Model 3300 Transimpedance Amplifier (TIA)

User Manual

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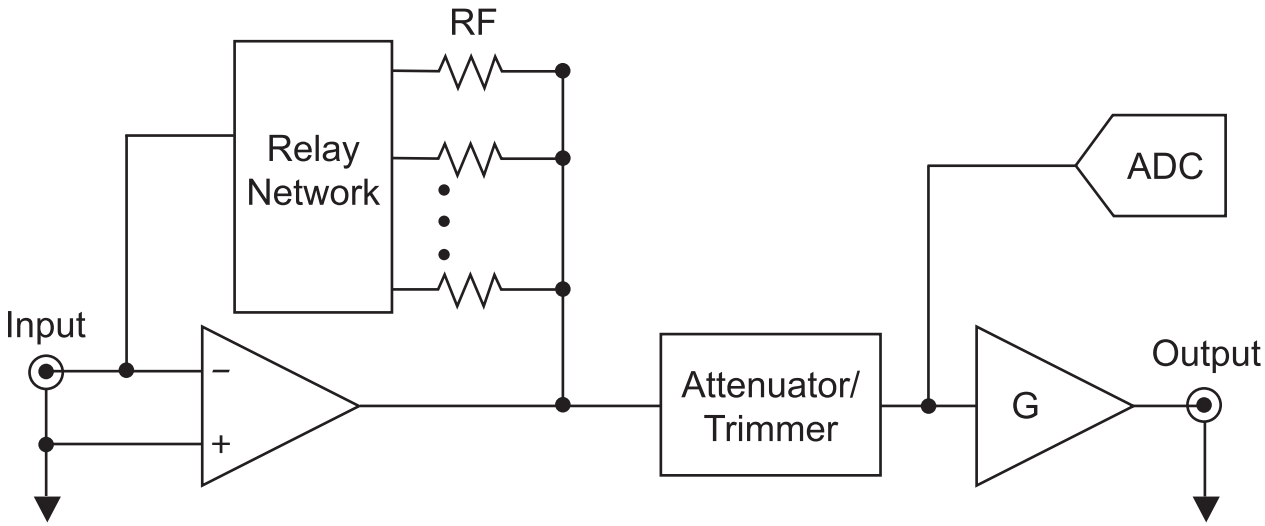
1 Overview

The L-1 Standards Model 3300 Transimpedance Amplifier (TIA) is a precision electronic instrument designed to measure photocurrents to very low uncertainties, for the most demanding optical metrology applications. The amplifier senses the current flowing into/out of its input, which is held at constant potential (virtual ground), and supplies a proportional analog potential at its output. There is an internal analog-to-digital convertor that can be used in-lieu of an external voltmeter to measure the output potential. The amplifier has 11 effective gains that may be set either via front panel controls or remotely through a USB or Ethernet computer interface.

A block diagram of the amplifier is shown below:



There are 3 stages in the TIA: a current-to-voltage amplifier with selectable gains ranging from 10^3 [V/A] to 10^9 [V/A] by factors of 10, an electronically controlled trimming attenuator with a 0% to 1% range, and a voltage amplifier with gains of 1, 10 and 100 and a full scale output of +/- 10 volts. The input is held at a virtual ground, within a millivolt of its shield. Using a low bias current op-amp, current flowing onto the input is forced through one of several feedback resistors. A network of relays selects the feedback resistor. The internal analog-to-digital convertor samples the output voltage with 24 bits of resolution. The convertor supports several user selectable integration times and trigger modes. The available integration times include integer multiples of both 50 Hz and 60 Hz power line cycles. All critical components in the circuit are very stable and highly accurate. In addition, a trimming network is included, so all gains are adjusted and set very close to their nominal values during factory calibration.

The computer interface is routed through a TIA power supply module. There are two module types. Model 3310 TIA Power Supply powers one TIA and supports USB communications with a Windows based computer, while Model 3311 TIA Quad Power Supply powers up to four TIAs and supports both USB and Ethernet communications. A 9-pin Mini DIN cable from a TIA power module routes both power and data to an amplifier. All data transfers are ASCII text based. To minimize the effects of ground loops, there is galvanic isolation between the TIA analog ground and the ground references of the USB, Ethernet, and line power cables.

The TIA can communicate with a Windows based computer via the USB port located on its power supply. An FTDI FT232RL USB2.0 UART converter located inside the power supply translates communications between the USB and the RS232 interface that connects the power supply to the TIA. Once installed on the host PC, the required USB driver creates a virtual COM port which emulates standard RS232 communications.

The RS232 settings used by the TIA are as follows:

Port Settings	
Baud Rate	115200
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

Note that this initialization is automatically done with the supplied LabVIEW control demo software. The communication protocol is further defined in the “Command Guide” section of this manual.

2 Parts List

• Model 3300v2 Transimpedance Amplifier	1 each
• 9-pin Mini DIN Cable	1 each
• BNC Cables	2 each
• Power Cable	1 each
• USB to Mini USB Cable	1 each

TIA Power Supply Required Separately:	1 each of either
• Model 3310 TIA Power Supply	
OR	
• Model 3311 TIA Quad Power Supply	

3 General Specifications

Model 3300 Transimpedance Amplifier

General Specifications

Voltage Output Range	+/- 10 Volts Minimum
Linearity:	
Differential	10 ppm
Integral	2 ppm
Input Offset Voltage	<100 microvolts
Internal ADC:	
Resolution	24-bits
Uncertainty	50 ppm
Stability	4 ppm/C; Longterm 40 ppm

Specifications as a Function of Gain & Multiplier Settings

	Uncertainty (k=2, 25 C)	Temperature Coefficient (ppm/C)	3dB Roll-off (Hz)*			Input Resistance (Ω)	Noise Average (1-10 Hz) ($A/Hz^{½}$)		
Multiplier	1,10,100	1	1	10	100	-	1	10	100
Gain									
10^3	0.005%	<1	1.6E+05	> 5E+04	> 1E+04	0.10	5.6E-11	3.0E-11	2.7E-11
10^4	0.005%	<1	5.9E+04	> 5E+04	> 1E+04	0.11	6.1E-12	3.1E-12	3.3E-12
10^5	0.005%	<1	1.6E+04	1.6E+04	> 1E+04	0.15	7.2E-13	4.8E-13	4.9E-13
10^6	0.005%	5	5.7E+03	5.7E+03	5.7E+03	0.60	1.4E-13	1.4E-13	1.2E-13
10^7	0.005%	5	1.4E+03	1.4E+03	1.4E+03	5.1	4.0E-14	3.9E-14	4.0E-14
10^8	0.005%	5	6.4E+02	6.4E+02	6.4E+02	50	1.2E-14	1.3E-14	1.3E-14
10^9	0.010%	25	1.6E+02	1.6E+02	1.6E+02	500	4.1E-15	4.2E-15	4.1E-15

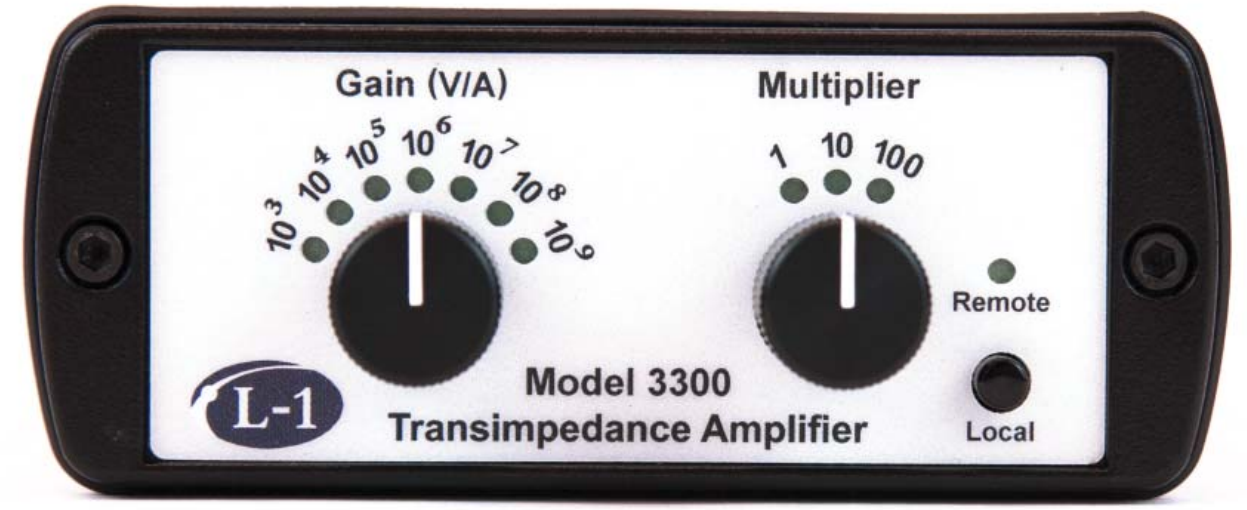
*Note: The trimmer network rolls-off at approximately 25 kHz. Above this frequency the gain may change by as much as 1%.

Sync Input Electrical Specifications

Sync Input
Edge Triggered Rising or Falling
Input Voltage 0 V to 5.5 V
Logic Low: max 1.5 volts
Logic High: min 2 volts

4 Identification

Model 3300 Transimpedance Amplifier—Front



Gain (V/A)

Selects the feedback resistance used in the amplifier.

Multiplier

Selects the gain of the built-in voltage amplifier that further amplifies the voltage output of the TIA.

Remote

When LED is lit, indicates the amplifier is connected to a computer for remote control of amplifier functions.

Local

Press to take amplifier out of remote mode. While in remote mode, any changes made to the gain or multiplier on the front panel will not register. If button is pressed and held for five seconds, front LED indicators are turned off or on. If the amplifier is being controlled remotely, do not turn off and on the front LED indicators using this button.

Model 3300 Transimpedance Amplifier—Back

Current In

Provides connection to detector or current source to be measured through supplied BNC cable.

Voltage Out

Provides connection to a digital voltmeter or digital multimeter through supplied BNC cable.

Pwr/Com

Provides connection to a TIA power supply through supplied 9-pin DIN cable.

Model 3310 TIA Power Supply—Front

USB

Provides connection to a computer for remote operation.

Sync

Used to synchronize measurements of the internal analog to digital converter with external triggers.

Amplifier Pwr/Com

Provides connection to a Model 3300 Transimpedance Amplifier through supplied 9-pin DIN cable.

Model 3310 TIA Power Supply—Back

Model 3311 TIA Quad Power Supply—Front

TIA 1

Provides connection to a Model 3300 Transimpedance Amplifier through supplied 9-Pin Din cable at TIA address 1. See “TIA Addressing” located in the Command Guide section for more details about TIA addresses.

TIA 2

Provides connection to a Model 3300 Transimpedance Amplifier through supplied 9-Pin Din cable at TIA address 2. See “TIA Addressing” located in the Command Guide section for more details about TIA addresses.

TIA 3

Provides connection to a Model 3300 Transimpedance Amplifier through supplied 9-Pin Din cable at TIA address 3. See “TIA Addressing” located in the Command Guide section for more details about TIA addresses.

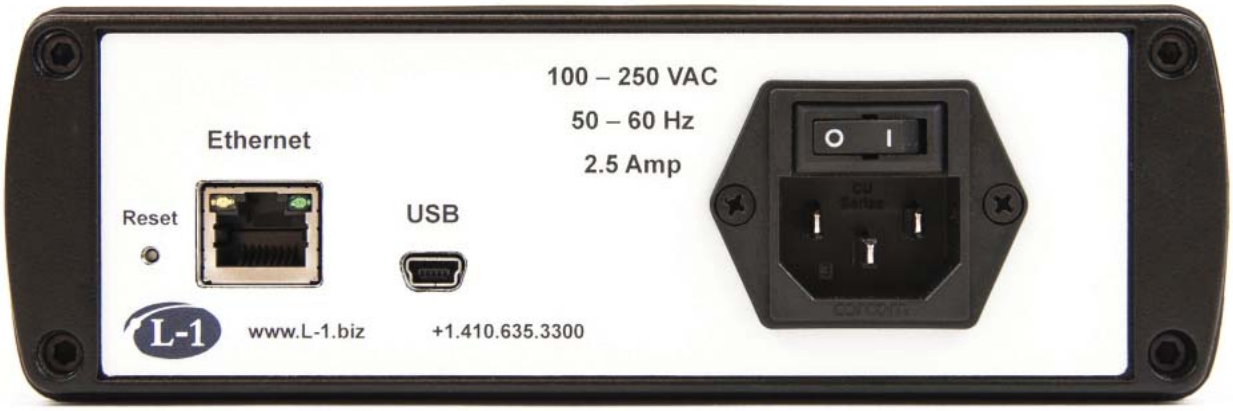
TIA 4

Provides connection to a Model 3300 Transimpedance Amplifier through supplied 9-Pin Din cable at TIA address 4. See “TIA Addressing” located in the Command Guide section for more details about TIA addresses.

Sync

Used to synchronize measurements of the internal analog to digital converter with external triggers for all connected TIAs.

Model 3311 TIA Quad Power Supply—Back



Reset

Resets the internal microcontroller of the Model 3311 Power Supply.
Do not operate the Reset button while communicating with the instrument.

Ethernet

Provides connection to a computer for remote operation using TCP-IP communications.

USB

Provides connection to a computer for remote operation using RS232 communications.

5 Set Up

The Model 3300 Transimpedance Amplifier must be used with a correct communication/power supply unit, either Model 3310 TIA Power Supply or Model 3311 TIA Quad Power Supply. The Model 3310 TIA Power Supply can only be used with one TIA unit. The Model 3311 TIA Quad Power Supply can be used with up to four TIA units at once.

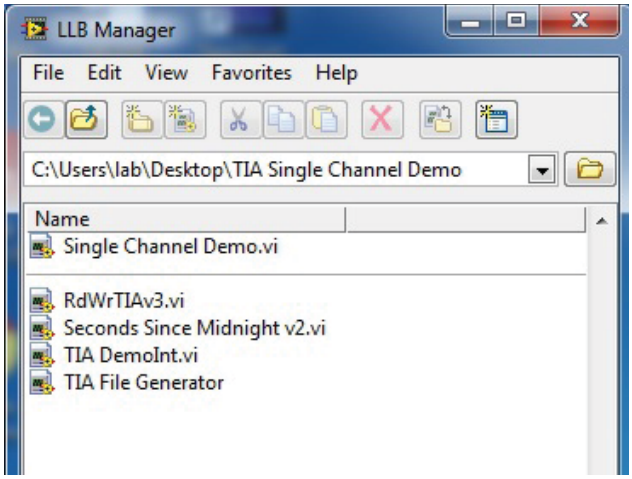
To setup (using either TIA power supply):

1. Plug the supplied 9-pin DIN cable between Amplifier Pwr/Com port on the front of the power supply and the Pwr/Com port on the back of the amplifier. Connect up to four amplifiers to the Model 3311 Quad Power Supply if desired.
2. Connect the power supply to a grounded, surge protected AC power source using the provided AC power cable. Turn the power switch on at the back of the power supply. The indicator LEDs for the selected gain and multiplier will illuminate on the front of the amplifier.
3. Use shielded BNC cables when connecting the TIA input to a photo-detector or the TIA output to a voltmeter. Connect either the input or output shield to ground at a single point—avoid multiple ground connections.
4. When possible, use a gain setting that is smaller than the shunt resistance of the detector. If more amplification is desired, increase the multiplier instead. This maximizes the amplifier linearity and accuracy and has minimal impact on signal-to-noise ratios compared to increasing the gain in-lieu of the multiplier.
5. If using a Windows based computer to control the amplifier and/or record data, plug the supplied mini USB cable between the USB port on the front of the power supply and the computer or laptop.

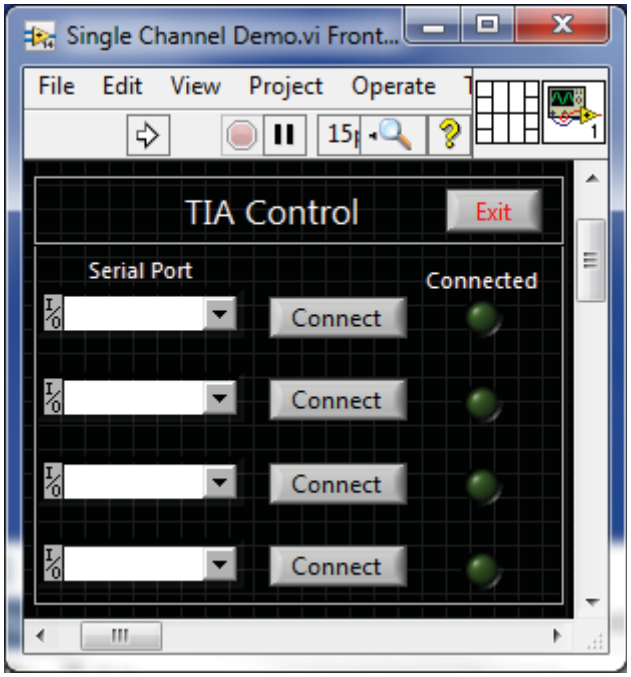
The required USB driver needed to communicate with the TIA unit(s) should automatically install when a USB cable from the Power Supply USB port is connected to a Windows based computer. If communication through the USB port cannot be established with the TIA unit(s), it may be necessary to install the USB driver manually from the provided CD. The provided CD contains a folder labeled FTDI which contains CDM21228_Setup.exe, a setup executable for installing the VCP drivers for the Windows operating system only (driver release date 2017-08-30; version 2.12.28). To install the USB driver manually on a computer using the Windows operating system, open the FTDI folder and double click on CDM2128_Setup.exe. Once the installer successfully finishes, the correct USB driver for use with the TIA unit(s) should be installed. In Windows' Device Manager under the Ports sub-tree, the TIA should be listed as a "USB Serial Port" followed by the COM port number being used. If needed, the most recent drivers for the FT232RL can be found in the "VCP Drivers" section of the FTDI Chip website: www.ftdichip.com/Drivers/VCP.htm

6 Control Software — Single Channel

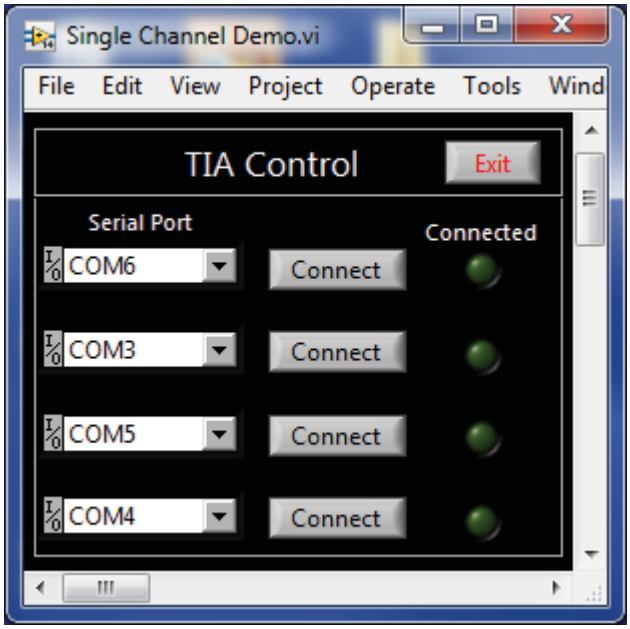
Demo software is provided as LabVIEW source code. The software is optimized to be used with a screen resolution of 1920 x 1080. To use the demo software, open the TIA Single Channel Demo library (.llb file extension) and double click on the Single Channel Demo vi in the LLB Manager window.



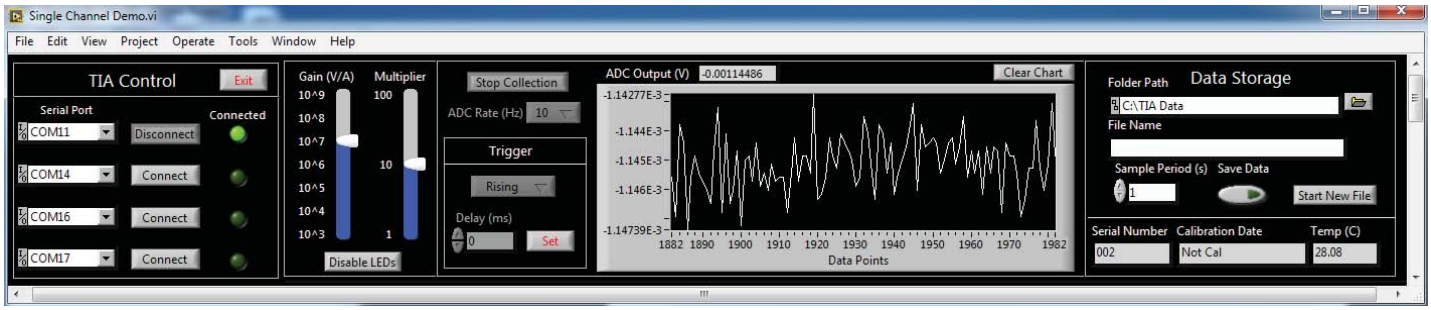
In the Single Channel Demo vi, press the run button to start the software.



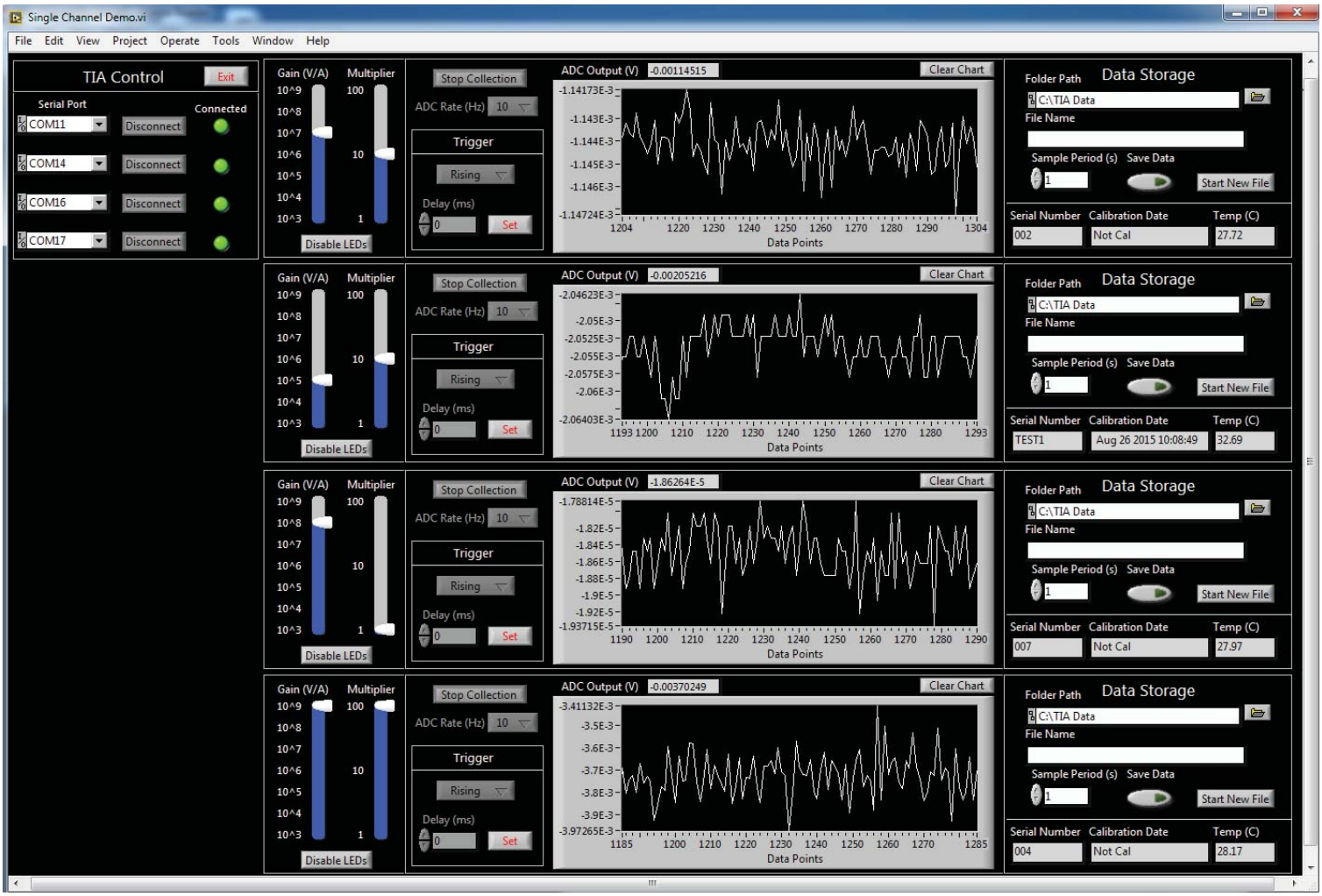
Up to four TIAs with single channel power supplies (Model 3310) can be operated using the demo software. Select the computer serial ports that the TIAs are connected to and press the Connect buttons to connect to the TIA units.



When the TIAs are connected through the demo software, the green Connected lights are lit. Controls for the corresponding number of TIAs connected will open in the software window. The below screen shows one TIA connected and its corresponding controls.



The screen below shows four TIAs connected and their corresponding controls.



Gain/Multiplier:

Use to select the gain and multiplier settings.

Disable LEDs:

Press to turn off the LED lights on the front panel of the TIA. Press again to turn on the LED lights on the front panel.

Collect Data/Stop Collection:

Press to start or stop data collection.

ADC Rate (Hz):

Use to select ADC rate in Hz. Default is 10 Hz.

Trigger:

Use to synchronize the TIA ADC conversion with an external trigger signal applied to the sync input on the back of the TIA power supply. Select the trigger polarity (Falling or Rising), set the delay in milliseconds (range 0-65534 ms), and then press the Set button. The button will now read ‘Clear’. Press the Collect Data button and data collection will begin once the trigger signal is detected. Press the clear button to clear the wait for trigger.

ADC Output (V):

Shows the ADC output in volts in graphical and numeric format. Press the Clear Chart button if a chart restart is desired.

Data Storage:

File Path:

Default is C:\TIA Data which is created if it does not exist. Press the folder button to choose a different file path.

File Name:

Cannot be changed. Consists of TIA serial number and date/time code which is auto generated by software upon pressing Save Data button or Start New File button.

Sample Period (s):

The number of seconds between recorded data. Default is 1.

Save Data:

Default is off. Turn on to save data in a tab delimited text file.

Start New File:

Press to start recording data to a new text file. File Name will be updated upon button release.

Serial Number:

Serial number of the TIA unit.

Calibration Date:

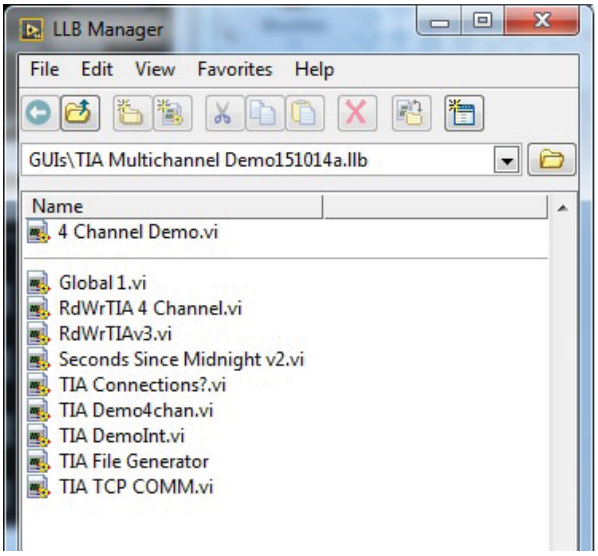
Date and time stamp of last factory calibration. Not Cal indicates that the unit has not been calibrated.

Temp (C):

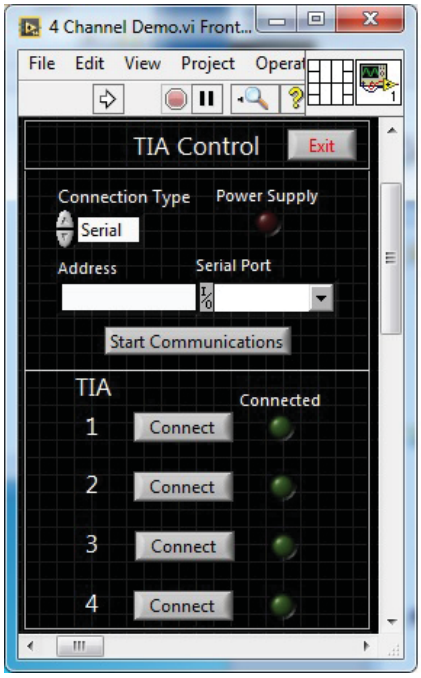
Temperature in degrees Celsius of the main PCB within the TIA.

7 Control Software — Four Channel

Demo software is provided as LabVIEW source code. The software is optimized to be used with a screen resolution of 1920 x 1080. To use the demo software, open the TIA 4 Channel Demo library (.llb file extension) and double click on the 4 Channel Demo vi in the LLB Manager window.



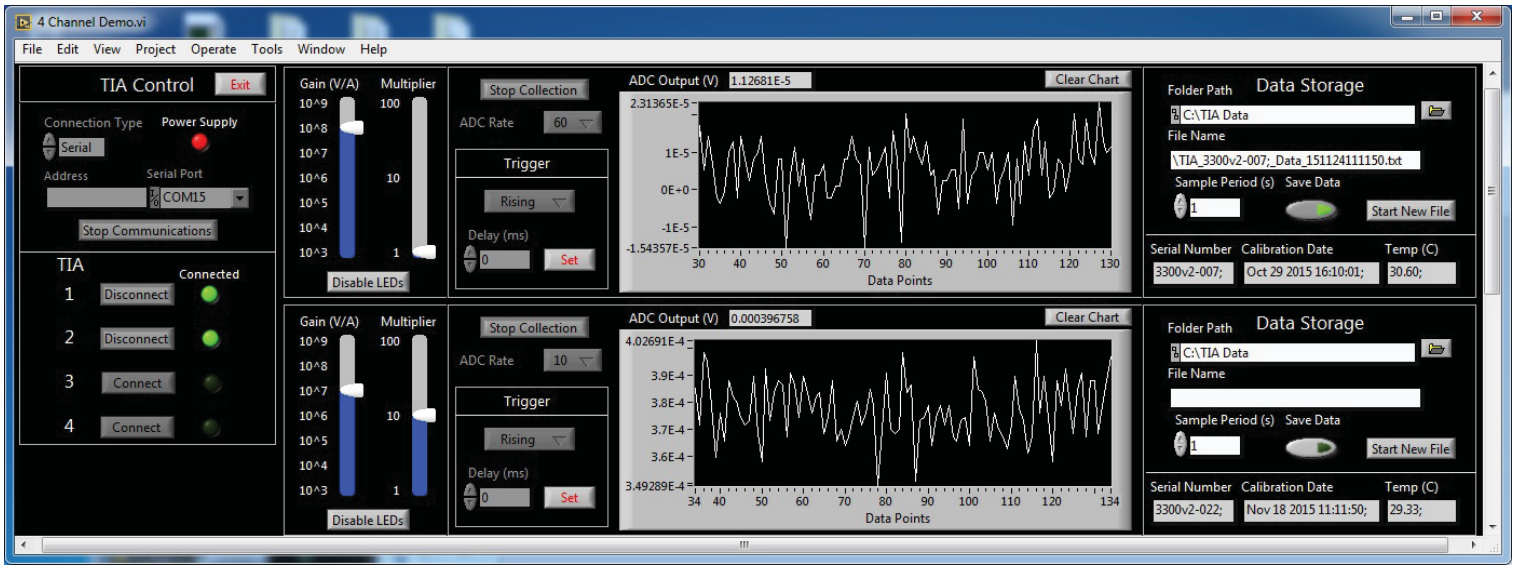
In the 4 Channel Demo vi press the run button to start the software.



Up to four TIAs can be operated with the power supply and demo software using either TCP or Serial communications. For TCP communications, select TCP using the Connection Type control and input the IPv4 address of the device in the corresponding field. For Serial communications select Serial using the Connection Type control and select the computer serial port the power supply is connected to. Once the connection parameters have been chosen press the Start Communications button to connect to the power supply. If successful the red light will illuminate.

The 4 channel power supply has the capability to detect the presence of any TIAs connected to it. The software will automatically poll the power supply to determine if and where any TIAs are connected. If a TIA is connected to any of the ports, the corresponding controls will enable automatically.

Press the Connect buttons to connect to the TIA units. When the TIAs are connected through the demo software, the green connected lights are lit. Controls for the corresponding number of TIAs connected will open in the software window. The screen below shows two TIAs connected and their corresponding controls.



Gain/Multiplier:

Use to select the gain and multiplier settings.

Disable LEDs:

Press to turn off the LED lights on the front panel of the TIA. Press again to turn on the LED lights on the front panel.

Collect Data/Stop Collection:

Press to start or stop data collection.

ADC Rate (Hz):

Use to select ADC rate in Hz. Default is 10 Hz.

Trigger:

Use to synchronize the TIA ADC conversion with an external trigger signal applied to the sync input on the back of the TIA power supply. Select the trigger polarity (Falling or Rising), set the delay in milliseconds (range 0-65534 ms), and then press the Set button. The button will now read ‘Clear’. Press the Collect Data button and data collection will begin once the trigger signal is detected. Press the clear button to clear the wait for trigger.

ADC Output (V):

Shows the ADC output in volts in graphical and numeric format. Press the Clear Chart button if a chart restart is desired.

Data Storage:

File Path:

Default is C:\TIA Data which is created if it does not exist. Press the folder button to choose a different file path.

File Name:

Cannot be changed. Consists of TIA serial number and date/time code which is auto generated by software upon pressing Save Data button or Start New File button.

Sample Period (s):

The number of seconds between recorded data. Default is 1.

Save Data:

Default is off. Turn on to save data in a tab delimited text file.

Start New File:

Press to start recording data to a new text file. File Name will be updated upon button release.

Serial Number:

Serial number of the TIA unit.

Calibration Date:

Date and time stamp of last factory calibration. Not Cal indicates that the unit has not been calibrated.

Temp (C):

Temperature in degrees Celsius of the main PCB within the TIA.

8 Command Guide

Introduction

The Model 3300v2 Trans-Impedance Amplifier (TIA) implements a set of commands through its serial port interface. These commands provide control of amplifier gain settings and electronics, as well as access to internal data and measurements. This document specifies command syntax (general to all commands) and individual descriptions of respective functionality, parameters, and expected results/return values. Commands are categorized into two general types:

- “Set” commands which instruct the TIA to control its state in some manner.
- “Get” commands which request information about the instrument state or retrieve data.

Command Structure

Each command sent to the TIA is an ASCII line comprised of:

1. [*optional*] numerical prefix [1 - 4] to select one of four TIA (only required when powering amplifiers with Model 3311 Quad Power Supply)
2. Command string literal unique to each command
3. Arguments (if required by the command)
4. Line termination by <CR><LF> or <LF> (the TIA accepts either termination sequence).

In commands requiring arguments, the command string and each argument sent to the TIA must be delineated by the space character:

Table 1 ASCII reference

Character	Symbol	Hex	Dec
Single Space	<SP>	0x20	32
Carriage Return	<CR>	0x0D	13
Newline/Linefeed	<LF>	0x0A	10

Command string-literals are shown in this document capitalized, but are parsed by the TIA in case-insensitive manner.

Whitespace characters are shown visibly via symbolic representation (e.g. “<SP>”) throughout this document in most command/response examples. In actual serial data transfers, **ONLY** the single whitespace ASCII character is to be present.

The TIA must only be sent a single command/line at any given time. An acknowledgment/response will be returned by the TIA when each command is completed. Subsequent commands sent to the TIA before it returns acknowledgment will be ignored.

Command Acknowledgment and Syntax

Correctly formatted “Set” commands received by the TIA will be acknowledged with the following response:

ACK;<CR><LF>

Correctly formatted “Get” commands will prompt the TIA to reply with a string containing the requested control settings or data values. The format of these responses depends upon the issued command, and is described completely in this document under the section of each respective command. All TIA responses end with a semicolon and are line-terminated by both <CR> and <LF> non-printable characters.

Response example from GETVOLTSOUT command:

-1.441568E-2;<CR><LF>

Command Errors

Incorrectly formatted commands will prompt error messages from the TIA. Unrecognized commands produce the following reply:

ERR<SP>BAD<SP>CMD;<CR><LF>

Commands with arguments that are out of range or incorrectly formatted produce the following reply:

ERR<SP>BAD<SP>VAL;<CR><LF>

Remote/Local Mode

The TIA may be used as a local device, i.e. controlled solely through the knobs located on the front panel of the amplifier. Because the command interface exposes the functionality of these knobs through the serial interface, the front panel knobs are “locked” out by entering “Remote Mode” whenever a “Set” command is issued to the TIA through the serial interface. The mode can be toggled between Remote and Local Modes via the front panel “Local” button, or by serial command.

TIA Addressing

TIAs may be used individually, as when connected to single channel power supplies. They may also be used in a group through Four-channel power supplies. The command structure changes slightly when multiple units are utilized. Each command must be prefixed by a numberical address (‘1’ through ‘4’) in order to select to which connected TIA the command is directed. TIAs operating individually ignore the address, so it is syntactically conformant to send an individual TIA the same packet as a group. Address prefixes need to be separated from the command with a space character. For example:

1<SP>getVoltsOut<CR><LF>

Two commands are implemented that pertain only to the Quad Power Supply. These commands (“get_TIA_pres” and “set_ethernet”) are not forwarded to any Model 3300 TIAs connected to the power supply.

GETSERNUM (or GetSerNum)

Description: The GETSERNUM command, for “get serial number”, prompts the TIA to return its unit serial number.

Arguments:

Argument	Range	Description
none		

Syntax:

GETSERNUM<CR><LF>

Response example:

3300v2-001;<CR><LF>

GETFWDATE (or GetFWdate)

Description: The GETFWDATE command, for “get firmware date”, prompts the TIA to return its firmware build date and time.

Arguments:

Argument	Range	Description
none		

Syntax:

GETFWDATE<CR><LF>

Response example:

Jun 3 2015 08:46:32;<CR><LF>

GETTIAGAIN (or GetTIAgain)

Description: The GETTIAGAIN command prompts the TIA to return its present trans-impedance amplification. The value returned is the $\log_{10}$ of the gain (see Table 2 TIA Gain Enumeration).

Arguments:

Argument	Range	Description
none		

Syntax:

GETTIAGAIN<CR><LF>

Response example:

3;<CR><LF>

Table 2 TIA Gain Enumeration

Value	I-V Gain
3	10^3
4	10^4
5	10^5
6	10^6
7	10^7
8	10^8
9	10^9

SETTIAGAIN (or SetTIAgain)

Description: The SETTIAGAIN command configures the trans-impedance gain setting of the amplifier to the value sent.

Arguments:

Argument	Range	Description
arg	[3,9]	Trans-impedance gain desired. Argument value is the $\log_{10}$ of gain (*see Table 2 TIA Gain Enumeration*).

Syntax:

SETTIAGAIN<SP>arg1<CR><LF>

example: SETTIAGAIN<SP>5<CR><LF>

Response example:

ACK;<CR><LF>

GETPOSTGAIN (or GetPostGain)

Description: The GETPOSTGAIN command prompts the TIA to return its present output stage voltage amplification. The value returned is the $\log_{10}$ of the voltage multiplier (*see Table 3 Output Voltage Multiplier Enumeration*).

Arguments:

Argument	Range	Description
none		

Syntax:

GETPOSTGAIN<CR><LF>

Response example:

0;<CR><LF>

Table 3 Output Voltage Multiplier Enumeration

Value	I-V Gain
0	10^0
1	10^1
2	10^2

SETPOSTGAIN (or SetPostGain)

Description: The SETPOSTGAIN command configures the output stage voltage gain setting of the amplifier to the value sent.

Arguments:

Argument	Range	Description
arg	[0,2]	Output stage voltage gain desired. Argument value is the $\log_{10}$ of gain (*see Table 3 Output Voltage Multiplier Enumeration*).

Syntax:

SETPOSTGAIN<SP>arg1<CR><LF>

example: SETPOSTGAIN 0<CR><LF>

Response example:

ACK;<CR><LF>

SETLOCALMODE (or SetLocalMode)

Description: The SETLOCALMODE command enables the TIA's front panel controls. These controls are disabled in remote mode. Remote mode is activated when the TIA receives a "Set" command through its command interface (with the obvious exception of this command).

Arguments:

Argument	Range	Description
none		

Syntax:

SETLOCALMODE<CR><LF>

Response example:

ACK;<CR><LF>

SETREMOTEMODE (or SetRemoteMode)

Description: The SETREMOTEMODE command disables the TIA's front panel controls.

Arguments:

Argument	Range	Description
none		

Syntax:

SETREMOTEMODE<CR><LF>

Response example:

ACK;<CR><LF>

SETLEDDISABLE (or setLEDdisable)

Description: The SETLEDDISABLE command, for "Set LEDs to disabled" disables the TIA's front panel LEDs so that the TIA can be used near lab experiments where illumination is undesirable.

Arguments:

Argument	Range	Description
none		

Syntax:

SETLEDDISABLE<CR><LF>

Response example:

ACK;<CR><LF>

SETLEDENABLE (or setLEDenable)

Description: The SETLEDENABLE command, for “Set LEDs to enabled” enables the TIA’s front panel LEDs.

Arguments:

Argument	Range	Description
none		

Syntax:

SETLEDENABLE<CR><LF>

Response example:

ACK;<CR><LF>

GETTEMP (or getTemp)

Description: The GETTEMP command prompts the TIA to return the internal board temperature in degrees C.

Arguments:

Argument	Range	Description
none		

Syntax:

GETTEMP<CR><LF>

Response example:

29.12;<CR><LF>

GETVOLTSOUT (or GetVoltsOut)

Description: The GETVOLTSOUT command prompts the TIA ADC to sample and return the output voltage measured across the “Voltage Out” BNC connector.

When the TIA is configured for an external trigger (see command “SETTRIGDELAY”) this command arms the hardware trigger mechanism. Please refer to the hardware section of this manual for trigger signal specifications. In that case, the value “NaN” (Not a Number) is returned by this command until a hardware trigger has been detected and the subsequent ADC conversion has occurred.

When the output voltage is in violation of allowable range, the response will be “1E+38” or “-1E+38.”

Arguments:

Argument	Range	Description
none		

Syntax:

GETVOLTSOUT<CR><LF>

Response example:

-1.441568E-2;<CR><LF>

NaN;<CR><LF>

1E+38;<CR><LF>

SETTRIGDELAY (or setTrigDelay)

Description: The SETTRIGDELAY command sets the ADC trigger mode and delay time.

Three trigger modes are possible:

- Immediate (default) where no hardware trigger is required
- Zero delay hardware trigger
- Delay sampling past hardware trigger

This command does NOT arm the trigger. The command: “GETVOLTSOUT” must be issued to the TIA (See command GETVOLTSOUT) to arm.

Arguments:

Argument	Range	Description
arg1	[0, 65535]	Time delay (ms) to delay ADC sampling of voltage after hardware trigger occurs. Setting this value to 65535 (or 0xFFFF) enables immediate sampling.

Table 4 Trigger Delay/Mode Argument

Argument	Delay mode
65535 (0xFFFF)	Immediate mode (default)
0	Zero Delay
1-65534	Delay in milliseconds

Syntax:

SETTRIGDELAY<SP>arg1<CR><LF>

Response example:

ACK;<CR><LF>

SETTRIGEDGE (or setTrigEdge)

Description: The SETTRIGEDGE command configures the polarity of the ADC hardware trigger.

Arguments:

Argument	Range	Description
arg1	[0,1]	

Argument Value	Edge Sensitivity
1	Rising (default)
0	Falling

Syntax:

SETTRIGEDGE<SP>arg1<CR><LF>

Response example:

ACK;<CR><LF>

SETDATARATE (or setDataRate)

Description: The SETDATARATE command programs the sampling rate of the TIA's on-board ADC. Changing the sampling rate forces the ADC to perform a self-calibration (see command ADCSELFCAL for more information).

Arguments:

Argument	Range	Description
arg1	[see Table 5 Valid Data Acquisition Rates]	The data rate, in samples per second, to program the ADC to convert data.

Table 5 Valid Data Acquisition Rates

Argument Value	Sample rate (s^{-1})
100	100
60	60
50	50
30	30
25	25
15	15
10	10
5	5
2p5	2.5

Syntax:

SETDATARATE<SP>arg1<CR><LF>

Response example:

ACK;<CR><LF>

GETDATARATE (or GetDataRate)

Description: The GETDATARATE command prompts the TIA to return the current sampling rate of its on-board ADC. The command reply returns responses shown in Table 6 Data Acquisition Rates.

Arguments:

Argument	Range	Description
none		

Table 6 Data Acquisition Rates

Return String	Sample rate (s^{-1})
100SPS	100
60SPS	60
50SPS	50
30SPS	30
25SPS	25
15SPS	15
10SPS	10
5SPS	5
2p5SPS	2.5

Syntax:

GETDATARATE<CR><LF>

Response example:

2p5SPS;<CR><LF>

ADCSELFCAL (or ADCselfCal)

Description: The ADCSELFCAL command prompts the TIA's on-board analog-to-digital converter to perform an internal self-calibration. Changing the ADC data rate (see command SETDATARATE) will cause a self-calibration as well. Calibration removes internal gain and offset drifts in the converter. It is recommended that an ADC self-calibration be performed after the TIA is powered and warms-up and then periodically afterwards.

Please note that the calibration process may take up to nearly 1.8 seconds (at the slowest data rate). The TIA response: "ACK" must be observed before the next command can be accepted.

Arguments:

Argument	Range	Description
none		

Syntax:

ADCSELFCAL <CR><LF>

example: ADCSELFCAL <CR><LF>

Response example:

ACK;<CR><LF>

SETDECIMAL (or SetDecimal)

Description: The SETDECIMAL command determines the separator symbol (i.e. decimal “period” or “comma”) displayed in decimal return values. The selected configuration is saved to non-volatile memory.

Arguments:

Argument	Range	Description
arg1	[0,1]	Argument value is a numeric enumeration of which decimal symbol to use (*see Table 1 Decimal Separator Enumeration*).

Table 6 Data Acquisition Rates

Value	Separator
0	Comma
1	Period

Syntax:

SETDECIMAL<SP>arg1<CR><LF>

example: SETDECIMAL<SP>1<CR><LF>

Response example:

ACK;<CR><LF>

get_TIA_pres

Description: Specific only to the Model 3311 Quad Power Supply. The get_TIA_pres command, for “get TIA presence”, prompts the Model 3311 Quad Power Supply to return a string that indicates which ports have a Model 3300 TIA plugged in.

The reply string will report the status of each Model 3311 port, starting with port 1, and ending with port 4. TIA presence (an Model 3300 plugged in by cable) on a port is indicated by a ‘1’; conversely, absence is indicated by a ‘0’. In the response example below, TIAs are plugged into ports 3 and 4.

Arguments:

Argument	Range	Description
none		

Table 2 Port Status Indication

Value	Port Status
0	No TIA
1	TIA present

Syntax:

get_TIA_pres<CR><LF>

Response example:

0, 0, 1, 1;<CR><LF>

set_ethernet

Description: Specific only to the Model 3311 Quad Power Supply. The set_ethernet command configures the IPv4 address and local network settings of the Model 3311 Quad Power Supply TCP/IP interface. These new settings (when syntactically correct) are applied immediately. Further they are committed to non-volatile memory, and therefore will remain in effect through subsequent power cycles and resets.

Textual representation of the four “dotted-decimal” arguments must be presented to the TIA with no whitespace contained between octets and stops (periods). Leading zero padding in each octet, however, is acceptable. Whitespace “outside” the IP address is also acceptable and treated as a delimiter.

Acceptable Format(s):

10.0.0.1

010.000.000.001

<SP>10.0.0.1<SP>

Unacceptable:

10. <SP><SP>0. <SP><SP>0. <SP><SP>1

Note: Holding the reset button in for extended durations does NOT restore any default factory IP settings. These may be reprogrammed/recovered via the USB/serial port should connection via TCP/IP be lost.

Arguments:

Argument	Range	Description
arg1	“dot-decimal” IPv4 address	IP address desired.
arg2	“dot-decimal” IPv4 address	Subnet mask desired.
arg3	“dot-decimal” IPv4 address	Internet gateway desired.
arg4	“dot-decimal” IPv4 address	DNS desired.

Syntax:

set_ethernet:arg1,arg2,arg3,arg4<CR><LF>

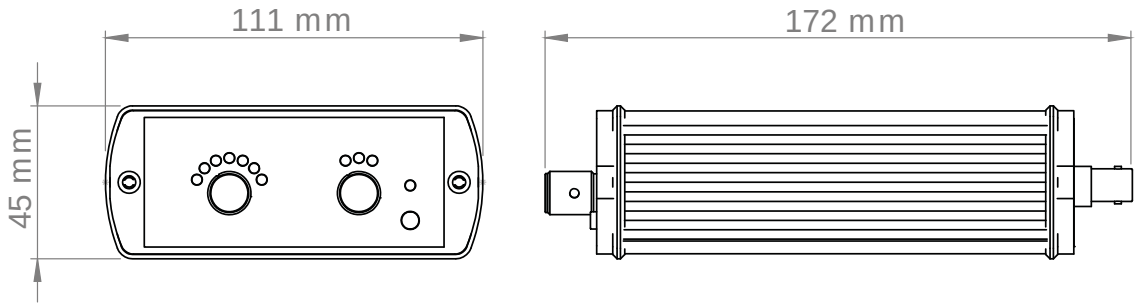
example: set_ethernet:10.0.0.2,255.255.255.0,10.0.0.1,10.0.0.1<CR><LF>

Response example:

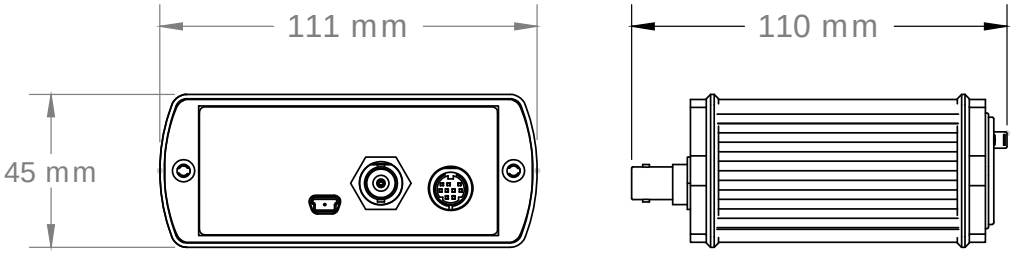
ACK;<CR><LF>

9 Dimensions

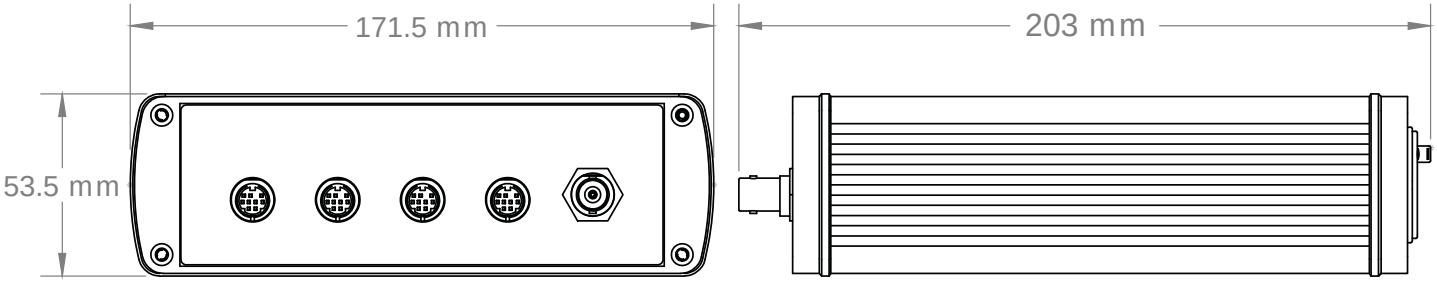
Model 3300 Transimpedance Amplifier



Model 3310 TIA Power Supply



Model 3311 TIA Quad Power Supply



Drawings are not to scale.