SIGNALOC™ 2100
LOCK-IN AMPLIFIER

USER MANUAL

Hinds Instruments, Inc.
P/N: 020-2651-046-R UM Rev E

Software Version 3.0

Table of Contents

Table of Contents iii

Table of Figures v

1 Introduction 1

Signaloc™ 2100 Lock-In Amplifier Overview 1

2 Lock-In Amplifier Module Front and Back Plate Identification 3

Front Plate 3

Front Plate Functional Items 3

Back Plate 4

Back Plate Functional Items 4

3 Typical Setups for the Signaloc™ Lock-In Amplifier 5

Basic Setup 5

Setups for Measuring AC and DC Input Signals 5

4 Software Interface 9

Software Installation 9

Required Files 9

Connections 10

Window Overview 10

Starting the Application 11

AC Gain 12

Time Constant 13

Phase 14

Display 14

Analog Output 16

Logging Data 17

Start Log 18

Points To Log 19

File Format 20

Calibration 20

Communication Interruption 21

5 Troubleshooting 23

Troubleshooting Guide – Symptoms & Possible Remedies 23

A Specifications 25

General 25

Measurement Modes 25

Signal Input 26

DC Input 26

Reference Input 27

Demodulator and Output Processing 27

DAC Output 27

RS232 Interface 28

Environmental 28

Compliance Specifications 28

CE Approved 28

Desktop Power Supply, General 29

Desktop Power Supply, Input/Output Specifications 29

Desktop Power Supply - Environmental 29

Desktop Power Supply Approvals 29
B User Support Information 31
Limited Warranty 31
Exclusions 31
Return for Repair Procedure 32
Packing 32
Include 32
Shipping 32
Send to: 32
Index 35

Table of Figures

Figure 2.1 Lock-In Amplifier Module Front Plate 3
Figure 2.2 Lock-In Amplifier Module Back Plate 4
Figure 3.1 Basic Setup 6
Figure 3.2 Measuring Combined AC and DC Input 7
Figure 3.3 Measuring Split AC and DC Inputs 8
Figure 4.1 Start up 10
Figure 4.2 Select Com Port 11
Figure 4.3 Start Acquire 11
Figure 4.4 Input Gain 12
Figure 4.5 Over Limit 13
Figure 4.6 Time Constant 13
Figure 4.7 Phase 14
Figure 4.8 Display Values, Right Side 14
Figure 4.9 Select Display 15
Figure 4.10 Select Units 15
Figure 4.11 Select Set DAC 16
Figure 4.12 Select Set DAC Output 16
Figure 4.13 Log Data 17
Figure 4.14 Start Log 18
Figure 4.15 Logging Indicator 18
Figure 4.16 Points To Log 19
Figure 4.17 Number Of Points To Log 19
Figure 4.18 Logging Indicator 20
Figure 4.19 Communication Lost 21

Table of Tables

Table 4.1 Signaloc Files.....9
Table 4.2 RS232 Settings.....10
Table 4.3 AC Gain.....12
Table 4.4 File Format Example.....20
Table 5.1 Troubleshooting Power Problems 23

1
Introduction

Signaloc™ 2100 Lock-In Amplifier Overview

The Signaloc 2100 Lock-In Amplifier is an AC and DC signal recovery instrument made up of the proprietary Hinds Instruments Lock-In Amplifier module and control display software. It measures the applied signal at a user defined 1f harmonic frequency. A 2f second harmonic measurement capability is also available if the 2f frequency does not exceed 220 kHz. Both 1f and 2f signals are passed through band pass filters to remove line frequency and other un-wanted noise components.

Information from the Signaloc 2100 is sent to a computer via RS-232 where it is displayed on a computer monitor. The user can control various settings of the Lock-In Amplifier using the software program. The instrument measures and displays the AC magnitude of the signal in Volts RMS, the DC magnitude of the signal in Volts, and the frequency of the reference signal in Hertz.

In addition, the user can display one of the following signal parameters:

a) Angle of AC component in degrees with respect to reference signal input.

b) X component of AC signal in Volts RMS.

c) Y component of AC signal in Volts RMS.

Using the computer and control software, the user can select the optimum Gain and Time Constant values for the measurement and can select/de-select the Auto Phase function. In addition, the user can initiate a device self-calibration.

Data can be logged either by specifying a time window or by specifying the number of data points desired.

The Signaloc 2100 Lock-In Amplifier includes the Hinds proprietary Lock-In Amplifier module, 15V DC power supply, control display software, user manual, and RS232 cable.

2
Lock-In Amplifier Module Front and Back Plate Identification

Front Plate

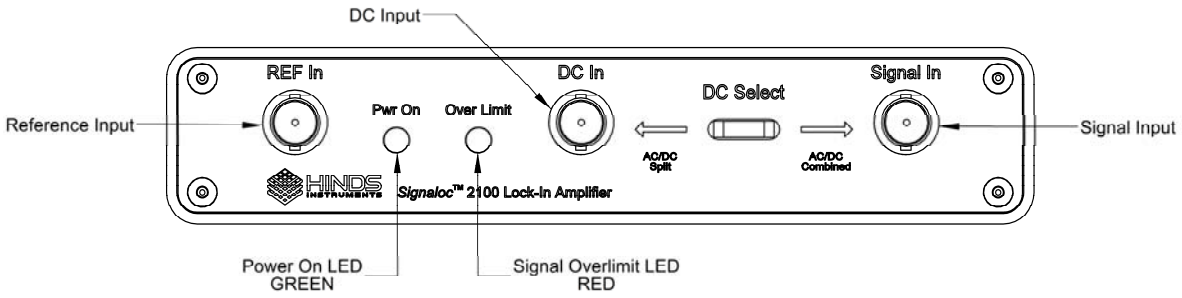

Figure 2.1 Lock-In Amplifier Module Front Plate

Front Plate Functional Items

Signal In: If the AC and DC signals are split, then connect the AC signal to the Signal In BNC and the DC signal to the DC In BNC. If the AC and DC signals are combined, then connect the combined AC/DC signal to Signal In and do not connect anything to the DC In BNC.

DC Source: If the AC and DC signals are split, then move the slide switch to the left. If the AC and DC signals are combined, then move the slide switch to the right.

DC In: If the AC and DC signals are split, then connect the DC portion of the signal to the DC In BNC. If the AC and DC signals are combined, then do not connect anything to the DC In BNC.

Ref In: The reference input (TTL compatible) is provided via the Ref In BNC connector.

Overlimit: The red Overlimit LED illuminates if the AC signal is too large for the selected Gain setting.

Power On: The green Power On LED illuminates when 15V DC power is applied to the Lock-In Amplifier module.

Back Plate

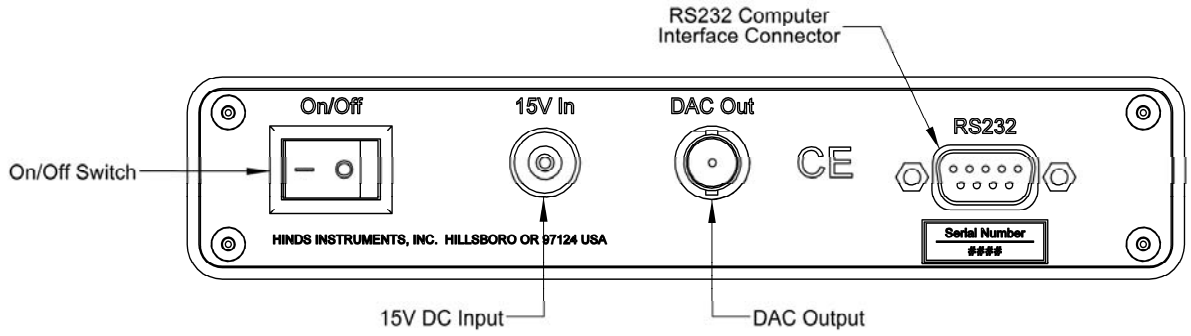

Figure 2.2 Lock-In Amplifier Module Back Plate

Back Plate Functional Items

RS232: The computer COM Port is connected through a 9-pin D-Sub cable to the Lock-In Amplifier module's RS232 connector.

On/Off: The On/Off switch turns the Lock-In Amplifier module ON or OFF.

15V In: The 15V DC power supply is connected to the 15V In Jack.

DAC Out: A 0.01 to 4.90 VDC DAC output is provided via the DAC Out BNC. A cable connected to this output cannot exceed 3 meters in length. The DAC output amplitude is controlled using the 'Set DAC' control in the Signaloc software.

Serial Number: This shows the serial number of the Lock-In Amplifier module.

3

Typical Setups for the Signaloc™ Lock-In Amplifier

This section gives examples of how the Signaloc Lock-In Amplifier is typically used. Custom user setups can be determined using this information.

Basic Setup

Figure 3.1 shows a simple configuration to begin the setup discussion. Here are the important things to note in this setup:

- A 0-5V square wave signal should be applied to “REF IN”. The frequency of the signal must be within ±2% of the Signaloc’s calibrated “Center Frequency” in order to maintain a measurement accuracy of 1% or better.
- The maximum AC signal that can be applied to “Signal In” is 5V P-P. If the AC Gain setting is too high, the “Over Limit” LED will turn on and the measurement will be inaccurate. Reduce the AC Gain setting to a lower dB level to turn off the LED and maintain measurement accuracy.

Setups for Measuring AC and DC Input Signals

Note: The maximum DC level that can be applied to any Signaloc input is ± 10 Volts.

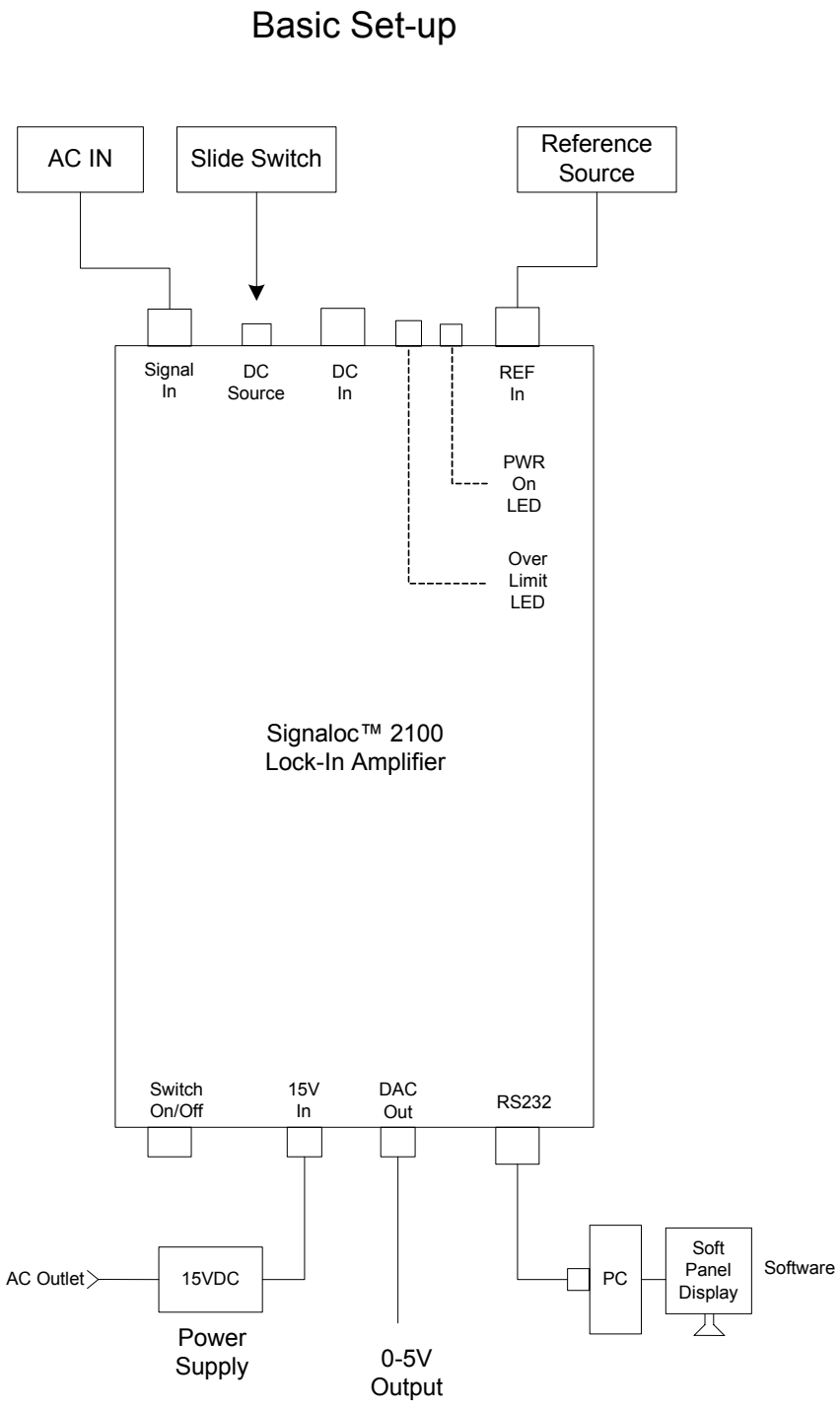

Figure 3.1 Basic Setup

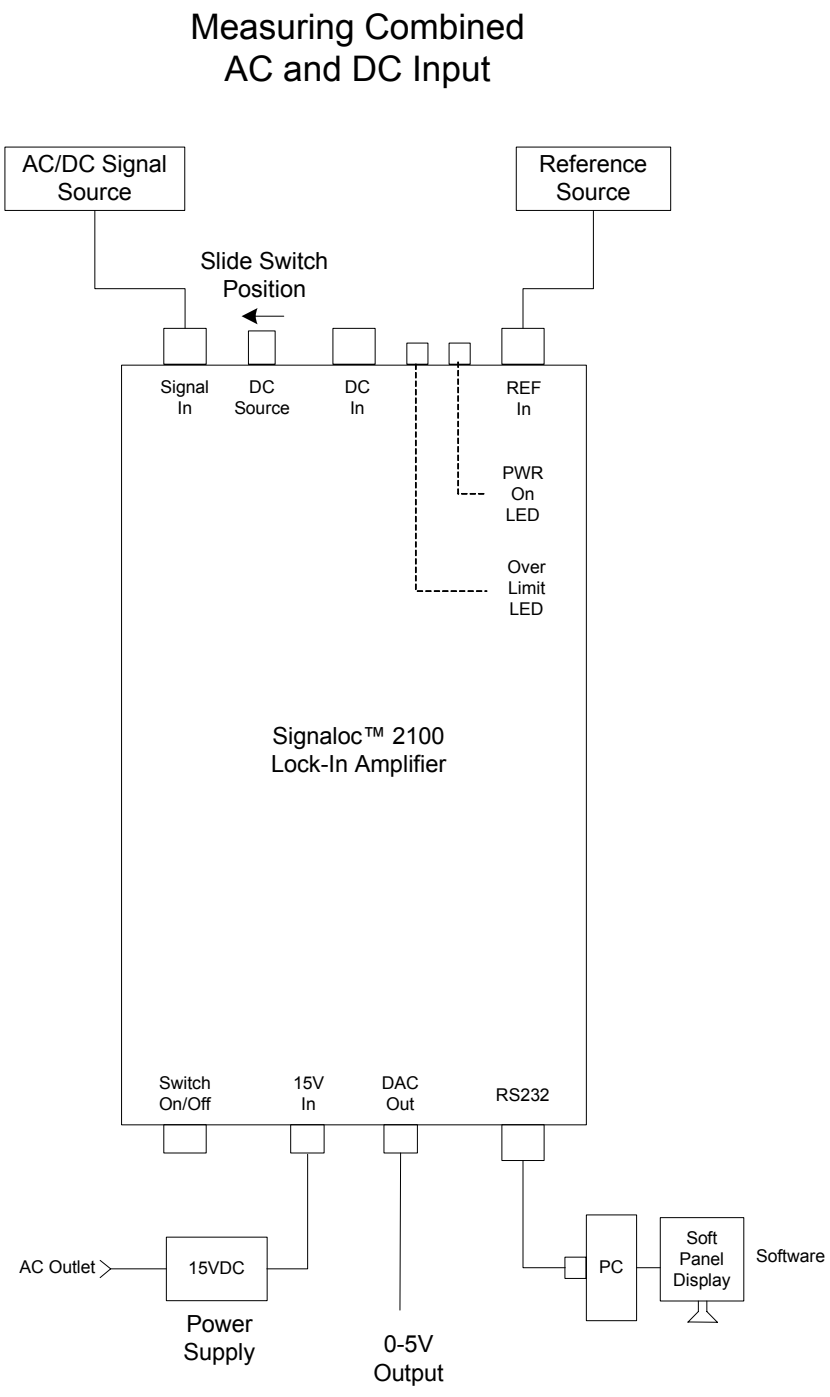

Figure 3.2 Measuring Combined AC and DC Input

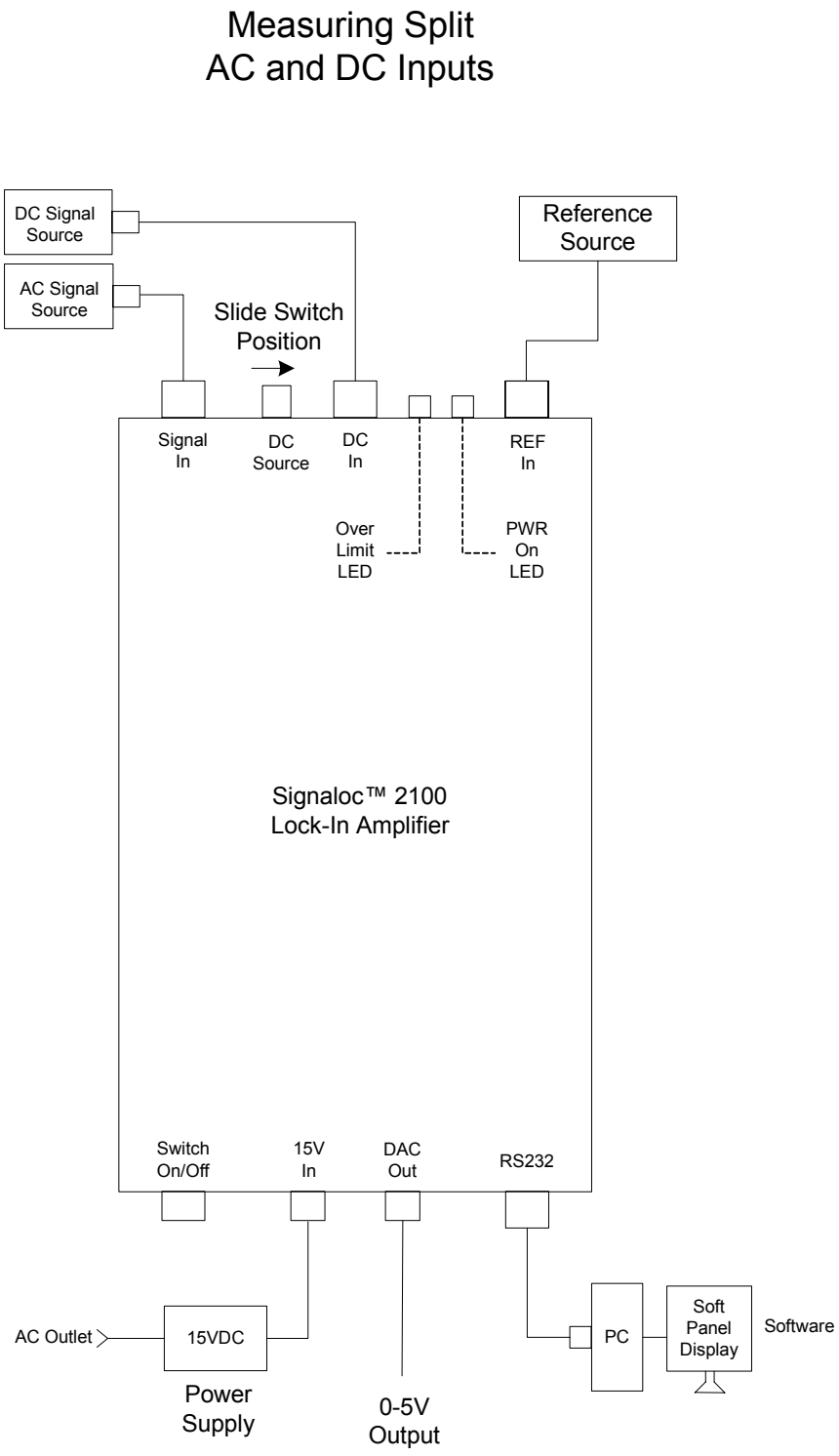

Figure 3.3 Measuring Split AC and DC Inputs

4
Software Interface

The software interface section describes the Signaloc 2100 software used to acquire, view and save data with the Signaloc 2100 Lock-In Amplifier module.

Software Installation

Place the CD in the DVD/CD drive and select the directory **Signaloc 2100 Setup**. Double Click on the file named **setup.exe**. Depending on your Operating System's security you may be asked to "Allow" the setup application to run. Allow the program to run.

Follow the instructions in the dialog boxes that appear. The installer will create a directory for the Lock-In Amplifier interface on the C: drive named Signaloc 2100. It will install all the necessary drivers and the interface executable. The installer will create a shortcut to the application on your desktop.

The installer may ask you to restart the computer so that it can load the National Instruments drivers into memory.

Required Files

After the software installation the computer now has the directory C:\Signaloc 2100 which contains the necessary files to operate the Signaloc 2100 Lock-In Amplifier.

The C:\Signaloc 2100 directory should contain the following files:

File Name	Description
Signaloc 2100.exe	The application used with the Signaloc 2100 Lock-In Amplifier
Hinds_LockIn.ini	Hinds Instruments file that supports the application
Signaloc 2100.ini	National Instruments support file
Signaloc 2100.aliases	Required resource file

Table 4.1 Signaloc Files

Connections

The Signaloc 2100 Lock-In Amplifier software requires an RS232 connection. The computer's COM Port is connected to the Lock-In Amplifier module's RS-232 connector via a 9-Pin D-Sub type cable. The COM port must be able to communicate at 115200 baud.

The computer COM Port settings are listed below in *Table 4.2*.

Item	Lock-In
Com Port	1-10
Baud Rate	115200
Data Bits	8
Parity	None
Stop Bit	1
Flow Control	None

Table 4.2 RS232 Settings

Window Overview

This section gives a brief description of the software and its components.

Figure 4.1 Start up

When the user starts the program, the window in *Figure 4.1* will open. This window allows the user to acquire, view and save data.

The window is comprised of three sections, Lock-In settings on the left, data display on the right and computer settings at the bottom.

Starting the Application

When the application is started for the first time the **COM** control displays a question mark as shown in *Figure 4.2*.

The user selects the COM Port that the Lock-In Amplifier module is connected to by clicking in the selection box.

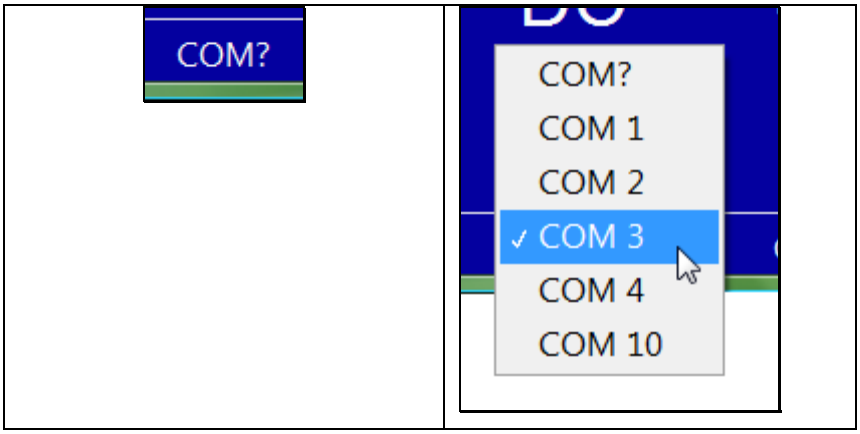

Figure 4.2 Select Com Port

If the Signaloc 2100 Lock-In Amplifier module is connected to the COM port correctly, the application will start to acquire and display the data immediately as shown in Figure 4.3.

Figure 4.3 Start Acquire

The Lock-In control settings on the left are no longer dim and the user can now select these.

AC Gain

The AC Gain control changes the Hinds Instruments Lock-In Amplifier AC signal input range. There are six ranges the user may select from. For best performance the AC Gain should be set close to the expected signal range.

Figure 4.4 Input Gain

Select	AC Signal Input Range
AC Gain 0 dB	± 2.5 V
AC Gain 3 dB	±1.25 V
AC Gain 6 dB	±0.625 V
AC Gain 9 dB	±0.3125 V
AC Gain 12 dB	± 0.1563 V
AC Gain 15 dB	± 0.0781 V

Table 4.3 AC Gain

If the user selects an input Gain too large for the AC signal applied, the application will flash an “Over Limit” message as shown in *Figure 4.5*.

Figure 4.5 Over Limit

A technique for finding the optimum input Gain setting is to increase the Gain value until the “Over Limit” message begins to flash. Then select the next lower Gain setting until the flashing stops.

Time Constant

The user may change the Time Constant of the input filter of the Lock-In Amplifier module. Select the TC control and then select the filter time in ms. Selecting a larger time constant value improves measurement accuracy but slows the response. A lower time constant responds quicker, which may provide better accuracy for fast changing signals.

Figure 4.6 Time Constant

Phase

Users can Auto Phase the Lock-In Amplifier module. When the user selects **Set Auto Phase**, the X and Y components are rotated so that the X component is parallel with the Resultant. This results in a phase angle of zero degrees.

The user can return to the original phase angle by selecting **Clear Auto Phase**.

Figure 4.7 Phase

Display

The right side of the window displays the values from the Signaloc 2100 Lock-In Amplifier in real time.

The R value is the magnitude of the Resultant vector. The DC value is the DC level of the signal. On the third line the user can choose to display the X component, the Y component or the Phase Angle.

Figure 4.8 Display Values, Right Side

The third line can be changed by selecting **Display Angle**, **Display X** or **Display Y** on the left side of the window as shown in *Figure 4.9*.

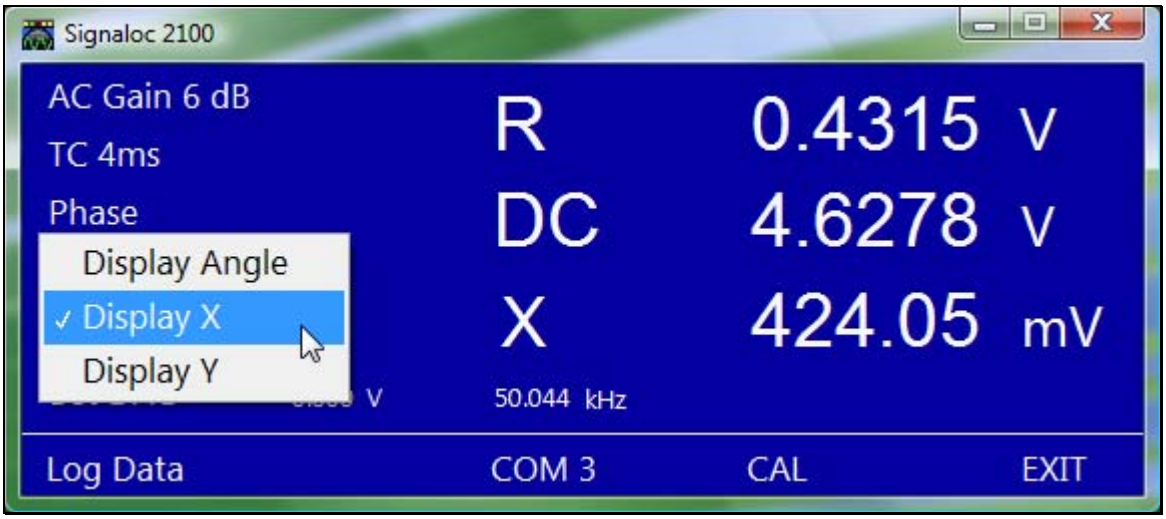

Figure 4.9 Select Display

The units of the R, DC, X and Y may be changed between Volts and Millivolts by clicking on the **Units** display.

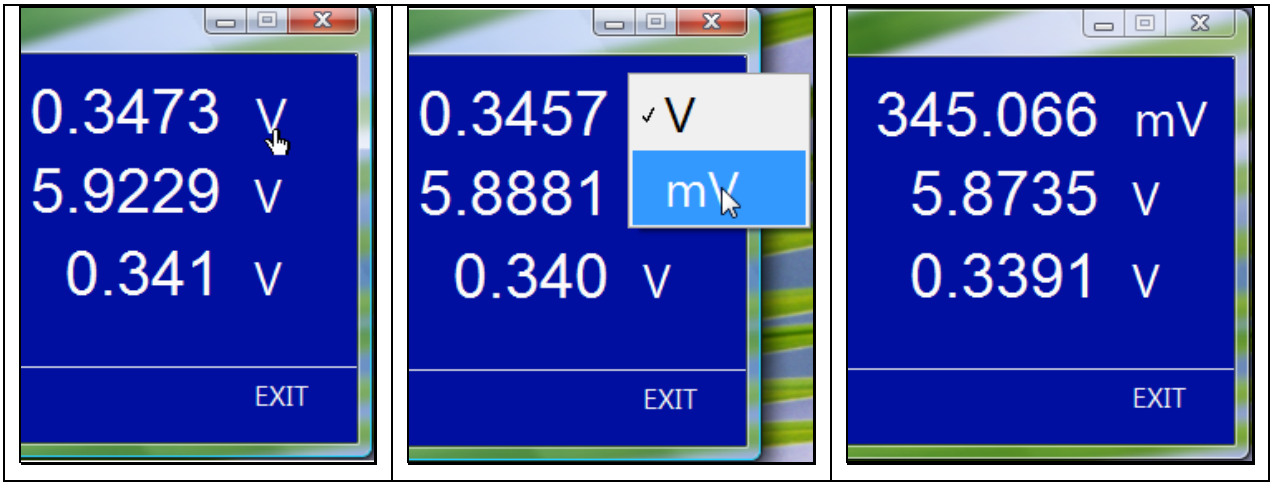

Figure 4.10 Select Units

Analog Output

The Signaloc 2100 Lock-In Amplifier provides a programmable 0.01 – 4.9 V DAC. The user sets the voltage on the DAC by clicking on **Set DAC**.

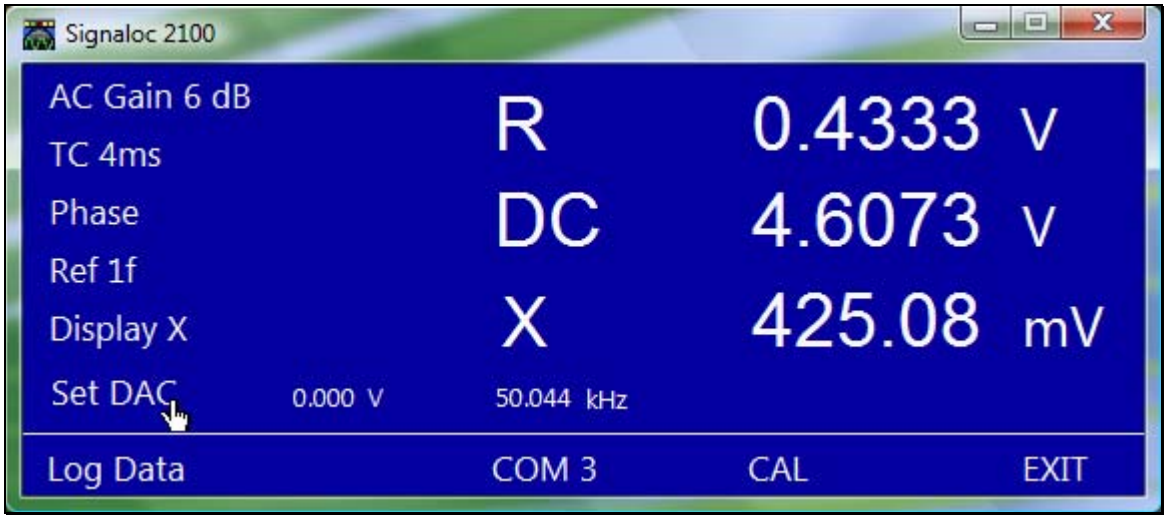

Figure 4.11 Select Set DAC

When **Set DAC** is clicked the *Set DAC Output* dialog window will open as in *Figure 4.12*.

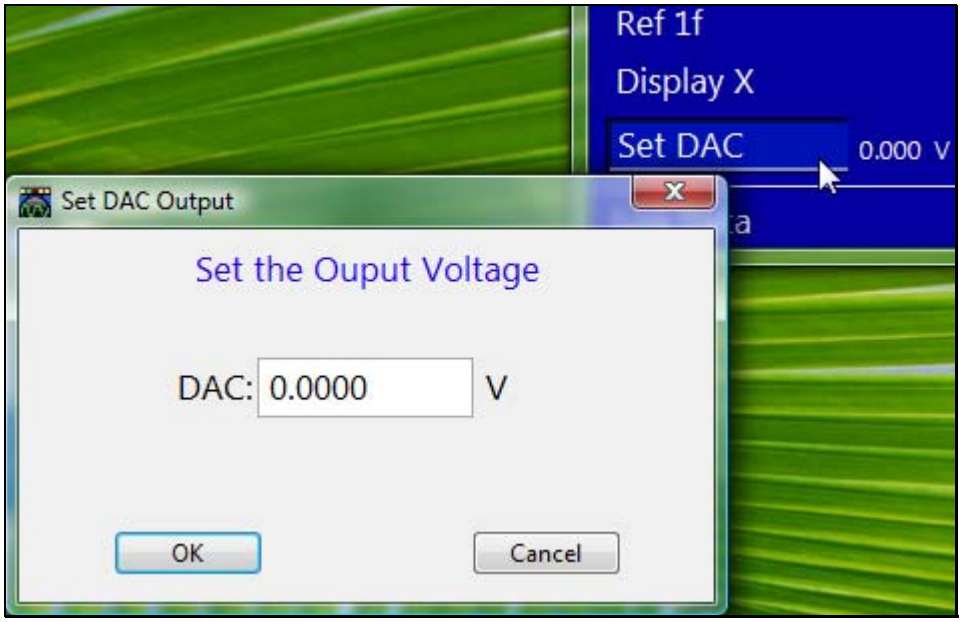

Figure 4.12 Select Set DAC Output

The DAC has a 1 mV resolution. The user enters the desired voltage through the dialog window and then clicks **OK**. The DAC output is set to the voltage entered and the value is displayed just to the right of the **Set DAC** label.

The DAC voltage is persistent and remains at the last setting when the software is closed. The DAC voltage resets to zero, 0.0 V, if the Lock-In is turned off and then turned on. When the software is started it will set the DAC voltage to the last voltage setting

Logging Data

The Signaloc 2100 Lock-In Amplifier software has the capability to log data in real time.

Figure 4.13 Log Data

When the user selects **Log Data** there are two methods of data collection available;

- **Start Log** – Continuously saves to a data file until **Stop Log** is clicked or a file size of 50 MB is reached.
- **Points to Log** – Saves the number of data points chosen by the user.

The logger will save data at a rate of up to 200 points a second. This will vary depending on hard drive latencies, network latencies and type of computer hardware.

Start Log

When the user selects **Start Log** from the selection box below, a standard Windows™ dialog box for saving files with the file type *.dat, will open.

Click the **OK** button to start saving data.

Figure 4.14 Start Log

Once the application begins saving data a “Logging” indicator will start to flash. The user may stop the logging at any time by selecting **Stop Log**.

Figure 4.15 Logging Indicator

Logging will automatically stop when the file size reaches 50 MB. A limit has been placed on the file size so that the hard drive will not be inadvertently filled with one data file.

Points To Log

With the **Points To Log** selection, the user specifies the number of data points to save.

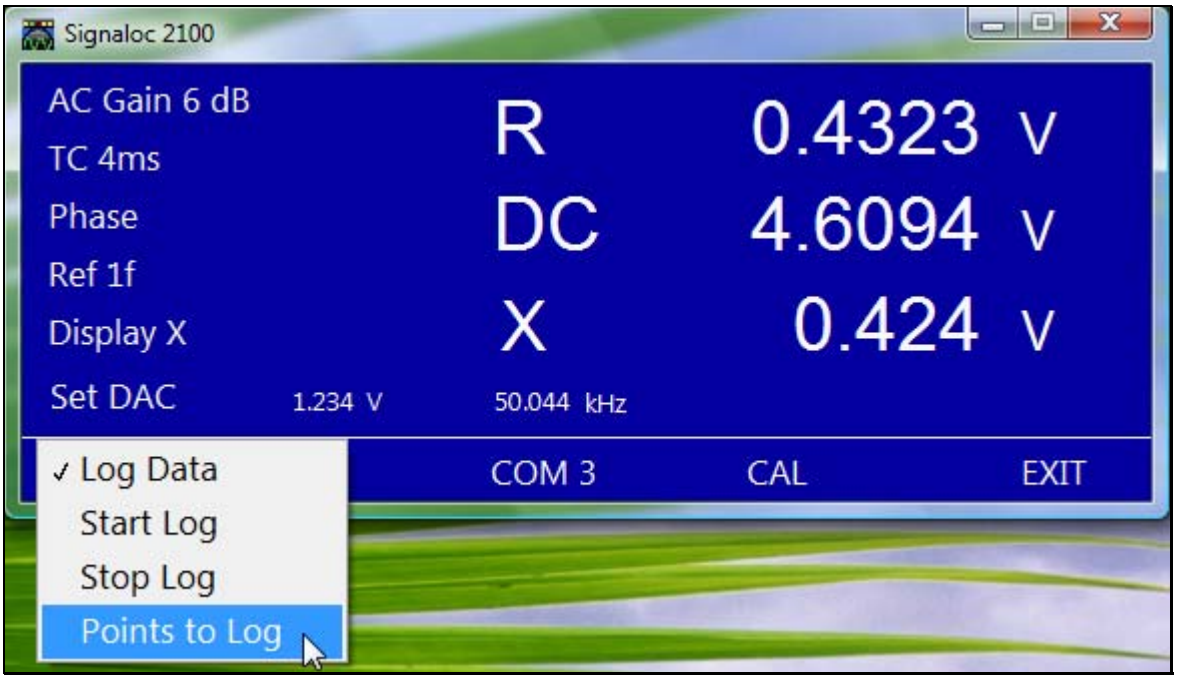

Figure 4.16 Points To Log

When the **Points To Log** is clicked, a standard Windows™ dialog box for saving files with the file type *.dat will open.

Type in a file name and click the **OK** button. Another dialog box named “Number of points to log” will open.

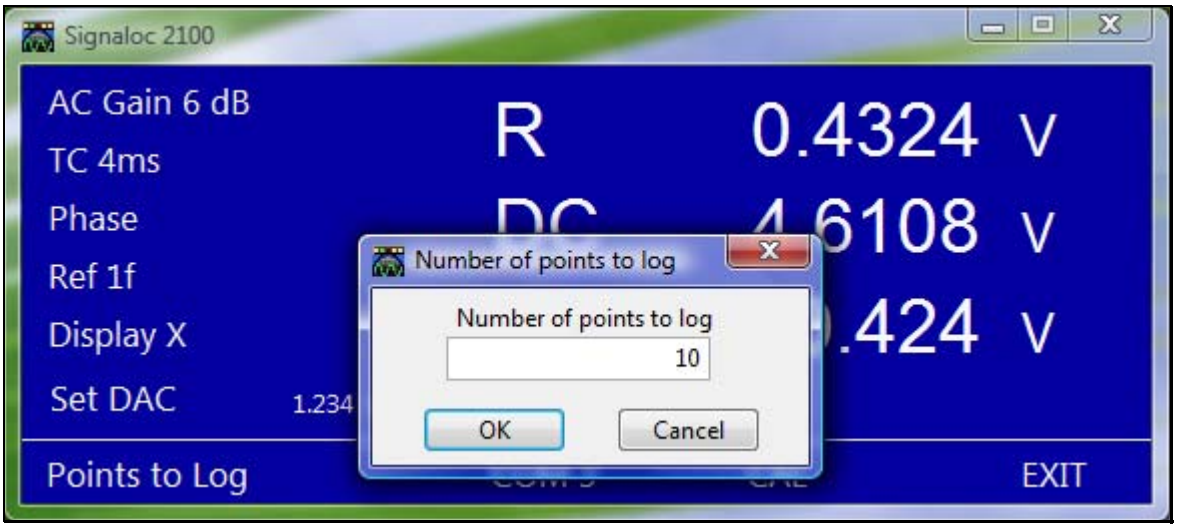

Figure 4.17 Number Of Points To Log

Enter the number of data points to save. When the user clicks **OK**, the application will start saving data. Once the application is saving data, a "Logging" indicator will start to flash.

Figure 4.18 Logging Indicator

The application will stop collecting data when the selected number of data points has been reached. The user may also select **Stop Log** to stop the data collection.

File Format

The format of the file created is text (tab delineated). This format allows the user to import the data into Excel™ easily. A file format example is shown in *Table 4.4*.

R (Volts)	Angle (deg)	X (Volts)	Y (Volts)	DC (Volts)	Time (sec)
0.344045	-10.7555	0.338001	-0.06420	6.058216	0.019
0.344056	-10.7562	0.338011	-0.06421	6.058121	0.036
0.343976	-10.7645	0.337923	-0.06425	6.057968	0.053
0.343958	-10.7639	0.337906	-0.06424	6.057949	0.07
0.344007	-10.7555	0.337964	-0.06420	6.058064	0.087
0.344071	-10.7546	0.338028	-0.06420	6.058083	0.105
0.344002	-10.7597	0.337954	-0.06422	6.057987	0.122

Table 4.4 File Format Example

Calibration

The user interface provides a button to perform an internal calibration. The user can request a calibration at any time by clicking on the **CAL** button. When the button is pressed, the module will perform the calibration and return to acquiring data. The calibration time is approximately 400 ms.

Communication Interruption

If COM communication is interrupted the User Interface will flash “Communication Lost” as in Figure 4.19..

Figure 4.19 Communication Lost

If the Signaloc looses communication, the user should check the COM port cable and settings. Also check that power is connected to the Signaloc. When the problem has been resolved, the User Interface will continue with normal operation.

5
Troubleshooting

Troubleshooting Guide – Symptoms & Possible Remedies

Power Problems	
Symptoms	***Possible Remedies***
No measurements displayed on computer	The AC cord is unplugged from the wall outlet or from the desktop power supply. The desktop power supply DC plug is not fully engaged in the Power In receptacle on Lock-In Amplifier module. Check COM Port settings. Check the cable connections to the Lock-In Amplifier module. Cycle power to the Lock-In Amplifier module.
Symptoms	***Possible Remedies***
Displayed readings are incorrect.	The Gain setting may be too high for the applied signal. Ensure that the front panel over limit LED is not **ON** and that "OVER LIMIT' is not flashing on the PC software display.

Table 5.1 Troubleshooting Power Problems

A
Specifications

NOTICE

USE MAXIMUM ALLOWABLE GAIN SETTING FOR BEST ACCURACY MEASUREMENT.

General

Dual-phase analog lock-in amplifier calibrated for a user defined 1f harmonic frequency. A 2f second harmonic measurement capability is also available if the 2f frequency does not exceed 220 kHz. Both 1f and 2f signals are passed through band pass filters to remove line frequency and other un-wanted noise components. Proprietary Lock-In Amplifier module, Computer and Control display software, 15V DC power supply and AC Cable, RS232 cable, and Signal Out/DC in BNC cable are supplied with each instrument.

Model Number	Signaloc 2100 Lock-In Amplifier PN: 020-2651-046-R
Dimensions	10 L x 6.75 W x 1.375 H (in)
Weight	1.6 Lbs
Shipping weight	41 Lbs, 1.7 Kg (includes Lock-In Amplifier, 15V DC power supply & AC cable, RS232 cable, and software and packaging.

Measurement Modes

The instrument measures and displays the following signal parameters:

- R magnitude (V or mV RMS)
- DC value (V or mV)

In addition, the user can choose to display one of the following signal parameters:

- X - In Phase value (V or mV)
- Y - Quadrature value (V or mV)
- Θ – Phase Angle of signal with respect to reference (degrees)

Signal Input

Signal Input	AC + DC, AC only
Modes	Single-ended
Grounding	BNC shield connected to ground
Input Impedance / Connector	1MΩ//10pF / BNC
1f Frequency Response Range	40 Hz to 250 kHz
1f Frequency Response Bandwidth	10 kHz
2f Frequency Response Range	not to exceed 220 kHz
2f Frequency Response Bandwidth	10 kHz
Maximum Input	± 2.5 VAC Peak, ± 10 VDC
Full-scale Sensitivity	4uV min
Gain	0, 3, 6, 9, 12, 15 dB (selectable by user)
Gain Accuracy	± 1% max for input signals ≥1mV ± 5% max for input signals < 1mV
Phase Accuracy	± 3º max for input signals ≥ 1mV
Voltage Noise	2uV/√Hz
CMRR	> 60 dB
Frequency Accuracy	± 1%

DC Input

Input Range	-10 VDC to +10 VDC
Input Impedance / Connector	1M Ω // 10pF / BNC
Frequency Response	DC to 110 Hz

Reference Input

1f Frequency Range	User defined fixed frequency between 20 kHz and 220 kHz
2f Frequency Range	Not to exceed 220 kHz
Max Reference Input Drift	± 2% Maximum deviation from center frequency to maintain accuracy of 1%
Reference Input	Square wave “0 to 5V”
Input Impedance / Connector	10MΩ, 50pF / BNC
Phase Resolution	0.01º
Orthogonality	90º ± 0.088º
Acquisition Time	2 sec max

Demodulator and Output Processing

Mode	Quadrature analog sine wave multipliers + HP/LP filters
Output Filter Time constants (selectable by user)	4, 10, 18, 32, 64, 132, 260, 516 mSec

DAC Output

Output Control	Per the Signaloc Software ‘Set DAC’ feature
Output Range	0.01 to 4.90V
Resolution	1 mV
Output Impedance / Connector	1k Ohm / BNC
Output Accuracy	0.1% with a 1 Megohm load
Cable Length	Specified for a cable length not to exceed 3 meters

RS232 Interface

Type	RS232 9-pin D type plug
Parameters (fixed)	115200 baud, 8 data bits, no parity, 1 stop bit, no flow control
Controls	Software control
Data Transfer Rate	>200 readings per second
LED Indicators	Power ON – Green LED Signal Overlimit – Red LED

Environmental

Operating Temperature	0 to 40 degrees C
Storage Temperature	-20 to 70 degrees C

Compliance Specifications

RoHS Compliant	EU Directive 2002/95/EC

CE Approved

Compliance demonstrated per the following Directives and /Standards:

EMC Directive	EU Council EMC Directive 2004/108/EC
EMC Product Family Standards	EN 61326-1:2006 (IEC 61326-1:2005) EMC Product Family standard for measurement, control and laboratory equipment
	EN 61000-3-2:000 Powerline Harmonics
	EN 61000-3-3:1995/A1:2001/A2:2005 Powerline Voltage Fluctuation/Flicker
EMC Basic Test Standards	IEC 61000-4-2:2001 Electrostatic Discharge Immunity
	IEC 61000-4-3:2006 RF Field Immunity
	IEC 61000-4-4:2004 Electrical Fast Transient/Burst (EFT) Immunity
	IEC 61000-4-5:2005 Electrical Slow Transient (Surge) Immunity

EMC Basic Test Standards Cont.	IEC 61000-4-6:2006 RF Conducted Immunity
	EN61000-4-11:2004 Voltage Interruption Immunity
Safety Directive	Low Voltage 2006/95/EC
Safety Standards	IEC 61010-1:2001 (2nd Edition)
	EN 61010-1:2001 (2nd Edition)

Desktop Power Supply, General

Model Number	TBD
Dimensions	TBD
Weight	TBD

Desktop Power Supply, Input/Output Specifications

Input	100 – 240 VAC, 47 – 63 Hz
Output	+15V DC @ TBD

Desktop Power Supply - Environmental

Operating Temperature	0 to 40 degrees C
Storage Temperature	-10 to 70 degrees C

Desktop Power Supply Approvals

CE

RoHS Compliant

B
User Support Information

Hinds Instruments, Inc. makes every attempt to ensure that the Signaloc 2100 Lock-In Amplifier is a product of superior quality and workmanship. Our service personnel are available to assist you from 8:00AM to 4:00PM, Pacific Standard Time, Monday through Friday. You may contact our Service Department at 503.690.2000 (Voice), 503.690.3000 (Fax), or service@hindsinstruments.com.

This section consists of the following items:

A. One-Year Limited Warranty. Please read this information carefully.
B. Return for Repair Procedure: This procedure is for your convenience in the event you must return your Signaloc 2100 Lock-In Amplifier for repair. Follow the packing instructions carefully to protect your instrument in transit.

Limited Warranty

Hinds Instruments, Inc. (Hinds) warrants the Signaloc 2100 Lock-In Amplifier to be free from defects in materials and/or workmanship when operated in accordance with the manufacturer's operating instructions for one (1) year from the date of purchase, subject to the provisions contained herein. Hinds' warranty shall extend to the original purchaser only and shall be limited to factory repair or replacement of defective parts.

Exclusions

This warranty does not cover normal maintenance, damage resulting from improper user or repair, or abuse by the user. This warranty extends only to repair or replacement, and shall in no event extend to consequential damages. In the event of user repair or replacement, this warranty shall cover neither the advisability of the repair undertaken, nor the sufficiency of the repair itself.

THIS DOCUMENT REFLECTS THE ENTIRE AND EXCLUSIVE UNDERSTANDING OF ALL THE PARTIES, AND EXCEPT AS OTHERWISE PROVIDED HEREIN, ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, PARTICULARLY THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Return for Repair Procedure

In the event of defects for damage to your unit, first call the factory Service Department. Our hours are 8:00AM to 4:00PM, Pacific Standard Time, Monday though Friday. You can contact our Service Department at 503.690.2000 (Voice), 503.690.3000 (Fax), or service@hindsinstruments.com.

If factory service is required, return your unit as follows:

Packing

- wrap unit in plastic bag first
- pack in original shipping carton or a sturdy oversized carton
- used plenty of packing material

Include

- Packing List and RMA number emailed to you from the Service Department
- a brief description of the problem with all known symptoms
- your daytime phone number and email address
- your return shipping address (UPS/FedEx will not deliver to a post office box)

Shipping

- send freight prepaid (UPS/FedEx - Air recommended)
- insurance recommended (Service Personnel will provide the replacement value of the item(s) being shipped)
- COD shipments will not be accepted

Send to:

Service Department

Hinds Instruments, Inc.

7245 NW Evergreen Pkwy

Hillsboro, OR 97124-5850 USA

If your unit is under warranty, after repair or replacement has been competed, it will be returned by a carrier and method chosen by Hinds Instruments, Inc. to any destination within the continental United States. If you desire some specific form of conveyance or if you are beyond these borders, then you must bear the additional cost of return shipment.

If your unit is not under warranty, we will call you with an estimate of the charges. If approved, your repaired unit will be returned after all charges, including parts, labor, and return shipping and handling, have been paid in full. if not approved, your unit will be returned as is via UPS COD for the amount of the UPS COD freight charges.

Index

A

AC gain 12

B

back plate..... 4
basic setup..... 5, 6

C

calibration..... 20
communication lost 21

D

DAC output 16
desktop power supply 29
  approvals..... 29
  environmental..... 29
  input/output 29
display values 14
  selecting..... 15

F

file format 20
front plate..... 3
functional items
  back plate..... 4
  front plate 3

I

input gain 12

L

logging data 1, 17
  calibration..... 20
  file format 20
  indicator..... 18, 20
  points to log..... 19
  start log 18

M

measuring
  AC & DC Input Signals 5
  combined AC & DC Input.....7
  split AC & DC inputs 8

N

number of points to log 19

O

over limit 13

P

phase.....14
points to log 19

R

return for repair.....32
RS232
  connections.....10
  settings 10

S

signal parameters.....1
Signaloc™ 2100 Lock-In Amplifier
  back plate 4
  files 9
  front plate.....3
  Introduction 1
  software interface 9
  troubleshooting 23
software
  AC gain.....12
  analog output.....16
  display 14
  installation.....9
  logging data 17
  phase.....14

required files 9
starting the application 11
time constant 13
specifications
approvals 28
DC input 26
demodulator and output processing 27
desktop power supply 29
environmental 28
general 25
interface 28
measurement modes 25
reference channel 27
signal channel 26
signal input 26
start acquire 11
start log 18
startup 10

T

time constant 13
troubleshooting 23

U

units 15

W

warranties
document ii
exclusions 31
limited 31
window overview 10

HINDS INSTRUMENTS, INC
7245 NW Evergreen Pkwy
HILLSBORO, OR 97124 USA
PHONE: 503/690.2000
FAX: 503/690.3000
TOLL FREE: 1.800/688.4463
EMAIL: sales@hindsinstruments.com
www.hindsinstruments.com