pendulum

Pendulum Instruments is a high-quality global supplier of solutions for calibration, measurement and analysis of time and frequency related parameters.

In addition to the core business, the company has developed its portfolio into pre-compliance EMC testing and high-voltage linear amplification.

60+ YEARS OF EXPERIENCE AND EXPERTISE

The company roots date back to the 1950's, when Pendulum was the Swedish branch of Philips Test & Measurement division. Pendulum Instruments was a spin-off in 1998. The company currently has offices in Poland, Sweden, China and USA. Pendulum products have been awarded "Best-in-Test" honorable mention from T&M World magazine several times, and Pendulum Instruments was awarded "Electronic Company of the Year" in the Swedish "Elektronik i Norden" magazine. Our reputation has created strategic alliances with a.o. Fluke, Wavetek, and other global T&M companies. Pendulum was the first company to launch traceable frequency standards in 2000 and Graphical timer / counters in 2004 and multi-channel frequency analyzers in 2023. Pendulum expanded its offering in 2020 with acquisitions of Detectus AB offering pre-compliance EMC scanners and FLC Electronics AB, experts in high-voltage linear amplifiers and arbitrary pulse pattern generators.

2023 MAE Innovators Awards

CNT-104S Multi-channel Frequency Analyzer was recognized among the best innovations by the 2023 MAE Innovators Awards. Votes placed by the engineering community recognized Pendulum Instruments as a Gold nominee in the Military + Aerospace Electronics Innovators Category.

The 2023 MAE Innovators Awards celebrates outstanding innovation in defense and aerospace for the engineering industry. Every year they showcase and reward companies, designers, and innovators who have contributed to the advancement of technology through their creative and impactful designs.

MARKETS SERVED

Today, our products fit the needs of metrology, aerospace and defense, telecom, oscillator manufacturing, RF and microwave, electronic industries, contract manufacturing and materials science and physics research in around 100 countries worldwide. We have sales representatives in approximately 100 countries on all continents plus service centers in several countries.

pendulum-instruments.com

PENDULUM INSTRUMENTS

MULTI-CHANNEL FREQUENCY ANALYZERS CNT-100 series

Pendulum brand frequency counter/analyzers historically long well known as industry-leading time and frequency measurement instruments. Our products were pioneers in the market with the revolutionary graphical UI and extensive analysis functions. Now we take one step further and introduce the world's first multi-channel combined frequency counter/analyzer and time interval analyzer, with outstanding performance in a compact bench-top format. The CNT-100 series.

New measurement functions are up to 4 parallel frequency, time, phase, and TIE measurements, that enables cost effective production testing ("4 counters in one box"), continuous phase tracking of 4 atomic clocks without the need for a switch, and multi-stop time interval for time-of-flight measurements in physics research. In general R&D in the electronics industry, you can now follow frequency and pulse parameters from various test points simultaneously, just as you can do on a 2- or 4-channel oscilloscope.

We offer three models. The pioneering CNT-104S with 4 parallel channels, the higher performance model CNT-104R with a built-in rubidium atomic clock as standard, and a lower cost multi-channel Frequency Analyzer alternative, the CNT-102, with dual parallel input channels.

KEY SPECIFICATIONS

- Two or four channel 400 MHz Frequency Analyzer - plus optional RF-channel to 24 GHz
- Gap-free continuous timestamping measurements
- 2 or 4 parallel independent counter/analyzers in one box
- Ultra-high resolution:
  - Time: 7 ps (CNT-104S/104R); 14 ps (CNT-102)
  - Freq.: 12-13 digits/s
- Ultra-high timebase stability
  - OCXO to 1.5E-8/yr (CNT-102, CNT104S)
  - Rubidium to 2E-10/yr (CNT-104R)
  - GNSS-disciplined Rubidium option gives zero ageing (CNT-104R)
- Ultra-high sample speed, up to:
  - 20M meas./s (CNT-104S/104R);
  - 1M meas./s (CNT-102)
  - 170k meas./s to remote controller
- Graphic touch screen for settings and display of values, statistics (distribution graph), trend & modulation
- Touch screen can be mouse controlled and/or remote controlled via webserver, from PC/Tablet/Mobile Phone from anywhere in the world
- Intelligent and easy-to-use.

CNT-104R

- Combined CNT-104S, 4 channel 400 MHz channel Frequency Analyzer, and 10 MHz Frequency Reference with integrated Rubidium oscillator
- Accurate time calibration to 10 ns rms to UTC (with GNSS option)
- Optional automated Frequency and Time Offset measurements
- Zero-ageing of Rubidium oscillator thanks to GNSS option

CNT-104S

- Four channel 400 MHz Frequency Analyzer - plus optional RF-channel to 24 GHz
- Ultra-high resolution: 7 ps (Time), 12-13 digits/s (Frequency)
- Ultra-high measurement speed: up to 20 Millions of Samples per second
- Phase comparison of up to 4 independent signals
- Gap-free frequency measurements; 50ns to 1000s gate time

CNT-102

- Dual-channel 400 MHz Frequency Analyzer - plus optional RF-channel up to 24 GHz
- Very-high resolution: 14 ps (Time), 12-13 digits/s (Frequency)
- Very high meas. speed: 1M meas./s to internal memory
- 2 parallel counter/analyzers in one box
- Gap-free frequency measurements; 1µs to 1000s gate time

CNT-100 SERIES

FREQUENCY REFERENCES

We offer several models of very precise stand-alone or GNSS-controlled Rubidium Reference clocks for various metrology, industrial and telecom applications.

Depending on the model, they offer a unique built-in traceability concept to eliminate all calibration costs, optional measurement input to provide a true one-box frequency and time calibrator, or portability to bring instant Cesium accuracy to the field.

GPS12R/HS PORTABLE

- GPS-disciplined Rubidium clock
- Internal battery option for transportation and mains-free field use
- Multi-frequency outputs: 1 pps, 0.1 MHz, 10 MHz, 5 MHz, 1 MHz, 1.544 MHz (T1) or 2.048 MHz (E1)
- Seven standard outputs and four optional
- User friendly front panel operation, with eight selectable languages

6688/6689

- Stand-alone frequency reference
- Rubidium (6689) or high stability OCXO (6688)
- 5x10 MHz and 1x5 MHz outputs as standard
- Optional five extra 10 MHz outputs
- 0.001 ppm aging in 10 years (Rubidium)

FTR-210R

GNSS disciplined Rubidium Frequency & Time Reference

- GNSS-disciplined Rubidium Frequency Standard
- Ultra-high frequency stability and time accuracy
- Independent internal calibration system enables traceability to UTC
- Generates traceable calibration reports
- Seven standard outputs; 5x 10MHz, 1x 5MHz, 1x 1-pps
- Four extra optional frequency outputs plus programmable pulse output to 100 MHz
- Optional measurement input to 400 MHz for one-box frequency calibration with optional Time Offset to UTC and Frequency Offset meter enabled by software
- Web server functionality. Control and read status from anywhere in the world.
- Graphical easy-to-use User Interface
- No recurring calibration costs

FTR-210R GNSS disciplined Rubidium Frequency & Time Reference was recognized among the best innovations by the 2024 Military + Aerospace Electronics Innovators Awards program. A Silver nomination in the Test & Measurement Category was bestowed upon Pendulum Instruments for marked improvement over previous methods employed, approaches taken, or products/systems used.

TIME AND FREQUENCY COUNTER/ANALYZERS
CNT-90 series

Pendulum brand frequency counters/analyzers are well-known as industry-leading time and frequency measurement instruments. Our products were pioneers in the market with the revolutionary graphical UI and extensive analysis functions. Our product range covers pulsed RF measurements to 60 GHz as well as ultra-accurate Analyzers/Calibrators with built-in Rubidium atomic clock.

CNT-90

- Frequency range: 400 MHz standard; 3, 8, 15 and 20 GHz optional
- Resolution: 70 ps (Time), 12 digits/s (Frequency)
- High meas. speed: 250k meas./s to internal memory
- USB and GPIB as standard

CNT-90XL

- As CNT-90 plus extra microwave input for frequency and power
- CW Frequency Counter to 27, 40, 46, or 60 GHz
- CW Power Meter to 27, 40, 46, or 60 GHz
- Pulsed RF Frequency & Power Analyzer
- Microwave Modulation Domain Analyzer

CNT-91\91R

- As CNT-90 plus higher performance
- Time resolution: 35 ps rms
- Zero dead-time, gap-free measurements
- High speed: 15k meas./s via USB/GPIB
- Continuous data streaming to 10k meas./s

TIME VIEW™

Modulation Domain Analyzer (MDA) SW to analyze:

- Hopping frequencies to 20 GHz with 20 GHz analysis bandwidth (CNT-90/91)
- Hopping frequencies to 60 GHz with 50 MHz analysis bandwidth (CNT-90XL)
- VCO frequency settling, Frequency sweep
- CW, Doppler, Pulsed or Chirp radar
- Phase and locked loops
- Frequency locked loops
- Frequency and pulse modulation (FM, FSK, PWM), frequency stability (ADEV)
- FFT and Waveform presentation modes
- Emulation of legacy HP 53310A MDA (TimeView 3)

CNT-90 SERIES

FREQUENCY DISTRIBUTION AMPLIFIERS

Distribution Amplifiers offer an economical solution to the problem of transferring frequency reference signals over longer distances, up to 2 km. Our products enable distribution via optical fiber between floors, buildings or sites using either point-to-point or flexible point-to-multipoint, distribution to 4-216 users. Advantages of fiber distribution instead of coax are:

- Drive up to 2 km of optical fiber
- Easy to install – flexible, lightweight and small diameter cable
- No electromagnetic noise pickup, and EMP-proof distribution over fiber
- Eliminate ground current loop problems

FDA-301A

- Distributes sine, pulse, and ToD signals over fiber and/or coax
- 3 modular output slots provides easy upgradability in the field
- Up to 18 fiber or 12 coax outputs
- Auto-switch-over when connecting two input sources for input source redundancy
- Optional DC power input for power redundancy

DA-36

- Distribution of reference frequencies over fiber or coax
- Coax: 1 input, 4 outputs; Fiber: 1 input, 1 output
- Low cost solution for Electrical-to-Optical, or Optical-to-Electrical conversion

HIGH VOLTAGE LINEAR AMPLIFIERS

High Voltage Linear Amplifiers are general purpose broadband linear amplifiers having a fixed or variable amplification, and capable of bipolar or unipolar output. The amplifiers outputs are linear from DC up to Megahertz range and are available in Single-Channel and Dual-Channel versions. They are valuable tools, for research institutes, R&D labs and component manufacturing industries, in a wide range of applications. Common examples are driving piezo actuators, MEMS, OLEDs, liquid crystals, etc. The amplifiers are designed to drive resistive and/or small capacitive loads. The output is equipped with a current limiting circuit that withstands accidental short-circuits.

- Ultra-linear Amplifiers from 70Vp-p up to 1600Vp-p
- Single or dual version
- High output power, up to 2A output current
- High Bandwidth, up to 5 MHz
- High Slew rate, up to 500V/µs
- Low output impedance, down to 0.1 Ohm
- Wide range of models to suit any performance and/or budget demand

*depending on the model

DETECTUS EMC SCANNERS

The Pendulum/Detectus series of EMC-Scanners are powerful pre-compliance tools for measurement and analysis of Electro-Magnetic Interference (EMI). The Scanners feature repetitive high-resolution scanning of emission (and optionally also immunity) down to 25 µm steps which allows you to see minuscule details such as the inside of the IC.

The frequency range is 3, 6 or 10 GHz with the Pendulum near-field probes kits but can be extended by using third parties' probe kits. Since there are no built-in limitations, measurement from DC to daylight is feasible depending on the capabilities of the spectrum analyzer and probes used.

SCN-500 series with 2D or 4D scanning (0.1 mm step size)

SCN-522 – 2D scanner: 200 x 100 mm
SCN-524 – 4D scanner: 200 x 100 x 100 mm
SCN-534 – 4D scanner: 300 x 200 x 100 mm
SCN-564 – 4D scanner: 600 x 400 x 300 mm

HRE series High-resolution Scanners with 3D or 4D scanning (25 µm step size)

HRE-03: 390x290x130 mm
HRE-43: HRE-03 plus rotational probe axis for 4D measurements

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www.pendulum-instruments.com

info@pendulum-instruments.com
sales@pendulum-instruments.com
service@pendulum-instruments.com

4031.600.00091