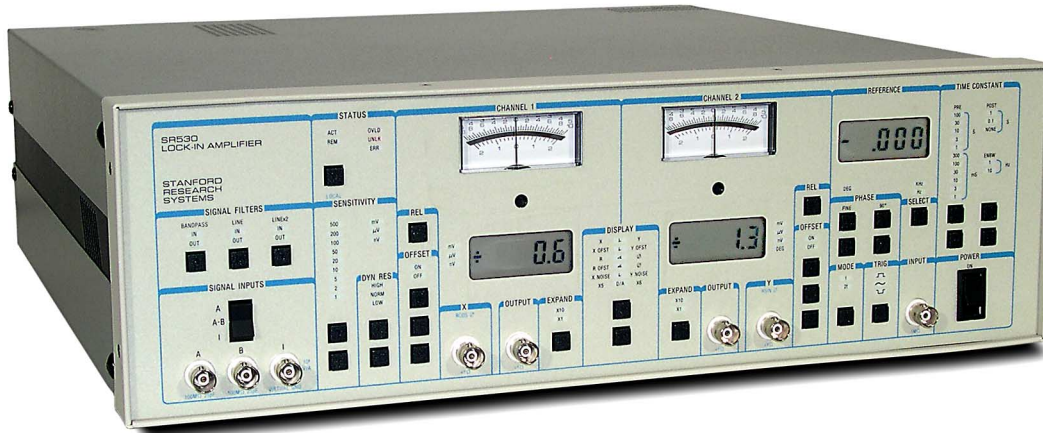


# Lock-In Amplifiers

SR510 and SR530 — Analog lock-in amplifiers



SR530 Lock-In Amplifier

## SR510 & SR530 Lock-In Amplifiers

- **0.5 Hz to 100 kHz frequency range**
- **Current and voltage inputs**
- **Up to 80 dB dynamic reserve**
- **Tracking band-pass and line filters**
- **Internal reference oscillator**
- **Four ADC inputs, two DAC outputs**
- **GPIB and RS-232 interfaces**

• **SR510 ... \$2495 (U.S. list)**

• **SR530 ... \$2995 (U.S. list)**

The SR510 and SR530 are analog lock-in amplifiers which can measure AC signals as small as nanovolts in the presence of much larger noise levels. Both the single phase SR510 and the dual phase SR530 have low-noise voltage and current inputs, high dynamic reserve, two stages of time constants, and an internal oscillator. In addition, both lock-ins come equipped with a variety of features designed to make them simple to use.

### Sine Wave Mixing

The core of the SR510/SR530 is a precision analog sine-wave multiplier. Lock-ins use a multiplier (demodulator) to translate the input signal (at the reference frequency) down to DC where it can be filtered and amplified. Many lock-ins use square wave multipliers which introduce spurious harmonic responses. The SR510/SR530 use clean sine-wave multipliers which are inherently free of unwanted harmonics.

### Signal Input

The SR510 and SR530 have differential inputs with 7 nV/√Hz of input noise and 100 MΩ input impedance. The input can be configured as a voltage input, or as a current input with 10<sup>6</sup> V/A gain and an input impedance of 1 kΩ to virtual ground. Full-scale sensitivities from 500 mV down to 100 nV are available.

Three input prefilters can be selected. The first is a line notch filter providing 50 dB of rejection at the line frequency. The



## A/Ds and D/As

There are four A/Ds and two D/As on the rear panel that provide flexibility in interfacing the SR510/SR530 with external signals. These input/output ports measure and supply analog voltages with a range of  $\pm 10.24$  VDC and a resolution of 2.5 mV. The A/Ds digitize signals at a rate of 1 kHz. The D/A output is ideal for controlling the frequency of the SR510/530's internal voltage-controlled oscillator. A built-in ratio feature allows the SR510/SR530 to calculate the ratio of its output to a signal at one of the A/D ports. This feature is important in servo applications to maintain a constant loop gain, or in experiments that normalize a signal to an intensity level.

## Available Preamplifiers

Although the SR510 and SR530 are completely self contained and require no preamplification, sometimes an external preamplifier can be useful. Remote preamplifiers provide gain where it's most important—right at the detector, before the signal-to-noise ratio is permanently degraded by cable noise and pickup. The SR550 FET-input preamplifier, the SR552 bipolar-input preamplifier, and the SR554 transformer-input preamplifier are ideally suited for use with the SR510/SR530 lock-ins. These preamplifiers are especially useful when measuring extremely low-level signals.

## Computer Interfaces

An RS-232 computer interface is standard on both the SR510 and SR530. An optional GPIB interface is also available. All features of the instruments can be queried and set via the computer interfaces.

## Ordering Information

SR510	Single phase lock-in amplifier (w/ rack mount)	\$2495
SR530	Dual phase lock-in amplifier (w/ rack mount)	\$2995
Option 01	GPIB interface for SR510/SR530	\$895
SR550	Voltage preamplifier (100 M $\Omega$ , 3.6 nV/ $\sqrt{\text{Hz}}$ )	\$595
SR552	Voltage preamplifier (100 k $\Omega$ , 1.4 nV/ $\sqrt{\text{Hz}}$ )	\$595
SR554	Transformer preamplifier (0.091 nV/ $\sqrt{\text{Hz}}$ )	\$995
SR540	Optical chopper	\$1095



SR510 and SR530 rear panels (with opt. 01)