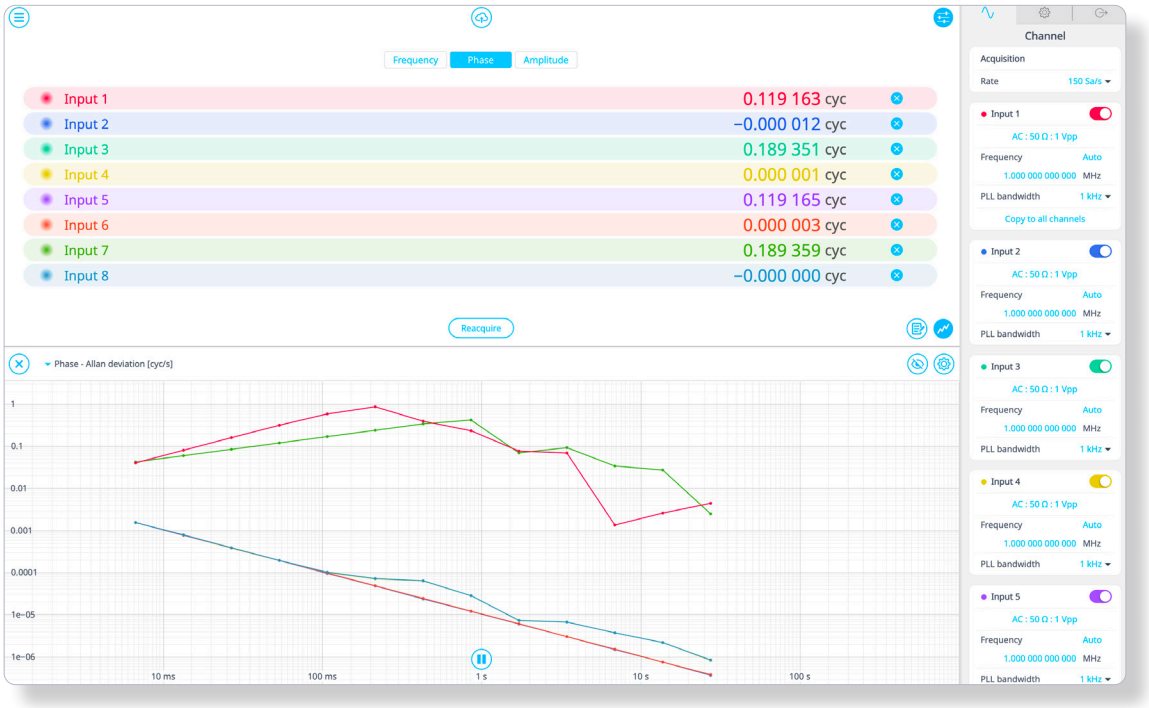
Moku:Delta Instrument Datasheet

Phasemeter

The Moku:Delta Phasemeter provides ultra-precise phase, frequency, and amplitude tracking across eight analog input channels with up to 2 GHz frequency range. Built on a digitally implemented phase-locked loop (PLL) architecture, it delivers real-time measurements with zero dead time, < 10 nV/√Hz input noise, and sub-µrad phase precision. Ideal for advanced research, it includes built-in tools for Allan deviation, power spectral density, and frequency stability analysis. With phase-locked sine wave generation, frequency multipliers up to 250x, microhertz-level resolution, and full API support, it's a powerful solution for time/frequency metrology, optics, and quantum systems.



Frequency range	Tracking bandwidth	Input noise	Built-in analysis	Data capturing rates	Clock reference options
1 kHz to 2 GHz	**Up to 1 MHz**	**< 10 nV/√Hz**	**Allan deviation**	**37 Hz to 152 kHz**	**10 MHz, 100 MHz, GPS**

Features

- Eight independent Phasemeter channels that track and record phase, frequency, and amplitude in real time
- Phase-locked output option enables you to generate sine waves that are phase-locked to the inputs at the fundamental frequency or harmonics
- Output measured amplitude, phase, or frequency offset for closed-loop control systems, or stream to a computer using Moku APIs
- Real-time spectral analysis to display and save power spectral densities, Allan deviation, and more
- Ultra-stable onboard clock (± 1 ppb) with option for GPS clock reference

Specifications

- Input frequency range: 1 kHz to 2 GHz
- Input voltage range: 100 mVpp, 1 Vpp, 10 Vpp, or 40 Vpp
- Tracking bandwidth: 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
- Data acquisition rates: 37 Hz, 150 Hz, 596 Hz, 2.4 kHz, 19.1 kHz, 152 kHz
- Sine wave generators: eight-channel 2 GHz (manual or input-locked)
- Output frequency multiplier: 0.125x to 250x (phase-locked to input)
- Phase output wrap: off, ± π, ± 2π, ± 4π
- Built-in measurements: time series, power spectral density, amplitude spectral density, Rayleigh spectrum, coherence, Allan deviation

Applications

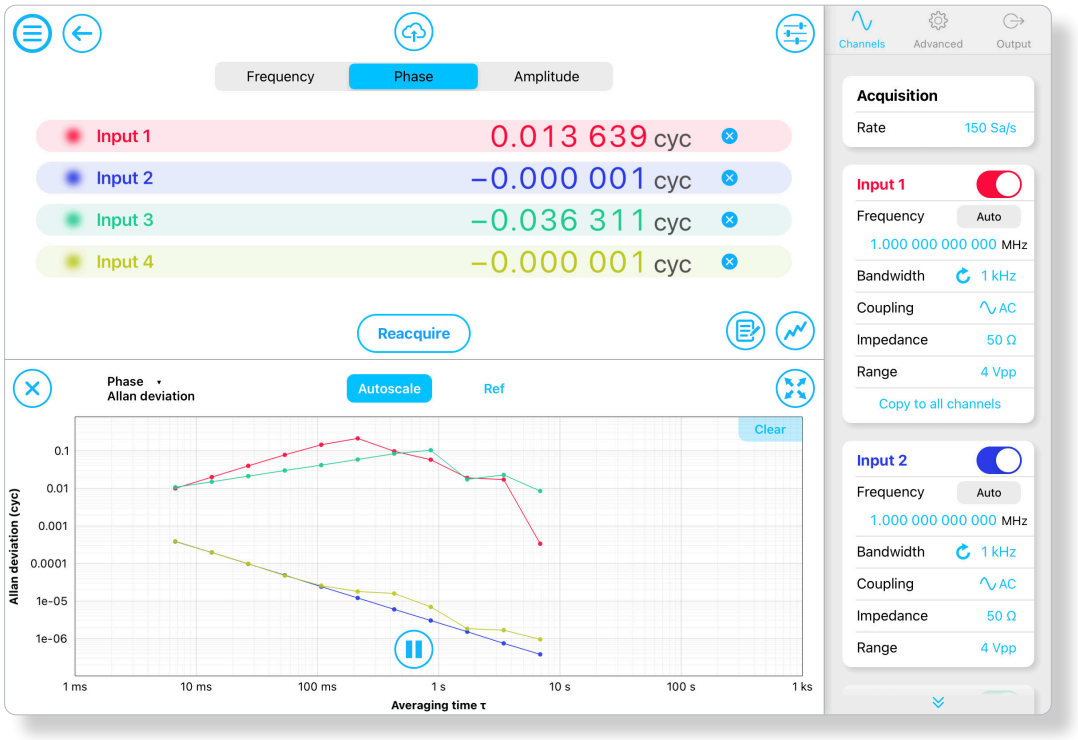
- Precision oscillator characterization
- Optical / ultrasound ranging
- Gravitational wave detection
- Optical and RF interferometry
- Time and frequency metrology
- Quantum optics and photonic systems
- Advanced control systems and feedback loops

Note: All Moku:Delta specifications are subject to change.

Moku:Pro Instrument Datasheet

Phasemeter

The Moku:Pro Phasemeter tracks and measures the phase (relative to a reference clock), frequency, and amplitude of up to four input signals from 1 kHz up to 300 MHz. Based on a digitally-implemented phase-locked loop architecture, the Moku:Pro Phasemeter provides exceptional dynamic range, zero dead time, and measurement precision that exceeds the performance of conventional lock-in amplifiers and frequency counters.



Frequency range	Tracking bandwidth	Phase error	Data capturing rates	Built-in analysis
1 kHz to 300 MHz	Up to 1 MHz	0.5 µrad/√Hz @ 10 Hz	37 Hz to 152 kHz	Allan deviation

Features

- Four independent Phasemeter channels that track and record phase, frequency, and amplitude
- Phase-locked output option enables you to generate sine waves that are phase-locked to the inputs at the fundamental frequency or harmonics
- Output measured amplitude, phase, or frequency offset for closed-loop control systems, or stream to a computer using Moku APIs
- Real-time spectral analysis to display and save power spectral densities, Allan deviation, and more
- Phase-locked loop tracking bandwidths from 1 Hz to 1 MHz

Specifications

- Input frequency range: 1 kHz to 300 MHz
- Input voltage range: 400 mVpp, 4 Vpp, or 40 Vpp
- Tracking bandwidth: 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
- Data acquisition rates: 37 Hz, 150 Hz, 596 Hz, 2.4 kHz, 19.1 kHz, 152 kHz
- Reference frequency resolution: 10 µHz
- Sine wave generators: four-channel 500 MHz (manual or input-locked)
- Output frequency multiplier: 0.125x to 250x (phase-locked to input)
- Phase output wrap: off, ± π, ± 2π, ± 4π

Applications

- Oscillator analysis
- Optical/ultrasound ranging
- Gravitational wave detection
- Interferometry
- Phase-locked loop

Moku:Lab Instrument Datasheet

Phasemeter

The Moku:Lab Phasemeter tracks and measures phase (relative to a reference clock), frequency and amplitude of two independent input signals from 1 kHz to 200 MHz. Based on a digitally implemented phase-locked loop architecture, the Moku:Lab Phasemeter provides exceptional dynamic range, zero dead time and measurement precision that exceeds the performance of conventional lock-in amplifiers and frequency counters.

Frequency Range	Tracking Bandwidth	Phase error	Data Logging rates	Built-in Analysis
1 kHz to 200 MHz	**Up to 100 kHz**	**0.9 µrad/√Hz @ 10 Hz**	**Up to 15.2 kSa/s**	**Allan Deviation**

Features

- Two independent phasemeter channels that track and record phase, frequency, and amplitude
- Phase-locked output option enables you to generate sine waves that are phase-locked to the inputs at the fundamental frequency or harmonics
- Output measured amplitude, phase, or frequency offset for closed-loop control systems, or stream to a computer using Moku APIs
- Real-time spectral analysis to display and save power spectral densities, Allan deviation, and more
- Phase-locked loop tracking bandwidths from 1 Hz to 100 kHz

Specifications

- Input frequency range: 1 kHz to 200 MHz
- Input voltage range: 1 Vpp or 10 Vpp
- Tracking bandwidth: 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz
- Reference frequency resolution: 4 µHz
- Data logging rates: 30 Sa/s, 119 Sa/s, 477 Sa/s, 1.9 kSa/s, 15.2 kSa/s
- Sine wave generators: Dual-channel 250 MHz (manual or input-locked)
- Output frequency multiplier: 0.125x to 250x (phase-locked to input)
- Phase output wrap: off, ± π, ± 2π, ± 4π

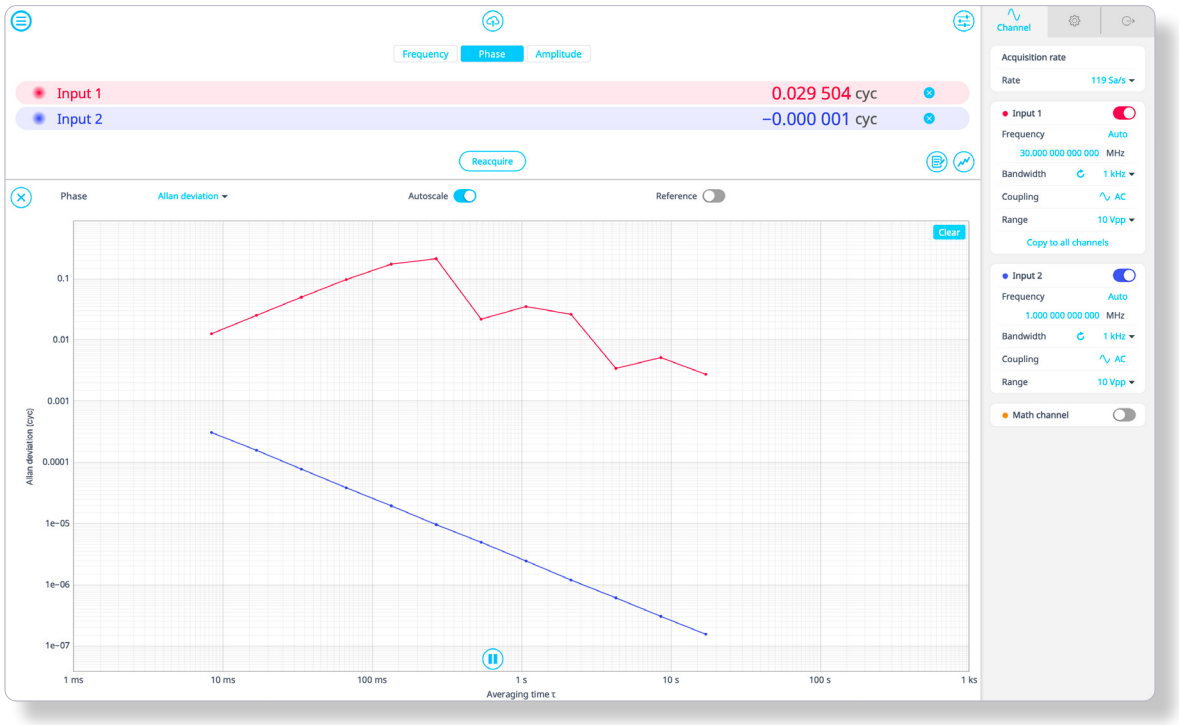
Applications

- Oscillator analysis
- Optical/ultrasound ranging
- Gravitational wave detection
- Interferometry
- Phase-locked loop

Moku:Go Instrument Datasheet

Phasemeter

The Moku:Go Phasemeter tracks and measures phase (relative to a reference clock), frequency, and amplitude of two indepedent input signals from 1 kHz to 30 MHz. Based on a digitally implemented phase-locked loop architecture, the Phasemeter provides exceptional dynamic range, zero dead time, and measurement precision that exceeds the performance of conventional lock-in amplifiers and frequency counters.



Frequency range	Tracking bandwidth	Phase error	Data capturing rates	Built-in analysis
1 kHz to 30 MHz	**Up to 100 kHz**	**1.1 µrad/√Hz @ 10 Hz**	**30 Hz to 122 kHz**	**Allan deviation**

Features

- Two independent phasemeter channels that track and record phase, frequency, and amplitude
- Phase-locked output option enables you to generate sine waves that are phase-locked to the inputs at the fundamental frequency or harmonics
- Output measured amplitude, phase, or frequency offset for closed-loop control systems, or stream to a computer using Moku APIs
- Real-time spectral analysis to display and save power spectral densities, Allan deviation, and more
- Phase-locked loop tracking bandwidths from 1 Hz to 100 kHz

Specifications

- Input frequency range: 1 kHz to 30 MHz
- Input voltage range: 10 Vpp or 50 Vpp
- Tracking bandwidth: 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz
- Data acquisition rates: 30 Hz, 119 Hz, 477 Hz, 1.9 kHz, 15.2 kHz, 122 kHz
- Reference frequency resolution: 1 µHz
- Sine wave generators: two-channel 20 MHz (manual or input-locked)
- Output frequency multiplier: 0.125x to 250x (phase-locked to input)
- Phase output wrap: off, ± π, ± 2π, ± 4π

Applications

- Interferometry
- Optical/ultrasound ranging
- Oscillator analysis
- Phase-locked loop