



# ***DI-1100***

***4-Channel USB Data Acquisition Starter Kit***

## ***User's Manual***

***Manual Revision B***

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# Warranty and Service Policy

## Product Warranty

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2. DATAQ Instruments will repair or replace any defective product within 5 days of its receipt.
3. For in-warranty repairs, DATAQ Instruments will return repaired items to the buyer freight prepaid. Out of warranty repairs will be returned with freight prepaid and added to the service invoice.



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# Table of Contents

<b>Warranty and Service Policy .....</b>	<b>iii</b>
<b>1. Introduction .....</b>	<b>1</b>
Features .....	1
Analog Inputs .....	1
Digital Inputs .....	1
Software .....	1
WinDaq® Recording and Playback Software .....	1
Help .....	2
<b>2. Specifications .....</b>	<b>3</b>
<b>3. Installation .....</b>	<b>5</b>
Installing WinDaq Software .....	5
Connecting the Instrument to Your Computer .....	6
<b>4. Controls, Indicators, and Connections .....</b>	<b>7</b>
Mini-B USB Connection .....	7
Connecting Input Signals .....	7
DI-1100 Signal Connections .....	7
Connecting Signal Leads .....	8
Analog Inputs .....	8
WinDaq Remote Controls (Digital Inputs) .....	9
WinDaq Remote Events .....	10
WinDaq Remote Storage (Record) .....	12
4-20mA Current Loop Measurements .....	12
LED Indicators .....	13
<b>5. Dimensional Drawing .....</b>	<b>15</b>



# 1. Introduction

This manual contains information designed to familiarize you with the features and functions of the DI-1100 USB data acquisition starter kit. These high-end Starter kits contain features and functionality normally reserved for more expensive data acquisition systems.

## Features

The **DI-1100** data acquisition instrument is a portable data recording module that communicates through your computer's USB port. Power is derived from the interface port so no external power is required. Features include:

- 4 fixed differential analog inputs protected to  $\pm 100\text{V}$  (transient).
- Two dedicated digital I/O ports for Remote control protected to  $\pm 30\text{V}$ .
- $\pm 10\text{V}$  full scale measurement range.
- 12-bit analog-to-digital resolution.
- 20kHz to 40kHz max sample rate per channel (dependent on number of channels enabled).
- A push-button to tag remote events in WINDAQ software.
- Three status LEDs for easy notification of system status.
- Free WinDaq recording and playback software allowing you to record at the full speed of the instrument.
- Included .Net Class supports programming the DI-1100 under any .Net programming language.
- Fully documented instrument protocol for programming the device in operating systems other than Windows.

## Analog Inputs

The **DI-1100** features four differential channel inputs located on a single sixteen-position screw terminal block for easy connection and operation (other terminals used for digital I/O or reserved). Note: The DI-1100 does not support Gain.

Utilize the functionality of WINDAQ software to experience all the features encased in these small, inexpensive instruments.

## Digital Inputs

The DI-1100 contains two digital lines (bits) for WINDAQ remote control operations (Remote Start/Stop and Remote Events). Connect switch closures or discrete levels with a maximum input of 30V and a TTL level threshold. The inputs float at 1 level, about 3.3V relative to the “-” terminal, and require sinking about 50uA to bring them down to 0.8V and guarantee a 0. When no Options Remote are enabled in WINDAQ, the Event input appears inverted in data bit 0 and the Record input appears inverted in data bit 1 of data for the first enabled channel.

## Software

All software required to record and playback waveforms is included with the purchase of any DI-1100 data acquisition starter kit via download.

### **WINDAQ<sup>®</sup> Recording and Playback Software**

WINDAQ Acquisition and WINDAQ Waveform Browser allow you to record and playback data acquired through your instrument. WINDAQ software is an invaluable resource to record and analyze your data and is available for free from our web site ([www.dataq.com](http://www.dataq.com)).

WINDAQ Acquisition software can be used to record waveforms directly and continuously to disk while monitoring a real time display of the waveforms on-screen. It operates, displays, and records waveform signals in real time at the full sample rate of the DI-1100.

WINDAQ Waveform Browser playback software (also known as “WWB”) offers an easy way to review and analyze acquired waveforms. A built-in data file translator allows the user to display multiple waveforms acquired by WINDAQ Acquisition software or any of a wide range of data acquisition packages. The software’s disk-streaming design allows data files of any length to be graphically displayed rapidly, in normal or reverse time directions. Seven standard cursor-based measurements, frequency domain, and statistical analysis functions help simplify waveform analysis and interpretation. WINDAQ Waveform Browser is free and installed when installing WINDAQ Software.

### ***Help***

All WINDAQ software utilizes context-sensitive help. Help may be accessed through the Help menu or by pressing the F1 key with any pull-down menu item selected. This will take you directly to the Help topic most relevant to that particular function or feature. Help topics discuss in detail each function available in the software.



## 2. Specifications

### **Analog Inputs**

Number of Channels:	4
Channel Configuration:	Differential
Voltage Measurement Range:	$\pm 10\text{V}$ Full Scale fixed
Input Impedance:	$1\text{M}\Omega$
Isolation:	none
Absolute accuracy: @ 25°C, excluding common mode error	$\pm 12.5\text{ mV}$
Absolute maximum input without damage:	$\pm 75\text{ V}$ peak, continuous $\pm 100\text{ V}$ peak, one minute or less
System noise:	7.8 mV rms
Maximum common mode voltage:	$\pm 10\text{ V}$
Common mode rejection ratio:	40 dB (dc - 60 Hz)
Channel-to-channel crosstalk rejection:	-80 dB

### **Digital Inputs**

Number of ports:	2 (reserved)
Type:	MOSFET switch
Threshold levels:	TTL-compatible
Absolute maximum applied voltage (V):	$\pm 30\text{ V}$ dc

### **Reserved Inputs (Digital Inputs)**

Digital In 0:	WINDAQ remote events
Digital In 1:	WINDAQ remote start/stop

### **ADC Characteristics**

Resolution:	12-bit Above zero ADC counts: 2,047 Below zero ADC counts: 2,048
Maximum sample rate per channel:	40 kHz, 1 enabled channel 30 kHz, 2 enabled channels 24 kHz, 3 enabled channels 20 kHz, 4 enabled channels
Min. sample throughput rate:	915.5 Hz (0.0006104 Hz with WinDaq software)
Sample rate timing accuracy:	50 ppm

### **Indicators and Connections**

Interface:	USB 2.0 (mini-B style connector)
Indicators (LED):	3 LEDs, (2) Green, (1) RGB

Input Connections: One 16-position terminal strip

### **Power**

Power Consumption: <1.0 Watt, via USB interface

### **Environmental**

Operating Temperature: 0°C to 50°C (32°F to 122°F)

Operating Humidity: 0 to 90% non-condensing

Storage Temperature: -20°C to 60°C (-4°F to 140°F)

Storage Humidity: 0 to 90% non-condensing

### **Physical Characteristics**

Enclosure: Hardened Plastic

Mounting: Desktop; bulkhead

Dimensions: 2.625D × 5.5W × 1.53H in.  
(6.67D × 13.97W × 3.89H cm.)

Weight: 3.6 oz.

### **Software Support**

WINDAQ software: OS support: [Check Online at https://www.dataq.com/products/windaq/windows-compatibility/](https://www.dataq.com/products/windaq/windows-compatibility/)

Programming: DATAQ .NET Class, Instrument protocol, ActiveX Control

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## 3. Installation

The following items are included with each WINDAQ Starter Kit. Verify that you have the following:

- A DI-1100 USB data acquisition instrument.
- USB cable.
- A DATAQ Instruments screwdriver for signal lead connections.

If an item is missing or damaged, call DATAQ Instruments at 330-668-1444. We will guide you through the appropriate steps for replacing missing or damaged items. Save the original packing material in the unlikely event that your unit must, for any reason, be sent back to DATAQ Instruments.

### Installing WINDAQ Software

All software for the DI-1100 can be installed via a downloadable executable directly from the DATAQ Instruments web site. No CD is shipped with the device. You may burn the executable onto a CD to transport the software to a computer with no internet connection.

1. Disconnect all DATAQ Instruments USB devices from your Computer.



2. Go to [run.dataq.com](http://run.dataq.com) in your web browser.
3. Click on the WinDaq Software link (requires subscription).
4. Sign up for our newsletter to receive the download link (you can opt-out after download).
5. Double-click on the downloaded file to extract the program and begin software installation.
6. Follow the on-screen prompts and enter any required information.

7. Software installation is complete - you will now see a “Successful Installation” box - click **OK** to exit WINDAQ Installation.

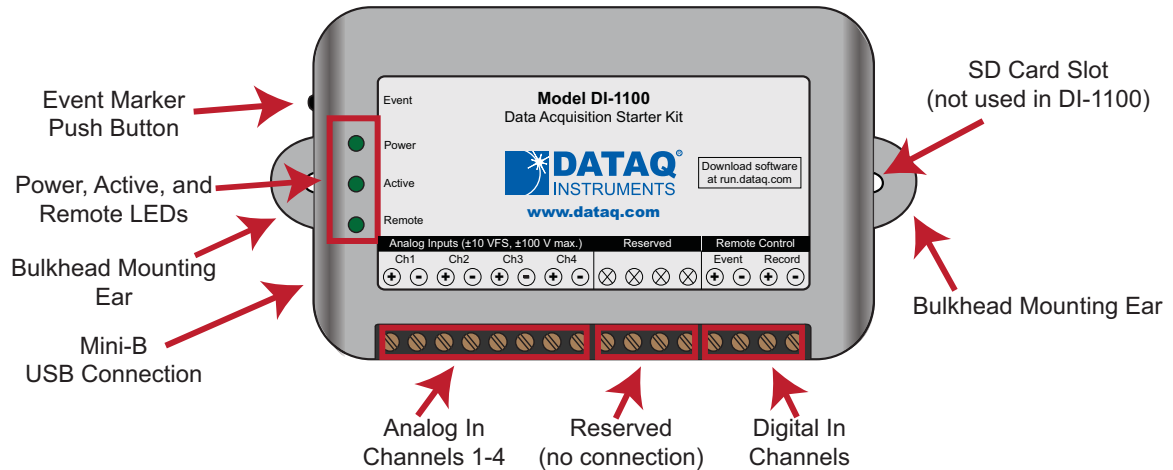
You can now plug the device(s) into your PC.

## Connecting the Instrument to Your Computer

DI-1100 instruments can be connected to your computer’s USB port using the provided USB cable. No external power is required. Connect one end of the communications cable to the instrument port and the other to your PC’s port. Only one device may be connected at a time when using WinDaq.

***Note:** Use a powered USB hub or a USB port on your PC. Non-powered USB hubs may not have sufficient power to run the instrument.*

# 4. Controls, Indicators, and Connections



**Please note:** The SD card slot is not used in the DI-1100. Allowing foreign materials to enter the device through the SD card slot may result in damage to the instrument.

## Mini-B USB Connection

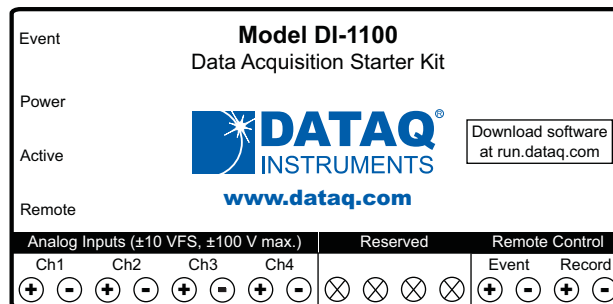
Use the supplied USB cable to connect and power the instrument through your computer's USB port.

## Connect Input Signals

Make input signal connections to the 16-port screw terminals. Each terminal is labeled directly on the instrument case.

### DI-1100 Signal Connections

Refer to the following for screw terminal port identification.



**Ch#:** Analog channels 1-4 ( $\pm 10$ VFS,  $\pm 100$ V transient Max.)

**Remote Control Event:** Digital Input bit 0—Remote Event Marker

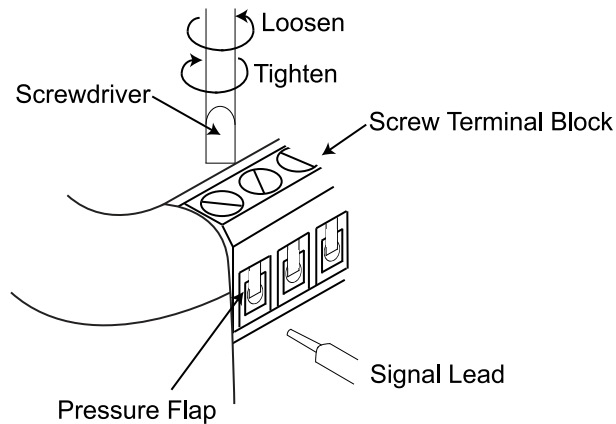
**Remote Control Record:** Digital Input bit 1—Remote Start/Stop

**Reserved NC:** No connection—reserved.

## Connect Signal Leads

Connect signal leads to the DI-1100:

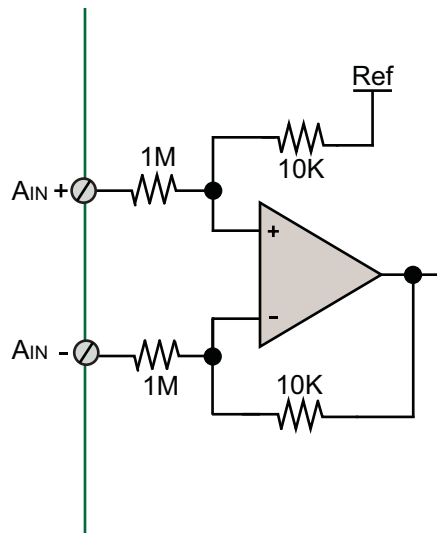
1. Insert the stripped end of a signal lead into the desired terminal directly under the screw.
2. Tighten the pressure flap by rotating the screw clockwise with a small screwdriver. Make sure that the pressure flap tightens only against the signal wire and not the wire insulation. Do not over-tighten.
3. Tug gently on the signal lead to ensure that it is firmly secured.



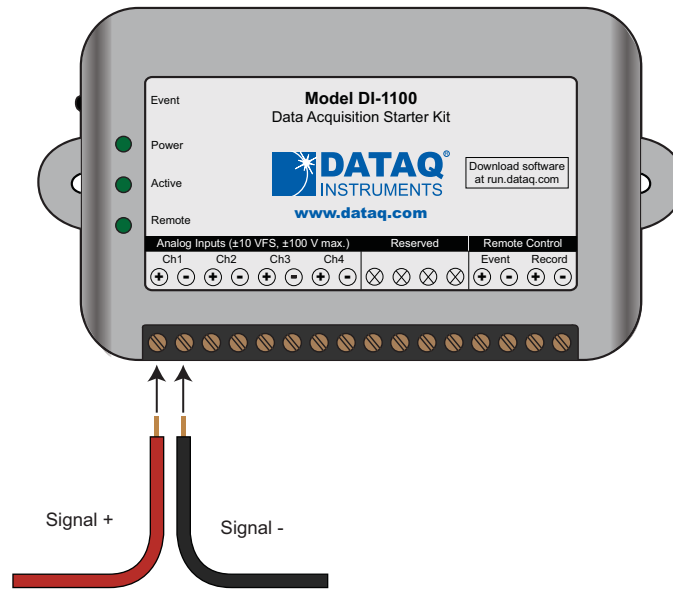
When an input signal is connected and WINDAQ Acquisition software is run, WINDAQ's real time display immediately reveals the input waveform on your computer's monitor.

## Analog Inputs

Four differential analog inputs measure  $\pm 10$  Volts. Designed to withstand  $\pm 100$ V.

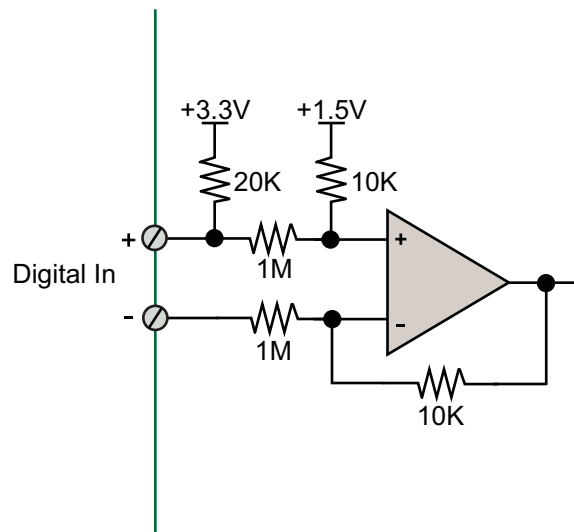


Use the following diagram to connect Analog Input Channel 1.

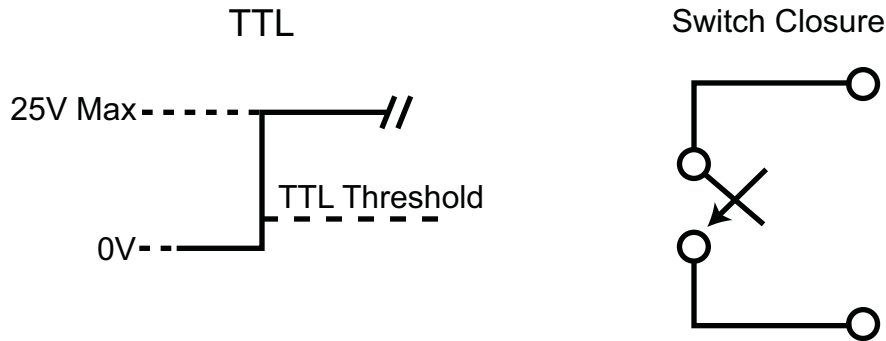


### **WINDAQ Remote Controls (Digital Inputs)**

The DI-1100 contains 2 digital inputs designated for WINDAQ Remote Events (inserts an Event Marker) and Remote Storage (Record data).

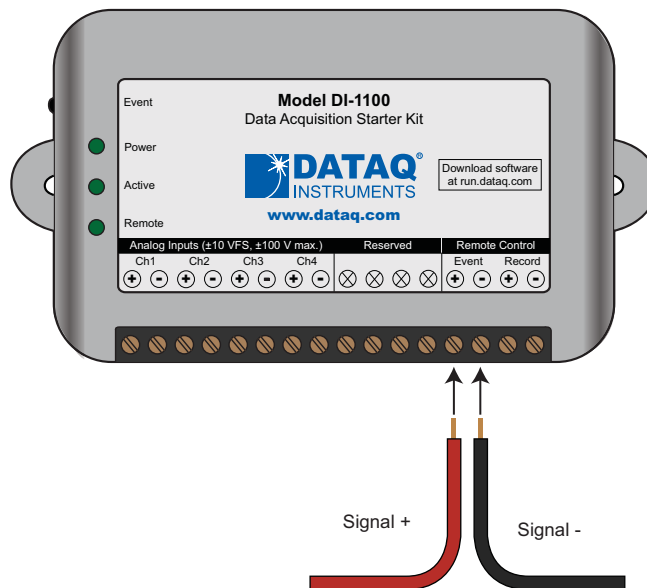


Valid remote record and event signals are switch closures or discrete levels with a maximum input of 30 V and a TTL level threshold.



### WINDAQ Remote Events

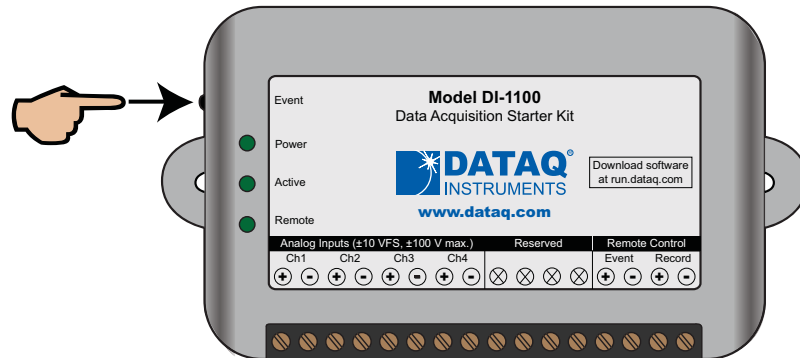
To use a switch closure or TTL signal to record WINDAQ Event Markers, connect signal leads to the appropriate Remote Control Event terminals on the DI-1100 as shown below.



Once the switch closure or TTL signal is connected, activate Remote Events through WINDAQ Acquisition Software. Events may be automatically placed on the rising or falling edge of the trigger signal. Use the menu command **Options > Remote Events +** to set WINDAQ to place event markers on low-to-high transitions of the Event input. Use the menu command **Options > Remote Events -** to set WINDAQ to place event markers on high-to-low transitions of the Event input.

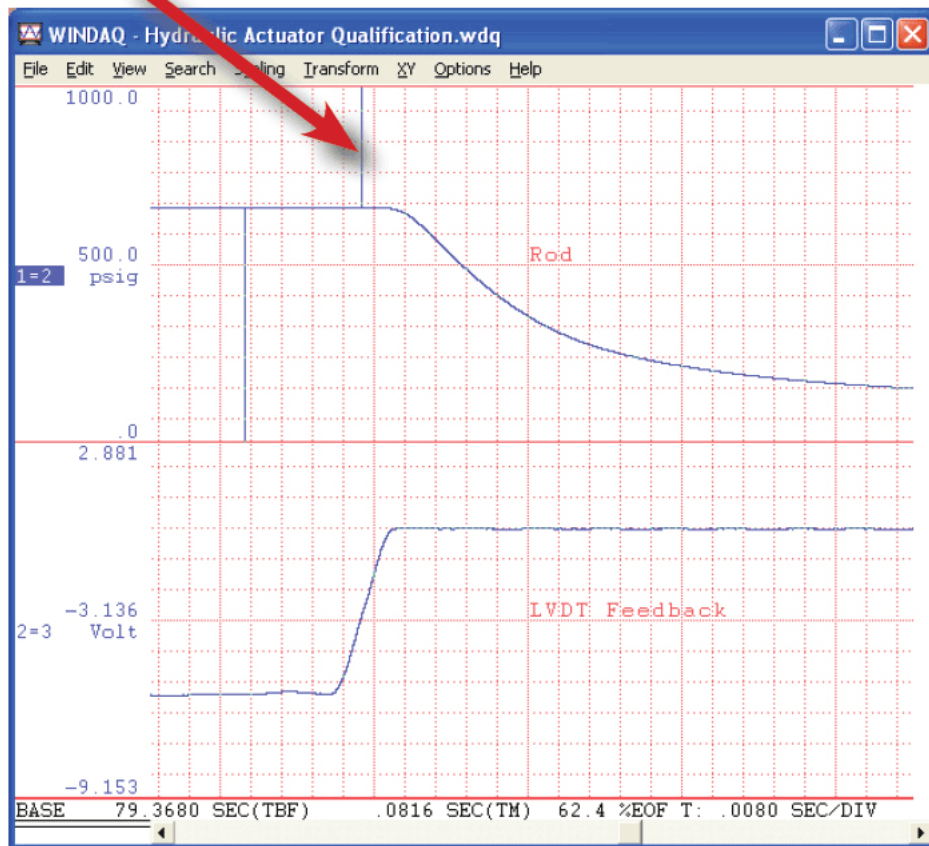


Event markers may also be placed in your data file manually by pressing the push button on the DI-1100 Instrument. You must enable Remote Events in WINDAQ to use the button (use the menu command **Options > Remote Events +or Options > Remote Events -**).



An example event marker in a WINDAQ data file is shown below.

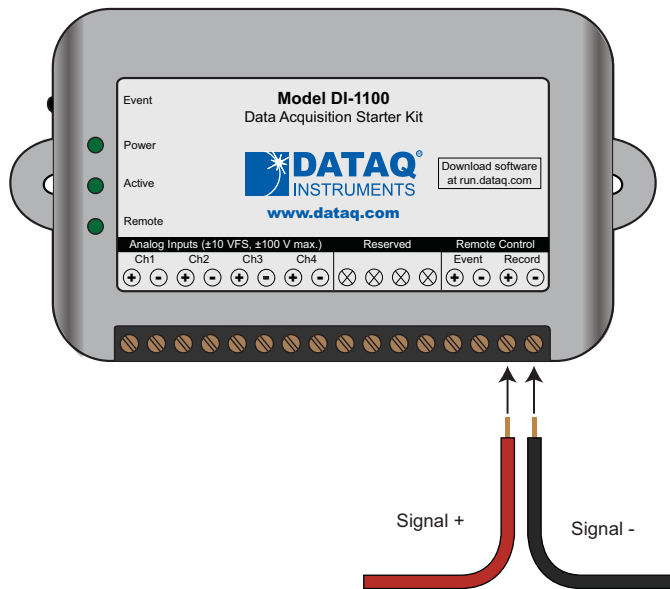
Event Marker\*



*\*Please Note: Event Markers do not display in the real-time WINDAQ acquisition software - they only display in the WINDAQ playback software (WWB).*

### WINDAQ Remote Storage (Record)

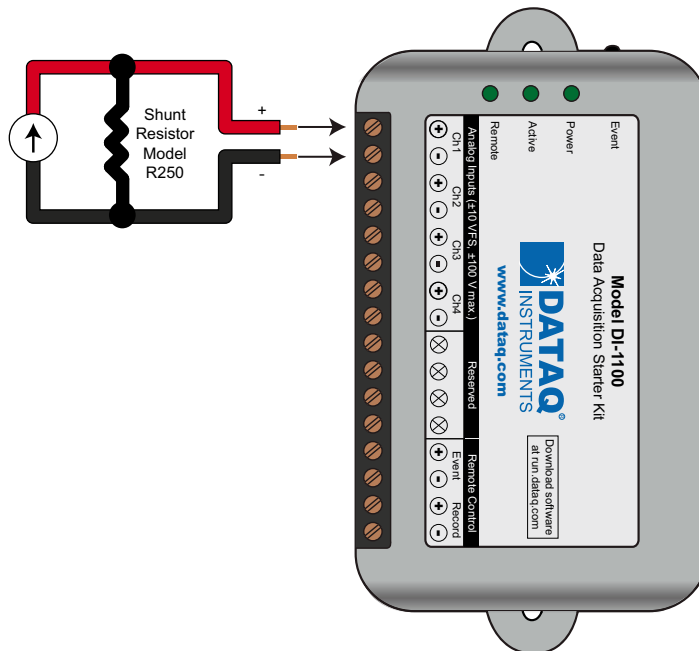
To use a switch closure or TTL signal to begin recording data remotely, connect signal leads to the appropriate Remote Control Record terminals on the DI-1100 as shown below.



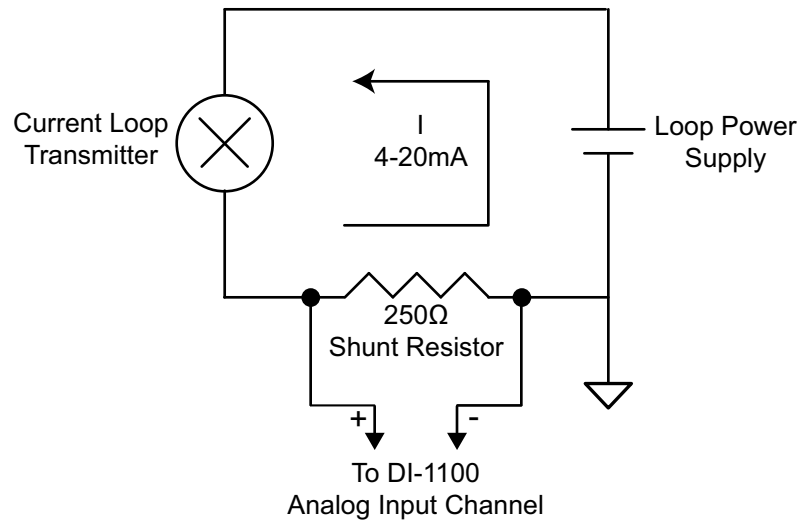
Once the switch closure or TTL signal is connected, activate Remote Storage (Record) through WINDAQ Acquisition Software. Storage to Disk may be automatically placed on the rising or falling edge of the trigger signal. Use the menu command **Options > Remote Storage 1** to set WINDAQ to begin recording on low-to-high transitions of the Record input. Use the menu command **Options > Remote Storage 0** to set WINDAQ to begin recording on high-to-low transitions of the Record input.

### 4-20mA Current Loop Measurements

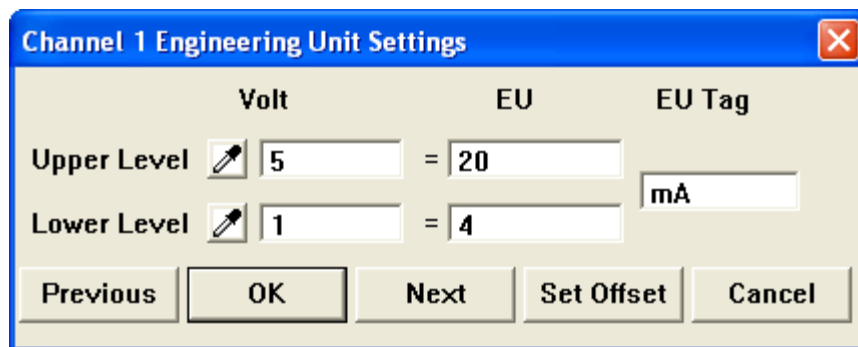
Use the following diagram for 4-20mA current loop measurement connections.



The shunt resistor should be placed on the low side of the circuit as shown below:



Set the engineering units as desired and define upper/lower levels in WINDAQ as  $1V = 4mA$  for the low value and  $5V = 20mA$  for the high value. For example, when using WINDAQ Acquisition software, in the EU Settings dialog box:



Enter the following values:

	Volt	EU	EU Tag
Upper Level	5	20	mA
Lower Level	1	4	

You can also associate these values to a physical measurement such as pressure, load, flow, torque, etc. Read the Help files for more information regarding Engineering Units Settings.

## LED Indicators

The DI-1100 provides three LEDs for instrument status and notification.

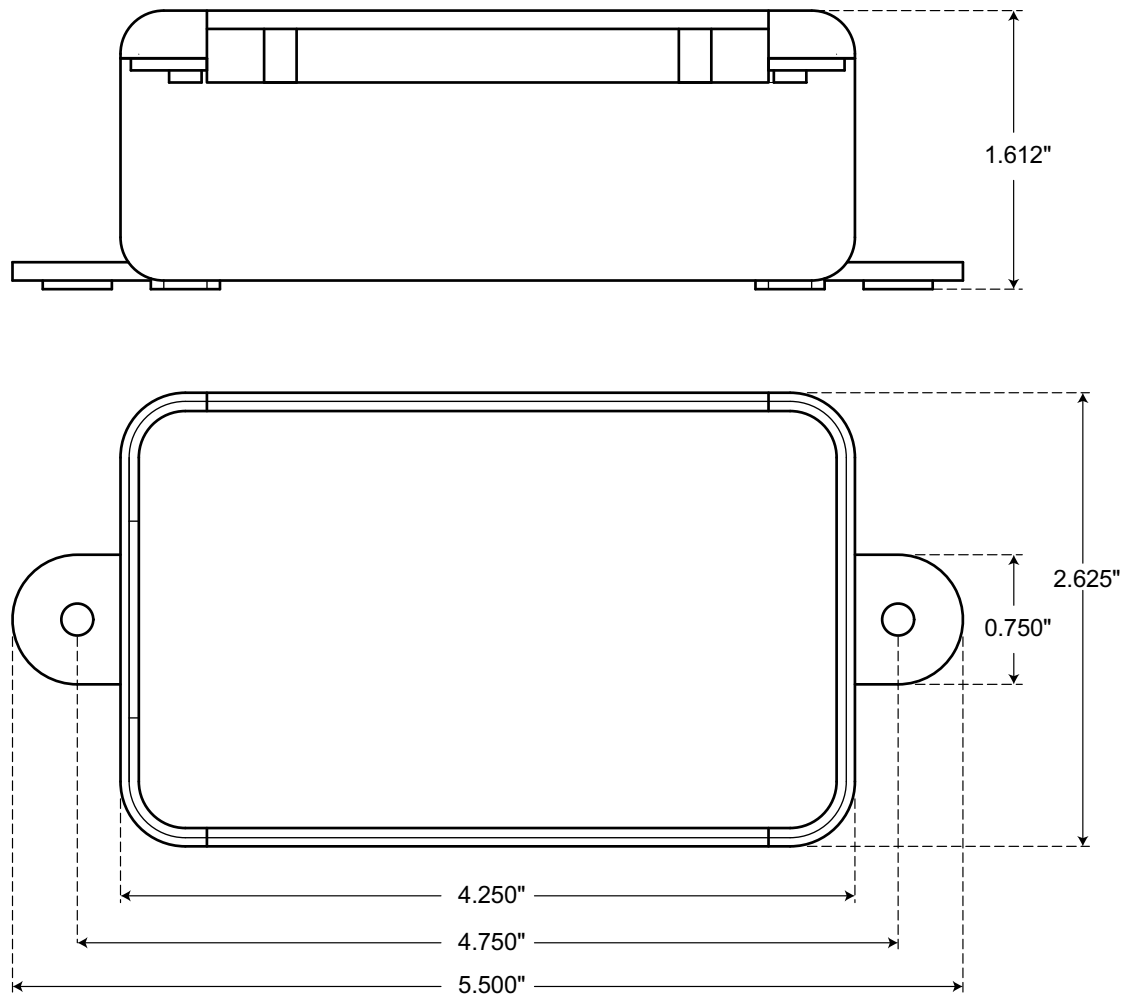
**Power:** Green LED indicates power is applied via the USB cable.

**Active:** Indicates the device is in use either by WINDAQ Acquisition Software or a custom user-developed program.

**Remote:** Green LED indicates when the Event Button is pushed or the Event terminals are connected via a relay contact or digital input.



# 5. Dimensional Drawing









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