Specifications

Appendix A

General

Dual-phase analog lock-in amplifier operating over a reference frequency range of 5 Hz to 20 kHz, but also available calibrated for use at one user-specified spot frequency in the range 20 kHz to 100 kHz

The model 5105 is a complete tested module and the model 5106 is tested PCB assembly. Both units share common specifications.

Measurement Modes

The instrument can simultaneously measure these outputs:

X	In-phase
Y	Quadrature
R	Magnitude
θ	Phase Angle

Signal Channel Input

Modes	Single-ended or pseudo-differential
Grounding	Input signal ground can be grounded or floated via 1 kΩ to ground using internal jumper
Full-scale Sensitivity	10 μV to 1 V in a 1-3.16-10 sequence (10 dB steps)
Max. Dynamic Reserve	> 80 dB
Impedance	10 MΩ // 30 pF
Maximum Safe Input	20 V pk-pk
Voltage Noise	< 30 nV/√Hz @ 1 kHz
C.M.R.R.	> 40 dB @ 1 kHz
Frequency Response	5 Hz to 100 kHz
Gain Accuracy	2% typical for digital outputs; 6% typical for analog outputs
Gain Stability	200 ppm/°C typical

Signal Channel Filters

High-pass Signal Channel Filter	
-3 dB frequency	1 Hz, 10 Hz, 100 Hz or 1 kHz
Low-pass Signal Channel Filter	
-3 dB frequency	50 Hz, 500 Hz, 5 kHz or 50 kHz or, by jumper selection, 220 Hz, 2.2 kHz, 22 kHz or 220 kHz
Frequency Accuracy	± 10%

Reference Channel

Mode	TTL or Analog input
Frequency Range	5 Hz to 20 kHz or spot frequencies to 100 kHz
Analog Impedance	1 MΩ // 30 pF
Reference harmonic	F only
Phase Set Resolution	0.1° increments
Phase Set Accuracy	± 1°
Phase Noise	≤ 0.015° rms @ 1 kHz, 100 ms, 12 dB TC ≤ 0.007° rms @ 10 kHz, 100 ms, 12 dB TC
Phase Drift	< 0.05°/°C
Orthogonality	± 1°
Acquisition Time	1 s + 2 cycles max

Demodulator and Output Processing

Mode	Squarewave switching demodulator + HP/LP filters

Zero stability/Dynamic Reserve

Setting	Dynamic Reserve for signals within filter pass-band	Stability
High Reserve	46 dB	500 ppm/°C
Normal	26 dB	100 ppm/°C
High Stability	6 dB	40 ppm/°C

Output Filters

Time Constants	
Analog and Digital Outputs	
Fast Mode	300 µs, 1 ms, 3 ms or 10 ms (316 µV to 1 V FS sensitivity)
Normal Mode	30 ms, 100 ms, 300 ms or 1 s
Digital Outputs only	3 s and 10 s
Accuracy	±10%
Slope	6 dB/octave or 12 dB/octave
Offsets	±20% full-scale, X and/or Y

Outputs

Main Analog (X and Y) Outputs	
Amplitude	±1 V FS
Impedance	1 kΩ
Signal Monitor	10 V pk-pk maximum
Reference Output	
Waveform	0 to 5 V rectangular wave
Impedance	TTL-compatible

Interface

Type
RS232 via 9-pin D type plug, configured as a DTE device. Two ports are provided allowing up to fifteen model 5105/5106 or compatible instruments to be controlled from a single computer port

Parameters (fixed)
4800 baud, no parity, 8 data bits and 1 stop bit

Addressing
Rear panel rotary switch assigns a unique address to each instrument

Controls
Sensitivity, High and Low-Pass Filter settings, Dynamic Reserve, Reference Phase, Time Constant and Slope can all be set and read via RS232 command

Auto Functions
Auto-Phase and Auto-Offset

Data Transfer Rate
6 - 8 readings per second typical

Outputs

X and Y	Max count = ±1200 (±1000 = FS)
Magnitude	Max count = 1200 (1000 = FS)
Signal Phase	Max count = ±1800, corresponding to ±180°
Ref Frequency	Response in millihertz

Software & RS232 Cable

A full applications package for PC compatible computer providing access to all instrument controls and outputs, and supporting up to 16 units, is supplied with each instrument. In addition, a LabVIEW driver software suitable for versions 4.01 and later of LabVIEW is available by download from our website at **www.signalrecovery.com**

The instrument is also compatible with the ***SIGNAL RECOVERY*** Acquire Lock-in Amplifier Applications software. A free demonstration version can be downloaded from the above website.

2 meter null-modem cable suitable for connecting the instrument to a 9-pin D-type RS232 plug on a PC computer also included.

Power Requirements

+18 V DC unregulated @ 300 mA -18 V DC unregulated @ 80 mA
A separate power supply (model PS0108) suitable for 110 V 60 Hz or 230 V 50 Hz operation is supplied with each model 5105 and available as an optional extra for each model 5106 instrument

Dimensions

Model 5105	
Width	8¼" (209 mm)
Depth	10½" (266 mm)
Height	3½" (85 mm)
Weight	5 lb (2.3 kg)
Model 5106	
Dimensions	
Width	6½" (167 mm)
Depth	9¼" (233 mm)
Height	1½" (40 mm)