

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



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 |
|-------------------|---|

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 (<i>via</i> 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 |

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

Note: specifications are subject to change