



# PolyNet PCAC1000

## Optically-Pumped Cesium Atomic Clock



The **PCAC1000** is an advanced optically-pumped cesium-beam frequency standard, delivering exceptional frequency accuracy and stability for both laboratory and field applications. With a stability specification for a 30-day averaging period, it ensures highly predictable time and phase over extended durations.

Designed for precision-critical applications, the **PCAC1000** provides multiple high-quality outputs, including 10 MHz sine, 5 MHz sine, and 1PPS, 2048KHz enabling precise long-term averaging of noisy signals. Its superior performance makes it an ideal choice for telecommunications, power grid synchronization, metrology, astronomy, geodesy, military operations, airport systems, and other demanding fields.

### Benefits

- **Exceptional Frequency Accuracy & Stability**  
Ensures long-term precision for critical applications
- **Reliable Time & Phase Synchronization**  
Maintains predictable timing over extended periods
- **Multi-Output Capability**  
Versatile signal outputs for various use cases
- **Suitable for Both Laboratory & Field Applications**  
Automatic startup and simplified menu structure
- **Supports Long-Term Averaging of Noisy Signals**  
Ideal for precision measurements and signal analysis
- **Wide Application Range**  
Perfect for telecommunications, power grids, network security, finance, metrology, and more
- **Easy to use**  
Engineered for diverse environments
- **Built to Last**  
High performance, high reliability, long service life

# PolyNet PCAC1000 Specifications

## Features

- Optically-pumped cesium frequency standard
- Touch screen control
- Remote interface and control
- Automatic startup and simplified menu structure
- Real-time monitoring operation status and record
- Complete status information
- Automatic logging of major internal events
- Full clock and frequency control
- Multiple timing and frequency outputs
- Automatic synchronization of 1PPS signal

## Applications

- Calibration: Used for calibrating counters, frequency meters, spectrum analyzers, and network analyzers.
- Telecom Infrastructure: Serves as primary clocks (ePRC) in 3G, 4G, 5G networks, big data centers, GNSS (Global Navigation Satellite Systems), and PNT (Positioning, Navigation, and Timing) systems.
- Network Time Synchronization: Used in Network Time Protocol (NTP) for power grids, financial transactions, utilities, security, communications timing, and airport operations.
- Telecommunications & Broadcasting: Serves as frequency references for DTV, DAB, VHF, UHF, PMR transmitters, CDMA, TETRA, and IPTV.
- Production Testing: Provides frequency standards for testing in manufacturing environments.
- Scientific & Metrology Applications: Acts as a standard in calibration labs, metrology labs, radio workshops, and research stations.
- Aerospace & Defense: Used in satellite ground stations for precision timing.

## Physical Specifications

	Standard Performance	High Performance	Ultra-High Performance*
<b>Operating temperature</b>	0°C - 40°C	15°C - 30°C	15°C - 30°C
<b>Temperature coefficient</b>	≤ 1E-12/°C	≤ 5E-14/°C	≤ 5E-14/°C
<b>Storage temperature</b>	-20°C - 50°C	-20°C - 50°C	-20°C - 50°C
<b>Humidity</b>	10% - 60% RH	Up to 95%	Up to 95%
<b>Altitude</b>	0 - 3km	0 - 5km	0 - 5km
<b>Vibration</b>	Compliant with 3 <sup>rd</sup> level road and railway transportation conditions		
<b>EMC</b>	Compliant with GJB151A naval ground requirement		
<b>Dimensions (DxWxH)</b>	19inch, 4U standard rack (553mm×454mm×177mm)		
<b>Net weight</b>	≤ 40kg		
<b>Communication port</b>	1xRS-232 on DB-9 1xEthernet TCP/IP port on RJ45		
<b>LEDs</b>	3 LED indicators for power supply status, operation and alarms		

## PolyNet PCAC1000 Technical Data

### Electrical Specifications

<b>AC Power Supply</b>	220V; 50 - 60Hz
<b>DC Power Supply</b>	48V; Nominal floating: 22V - 75V (If AC and DC co-exist, AC power supply is automatically selected.)
<b>Power Consumption</b>	Warm up $\leq$ 200W Steady state $\leq$ 110W @ 25°C
<b>Warm-up Time</b>	$\leq$ 40 min @ 20°C
<b>MTBF</b>	$\geq$ 100,000 hours
<b>Lifetime</b>	$\geq$ 10 years

### Cesium Performance Characteristics

#### ACCURACY

	Standard	High	Ultra-High*
<b>Frequency tolerance</b>	$\leq$ 1E-12	$\leq$ 5E-13	$\leq$ 5E-13
<b>Reproducibility</b>		$\leq$ 5E-13	
<b>Frequency tuning range</b>		$\geq$ 1E-9	
<b>Frequency resolution</b>		$\leq$ 1E-15	
<b>Retrace (fractional frequency offset after a power cycle)</b>		$\leq$ 2E-13	

#### LONG-TERM STABILITY

Frequency stability (10MHz)	Standard	High	Ultra-High*
<b>1s</b>	$\leq$ 5.0E-12	$\leq$ 3.5E-12	$\leq$ 3.0E-12
<b>10s</b>	$\leq$ 3.5E-12	$\leq$ 3.0E-12	$\leq$ 1.5E-12
<b>100s</b>	$\leq$ 2.7E-12	$\leq$ 8.5E-13	$\leq$ 3.0E-13
<b>1,000s</b>	$\leq$ 8.5E-13	$\leq$ 2.7E-13	$\leq$ 1.5E-13
<b>10,000s</b>	$\leq$ 2.7E-13	$\leq$ 8.5E-14	$\leq$ 3.0E-14
<b>100,000s</b>	$\leq$ 8.5E-14	$\leq$ 2.7E-14	$\leq$ 1.5E-14

## PolyNet PCAC1000 Technical Data

### FREQUENCY OUTPUTS

<b>Frequency</b>	10MHz, Sine wave, 2 channels 5MHz, Sine wave, 2 channels 2048kHz/E1, 2 channels (Optional)
<b>Amplitude</b>	7 - 14dBm
<b>Harmonic</b>	≤ -45dBc
<b>Non-harmonic</b>	≤ -85dBc
<b>Connector</b>	BNC/TNC
<b>Load impedance</b>	50 Ω

### TIMING OUTPUTS

<b>Format</b>	1PPS pulse signal, 3 channels
<b>Amplitude</b>	≥ 2.4V; TTL
<b>Pulse width</b>	20µs
<b>Rise time</b>	≤ 5ns
<b>Jitter</b>	≤ 1ns RMS
<b>Connector</b>	BNC
<b>Load impedance</b>	50 Ω

### SYNC INPUTS

<b>Sync input</b>	1PPS
<b>Amplitude</b>	5V ± 0.5V
<b>Pulse width</b>	100ns min to 0.5s max
<b>Rise time</b>	≤ 5ns
<b>Jitter</b>	≤ 1ns RMS
<b>Connector</b>	BNC
<b>Sync accuracy</b>	≤ 20ns

### SSB PHASE NOISE

	<b>10MHz Output</b>
<b>1Hz</b>	≤ -100dBc
<b>10Hz</b>	≤ -132dBc
<b>100Hz</b>	≤ -148dBc
<b>1,000Hz</b>	≤ -150dBc
<b>10,000Hz</b>	≤ -155dBc
<b>100,000Hz</b>	≤ -155dBc

\*Product currently in development. Specifications subject to change.