



Chop-In Opus 1™

Digital Dual-Phase Lock-In Amplifier & Phase-Locked Chopper Combination

- ◆ **Affordable** lock-in amplifier and chopper system for the price of a chopper alone
- ◆ Provides digital dual-phase lock-in amplifier functionality at frequencies up to 5 kHz
- ◆ USB powered—no additional power needed
- ◆ Compact 3 inch diameter chopper disk



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Chop-In Opus 1™ Specifications

Input channel

Input signal	Differential (± 3 V max), 1 M Ω input impedance
Gain settings	1x, 10x, 100x, 1000x
Sensitivity*	20 nV

Reference channel

Reference signal	3.3-5 V logic
Frequency range	20-5000 Hz (lock-in amplifier), 20-700 Hz (chopper)
Frequency resolution	0.1 Hz or 0.01%, whichever is greater
Harmonic #	Selectable, limited by the frequency range and sampling rate

Chopper

Disk diameter	3" (76 mm)
Aperture	9 mm
Mounting	8-32 and M4 threaded holes, compatible with standard optical posts

Demodulator

Implementation	Bundled application
Time constant	0.001-1000 s (6, 12, 18, 24 dB/Oct rolloff)
Dynamic range*	Typically > 120 dB
SNR*	Typically > 90 dB
Harmonic rejection ratio*	Typically > 80 dB
Measurement accuracy*	< 0.1% (20-1000 Hz); 0.1-3% (1000-5000 Hz)

Outputs

Host computer GUI	X, Y, R, θ and reference frequency
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Front panel input/output connectors

Signal input	BNC (Input)
External reference input	BNC (Ref In)
Chopper control	3.5mm audio jacks
Chopper frequency control	Via software
Data interface and power	Mini-USB connector
Power indicator	LED

Software

Stand-alone executable	Controls the hardware, implements signal acquisition, digital demodulation and filtering—req. min. Windows 7, Pentium i3, and 4GB RAM or higher
An example LabView VI	Demonstrates full user control of the hardware, data acquisition, graphical display of the results and saving of the data

Power, dimensions and weight

Power source	+5 V (via USB), 300 mA + 50 mA per chopper
Dimensions	Main unit: 7.0" (W) x 7.5" (D) x 2.5" (H); chopper: 3" (W) x 2.5" (D) x 3.5" (H)
Weight	Main unit: 800 g; chopper: 120 g

*First harmonic signal measurement, time constant 100 ms (24 dB/Octave)

Note: specifications are subject to change

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