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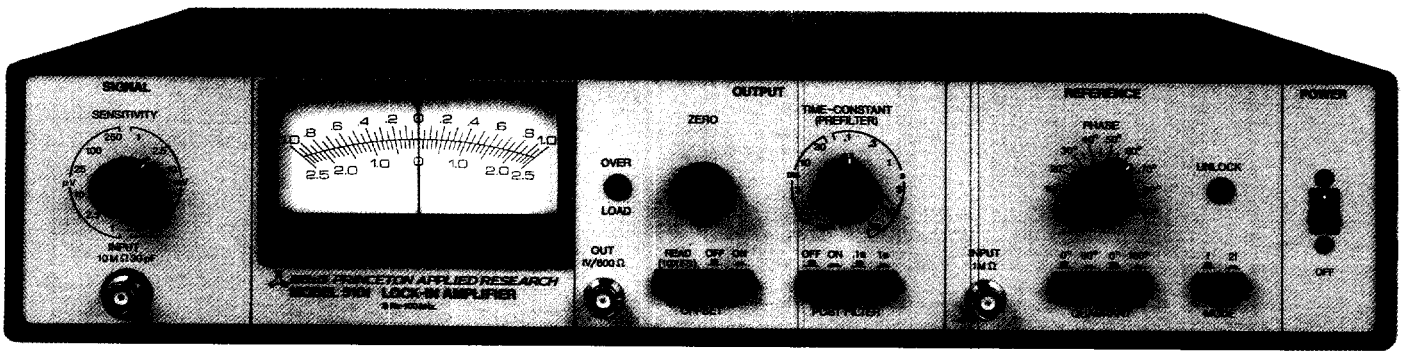
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5101 BEST VALUE LOCK-IN AMPLIFIER



FEATURES

- Low cost
- 5 Hz to 100 kHz operating-frequency range built in without band switching or card changing
- Automatic reference tracking
- 1 μV full-scale sensitivity
- Built-in 2f mode
- Tuned-signal-channel (opt.)
- Reference-oscillator (opt.)

DESCRIPTION

The Model 5101 is a low-cost lock-in amplifier that offers many of the most desirable features of EG&G PARC's more sophisticated instruments. With the Model 5101, even low-budget projects can now afford the luxury and convenience of signal processing precision and versatility. This instrument can be used effectively in a wide variety of applications ranging from industrial quality control to scientific research in astronomy, biology, chemistry, physics and engineering. As a teaching tool in colleges and universities, the operating simplicity and low cost of the Model 5101 make it ideal for demonstrating the theory and applications of phase-sensitive detection. For even greater flexibility, tuned-signal-channel and internal-oscillator options are available.

SIGNAL CHANNEL

Frequency Range

5 Hz-100 kHz.

Sensitivity

1 μV to 250 mV rms full scale in a 1-2.5-10 sequence.

Internal Noise

Typically 10 $nV/Hz^{1/2}$ at 1 kHz.

System Gain Stability

Less than 0.1%/°C.

Signal Channel

Pseudo-differential; outer shell of Input connector floats above chassis by 100 Ω.

Common-Mode Rejection

Typically 85 dB at 1 kHz, degrading to approximately 70 dB at 100 kHz.

Maximum Input Signal

1000 times full scale on the most sensitive ranges.

Input Impedance

10 megohms in parallel with 30 pF.

Tuned-Signal-Channel Option (5101/98)

Provides a switch-selectable choice of a flat response or of a tuned bandpass (or notch characteristic) at a set frequency with a Q of 5. The frequency can be adjusted over a 3:1 range by means of a potentiometer, accessible from the rear panel, and can be changed to any frequency within the range of approximately 5 Hz to 100 kHz by changing capacitors mounted on solderless component clips on the board. When ordering the board, specify Model 5101/98 and the desired frequency range from the table shown. Additional capacitor sets may also be ordered.

5101 LOCK-IN AMPLIFIER SPECIFICATIONS

REFERENCE CHANNEL

Approximate Frequency Ranges
2.7 Hz to 7.9 Hz
5.3 Hz to 15.8 Hz
10.6 Hz to 32 Hz
27 Hz to 79 Hz
53 Hz to 158 Hz
106 Hz to 320 Hz
270 Hz to 790 Hz
530 Hz to 1.5 kHz
1 kHz to 3.2 kHz
2.7 kHz to 7.9 kHz
5.3 kHz to 15 kHz
10 kHz to 32 kHz
27 kHz to 79 kHz
44.5 kHz to 130 kHz

Frequency Range: 5 Hz-100 kHz. No range switching or tuning required.

Modes of Operation: Fundamental (f)—the Model 5101 locks onto any external reference signal of the proper input characteristic. Harmonic (2f)—in this mode, the 5101 will respond at the second harmonic of the external reference frequency; maximum input frequency is 50 kHz.

Input Required: The reference channel will phase-lock to virtually any external voltage waveform of at least 200 mV pk-pk amplitude which crosses its means only twice each cycle. The minimum pulse duration (for asymmetrical waveforms) is 100 ns. The front-panel Reference Unlock lamp indicates the presence of an improper reference input. When using a sine-wave reference, best phase accuracy is achieved at 1 V rms.

Acquisition Time: The time required for the reference channel to sweep from 5 Hz to 100 kHz and lock is typically 8 seconds.

Phase Adjustment: A one-turn potentiometer provides $-10°$ to $+100°$ phase shift. The phase shift accuracy is $\pm 5°$ over the entire frequency range. Two pushbutton switches provide 90° phase-shift increments accurate to 0.2°.

Internal-Oscillator Option (5101/99): A low-distortion oscillator board is available which drives the phase-sensitive detector and also provides a 3.5 V rms (adjustable) signal to a rear-panel BNC connector. The oscillator frequency can be varied over a 3:1 range by means of an internal potentiometer, accessible from the rear panel, and can be changed to any frequency within the range of 5 Hz to 100 kHz by changing capacitors mounted on solderless component clips on the board. When ordering the board, specify the desired frequency range. (See table at left.) Additional capacitor sets may also be ordered.

PHASE-SENSITIVE DETECTOR

Dynamic Reserve: Asynchronous signals with rms amplitudes corresponding to 1000 times full scale can be applied without overload. Dynamic reserve can be greatly increased by installing the tuned amplifier option 5101/98.

Filter Time-Constants: 1 ms to 30 seconds plus a Minimum time position (typically 100 μs). A dc Post-Filter switch is provided which inserts an additional 0.1 or 1 second time-constant filter to provide an overall 12 dB/octave roll-off rate.

DC-Output Zero Stability: Better than 0.1%/°C; 0.1%/24 hours at constant temperature.

Output Voltage: ± 1 V full scale from 600 Ω.

Zero Offset: Ten-turn potentiometer allows up to ± 10 x full-scale signal to be suppressed.

OUTPUTS

Meter Readout: Zero-center taut-band meter to monitor dc output.

Recorder: ± 1 V full scale at a front-panel BNC connector for driving a recorder.

Rear Panel BNC Option (5101/97): Three rear-panel BNC connectors parallel the front panel BNC's.

GENERAL

Overload: A front-panel lamp indicates overload at all critical points in the instrument.

Ambient Temperature Range: The unit can be operated at temperatures ranging from 15°C to 45°C.

Auxiliary Power Output: Regulated ± 15 V at ± 30 mA available at a rear-panel connector.

Power Requirements: 100-130 or 200-260 V ac; 50-60 Hz; 15 watts.

Size: 17¼" W x 3½" H x 14½" D (44 cm W x 9 cm H x 37 cm D).

Weight: 11 lbs (4.9 kg).

Shipping Weight: 14 lbs (6.3 kg).

Warranty: Two years.

NOTE: Specifications subject to change without notice.

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P.O. Box 2565 • Princeton, NJ 08543-2565 • (609) 530-1000 • Fax: (609) 883-7259

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