GHz, standard time base
<i>Opt. 04:</i>	GPIB interface
<i>Opt. 07:</i>	MTCXO time base

### Included with Instrument

Operators manual
Calibration certificate

### Optional accessories

<i>Option 05:</i>	19" rack mount kit
<i>Option 09:</i>	Carrying case

Specifications subject to change without notice

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## Pendulum Instruments AB

[www.pendulum.se](http://www.pendulum.se)

– experts in Time & Frequency Calibration, Measurement and Analysis