



Bartles Industrial Estate
North Street
Redruth
Cornwall TR15 1HR
United Kingdom

t. +44 [0]1209 314608
f. +44 [0]1209 314609
f2. +44 [0]870 1600860

i. www.scitec.uk.com
e. scitec@scitec.uk.com

Director. JW Smith Ph.D

Scitec Instruments Ltd
Registered in England
No. 1535664

Registered Office
1 Jefferson Court
6 Marine Drive West
Bognor Regis
West Sussex
PO21 2QA

Lock-in Amplifier

Model 410
Single Phase Analogue Lock-in Amplifier

Model 420
Dual Phase Analogue Lock-in Amplifier

Model 430OEM
Single Phase Lock-in Amplifier Board

Model 441OEM
Dual Phase Lock-in Amplifier Board

Model 432OEM
**Single Phase Lock-in Amplifier Board with
Digital Interface**

Model 442OEM
**Dual Phase Lock-in Amplifier Board with
Digital Interface**

Model 410 Single Phase Analogue Lock-in Amplifier

Feature

Scitec Instruments Model 410 is a single phase analogue lock-in amplifier. It is suitable for making amplitude and phase measurements.

- Single phase instrument
- Differential or single-ended input
- Gain settings from 3 μ V to 1 V
- 10 Hz to 100 kHz
- High performance wide bandwidth input gain stage
- Analogue meter for display of output signals
- Output offset controls
- Output time constants from 100 μ s to 30 s
- 1F and 2F reference signal operation
- 90° step and fine phase control



Specifications

Input Signal Channel : The input signal channel amplifies the input signal to a level suitable for the demodulator. High performance, low-noise, broad-band amplifiers are used throughout. The input circuitry can accept a differential or single-ended input via the front panel signal input BNC.

- Input : High or low impedance differential or single ended via front panel BNC
- Sensitivity : 3 μ V to 1 V (for 1 V output) switched in 1, 3, 10 steps
- Input Impedance : $10^{12}\Omega//1$ nF, dc coupled
- Frequency : 10 Hz to 100 kHz
- Maximum Inputs : ± 16 V before input protection circuitry comes into operation. The input BNC has been tested for electrostatic discharge damage
- Input Noise Voltage : Other lock-in amplifier manufacturers give input noise values but without providing any definition of this specification. Indeed there is no meaningful definition of this specification in relation to lock-in amplifiers. As such, Scitec Instruments does not provide noise values and other manufacturers data sheets are considered misleading. Further details about input noise are available on request
- Gain Accuracy : 1%
- Gain Stability : 200 ppm/ $^{\circ}$ C
- Dynamic Reserve : 60 dB limited by a maximum signal input noise voltage of 10 V

Demodulator : The output of the signal input stage is processed using a very high bandwidth demodulator to recover the input signal.

Low Pass Filter : The output from the demodulator is passed through a first order low pass filter and then

amplified before output via a front panel BNC.

- Time Constant : 100 μ s to 30 s in 1, 3, 10 steps
- Output : +/-1 V output corresponds to full scale input. Short circuit protection included
- Offset : Up to 1x full scale, switchable on or off

Reference Channel

- Frequency : 10 Hz to 100 kHz
- Input Impedance : 5.6 M ac coupled
- Trigger : Sine - 100 mV rms min (15 V max.) Pulse - 5 V, 95% mark/space ratio min.
- Acquisition Time : 10 s max.
- Phase Control : 90° steps + fine shift in range 0° - 100°
- Phase Drift : 0.1°/°C

General

- Power : 115 Vac, 230 Vac ; 50-60 Hz ; 10 VA max.
- Mechanical : 440(W) x 87(H) x 190(D) mm
- Temperature range : 0-50°C
- Warranty : 2 years from date of shipment

Standards

- Electrostatic Discharge : BS EN 61000-4-2 Level 2
- Surge : BS EN 61000-4-5 Level 3
- Burst & Transient : BS EN 61000-4-4 Level 2
- RF Emissions : BS EN 50081-2
- RF Immunity : BS EN 61000-4-3 / BS EN 50082-2
- Low Voltage Directive : BS EN 61010-1

Model 420 Dual Phase Analogue Lock-in Amplifier

Feature

Scitec Instruments Model 420 is a dual phase analogue lock-in amplifier. Both single phase Model 410 and dual phase Model 420 are suitable for making amplitude and phase measurements but it is significantly easier with the Model 420.

- Dual phase instrument
- Differential or single-ended input
- Gain settings from 3 μ V to 1 V
- 10 Hz to 100 kHz
- High performance wide bandwidth input gain stage
- Analogue meter for display of output signals
- Output offset controls
- Output time constants from 100 μ s to 30 s
- 1F and 2F reference signal operation
- 90° step and fine phase control



Specifications

Input Signal Channel : The input signal channel amplifies the input signal to a level suitable for the demodulator. High performance, low-noise, broad-band amplifiers are used throughout. The input circuitry can accept a differential or single-ended input via the front panel signal input BNC.

- Input : High or low impedance differential or single ended via front panel BNC
- Sensitivity : 3 μ V to 1 V (for 1 V output) switched in 1, 3, 10 steps
- Input Impedance : $10^{12}\Omega//1$ nF, dc coupled
- Frequency : 10 Hz to 100 kHz
- Maximum Inputs : ± 16 V before input protection circuitry comes into operation. The input BNC has been tested for electrostatic discharge damage
- Input Noise Voltage : Other lock-in amplifier manufacturers give input noise values but without providing any definition of this specification. Indeed there is no meaningful definition of this specification in relation to lock-in amplifiers. As such, Scitec Instruments does not provide noise values and other manufacturers data sheets are considered misleading. Further details about input noise are available on request
- Gain Accuracy : 1%
- Gain Stability : 200 ppm/ $^{\circ}$ C
- Dynamic Reserve : 60 dB limited by a maximum signal input noise voltage of 10 V

Demodulator : The output of the signal input stage is processed using two very high bandwidth demodulators each operating 90° apart from each other to produce the X and Y signals.

Low Pass Filter : The X and Y outputs from the demodulators are passed through two first order low pass filters and then amplified. The X and Y signals are combined to produce R, the modulus signal, where $R=(X^2+Y^2)^{1/2}$ before output via a front panel BNC.

- Time Constant : 100 μ s to 30 s in 1, 3, 10 steps
- All Outputs : +/-1 V output corresponds to full scale input. Short circuit protection included
- Front Panel Output: X, Y or R switchable output
- Rear Panel Outputs: X, Y and R separate outputs
- Offset : Up to 1x full scale for both X and Y channels, switchable on or off

Reference Channel

- Frequency : 10 Hz to 100 kHz
- Input Impedance : 5.6 M ac coupled
- Trigger : Sine - 100 mV rms min (15 V max.) Pulse - 5 V, 95% mark/space ratio min.
- Acquisition Time : 10 s max.
- Phase Control : 90° steps + fine shift in range 0° - 100°
- Phase Drift : 0.1°/°C

General

- Power : 115 Vac, 230 Vac ; 50-60 Hz ; 10 VA max.
- Mechanical : 440(W) x 87(H) x 190(D) mm
- Temperature range : 0-50°C
- Warranty : 2 years from date of shipment

Standards

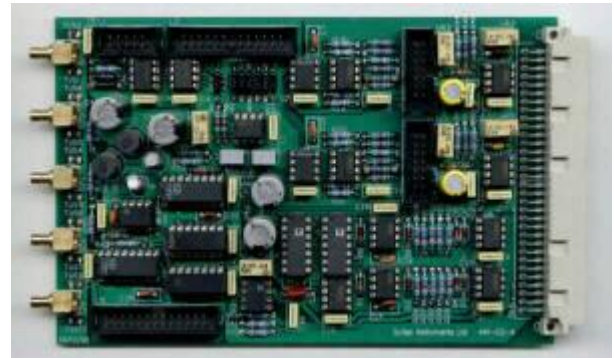
- Electrostatic Discharge : BS EN 61000-4-2 Level 2
- Surge : BS EN 61000-4-5 Level 3
- Burst & Transient : BS EN 61000-4-4 Level 2
- RF Emissions : BS EN 50081-2
- RF Immunity : BS EN 61000-4-3 / BS EN 50082-2
- Low Voltage Directive : BS EN 61010-1

430OEM & 441OEM Single & Dual Phase Lock-in Amplifiers

Feature

Scitec Instruments Model 430 and Model 441 are OEM analogue lock-in amplifiers. Both the single phase Model 430 and dual phase Model 441 are suitable for making amplitude and phase measurements but it is significantly easier with the Model 441. These pcb lock-in amplifiers offer a low cost solution to recovering noisy signals in many situations.

- Single and dual phase versions
- Differential or single-ended input
- Sensitivities from 3 μ V to 10 V for 1 V output
- High performance wide bandwidth input gain stage
- Low pass filter output time constants from 100 μ s to 30 s
- 1F and 2F reference signal operation
- 90° step and fine phase control



Model 430 : A single phase lock-in amplifier with manual setting, using jumpers, of input mode, sensitivity, low pass filter time constant and reference signal course phase control.

- Sensitivity : 3 μ V to 10 V in 1, 3, 10 steps for 1 V output (Gain settings of x0.1 to x330,000)
- Reference input : TTL/CMOS with mark/space of 1:10 to 10:1 (triggered from rising edge only)
- Power : -15 V, 0 V, +15 V dc at 50 mA per supply rail.

Model 441 : A dual phase lock-in amplifier with manual setting, using jumpers, of input mode, sensitivity, low pass filter time constant and reference signal course phase control. Can be used in either of the following three modes:

- Dual phase operation - one input signal with two demodulators operating 90° apart providing both X and Y (or real and imaginary) components of the input signal.
- R calculation - on board circuitry provides the modulus of the X and Y components.
- Single channel 1F and 2F operation - one input signal and two demodulators operating at 1x and 2x the reference frequency to measure the first and second harmonics of the input signal.
- Sensitivity : 3 μ V to 10 V in 1, 3, 10 steps for 1 V output (Gain settings of x0.1 to x330,000)
- Reference input : TTL/CMOS with mark/space of 1:10 to 10:1 (triggered from rising edge only)
- Power : -15 V, 0 V, +15 V dc at 50 mA per supply rail.

Specifications

Input Signal Channel : The input signal channel amplifies the input signal to a level suitable for the demodulator(s). High performance, low-noise, broad-band amplifiers are used throughout. The input circuits can accept differential or single-ended inputs via the input SMB connectors. Options within the unit allow the outer SMB contact or screen to act as a high impedance differential input or allow it to be connected to ground for single-ended operation.

- Input : Differential or single ended voltage via SMB socket
- Input Gain : x0.1 to x330 in 1, 3.3, 10 steps
- Input Impedance : $10^{12} // 1$ nF, dc coupled
- Frequency : 10 Hz to 100 kHz
- Maximum Inputs : ± 10 V before saturation occurs
- Input Noise Voltage : Other lock-in amplifier manufacturers give input noise values but without providing any definition of this specification. Indeed there is no meaningful definition of this specification in relation to lock-in amplifiers. As such, Scitec Instruments does not provide noise values and other manufacturers data sheets are considered misleading. Further details about input noise are available on request
- Gain Accuracy : 1%
- Gain Stability : 200 ppm/°C
- Dynamic Reserve : 0dB to 80dB

Demodulator : The input stage drives high bandwidth demodulators to recover the input signal.

Output : The demodulator outputs are passed through low pass filters before being amplified for output.

- Output Gain : x1, x10, x100, x1000
- Low Pass Filter Time Constants : 100 μ s to 30 s in 1, 3, 10 steps
- Outputs - SMB connectors : +/-100 mV to +/-10 V full scale

Reference Channel : A single reference channel is used to generate the signals that drive the demodulator(s). A fine phase shifting circuit allows the reference signal to be phase shifted from 0° to 150° relative to the signal input. A second circuit then produces signals that are phase shifted by 0°, 90°, 180° and 270° at both the reference frequency and twice the reference frequency.

- Frequency : 10 Hz to 100 kHz
- Trigger: Standard TTL, 95% mark/space ratio min. Rising edge triggered.
- Acquisition Time : 10 s max.
- Phase Control : 90° steps + fine shift of 0° - 150°
- Phase Drift : 0.1°/°C
- 1F and 2F operation

General

- Power connections are made via a 64 pin type C DIN41612 connector. Signal connections are not

possible via this connector.

- Mechanical : 100 x 160 mm
- Temperature range : 0-50°C
- Warranty : 2 years from date of shipment

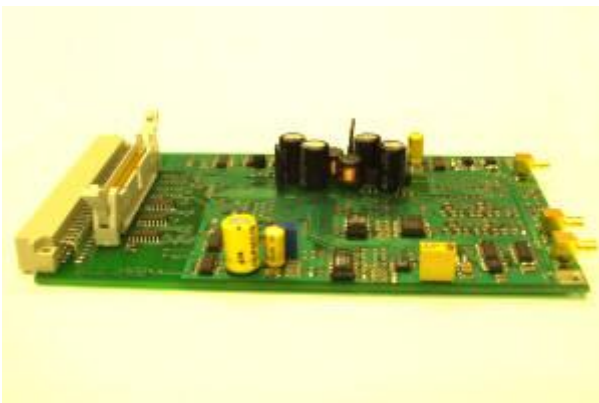
432OEM & 442 OEM Single Phase & Dual Phase Lock-in

Amplifier Board with Digital Interface

Feature

Scitec Instruments Model 432 and Model 442 are OEM analogue lock-in amplifiers with digital interfaces for controlling the boards. Both the single phase Model 432 and dual phase Model 442 are suitable for making amplitude and phase measurements but it is significantly easier with the Model 442. These boards are controlled via a digital interface which can connect to either an 8 bit bus of a μ Controller or μ Processor or to the parallel port of a PC.

- Single and dual phase versions
- Differential or single-ended input
- Sensitivities from 1 μ V to 10 V for 1 V output
- High performance wide bandwidth input gain stage
- Low pass filter output time constants from 100 μ s to 30 s
- 1F and 2F reference signal operation
- 90° step and fine phase control



Model 432 : A single phase lock-in amplifier with computer interface for selection of input mode, sensitivity, low pass filter time constant, output gain, offset and phase control (fine and course) of the reference signal.

- Sensitivity : 1 μ V to 1 V in 1, 3, 10 steps for 1 V output
- Reference input : TTL/CMOS with mark/space of 1:10 to 10:1 (triggered from rising edge only). Sine, triangular, square waves etc with amplitudes from 200 mV to 10 V.
- Fine phase adjust : 0° to 150° in 256 steps.
- Computer interface : 34 pin IDC connector can be connected to PC parallel port
- Power : -15 V, 0 V, +15 V dc at 50 mA per supply rail.

Model 442 : A dual phase lock-in amplifier with manual setting, using jumpers, of input mode, sensitivity, low pass filter time constant and reference signal course phase control. Can be used in either of the following three modes:

- Dual phase operation - one input signal with two demodulators operating 90° apart providing both X

and Y (or real and imaginary) components of the input signal.

- R calculation - on board circuitry provides the modulus of the X and Y components.
- Single channel 1F and 2F operation - one input signal and two demodulators operating at 1x and 2x the reference frequency to measure the first and second harmonics of the input signal.
- Sensitivity : 1 μ V to 1 V in 1, 3, 10 steps for 1 V output
- Reference input : TTL/CMOS with mark/space of 1:10 to 10:1 (triggered from rising edge only). Sine, triangular, square waves etc with amplitudes from 200 mV to 10 V.
- Fine phase adjust : 0° to 150° in 256 steps.
- Computer interface : 34 pin IDC connector can be connected to PC parallel port
- Power : -15 V, 0 V, +15 V dc at 50 mA per supply rail.

Specifications

Input Signal Channel : The input signal channel amplifies the input signal to a level suitable for the demodulator(s). High performance, low-noise, broad-band amplifiers are used throughout. The input circuits can accept differential or single-ended inputs via the input SMB connectors. Options within the unit allow the outer SMB contact or screen to act as a high impedance differential input or allow it to be connected to ground for single-ended operation.

- Input : Differential or single ended voltage via SMB socket
- Input Gain : x0.1 to x330 in 1, 3.3, 10 steps
- Input Impedance : $10^{12} // 1$ nF, dc coupled
- Frequency : 10 Hz to 100 kHz
- Maximum Inputs : ± 10 V before saturation occurs
- Input Noise Voltage : Other lock-in amplifier manufacturers give input noise values but without providing any definition of this specification. Indeed there is no meaningful definition of this specification in relation to lock-in amplifiers. As such, Scitec Instruments does not provide noise values and other manufacturers data sheets are considered misleading. Further details about input noise are available on request
- Gain Accuracy : 1%
- Gain Stability : 200 ppm/°C
- Dynamic Reserve : 0dB to 80dB

Demodulator : The input stage drives high bandwidth demodulators to recover the input signal.

Output : The demodulator outputs are passed through low pass filters before being amplified for output.

- Output Gain : x1, x10, x100, x1000
- Low Pass Filter Time Constants : 100 μ s to 30 s in 1, 3, 10 steps
- Outputs - SMB connectors : +/-100 mV to +/-10 V full scale

Reference Channel : A single reference channel is used to generate the signals that drive the demodulator(s). A fine phase shifting circuit allows the reference signal to be phase shifted from 0° to 150° relative to the signal

input. A second circuit then produces signals that are phase shifted by 0°, 90°, 180° and 270° at both the reference frequency and twice the reference frequency.

- Frequency : 10 Hz to 100 kHz
- Trigger : Standard TTL, 95% mark/space ratio min. Rising edge triggered.
- Acquisition Time : 10 s max.
- Phase Control : 90° steps + fine shift of 0° - 150°
- Phase Drift : 0.1°/°C
- 1F and 2F operation

General

- Power connections are made via a 64 pin type C DIN41612 connector. Signal connections are not possible via this connector.
- Mechanical : 100 x 160 mm
- Temperature range : 0-50°C
- Warranty : 2 years from date of shipment