

CNT-91R

Frequency Calibrator/Analyzer

Ideal for portable frequency calibration and analysis

- Built in ultra-stable atomic clock
- Calibration/analysis of the highest precision OCXOs
- Ageing per month is $<5 \cdot 10^{-11}$
- Short warm-up time, only 12 minutes to reach $5 \cdot 10^{-10}$
- Frequency resolution is 12 digits in one second measurements
- Graphic display shows numerical statistics data, histograms or trends (frequency vs. time)
- Compact “one-box-solution” for portable frequency calibration and analysis



The new CNT-91R is an all-inclusive high performance calibrator of frequency sources, that combines high resolution measurements and advanced analysis, and a built-in ultra-stable Rubidium atomic reference clock. Its compact format, and its short warm-up time, makes the CNT-91R an ideal transportable frequency calibrator/analyzer.

The New CNT-91R

The new CNT-91R is the first instrument in the Pendulum CNT-90-family that includes a built in ultra-stable atomic clock.

The CNT-91R is basically a combination of the ultra-high resolution CNT-91 and a Rubidium Frequency Standard, all in one box.

The CNT-91R is an ideal transportable Frequency Calibrator for master clocks and other oscillators, since it combines both an ultra-stable Frequency Reference, and a high-accuracy/high-resolution frequency and phase comparator.

The CNT-91R can also be used to analyze/characterize oscillators, including calculation of Allan Deviation and frequency warm-up performance, thanks to its built-in numerical statistics analysis and the graphic trend plot.

The CNT-91R can be used together with the optional Modulation Domain Analysis SW TimeView™, for in-depth analysis of jitter, modulation and frequency settling.

Customer benefits

Transportability: The CNT-91R is an all-inclusive high performance calibrator of frequency sources, including also the highest

precision OCXO:s. The compact format, and the short warm-up time, makes the CNT-91R an ideal transportable frequency calibrator

Complete frequency calibrator: The following parameters are displayed at a glance on the graphic LCD: - statistical mean value of frequency - Standard and/or Allan Deviation of frequency - Graphic view of initial frequency drift vs time

Fast and precise calibration of mean frequency and Allan Deviation (ADEV): The combination of ultra-high stability time-base and resolution enables very fast and accurate frequency calibration. Frequency measurements are made back-to-back with zero-dead-time to enable correct calculation of Allan Deviation

Oscillator analysis

The CNT-91R features true zero-dead-time measurements of frequency and phase (TIE), and can therefore be used for wander and jitter analysis of clocks under test. Zero-dead-time measurements are also a

pre-requisite for correct calculation of short term stability expressed as Allan Deviation.

CNT-91 vs CNT-91R selection chart

Feature	CNT-91	CNT-91R
Graphic display of trend, histogram, modulation domain	yes	yes
Freq. resolution	12 digits/sec	12 digits/sec
Time resolution (single shot)	50 ps	50 ps
Voltage resolution	1 mV	1 mV
Meas. speed to internal memory	250k meas/sec 3.5M results	250k meas/sec 3.5M results
Freq/period, time, phase, volt, duty c, pulse w, rise time	yes	yes
Programmable pulse output	yes	yes
Continuous measurements	yes	yes
Best timebase stability/month	$3 \cdot 10^{-9}$	$5 \cdot 10^{-11}$
Best timebase stability over full temp. range	$2,5 \cdot 10^{-9}$	$1 \cdot 10^{-10}$

CNT-91R Technical Specifications

INLAY to Product Data CNT-90/91

Specifications

Operating Temp: 0°C to +45°C

Power Requirements

Warm-up (12 minutes):

90 to 265V rms, 45 to 440 Hz, <80W

Operating: 90 to 265V rms, 45 to 440 Hz, <50W

Time Base Specifications

Time base type:	Rubidium
Uncertainty due to:	
-Ageing	
per month	<5x10 ⁻¹¹ (1)
per year	<3x10 ⁻¹⁰ typ
-Temperature variation: 0°C-45°C	<1x10 ⁻¹⁰
20°C-26°C (typ. values)	<2x10 ⁻¹¹
Short term stability: $\tau = 1s$	<1x10 ⁻¹¹
(root Allan Variance) $\tau = 10s$	<1x10 ⁻¹¹
Power-on stability	
-Deviation vs final value after 24h on time, after a warm-up time of:	<5x10 ⁻¹⁰ 12 min
Typical total uncertainty, for operating temperature 20°C to 26°C, at 2 σ (95%) confidence interval:	
- 1 year after calibration	<3.5x10 ⁻¹⁰
- 2 years after calibration	<7x10 ⁻¹⁰

1) After 3 months of continuous operation

All other specifications as CNT-91

Ordering Information

Basic Model

CNT-91R 300 MHz, 50 ps Frequency Calibrator/Analyzer including Rubidium Time Base

Included with Instrument: 18 months product warranty, line cord, user documentation on CD, and Certificate of Calibration

Input Frequency Options

Option 10 3 GHz Input C

Option 13 8 GHz Input C

Option 14 14 GHz Input C

Option 14B 20 GHz Input C

Optional Accessories

Option 11/90 Rear Panel Inputs

Option 22/90 Rack-Mount Kit

Option 27 Carrying Case - soft

Option 27H Heavy-duty Hard Transport Case

Option 29/90 TimeView Modulation domain Analysis SW for CNT-90

Option 90/07 Calibration Certificate with Protocol; Rubidium oscillator

Option 90/00 Calibration Certificate with Protocol; Hold-over frequency ageing/week

Option 95/03 Extended warranty from 18 months to 3 years

Option 95/05 Extended warranty from 18 months to 5 years

Specifications subject to change without prior notice

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US: Pendulum Instruments Inc

5811 Racine Street; Oakland, CA 94609-1519, USA
Voice:(510)-428-9488 Fax: (510)-428-9469

International: Pendulum Instruments AB

PO Box 20020, SE-16102 Bromma, Sweden
Voice: +46 8 598 51057 Fax:+46 8 598 51040

www.pendulum-instruments.com

- Experts in time & frequency calibration, measurement and analysis

Pendulum Instruments is a company of the Orolia Group