LOCK-IN AMPLIFIERS / PREAMPLIFIERS

DIGITAL LOCK-IN AMPLIFIER — LI5630/LI5640

LI5630

LI5640

NF's experienced technique utilizes fully a high speed computing function of digital signal processor, and designs DSP Lock-in Amplifiers for easier operation and cost performance, also withimproving high speed and output stability of setting or measurement response.

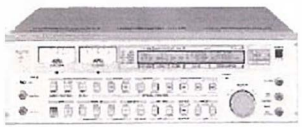
FEATURES

- High stability based on digital processing
  Phase stability 0.01°/℃, Gain stability ±100ppm/℃
- Measurement from 1mHz
  Low speed signal analysis is available like infrared spectrum, temperature response etc.
- High speed and smooth response
  Minimum time constant 10μs, synchronized filter provided and quick response to setting change.
- Simple and assured operation to sophisticated measurement
  Auto function, key allocation, large indicating window, analog meters, and modify dial are provided.
- Two models lined up
  Fulfilled multi-function digital lock-in amplifier : LI5640
  Simplified and cost-performance : LI5630

SPECIFICATIONS

Model	LI5630	LI5640
Sensitivity	2nV to 1V, full-scale	
Frequency range	0.001Hz to 100kHz	
Dynamic reserve	100dB or greater	
Input impedance	10MΩ ±1.5%, differential, floating	
Input referred noise (voltage)	6nV/√Hz (max.), 4.5nV/√Hz (typ.) (at 1kHz)	
Input referred noise (current)	—	130fA/√Hz (typ.) (10^{-9}V/A, at 1kHz) 13fA/√Hz (typ.) (10^{-9} V/A, at 125Hz)
Filter	50/60Hz, 100/120Hz, notch filter	
Time constant	10μs to 30ks, 24dB/oct fixed, SYNC*1	10μs to 30ks, 6, 12, 18, 24dB/oct, SYNC*1
Phase measurement	−180.00° to +179.99° resolution : 0.01°	
Reference signal mode	REF IN / INT OSC, 2F	REF IN / INT OSC / SIGNAL*2 , nF (n≦19999)
Internal oscillator	—	0.0005Hz to 105kHz (4½-digits)
Measurement display*3	X, Y, R, θ Reference frequency, Ratio	DATA1 : X, R, NOISE, AUX IN1, X(dB), X(%) DATA2 : Y, θ, AUX IN1, AUX IN2 Reference frequency, Ratio, DC
Data memory	16 bit × 64K data sampling interval : 1/16ms to 20s	
Interface	GPIB, RS-232C	
Power requirements	AC100V, 120V or 230V switchable 50/60Hz ± 2Hz 50VA max.	
Dimensions (mm)	434(W) × 132.5(H) × 400(D)	
Weight	approx. 10kg	
Remarks	*1 Output ripple is reduced by synchronous filter which is performed moving average with integer multiples of reference signal period *2 Synchronized with measuring signal without reference signal *3 X : Rcosθ, Y : Rsinθ, θ : phase, R : amplitude	

LOCK-IN AMPLIFIER — 5610B



FEATURES

- Computer interface(GPIB, RS232C)
- Automatic functions : AUTO SET,
  AUTO RANGE, AUTO NORMALIZE, PHASE SET
- High dynamic reserve(110dB Max.)

FEATURES

Sensitivity	100nV to 1V fullscale, in 1-3 steps (10nV at the METER MAG operation)
Frequency range	0.5Hz to 200kHz
Input type	Differential
Input impedence	10M //40pF
Common-mode rejection ratio	110dB or greater(at 1 kHz)
Input referred noise	5nV/or lower(at 1 kHz)
Filter	LPF, HPF, BPF, automatic tuning is available.
Reference signal mode	EXT F/2F, INT F/2F
Internal oscillator	0.5Hz to 120kHz
Measurement display	DATA 1 : One of either A, A(dB), A%, X(Acosφ), X(dB), X(%) DATA 2 : One of either θ or Y (Asinφ) DATA 3 : One of either ratio, reference frequency, EXT DC
Monitoring meter	Acosφ or Asinφ
Time constant	1ms to 30s 6dB/oct or 12dB/oct
Averaging functions	Linear or exponential averaging mode No. of averages 2^1 to 2^8
Interface	GPIB, RS-232C
Power requirements	AC100, 120, 220 or 240V switchable
Dimensions(mm)	432(W)× 132.5(H) × 500(D)
Weight	approx.13.5kg

SYNCHROTRACK LOCK-IN AMPLIFIER — LI-575

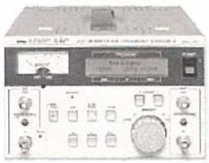
FEATURES

- Completely free from harmonic influences
- Wide band frequencies between 0.5Hz and 200kHz can be continuously set.
- Dynamic reserve 100dB
- Phase measurements easily performed.
- Built-in noise measuring mode; equivalent of 0.1Hz to 100Hz

SPECIFICATIONS

Sensitivity	100nV to 500mV
Frequency range	0.5Hz to 200kHz
Input mode	Ground line may be switch-floated.
Input impedance	100M Ω //40pF
Input referred noise	Less than 5nV/√Hz (at 1kHz)
Reference mode	AUTO, INT, EXT, EXT2F
Phase adjustment	Not required
Time constant	1.25ms to 125s, 6dB/oct or 12dB/oct
Dynamic reserve	Maximum 100dB
DC output	Acosφ, Asin φ, A, φ, NOISE
Power requirements	AC100, 120, 220 or 240V switchable
Dimensions (mm)	480(W)×149(H)×500(D)
Weight	approx. 20kg

LOCK-IN AMPLIFIER FREQUENCY EXTENDER — 557.1



A frequency converter, which can extend upper limited frequency of Lock-in Amplifier up to max. 5MHz.

FEATURES

- Intput impedance: 50Ω
- Input sensitivity range: +40dB to -10dB
- Input frequency: 10kHz to 5MHz
- Input noise 10nV/√Hz (typ.)
- GPIB interface

DIFFERENTIAL AMPLIFIER — 5307

The 5307 is a general-purpose low-noise differential amplifier featuring a bandwidth of DC to 10MHz, a maximum gain of 1000 and a noise level of 4nV/√Hz.

FEATURES

- Wide bandwidth : DC to 10MHz
- High gain : 10 to 1000
- Differential input (single-ended configuration also selectable)
- High CMRR : 120dB or higher
- High common mode voltage : ±10V
- Low noise : 4nV/√Hz typ. (1kHz)

SPECIFICATIONS

Input configuration	Balanced differential input (2 BNC connectors)
Input impedance	1MΩ ±2% (100MΩ impedance is available.)
Gain	10 to 1000(With 50Ω load) in 1, 2, 5 sequence
Power requirements	AC 100, 120, 220 or 240V switchable
Dimensions(mm)	215(W)×88(H)×350(D)
Weight	Approx. 3.2kg

LOW NOISE PREAMPLIFIER — LI-75A

LI-75A

PS-70A

SPECIFICATIONS

Input terminal	Balanced
Input impedance	100MΩ//50pF
CMRR	120dB (DC to 100Hz)
Input referred noise	2nV/√Hz (at 1kHz)
Voltage gain	40dB
Frequency response	DC to 1MHz (DC), 0.2Hz to 1MHz (AC)
Maximum output voltage	±10V/2kΩ (DC to 200kHz)
Power requirements	Provided by the Lock-in amplifier or PS-70A
Dimensions (mm)	120(W)×55(H)×200(D)
Weight	1.15kg

PS-70A DC Power Supply: Dedicated power supply for LI-75A and LI-76

Specifications

Input section

Input type: Differential input, 2 BNC connectors
A–B (differential input)
A, –B, A–OFS, –B + OFS (single-ended input)
GND (input short-circuit)
Selectable on the panel, OFS = internal offset

Input impedance: Resistance; 1 MΩ ± 2 %
Capacitance; Less than 35 pF
A, -B Input capacitance matching; Less than 3 pF
The resistance of 100 MΩ is obtained by switching an internal short plug.

Input bias current: 3 nA typical (23 °C) 2 times/10 °C up

Allowable maximum input voltage: ±50 V (input protector works at ±10.5 V, and the unit recovers automatically approximately 5sec. after the excessive input is removed)

Common mode voltage: ±10 V (linear operation)

Common mode rejection ratio: 120 dB minimum (at DC 1 kHz, gain = 1000 times, common mode voltage = ±5 V)

Equivalent input noise voltage: 4 nV/$\sqrt{\text{Hz}}$ typical (at 1 kHz, input shunted, gain = 1000 times)

Input offset voltage adjustment: Adjustable to 0 V (An adjustment range referred to input is ±0.5 mV minimum)

Stability : ±8 μV/°C typical (input shorted, gain = 1000 times, equivalent input value)

DC offset cancellation range: For single-ended connection input, the DC component is canceled up to an input equivalent value of ±5 V by the internal offset function.

Offset voltage cancellation voltage range : ±0.5 V, ±5 V 2 range, accuracy within ±3 % of full scale

Stability : less than ±200 ppm/°C

Output section

Output type : Single-ended output, BNC connector

Output impedance : 50 Ω ± 2% (f = 1 kHz)

Rated output voltage : ±5 V (R_L = 50 Ω ± 1 %, DC to 3 MHz)
±10 V (R_L ≥ 1 MΩ, DC to 3 MHz)

Maximum output voltage : ±5.2 V (R_L = 50 Ω ± 1 %, DC to 3 MHz)
±10.4 V (R_L = 1 MΩ, DC to 3 MHz)

Maximum output current : ±100 mA

Slew rate : 150 V/μs typical (R_L = 50 Ω, V_0 = ±5 V)
300 V/μs typical (R_L ≥ 1 MΩ, V_0 = ±10 V)

Overload detecting voltage : ±5 V +10 %/–0% (f = 1 kHz, R_L = 50 Ω ± 1 %)

Output noise : Within 20mVrms (input shorted, gain = 1000 times, band width = 10 MHz, R_L = 50 Ω)

Amplifier section

Gain : 10 to 1000 times (R_L = 50 Ω) 1-2-5 steps

Gain accuracy : Within ±3 % (f = 1 kHz, R_L ≥ 1 MΩ)

Gain stability : Within ±200 ppm/C° (f =1 kHz, R_L ≥ 1 MΩ)

Frequency characteristic : DC to 10 MHz +0.2/–3dB (R_L = 50 Ω, V_0 = ±1 V)

Full power band width : DC to 3 MHz (R_L =50 Ω, V_0 = ±5 V)

Distortion factor : Less than 0.02 % (f = 1 kHz, R_L =50 Ω, V_0 = ±5 V, gain = 10 times)

Settling time : 300 ns typical (±1 % error, gain = 10 times, R_L = 50 Ω)
Band width limit filter OFF, Output 5 V step

Overload recovery time : Within 10 μs (gain = 10 to 100 × 1 time)
Within 50 μs (gain = 10 to 100 × 10 times)
This is the time for the output voltage to be restored to the rated output voltage ±1 % after adding a +5 V or −5 V voltage to the input in 10 ms.

Propagation delay time : 55 ± 10 ns typ. (band limit filter FULL)
310 ± 10 ns typ. (band limit filter 1MHz)

Band limit filter : Cut off frequency 1 MHz ± 10 % (−3 dB)
−18 dB/OCT, phase linear

General

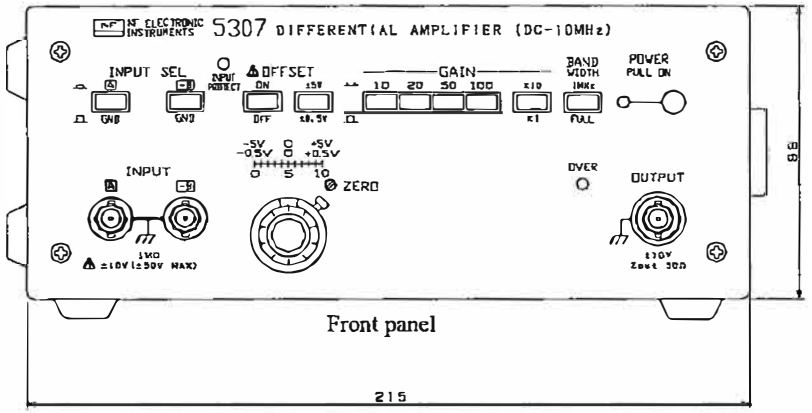
Power : AC 100 V (120 V, 220 V, 240 V switchable) ± 10 % (250 V Max), 48 to 62 Hz, 30 VA max
Insulation resistance; 30 MΩ minimum, DC 500 V
Withstand voltage; AC 1500 V for 1 minute

Operating temperature and humidity: 0 to 40 °C, 10 to 90 %RH (no condensation)

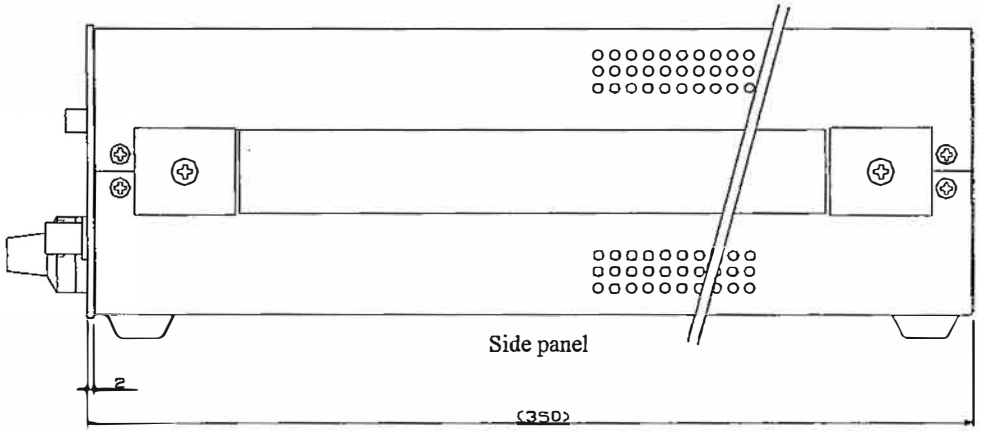
Storage temperature and humidity: −10 to 50 °C, 10 to 80 %RH (no condensation)

External dimensions: 215 × 88 × 350 mm (excluding projections)

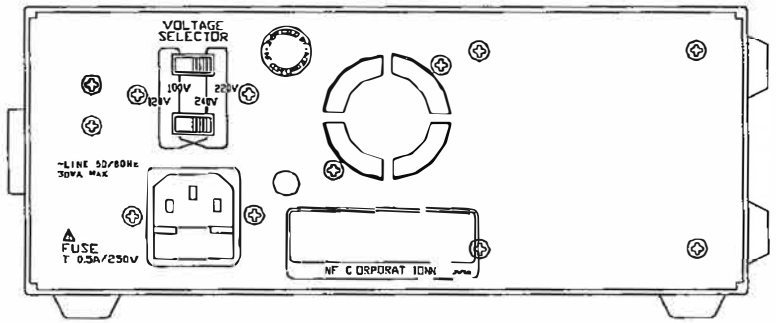
Weight: Approximately 3.2 kg



Front panel



Side panel



Rear panel

Panel finish

Panels: Metallic gray finish

Cover: Hardened polyvinyl chloride metallic gray

External Dimensions