

# Daxus Operations Manual

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Manual Version 1.5

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Specifications are subject to change without notice

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## **FCC Compliance Statement**

This device has been tested and complies with Part 15 of the FCC Rules for a Class A digital device. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference; and (2) this device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy; if not installed and used in accordance with the operations manual it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the purchaser will be required to correct the interference at its own expense.

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**Warning:** Modifications to unit not expressly approved by the party responsible for compliance could void user authority to operate the equipment.

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## **Canadian Emissions Requirements**

This Class A digital apparatus complies with Canadian ICES-003 (2012).

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## Symbols Displayed on this Product



Attention, refer to manual.



Off (system shutdown).



On (system connection to mains).

## General Safety Information



Please review the following safety precautions to prevent personal injury or equipment damage.

- Service must be performed by qualified service personnel.
- Use only the specified power supply, power cord, and a proper outlet with protective earth ground connection.
- Never exceed the specified mains or signal input voltages specified in Appendix A: Specifications.
- This equipment is designed for indoor use only. Never operate it in wet conditions, explosive atmospheres, or environments outside of the temperature and humidity specifications listed in Appendix A: Specifications. Proper ventilation must be provided to keep this equipment within these specifications.
- Do not block the ventilation holes. Ensure there is adequate space to allow air flow around the unit.
- Do not use the equipment or apply any voltage or signals to it if it has visible or detectable damage, or if the equipment has been exposed to stresses beyond the limits indicated in Appendix A: Specifications.
- Using this product in a manner inconsistent with what is described in this manual may impair protections provided.

## **Important Battery Information**

This product contains an internal lithium-ion (Li-ion) battery pack. The battery should only be removed or replaced by authorized personnel.

- The pack is charged any time that the voltage at the input power connector is between 18 and 24 volts. Charging is regulated by a battery charger located inside the Daxus. No other battery charging methods are supported.
- The Daxus operating temperature range is 0 to 40 °C (32 to 104 °F) and its storage temperature range is -20 to 60 °C (-4 to 140 °F). The unit should not be connected to power (with power switch on or off) when the unit is outside of its operating temperature range or is exposed to direct sunlight.
- The unit should not be connected to a power source or turned on if there is physical damage to the unit.
- Once past its useful lifetime, the product, including its internal battery must be recycled/disposed in accordance with local regulations.

## **Limited Warranty**

AstroNova warrants all portions of this hardware equipment against defects in materials or workmanship for a period of one year from the date of original purchase. If you discover a defect, AstroNova will, at its option, repair or replace this product at no additional charge except as set forth below.

Repair parts and replacement parts will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts become the property of AstroNova. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication or has been modified without the written permission of AstroNova.

To obtain warranty services, contact AstroNova at 401-828-4000. AstroNova is not responsible for your product if it is lost or damaged in transit. AstroNova makes no warranty either express or implied with respect to this product's fitness for a particular purpose.

## **Disclaimer of Warranty**

This software and the accompanying files are sold "as is" and without warranties as to performance or merchantability or any other warranties whether expressed or implied. No warranty of fitness for a particular purpose is offered.

It is good practice to thoroughly test the software with non-critical data before relying on it. It is the customer's responsibility to follow proper file backup procedures in the event of data loss. AstroNova is not responsible for any data loss experienced in operation of this software.

AstroNova does not warranty that the functions contained in the software will meet your requirements or that the operation of the software will be uninterrupted or error-free. The user must assume the entire risk of using the program. Any liability of the seller will be limited exclusively to product replacement or refund of purchase price.

## **Contact AstroNova**

To contact AstroNova, send us an e-mail at [mtgroup@astronovainc.com](mailto:mtgroup@astronovainc.com) or call 401-828-4000.

## **Product Identification**

The software provided with your equipment is the most current available. Record the model number, serial number, and software version installed on your equipment using the following spaces. Any upgrades to resident software should also be noted as they are installed.

If for any reason you need to contact AstroNova regarding your purchase, you will be asked to refer to this information.

Model Number:

Serial Number:

Original Software Version:

Upgraded Software Version:

Date Installed:

Upgraded Software Version:

Date Installed:

Upgraded Software Version:

Date Installed:

<b>Declaration of Conformity</b> <b>Declaration de Conformité</b> <b>Übereinstimmungserklärung</b> <b>Dichiarazione di Conformità</b>	
ID	DoC-22834644
Manufacturer's name and address Nom et adresse du fabricant Hersteller Nome del costruttore	AstroNova, Inc. 600 East Greenwich Avenue West Warwick, RI 02893 USA
Model No. Modèle No. Model Nr. Modello No.	DAXUS
Standards to which conformity is declared Standards auquel la conformité appartient Normen für welche Übereinstimmung erklärt wird Norme per le quali si dichiara la conformità	Safety: IEC 61010-1:2010 (Third Edition) IEC 61010-2-030:2010 EMC: IEC 61326-1 ed 2.0 (2012)
Application of Council Directives Application des Decisions du Conseil Anwendbar für die Richtlinien Applicazione delle Direttive del Comitato	2014/30/EU 2014/35/EU
<p>I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standard.</p> <p>Je, Soussigné, déclare que l'équipement spécifié ci-dessus est en conformité avec la directive et le standard ci-dessus.</p> <p>Ich, der unterzeichnende erkläre hiermit, daß das oben beschriebene Gerät den vorgenannten Richtlinien und Normen entspricht.</p> <p>Il sottoscritto dichiara che l'apparecchio sopra specificato è conforme alle Direttive e Norme sopra specificate.</p>	
Steven Holbrook Quality Assurance Manager AstroNova, Inc. CE Label First Affixed Date: 15	 Date of issue: <u>5/16/2017</u> Place of issue: <u>West Warwick, RI</u>
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# 1

## Getting started

### Introduction

The Daxus is a versatile data acquisition recording system that provides the capability to record data directly to an internal dedicated hard drive and to display and review waveform data on a host computer.

It can be used in a PC network environment for setup, real-time signal monitoring, data capture, scope capture, and capture review. After initial setup via PC, Daxus can also be used as a single stand-alone unit for capturing data without the need for a host PC.

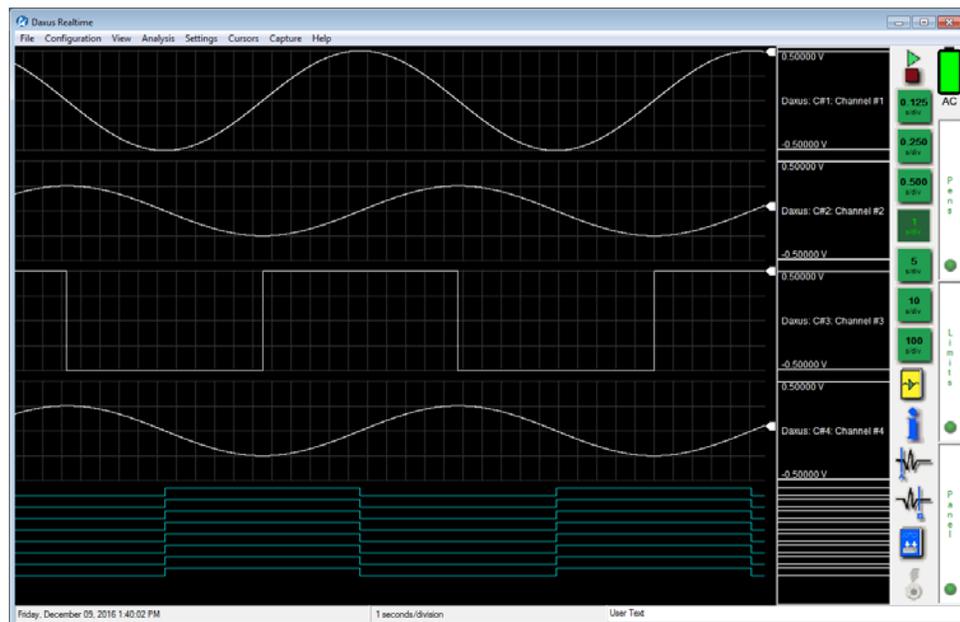
The Daxus utilizes a PC based software application as the main user interface. Many of the control buttons are customizable, providing the capability to modify the display based on the needs of the user or application. Additionally, soft keys on the Daxus unit provide local control options.

### Modes of operation

The operating modes are Realtime, Scope, and Review modes.

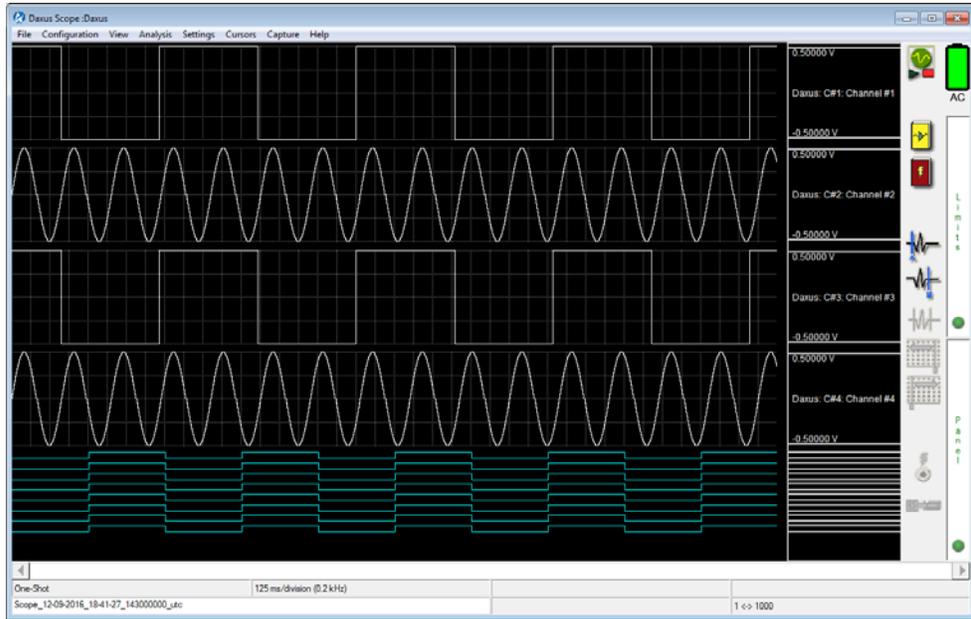
- **Realtime mode** - Realtime mode provides real-time waveform scrolling, monitoring, and data capture capabilities, typically used to view low frequency waveforms. Additionally, almost all system setup options are accessible from Realtime mode.

Choose Configuration >> Realtime from the menu bar to access Realtime mode.



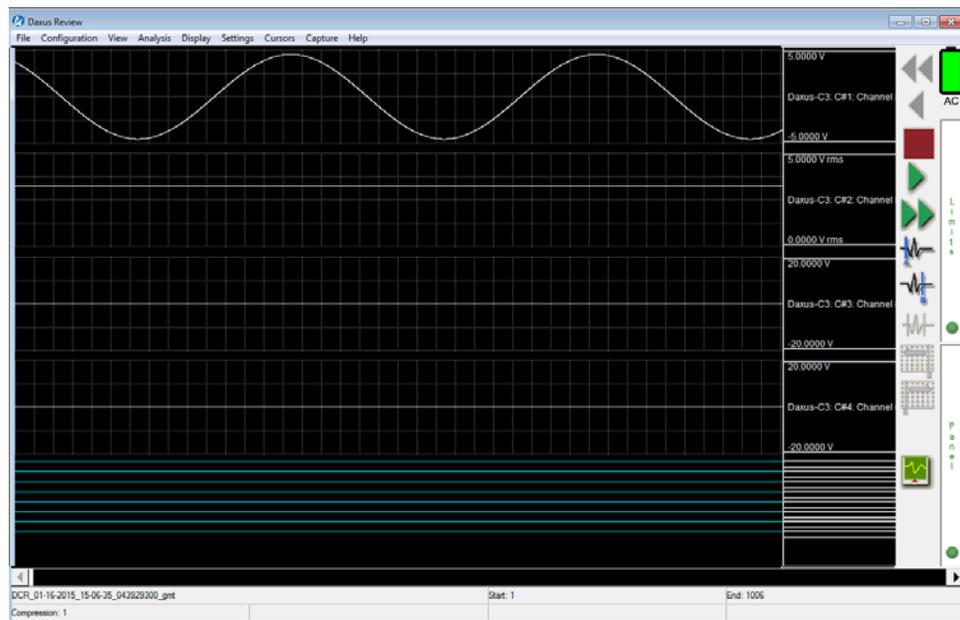
- **Scope mode** - Scope mode acts like a digital storage oscilloscope, providing high time-base resolution for viewing high-frequency signals. Scope mode is useful for timing and synchronization analysis, transient capture, and high-speed testing. It can be used while continuously capturing data and monitoring signals on the display.

Choose Configuration >> Scope from the menu bar to access Scope mode.



- **Review mode** - Review mode provides the capability to review and analyze saved data capture and scope capture files. It also provides file management features.

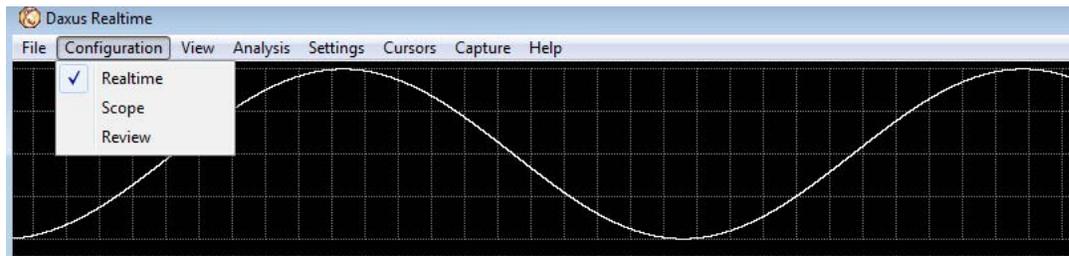
Choose Configuration >> Review from the menu bar. A file selection window will open. Select a file to review and choose OK.



## User interface introduction

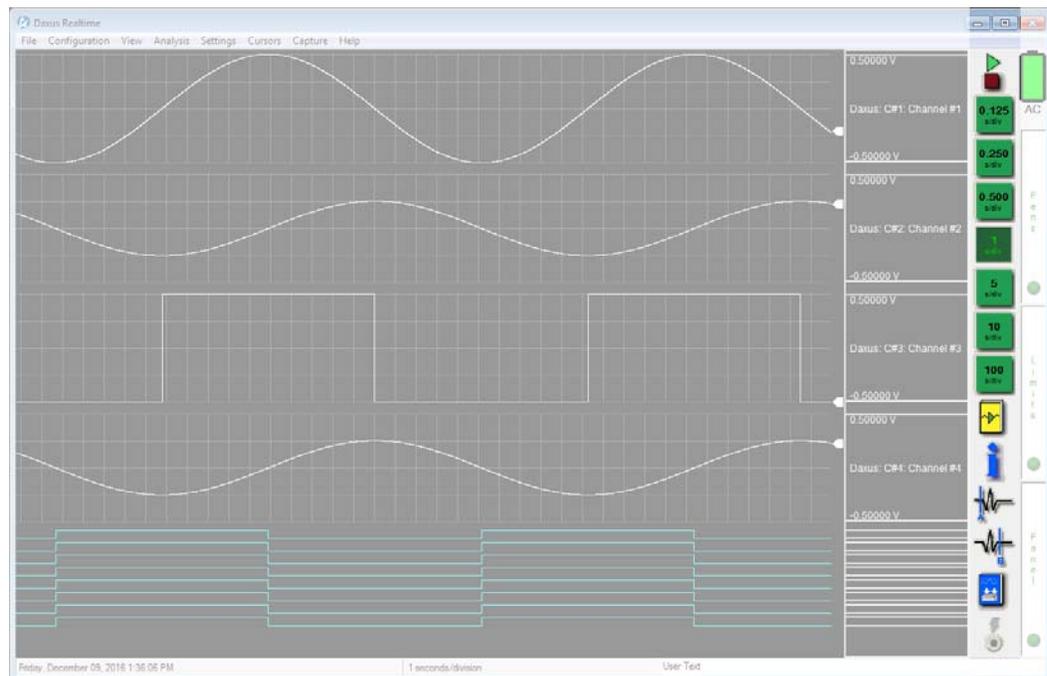
The Daxus software menu bar and control panel provide access to the controls and settings. A keypad on the Daxus recorder is also used.

- **Menu bar** - The menu bar is a group of drop-down menus located across the top of the display. All modes and features can be accessed from this menu. Menu options will vary based on the mode of operation (Realtime, Scope, or Review) used.

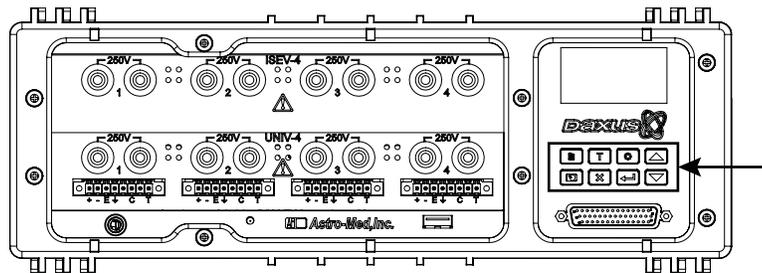


**Note:** The “>>” symbol in this manual indicates selections made using the menu bar. For example, “Configuration >> Realtime” indicates to choose Configuration, then Realtime from the menu bar.

- **Control panel** - The control panel is a customizable group of icon buttons located on the right side of the display. It provides immediate access to virtually any function with one touch. Each mode of operation (Realtime, Scope, and Review) utilizes its own control panel.



- **Daxus keypad** - Local operation and basic data acquisition functions can be controlled via the keypad.



## Help features

The online manual is available to help you learn more about the recorder.

### Viewing the operations manual PDF

The Adobe Portable Document Format (PDF) version of this manual is available for on-screen viewing.

- 1 Choose Help >> Operations Manual. Adobe® Acrobat® Reader will launch and the online version of this manual will be opened.
- 2 To exit the online manual, close Adobe Acrobat Reader.

## Technical support

For additional assistance, contact AstroNova Technical Support via telephone toll-free at 1-877-867-9783 (U.S. and Canada only) or e-mail at [techserv@astronovainc.com](mailto:techserv@astronovainc.com).

Please have the serial number of the unit available when contacting support.

### Viewing the software version number

Use the About window to view the version number of the Daxus software currently installed on the PC. Use the Unit Information window to view the version number of the software currently installed on the Daxus system.

- 1 To view the version number of Daxus PC software, choose Help >> About.
- 2 To view the version number of Daxus system software, choose Help >> Unit Information.

## Daxus software PC requirements

- Operating System: 32-bit or 64-bit Windows 8, 7, Vista, XP
- Memory: 2 Gb RAM (4 Gb recommended)
- Hard Drive: 25 MB free space (More is required if archiving data files)
- Ethernet: 1000BaseT (GB) or 100BaseT required for connection

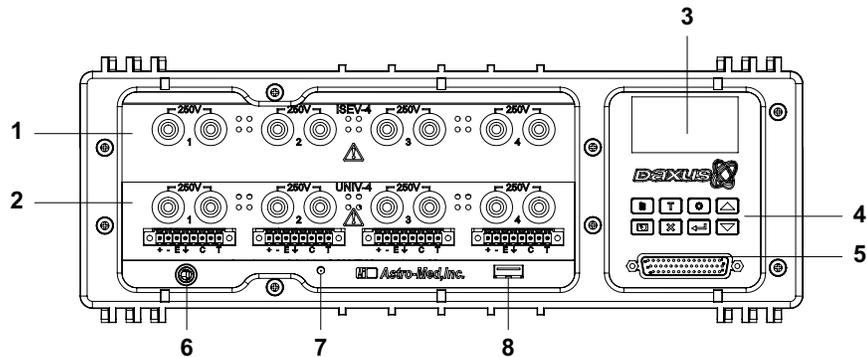
# 2

## Hardware overview

### Hardware diagrams

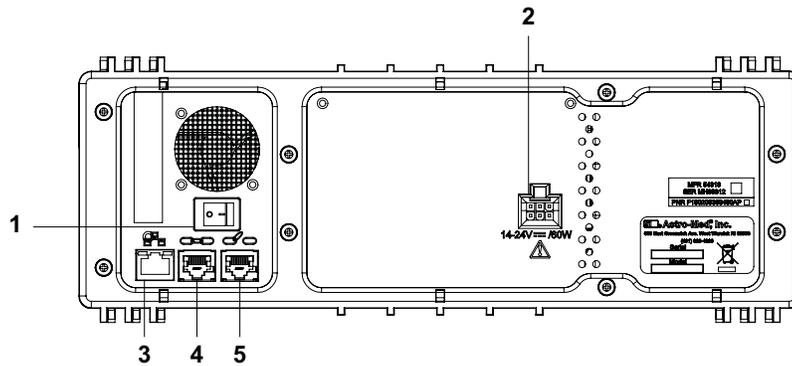
This section provides a visual overview of the hardware characteristics of the system. In addition to the diagrams, brief descriptions are included on various components.

#### Front view



#	Description
1	<b>Input module slot 1</b> This input module is identified as module 1 in the software.
2	<b>Input module slot 2</b> This input module is identified as module 2 in the software.
3	<b>LCD Display</b> The Daxus menu is shown on the LCD display.
4	<b>Keypad</b> The keypad is used to operate the Daxus and navigate LCD menu options.
5	<b>Utility / DIO port</b> This port provides utility input/output functions and is used for event inputs.
6	<b>Ground connection</b> The ground connection is used to connect shields on input wiring, if needed.
7	<b>Power indicator light</b> This light visually indicates the power status of the recorder. When the recorder is initialized and operating properly, the indicator will remain lit. When the unit is shutting down, the light will flash. When a unit running on a low battery has shut down, this light will flash and indicates to the user that the power switch should be switched off as soon as possible.
8	<b>USB 2.0 port</b> The USB 2.0 port is used to connect USB accessories to the unit, such as a portable memory storage device.

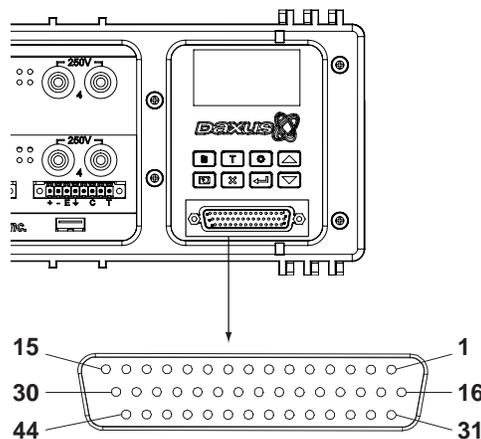
## Back view



#	Description
1	<b>Power switch</b> Use the power switch to power up and power down the recorder. The power-up sequence requires less than one minute.
2	<b>Power connector</b> Connect the cable from the power supply to this connector.
3	<b>Ethernet port (10/100/1000 Mbps)</b> The Ethernet port is used to connect to the host computer.
4	<b>Link in port</b> The link out and link in ports are used to connect multiple Dexus units.
5	<b>Link out port</b> The link out and link in ports are used to connect multiple Dexus units.

## Utility / DIO port pin configuration

The following diagram illustrates the utility / DIO port pin configuration. You can also view utility / DIO port information in Dexus PC software by choosing Help >> Utility Port.



Pin	Type	Voltage Levels	Description
1	Input	3.3V (5V tolerant)	Event 1 input
2	Input	3.3V (5V tolerant)	Event 2 input
3	Input	3.3V (5V tolerant)	Event 3 input
4	Input	3.3V (5V tolerant)	Event 4 input
5	Input	3.3V (5V tolerant)	Event 5 input
6	Input	3.3V (5V tolerant)	Event 6 input
7	Input	3.3V (5V tolerant)	Event 7 input
8	Input	3.3V (5V tolerant)	Event 8 input
9	Output	TTL	Active low trigger output  The trigger output pulses a low in response to the recorder recognizing a trigger. This line can be connected to the external trigger input line of another Daxus. In this case, the Daxus receiving the external trigger input signal will trigger in response to the same event as the Daxus sending the trigger output signal.
10	Input	TTL	Active low external abort input  The external abort input line provides the capability to abort any currently running data capture. A low will cause the recorder to abort any data capture in progress.

Pin	Type	Voltage Levels	Description
11	Input	TTL	Active low external trigger input  The external trigger input provides the capability to invoke a trigger using an outside signal. A low on this line will cause an external trigger, if external triggers are enabled.
12	Output	5V	Fused 5V output (200 mA max)
13	GND		Ground return for utility port functions
14	Output	30V	Output from uncommitted current input buffer 1
15	Input	30V	Input to uncommitted current input buffer 2
16	Output	TTL	Programmable Output 1
17	Output	TTL	Programmable Output 2
18	Output	TTL	Programmable Output 3
19	Output	TTL	Programmable Output 4
20	Output	TTL	Programmable Output 5
21	Output	TTL	Programmable Output 6
22	Output	TTL	Programmable Output 7
23	Output	TTL	Programmable Output 8
24	Input	TTL	Reserved (do not connect to this pin)
25	Output	TTL	Active low alarm output  The alarm output can be used to signal when alarm conditions for selected channels occur. The signal is low during alarm signals.
26	Input	TTL	Reserved (do not connect to this pin)
27	Input	TTL	Reserved (do not connect to this pin)
28	Input	TTL	Reserved (do not connect to this pin)
29	Output	30V	Output from uncommitted current input buffer 2
30	Input	30V	Input to uncommitted current input buffer 1

Pin	Type	Voltage Levels	Description
31	GND		Ground return for utility port functions
32	Output		Reserved (do not connect to this pin)
33	Input		Reserved (do not connect to this pin)
34	Input		Reserved (do not connect to this pin)
35	Output		Reserved (do not connect to this pin)
36	Input	TTL	Reserved (do not connect to this pin)
37	Input	TTL	Reserved (do not connect to this pin)
38	Output	TTL	Reserved (do not connect to this pin)
39	Input	TTL	<p>External sample clock input</p> <p>This pin provides the capability to enter a sample rate for data captures via an external signal. To use an external sample rate, external sample rate must be selected in the Capture Settings window. Sample clock must be between 10% - 90% duty cycle.</p> <p>The sample rate input takes a 0-5V signal as a sample clock (with 10%-90% duty cycle) and samples on the rising edge.</p>
40	Input	TTL	Reserved (do not connect to this pin)
41	GND		Ground return for utility port functions
42	Output	LVTTL	Reserved (do not connect to this pin)
43	Output	TTL	Reserved (do not connect to this pin)
44		30V	Common for uncommitted current buffers 1 & 2

## Uncommitted current input buffers (High voltage logic buffer)

The Utility / DIO port contains inputs for monitoring events and controlling functions such as triggering a data capture, defining a sample rate, etc. These inputs use TTL (0-5V) / LVTTTL (0-3.3V) / switch closure compatible signals. Inputs have a high state (3.3V, 5V tolerant) and a low state (0V).

If your high state control signal is greater than 5V, you cannot connect directly to the Utility / DIO port inputs. However, you can still use the signal to control a utility input by connecting via an uncommitted current input buffer. The uncommitted current input buffer provides you with an isolated logic buffer for your high voltage control signal. This buffer allows you to use a positive voltage in the 4 to 42 volt peak range as the high state control input to the utility port function.

Two buffers are provided for this purpose, allowing you to control up to two utility port inputs

The input pins for these buffers are isolated from each other, and each pin is rated for as much as 30Vrms / 42V peak voltage with respect to chassis or utility port ground (pin 13). Regardless of the magnitude of the voltage applied to these inputs, the buffers will limit current sourced from the user's signal to 4.3 mA (+/- 10%). The pins are protected against reverse voltage to -42 volts.

When wiring the buffer, use the following guidelines.

- Connect the positive control signal to a buffer input.
- Connect the negative control signal to the common for the uncommitted current buffers.
- Connect the output from the corresponding buffer to the utility port input you want to control.

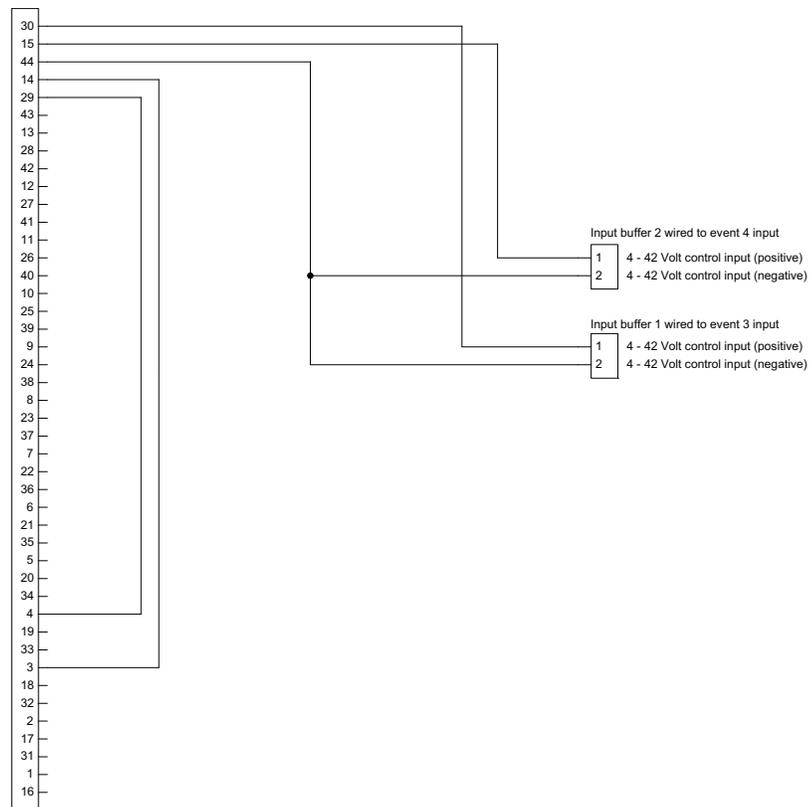
### Example 1:

For example, suppose you want to control Event 6 using uncommitted current input buffer 1. The wiring would be configured as described in the following table.

From	To
Positive signal	Pin 30
Negative signal	Pin 44
Pin 14	Pin 6

**Example 2:**

In the following example diagram, events 3-4 are buffered with the uncommitted current input buffers.



## Battery

An internal lithium ion battery provides a backup power source for the Daxus. This rechargeable battery allows the unit to temporarily operate while disconnected from the power source. Battery power is automatically activated when power is disconnected from the Daxus.

The Daxus battery charges while a power source that provides at least 19V is connected. To charge the battery, simply connect the power cord to the Daxus, and then to an outlet. The Daxus power does not need to be on for the battery to charge.

The battery charge time for a completely empty battery is approximately four hours. The battery typically provides 20 minutes of power on a single charge, but can be significantly more depending on how the unit is configured and used.

The unit shuts itself down when running on a battery which has reached a low level of charge. When this happens, the user should switch the power switch off as soon as possible, and re-charge the pack by re-applying external power when convenient.



---

# 3

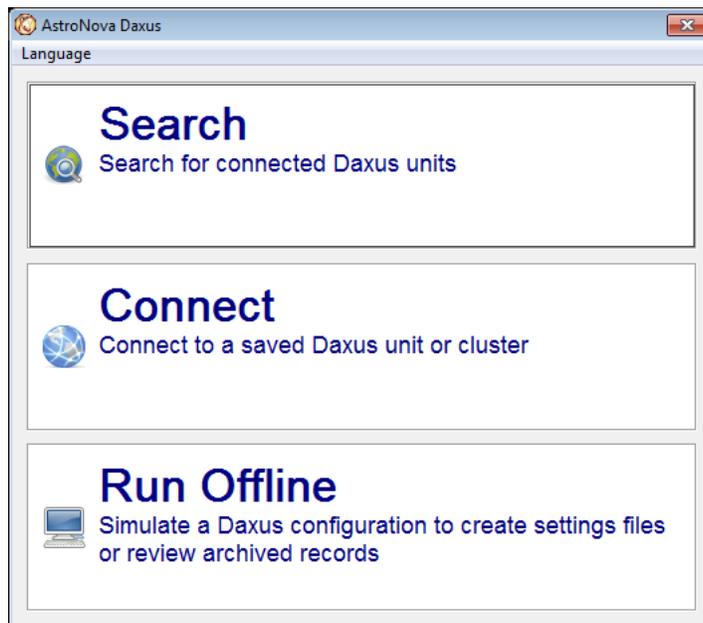
## Daxus connections

### Connecting to a Daxus

- 1 Ensure the Daxus recorder is powered on and connected to the PC via a network connection.

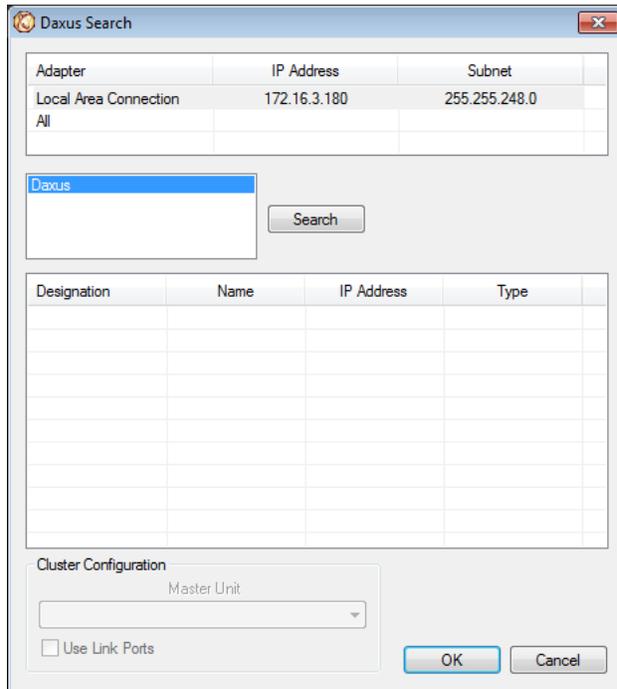
**Note:** *If you are connecting directly to the Daxus from a PC or laptop, a crossover cable must be used.*

- 2 Launch the Daxus software on your PC. The startup screen will open.



**Note:** *If necessary, you can use the Language menu to select a display language for the software.*

- 3 Choose Search. The Daxus Search window will open.



- 4 Select a specific network adapter or all adapters.
- 5 Choose Search. The software will search the network for connected Daxus units and display the results in the list.
- 6 Select a Daxus from the list.
- 7 Choose OK.

The Daxus software will display waveforms from the connected Daxus unit.

## Disconnecting from a Daxus

- 1 To disconnect from a Daxus and close the Daxus software, choose File >> Exit.
- 2 To disconnect from a Daxus and connect to a different Daxus, choose File >> New Connection.

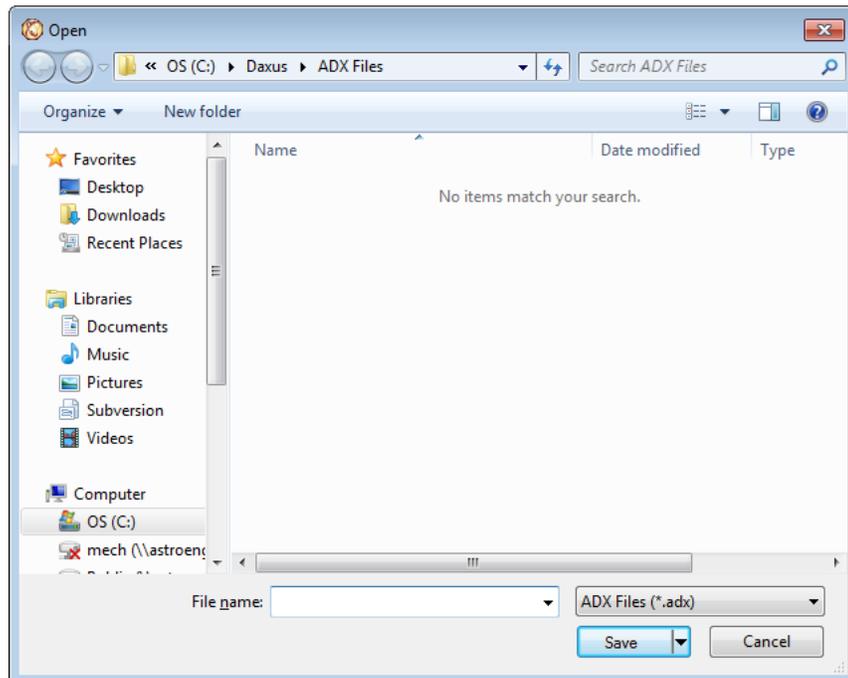
## Daxus connection files

Daxus connection files (\*.adx) contain connection settings for a Daxus unit or cluster of Daxus units. When you open a connection file in Daxus PC software, connections to the Daxus units will be established. These files can help save time when connecting to multiple Daxus configurations.

### Saving a Daxus Connection

After connecting to a Daxus unit, you can save the connection information in a file on your PC. You can later open this file instead of searching the network for the Daxus unit.

- 1 Choose File >> Save Connection. A save window will open.



- 2 Enter a file name and save location for the Daxus connection (\*.adx) file.
- 3 Choose Save.

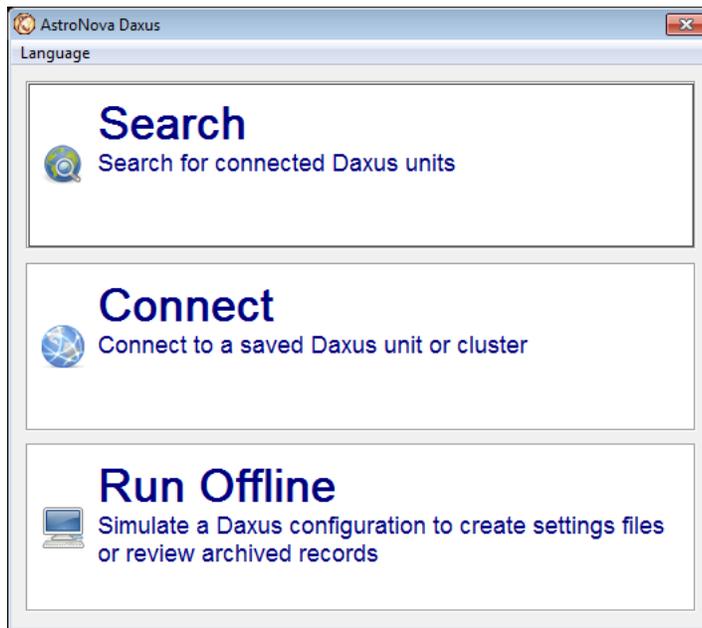
### Connecting to a saved Daxus

If connection information has been saved to a file on your PC, you can open the file to establish a connection to the Daxus.

- 1 Ensure the Daxus recorder is powered on and connected to the PC via a network connection.

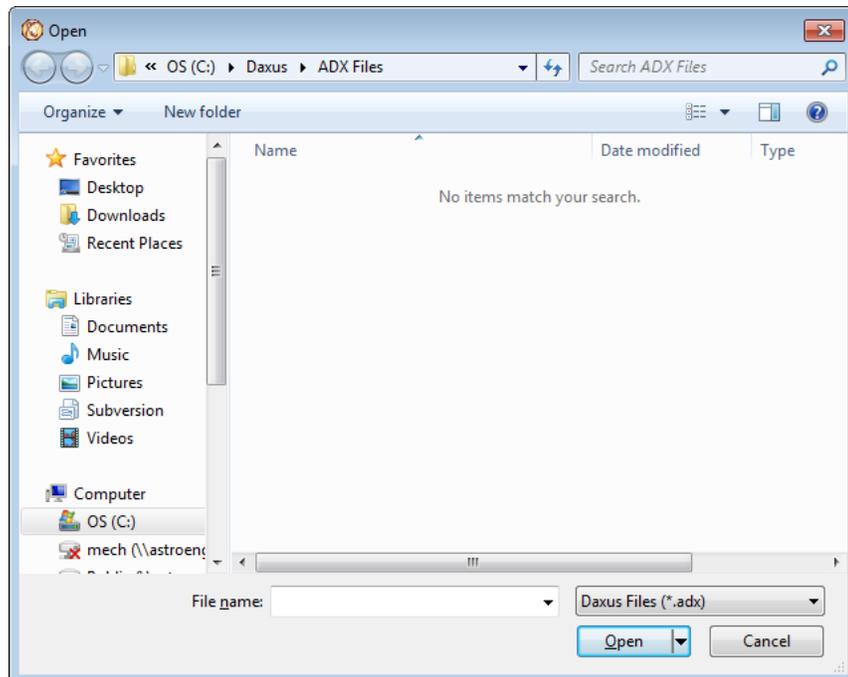
**Note:** If you are connecting directly to the Daxus from a PC or laptop, a crossover cable must be used.

- 2 Launch the Daxus software on your PC. The startup screen will open.



**Note:** If necessary, you can use the Language menu to select a display language for the software.

- 3 Choose Connect. A file selection window will open.



- 4 Select a Daxus connection file (\*.adx).
- 5 Choose Open.

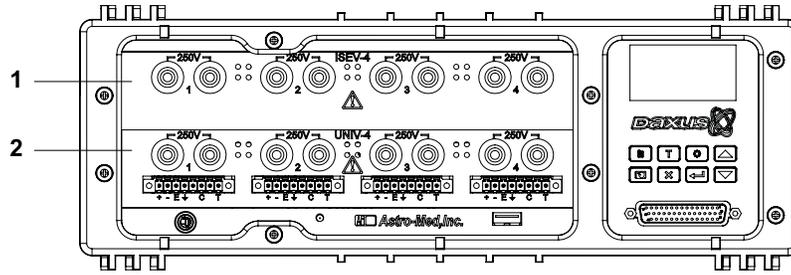
The Daxus software will display waveforms from the connected Daxus unit.

# 4

## Input modules

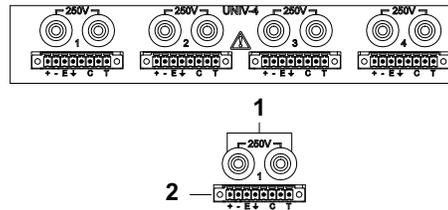
### Input module locations

The system uses two modules for signal input connections. The slots are labeled 1 and 2 for module identification in the software.



**Note:** The input modules displayed in this diagram are used for illustration purposes. The appearance of input modules will vary based on the module types installed.

### UNIV-4 - Universal voltage module

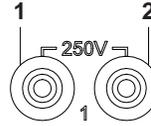


#	Description
1	Single ended input
2	Differential / DC bridge input

**Warning:** You must only use one physical connection per channel at a time. Use either the 8-pin connector or the banana jack inputs.

### UNIV-4 Single ended inputs

Use the following diagram to connect to the single ended inputs.

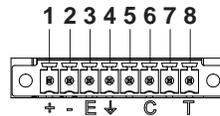


#	Description
1	Black (-) input
2	Red (+) input

**Note:** The use of guarded banana test leads will eliminate the possibility of introducing a ground to the equipment under test if a regular banana test lead should come in contact with the recorder metal case.

### UNIV-4 Differential / DC bridge inputs

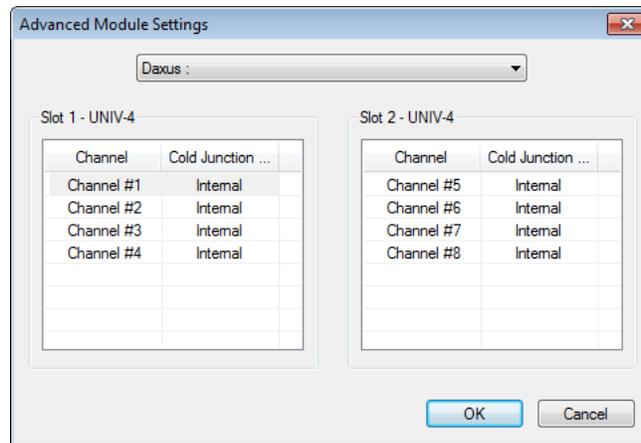
Use the following diagram to connect to the differential / DC bridge inputs.



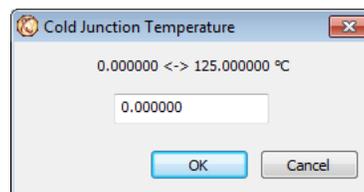
#	Description
1	Differential input + (Bridge, thermocouple*, DCVM)  *Thermocouple connections to external copper-copper wire only when using external CJC. For standard internal CJC thermocouple, connections are made to the ADP-T with a mini thermocouple connector.
2	Differential input - (Bridge, thermocouple mV, DCVM)
3	Excitation voltage (0-10V)
4	Excitation ground
5	Reserved (do not connect)
6	Reserved for future functionality
7	Reserved (do not connect)
8	Reserved for future functionality

## Configuring UNIV-4 advanced settings

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose Advanced >> Module Settings. The Advanced Module Settings window will open.



- 3 Select a channel. Choose the Cold Junction Compensation column heading and select a compensation option.
  - **Internal** - Select this option for standard thermocouple type-specific wiring to the UNIV-4.
  - **External** - Select this option when thermocouple type-specific wire is joined to copper wire externally on a user-supplied isothermal block for which the temperature is accurately known. The Cold Junction Temperature window will open.



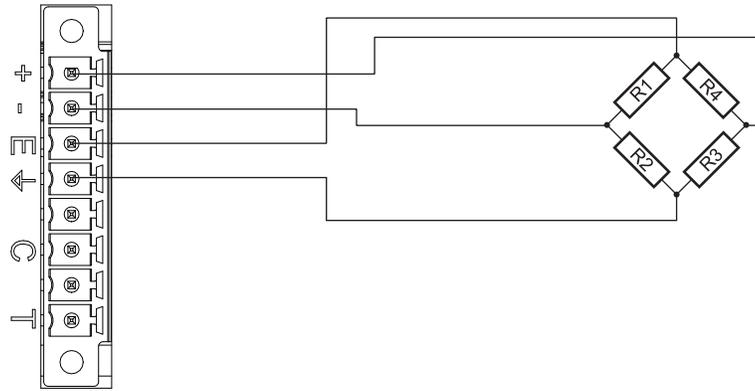
Enter the temperature for the external cold junction temperature and choose OK.

- 4 Choose OK.

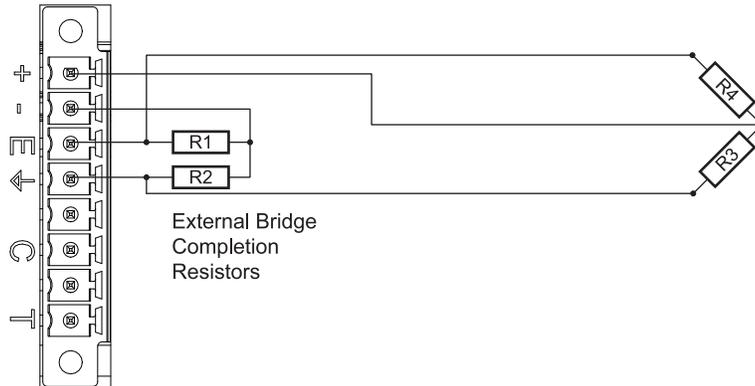
## UNIV-4 DC bridge wiring diagrams

Use the following diagrams to set up DC bridge wiring on the UNIV-4.

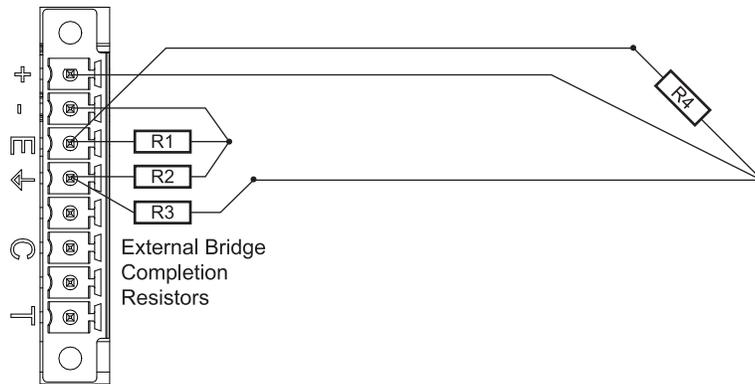
### Four-wire full bridge



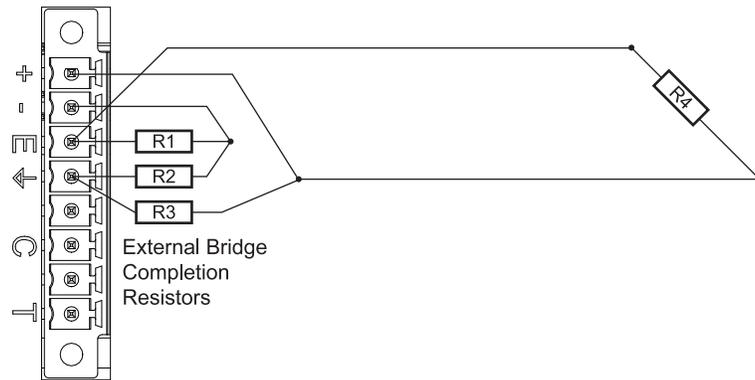
### Three-wire half bridge



### Three-wire quarter bridge

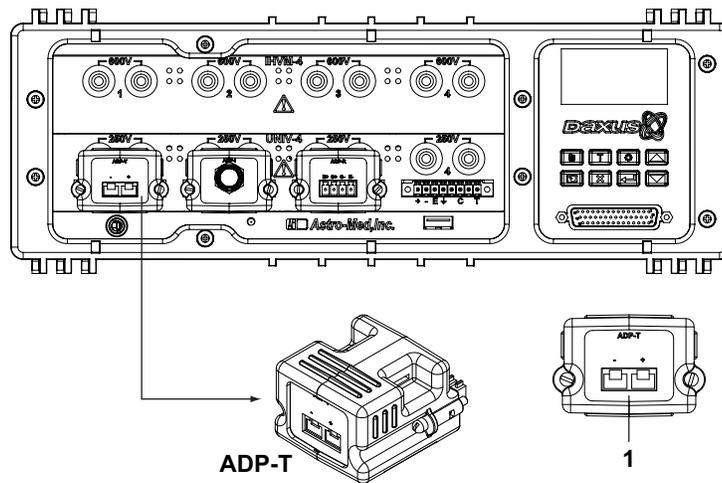


### Two-wire quarter bridge



### Optional ADP-T connector

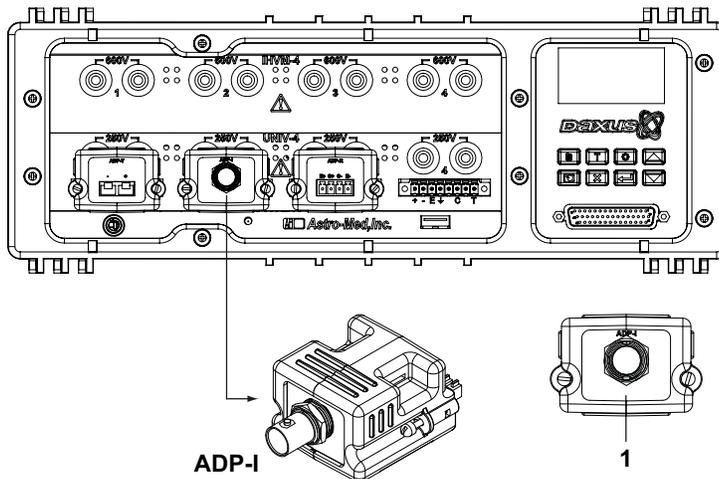
Connect the ADP-T to a UNIV-4 differential input for thermocouple inputs.



#	Description
1	Type U miniature thermocouple input

### Optional ADP-I connector

Connect the ADP-I to a UNIV-4 differential input for IEPE inputs.

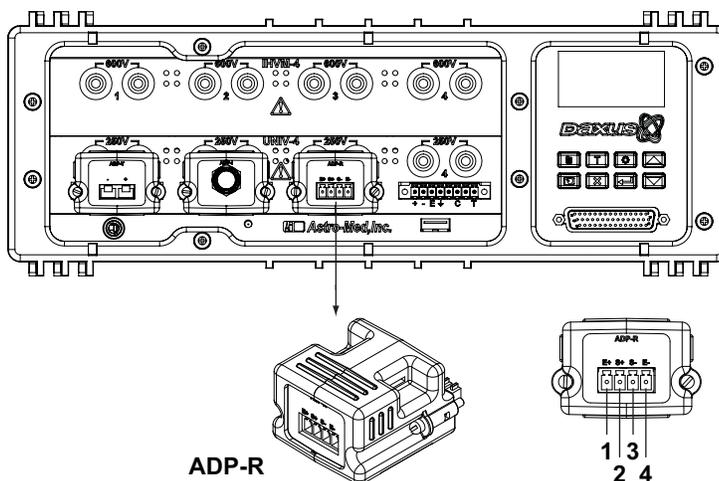


#	Description
1	Low Impedance Voltage Mode (LIVM) input

ADP-I inputs are Low Impedance Voltage Mode (LIVM) amplifiers with constant current DC excitation. These are typically used for Integrated Electronics Piezo-Electric (IEPE) transducers known as ICP® / ISOTRON® / PIEZOTRON® and LIVM transducers or charge amplifier heads.

### Optional ADP-R connector

Connect the ADP-R to a UNIV-4 differential input for RTD inputs.



#	Description
1	Excitation positive

#	Description
2	Amplifier positive input (connected internally to pin 1 for 2-wire RTDs)
3	Amplifier negative input (connected internally to pin 4 for 2-wire RTDs)
4	Excitation negative

The ADP-R has a 4 pin Phoenix mini combicon (green) connector. The connection to this is intended to be a 2, 3, or 4-wire 100 Ohm platinum Resistance Temperature Detector. It can be also be used to measure resistance up to 1500 ohms.

## Thermocouple temperature ranges

The following list describes temperature measurement ranges based on thermocouple type.

Type	Range
Specified Range Type J:	-210 to 1200 °C
Specified Range Type K:	-200 to 1372 °C
Specified Range Type E:	-200 to 1000 °C
Specified Range Type T:	-200 to 400 °C
Specified Range Type N:	-200 to 1300 °C
Specified Range Type B:	600 to 1820 °C (250 to 1820 on menu)
Specified Range Type R:	0 to 1767 °C (-20 to 1768 on menu)
Specified Range Type S:	0 to 1767 °C (-20 to 1768 on menu)
Specified Range Type C:	0 to 2316 °C

## Thermocouple application notes

The following table provides background information about each thermocouple type.

**Note:** This information is intended primarily as an overview. For a more detailed explanation of thermocouple types and applications, refer to one of the many texts available on the subject of thermocouples.

Type	Description
J	This type is a popular thermocouple for general use. However, this type can rust in oxidizing environments and sub-zero temperatures.
K	This type is a popular thermocouple recommended for use in oxidizing environments.

Type	Description
E	This type has the highest voltage output of standard thermocouple types and does not corrode at sub-zero temperatures.
T	This type is often used in moist or sub-zero temperature environments. It provides excellent corrosion resistance.
N	This type is a newer, general purpose type which offers higher stability than standard types such as J, K, E, or T.
B	This type is used in high temperature environments. However, this type can be contaminated easily.
R	This type is a Japanese standard, often used in high temperature, oxidizing environments. However, this type can be contaminated easily.
S	This type is an international lab standard and resists oxidation and corrosion. However, this type can be contaminated easily.
C	This type is used at extremely high temperatures. However, this type has no oxidation resistance.

### Thermocouple composition

The following table describes the composition based on thermocouple type.

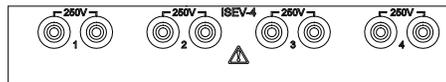
Type	Composition
J	Fe versus Cu-Ni alloy
K	Ni-Cr alloy versus Ni-Al alloy
E	Ni-Cr alloy versus Cu-Ni alloy
T	Cu versus Cu-Ni alloy
N	Ni-Cr-Si alloy versus Ni-Si-Mg alloy
B	Pt-30% Rh versus Pt-6% Rh
R	Pt-13% Rh versus Pt
S	Pt-10% Rh versus Pt
C	W-5% Re versus W-26% Re

## Thermocouple wire coloring standards

The following table describes the ANSI and IEC wire color standards based on thermocouple type.

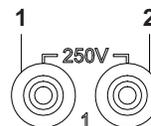
Type	ANSI Wire Color Standard		IEC Wire Color Standard	
	Positive	Negative	Positive	Negative
J	White	Red	Black	White
K	Yellow	Red	Green	White
E	Purple	Red	Violet	White
T	Blue	Red	Brown	White
N	Orange	Red	Pink	White
B	Gray	Red	-	White
R	Black	Red	Orange	White
S	Black	Red	Orange	White
C	White	Red	No standard	

## ISEV-4 - Single ended voltage module



### ISEV-4 Single ended inputs

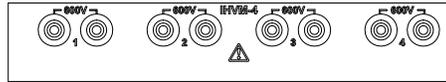
Use the following diagram to connect to the single ended inputs.



#	Description
1	Black (-) input
2	Red (+) input

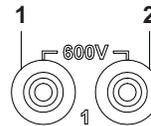
**Note:** The use of guarded banana test leads will eliminate the possibility of introducing a ground to the equipment under test if a regular banana test lead should come in contact with the recorder metal case.

## IHVM-4 Isolated high voltage differential input module



### IHVM-4 Differential inputs

Use the following diagram to connect to the differential inputs.



#	Description
1	Black (-) input
2	Red (+) input

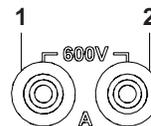
**Note:** The use of guarded banana test leads will eliminate the possibility of introducing a ground to the equipment under test if a regular banana test lead should come in contact with the recorder metal case.

## IHVM-4P Isolated high voltage input module for power applications



### IHVM-4P Differential inputs

Use the following diagram to connect to the differential inputs.



#	Description
1	Black (-) input
2	Red (+) input

**Note:** The use of guarded banana test leads will eliminate the possibility of introducing a ground to the equipment under test if a regular banana test lead should come in contact with the recorder metal case.

## IHVM-4P Overview

The IHVM-4P is a high voltage signal input module designed to provide critical power measurements in industries where power quality is essential to maintaining efficient operations. The module takes up to 4 physical inputs and creates multiple waveforms that can be displayed and captured.

Two modes of operation, standard and power, are included in the module. Standard mode provides calculations for RMS, applied filters, frequency counters, and other mathematic functions. This mode allows the user to decide how the output channels are generated.

Power mode provides calculations for power factor, true power, apparent power and frequency based on voltage and current as follows:

- **True Power** - Determines the power value delivered to a load. True Power is obtained by averaging the product of voltage and current waveforms over one cycle of the source. The default units value for True Power is VA.
- **Apparent Power** - Compares voltage and current. Apparent Power is defined as  $V_{rms} \times I_{rms}$ , where V is the voltage across a load and I is the current flowing to the load. The default units value for Apparent Power is VA.
- **Power Factor** - Calculates the ratio between True Power and Apparent Power. Because the Power Factor is a ratio, no units value is assigned.

## Standard mode channels

This mode allows each physical input (A, B, C, D) to provide four channels to the system as follows.

Input	Channel #
Input A	Channel 1
	Channel 2
	Channel 3
	Channel 4
Input B	Channel 5
	Channel 6
	Channel 7
	Channel 8
Input C	Channel 9
	Channel 10
	Channel 11
	Channel 12

Input	Channel #
Input D	Channel 13
	Channel 14
	Channel 15
	Channel 16

This mode allows each channel to be one of the DSP functions of the raw input. A typical configuration for Input A, for example, might be:

Input	Channel #	Function
Input A	Channel 1	Peak-to peak (raw)
	Channel 2	RMS
	Channel 3	Frequency
	Channel 4	Low pass filtered

### Power mode channels

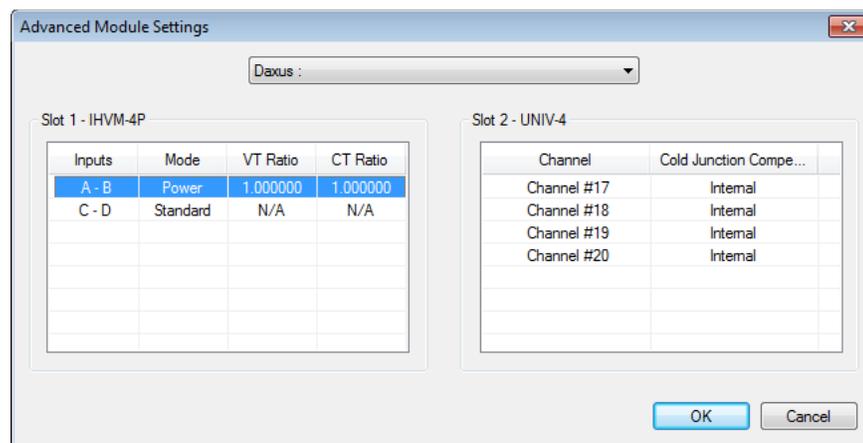
This mode uses specific physical inputs for voltage and current to provide the waveforms required to perform the power calculation. The voltage and current inputs are considered a pair (A and B is one pair, C and D is another) for the calculation. The inputs, channels, and resulting power calculations are as follows:

Input	Channel #	Function
Input A (voltage)	Channel 1	Peak-to peak voltage
	Channel 2	RMS voltage
	Channel 3	Peak-to peak current
	Channel 4	RMS current
Input B (current)	Channel 5	Frequency
	Channel 6	True Power
	Channel 7	Apparent Power
	Channel 8	Power Factor

Input	Channel #	Function
Input C (voltage)	Channel 9	Peak-to peak voltage
	Channel 10	RMS voltage
	Channel 11	Peak-to peak current
	Channel 12	RMS current
Input D (current)	Channel 13	Frequency
	Channel 14	True Power
	Channel 15	Apparent Power
	Channel 16	Power Factor

## Selecting a mode

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose Advanced >> Module Settings. The Advanced Module Settings window will open.



**Note:** The mode settings can be different for inputs A-B and C-D as required. In the example above, inputs A-B are set up for Power mode while inputs C-D are set up for Standard mode.

- 3 Select the inputs (A-B or C-D) you want to configure, then click on the Mode column heading. A sub menu will appear.
- 4 Select either Standard or Power mode.
- 5 If Power mode is selected, the ratios for the voltage transducer (VT ratio) and current transducer (CT ratio) must be specified by clicking on the appropriate column heading and entering a value.
- 6 Choose OK.

## Selecting a function

The IHVM-4P attenuator and range settings are similar to the standard IHVM-4 module. The IHVM-4P has four physical inputs (A, B, C, and D) that can be set up.

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose whether to define the channel in terms of top/bottom or span/center. Use the Advanced >> Range Display menu to switch methods.
  - **Top/Bottom** - If you select this method, choose the Top and Bottom column headings to enter the highest and lowest channel values.
  - **Span/Center** - If you select this method, choose the Span and Center column headings to enter the total span of the channel and the center value.
- 3 If the Standard mode is being used, then the functions of the next 3 channels can be selected by choosing any of the Filter, Advanced, or Counter functions. All of the selected functions will be based on that physical input.
- 4 If the Power mode is being used, then the functions are fixed. See *“Power mode channels” on page 40*. The voltage and current signals are required to be in their allotted physical inputs (A-B or C-D).

## Example IHVM-4P configuration

In the following illustration, inputs A-B are configured in the Power mode while C-D are configured in the Standard mode.

Channels   Option Channels   Derived Channels   Events									
Label	Id	Attenuator	Top	Bottom	Units	Alarms	Filter	Advanced	Counter
1-A *Voltage	Daxus: C#1	Diff 100 V	100.000	-100.000	V	Off	Off	N/A	N/A
1-A *RMS Voltage	Daxus: C#2	N/A	100.000	0.000	V RMS	Off	Off	N/A	N/A
1-B *Current	Daxus: C#3	Diff 20 A	100.000	-100.000	A	Off	Off	N/A	N/A
1-B *RMS Current	Daxus: C#4	N/A	100.000	0.000	A RMS	Off	Off	N/A	N/A
1-AB *Frequency	Daxus: C#5	N/A	20000.0	0.0	Hz	Off	Off	N/A	N/A
1-AB *True Power	Daxus: C#6	N/A	10.0000	-10.0000	Watts	Off	Off	N/A	N/A
1-AB *Apparent Power	Daxus: C#7	N/A	10.0000	0.0000	VA	Off	Off	N/A	N/A
1-AB *Power Factor	Daxus: C#8	N/A	1.00000	-1.00000		Off	Off	N/A	N/A
Channel #9	Daxus: C#9	Diff 1000 V	40.0000	-40.0000	V	Off	Off	Off	Off
Channel #10	Daxus: C#10	N/A	N/A	N/A	V	Off	Off	RMS	Off
Channel #11	Daxus: C#11	N/A	N/A	N/A	V	Off	Off	N/A	*Cycle Based
Channel #12	Daxus: C#12	N/A	N/A	N/A	V	Off	100.0 Hz Bessel Low Pass	Off	Off
Channel #13	Daxus: C#13	Diff 1000 V	40.0000	-40.0000	V	Off	Off	Off	Off
Channel #14	Daxus: C#14	N/A	N/A	N/A	V	Off	Off	RMS	Off
Channel #15	Daxus: C#15	N/A	N/A	N/A	V	Off	Off	N/A	*Time Based
Channel #16	Daxus: C#16	N/A	N/A	N/A	V	Off	100.0 Hz Bessel High Pass	Off	Off

### Inputs A-B

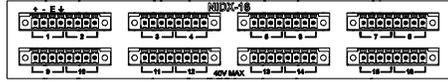
- Input A is a voltage input.
- Input B is a current input.
- Channels 1-8 are the voltage, current, and power measurements for those two physical inputs. See *“Power mode channels” on page 40*.

### Inputs C-D

- Input C is a voltage input and channels 9-12 are the raw, RMS, cycle-based frequency, and 100Hz lowpass filtered signal.

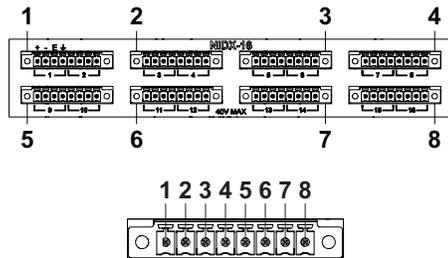
- Input D is a voltage input and channels 13-16 are the raw, RMS, time-based frequency, and 100Hz highpass filtered signal.

## NIDX-16 - Non-isolated differential voltage module



### NIDX-16 Differential inputs

Use the following diagram to connect to the differential inputs.



Connectors 1 - 4 (Channels 1 - 8)	
Pin #	Description
1	Channel 1, 3, 5, or 7 (+) input
2	Channel 1, 3, 5, or 7 (-) input
3	Channels 1 - 8 output
4	Channels 1 - 8 output ground
5	Channel 2, 4, 6, or 8 (+) input
6	Channel 2, 4, 6, or 8 (-) input
7	Channels 1 - 8 output
8	Channels 1 - 8 output ground

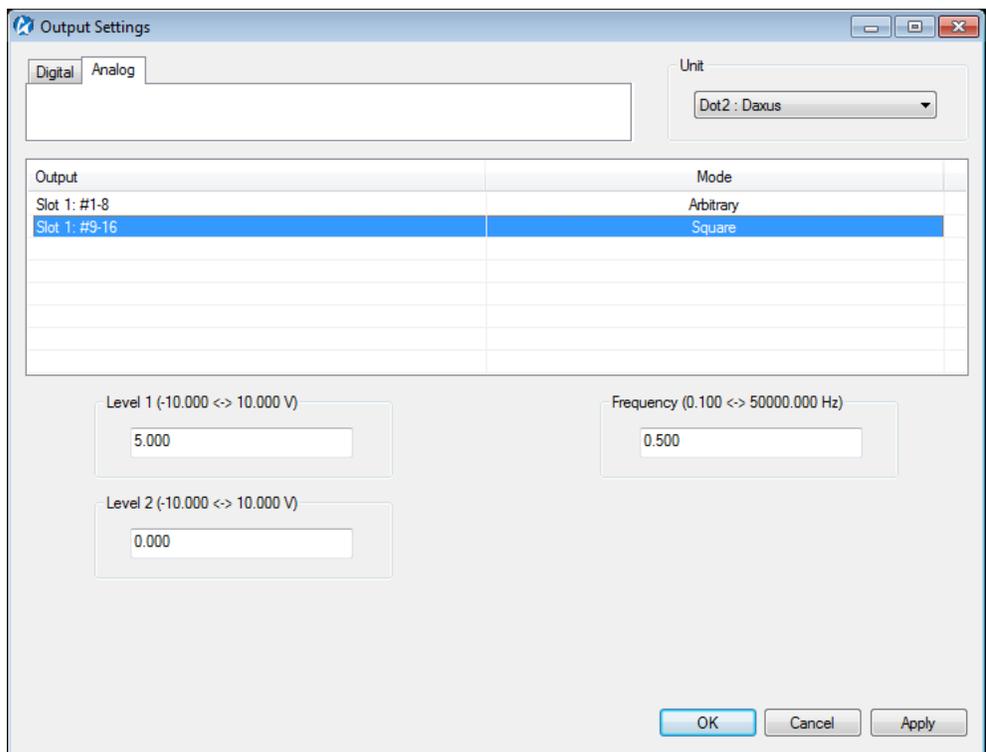
Connectors 5 - 8 (Channels 9 - 16)	
Pin #	Description
1	Channel 9, 11, 13, or 15 (+) input
2	Channel 9, 11, 13, or 15 (-) input
3	Channels 1 - 8 output

Connectors 5 - 8 (Channels 9 - 16)	
Pin #	Description
4	Channels 1 - 8 output ground
5	Channel 10, 12, 14, or 16 (+) input
6	Channel 10, 12, 14, or 16 (-) input
7	Channels 1 - 8 output
8	Channels 1 - 8 output ground

### Setting up NIDX-16 outputs

The NIDX-16 module provides two analog outputs. One corresponds to channels 1-8 while the other corresponds to channels 9-16. These outputs can be used for a variety of purposes including transducer excitation or the stimulation of an external test apparatus.

- 1 Choose Settings >> Outputs. The Output Settings window will open. Choose the Analog tab.



- 2 Select the Daxus from the Unit list.
- 3 Select a NIDX-16 module from the Output list.

- 4 Choose the Mode column heading. Select a mode for the output.
  - **Level** - Select this option to output a direct voltage. Choose the Level field to specify the voltage output.
  - **Pulse Train** - Select this option to output a pulse train of two levels.

Choose the Level 1 field to specify a voltage output, and choose the Time 1 field to indicate the duration of that output before switching to Level 2.

Choose the Level 2 field to specify a voltage output, and choose the Time 2 field to indicate the duration of that output before switching to Level 1.
  - **Arbitrary** - Select this option to control the output levels with a file. Choose the Arbitrary File field to select an analog output file (\*.dao). Then enter an arbitrary time delta to indicate the amount of time between each sample in the file. If a time delta is specified in the file, the time delta specified in the window will override that value.

*Note: An application note describing analog output files and their application is available from Technical Support.*
  - **Sine** - Select this option to output voltage in a sine wave. Choose the Level 1 field and select a voltage level for the top of the sine wave. Choose the Level 2 field and select a voltage level for the bottom of the sine wave. Then choose the Frequency field to specify the sine wave frequency.
  - **Square** - Select this option to output voltage in a square wave. Choose the Level 1 field and select a voltage level for the top of the square wave. Choose the Level 2 field and select a voltage level for the bottom of the square wave. Then choose the Frequency field to specify the square wave frequency.
- 5 Choose Apply.
- 6 Choose OK.



# 5

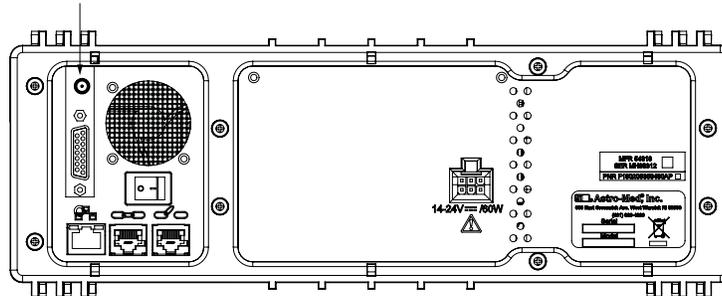
## Optional hardware

### GPS/IRIG/CAN

By default, the Daxus uses an internal time reference. In some cases, an external time reference may be needed. The GPS/IRIG/CAN card is a purchased option for the Daxus that allows the use of the following options.

- IRIG - For external IRIG time
- GPS - For external GPS time and/or location and speed information
- CAN - For signals to be sourced from a user's CAN bus (automobile, truck, bus, boat, machine, etc.)

The GPS/IRIG/CAN card is installed in a slot on the back of the recorder.



An external reference is a time code supplied by the user in GPS/IRIG/CAN format. If an external time source is referenced, the recorder's time functions are synchronized to it.

For example, when viewing time-based measurements in the Channel Information window or Absolute Time in the Review mode status text, the external time will be displayed instead of the system-based time.

The following external time options are available.

GPS Support Option	
Time synchronization	Yes
Connector	SMA, with support for passive antennas as well as active antennas (3.3V power)  A GPS antenna is also available from AstroNova, please contact us for more information

GPS Support Option	
GPS Signals available	Number of satellites (SV) Latitude Longitude Altitude Ground Speed Direction

IRIG Support Option	
Time synchronization	Yes
IRIG time codes supported	IRIG-A IRIG-B
IRIG signaling supported	AM (modulated) TTL (DCLS)

CAN Support Option	
Selectable baud rate	Currently supports 250 Kbs and 500 Kbs
Selectable addressing	11-bit and 29-bit
.dbc file support	Yes
Number of channels viewable at any one time	13 (when GPS and/or IRIG options purchased) 16 (when neither GPS or IRIG options purchased)

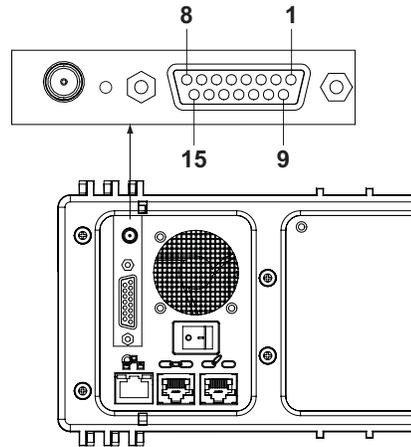
Options module channels can be captured with data capture at rates up to 1000 Hz.

**Related Topics:**

- "Setting up option channels" on page 98

## GPS/IRIG/CAN options module pin configuration

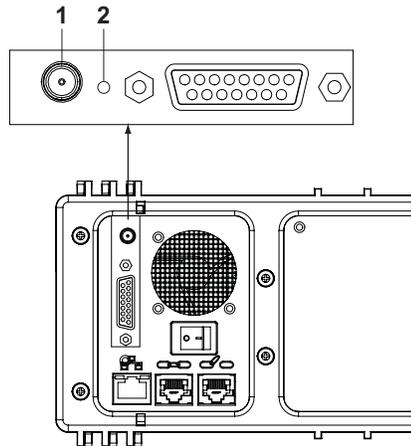
The following diagram illustrates the GPS/IRIG/CAN options module pin configuration.



Pin	Description
1	Fused 5V aux power (0.1A max)
2	CAN 1 LOW
3	Ground
4	CAN 2 LOW
5	Ground
6	IRIG IN -
7	GPIO 1
8	GPIO 2
9	Ground
10	CAN 1 HIGH
11	Reserved
12	CAN 2 HIGH
13	Reserved
14	IRIG IN +
15	Fused 12V aux power (0.15A max)

**Note:** An optional breakout box (ordering part number 32930000) is available to break out the IRIG connection to a BNC connector as well as break each of the two CAN busses into two 9-pin male DSub connectors.

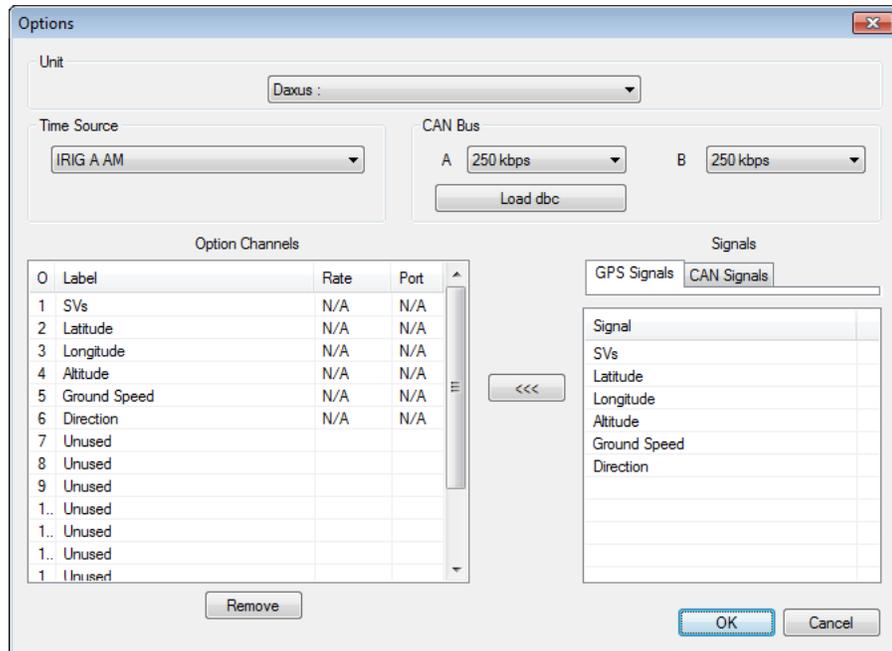
The following diagram illustrates the GPS antenna input [1] and IRIG/GPS LED indicator [2].



The LED indicator will blink at a one-second interval for either IRIG A or B (synchronized to those signals). For GPS, the light will blink if a valid GPS signal is acquired. If there is no GPS signal, the LED will be solid green.

### Setting up GPS/IRIG/CAN options

- 1 If a GPS antenna will be used, connect it to the Daxus while the Daxus is powered down. Then turn the Daxus power on.
- 2 In Realtime mode, choose Settings >> Options. The Options window will open.



- 3 Select the Daxus from the Unit list.

- 4 If necessary, select a time source. Time source selections will vary based on your purchased options.
  - Internal
  - GPS
  - IRIG A TTL
  - IRIG A AM
  - IRIG B TTL
  - IRIG B AM
- 5 If necessary, select CAN Bus options.
  - Select a speed of 250 or 500 kbps for CAN Bus A (CAN 1).
  - Select a speed of 250 or 500 kbps for CAN Bus B (CAN 2).
  - To load a CAN Bus file (\*.dbc), choose Load dbc. A file selection window will open. Select the dbc file and choose Open.
- 6 If necessary, select the signals that will be displayed as option channels.
  - To add a signal, select a signal from the GPS Signals or CAN Signals tab. Then choose the "<<<" button. The signal will be added to the option channels.
  - To remove a signal, select a signal from the Option Channels list. Then choose Remove. The signal will be removed from the option channels.
- 7 If necessary, select a rate and port for option channels.
  - Select an option channel. Choose the Rate column heading and select a rate (1, 10, 100, or 1000 Hz).
  - Select an option channel. Choose the Port column heading and select a port (A or B).
- 8 Choose OK.

## Wireless USB adapter

The Daxus is usually connected to a PC with a wired network connection. An optional wireless USB adapter is available for applications that require wireless connectivity.

The DAX-WIFI adapter is a purchased option that connects to the USB port on the front of the Daxus.

### Setting up a wireless connection

Use the following instructions to set up a wireless connection to your Daxus with the DAX-WIFI adapter accessory. This procedure requires you to create a plain text file on a PC and then transfer that file to the Daxus with a USB memory drive.

- 1 Use a text editor on your PC to create a file named "DaxusIPAddresses.ini" (case sensitive). The file will contain your wireless network settings.

This file must be formatted according to specific guidelines. See *"IP address files"* on page 69.

- 2 Copy the "DaxusIPAddresses.ini" file to a USB memory drive.
- 3 Insert the USB drive into the Daxus USB port.
- 4 Load the IP address file using the Load New IPs from USB Drive function in the Wireless Settings menu. See *"Wireless Settings menu"* on page 67.
- 5 After the settings have loaded, disconnect the USB drive from the Daxus USB port.
- 6 Connect the DAX-WIFI adapter to the Daxus USB port.
- 7 Enable wireless communication using the Wireless Settings menu. See *"Wireless Settings menu"* on page 67.

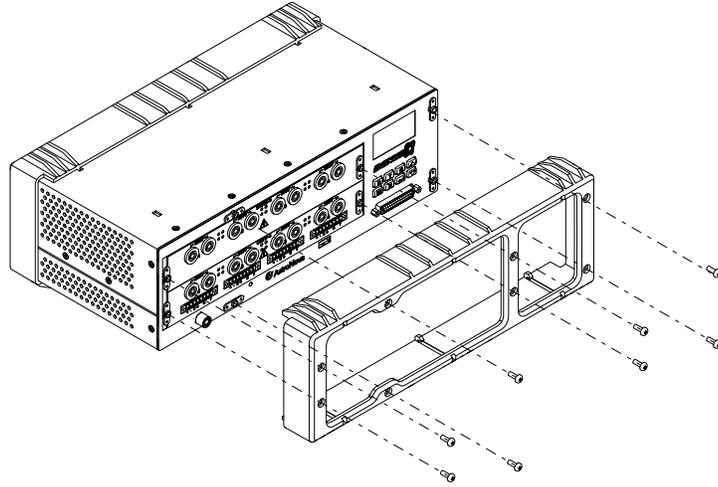
## Rack mount kit

Use the Daxus rack mount kit to configure the Daxus for installation in a standard rack enclosure.

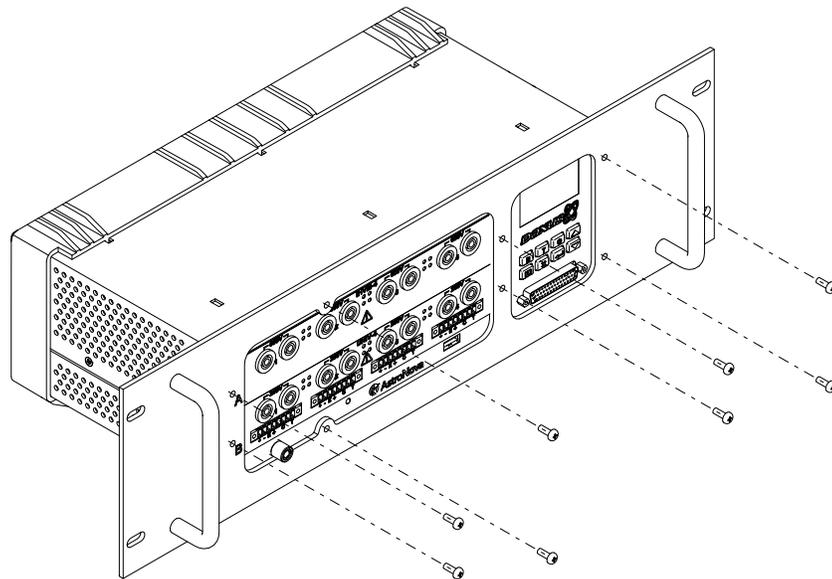
### Installing the Daxus in a rack enclosure

- 1 Disconnect all cables from the Daxus.

- 2 Remove the eight screws from the front of the Daxus and set the screws aside. These screws secure the rubber endcap in place.



- 3 Remove the rubber endcap by sliding it away from the Daxus. Store the rubber endcap in case it is needed in the future.
- 4 Align the back of the rack mount plate with the front of the Daxus. The screw holes on the plate must be aligned with the corresponding screw holes on the Daxus.



- 5 Install the eight screws that were previously set aside. Tighten the screws until the Daxus is firmly attached to the plate.
- 6 Install the assembly in a rack mount enclosure.



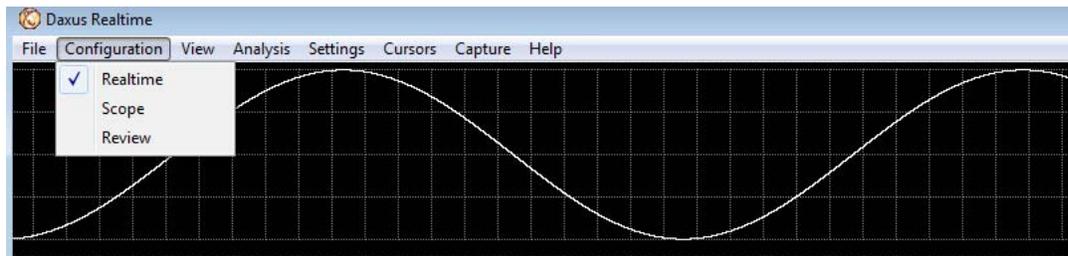
# 6

## Menus and icons

### Menu bar

The menu bar is a group of drop-down menus located across the top of the display. All modes and features can be accessed from this menu. Menu options will vary based on the mode of operation (Realtime, Scope, or Review) used.

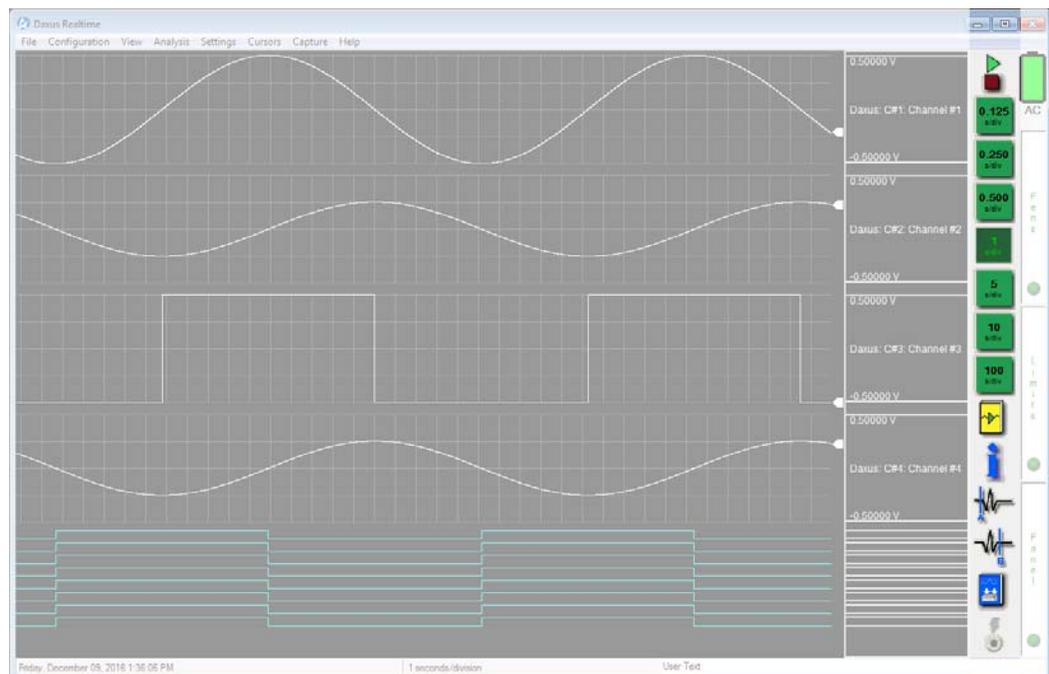
The following illustration displays the menu bar with the Configuration menu selected.



### Control panel

The control panel is a customizable group of icon buttons located on the right side of the display. It provides immediate access to virtually any function with one touch. Each mode of operation (Realtime, Scope, and Review) utilizes its own control panel.

The following illustration displays the control panel.

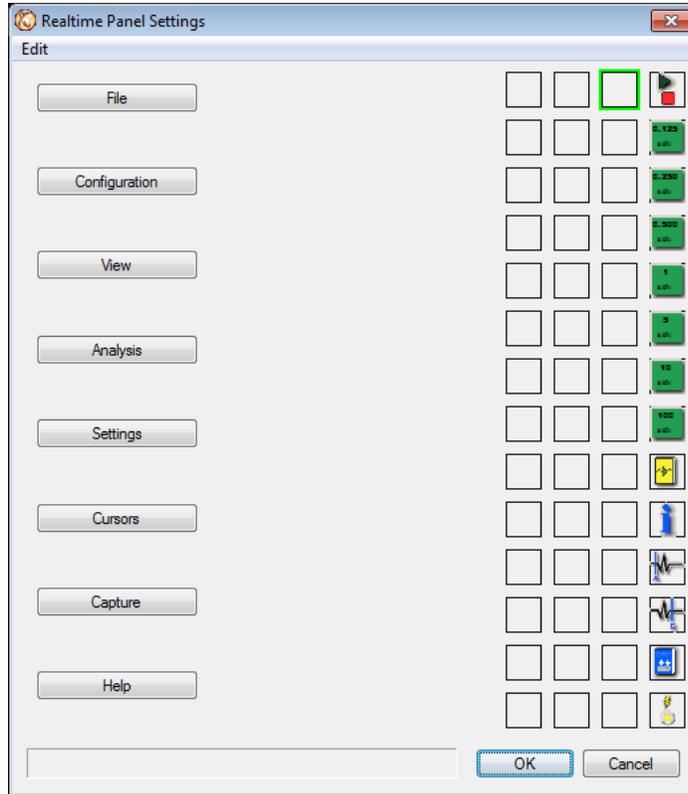


Most of the control panel buttons are one-touch equivalents of multi-step functions involving the menu bar and/or specific windows. Adding frequently used functions and removing unused functions can save time and effort while using the recorder.

For example, if the Channel Settings window is used frequently, it might be wise to add the associated icon button to the control panel. Instead of using the menu bar to choose Settings >> Channels, the function can be utilized by pressing one control panel button.

## Customizing the control panel

- 1 Choose Settings >> Control Panel. The Panel Settings window will open.



The buttons on the left provide functions that can be added to the control panel. Many of these functions correspond to menu bar options. The columns on the right display the layout of the control panel.

- 2 To add icons, select an empty control panel icon slot or existing icon. Then select a function from the buttons on the left.

An icon for the chosen function will appear in the selected control panel location. If the location previously contained an icon, the icon will be replaced.

- 3 To remove icons, select an existing control panel icon. Then choose Edit >> Clear.

You can also remove icons by pressing and dragging an empty icon over the icon you want to remove. Release it and the icon will be removed.

- 4 To arrange the icons, select a control panel icon. While pressing the icon, drag it to a different location in the control panel and release it. The icon will be moved to the new location. If the new location previously contained an icon, it will be replaced.
- 5 Choose OK.

## Battery status icons

A battery icon is located in the upper-right corner of the display in Realtime, Scope, and Review modes. This icon provides a visual indication of the Daxus battery charge level.



**Note:** If multiple Daxus units are connected, the battery indicator shows the status of the battery on the master unit only.

The appearance of the battery icon will vary based on the charge level and whether the Daxus is running on AC or battery power.

Icon	Description
	External power (i.e. AC power) is connected.
	Daxus is operating with battery power. Battery charge level is over 50%.
	Daxus is operating with battery power. Battery charge level is between 25% and 50%.
	Daxus is operating with battery power. Battery charge level is under 25%.

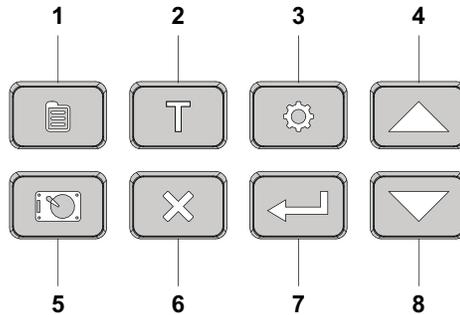


# 7

## Daxus unit keypad and menus

### Daxus keypad

Eight soft keys are located under the LCD display on the Daxus. These keys can be used for menu navigation and data capture functions.

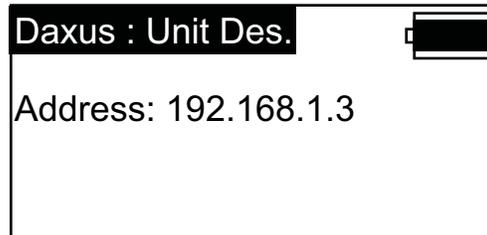


#	Description
1	<b>Menu key</b> Press the Menu key to display the main menu.
2	<b>Trigger key</b> Press the Trigger key to trigger a data capture manually.
3	<b>Settings key</b> Press the Settings key to load setup files.
4	<b>Up arrow key</b> Press the Up arrow key to move up in a menu.
5	<b>Arm key</b> Press the Arm key to arm a data capture.
6	<b>Abort key</b> Press the Abort key to abort a data capture manually.
7	<b>Enter key</b> Press the Enter key to make a selection in a menu.
8	<b>Down arrow key</b> Press the Down arrow key to move down in a menu.

## Daxus LCD menus

### Home screen

The home screen on the Daxus LCD shows the unit designation and IP address.

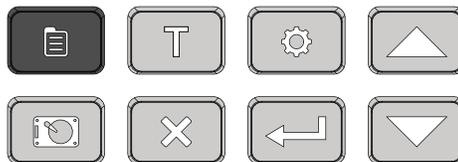


When no keys are pressed for approximately 30 seconds while in a menu, the home screen will be displayed.

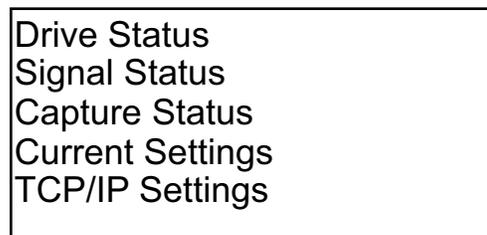
### Drive Status menu

Use the Drive Status menu to view information about the Daxus data capture drive.

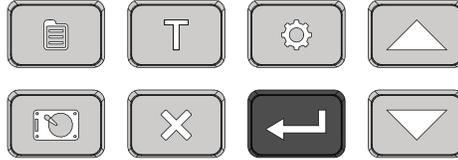
- 1 Press the Menu key.



The main menu will be displayed.



- Use the arrow keys to select Drive Status. Then press the Enter key.



The drive status information will be displayed.

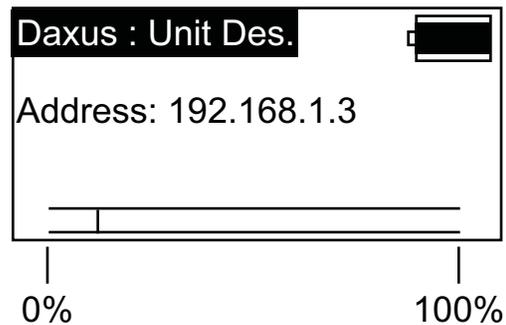
```
Captures: 83
Scopes: 0
Free: 475.89 GB
```

The number of data captures and scope captures on the drive will be displayed. The remaining storage capacity will also be shown.

- Press the Enter key again or wait approximately 30 seconds to return to the home screen.

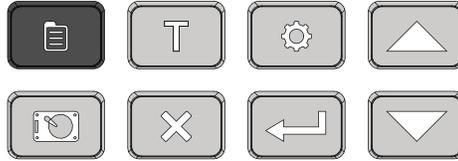
## Signal Status menu

Use the Signal Status menu to select a channel that will be visually displayed on the Daxus home screen. This is useful to determine signal activity on any given channel without the need to connect to a PC.

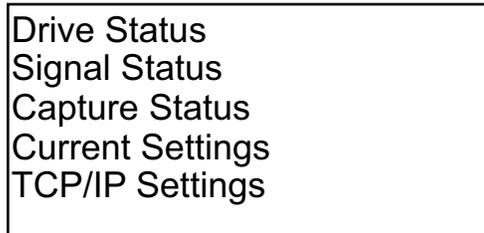


The left edge indicates 0% of the channel span (the grid bottom). The right edge indicates 100% of the channel span (the grid top). The moving bar is intended as a low resolution visual indicator of signal activity.

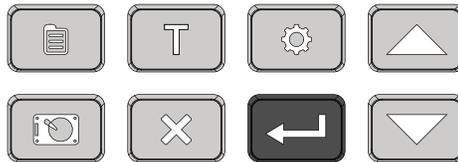
- 1 Press the Menu key.



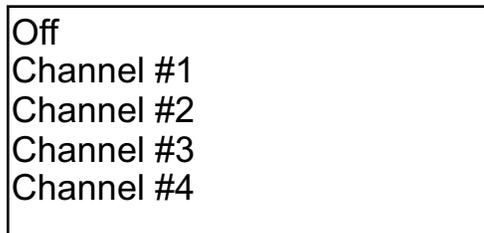
The main menu will be displayed.



- 2 Use the arrow keys to select Signal Status. Then press the Enter key.

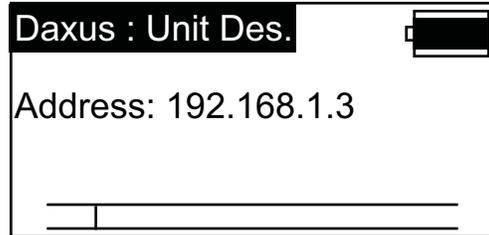


The signal options will be displayed.



- 3 Use the arrow keys to select the channel that will be displayed on the home screen. Then press the Enter key.

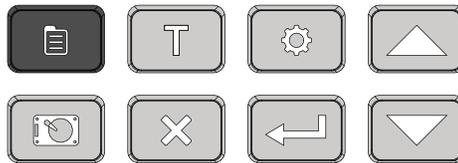
When you return to the Daxus home screen, the signal activity will be indicated by a bar at the bottom of the display.



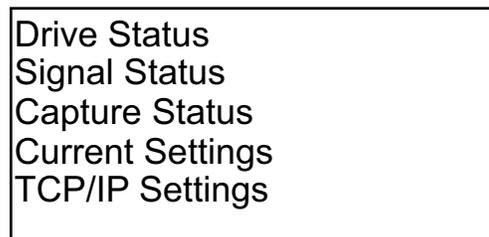
## Capture Status menu

Use the Capture Status menu to view if a data capture is active.

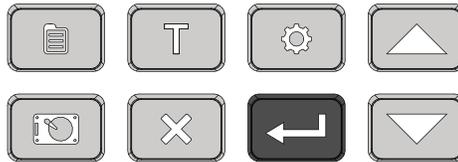
- 1 Press the Menu key.



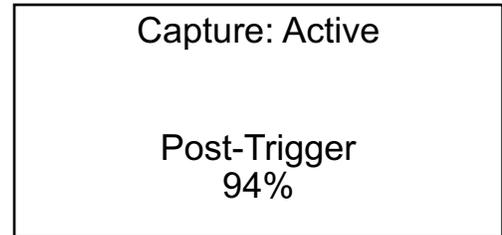
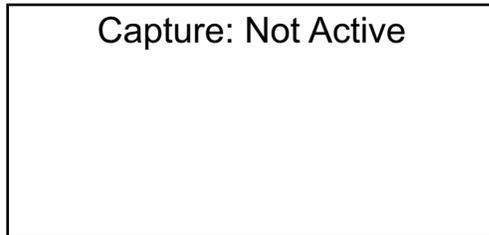
The main menu will be displayed.



- 2 Use the arrow keys to select Capture Status. Then press the Enter key.



The data capture status will be displayed. The status will differ based on whether a data capture is active.

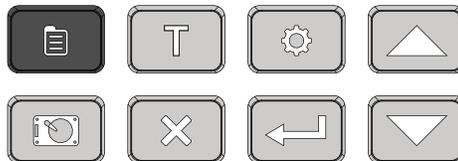


- 3 Press the Enter key again or wait approximately 30 seconds to return to the home screen.

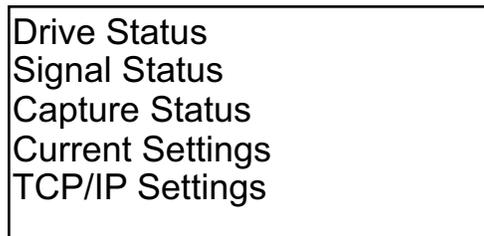
### Current Settings menu

Use the Current Settings menu to view the last setup file that was loaded.

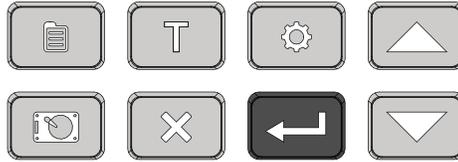
- 1 Press the Menu key.



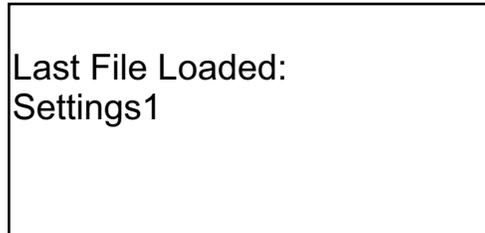
The main menu will be displayed.



- 2 Use the arrow keys to select Current Settings. Then press the Enter key.



The setup file that was last loaded will be displayed.

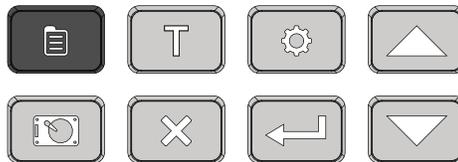


- 3 Press the Enter key again or wait approximately 30 seconds to return to the home screen.

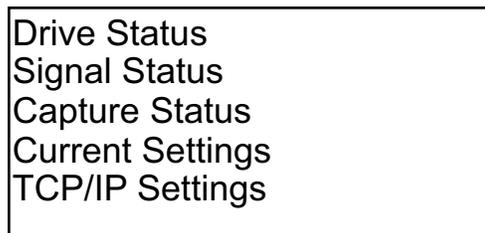
## TCP/IP Settings menu

Use the TCP/IP Settings menu to select wired networking settings for the Daxus.

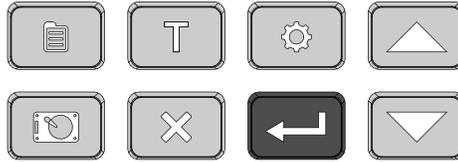
- 1 Press the Menu key.



The main menu will be displayed.



- 2 Use the arrow keys to select TCP/IP Settings. Then press the Enter key.



The TCP/IP settings will be displayed.

Obtain IP Automatically  
192.168.1.1:255.255.255.0  
192.168.1.2:255.255.255.0  
192.168.1.3:255.255.255.0  
Load New IPs from USB Drive

- 3 To configure wired communication settings, select a connection method.
- To use DHCP, use the arrow keys to select Obtain IP Automatically. Then press the Enter key.
  - To use an IP address from the menu, use the arrow keys to select the IP address. Then press the Enter key.
- 4 To load a new IP address file, insert a USB drive into the Daxus USB port. Use the arrow keys to select Load New IPs from USB Drive. Then press the Enter key.

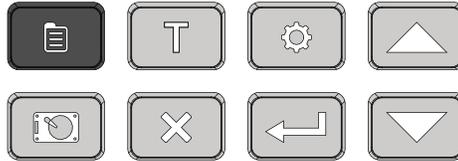
The root folder of the USB drive must contain a text file named “DaxusIPAddresses.ini” (case sensitive) and it must contain IP information in a specific format. See “IP address files” on page 69.

**Note:** When loading a new IP address file, wired and wireless settings from the file will be applied to the Daxus.

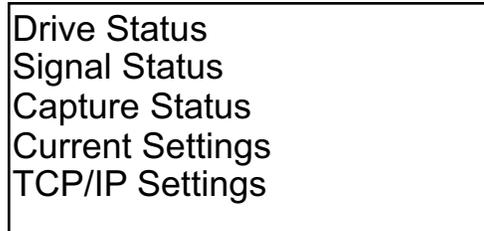
## Wireless Settings menu

Use the Wireless Settings menu to select wireless networking settings for the Daxus. The optional DAX-WIFI wireless USB adapter must be used for wireless connections. See “Wireless USB adapter” on page 52.

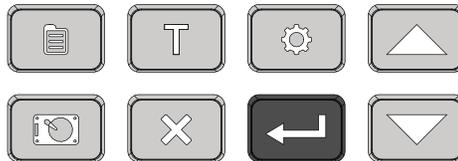
- 1 Press the Menu key.



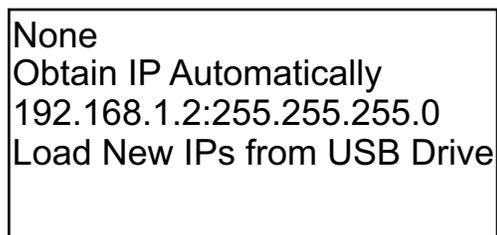
The main menu will be displayed.



- 2 Use the arrow keys to select Wireless Settings. Then press the Enter key.



The wireless settings will be displayed.



- 3 To disable wireless communication, use the arrow keys to select None. Then press the Enter key. If the DAX-WIFI adapter is connected to the Daxus USB port, remove it.

- 4 To enable wireless communication, connect the DAX-WIFI adapter to the Daxus USB port. Then select a connection method.
  - To enable wireless communication using DHCP, use the arrow keys to select Obtain IP Automatically. Then press the Enter key.
  - To enable wireless communication using the IP address from the menu, use the arrow keys to select the IP address. Then press the Enter key.

The DAX-WIFI adapter will connect to the network after several moments. The Daxus will return to the home screen and display the IP address for the wired network and the wireless network if the connection was successful.

- 5 To load a new IP address file, insert a USB drive into the Daxus USB port. Use the arrow keys to select Load New IPs from USB Drive. Then press the Enter key.

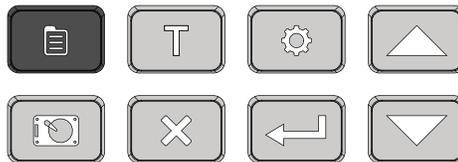
The root folder of the USB drive must contain a text file named “DaxusIPAddresses.ini” (case sensitive) and it must contain IP information in a specific format. See “IP address files” on page 69.

**Note:** When loading a new IP address file, wired and wireless settings from the file will be applied to the Daxus.

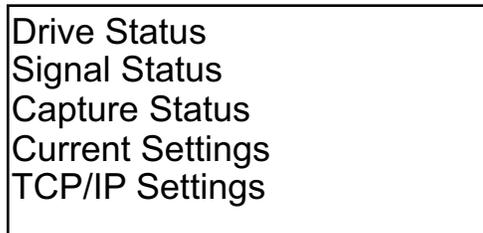
## Archive Record menu

Use the Archive Record menu to copy a data capture file from the Daxus to a USB memory drive.

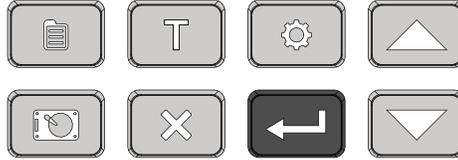
- 1 Insert a USB drive into the Daxus USB port
- 2 Press the Menu key.



The main menu will be displayed.



- 3 Use the arrow keys to select Archive Record. Then press the Enter key.



A list of data capture files on the Daxus will be displayed.

```
Capture file #1
Capture file #2
Capture file #3
Capture file #4
```

- 4 Use the arrow keys to select a file. Then press the Enter key. The selected file will be copied to the USB memory drive.

## IP address files

Networking settings for the Daxus are configured using a plain text file named "DaxusIPAddresses.ini" (case sensitive). This file contains settings for up to three wired connections and one wireless connection.

After creating or modifying an IP address file, you can apply its settings to the Daxus. Save the file to a USB memory drive, insert the drive into the Daxus USB port, and load the file using the TCP/IP Settings or Wireless Settings menu.

- See "TCP/IP Settings menu" on page 65.
- See "Wireless Settings menu" on page 67.

## File format

The “DaxusIPAddresses.ini” file uses the following format. Sample information is used for illustration purposes. Your settings will vary based on your network.

```
[GENERAL]
ActiveIP=1

[IP1]
Address=192.168.1.1
Mask=255.255.255.0
Gateway=0.0.0.0

[IP2]
Address=192.168.1.2
Mask=255.255.255.0
Gateway=0.0.0.0

[IP3]
Address=172.16.2.90
Mask=255.255.0.0
Gateway=172.16.9.254

[WIRELESS]
DNS Address=10.138.18.46
WirelessActiveIP=0
Static Address=10.138.141.247
Static Mask=255.255.255.128
Network=AstroNovaGuestNetwork
Password=password12345
```

## Settings

The “DaxusIPAddresses.ini” networking settings are described in the following tables.

[GENERAL] section		
Setting	Description	Options
ActiveIP	Indicates which wired IP address to use.	<ul style="list-style-type: none"><li>• 1 - Enter 1 to use the IP address defined in the [IP1] section of the file.</li><li>• 2 - Enter 2 to use the IP address defined in the [IP2] section of the file.</li><li>• 3 - Enter 3 to use the IP address defined in the [IP3] section of the file.</li></ul>

[ IP1 ] section	
Setting	Description
Address	Indicates the IP address to use for wired IP address 1.
Mask	Indicates the subnet mask to use for wired IP address 1.
Gateway	Indicates the gateway to use for wired IP address 1.

[ IP2 ] section	
Setting	Description
Address	Indicates the IP address to use for wired IP address 2.
Mask	Indicates the subnet mask to use for wired IP address 2.
Gateway	Indicates the gateway to use for wired IP address 2.

[ IP3 ] section	
Setting	Description
Address	Indicates the IP address to use for wired IP address 3.
Mask	Indicates the subnet mask to use for wired IP address 3.
Gateway	Indicates the gateway to use for wired IP address 3.

[ WIRELESS ] section		
Setting	Description	Options
DNS Address	Indicates the DNS address for the wireless connection.	
WirelessActiveIP	Indicates whether to use DHCP or a static IP address on the wireless connection.	<ul style="list-style-type: none"> <li>• 0 - Enter 0 to use DHCP on the wireless connection.</li> <li>• 1 - Enter 1 to use a static IP address on the wireless connection.</li> </ul>
Static Address	Indicates the wireless static IP address.	
Static Mask	Indicates the wireless static subnet mask.	
Network	Indicates the wireless network name (SSID). Note that the SSID broadcast must be enabled for your wireless network.	

<b>[ WIRELESS ] section</b>		
<b>Setting</b>	<b>Description</b>	<b>Options</b>
Password	Indicates the wireless network password, or PSK (WPA/WPA2). Enter zero if you are connecting to an open network.	

---

# 8

# Channel setup

## Channel setup concepts

The following concepts are commonly used during channel setup tasks.

### Channels

Channels are single paths used for displaying waveforms. A waveform displayed in a channel can be generated directly from a signal input, or can result from filtering or math operations performed on a signal input.

### Signals

Signals are voltage levels transmitted to the recorder from the measurement source. Signals enter the recorder via the input modules located on the side of the unit.

### Channel labels

By default, waveforms are identified by labels corresponding to channel inputs. These labels can be modified to assign meaningful names to waveforms. For example, instead of using default labels:

- Channel #1
- Channel #2
- Channel #3

Descriptive labels can be assigned:

- Power
- Power (after filter)
- Pressure

### Spans

The span indicates the size of the channel from top edge to bottom edge.

### Bottoms/Centers

The bottom option indicates the bottom point of the channel span. The center option indicates the center point of the channel span.

### Engineering units

Engineering units provide the capability to display user-selected units instead of voltage.

All signal information enters the recorder as voltage. However, converting the voltage unit to an alternative unit of measure may be desirable in applications that measure pressure, strain, or any other nonvoltage unit.

**Note:** *The relationship between the voltage and the engineering unit is assumed to be linear, characterized by a slope and offset ( $y = mx + b$ ).*

After engineering units are defined and enabled, all appropriate menus will be displayed in the designated engineering unit values. For example, if pounds per square inch (PSI) are used as engineering units, the PSI label and value will be displayed instead of voltage.

**Low and high alarm levels**

Alarms provide a visual indicator when signals extend below or above specified boundaries. These boundaries are defined by setting up low and high alarm levels.

- **Low alarm level** - An alarm will occur when a signal is at or below the specified low alarm level. Portions of the waveform in the alarm area will be drawn in the selected alarm color.
- **High alarm level** - An alarm will occur when a signal is at or above the specified high alarm level. Portions of the waveform in the alarm area will be drawn in the selected alarm color.

The utility / DIO port provides an alarm output pin that can be used to signal when alarm conditions for selected signals occur.

**Filters**

Filters limit waveform amplitude based on frequency and thereby restrict or allow the waveforms to pass. Filters can be set up to filter out specific ranges of frequencies while allowing others to pass through for measurement.

<b>Anti-aliasing filter</b> – Limits input frequencies and prevents aliasing	
Implementation	Hardware
Type	Bessel lowpass
Cutoff (-3dB)	Module specific. Refer to module specifications.
Order	4
Roll-off	-80 dB/decade

<b>Built-in user-selectable filter</b> – User-selectable filtering	
Implementation	Digital signal processing
Topology	IIR Biquad [Bessel, Butterworth, Chebyshev 1, Chebyshev 2]
Cutoff (-3dB)*	User selectable  *Chebyshev 1 and Chebyshev 2 cutoff frequency is specified as the point at which the level has fallen to the value of the passband ripple.

Order	4th for greater than 4 KHz 2nd for between 100 Hz and 4 KHz 1st for less than 100 Hz
Roll-off	-80 dB/decade (for 4th order filter) -40 dB/decade (for 2nd order filter) -20 dB/decade (for 1st order filter)

### Attenuators

Attenuators limit the maximum signal input to the recorder. When the attenuator ranges are unlocked, the software will select the best attenuator setting. When the attenuator ranges are locked, possible span values will be limited based on the attenuator setting.

### Grounding

A ground is generally considered an equipotential point or structure designed so the voltage between any two points is zero. In practice, there are no perfect grounds and all should be considered suspect.

Grounds may be used to:

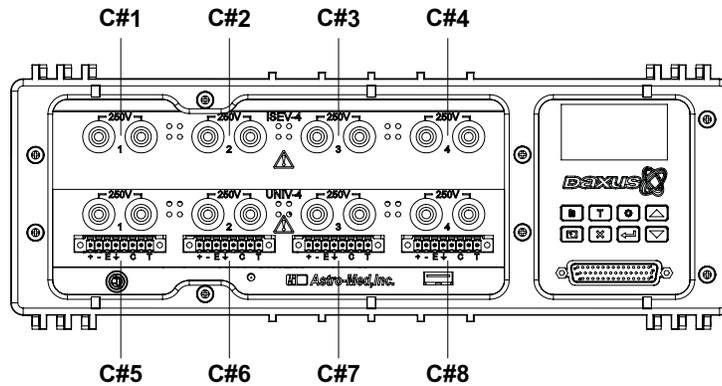
- Provide a safe return for excess current under fault conditions.
- Shield components from external sources.
- Provide a reference for voltage measurements. Poor grounding is a common cause of measurement errors.

A review of one of the many texts on the subject of grounding is advised. The following definitions are used in this document:

- **Earth Ground** is a low-impedance path to earth. In a properly installed 120-VAC outlet, the green wire is assumed to be earth ground.
- **Case Ground** refers to grounding achieved using an instrument's metal enclosure or frame. The case must be connected to earth ground by the use of the grounding connector on the front panel when needed to shield from environmental noise or other requirements that need the case to be grounded.
- **Signal Ground** is an analog reference point for the measuring device.
- **Source Common** is a reference point at the voltage source.

## Signal inputs

The term input refers to a signal connected to a physical input on an input module. The following diagram illustrates the layout of signal inputs.

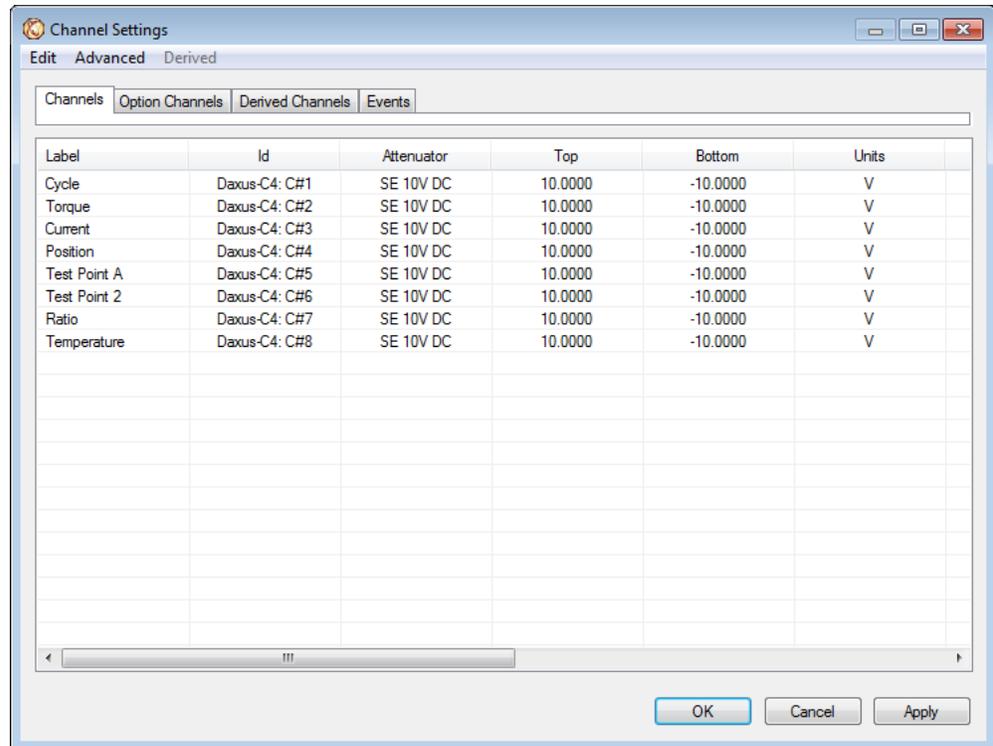


**Note:** The input modules displayed in this diagram are used for illustration purposes. The appearance of input modules will vary based on the module types installed.

In the software, each signal input has a channel ID for identification purposes. The ID corresponds to the physical location of the input. Inputs are numbered starting with the first input in module 1 and ending with the last input in module 2.

## Setting up channels

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose the Channels tab.

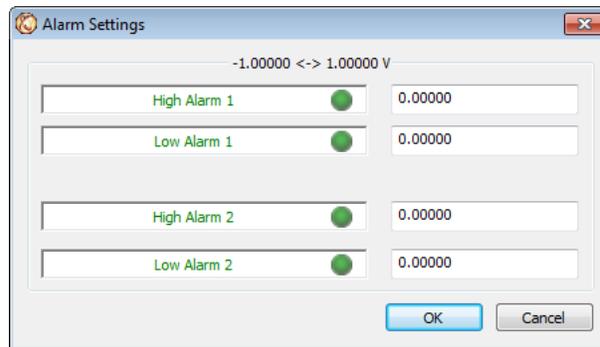


- 3 Select a channel.
  - 4 Use the Advanced >> Attenuator Lock menu to specify whether to lock the attenuator ranges. A check mark in the Attenuator Lock menu indicates the lock is enabled.
- When the attenuator ranges are unlocked, the software will select the best attenuator setting. When the attenuator ranges are locked, possible span values will be limited based on the attenuator setting.
- 5 To edit the channel label, select a channel. Then click the channel label to enable editing. Enter a label and press Enter.
  - 6 Choose the Attenuator column heading to specify the attenuator type for the input. The attenuator type refers to how the signal is physically connected to the recorder. Attenuator types vary based on input modules.

The attenuator setting limits the input signal to the selected maximum voltage.

- 7 Choose whether to define the channel in terms of top/bottom or span/center. Use the Advanced >> Range Display menu to switch methods.
  - **Top/Bottom** - If you select this method, choose the Top and Bottom column headings to enter the highest and lowest channel values.
  - **Span/Center** - If you select this method, choose the Span and Center column headings to enter the total span of the channel and the center value.

- 8 If necessary, set up user engineering units.
- 9 To use low and/or high alarms, choose the Alarm column heading, and then Set Alarms. The Alarm Settings window will open.



Choose the Low Alarm and/or High Alarm buttons. The selected alarms will become active and the alarm fields will be displayed. Use the alarm fields to enter alarm levels. Choose OK in the Alarms window.

- 10 If necessary, enable a filter for the input.
- 11 If you are using a bridge input and attenuator, choose the Excitation column heading to select an excitation voltage for the input. This process is necessary only for bridge inputs.
- 12 If necessary, you can display the inverse of the signal by choosing the Signal State column heading and choosing Invert.
- 13 Choose OK.

**Related Topics:**

- "Setting up amplifier input filters" on page 78
- "Engineering units" on page 88

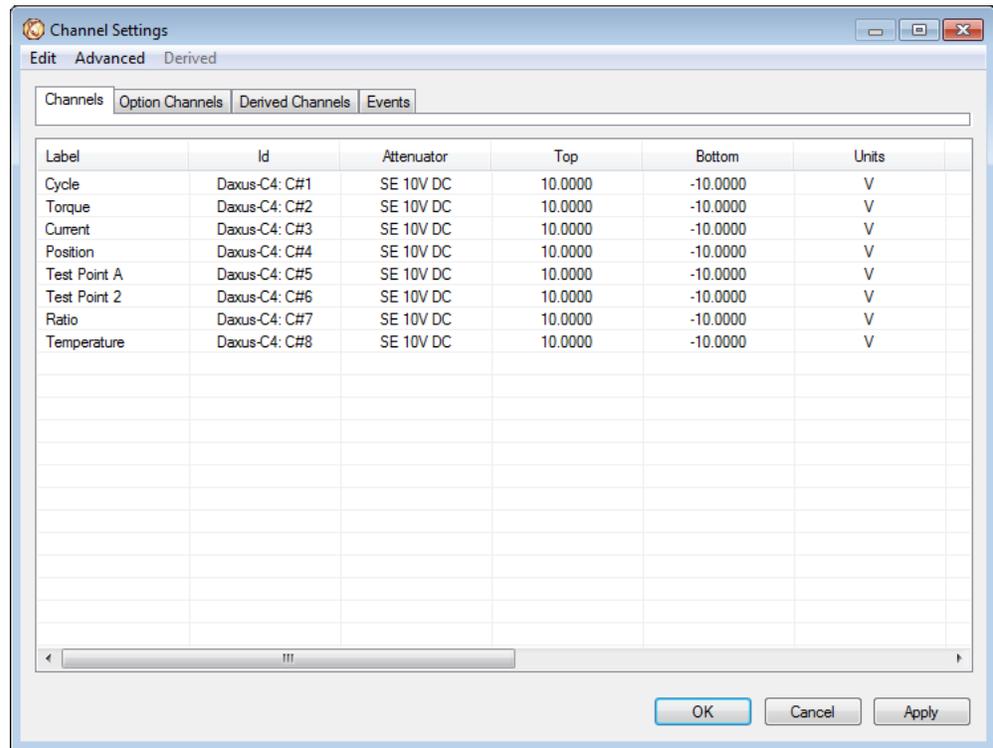
## Setting up amplifier input filters

Filters are used to reduce the amplitude of certain waveforms based on their frequency. This allows you to restrict your data to certain frequencies and exclude extraneous data. Two types of filters are available.

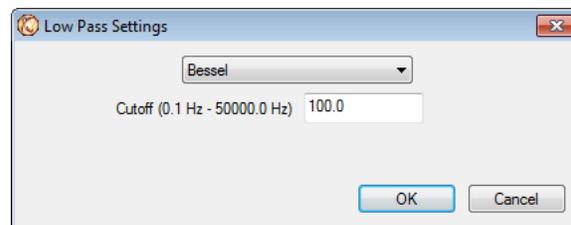
- **Amplifier input filters** are hardware based and affect the input data before it is captured. These filters are permanent and cannot be undone once the data is captured.
- **Review mode filters** are software based and affect how the data is viewed in Review mode. They temporarily modify the view without altering the captured data.

This section describes how to set up amplifier input filters.

- 1 Choose Settings >> Channels. The Channel Settings window will open.



- 2 Choose the Channels tab.
- 3 Select a channel.
- 4 Choose the Filter column heading. Select a filter type. The Filter window will open.



- **Low Pass** - Filters out frequencies above a specified cutoff point.
- **High Pass** - Filters out frequencies below a specified cutoff point.
- **Band Pass** - Creates a window based on two specified cutoff points, identified as upper and lower frequency boundaries. Anything outside this window is excluded.
- **Band Stop** - Creates a window based on two specified cutoff points, identified as upper and lower frequency boundaries. Anything inside this window is excluded.

5 Select a filter topology.

- **Bessel** filters are typically characterized by a nearly linear phase response in the pass band. They are commonly used in applications where little phase distortion is required. The trade off for this is a gentler roll off around the cutoff frequency.
- **Butterworth** filters produce the most “ideal” response, generating maximum flatness and unity gain in the pass band, and monotonic decrease of frequency after the cutoff.
- **Chebyshev** filters feature the sharpest transition band, but will have gain ripple in the pass band (type I) or stop band (II). A 4th order Chebyshev with 3 db of ripple, for instance, will drop at 100 db per decade.

If the Chebyshev topology is used, the Ripple field will appear. Enter a desired ripple value from 0.1 to 10.0 into this field.

6 Enter a cutoff frequency. The available range of this value will vary, depending on the current filter type. If the Band Pass or Band Stop filter types are used, you’ll need to enter two cutoff frequencies; an upper boundary and a lower boundary.

Setting a cutoff value to 500 Hz or greater will result in a 4th order filter; a cutoff of less than 500 Hz will result in a 1st order filter.

7 Choose OK in the Filter window.

8 Choose OK.

**Related Topics:**

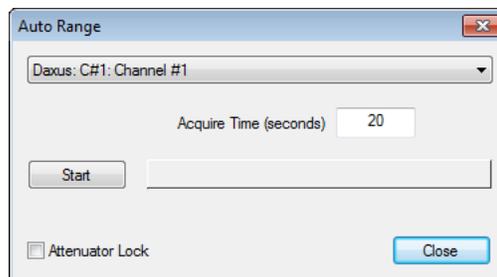
- "Setting up Review mode filters" on page 170

## Setting channel ranges automatically

The Channel Settings window provides the capability to enter channel spans manually. However, it may be more convenient to calculate channel spans based on the content of input signals.

Channels will be sampled for a selected time period. Then a span and bottom will be assigned to each channel based on highest and lowest signal points for each channel during the sampling process.

1 Choose Settings >> Auto Range.



2 Select a channel. Then select an acquire time in seconds.

3 Use the Attenuator Lock option to specify whether to lock the attenuator ranges.

**4** Choose Start.

The channel will be sampled for the selected time period. Then a span and bottom will be assigned to the channel based on highest and lowest signal points for the channel during the sampling process.

**5** Choose OK.

## Derived channels

Derived channels allow you to define flows of data that are not represented by a physical input, but instead result from operations performed on data from physical inputs. Once created, derived channels can be added to any grid on the display.

### Derived channel syntax

Equations are used to define the content of derived channels. The equations indicate channels and the operations to perform on the channels. Up to four system channels can be included in a derived channel equation. A derived channel cannot be used in the equation for another derived channel. The following table describes the syntax of derived channel equations.

**Note:** Units for *sin*, *cos*, and *tan* are in radians. For degrees use *sind*, *cosd*, and *tand*.

Function	Parameters	Equations
Addition	Channel1, Channel2	#1+#2
Subtraction	Channel1, Channel2	#1-#2
Multiplication	Channel1, Channel2	#1*#2
Division	Channel1, Channel2	#1/#2
Exponentiation (power)	Channel1, Channel2	#1^#2
Sine	Channel1	sin(#1) or sind(#1)
Cosine	Channel1	cos(#1) or cosd(#1)
Tangent	Channel1	tan(#1) or tand(#1)
Square Root	Channel1	sqrt(#1)
Absolute Value	Channel1	abs(#1)
Base 10 Log	Channel1	log(#1)
Natural Log	Channel1	ln(#1)
Arcsine	Channel1	asin(#1) or asind(#1)
Arccosine	Channel1	acos(#1) or acosd(#1)
Arctangent	Channel1	atan(#1) or atand(#1)

**Note:** You can also use numeric constants in the equations. For example, to multiply channel 1 by the constant 4, use the equation: #1\*4

Parentheses must be used to denote the order of operations. Without parentheses, operations are processed left to right. Nested parentheses are allowed.

If the calculation has the possibility of a divide-by-zero error, the system will default the scaling to +/- 10,000,000 for that channel.

If an infinity calculation occurs (divide-by-zero, tan(90), etc.), the channel will be shown as overrange. Undefined calculations (ln(-1), etc.) are not allowed and are checked against minimum grid, maximum grid, and zero value (if within the grid span) of the input channel to the function.

## Derived channel examples

Derived channels are flexible and can be configured to suit many applications. When setting up your derived channels, consider the following:

- The purpose of the derived channel
- The label (name) you will assign to the derived channel
- The channel or channels (up to four) that will be included in the calculation of the derived channel
- The math operations that will be performed on the channel or channels

Examples are provided in the following tables for reference.

Power Calculation	
Derived Channel Purpose	Calculate power based on voltage and current input
Derived Channel Label	Power
Channels Included	1: Voltage 5: Current
Math Operation	Multiply the voltage times the current
Derived Channel Equation	#1*#5

Application-Specific Calculation	
Derived Channel Purpose	Calculate application-specific value based on voltage and a known constant
Derived Channel Label	Adjusted Voltage
Channels Included	1: Voltage
Math Operation	Divide the voltage by the constant 2.34
Derived Channel Equation	#1/2.34

These examples illustrate only some derived channel configurations. The math functions available, up to four channel inputs, and numeric constants can be used to create a broad range of possibilities.



- 3 To add a derived channel, choose Derived >> Add. The Derived Channel Properties window will open.

Chann...	Label	Unit Designation
#1	Channel #1	Daxus
#2	Channel #2	Daxus
#3	Channel #3	Daxus
#4	Channel #4	Daxus
#5	Channel #5	Daxus

Enter a label, unit designation, and precision value (number of decimal places) for the derived channel. Enter the derived channel's equation. The Channel Helper list provides a quick reference that can be used while setting up the derived channel.

Choose OK in the Derived Channel Properties window. The new derived channel will be listed in the Derived Channels tab of the Channel Settings window.

- 4 To edit a derived channel, select it from the derived channel list. Then choose Derived >> Edit. The Derived Channel Properties window will open. Edit the derived channel and choose OK.
- 5 To delete a derived channel, select it from the derived channel list. Then choose Derived >> Remove.
- 6 Choose whether to define the channel in terms of top/bottom or span/center. Use the Advanced >> Range Display menu to switch methods.
  - **Top/Bottom** - If you select this method, choose the Top and Bottom column headings to enter the highest and lowest channel values.
  - **Span/Center** - If you select this method, choose the Span and Center column headings to enter the total span of the channel and the center value.





## Engineering units

Engineering units provide the capability to display user-selected units instead of voltage.

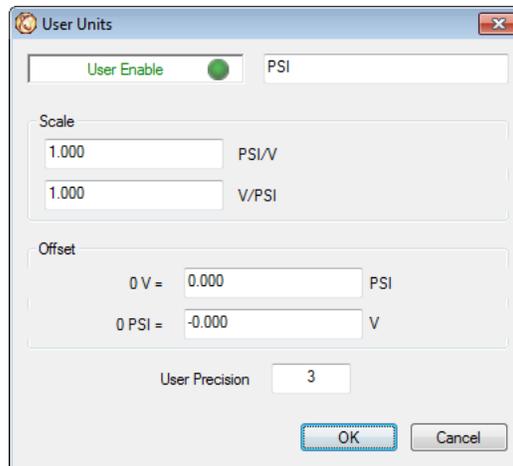
All signal information enters the recorder as voltage. However, converting the voltage unit to an alternative unit of measure may be desirable in applications that measure pressure, strain, or any other nonvoltage unit.

**Note:** The relationship between the voltage and the engineering unit is assumed to be linear, characterized by a slope and offset ( $y = mx + b$ ).

After engineering units are defined and enabled, all appropriate menus will be displayed in the designated engineering unit values. For example, if pounds per square inch (PSI) are used as engineering units, the PSI label and value will be displayed instead of voltage.

### Setting up engineering units

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Select a channel.
- 3 Choose the Units column heading. The Units window will open. Choose the User Enable button to activate engineering units. Other engineering units options will be displayed.



- 4 Choose the Engineering Units field and enter a name (display label) for the units. For example, PSI would be an appropriate label denoting pounds per square inch.
- 5 Enter a scale for the engineering units by using one of the Scale fields. Scale can be specified as either of the following:

- The waveform change in engineering units that is equal to one voltage unit.
- The waveform change in voltage units that is equal to one engineering unit.

Only one scale entry is required; the other is derived automatically.

- 6 Enter an offset for the engineering units by using one of the Offset fields. Offset can be specified as either of the following:
  - The number of engineering units equivalent to zero voltage units.
  - The number of voltage units equivalent to zero engineering units.Only one offset entry is required; the other is derived automatically.
- 7 Enter the number of decimal places for the engineering unit in the User Precision field.
- 8 Choose OK.

## Setting up engineering units based on DC levels

Use the following instructions to set up engineering units based on a DC signal input. With this alternative method of setting up engineering units, you do not enter the scale and offset directly. Instead, you specify high and low engineering units based on high and low signal activity.

**Note:** This method of setting up engineering units is available only in Realtime mode. It does not apply to Scope mode.

- 1 Choose Settings >> Scale to Levels. The Scale to Levels window will open.

The screenshot shows the 'Scale to Levels' dialog box. It features a dropdown menu at the top set to 'Daxus: C#1: Channel #1'. Below this is a 'Units' field containing the text 'ABC'. There are two sections for signal levels: 'Level 1' and 'Level 2'. Each section includes a checkbox, a numerical input field, and an 'Apply' button. Level 1 has its checkbox checked and a value of 100.000000. Level 2 has its checkbox unchecked and a value of 0.000000. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

- 2 Select a channel.
- 3 Choose the Units field and enter a name (display label) for the units. For example, PSI would be an appropriate label denoting pounds per square inch.

- 4 Enter low and high values for engineering units. This process assumes you know the engineering unit values associated with low and high signal levels.
  - **Level 1 (High Value)** - Adjust the signal to the level associated with the highest engineering unit value that will be used.

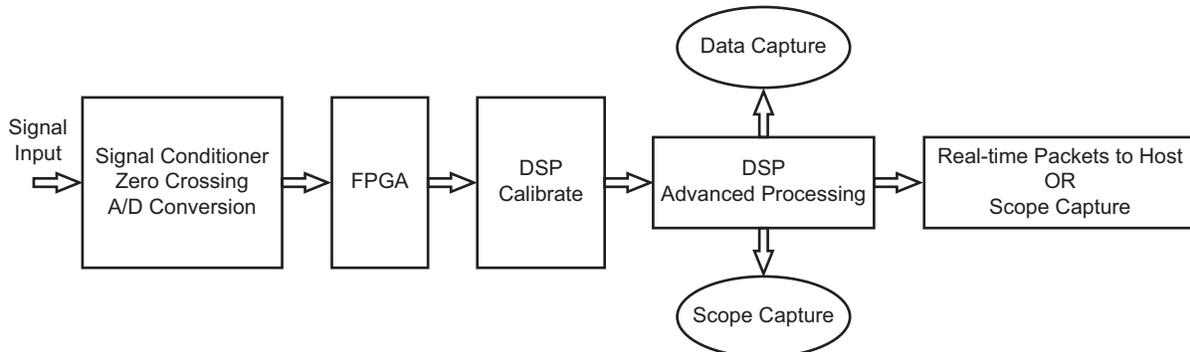
Enter the engineering unit value associated with the high signal. Then choose the Apply button to the right of the Level 1 field. The high value will be calculated. A check will appear in the Level 1 checkbox when this process is complete.
  - **Level 2 (Low Value)** - Adjust the signal to the level associated with the lowest engineering unit value that will be used.

Enter the engineering unit value associated with the low signal. Then choose the Apply button to the right of the Level 2 field. The low value will be calculated. A check will appear in the Level 2 checkbox when this process is complete.
- 5 Choose OK.

## Advanced math

### Theory of operation

The following illustration provides a block diagram of components involved in UNIV-4 signal processing and indicates how data flows.



Sampled data is provided to the module DSP by the FPGA that is in direct connection with signal conditioning and sampling hardware. The FPGA can supply sampled values from the output of an A/D converter or count values with a resolution of 0.02  $\mu$ sec. Circuitry detects when the input signal rises or falls through 0V (or a positive voltage if Uni-Polar mode is set) and the count can be based on either or both crossing points. The DSP processes a sample for each channel every 5  $\mu$ sec. The processed output can be sent to the Daxus system directly or used as input to a secondary DSP processing cycle. Although not shown, all data transfer from module DSP to the system goes through the FPGA.

The DSP's secondary processing cycle takes place at a fixed rate that is slower than the primary, interrupt based sample rate and varies depending on the selected function. When enabled, the output of the secondary process is sent to the Daxus system in place of the original sample or count values. An example of a secondary process is averaging count values over a fixed interval.

User selected signal filtering is performed by the DSP on the output of any advanced processing. When the advanced process makes use of the counter data the filter is applied to the output of the counter function.

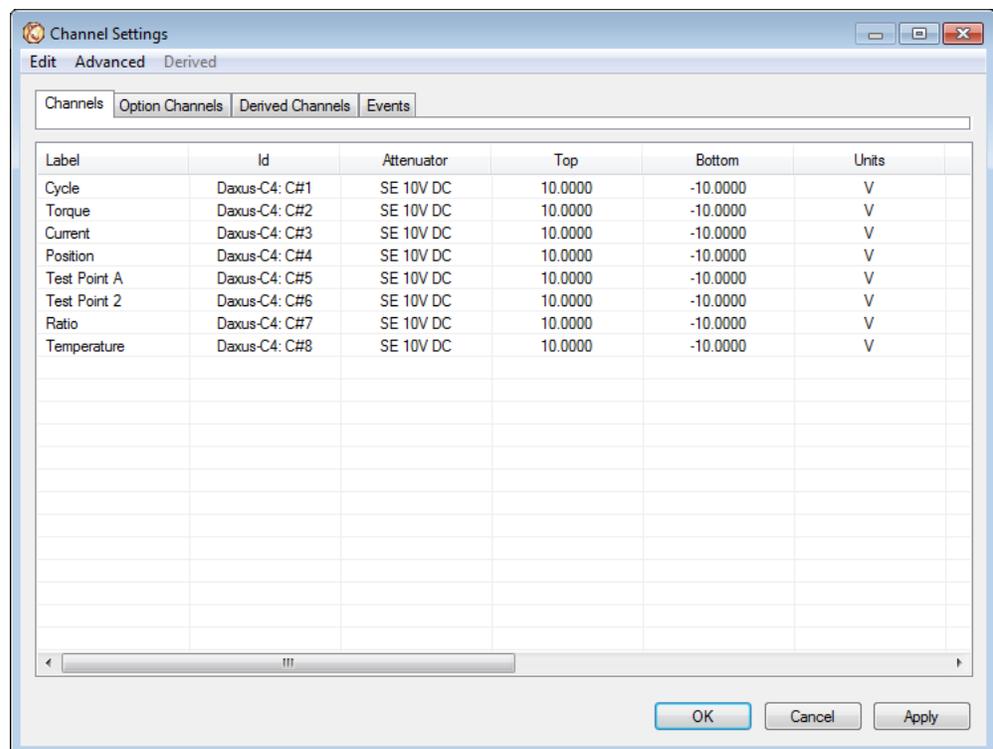
For additional information about advanced math and counters, contact Technical Support.

## About differentiation

Differentiation is performed on signal amplitude values provided by the SAR converter. When differentiation is enabled, samples are processed by the secondary DSP process every 20  $\mu$ sec (50 KHz). Differentiation operates by calculating the slope (aka slew rate) of the waveform as  $dX/dT$  where  $dX$  is the change in signal amplitude over a specific period of time ( $dT$ ). The DSP uses a circular buffer to save previous amplitude samples and calculates  $dX$  as the difference between the most recent sample and the oldest sample in the buffer. Therefore, the size of the circular buffer determines the value of  $dT$  in terms of the DSP secondary processing period (1/50 KHz).

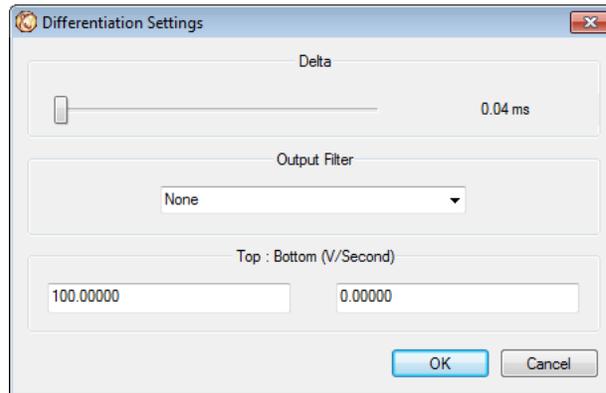
## Setting up differentiation

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose the Channels tab.



- 3 Select a channel.

- 4 Choose the Advanced column heading. A sub menu will appear. Choose Differentiation. The Differentiation Settings window will open.



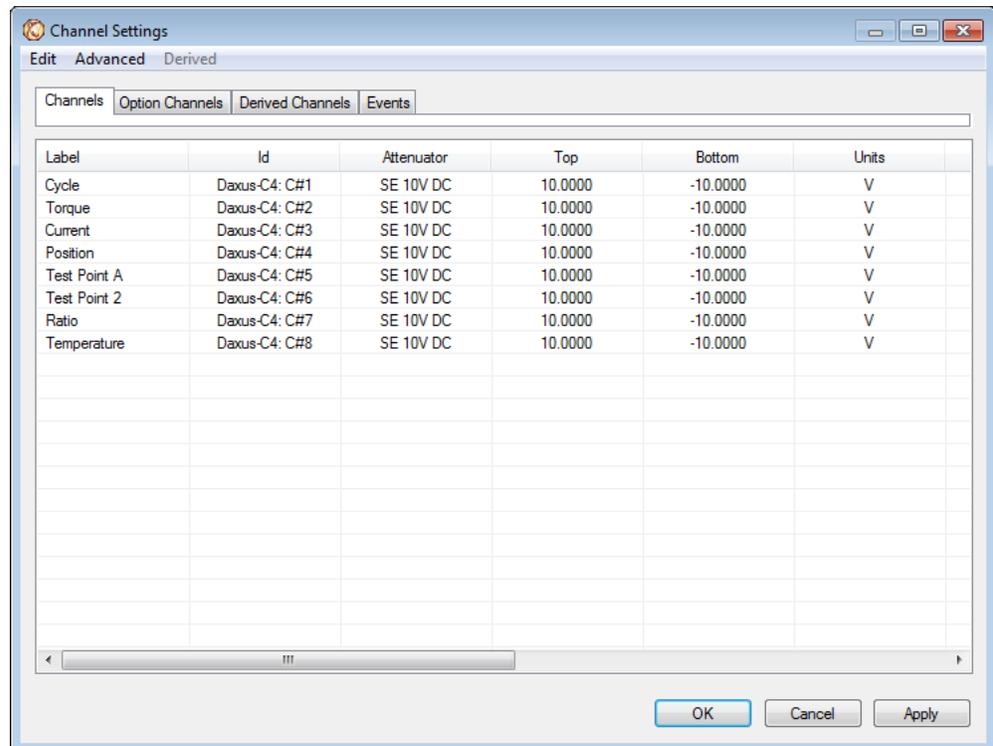
- 5 Set up the differentiation filter options.
  - **Delta** - Filtering is important to achieving good results with differentiation because noise tends to have high slew rates that can overwhelm the signal during differentiation. Choose a delta that is as large as possible without distorting the results.
  - **Output Filter** - Select a low pass filter that will be applied to the output of the differentiation filter.
- 6 Enter the scale of the output by selecting top and bottom values.
- 7 Choose OK.

## About integration

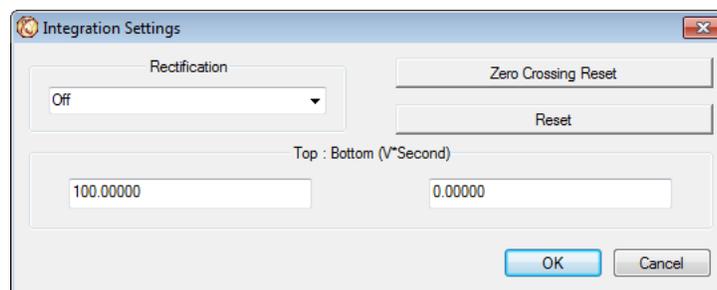
Integration is performed on signal amplitude values provided by the SAR A/D converter through the FPGA. This converter has 12 bits of resolution and is sampled every 5  $\mu$ sec. When integration is enabled, samples are processed by the secondary DSP process every 20  $\mu$ sec (50 KHz). This process multiplies the most recent sample by 20  $\mu$ sec to produce a rectangular approximation of the change in “area under the curve” or integral since the last cycle. This product is added to the previous value of the integral and the sum becomes the new value of the integral. Integration only uses every fourth sample and may miss changes that occur faster than 50 KHz.

## Setting up integration

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose the Channels tab.



- 3 Select a channel.
- 4 Choose the Advanced column heading. A sub menu will appear. Choose Integration. The Integration Settings window will open.



- 5 Select rectification options for the integration filter.
  - **Off** - The signal will not be rectified.
  - **Full Waveform** - Integrates the absolute value, as positive magnitude, of input values.
  - **Positive** - Uses zero for integrating any negative values.
  - **Negative** - Uses zero for integrating any positive values.

- 6 Select reset options for the integration filter.
  - **Zero Crossing Reset** - Resets the integration waveform to zero when the input signal crosses zero.
  - **Reset** - Performs a one-time reset of the integration waveform when you choose OK in the Channel Settings window.
- 7 Enter the scale of the output by selecting top and bottom values.
- 8 Choose OK.

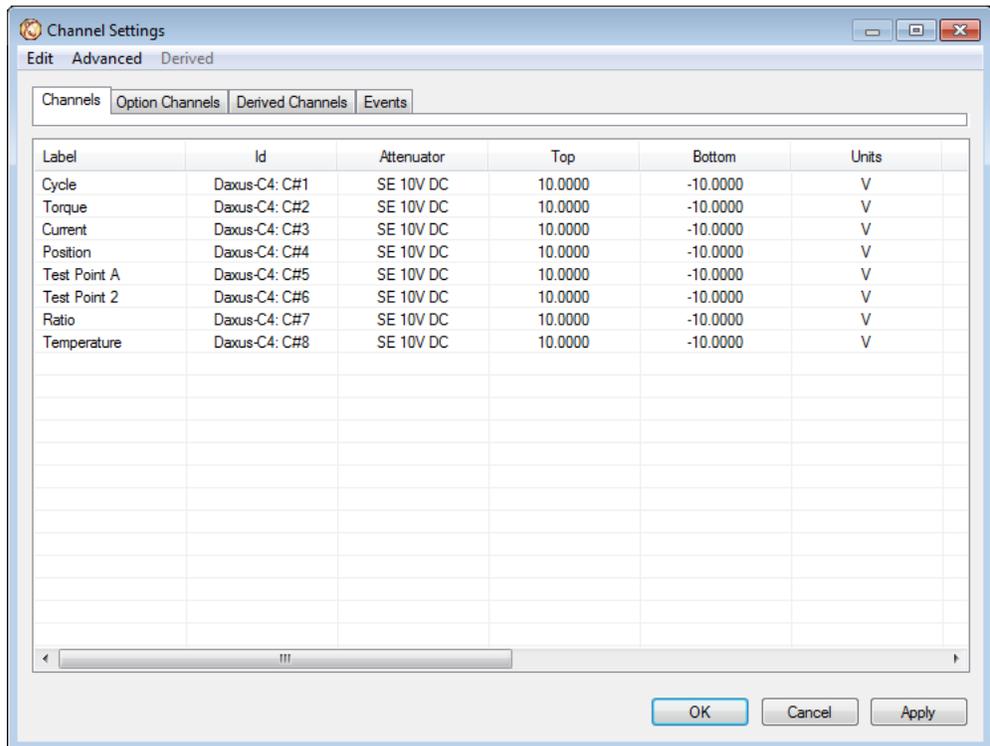
## About RMS

RMS computation is done on signal amplitude values provided by the SAR converter every 5 µsec. When RMS is enabled, each sample is squared and added to a running sum. In the secondary DSP process this sum is divided by the number of samples included in the sum to form an average square value of the input signal. The square root of this value is then taken and used as the output. Each time an RMS value is computed, the sum of squared samples is reset to 0. The process is summarized by the following equation:

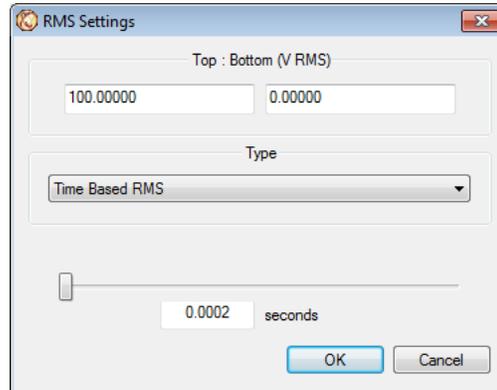
$$x_{\text{rms}} = \sqrt{\frac{1}{n} (x_1^2 + x_2^2 + \dots + x_n^2)}.$$

## Setting up RMS

- 1 Choose Settings >> Channels. The Channel Settings window will open.
- 2 Choose the Channels tab.



- 3 Select a channel.
- 4 Choose the Advanced column heading. A sub menu will appear. Choose RMS. The RMS Settings window will open.



- 5 Enter the scale of the output by selecting top and bottom values.
- 6 Select whether to use a time based RMS or cycle based RMS filter. Choose cycle based RMS if the input signal is a continuous time signal such as a power line sinusoid and it is desired to have the fastest response time possible. Choose time based RMS when the signal is not monotonic, or if averaging over a fixed number of cycles is desired.
- 7 Select the interval over which RMS is computed. The interval should be either an exact multiple of the period of the input waveform, or significantly longer than the slowest component of a repetitive waveform.
- 8 Choose OK.

## Setting up counters

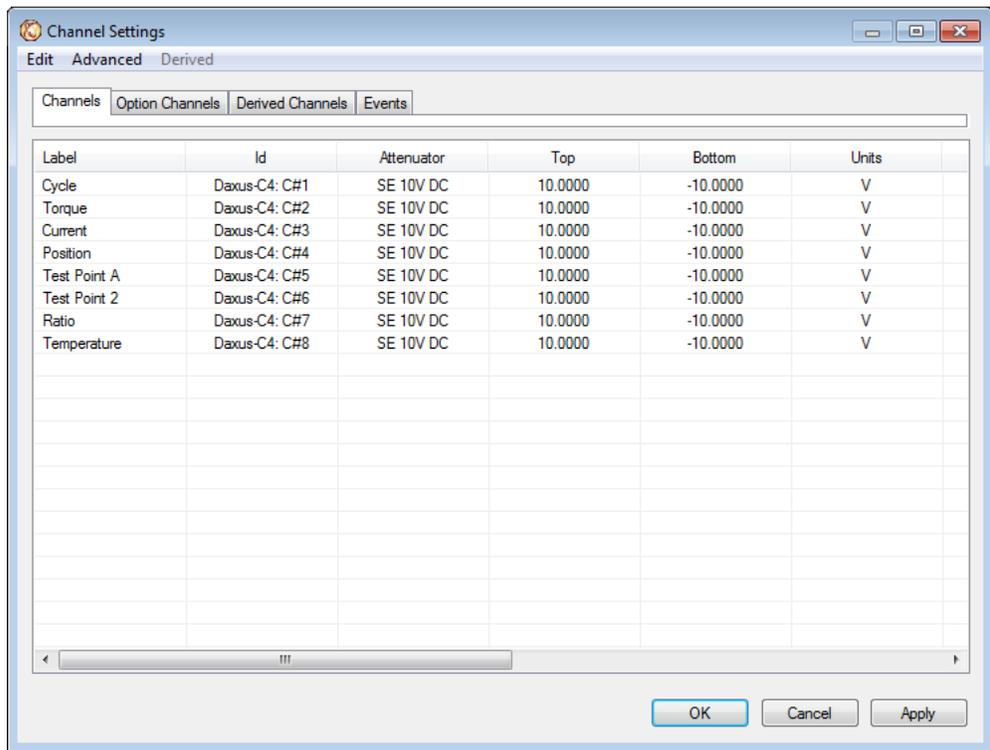
Daxus input modules provide a number of counter/totalizer modes such as frequency counters, quadrature counter, gated pulse counter, pulse width detector, edge separation timer, and others.

The scaling of the displayed result is determined by grid span and offset (top and bottom) settings.

The count can be reset to zero by re-selecting the counter type or pressing a counter reset button previously placed on the control panel.

- 1 Choose Settings >> Channels. The Channel Settings window will open.

- 2 Choose the Channels tab.



- 3 Select a channel.
- 4 Choose the Counter column heading. Select a counter. A counter setup window will open. The options available in this window will differ based on the selected counter type.
  - **Frequency (Time Based)** - Choose this option to use a general purpose frequency counter. This mode has an average time selection (Averaging Period) which is the amount of time that cycles are counted before updating the result, and thus the time over which the result is averaged. To ensure desired accuracy, this average time must be sufficiently long as compared to the input signal's period. Use the slider to configure the average time, moving it to the left to decrease response time, and to the right to increase accuracy.
  - **Frequency (Cycle Based)** - Choose this option to use a frequency counter that updates as soon as possible after a new period of the input crosses through the counter threshold, with no averaging. This mode operates on a single period of the input signal, which must be at least a user-specified minimum frequency. Response time to changes in frequency is directly proportional to the period of the input signal, which becomes slower as the frequency gets lower. Decreasing the selected minimum frequency increases the time it takes for the reported frequency to go to zero when the input is either removed or the frequency falls below the minimum.
  - **Duty Cycle** - Choose this option to use a duty cycle detector for a pulse train on the input. This counter will measure the percentage of time that the input pulse is above the counter threshold voltage.
  - **Pulse Width** - Choose this option to use a pulse width detector for a pulse train on the input. This counter will measure the amount of time (in  $\mu\text{sec}$ ) that the input pulse is above the counter threshold voltage.

- **Event Counter** - This counter mode will display the number of pulses (up to 2000000000) that have been recognized since the counter was initialized. The scaling of the displayed result is determined by counter grid span and offset (counter top and bottom) settings, and an approximate count is displayed if the grid span is greater than 60000.
- **Period** - Choose this option to use a period detector for a signal on the input. This counter will measure the amount of time (in  $\mu\text{sec}$ ) between one rising edge of the input waveform and the next rising edge.
- **Gated Pulse Counter** - This counter uses a z input to open/close the counter gate. When the z input is high, the gate is open and the counter will be active. When the z input is low, the gate is closed and the counter will be inactive.
- **Edge Separation** - This counter measures the time between rising edges of the two inputs of a counter pair. Channels #1-2 are a pair, as are #3-4, etc. Time difference between falling edges can be recorded using the counter invert setup parameter.
- **Quadrature X1** - This counter uses two separate inputs (A and B). For X1 encoding, the count increments on the edge of A when that input is leading the B input, and decrements when the B input is leading the A input. This is the most common usage.

Quadrature counters are organized into pairs of channels on the input module. Channels #1-2 are a pair, as are #3-4. When setting up this counter, the input channel you select is considered input A. Input B is automatically derived, and is the other channel in the pair with input A.

- **Quadrature X2** - This counter uses two separate inputs (A and B). For X2 encoding, the count increments on the rising edge of A when the B input is low and on the falling edge of the A input when the B input is high. Equivalently, the count decrements on the rising edge of A when the B input is high and decrements on the falling edge of A when the B input is low. The result is that for a quadrature encoder with a resolution of 300 per revolution, the count will be incremented 600 times per revolution.

Quadrature counters are organized into pairs of channels on the input module. Channels #1-2 are a pair, as are #3-4. When setting up this counter, the input channel you select is considered input A. Input B is automatically derived, and is the other channel in the pair with input A.

- **Quadrature X4** - This counter uses two separate inputs (A and B). For X4 encoding, the count increments on the rising edge of A when the B input is low, on the falling edge of the A input when the B input is high, on the rising edge of B when the A input is high and on the falling edge of the B input when the A input is low. Equivalently, the count decrements with the opposite conditions. The result is that for a quadrature encoder with a resolution of 300 per revolution, the count will be incremented 1200 times per revolution.

Quadrature counters are organized into pairs of channels on the input module. Channels #1-2 are a pair, as are #3-4. When setting up this counter, the input channel you select is considered input A. Input B is automatically derived, and is the other channel in the pair with input A.

- **Quadrature X1-Z, X2-Z, X4-Z** - These versions of the previously described counters provide for a z-index reset wire.

5 If necessary, adjust the range used for the counter output.

- 6 Select channel and counter threshold options.
  - **Input Channel** - Select the channel that will be used as the input for the counter.
  - **Invert Counter Input** - By default, a counter will increment when the signal's rising edge passes through the counter threshold.

If you enable the Invert Counter Input option, a counter will increment when the signal's falling edge passes through the counter threshold.
  - **Uni-Polar** - By default, the counter threshold is located near zero.

If you enable the Uni-Polar option, the threshold will be moved up to approximately 21% of the highest of the absolute value of the two grid edge voltages. This option is used when measuring signals that do not cross zero.

For highest accuracy on signals with a slower rise time, center the signal on the counter threshold and maximize the voltage swing on both sides of it.
- 7 If necessary, set up engineering units to indicate units for the frequency counter channel.
- 8 Choose OK.

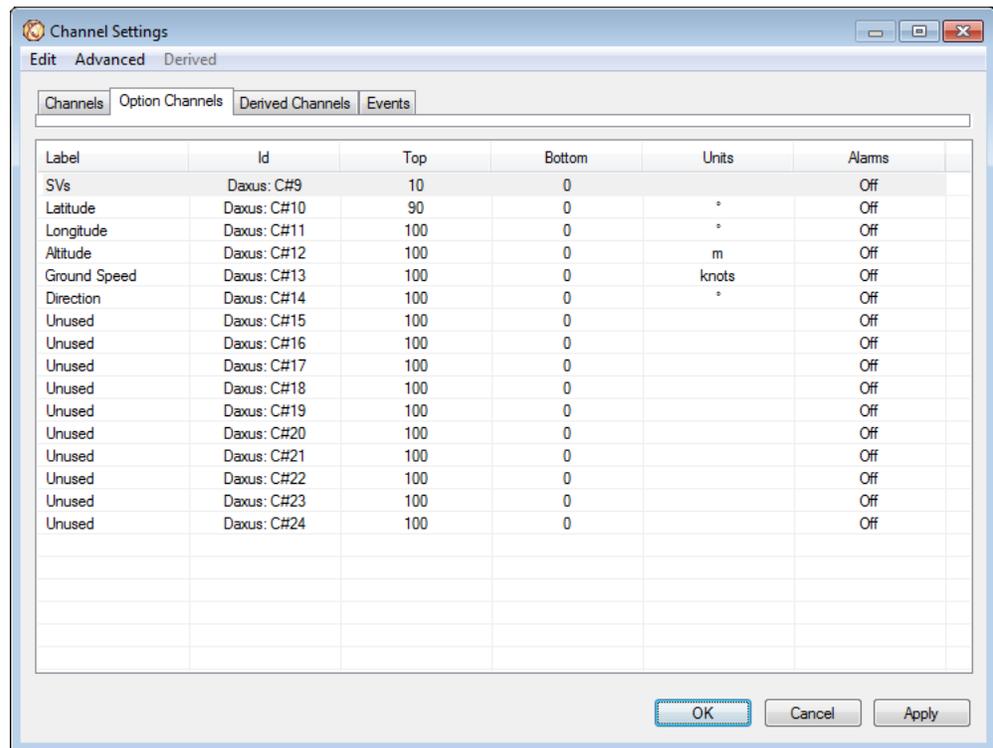
## Setting up option channels

The Option Channels tab in the Channel Settings window is used to configure how GPS/IRIG/CAN signals are displayed. Signals for option channels enter the recorder through the optional GPS/IRIG/CAN card.

**Note:** *The GPS/IRIG/CAN card must be installed to use option channels.*

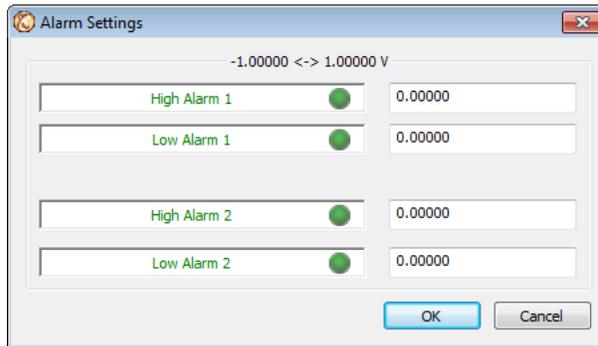
- 1 Choose Settings >> Channels. The Channel Settings window will open.

- 2 Choose the Option Channels tab.



- 3 Select a channel.
- 4 Choose whether to define the channel in terms of top/bottom or span/center. Use the Advanced >> Range Display menu to switch methods.
  - **Top/Bottom** - If you select this method, choose the Top and Bottom column headings to enter the highest and lowest channel values.
  - **Span/Center** - If you select this method, choose the Span and Center column headings to enter the total span of the channel and the center value.
- 5 If necessary, set up user engineering units.

- 6 To use low and/or high alarms, choose the Alarm column heading, and then Set Alarms. The Alarm Settings window will open.



Choose the Low Alarm and/or High Alarm buttons. The selected alarms will become active and the alarm fields will be displayed. Use the alarm fields to enter alarm levels. Choose OK in the Alarms window.

- 7 Choose OK.

**Related Topics:**

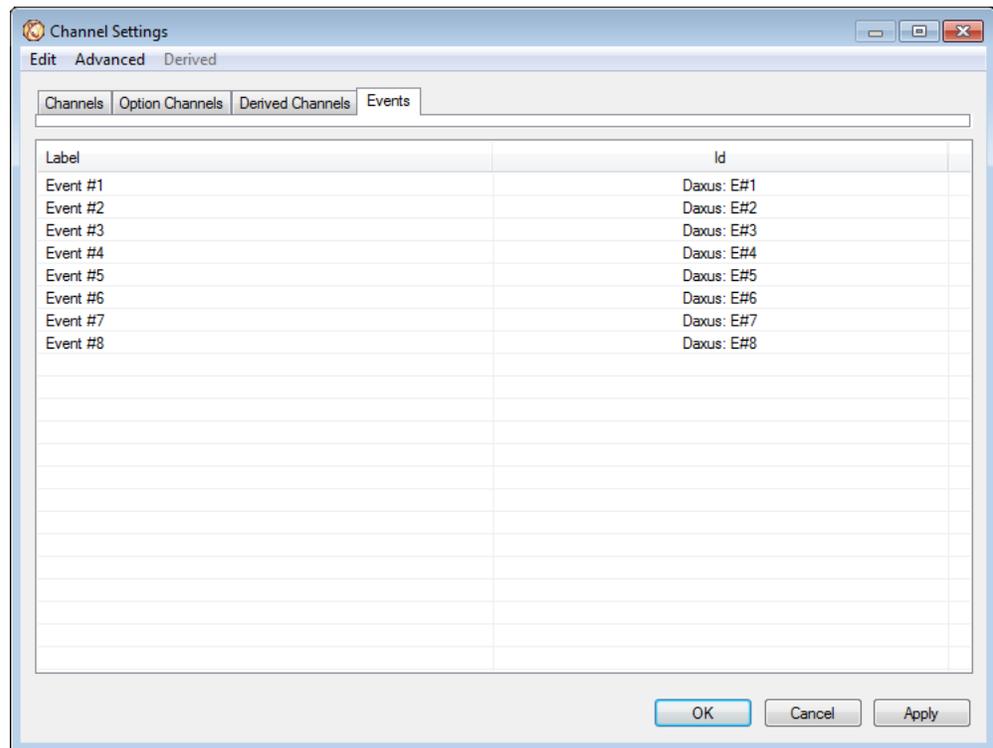
- "GPS/IRIG/CAN" on page 47

## Setting up event inputs

Event inputs are signals that have two states, high (3.3V) or low (0V). Event signals enter the recorder through the utility / DIO port.

- 1 Choose Settings >> Channels. The Channel Settings window will open.

- 2 Choose the Events tab.



By default, events are labeled based on event input numbers.

- 3 To edit the event label, select an event. Then click the event label to enable editing. Enter a label and press Enter.
- 4 Choose OK.

**Related Topics:**

- "Utility / DIO port pin configuration" on page 18



# 9

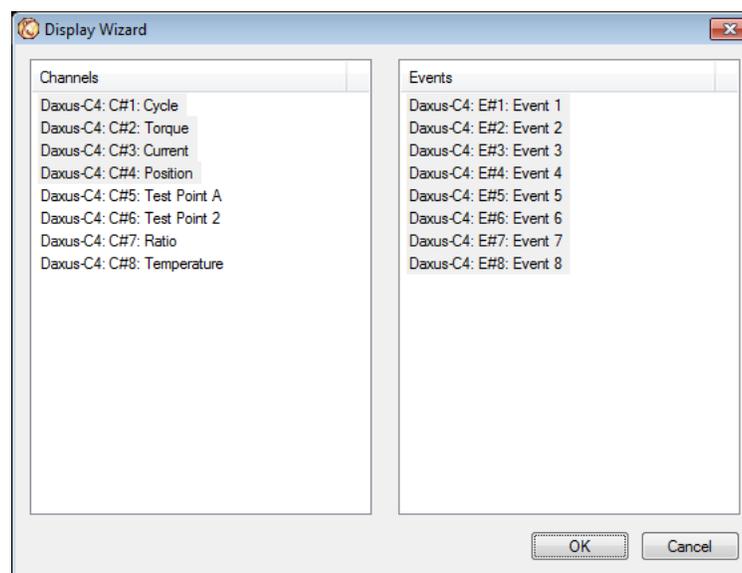
## Display setup

### Display Wizard

Use the Display Wizard to quickly set up or modify the display. You can add, edit, and remove grids and events. When you are finished, the grids and events will be sized to fit in the waveform display area.

#### Using the Display Wizard

- 1 Choose View >> Wizard. The Display Wizard window will open.



When selecting channels and events in this window, you can select multiple items in a list using the following methods.

- To select multiple items, press and hold the Ctrl key while clicking each item.
- To select multiple consecutive items, press and hold the Shift key. Then click the first and last items in the range you want to select.

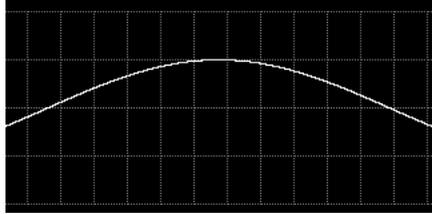
You can also click and drag a selection area using the mouse.

To clear all selections in a list, click in a blank area of the list.

- 2 Select the channels to display by choosing them from the Channels list box.
- 3 Select the events to display by choosing them from the Events list box.
- 4 Choose OK.

# Grids

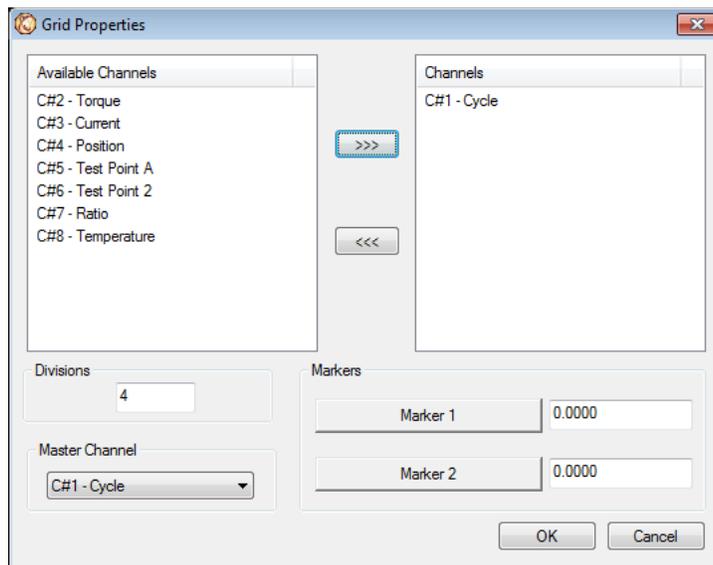
Channel waveforms are drawn on the display in customizable grids. The grids provide a visual aid that can be used for measurement purposes.



You can customize grid size, location, number of divisions, channel content, and various other settings to fit the needs of your application.

## Adding grids

- 1 Choose View >> Add Grid. The Grid Properties window will open.



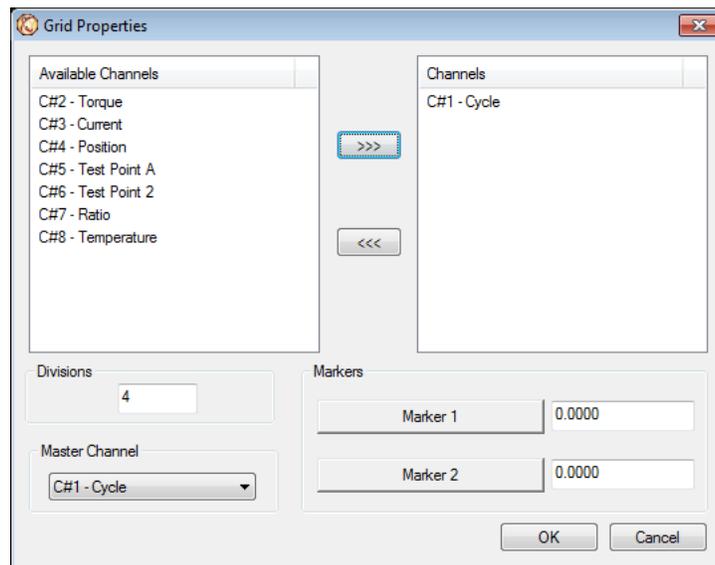
- 2 Select the channels to display by choosing them from the Available Channels list. Then choose the ">>>" button to add them to the Channels list.
- 3 If necessary, select the channels to remove by choosing them from the Channels list. Then choose the "<<<" button to remove them from the Channels list.
- 4 To change the number of grid divisions, enter a value in the Divisions field.
- 5 If there are two or more channels in the Channels list, select a master channel. This affects the display of the channel label area on the right side of the grid. If the label area is small and only one channel label will fit, information for the master channel will be displayed.
- 6 To enable a horizontal marker within the grid, choose a Marker button. Then enter the marker level in the corresponding marker field. Two markers are available.
- 7 Choose OK.

## Editing grids

- 1 Right-click the channel label on the right side of the grid. A sub menu will appear.



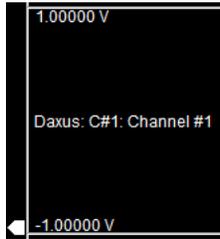
- 2 Choose Properties. The Grid Properties window will open.



- 3 Select the channels to display by choosing them from the Available Channels list. Then choose the ">>>" button to add them to the Channels list.
- 4 If necessary, select the channels to remove by choosing them from the Channels list. Then choose the "<<<" button to remove them from the Channels list.
- 5 To change the number of grid divisions, enter a value in the Divisions field.
- 6 If there are two or more channels in the Channels list, select a master channel. This affects the display of the channel label area on the right side of the grid. If the label area is small and only one channel label will fit, information for the master channel will be displayed.
- 7 To enable a horizontal marker within the grid, choose a Marker button. Then enter the marker level in the corresponding marker field. Two markers are available.
- 8 Choose OK.

## Moving grids

- 1 Click and drag inside the channel label area.



- 2 Move the grid to the desired location and then release it. The grid will be moved to the new position.

## Resizing grids

- 1 Click and drag the top or bottom border of the channel label area.



- 2 Move the top or bottom border and then release it to resize the grid. If necessary, other grids will be resized to accommodate the new position.

## Removing grids

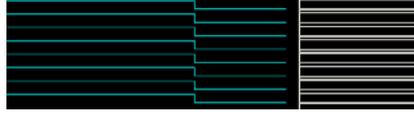
- 1 Right-click the channel label on the right side of the grid. A sub menu will appear.



- 2 Choose Remove. The grid will be removed from the display.

## Events

Events are binary signals that can be monitored and recorded along with waveform data. The state of an event signal is referred to as either high or low.



You can customize event location and style to fit the needs of your application.

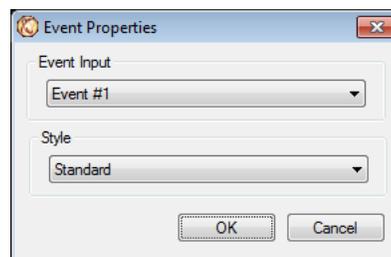
### Event styles

During the event setup process, you will select styles for events. Event styles determine how event signals are drawn on the display. The following event styles are available.

Event Style	Example
Standard	
Bar/Line	
Bar/Off	
Tick	

### Adding events

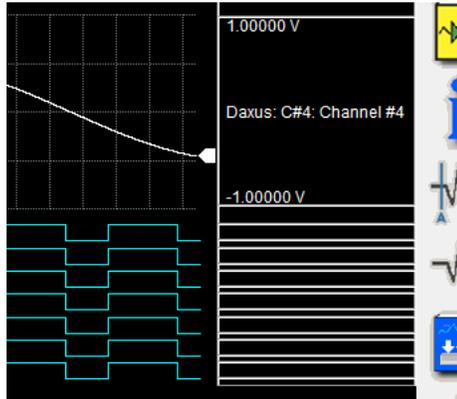
- 1 Choose View >> Add Event. The Event Properties window will open.



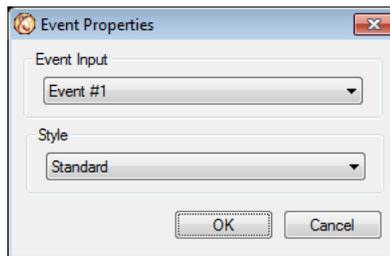
- 2 Select the event input to display by choosing it from the Event Input list.
- 3 Select the event style from the Style list.
- 4 Choose OK.

## Editing events

- 1 Right-click the event label on the right side of the event. A sub menu will appear.



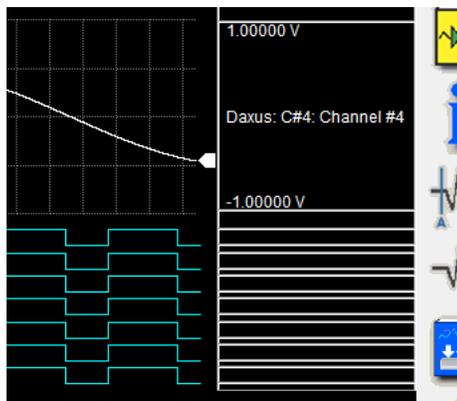
- 2 Choose Properties. The Event Properties window will open.



- 3 Select the event input to display by choosing it from the Event Input list.
- 4 Select the event style from the Style list.
- 5 Choose OK.

## Moving events

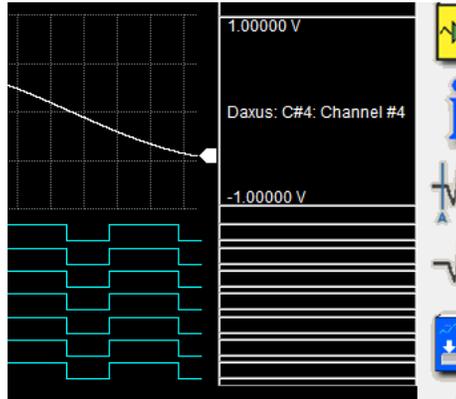
- 1 Click and drag inside the event label on the right side of the event.



- 2 Move the event to the desired location and then release it. The event will be moved to the new position.

## Removing events

- 1 Right-click the event label on the right side of the event. A sub menu will appear.



- 2 Choose Remove. The event will be removed from the display.

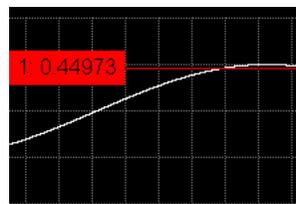
## Editing and moving markers

During the grid setup process, you can enable or disable horizontal markers for grids. You can also edit and move markers on existing grids.

- 1 Right-click the channel label on the right side of the grid. A sub menu will appear.



- 2 To toggle the visibility of a marker, choose Marker 1 or Marker 2. Visible markers will be indicated by check marks in this menu.
- 3 To move a visible marker, click the marker label and drag up/down to the desired location.



## Showing and hiding pens, channel limits, and the control panel

You can hide some display elements to use more of the screen for viewing waveforms.

- 1 Realtime waveforms are drawn on the display using on-screen pens. To show or hide these pens, click the Pens button along the right side of the display.



**Note:** On-screen pens are only available in Realtime mode.

- 2 The channel label area on the right side of the grid displays channel labels and high/low limits. To show or hide this area, click the Limits button along the right side of the display.



- 3 To show or hide the control panel, click the Panel button along the right side of the display.



## Adding user text

In Realtime mode, a user text area is available in the lower-right corner of the screen. You can enter text that will be displayed in this area during recording.

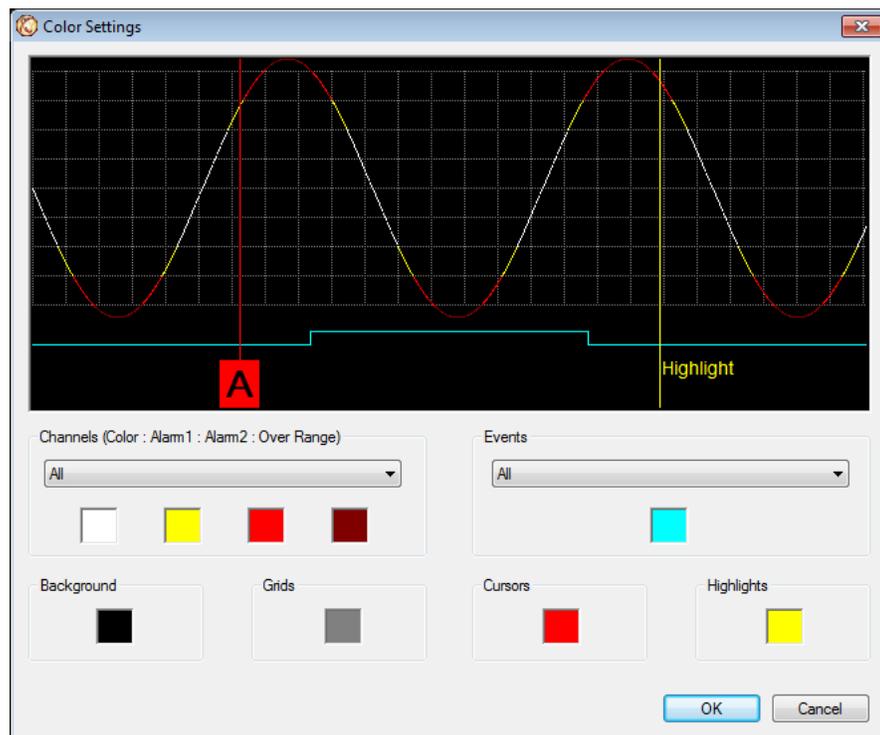
- 1 In Realtime mode, click the lower-right corner of the screen.



- 2 Enter the user text to display in this area (up to 50 characters).

## Setting up colors

- 1 Choose View >> Colors. The Color Settings window will open.



The display preview will be updated as you make selections in this window.

- 2 Apply colors to waveforms with the Channels options. You can choose to apply colors to all channels or individual channels.
  - **Color** - This option sets the color of the waveform. To modify the waveform color, choose the color box. The Color window will open. Select a color and choose OK.
  - **Alarm 1** - This option sets the color of the waveform portions that extend above or below the high and low boundaries for alarm 1. To modify the alarm 1 color, choose the color box. The Color window will open. Select a color and choose OK.
  - **Alarm 2** - This option sets the color of the waveform portions that extend above or below the high and low boundaries for alarm 2. To modify the alarm 2 color, choose the color box. The Color window will open. Select a color and choose OK.
  - **Over Range** - This option sets the color of waveform portions that extend above or below the grid boundaries. To modify the over range color, choose the color box. The Color window will open. Select a color and choose OK.
- 3 Apply colors to events with the Events options. You can choose to apply colors to all events or individual events.

To modify the event color, choose the color box. The Color window will open. Select a color and choose OK.
- 4 Apply colors to other display elements.
  - **Background** - This option sets the background color of the waveform display and channel label areas for contrast with your grid colors. To modify the background color, choose the color box. The Color window will open. Select a color and choose OK.
  - **Grids** - This option sets the grid color. To modify the grid color, choose the color box. The Color window will open. Select a color and choose OK.
  - **Cursors** - This option sets the cursor color. To modify the cursor color, choose the color box. The Color window will open. Select a color and choose OK.
  - **Highlights** - This option sets the highlight color. To modify the highlight color, choose the color box. The Color window will open. Select a color and choose OK.
- 5 Choose OK.

# 10

## Realtime mode

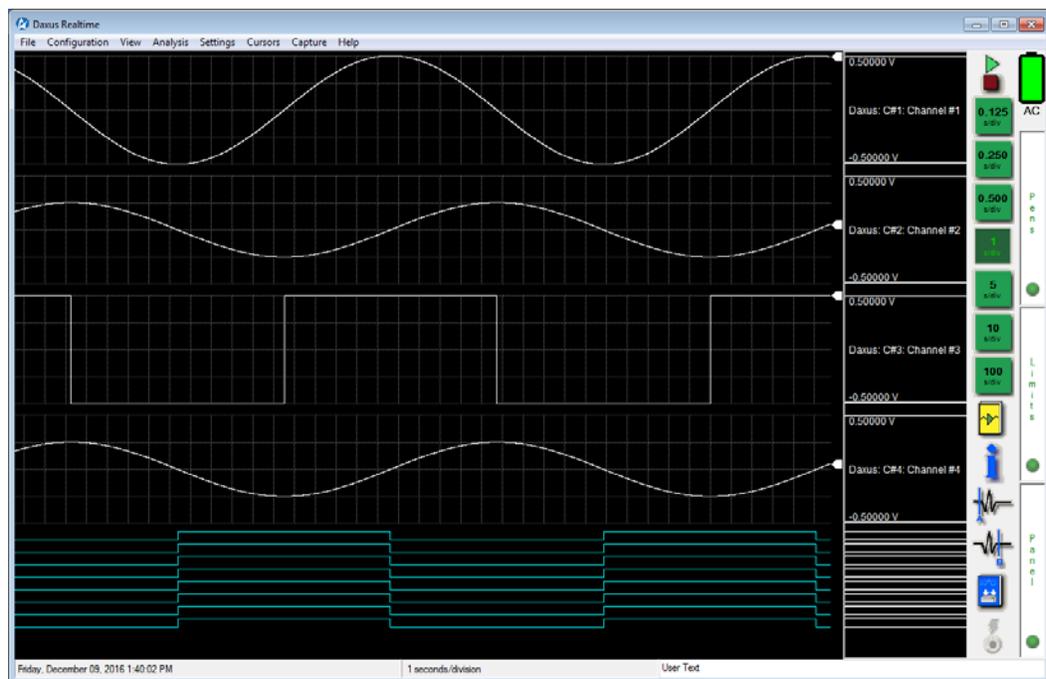
### Realtime mode introduction

Realtime mode provides real-time waveform scrolling, monitoring, and data capture capabilities, typically used to view low frequency waveforms. Additionally, almost all system setup options are accessible from Realtime mode.

### Accessing Realtime mode

- 1 Choose Configuration >> Realtime from the menu bar. Realtime mode will start.

The following illustration displays a typical Realtime mode screen. Realtime mode screen appearances will vary based on the control panel configuration and other selected options.



### Freezing and running the monitor

- 1 To freeze/run the monitor with the menu bar, choose View >> Freeze Display. Repeat this step to toggle between frozen and running monitor states.
- 2 To freeze/run the monitor with the control panel, choose the Monitor Run/Halt icon.



Repeat this step to toggle between frozen and running monitor states.

## Realtime mode default control panel

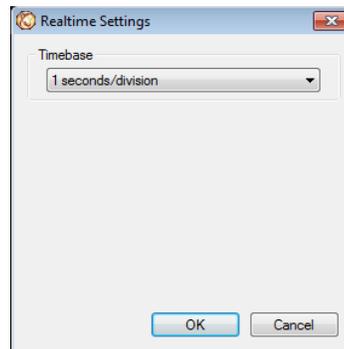
The following list describes the functions of default control panel icons.

**Note:** A selection path for each icon is indicated. When the Panel Settings window is open, you can use this path to add the icon to the control panel.

Icon	Description
	<p><b>Monitor Run/Halt</b> starts and stops the on-screen display from running.</p> <p><i>View &gt;&gt; Monitor Run/Halt</i></p>
	<p><b>Set Timebase</b> changes the speed of the on-screen chart. In this example, the chart speed will be changed to 5 seconds/division when the icon is pressed.</p> <p><i>Settings &gt;&gt; Timebase</i></p>
	<p><b>Channel Settings</b> opens the Channel Settings window, which is used to set up amplifier inputs, base channels, derived channels, and event inputs.</p> <p><i>Settings &gt;&gt; Channels</i></p>
	<p><b>Channel Information</b> displays and hides the Channel Information window, which is used in conjunction with cursors to measure signals.</p> <p><i>Analysis &gt;&gt; Channel Information</i></p>
	<p><b>Cursor A</b> displays and hides cursor A.</p> <p><i>Cursors &gt;&gt; Cursor A</i></p>
	<p><b>Cursor B</b> displays and hides cursor B.</p> <p><i>Cursors &gt;&gt; Cursor B</i></p>
	<p><b>Capture Settings</b> opens the Capture Settings window, which is used to configure data capture setup options.</p> <p><i>Capture &gt;&gt; Capture Settings</i></p>
	<p><b>Trigger Indicator</b> indicates when a trigger occurs by displaying a yellow circle.</p> <p><i>Capture &gt;&gt; Trigger Indicator</i></p>

## Setting up Realtime mode

- 1 Choose Settings >> Realtime.



- 2 Set the size of the timebase (seconds/division).
- 3 Choose OK.

## Realtime mode view options

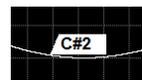
This section describes the view options available in Realtime mode.

### Printing signal IDs

Signal IDs are small visual indicators that identify channels. Signal IDs can be printed at any time. This feature is especially helpful for identifying multiple waveforms displayed in a single grid.

**Note:** *In Realtime mode, you can automatically display signal IDs at periodic intervals by choosing View >> Auto ID.*

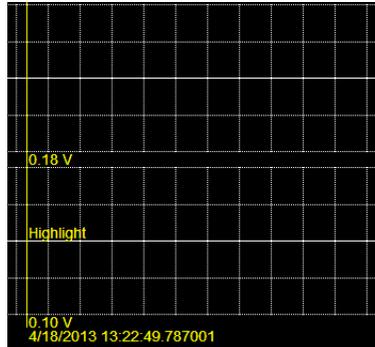
- 1 Choose View >> Print IDs.



A signal ID indicator will be displayed and printed for each waveform and event.

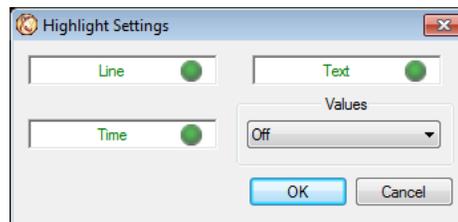
# Highlights

Highlights allow you to mark areas of interest during realtime recording and data captures. You can add a vertical line, time, channel values, and custom text as part of each highlight.



## Setting up highlights

- 1 Choose Settings >> Highlight. The Highlight Settings window will open.



- 2 Choose one or more highlight features to enable highlights.
  - **Line** - When you add a highlight with this option enabled, a vertical line will be displayed at the highlight point.
  - **Time** - When you add a highlight with this option enabled, the time will be displayed at the highlight point.
  - **Text** - When you add a highlight with this option enabled, you can enter a text line associated with the highlight.
  - **Values** - When you add a highlight with Under Waveform or Under Grid enabled, the channel value will be displayed at the highlight point.
- 3 Choose OK.

## Adding highlights

- 1 Double-click a location in the waveform display area.

**Note:** *Highlights cannot be added to scope captures.*

If a data capture is in progress, the highlight will be saved as part of the data capture.

## Printing to PDF or a printer

- 1 You can print an image of the screen contents to PDF or an installed printer.
  - To save the screen image as a PDF file, choose File >> Print Screen >> PDF. You will be prompted to save the PDF file to a folder on your PC.
  - To print the screen image using an installed printer, choose File >> Print Screen >> Printer.
- 2 In Review or Scope mode, you can save information from the data capture to a PDF file. Choose File >> Send to PDF. A sub menu will appear. Choose whether to save the entire file or the area between cursors. You will be prompted to save the PDF file to a folder on your PC.

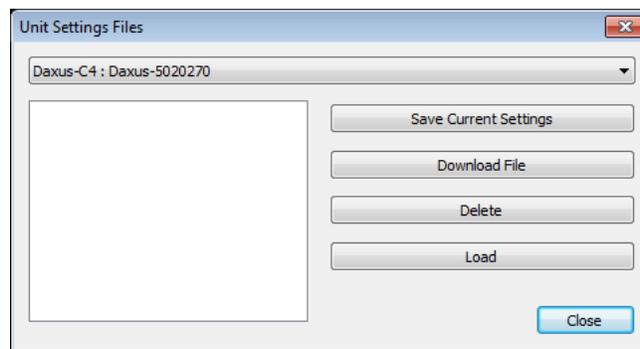
## Setup files

Setup files contain all system setup information that can be saved to a file for later recall. These files can be considered a “complete setup” that can be saved and loaded as needed.

It may be helpful to create a library of setup files to accommodate multiple tasks and/or users. Additionally, setup files are portable, so they can be shared with other Daxus units.

### Saving a setup file

- 1 In Realtime mode, choose Settings >> Unit Settings >> Settings Files. The Unit Settings File window will open.



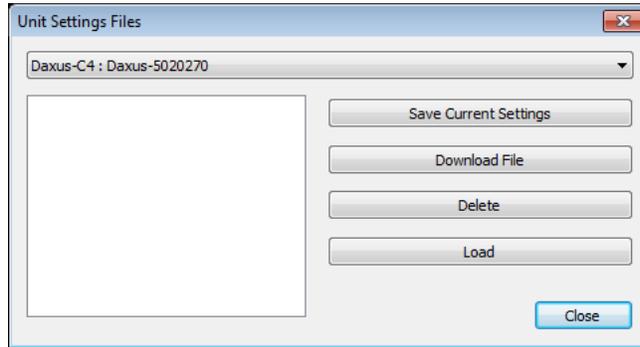
- 2 Select the Daxus from the Unit list.
- 3 Choose Save Current Settings. The Settings Name window will open.



- 4 Enter a name for the settings file.
- 5 Choose OK. The settings file will be saved on the Daxus.

## Loading a setup file from the PC

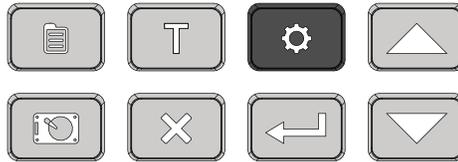
- 1 In Realtime mode, choose Settings >> Unit Settings >> Settings Files. The Unit Settings File window will open.



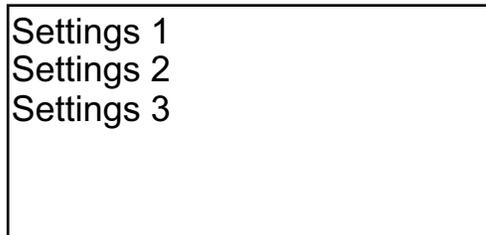
- 2 Select the Daxus from the Unit list.
- 3 Select a setup file from the list.
- 4 Choose Load. The setup file will be loaded.

## Loading a setup file from the Daxus

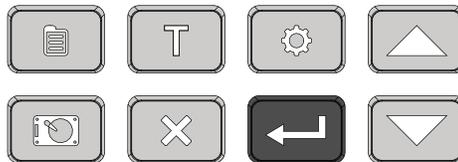
- 1 Press the Settings key.



The settings menu will be displayed. This menu lists all setup files saved on the Daxus unit.



- 2 Use the arrow keys to select a settings file. Then press the Enter key.

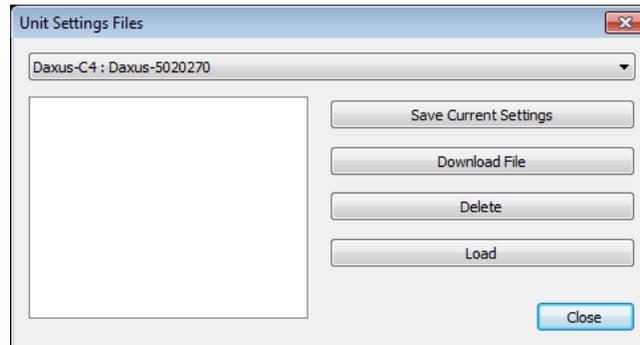


The settings file will be loaded.

## Downloading a setup file from the PC to the Daxus

Use the following instructions to copy a setup file created in the Daxus software on a PC to a Daxus.

- 1 In Realtime mode, choose Settings >> Unit Settings >> Settings Files. The Unit Settings File window will open.

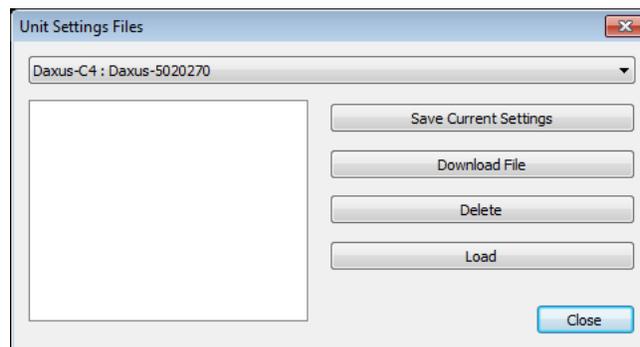


- 2 Select the Daxus from the Unit list.
- 3 Choose Download File. A file save window will open. Browse to and select a setup file on the PC.

The setup file will be copied from the PC to the selected Daxus. It will be available for selection in the settings menu on the Daxus.

## Deleting a setup file

- 1 In Realtime mode, choose Settings >> Unit Settings >> Settings Files. The Unit Settings File window will open.



- 2 Select the Daxus from the Unit list.
- 3 Select a setup file from the list.
- 4 Choose Delete. The setup file will be deleted.



## Data capture overview

This section provides an overview of data capture concepts and the data capture process.

### Data capture concepts

The following concepts are commonly used during data capture-related tasks.

#### Data capture

Data capture is the process of sampling signals and saving the sampled data to the Daxus hard drive.

#### Data capture record (DCR) file

The recorder saves data capture information in a type of file format known as a DCR file. Base file names can be assigned to these files as part of the data capture setup process.

#### Sample rates

Sample rates define the speed at which signals are sampled to the hard drive. This rate is defined in units of Hz (hertz), the number of samples per second.

#### Trigger

A trigger is a user-defined event that starts the post-trigger recording phase of a data capture.

#### Data capture storage allocation

The data capture storage allocation determines the size of the data capture.

An estimate of needed disk space for the DCR file is derived based on the data capture storage allocation and sample rate specified.

#### Pre-trigger and post-trigger data

Pre-trigger data makes up the sequence of samples recorded prior to the occurrence of a trigger. Similarly, post-trigger data makes up the sequence of samples recorded after the occurrence of a trigger.

#### Pre-trigger percent

The pre-trigger percent is the amount of space in a data capture that is reserved for pre-trigger data.

This amount is defined by a percentage of the whole data capture size. For example, a pre-trigger percentage of 25% would result in a data capture file that contains 25% pre-trigger data and 75% post-trigger data.

### Arm

Arming starts the data capture function. When armed, the system monitors trigger and abort conditions. If a trigger occurs, the post-trigger recording phase will begin. If an abort occurs, the data capture will be canceled.

- If a pre-trigger recording percentage is used, the pre-trigger recording phase begins when the system is armed. Pre-trigger samples will be acquired and stored up to the specified amount. When the specified amount of pre-trigger data has been stored, the oldest sample will be replaced by the most recent, creating a circular buffer.
- If no pre-trigger recording percentage is used, samples will be recorded up to the specified amount.

### Auto re-arm

The auto re-arm feature automatically re-arms a new capture immediately after the current capture is complete. Automatically re-arming data captures is helpful when analyzing repetitive events, but it can produce a large number of captures depending on trigger conditions.

### Abort

An abort is a user-defined event that stops a data capture in progress. When an abort condition is detected, any currently running data capture will be stopped. All data captured up to this point is saved.

## Data capture process

This section provides an overview of the data capture process.

### 1) Set up the data capture

The data capture setup process involves entering a base file name for the data capture, specifying storage allocation options, defining and selecting channel sample rates, and activating the desired automation options.

### 2) Set up triggers and aborts

The trigger and abort setup process involves defining conditions that initiate triggers and aborts.

### 3) Arm the data capture

Arming starts the data capture function. When armed, the system monitors trigger and abort conditions. If a trigger occurs, the post-trigger recording phase will begin. If an abort occurs, the data capture will be canceled.

- If a pre-trigger recording percentage is used, the pre-trigger recording phase begins when the system is armed. Pre-trigger samples will be acquired and stored up to the specified amount. When the specified amount of pre-trigger data has been stored, the oldest sample will be replaced by the most recent, creating a circular buffer.
- If no pre-trigger recording percentage is used, samples will be recorded up to the specified amount.

### 4) Post-trigger recording

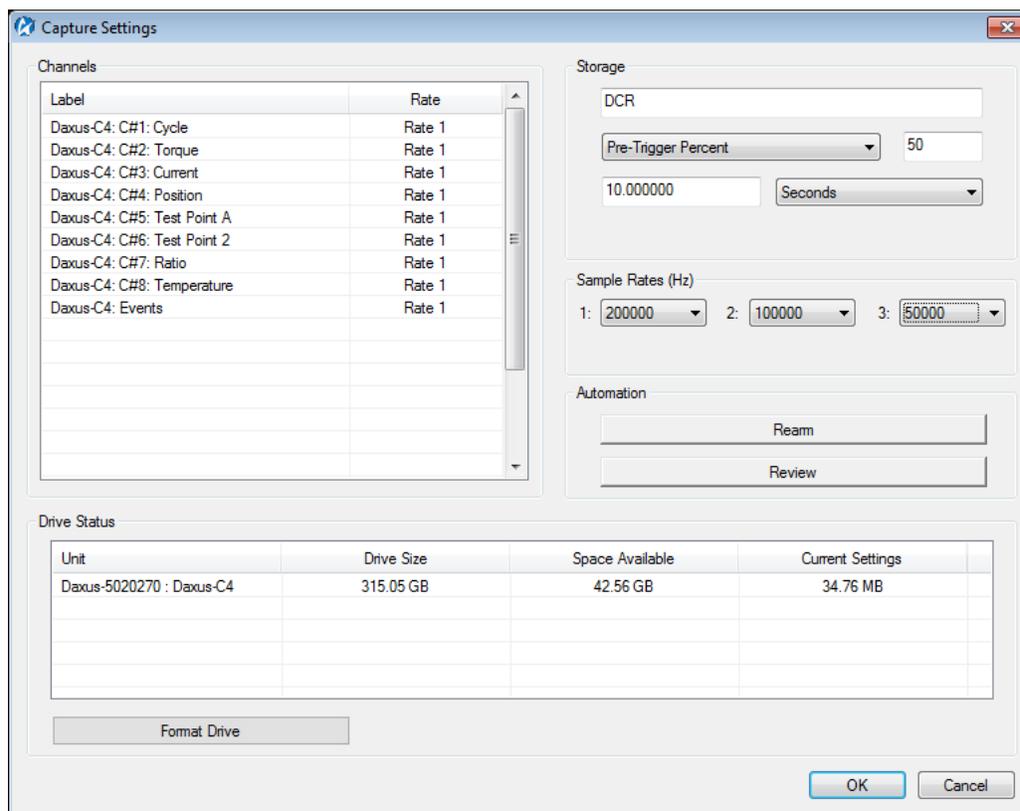
When a trigger occurs, the post-trigger recording phase will begin. Samples will be acquired and saved until the data capture storage allocation is met or the capture is aborted.

## Data capture setup

This section provides instructions for setting up data captures.

### Setting up a data capture

- 1 Choose Capture >> Settings. The Capture Settings window will open.



The Daxus hard drive status is displayed in the lower section of the window.

- 2 Specify a DCR base file name by choosing the text field in the Storage options. Enter a base file name for the DCR file.

When a data capture is saved, the time and date of the capture are automatically appended to the end of the base file name.

- 3 Specify pre-trigger storage options by deciding if pre-trigger data should be included in the data capture.
  - If the data capture will contain pre-trigger data, select the Pre-Trigger Percent option. Then choose the Pre-Trigger Percent field.
 

Enter the percentage of the file that will be used for pre-trigger data. If the trigger point represents the end of the data of interest, choose a high pre-trigger percentage. If it precedes the data of interest, choose a low number.
  - If the data capture will not contain pre-trigger data, select the No Trigger option.

- 4 Specify the size of the capture by defining a data capture storage allocation. The size can be defined in units of time (hours, minutes, or seconds).

Select a unit of measure from the drop-down list. Then choose the quantity field to the left of the drop-down list. Enter the desired quantity.

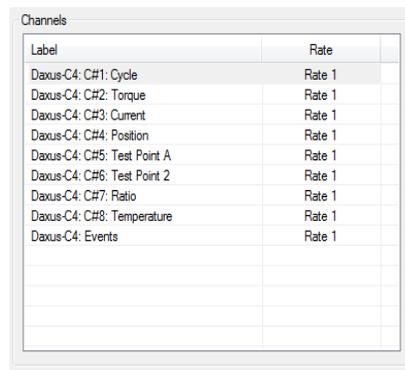
- 5 Specify sample rates to define the speeds at which channels are sampled. Sample rates are defined in units of Hz (hertz), the number of samples per second. You can select up to three sample rates.

Select the highest sample rate you plan to use from the first list. Then select the second, and third highest rates using the other lists.

Subsequent sample rates can be set to a value up to half of the previous rate. For example, if you choose 200000 for rate 1, you can choose up to 100000 for rate 2.

- 6 Select the channels to include in the data capture, and the sample rate for each channel.

Select a channel and choose the Rate column heading. A list of sample rate options will appear. To include the channel in the data capture, select Rate 1, Rate 2, or Rate 3. To exclude the channel from the data capture, select Off.



Label	Rate
Daxus-C4: C#1: Cycle	Rate 1
Daxus-C4: C#2: Torque	Rate 1
Daxus-C4: C#3: Current	Rate 1
Daxus-C4: C#4: Position	Rate 1
Daxus-C4: C#5: Test Point A	Rate 1
Daxus-C4: C#6: Test Point 2	Rate 1
Daxus-C4: C#7: Ratio	Rate 1
Daxus-C4: C#8: Temperature	Rate 1
Daxus-C4: Events	Rate 1

- 7 Specify automation preferences by choosing whether to enable automatic re-arm and review options.
  - To automatically re-arm the capture immediately after the current capture is complete, choose the Rearm option. This feature cannot be used if Auto Review is enabled.

Automatically re-arming data captures is helpful when analyzing repetitive events, but it can produce a large number of captures depending on trigger conditions.
  - To automatically open the DCR file in Review mode immediately after the data capture is complete, choose the Review option. This feature cannot be used if Auto Rearm is enabled.
- 8 Choose OK.

---

## Triggers and aborts

A trigger is a user-defined event that starts the post-trigger recording phase of a data capture. An abort is a user-defined event that stops a data capture in progress. When an abort condition is detected, any currently running data capture will be stopped. All data captured up to this point is saved.

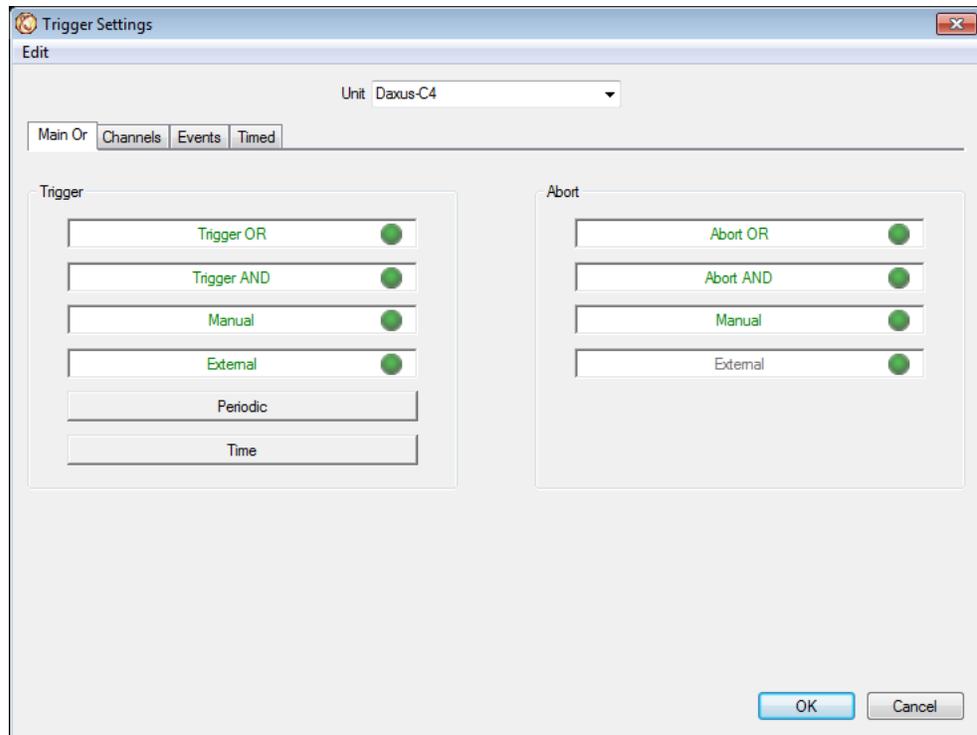
Trigger and abort conditions can be defined as the manual push of a button, the receiving of an external signal, or when specific channels detect data at certain values. Triggers can also be based on an elapsed time period or a specific date/time.

The following trigger/abort types are available:

- **Window Trigger/Abort** - This trigger/abort occurs when signals move inside or outside a predetermined window of values. The user provides the high and low level for the window.
- **Edge Trigger/Abort** - This trigger/abort occurs when signals move above or below a certain level. The user provides this level.
- **Slew Trigger/Abort** - This trigger/abort occurs when a signal's rate of change (known as "slew" or "slope") reaches or drops below a certain value. The user provides the change in amplitude and the length of time, which are used to calculate slew.
- **Manual Trigger/Abort** - This trigger/abort occurs when the user produces a trigger/abort via the menu bar or control panel.
- **External Trigger/Abort** - This trigger/abort uses an external low (0V) signal via the Utility / DIO port to produce a trigger or abort.
- **Periodic Triggers** - The Periodic trigger occurs after a specific amount of elapsed time. When a periodic trigger occurs, this process will be repeated.
- **Time Triggers** - The Time trigger occurs at a specific date and time.
- **Event Trigger/Abort** - This trigger/abort uses external signals via the event port to produce a trigger or abort, based on the state of the events.

## Enabling and disabling triggers and aborts

- 1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.
- 2 Choose the Main Or tab.



- 3 Enable and disable triggers or aborts by choosing the trigger/abort buttons. Buttons that appear green and “pressed in” indicate enabled triggers/aborts.

There are ten groups of triggers and aborts that can be enabled/disabled from this screen. All triggers/aborts fall into one of these categories.

- Trigger OR, Abort OR
- Trigger AND, Abort AND
- Manual Trigger, Manual Abort
- External Trigger, External Abort
- Periodic Trigger
- Time Trigger

**Note:** Event triggers/aborts are the exception to this rule and are configured separately in the Events tab.

- 4 The next step in the setup process depends on what kind of trigger/abort you are setting up.
  - **Manual** triggers/aborts require no additional setup. Simply choose OK to close the Trigger Settings window.
  - **External** triggers/aborts require that you set up the Utility / DIO port, if you have not already done so.
  - **AND/OR** triggers/aborts have their own setup procedures.
  - **Periodic** and **Time** triggers have their own setup procedures.

## AND/OR triggers/aborts

All AND/OR triggers and aborts use AND/OR logic to determine when to activate; they can be based on an amplitude window, level (edge), or slew.

- **OR** triggers/aborts will activate if **any** OR conditions have been met.  
For example: A one-channel OR trigger/abort will activate as soon as its conditions are met; the status of the other channels is irrelevant. A two-channel OR trigger/abort will activate as soon as either of the channels' conditions are met.
- **AND** triggers/aborts will activate if (and only if) **all** AND conditions have been met.  
For example: A two-channel AND trigger/abort will activate as soon as both channels' conditions are met; nothing will occur if one channel meets its conditions without the other. A three-channel trigger/abort will activate as soon as all three channels' conditions are met.

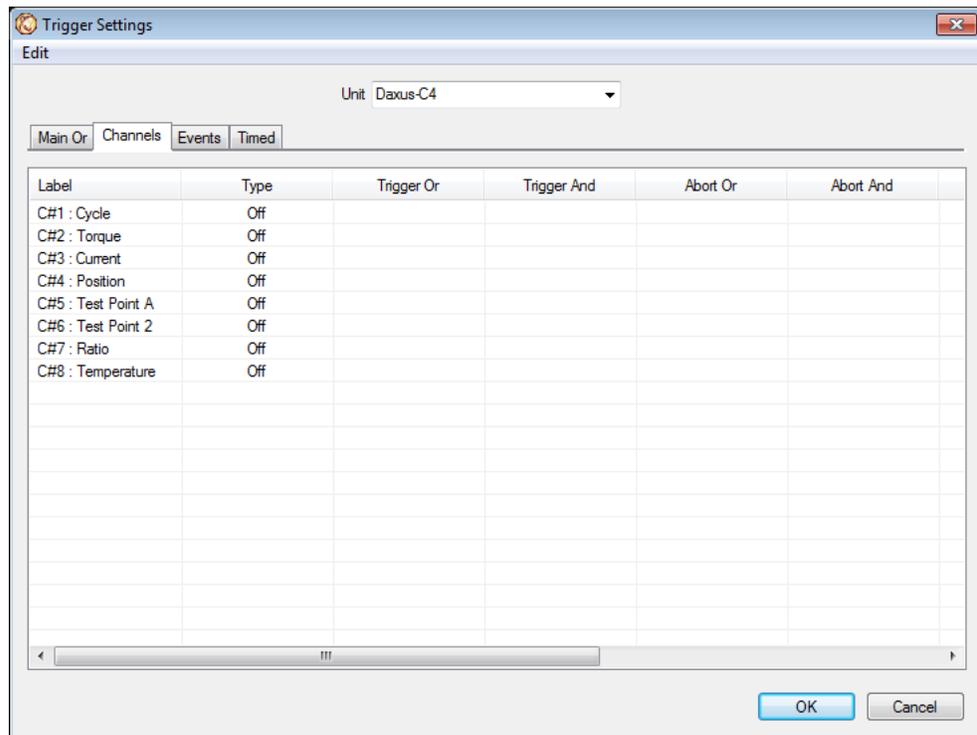
Any channel can be included or removed from either trigger/abort by adjusting its settings in the Trigger Settings window.

### Setting up a Window trigger/abort

This trigger/abort occurs when signals move inside or outside a predetermined window of values. The user provides the high and low level for the window.

- 1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.

## 2 Choose the Channels tab.



## 3 Select the Daxus unit that will be used.

## 4 Select the channel you want to apply the trigger/abort to from the channel list.

## 5 Choose the Type column heading. Select the window type from the list.

- **Outside window** - Choose this option to set the trigger/abort to occur when the signal exceeds the upper boundary or drops below the lower boundary.
- **Inside window** - Choose this option to set the trigger/abort to occur when the signal exceeds the lower boundary but remains below the upper boundary.

## 6 Define the amplitude window boundaries.

- Choose the High Level column heading. Enter the high value for the amplitude window and choose OK.
- Choose the Low Level column heading. Enter the low value for the amplitude window and choose OK.

- 7 Set the trigger/abort as AND, OR, or both.
  - **Trigger OR** - To include the channel in the OR trigger, choose the Trigger OR column heading and choose Include.
  - **Trigger AND** - To include the channel in the AND trigger, choose the Trigger AND column heading and choose Include.
  - **Abort OR** - To include the channel in the OR abort, choose the Abort OR column heading and choose Include.
  - **Abort AND** - To include the channel in the AND abort, choose the Abort AND column heading and choose Include.
- 8 Choose OK.

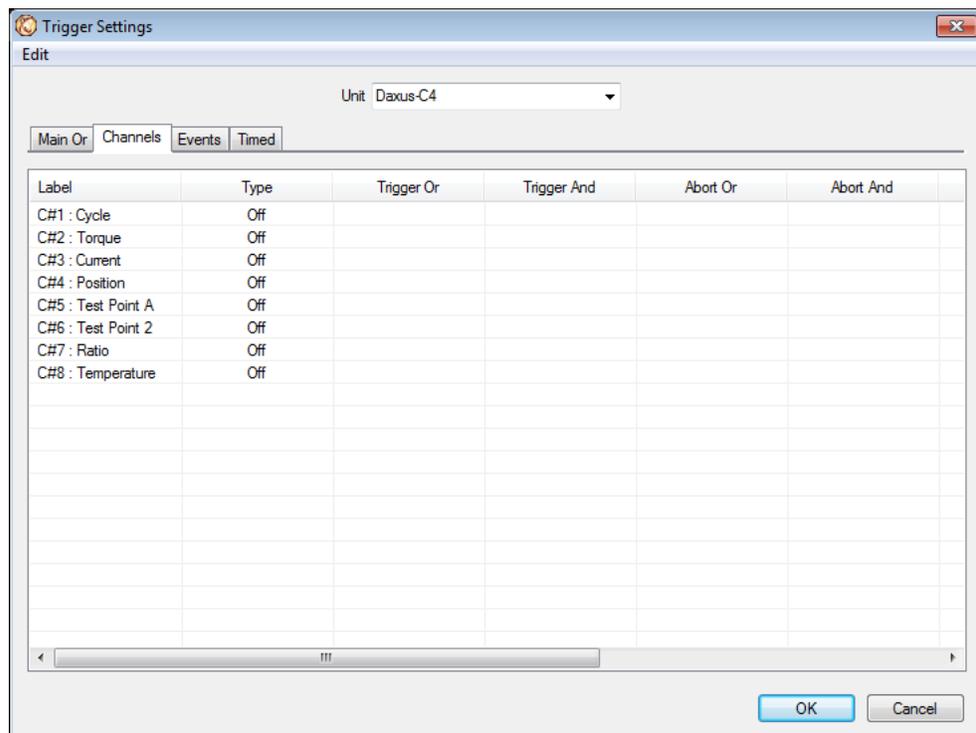
**Related Topics:**

- "AND/OR triggers/aborts" on page 127

## Setting up an Edge trigger/abort

This trigger/abort occurs when signals move above or below a certain level. The user provides this level.

- 1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.
- 2 Choose the Channels tab.



- 3 Select the Daxus unit that will be used.
- 4 Select the channel you want to apply the trigger/abort to from the channel list.

- 5 Choose the Type column heading. Select the edge type from the settings list.
  - **Rising Edge** - Choose this option to set the trigger/abort to occur when the signal rises above a specific level.
  - **Falling Edge** - Choose this option to set the trigger/abort to occur when the signal drops below a specific level.
- 6 Choose the High Level column heading. Enter the edge level and choose OK.
 

**Note:** The Low Level setting is not used in Rising Edge or Falling Edge triggers/aborts.
- 7 Set the trigger/abort as AND, OR, or both.
  - **Trigger OR** - To include the channel in the OR trigger, choose the Trigger OR column heading and choose Include.
  - **Trigger AND** - To include the channel in the AND trigger, choose the Trigger AND column heading and choose Include.
  - **Abort OR** - To include the channel in the OR abort, choose the Abort OR column heading and choose Include.
  - **Abort AND** - To include the channel in the AND abort, choose the Abort AND column heading and choose Include.
- 8 Choose OK.

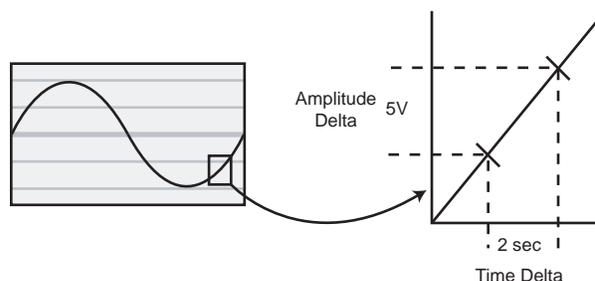
**Related Topics:**

- "AND/OR triggers/aborts" on page 127

## About Slew triggers/aborts

This trigger/abort occurs when a signal's rate of change (known as "slew" or "slope") reaches or drops below a certain value. The user provides the change in amplitude and the length of time, which are used to calculate slew.

The following example illustrates important concepts related to this trigger/abort. You may want to refer to this example as you set up a Slew trigger/abort.



**Amplitude Delta** - The Amplitude Delta indicates the slew voltage span. The slope of this voltage span with respect to the Time Delta will set the trigger point.

For this example, Amplitude Delta is set to 5 V.

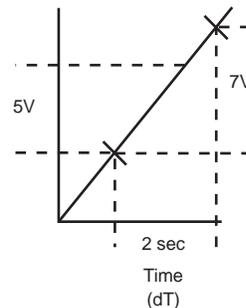
**Time Delta** - The Time Delta indicates the time to monitor the slope change of the Amplitude Delta span. This can be set from 500 ns to 8.3886075 seconds. This is done by choosing a number that when multiplied with 0.0000005 (500 ns, the shortest time you can set) results in the Time Delta.

For this example, Time Delta is set to 4000000, resulting in a Time Delta of 2 seconds.

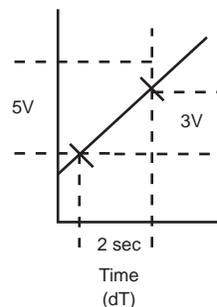
**Slew Spikes/Dropouts** - A slew spike occurs when the slew rate of the Amplitude Delta with respect to the Time Delta rises above the specified parameters.

Likewise, a slew dropout occurs when the slew rate of the Amplitude Delta with respect to the Time Delta falls below the specified parameters.

- If using slew spikes, the following scenario would result in a trigger/abort: Signal Slew Rate =  $7V / 2 \text{ sec} = 3.5 \text{ V/s}$



- If using slew dropouts, the following scenario would result in a trigger/abort: Signal Slew Rate =  $3V / 2 \text{ sec} = 1.5 \text{ V/s}$



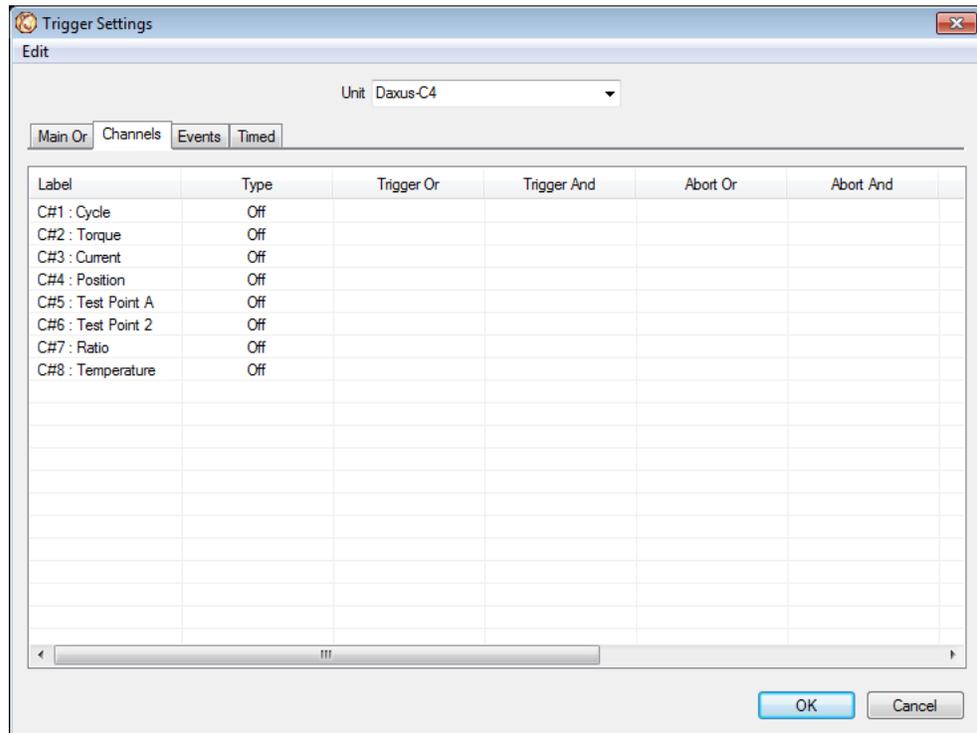
**Related Topics:**

- "AND/OR triggers/aborts" on page 127

## Setting up a Slew trigger/abort

This trigger/abort occurs when a signal's rate of change (known as "slew" or "slope") reaches or drops below a certain value. The user provides the change in amplitude and the length of time, which are used to calculate slew.

- 1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.
- 2 Choose the Channels tab.



- 3 Select the Daxus unit that will be used.
- 4 Select the channel you want to apply the trigger/abort to from the channel list.
- 5 Choose the Type column heading. Select the slew type from the list.
  - **Slew Spikes** - Choose this option to set the trigger/abort to occur when the slew rises above the chosen rate.
  - **Slew Dropout** - Choose this option to set the trigger/abort to occur when the slew falls below the chosen rate
- 6 Define the slew rate.
  - Choose the Time Delta column heading. Enter the time delta value and choose OK.
  - Choose the Amplitude Delta column heading. Enter the amplitude delta value and choose OK.

7 Set the trigger/abort as OR.

- **Trigger OR** - To include the channel in the OR trigger, choose the Trigger OR column heading and choose Include.
- **Abort OR** - To include the channel in the OR abort, choose the Abort OR column heading and choose Include.

**Note:** *Trigger/Abort AND logic cannot be used on slew triggers/aborts.*

8 Choose OK.

**Related Topics:**

- "AND/OR triggers/aborts" on page 127

## Event triggers/aborts

An Event Trigger/Abort occurs when event inputs meet their change in logic state. This is communicated through the Utility / DIO port, and is not affected by any of the channel waveforms.

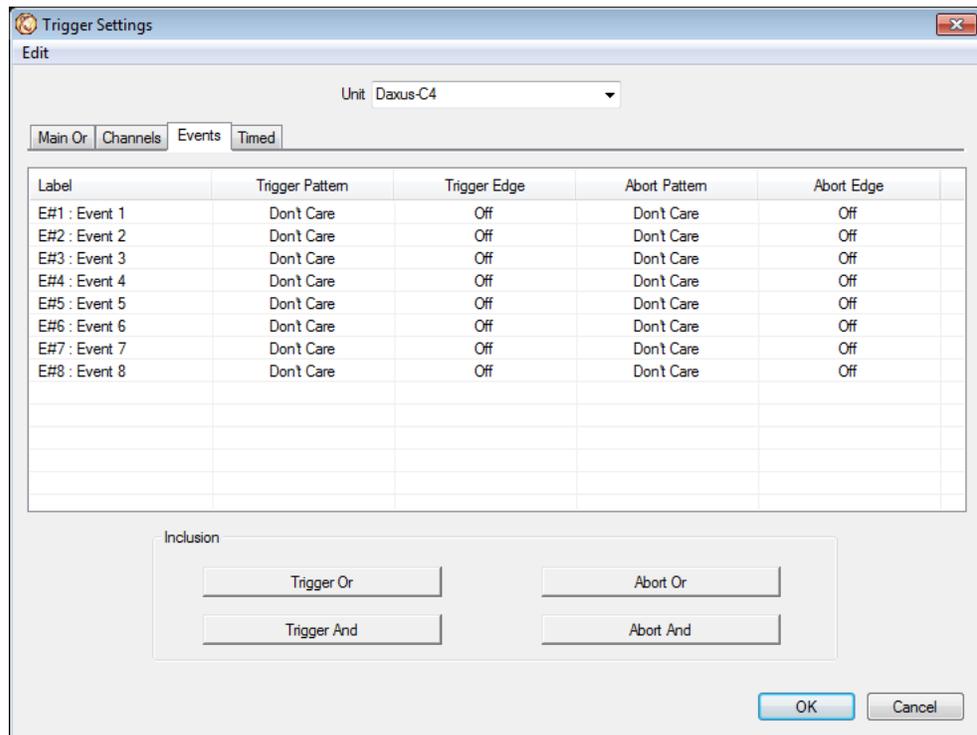
There are two types of Event triggers/aborts:

- **Pattern** - An event pattern trigger/abort occurs each time all events meet the selected logic state (high, low, don't care). The user provides the state for each event.
- **Edge** - An event edge trigger/abort occurs any time at least one of the events changes states in a specific direction (rising, falling, either). The user provides this direction for each event.

### Setting up an Event trigger/abort

1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.

## 2 Choose the Events tab.



## 3 Select the event you want to apply the trigger/abort to from the event list.

## 4 To set an event pattern trigger/abort, choose the Trigger Pattern or Abort Pattern column heading. Select a pattern option. Remember that all the events must meet their states in order for an event pattern trigger or abort to occur.

- **Don't Care** - If the Don't Care option is chosen, changes in the selected event will not be considered in the trigger/abort pattern.
- **Low** - If the Low option is chosen, a trigger/abort will occur when the selected event is in its low state (assuming all other event state trigger/abort conditions are met).
- **High** - If the High option is chosen, a trigger/abort will occur when the selected event changes to its high state (assuming all other event state trigger/abort conditions are met).

- 5 To set an event edge trigger/abort, choose the Trigger Edge or Abort Edge column heading. Select an edge option. Remember that a trigger or abort will occur whenever any one of the events meets its state.
  - **Off** - If the Off option is chosen, changes in the selected event will not cause a trigger/abort to occur.
  - **Rising** - If the Rising option is chosen, a trigger/abort will occur whenever the selected event changes to its high state.
  - **Falling** - If the Falling option is chosen, a trigger/abort will occur whenever the selected event changes to its low state.
  - **Either** - If the Either option is chosen, a trigger/abort will occur any time the selected event changes state in any way; low to high or high to low.
- 6 Set the event triggers/aborts as AND, OR, or both.
  - **Trigger OR** - Choose this option to include events in the OR trigger.
  - **Trigger AND** - Choose this option to include events in the AND trigger.
  - **Abort OR** - Choose this option to include events in the OR abort.
  - **Abort AND** - Choose this option to include events in the AND abort.
- 7 Choose OK.

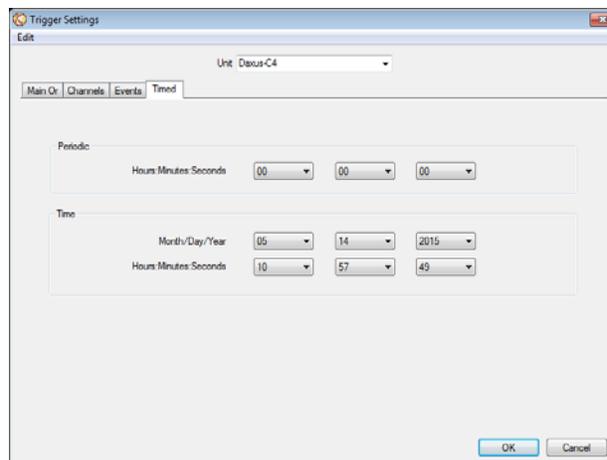
## Periodic and time triggers

Periodic and time triggers are based on elapsed time and a specific date/time respectively.

### Setting up a Periodic trigger

The Periodic trigger occurs after a specific amount of elapsed time. When a periodic trigger occurs, this process will be repeated.

- 1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.
- 2 Choose the Timed tab.

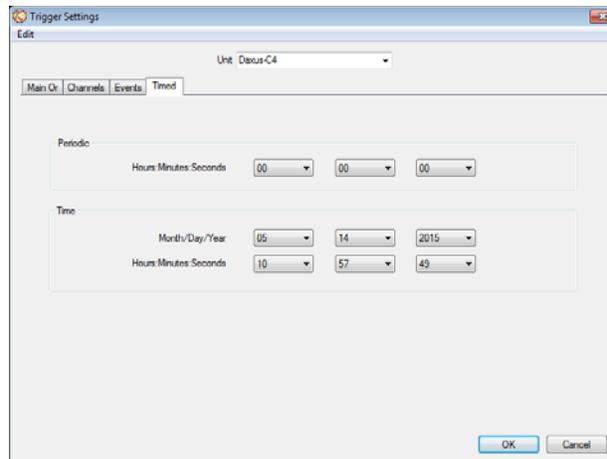


- 3 Use the Periodic options to select how often a trigger should occur. For example, if a trigger should occur every 10 minutes, choose a value of 10 in the Minutes field.
- 4 Choose OK. The clock period will start.

## Setting up a Time trigger

The Time trigger occurs at a specific date and time.

- 1 Choose Capture >> Trigger/Abort Settings. The Trigger Settings window will open.
- 2 Choose the Timed tab.



- 3 Use the Time options to select the date and time when a trigger should occur.
- 4 Choose OK.

## Performing a data capture

When the data capture setup, trigger setup, and abort setup tasks are complete, the data capture can be initiated by arming the system.

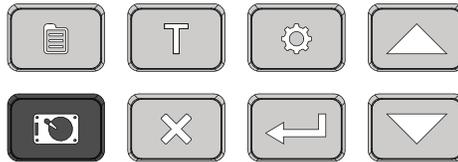
Arming starts the data capture function. When armed, the system monitors trigger and abort conditions. If a trigger occurs, the post-trigger recording phase will begin. If an abort occurs, the data capture will be canceled.

- If a pre-trigger recording percentage is used, the pre-trigger recording phase begins when the system is armed. Pre-trigger samples will be acquired and stored up to the specified amount. When the specified amount of pre-trigger data has been stored, the oldest sample will be replaced by the most recent, creating a circular buffer.
- If no pre-trigger recording percentage is used, samples will be recorded up to the specified amount.

When a trigger occurs, the post-trigger recording phase will begin. Samples will be acquired and saved until the data capture storage allocation is met or the capture is aborted.

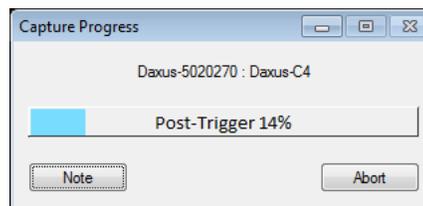
1 Arm the data capture using one of the following methods.

- Choose Capture >> Arm.
- Press the Arm key on the Daxus keypad.



If the data capture includes pre-trigger data, the recorder will begin recording pre-trigger data.

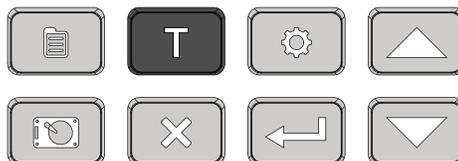
If you are monitoring the data capture with a computer, the Capture Progress window will open. This window is not available when using a Daxus for standalone data capture.



2 Wait for a trigger or abort to occur based on the trigger and abort settings.

If manual triggers are used, manually trigger the data capture when appropriate using one of the following methods.

- Choose Capture >> Trigger.
- Press the Trigger key on the Daxus.

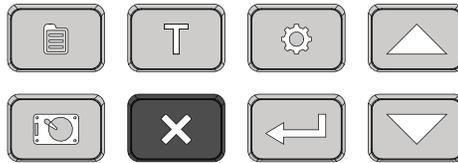


After a trigger occurs, the data capture will complete automatically and save the results to a file.

**Note:** If automatic re-arming is enabled, the system will continually re-arm the data capture.

If manual aborts are used, manually abort the data capture when appropriate using one of the following methods.

- Choose Capture >> Abort.
- Press the Abort key on the Daxus.

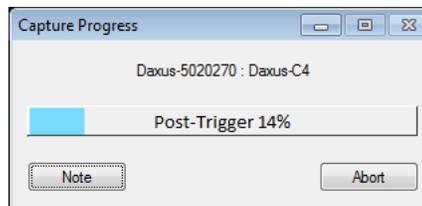


### Adding notes to data captures

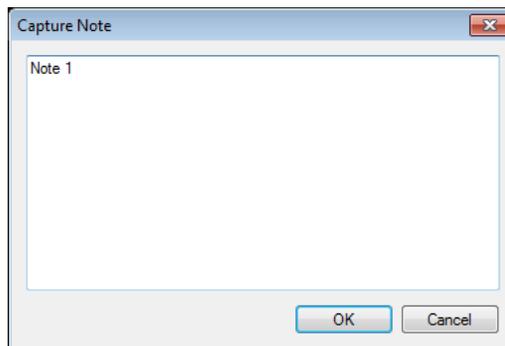
During a data capture, you can insert text notes that will be saved as part of the data capture file. These notes will later be available for viewing and editing in Review mode.

**Note:** This procedure assumes you are monitoring the data capture with a computer. The note feature is not available when using a Daxus for standalone data capture.

- 1 When a data capture is in progress, the Capture Progress window will be open.



- 2 Choose the Note button to add a text note. The Capture Note window will open.



- 3 Enter the note text and choose OK. The note will be saved as part of the data capture. To enter another note, repeat this process.

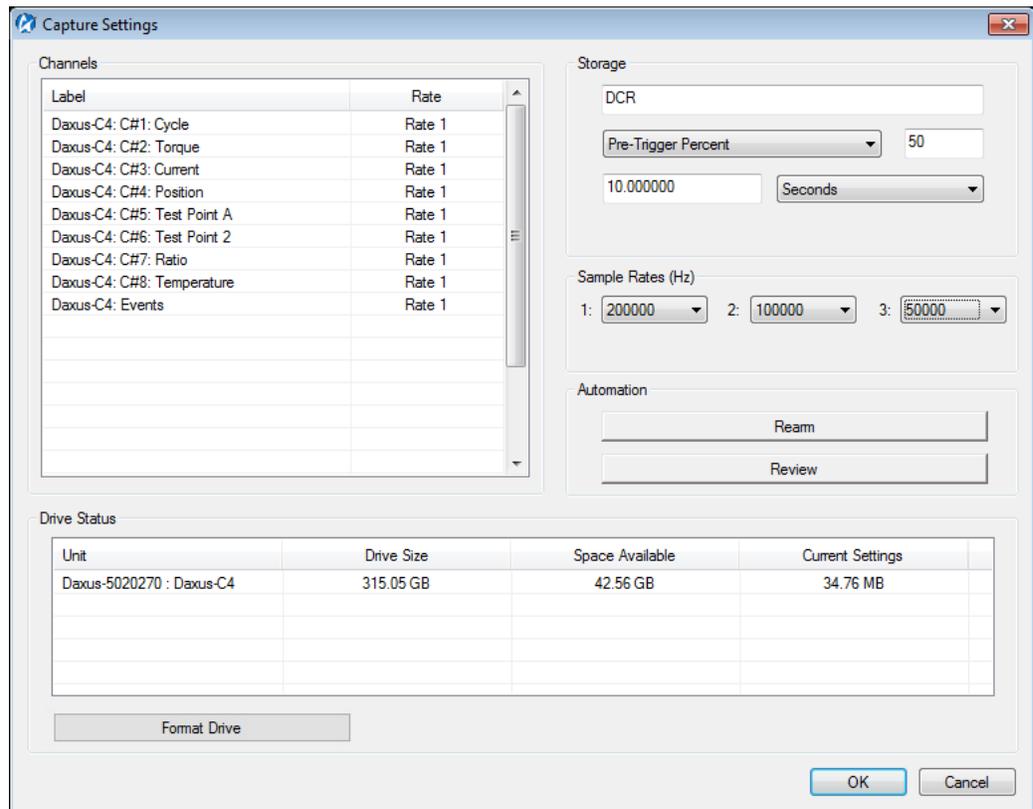
You can take as much time as needed to enter a note. Notes are embedded in the data capture at the point in time the Note button was clicked.

## Formatting the Daxus hard drive

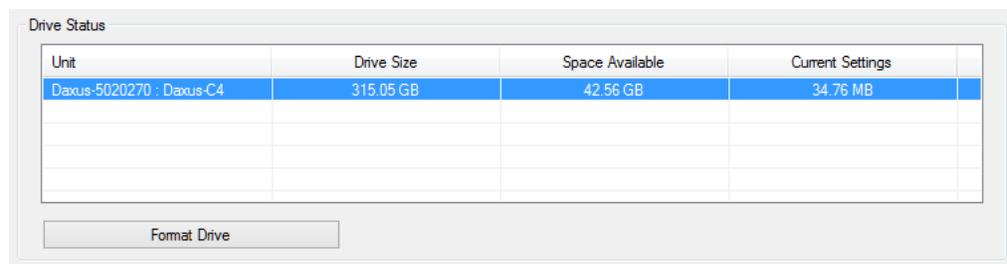
Records can be removed from the Daxus hard drive by performing a format of the drive.

**Caution:** Use caution when formatting the hard drive because all data files are deleted. Ensure you have archived any needed files prior to formatting.

- 1 Choose Capture >> Settings. The Capture Settings window will open.



- 2 Select the Daxus from the unit list. The Format Drive button will become available.



- 3 Choose Format Drive. A confirmation message will appear.

Choose Yes. The Daxus hard drive will be formatted.



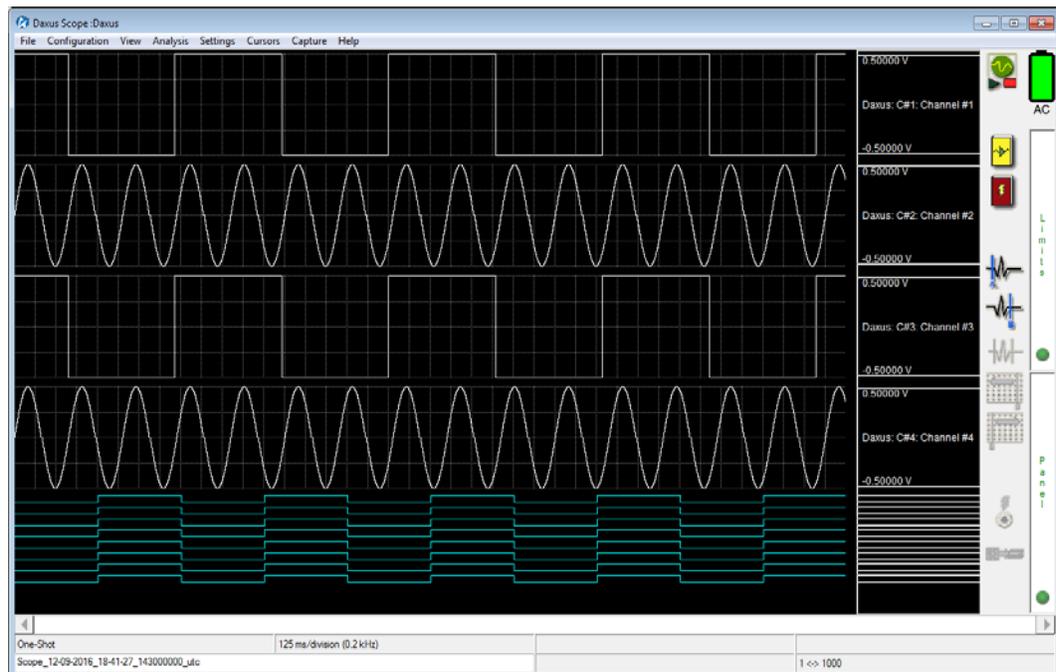
## Scope mode introduction

Scope mode acts like a digital storage oscilloscope, providing high time-base resolution for viewing high-frequency signals. Scope mode is useful for timing and synchronization analysis, transient capture, and high-speed testing. It can be used while continuously capturing data and monitoring signals on the display.

### Accessing Scope mode

- 1 Choose Configuration >> Scope from the menu bar. Scope mode will start.

The following illustration displays a typical Scope mode screen. Scope mode screen appearances will vary based on the control panel configuration and other selected options.



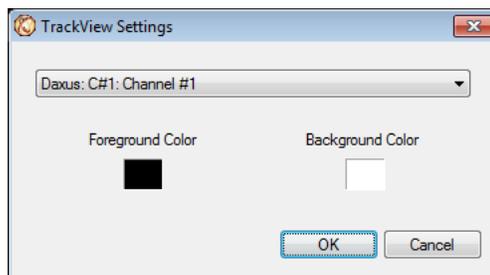
### Using the track view

The track view is a visual scroll bar located on the bottom of the display. It can be used to navigate to other areas of the capture.



The track view displays a signal for a visual reference. The signal displayed in the track view can be changed, if desired. If the track view signal is changed, the selected signal will become the default until another signal is chosen.

- 1 Navigate through a file using the track view.
  - To scroll slowly through the file in a particular direction, choose one of the arrows on the sides of the track view.
  - To scroll quickly through the file in a particular direction, click and hold the shaded portion of the track view. Then drag it to the new location and release it. The file will scroll as the shaded bar is dragged.
- 2 If necessary, edit track view settings by choosing View >> Track View Channel. The Track View Settings window will open.

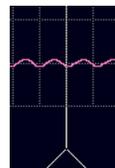


- Select a channel or event to display in the track view.
  - To select a track view foreground color, choose the Foreground Color box. The Color window will open. Select a color and choose OK.
  - To select a track view background color, choose the Background Color box. The Color window will open. Select a color and choose OK.
- 3 Choose OK.

## Displaying the trigger line

The trigger line is a vertical line drawn on the display that represents the trigger point of a capture. Use the following instructions to display the trigger line.

- 1 Choose View >> Show Trigger Line. The trigger line will be displayed.

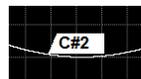


- 2 To hide the trigger line, repeat this process.

## Displaying channel IDs

Channel IDs are small visual indicators that identify channels. This feature is especially helpful for identifying multiple signals displayed in a capture.

- 1 Choose View >> Show Channel IDs. Channel IDs will be displayed.



- 2 To hide channel IDs, repeat this process.

## Scope mode default control panel

The following list describes the functions of default control panel icons.

**Note:** A selection path for each icon is indicated. When the Panel Settings window is open, you can use this path to add the icon to the control panel.

Icon	Description
	<b>Scope Arm/Abort</b> arms and aborts scope captures. <i>Settings &gt;&gt; Arm/Abort</i>
	<b>Channel Settings</b> opens the Channel Settings window, which is used to set up amplifier inputs, base channels, derived channels, and event inputs. <i>Settings &gt;&gt; Channels</i>
	<b>Trigger Settings</b> opens the Trigger Settings window, which is used to set up data capture triggers and aborts. <i>Capture &gt;&gt; Trigger/Abort Settings</i>
	<b>Cursor A</b> displays and hides cursor A. <i>Cursors &gt;&gt; Cursor A</i>
	<b>Cursor B</b> displays and hides cursor B. <i>Cursors &gt;&gt; Cursor B</i>
	<b>Move Cursor Left</b> moves the active cursor(s) to the left each time the icon is pressed. <i>Cursors &gt;&gt; Move Left</i>
	<b>Move Cursor Right</b> moves the active cursor(s) to the right each time the icon is pressed. <i>Cursors &gt;&gt; Move Right</i>

Icon	Description
	<p><b>Trigger Indicator</b> indicates when a trigger occurs by displaying a yellow circle.</p> <p><i>Capture &gt;&gt; Trigger Indicator</i></p>
	<p><b>Capture Indicator</b> indicates when a data capture is in progress by illuminating.</p> <p><i>Capture &gt;&gt; Capture Indicator</i></p>

## Scope captures

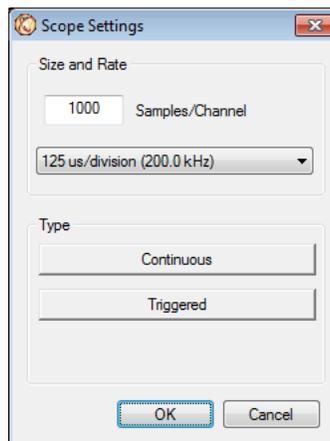
A scope capture is a high-speed snapshot of channel information. Every time you view data in Scope mode, you are viewing a scope capture. Scope captures are somewhat similar to data captures, and share much of the same terminology. For example, the concepts of arming, triggering, and aborting apply to scope captures as well as data captures.

### Setting up a scope capture

- 1 If triggers or aborts will be used, set them up using the Trigger Settings window (Capture >> Trigger/Abort Settings).

**Note:** *The trigger/abort setup process for scope captures is identical to the trigger/abort setup process for data captures.*

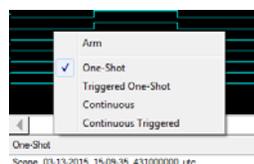
- 2 Choose Settings >> Scope. The Scope Settings window will open.



This window defines scope capture settings for all channels.

- 3 You can choose from four different types of captures by selecting various combinations of the Continuous and Triggered options.
- **One-Shot** - Perform a one-time scope capture without using a trigger. (Select neither option)
  - **Continuous** - Perform multiple scope captures without using a trigger. (Select the Continuous option)
  - **Triggered One-Shot** - Perform a one-time scope capture that is initiated by a trigger. (Select the Triggered option)
  - **Triggered Continuous** - Perform continuous scope captures that are initiated by a trigger. (Select the Triggered and Continuous options)

**Note:** You can later change the capture type by choosing the Scope mode status bar along the bottom of the display.

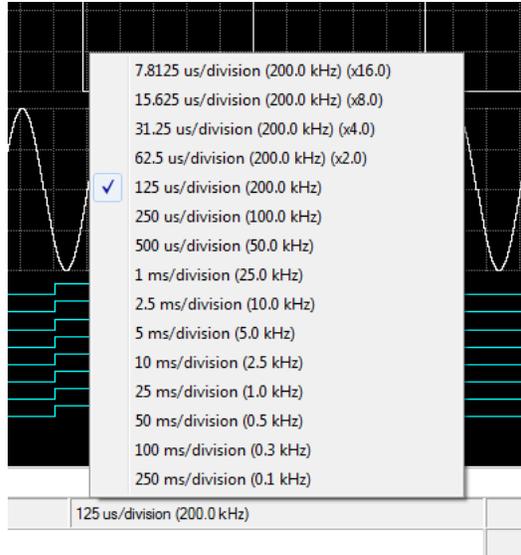


- 4 If the Triggered option is enabled, specify a pre-trigger percentage by selecting the percentage field. Enter the percentage of the scope capture to record before the trigger.
- 5 Select a size for the scope capture by choosing the Samples/Channel field. Enter the number of samples to include.

Scope capture size is based on the number of samples in the capture. If the scope capture exceeds the display size, a scrolling track view bar will appear on the bottom of the screen.

- 6 Select a time base from the drop-down list. The time base is specified in units of ms/Division or us/Division.

**Note:** You can later change the time base by choosing the Scope mode status bar along the bottom of the display.



- 7 Choose OK.

**Related Topics:**

- "Setting up a data capture" on page 123

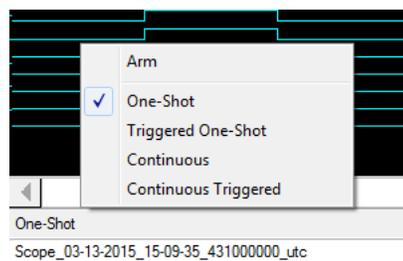
### Performing a scope capture

Scope captures are initiated using a similar process as data captures. The system is armed, pre-trigger data is collected (if triggers are used), a trigger occurs, and data is recorded until the capture is complete or aborted.

- 1 Set up the scope capture.
- 2 Arm the scope capture using the control panel or status bar.
  - To use the control panel, choose the Scope Arm/Abort icon.



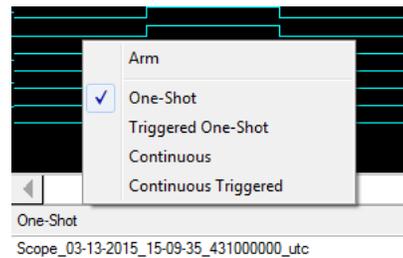
- To use the status bar along the bottom of the display, choose the Arm option.



- 3 The next system action depends on the type of scope capture being recorded. The following list describes the sequence of events for each scope capture type:
  - **One-Shot** - A one-time scope capture will occur and display when the scope capture is armed.
  - **Continuous** - Scope captures will occur and display continuously when the scope capture is armed.
  - **Triggered One-Shot** - The system will acquire pre-trigger data until all of the requested pre-trigger storage allocation is filled. When a trigger occurs, a one-time scope capture will occur and display.
  - **Triggered Continuous** - The system will acquire pre-trigger data until all of the requested pre-trigger storage allocation is filled. When a trigger occurs, a scope capture will occur and display. After each trigger, this process will be repeated.
- 4 To abort a scope capture, use the control panel or status bar.
  - To use the control panel, choose the Scope Arm/Abort icon.



- To use the status bar along the bottom of the display, uncheck the Arm option.

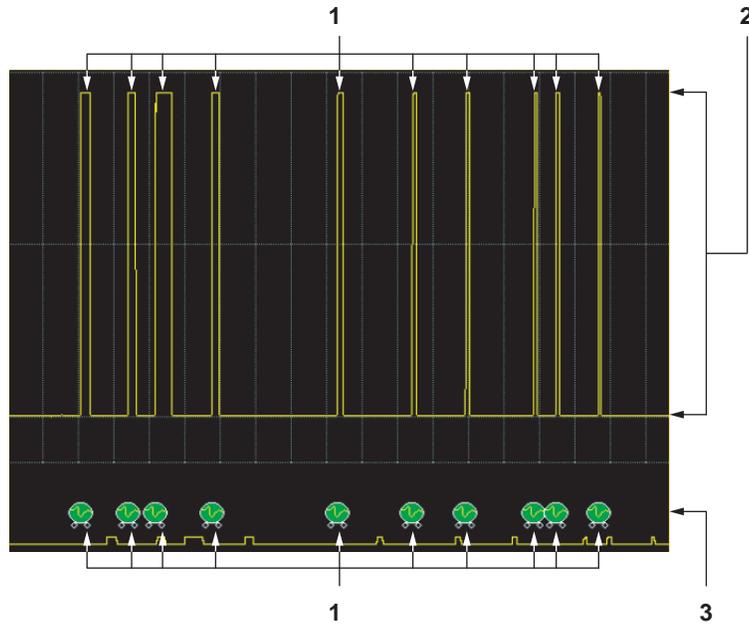


The currently running scope capture will be aborted.

## Embedded scope captures

Embedded scope captures is a powerful feature that allows you to save trend data at low sample rates while capturing transients at high sample rates. When you open the trend data capture in Review mode, the embedded scope captures will be viewable.

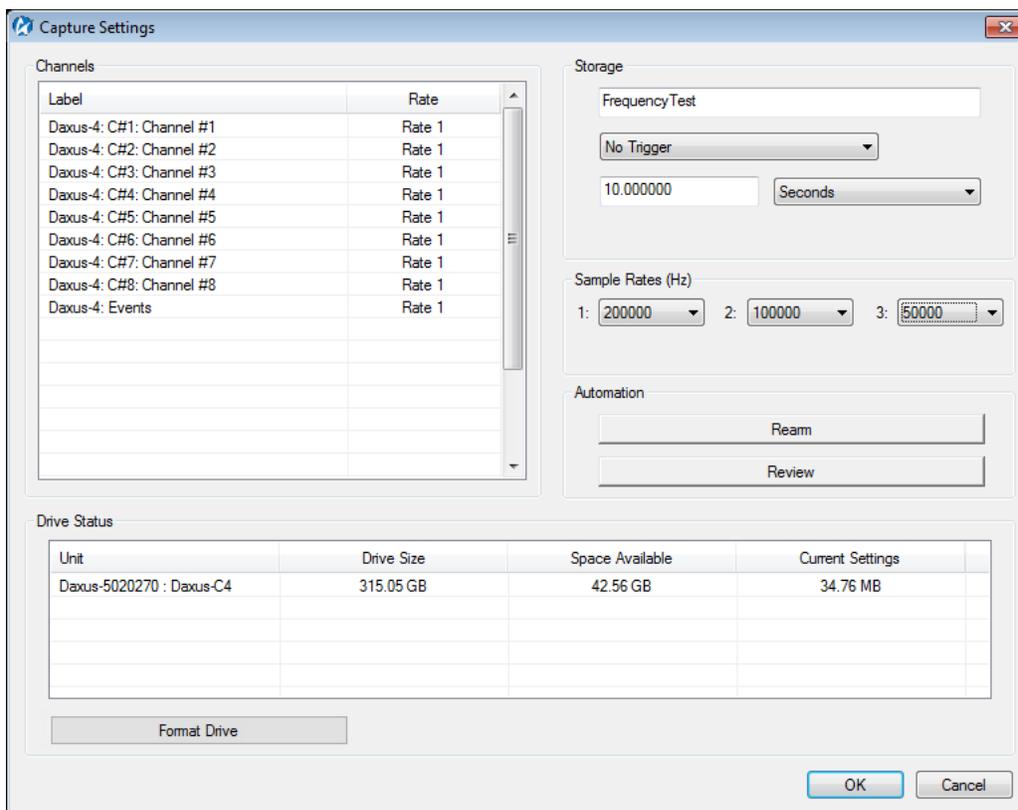
The following diagram illustrates the embedded scope capture concept. Trigger points initiate scope captures that are embedded into the trend data recording. During trend data review, you can open any of the embedded scope captures for high sample rate analysis.



#	Description
1	Transients
2	Trend data (low sample rate)
3	Embedded scope captures (high sample rate)

## Setting up embedded scope captures

- 1 Choose Capture >> Settings. The Capture Settings window will open. You will use this window to set up the trend data capture.

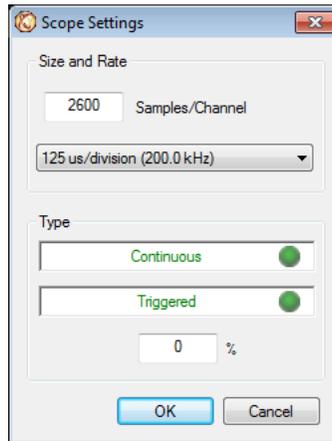


- 2 Select the No Trigger option. Trend data captures do not use pre-trigger recording and they begin when manually armed. Triggers will later be used to initiate scope captures.
- 3 Specify the size of the trend data capture by defining a data capture storage allocation. The size can be defined in units of time (hours, minutes, or seconds).
- 4 Specify sample rates to define the speeds at which trend channels are sampled.
- 5 Select the channels to include in the trend data capture, and the sample rate for each channel.
- 6 Choose OK to complete the trend data capture setup process.
- 7 Choose Capture >> Auto Save Scope with Capture. A check will appear next to this menu option to indicate it is enabled.
- 8 Set up the triggers (and aborts if necessary) using the Trigger Settings window (Capture >> Trigger/Abort Settings).

In the case of embedded scope captures, the triggers are used to capture the high-speed transients and embed them into the slower trend data.

**Note:** If the trigger condition is constantly being met, there is the potential to create many scope captures.

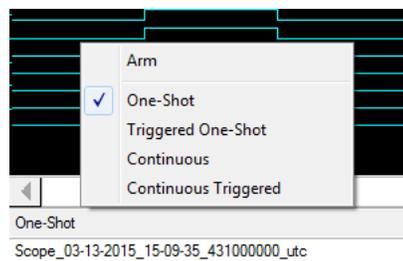
- 9 Choose Settings >> Scope. The Scope Settings window will open. You will use this window to set up scope captures that will be embedded in the trend data.



- 10 Select the Triggered and Continuous options.
- 11 Specify a pre-trigger percentage to indicate the percentage of the embedded scope capture to record before a trigger.
- 12 Select a size for the embedded scope captures by using the size slider bar or Samples/Channel field.
- 13 Select a time base for the embedded scope captures from the drop-down list.
- 14 When you are finished setting up the scope captures, choose OK to close the Scope Settings window.
- 15 Arm the scope capture using the control panel or status bar.
  - To use the control panel, choose the Scope Arm/Abort icon.

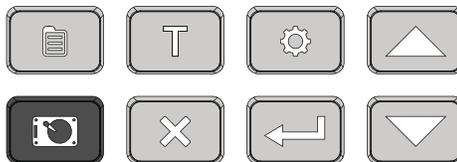


- To use the status bar along the bottom of the display, choose the Arm option.



16 Arm the trend data using one of the following methods.

- Choose Capture >> Arm.
- Press the Arm key on the Daxus keypad.



The trend data will begin recording.

When the trend data meets the specified trigger conditions, a scope capture will be embedded into the trend data.

**Related Topics:**

- "Setting up a scope capture" on page 144
- "Setting up a data capture" on page 123
- "Triggers and aborts" on page 125

## Printing to PDF or a printer

- 1 You can print an image of the screen contents to PDF or an installed printer.
  - To save the screen image as a PDF file, choose File >> Print Screen >> PDF. You will be prompted to save the PDF file to a folder on your PC.
  - To print the screen image using an installed printer, choose File >> Print Screen >> Printer.
- 2 In Review or Scope mode, you can save information from the data capture to a PDF file.

Choose File >> Send to PDF. A sub menu will appear. Choose whether to save the entire file or the area between cursors. You will be prompted to save the PDF file to a folder on your PC.

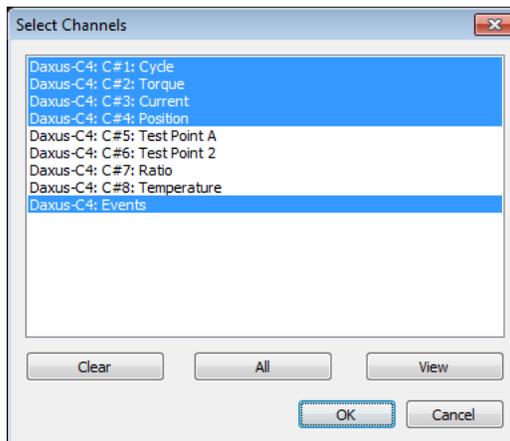
## Archiving scope captures

Archiving a scope capture saves the capture (or portions of the capture) to the Daxus hard drive. This section provides instructions on archiving scope captures.

## Archiving as data capture records in Scope mode

Use the following information to archive as data capture records in scope mode.

- 1 Choose File >> Archive as DCR. A sub menu will appear. Choose whether to archive the entire file, current page, or the area between cursors. The Select Channels window will open.



- 2 Select the channels and events to include in the archive.

As a shortcut, you can select all channels and events in the current view by choosing the View button.

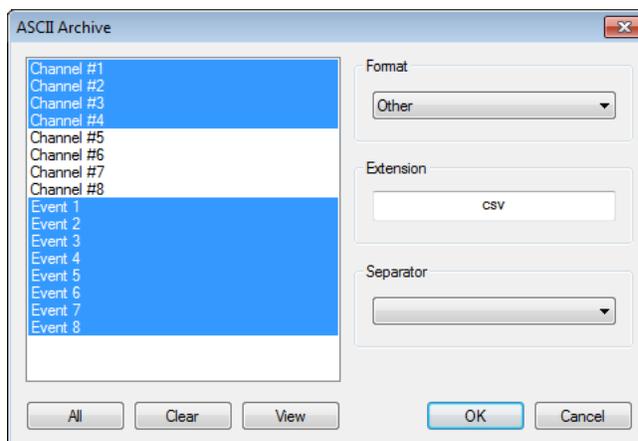
- 3 Choose OK.

The scope archive will now be available for review in Review mode.

## Archiving as ASCII in Scope mode

Use the following information to archive as ASCII files. ASCII format is helpful for archiving and analysis in other programs.

- 1 Choose File >> Archive as ASCII. A sub menu will appear. Choose whether to archive the entire file, current page, or the area between cursors. The ASCII Archive window will open.



- 2 Select the channels and events to include in the archive.

As a shortcut, you can select all channels and events in the current view by choosing the View button.

- 3 Select file format options.

- Choose Excel format to save the file with a CSV extension and comma delimiters.
- Choose Other format to save the file with a custom extension and delimiters.

- 4 Choose OK. The Save As window will open.

- 5 Select a name and destination for the archive file and choose OK. The archive file will be saved.



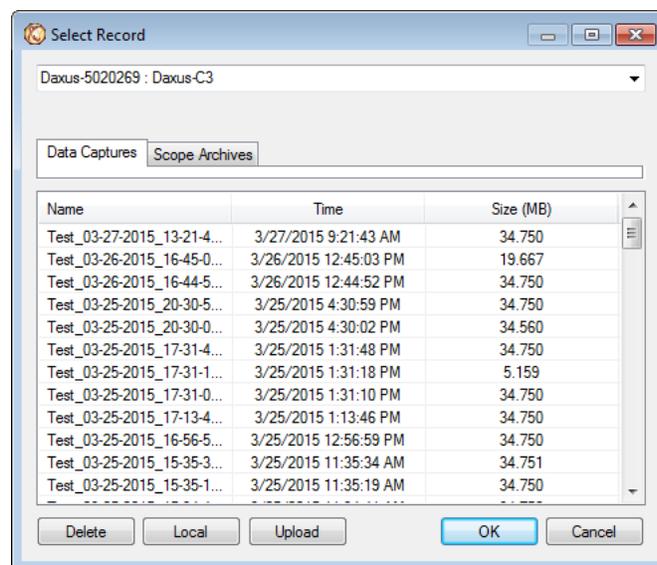
## Review mode introduction

Review mode provides the capability to review and analyze saved data capture and scope capture files. It also provides file management features.

### Accessing Review mode

- 1 Choose Configuration >> Review from the menu bar. A file selection window will open.

**Note:** You can use Review mode while a data capture is in progress.



This window provides a list of all files stored on the selected Daxus drive.

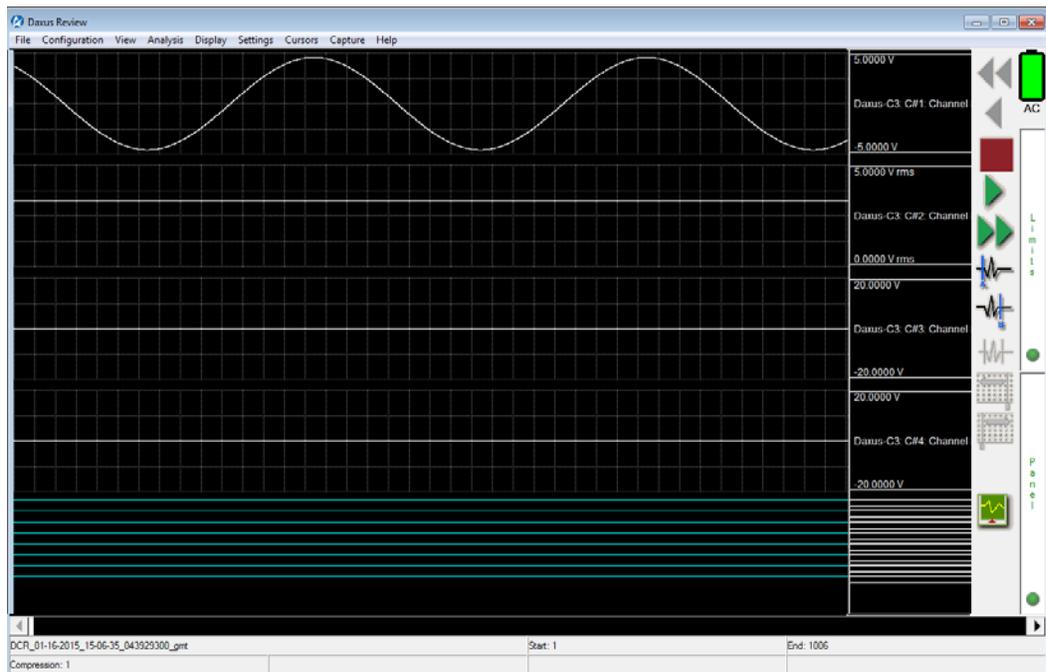
- 2 If multiple Daxus connections are active, select a Daxus recorder from the list.

3 Select a file to analyze in Review mode.

- To open a data capture, choose the Data Capture tab. Select a file from the list and choose OK.
- To open a scope archive, choose the Scope Archive tab. Select a file from the list and choose OK.
- To open a file located on the PC, choose Local. Browse to a file and choose OK.

Review mode will start.

The following illustration displays a typical Review mode screen. Review mode screen appearances will vary based on the control panel configuration and other selected options.



### Loading a new file

- 1 While in Review mode, choose File >> Load New File. A file selection window will open.
- 2 Select a file to open and choose OK.

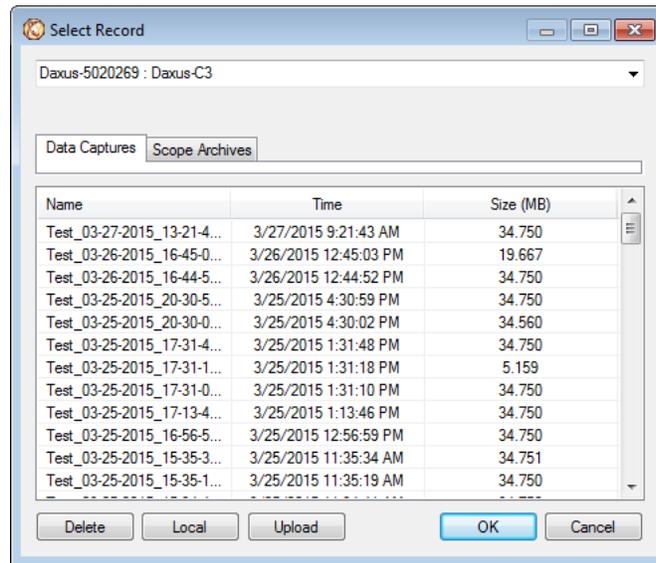
### Viewing file information

The File Summary window in Review mode provides additional information about capture files. It displays information including file name, number of samples, sample rates, data capture, and channel amplifier settings.

- 1 Open the File Summary window by choosing File >> Summary.

## Deleting files

- 1 Choose Configuration >> Review from the menu bar. A file selection window will open.



This window provides a list of all files stored on the selected Daxus drive.

- 2 To delete files, select the files and choose the Delete button. A confirmation message will appear. Choose Yes to delete the files.

## Review mode default control panel

The following list describes the functions of default control panel icons.

**Note:** A selection path for each icon is indicated. When the Panel Settings window is open, you can use this path to add the icon to the control panel.

Icon	Description
	<b>Scroll Fast Back</b> scrolls the chart backward quickly. <i>Display &gt;&gt; Rewind</i>
	<b>Scroll Back</b> scrolls the chart backward. <i>Display &gt;&gt; Scroll Backward</i>
	<b>Scroll Stop</b> stops the chart from scrolling. <i>Display &gt;&gt; Scroll Stop</i>
	<b>Scroll Forward</b> scrolls the chart forward. <i>Display &gt;&gt; Scroll Forward</i>
	<b>Scroll Fast Forward</b> scrolls the chart forward quickly. <i>Display &gt;&gt; Fast Forward</i>

Icon	Description
	<b>Cursor A</b> displays and hides cursor A. <i>Cursors &gt;&gt; Cursor A</i>
	<b>Cursor B</b> displays and hides cursor B. <i>Cursors &gt;&gt; Cursor B</i>
	<b>Active Cursor</b> changes the active cursor between A, B, or A & B. <i>Cursors &gt;&gt; Active Cursor</i>
	<b>Move Cursor Left</b> moves the active cursor(s) to the left each time the icon is pressed. <i>Cursors &gt;&gt; Move Left</i>
	<b>Move Cursor Right</b> moves the active cursor(s) to the right each time the icon is pressed. <i>Cursors &gt;&gt; Move Right</i>
	<b>Trigger Line</b> shows and hides the trigger line in the waveform display area. <i>View &gt;&gt; Trigger Line</i>

## File scrolling and navigation

This section describes how to use the track view, control panel, and menu bar to scroll and navigate through capture files in Review mode.

### Using the track view

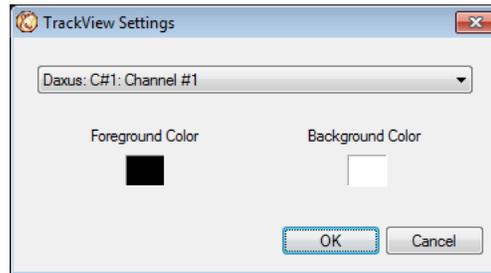
The track view is a visual scroll bar located on the bottom of the display. It can be used to navigate to other areas of the capture.



The track view displays a signal for a visual reference. The signal displayed in the track view can be changed, if desired. If the track view signal is changed, the selected signal will become the default until another signal is chosen.

- 1 Navigate through a file using the track view.
  - To scroll slowly through the file in a particular direction, choose one of the arrows on the sides of the track view.
  - To scroll quickly through the file in a particular direction, click and hold the shaded portion of the track view. Then drag it to the new location and release it. The file will scroll as the shaded bar is dragged.

- 2 If necessary, edit track view settings by choosing View >> Track View Channel. The Track View Settings window will open.



- Select a channel or event to display in the track view.
  - To select a track view foreground color, choose the Foreground Color box. The Color window will open. Select a color and choose OK.
  - To select a track view background color, choose the Background Color box. The Color window will open. Select a color and choose OK.
- 3 Choose OK.

## File navigation control panel icons

The default control panel for Review mode provides a variety of buttons to scroll through the file.

## File navigation menu options

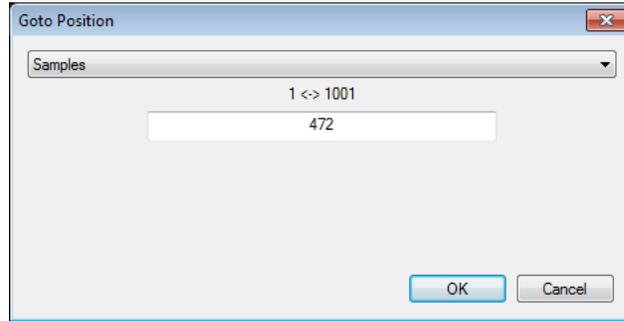
The Display option on the menu bar provides the following methods of navigating through capture files.

- **Goto** scrolls directly to the start, end, trigger point, cursor location, or specific position or range in a file. An advanced search is also available that scrolls based on specified conditions.
- **Page Back** scrolls the chart back one page.
- **Page Forward** scrolls the chart forward one page.
- **Rewind** scrolls the chart backwards quickly.
- **Scroll Back** scrolls the chart backwards.
- **Scroll Stop** stops the chart from scrolling.
- **Scroll Forward** scrolls the chart forward.
- **Fast Forward** scrolls the chart forward quickly.

Many of the navigational features found on the menu bar are also included in the default control panel for Review mode.

## Displaying a specific position in a file

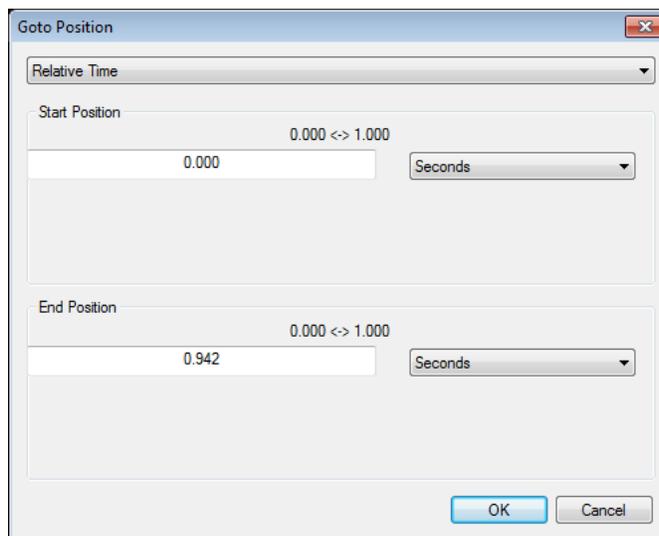
- 1 Choose Display >> Goto >> Position. The Goto Position window will open.



- 2 Select a specific position in the file.
  - **Samples** - Choose this option to select a sample number.
  - **Relative Time** - Choose this option to select a time relative to the start of the data capture.
  - **Absolute Time** - Choose this option to select a time as recorded by the system clock.
  - **Percent** - Choose this option to select a percentage point relative to the entire data capture.
  - **Reference Time** - Choose this option to select a time relative to the configured reference time.
- 3 Enter the position selection details and choose OK. The file will be scrolled to the specified position.

## Displaying a specific range in a file

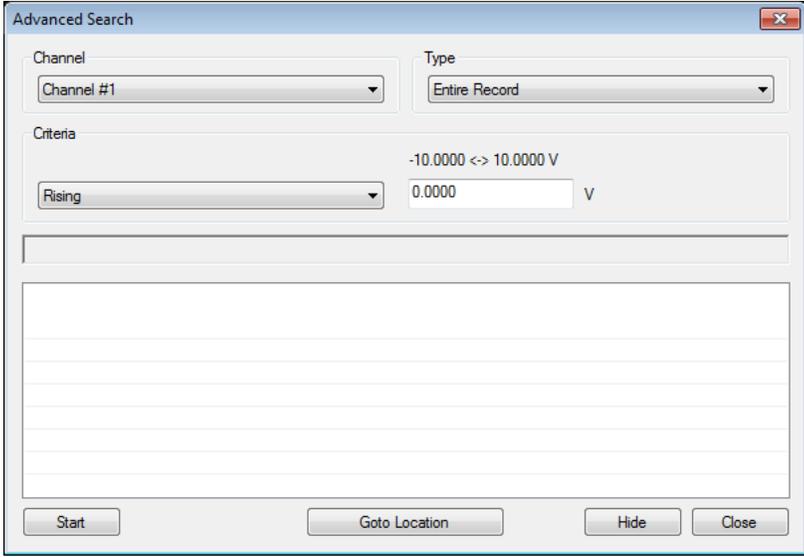
- 1 Choose Display >> Goto >> Range. The Goto Range window will open.



- 2 Select a specific range in the file.
  - **Samples** - Choose this option to select a range of sample numbers.
  - **Relative Time** - Choose this option to select a range of times relative to the start of the data capture.
  - **Absolute Time** - Choose this option to select a range of times as recorded by the system clock.
  - **Percent** - Choose this option to select a range of percentage points relative to the entire data capture.
  - **Reference Time** - Choose this option to select a range of times relative to the configured reference time.
- 3 Enter the start and end position details for the range and choose OK. The start and end positions will be displayed at the left and right edges of the waveform display area respectively. The file will be scrolled and expanded/compressed as needed.

## Using advanced search

- 1 Choose Display >> Goto >> Advanced. The Advanced Search window will open.



The screenshot shows the 'Advanced Search' dialog box. It has a title bar with 'Advanced Search' and a close button. The dialog is divided into several sections. The 'Channel' section has a dropdown menu with 'Channel #1' selected. The 'Type' section has a dropdown menu with 'Entire Record' selected. The 'Criteria' section has a dropdown menu with 'Rising' selected. To the right of the 'Criteria' dropdown, there is a voltage range field showing '-10.0000 <-> 10.0000 V'. Below this, there is a search value field showing '0.0000 V'. At the bottom of the dialog, there are four buttons: 'Start', 'Goto Location', 'Hide', and 'Close'.

- 2 Select the channel you want to search.
- 3 Select whether to search for rising, falling, rising or falling, maximum, minimum, or maximum and minimum voltage levels. Use the corresponding field to enter the voltage to search for.

- 4 Select a search type.
  - **Goto Next** - Searches forward in the file for the next instance of the specified voltage change.
  - **Goto Previous** - Searches backward in the file for the previous instance of the specified voltage change.
  - **Forward** - Searches forward in the file for all instances of the specified voltage change.
  - **Back** - Searches backward in the file for all instances of the specified voltage change.
  - **Entire Record** - Searches the entire file for all instances of the specified voltage change.
  - **Between Cursors** - Searches the area between cursors for the specified voltage change.
  - **Counter** - Searches the entire file and reports the number of instances of the specified voltage change.
- 5 Choose Start to perform the search. Search results will be displayed in the list.
- 6 To navigate directly to a search result, select it from the list and choose Goto Location.

## File compression

Review mode displays files in a horizontally scrolling orientation. The file under review is typically larger than the display area, and scrolling is used to navigate through the file. Compression and expansion options are available to decrease or increase the horizontal size of a file.

### Showing all of the file

The contents of a file can be compressed to fit the entire file in the display.

- 1 Choose Display >> Show All File. The file will be compressed to fit on one screen. The amount of compression will be displayed on the bottom of the screen.

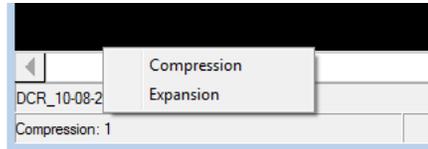
### Setting a compression

A specific compression ratio can be used to compress the file. The compression ratio is based on a factor of 1 to X, where X is that which will cause the entire file to fit on the display without scrolling. A compression ratio of 1 will result in no compression.

When a file is compressed, more of the entire file will fit on one screen, and less scrolling is necessary to navigate throughout the file.

**Note:** *Very large data captures may take some time to display if the compression value is high.*

- 1 Enter a compression ratio using the menu bar or status area.
  - Choose Display >> Compression. The Compression window will open.
  - Choose the compression/expansion status area, and then choose Compression. The Compression window will open.



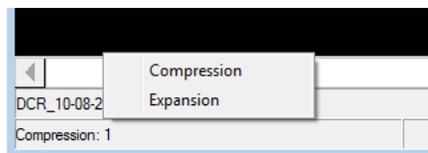
- 2 Enter the desired compression ratio and choose OK. The file will be compressed.

## Setting an expansion

A specific expansion ratio can be used to expand the file. The expansion ratio is based on a factor of 1 to 100. An expansion ratio of 1 will result in no expansion, while a ratio of 100 will expand the file by 100 times its original size.

When a file is expanded, less of the entire file will fit on one screen, and more scrolling is necessary to navigate throughout the file.

- 1 Enter an expansion ratio using the menu bar or status area.
  - Choose Display >> Expansion. The Expansion window will open.
  - Choose the compression/expansion status area, and then choose Expansion. The Expansion window will open.



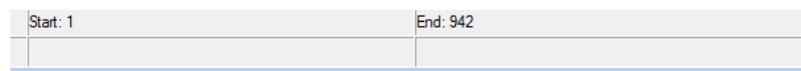
- 2 Enter the desired expansion ratio and choose OK. The file will be expanded.

## Review mode view options

This section describes how to configure the view and display options of Review mode.

### Selecting a status text format

In the lower-right corner of the Review mode screen, a status text area is displayed.



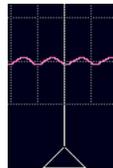
The type of information displayed in the status text area can be changed.

- 1 Choose View >> Status Text Format. A sub menu will appear.
- 2 Select a status text display option.
  - **Samples** - The sample numbers for the first and last samples displayed on the screen will be shown.
  - **Relative Time** - The times, relative to the start of the data capture, for the first and last samples displayed on the screen will be shown.
  - **Absolute Time** - The times, as recorded by the system clock, for the first and last samples displayed on the screen will be shown.
  - **Percent** - The percentage points, relative to the entire data capture, for the first and last samples displayed on the screen will be shown.

## Displaying the trigger line

The trigger line is a vertical line drawn on the display that represents the trigger point of a capture. Use the following instructions to display the trigger line.

- 1 Choose View >> Show Trigger Line. The trigger line will be displayed.

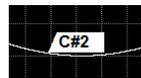


- 2 To hide the trigger line, repeat this process.

## Displaying channel IDs

Channel IDs are small visual indicators that identify channels. This feature is especially helpful for identifying multiple signals displayed in a capture.

- 1 Choose View >> Show Channel IDs. Channel IDs will be displayed.



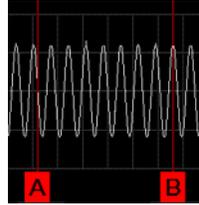
- 2 To hide channel IDs, repeat this process.

## Auto scaling between cursors

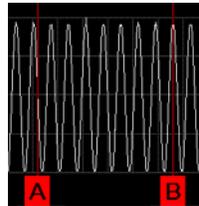
Use the auto scaling feature in Review mode to apply a full scale to channels based on the signal value in the area between cursors.

- 1 Show both of the cursors by selecting Cursors >> A and Cursors >> B from the menu bar.

- 2 Position the cursors at the beginning and end of the data you want to auto scale.



- 3 Choose Display >> Auto Scale Between Cursors. Amplitude scaling will be applied to all channels based on the area between the cursors.



- 4 To remove the auto scaling, choose Display >> Clear Auto Scale.

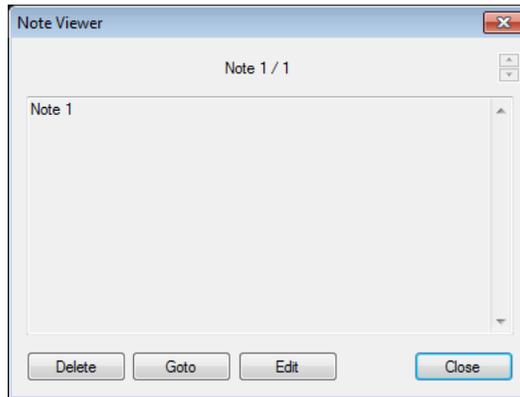
## Viewing and editing notes

If notes are included in a capture, they can be viewed and edited in Review mode.

- 1 Use the Note Viewer window to access notes in Review mode. There are two ways to open this window.
  - Chose Analysis >> Note Viewer.
  - Any note that was entered during a data capture is marked with a pencil icon at the bottom of the Review mode screen. Choose a pencil icon to open the Note Viewer window and display the selected note.



- 2 Review and edit notes with the Note Viewer window.



- Use the scroll arrows on the top of the window to toggle which note in the file is displayed.
- To scroll directly to the displayed note's location in the file, choose the Goto button.
- To edit the note, choose the Edit button. Edit the note and choose OK.
- To delete the note, choose the Delete button.

## Adding notes

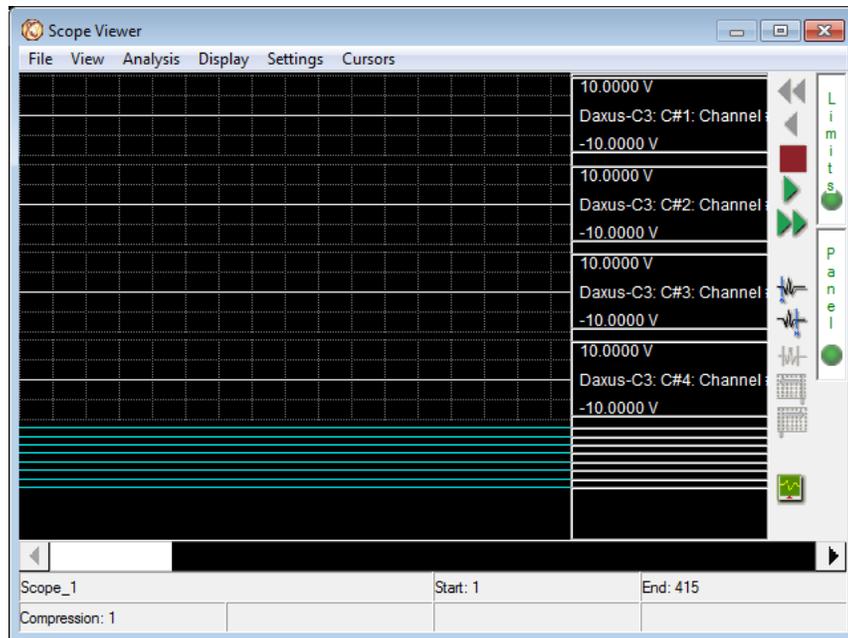
You can add notes to files in Review mode.

- 1 Choose Analysis >> Add Note. A sub menu will appear. Choose whether to add the note at the center of the screen or a cursor location. The Capture Note window will open.
- 2 Enter the note text and choose OK. The note will be saved as part of the capture file.

## Viewing embedded scope captures

If embedded scope captures are included in a capture, they can be viewed in Review mode.

- 1 Choose Analysis >> Scope Viewer to open the Scope Viewer window.



As an alternate method of opening embedded scope captures, scroll to and choose a scope icon in the file.

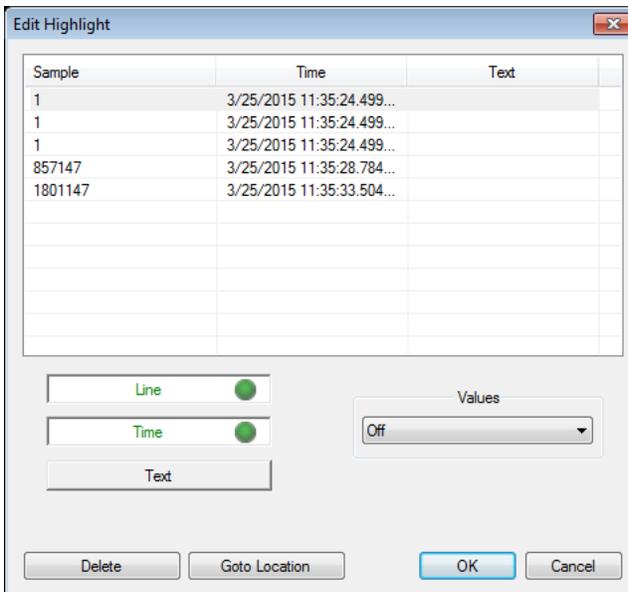


- If necessary, choose the Cursors menu option to use cursors. The cursors in this window function similar to cursors in other functions.
- If necessary, move to the next scope capture in the file by choosing File >> Next Scope.
- If necessary, choose File >> Print to print the contents of the Scope Viewer window.
- Choose the X in the upper-right corner to close the Scope Viewer window.

## Viewing and editing highlights

If highlights are included in a capture, they can be viewed and edited in Review mode.

- 1 Choose Analysis >> Edit Highlights. The Edit Highlight window will open.



- 2 Review and edit highlights with the Edit Highlight window.

- Use the list on the top of the window to toggle which highlight in the file is displayed.
- Edit the display properties of the selected highlight if necessary.

**Line** - When you enable this option, a vertical line will be displayed at the highlight point.

**Time** - When you enable this option, the time will be displayed at the highlight point.

**Text** - When you enable this option, you can view a text line associated with the highlight.

**Values** - When you enable Under Waveform or Under Grid, the channel value will be displayed at the highlight point.

- To scroll directly to the displayed highlight's location in the file, choose the Go To Location button.
- To edit the highlight text, enter text in the highlight text field.

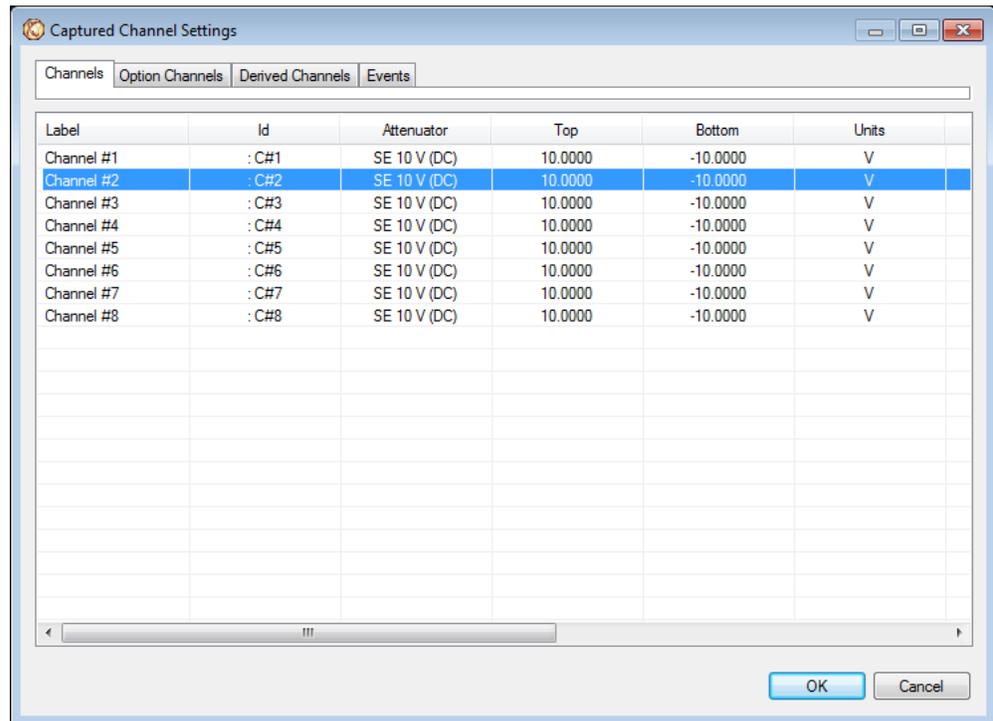
- 3 Choose OK.

## Review mode channel setup

This section describes how to modify channel settings for files during review.

### Viewing and modifying channel settings

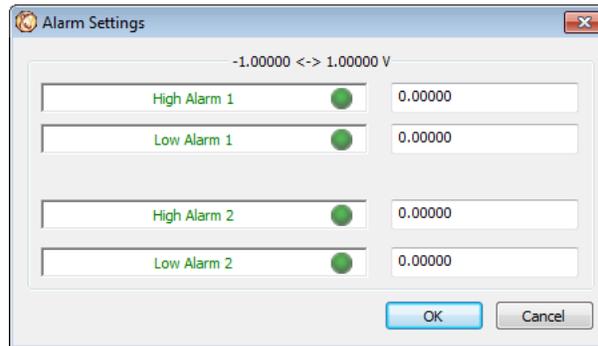
- 1 Choose Settings >> Channels. The Captured Channel Settings window will open.



Most items in the Captured Channel Settings window cannot be changed. They are saved as part of a data capture and cannot be edited in Review mode.

- 2 Select a channel.
- 3 To edit the channel label, select a channel. Then click the channel label to enable editing. Enter a label and press Enter.
- 4 If necessary, set up user engineering units.

- 5 To use low and/or high alarms, choose the Alarm column heading, and then Set Alarms. The Alarm Settings window will open.



Choose the Low Alarm and/or High Alarm buttons. The selected alarms will become active and the alarm fields will be displayed. Use the alarm fields to enter alarm levels. Choose OK in the Alarms window.

- 6 Choose OK.

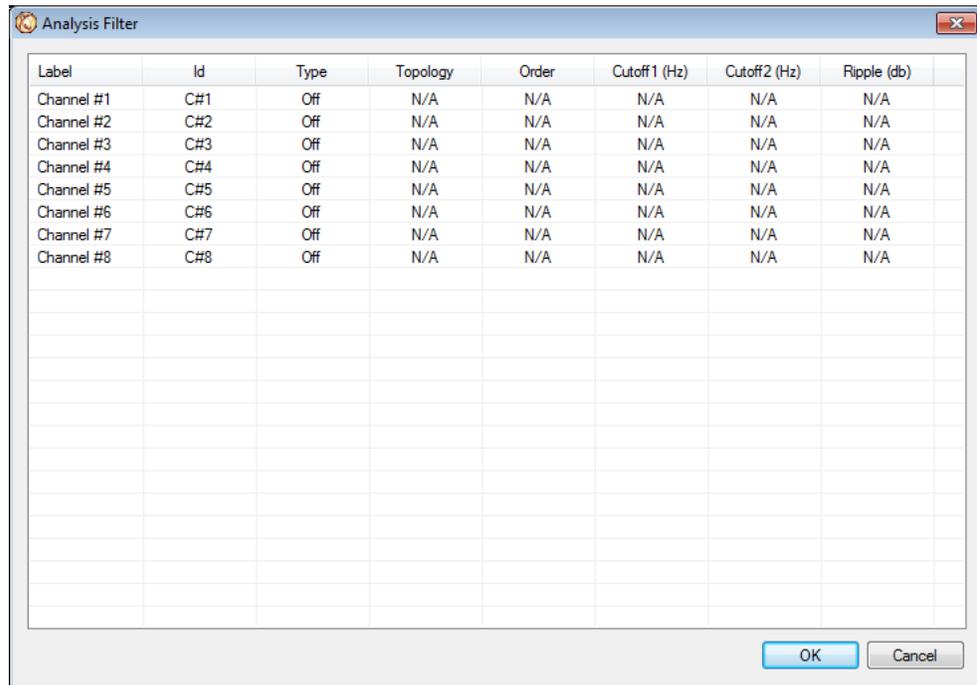
## Setting up Review mode filters

Filters are used to reduce the amplitude of certain waveforms based on their frequency. This allows you to restrict your data to certain frequencies and exclude extraneous data. Two types of filters are available.

- **Amplifier input filters** are hardware based and affect the input data before it is captured. These filters are permanent and cannot be undone once the data is captured.
- **Review mode filters** are software based and affect how the data is viewed in Review mode. They temporarily modify the view without altering the captured data.

This section describes how to set up Review mode filters.

- 1 Choose Analysis >> Filter. The Analysis Filter window will open.



- 2 Select the channel or channels to apply a filter to. Note that more than one channel can be selected at a time. Any changes made will affect all selected channels.
- 3 Choose the Type column heading to select a filter type.
  - **Low Pass** - Filters out frequencies above a specified cutoff point.
  - **High Pass** - Filters out frequencies below a specified cutoff point.
  - **Band Pass** - Creates a window based on two specified cutoff points, identified as upper and lower frequency boundaries. Anything outside this window is excluded.
  - **Band Stop** - Creates a window based on two specified cutoff points, identified as upper and lower frequency boundaries. Anything inside this window is excluded.
- 4 Choose the Topology column heading to select a filter topology.
  - **Bessel** filters are typically characterized by a nearly linear phase response in the pass band. They are commonly used in applications where little phase distortion is required. The trade off for this is a gentler roll off around the cutoff frequency.
  - **Butterworth** filters produce the most “ideal” response, generating maximum flatness and unity gain in the pass band, and monotonic decrease of frequency after the cutoff.
  - **Chebyshev** filters feature the sharpest transition band, but will have gain ripple in the pass band (type I) or stop band (II). A 4th order Chebyshev with 3 db of ripple, for instance, will drop at 100 db per decade.

If the Chebyshev topology is used, the Ripple field will appear. Enter a desired ripple value from 0.1 to 10.0 into this field.

- 5 Choose the Cutoff column headings to select cutoff frequencies.

Enter a cutoff frequency. The available range of this value will vary, depending on the current filter type. If the Band Pass or Band Stop filter types are used, you'll need to enter two cutoff frequencies; an upper boundary and a lower boundary.

Setting a cutoff value to 500 Hz or greater will result in a 4th order filter; a cutoff of less than 500 Hz will result in a 1st order filter.

- 6 Choose OK.

## Review mode derived channels

Derived channels are saved as part of data captures, however, derived channel data is not saved directly. Instead, the following items are saved.

- The derived channel equation
- The channels that are used in the derived channel equation

This allows you to review derived channels and modify their equations during review. You can also create new derived channels based on channels in the capture.

### **Related Topics:**

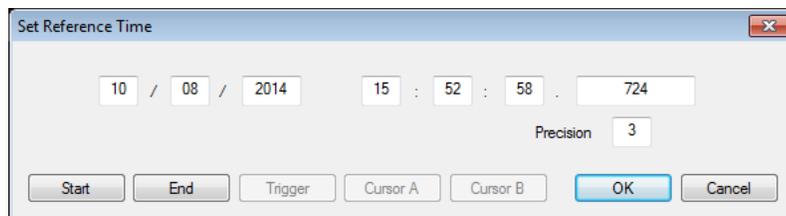
- "Derived channels" on page 81

## Using a reference time

The zero point of a data capture is typically the start or trigger point of the data capture file. With the reference time feature, you can set the zero point to any point. The user-defined reference time is reflected in the status text field, highlights, channel information measurements, and advanced searches.

This is useful when the start of data recording precedes the zero-time event. For example, a data capture may record the data during a rocket launch or explosive detonation. In Review mode, you can select the launch point or detonation as the reference time, or zero point for measurements.

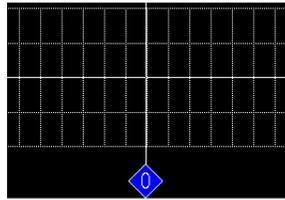
- 1 Choose Analysis >> Set Reference Time. The Set Reference Time window will open



- 2 Select the reference point. The reference point can be inside or outside of the data capture. You can enter a date/time manually or select a pre-set value using the buttons.

- To select a value manually, set the date and time of the zero reference point. Use the Precision field to adjust the number of decimal places if necessary.
- To select a pre-set value, choose one of the buttons. You can select the start, end, trigger, cursor A, or cursor B location in the file.

- 3 Choose OK. The reference point will now be indicated by a zero icon and line in the file.



- 4 To remove the reference point, choose Analysis >> Remove Reference Time.

## Printing to PDF or a printer

- 1 You can print an image of the screen contents to PDF or an installed printer.
  - To save the screen image as a PDF file, choose File >> Print Screen >> PDF. You will be prompted to save the PDF file to a folder on your PC.
  - To print the screen image using an installed printer, choose File >> Print Screen >> Printer.
- 2 In Review or Scope mode, you can save information from the data capture to a PDF file.

Choose File >> Send to PDF. A sub menu will appear. Choose whether to save the entire file or the area between cursors. You will be prompted to save the PDF file to a folder on your PC.

## Archiving files in Review mode

Archiving a file copies the file (or portions of the file) from the Daxus drive to the Windows PC or other networked storage area. Once files are archived, they can be copied, moved, and deleted similar to any other file on the PC.

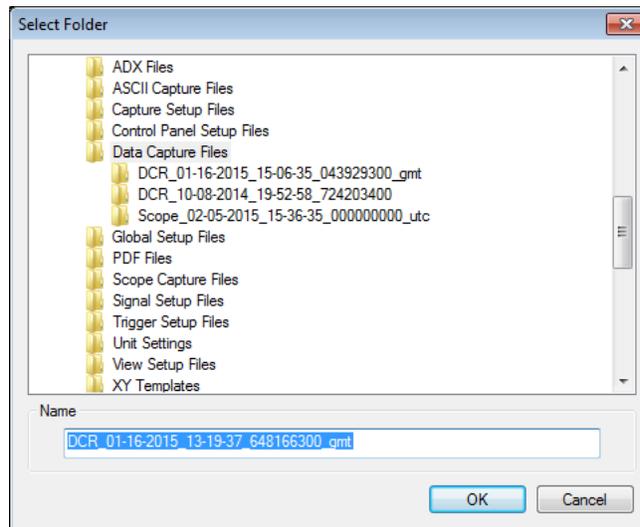
**Note:** Archiving files does not remove them from the Daxus drive.

## Archiving as data capture records in Review mode

Use the following information to archive as data capture records in review mode.

**Note:** Files can also be archived as data capture records in the file selection window prior to accessing Review mode. Select the files to archive and then choose the Archive button to select an archive location. This method is helpful for archiving multiple files at the same time.

- 1 Choose File >> Archive as DCR. A sub menu will appear. Choose whether to archive the entire file, current page, or the area between cursors. The Select Folder window will open.

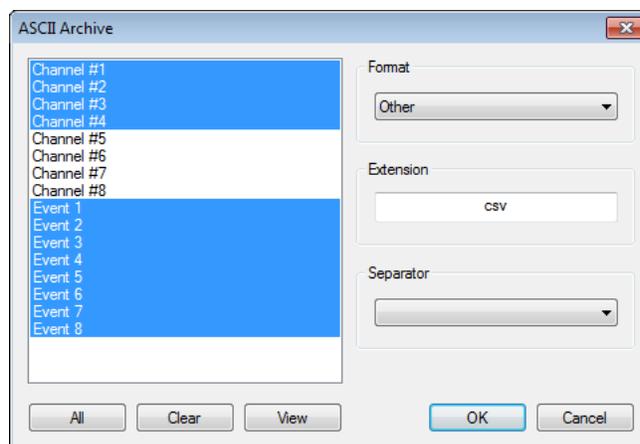


- 2 Select an archive location. Browse to the archive folder.
- 3 Enter a name for the archive file and choose OK. The archive file will be saved.

## Archiving as ASCII in Review mode

Use the following information to archive as ASCII files. ASCII format is helpful for archiving and analysis in other programs.

- 1 Choose File >> Archive as ASCII. A sub menu will appear. Choose whether to archive the entire file, current page, or the area between cursors. The ASCII Archive window will open.



- 2 Select the channels and events to include in the archive.

As a shortcut, you can select all channels and events in the current view by choosing the View button.

- 3 Select file format options.

- Choose Excel format to save the file with a CSV extension and comma delimiters.
- Choose Other format to save the file with a custom extension and delimiters.

- 4 Choose OK. The Save As window will open.

- 5 Select a name and destination for the archive file and choose OK. The archive file will be saved.

## Archiving as compressed ASCII in Review mode

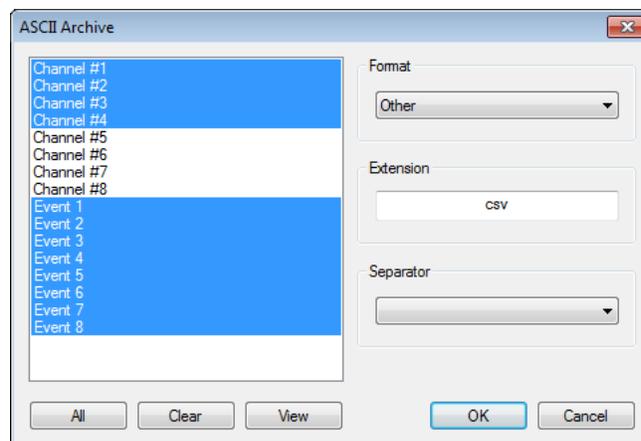
You can archive files in a compressed format to save disk space.

A compression factor is used to reduce the number of data points in the archived file. The compression factor is determined by the display compression (Display >> Compression).

For example, if the compression is set at 50, the following will occur: For every 50 data points, one average point will be created to replace the 50 points. The compressed archive file will contain all of the averaged points. This results in an archive file size that is a fraction of the original.

Use the following instructions to archive files in a compressed format.

- 1 If necessary, choose Display >> Compression and modify the compression ratio.
- 2 Choose File >> Archive as ASCII >> Compressed. A sub menu will appear. Choose whether to archive the entire file, current page, or the area between cursors. The ASCII Archive window will open.



- 3 Select the channels and events to include in the archive.

As a shortcut, you can select all channels and events in the current view by choosing the View button.

- 4 Select file format options.
  - Choose Excel format to save the file with a CSV extension and comma delimiters.
  - Choose Other format to save the file with a custom extension and delimiters.
- 5 Choose OK. The Save As window will open.
- 6 Select a name and destination for the archive file and choose OK. The archive file will be saved.

# 14

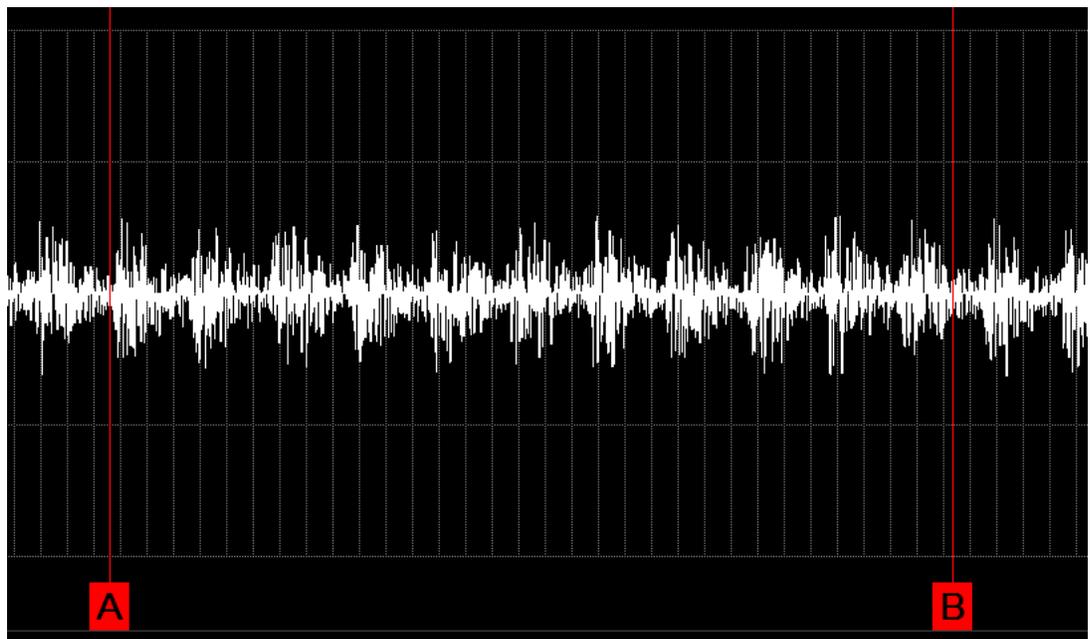
## Analysis tools

### Cursors

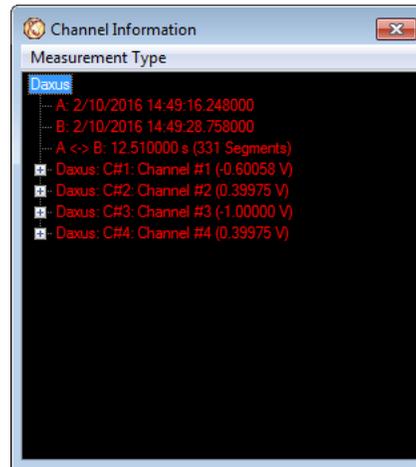
Cursors can be used to measure channels in Realtime, Scope, and Review modes. They are used in conjunction with the Channel Information window to view a variety of measurements.

#### Measuring channels with cursors

- 1 Show one or both of the cursors by choosing Cursors >> A and/or Cursors >> B from the menu bar.



- 2 Choose Analysis >> Channel Information to open the Channel Information window.



The Channel Information window displays the waveform values at each cursor based on the current measurement type.

- 3 Choose the Measurement Type menu option. Select a measurement type from the list.
  - **Average** displays the midpoint value of the data represented by the cursor. When using two cursors, it displays the average of the midpoint values of the data between cursors A and B (including cursor data).
  - **Minimum-Maximum** displays the maximum and minimum signal values of the data represented by the cursor. When using two cursors, it displays the maximum and minimum signal values represented by the data between cursors A and B (including cursor data).
  - **Peak-Peak** displays the difference between the maximum and minimum signal measurements between cursors A and B (including cursor data). This measurement is available only when both cursors are displayed.
  - **Slope** uses linear regression of the average of the maximum and minimum of each point between cursors A and B (including cursor data) to create a line which best represents the data. This measurement is available only when both cursors are displayed.
  - **RMS** displays the square root of the sum of squares divided by the number of samples between cursors A and B (including cursor data). This measurement is available only when both cursors are displayed.
  - **Sum** displays the sum of the average of the maximum and minimum of each point between cursors A and B (including cursor data). This measurement is available only when both cursors are displayed.
  - **Sum of Squares** displays the sum of the average of the maximum and minimum signal values represented by the data between cursors A and B (including cursor data) squared. This measurement is available only when both cursors are displayed.

- **Variance** measures how the set of data between cursors A and B (including cursor data) is dispersed about the mean.

$$\text{Variance} = (\sum y^2 - ((\sum y)^2 / n)) / n$$

Where y = sample value (average of maximum and minimum), n = number of points between cursors.

- **Standard Deviation** displays the square root of the variance. This measurement is available only when both cursors are displayed.
- **Area** displays the area under the curve. This measurement is available only when both cursors are displayed.

$$\text{Area} = \sum xy$$

Where x = time delta for a sample and y = sample value (average of maximum and minimum)

- 4 If necessary, move one or both of the cursors. Cursors must be activated before they can be moved. In the following illustration, cursor A is active and cursor B is inactive.



Activate the cursors you want to move by choosing Cursors >> Active >> A or B. You can also right-click the cursor labels to quickly activate/deactivate the cursors.

Move the active cursor or cursors by clicking and dragging the cursor label.

As cursors are moved, the values in the Channel Information window will update based on the signal values at the new cursor locations.

**Note:** In Realtime mode, cursors cannot be moved outside of the viewing window.

## Channel meters

Channel meters provide a variety of ways to visually indicate channel activity.

### Channel meter types

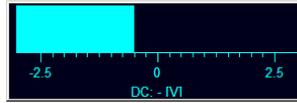
#### Numeric

The numeric meter displays the channel value.



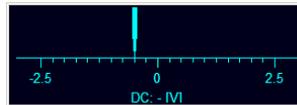
**Horizontal Bar**

The horizontal bar meter visually represents channel activity in a bar format.



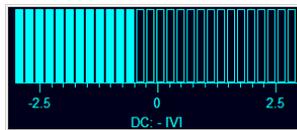
**Horizontal Needle**

The horizontal needle meter visually represents channel activity with a moving needle.



**Horizontal LED**

The horizontal LED meter visually represents channel activity with LED style bars.



**Vertical Bar**

The vertical bar meter visually represents channel activity in a bar format.



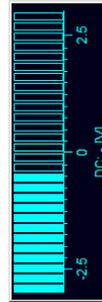
**Vertical Needle**

The vertical needle meter visually represents channel activity with a moving needle.



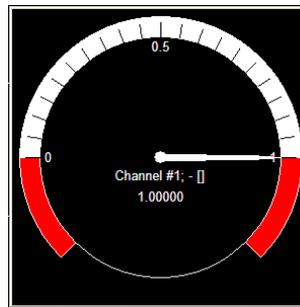
### Vertical LED

The vertical LED meter visually represents channel activity with LED style bars.



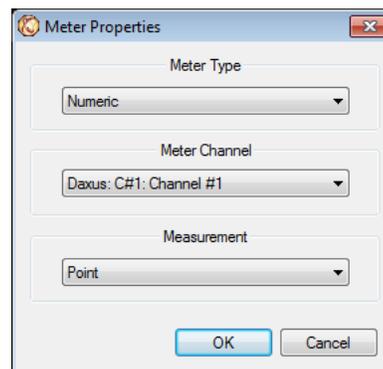
### Gauge

The gauge meter visually represents channel activity with a rotating needle.



## Adding channel meters

- 1 Choose Analysis >> Meter. The Meter Properties window will open.



- 2 Select a meter type and the channel that will be displayed in the meter.
- 3 Choose whether to use point or envelope (peak-to-peak) values for the meter.
- 4 Choose OK. The meter will be added to the display.

## Editing channel meters

- 1 Right-click the channel meter you want to edit. A sub menu will appear.
  - To change the meter options, choose Properties. The Meter Properties window will open. Edit the meter options and choose OK.
  - To change the measurement point in Scope and Review modes, choose Screen Left, Cursor A, or Cursor B. The cursor options are available only if cursors are displayed.

## Moving channel meters

- 1 Click the meter and drag it to the new location. Release the meter to lock it into position.

## Resizing channel meters

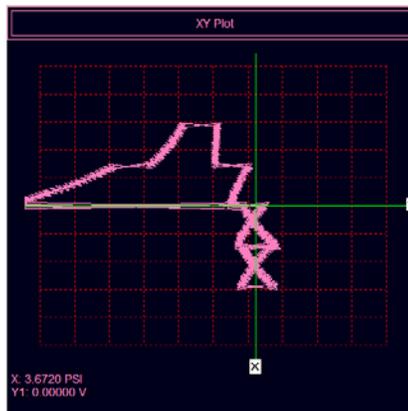
- 1 Click a meter window border or corner and drag it to resize the window. Release the border or corner to lock the new size into position.

## Removing channel meters

- 1 Right-click the channel meter you want to remove. A sub menu will appear.
- 2 Choose Close.

## XYY plots

XYY plots are available for viewing one X channel and up to two Y channels.

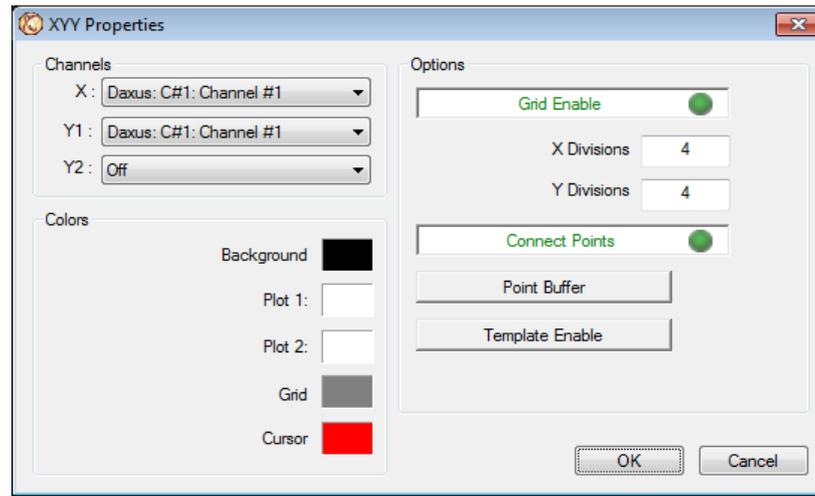


**Note:** The Realtime mode plot will continue updating while the realtime display is running. It will stop updating when the display is frozen.

**Note:** The Review mode plot is generated based upon points in the DCR file being reviewed. When cursors are enabled, however, the plot will be generated based upon review mode screen points.

## Adding XYY plots

- 1 Choose Analysis >> XYY Plot. The XYY Properties window will open.



- 2 Use the X, Y1, and Y2 options to select channels to display in the XYY plot.
- 3 Select a color scheme for the XYY plot.
  - To specify a background color, choose the Background color box. The Color window will open. Select a color and choose OK.
  - To specify a color for plot 1, choose the Plot 1 color box. The Color window will open. Select a color and choose OK.
  - To specify a color for plot 2, choose the Plot 2 color box. The Color window will open. Select a color and choose OK.
  - To specify a color for the grid, choose the Grid color box. The Color window will open. Select a color and choose OK.
  - To specify a color for cursors, choose the Cursor color box. The Color window will open. Select a color and choose OK.
- 4 To enable a grid in the XYY plot, choose the Grid Enable option. Grid X and Y division fields will appear. Enter the number of divisions to display in the grid.
- 5 To connect the sample points drawn on the plot with line segments, choose the Connect Points option.
- 6 To enable the point buffer, which simulates persistence, choose the point buffer option. A point buffer size field will appear. Enter a point buffer size to indicate how many data points should be used to make the plot.
- 7 Choose OK. The XYY plot will be displayed.
- 8 If necessary, you can clear the plot by right-clicking the XYY plot. A sub menu will appear. Choose Clear.
- 9 If necessary, you can print the plot by right-clicking the XYY plot. A sub menu will appear. Choose Print.

## Editing XYY plots

- 1 Right-click in the XYY plot. A sub menu will appear.
- 2 Choose Properties. The XYY Properties window will open.
- 3 Edit the XYY plot options and choose OK.

## Moving XYY plots

- 1 Click the top area of the XYY plot and drag it to the new location. Release the XYY plot to lock it into position.

## Resizing XYY plots

- 1 Click an XYY plot window border or corner and drag it to resize the window. Release the border or corner to lock the new size into position.

## Using XYY plot cursors

- 1 Right-click in the XYY plot. A sub menu will appear.
- 2 Choose Cursor X or Cursor Y to toggle the cursor display.

Cursor measurements will be displayed in the bottom of the XYY plot.

**Note:** *In Review mode, the cursor information shown at the bottom of the review screen and the Channel Information window will reflect the cursor measurements in either the XYY Plot, Zoom, or Fourier Transform window that is active and selected. If you have cursors on the review screen and the XYY Plot, Zoom, or Fourier Transform windows, you can toggle between measurements by touching the review screen and the appropriate analysis window.*

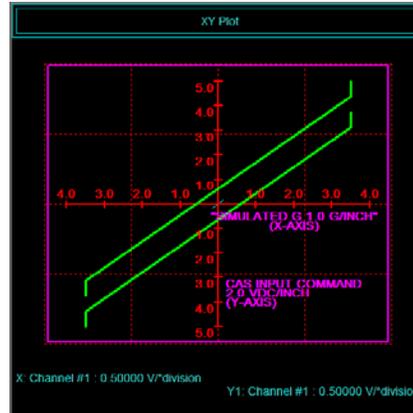
- 3 To move cursors, click and drag the cursor label and drag the cursor to a new position, and then release it.

## Removing XYY plots

- 1 Right-click in the XYY plot. A sub menu will appear.
- 2 Choose Close.

## XY plot templates

XY plot templates allow you to display a customized background template in the XY plot window. This background is a visual aid you can use for comparing plot results against a standard template you define.



### Creating XY plot templates

An XY plot template file (\*.xyt) specifies text strings and a series of curves created by connecting points. Each curve or text string is positioned based on a coordinate system. The template file creates an image to overlay on an XY plot.

- 1 Use a plain text editor, such as Notepad, on a personal computer to create and save a template file. Save the file with the extension XYT. This file must be saved with Unicode encoding.
- 2 Define the scaling used in the file by specifying the minimum and maximum values for both the X axis and Y axis. Values range from -32767 to +32767. Refer to the following example:

```
[Scale]
Min=-32767
Max=32767
```

- 3 Define the color that will be used as the transparent color. Choose a color that is unique to all colors used for curves or text. The color is specified in RGB format with values ranging from 0 to 255. Refer to the following example:

```
[Transparent]
Color=55,55,55
```

- 4 Enter curve information in the template file. You can enter up to ten curves. Refer to the following example:

```
[Curve 1]
Thickness=2
Color=255,0,0
Pt1=-26214,-655
Pt2=-26214,655
Pt3=-26214,0
```

- **[Curve Number]** - Enter the curve number between brackets. Curve numbers are specified in the following format: [Curve 1], [Curve 2], [Curve 3], etc. up to [Curve 10].
- **Thickness** - Enter a thickness value for the curve. Curve thickness is specified in pixels and ranges from 1 to 50.
- **Color** - Enter a color for the curve. The color is specified in RGB format with values ranging from 0 to 255.
- **Points** - Enter a list of points to describe the curve. Up to 300 individual points can be specified. Points are specified in the following format: Ptn=x,y

Values for n range from 1 to 300. Values for x and y range from -32767 to +32767.

The points are to be scaled from -32767 to +32767 and are contained in the first quadrant (both X and Y positive).

- 5 Enter text fields in the template file. You can enter up to 100 text fields. Refer to the following example:

```
[Text 1]
Color=255,0,0
Horizontal=0
Vertical=-1
Pt=-26214,786
String=4.0
```

- **[Text Number]** - Enter the text field number between brackets. Text field numbers are specified in the following format: [Text 1], [Text 2], [Text 3], etc. up to [Text 100].
- **Color** - Enter a color for the text. The color is specified in RGB format with values ranging from 0 to 255.
- **Horizontal** - Specify the horizontal alignment of the text: (-1) left justified, (0) centered, (1) right justified.
- **Vertical** - Specify the vertical alignment of the text: (-1) bottom, (0) centered, (1) top.
- **Pt** - Enter the point at which to position the text field. Points are specified in the following format: Pt=x,y

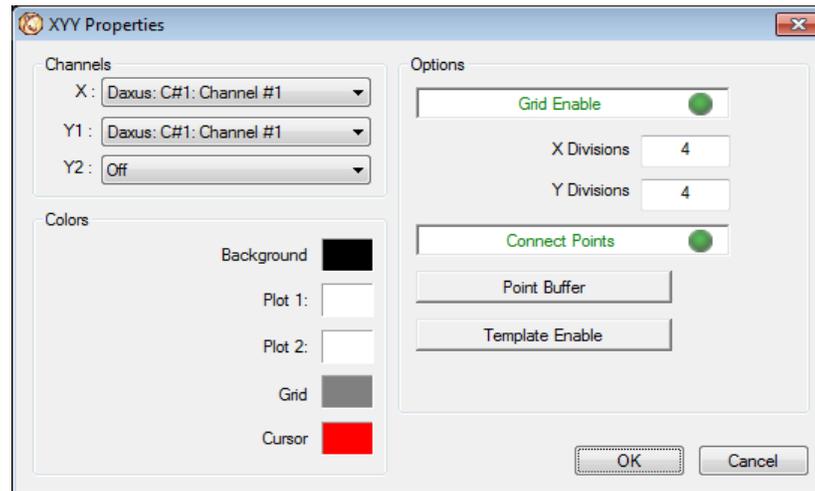
Values for x and y range from -32767 to +32767. Alignment is based on this point.

- **String** - Enter the text string to display in the field. You can enter up to 100 characters.

- 6 Save the template file. Ensure you save it with a XYT extension.

## Loading XYY plot templates

- 1 Choose whether to add an XYY plot template to a new XYY plot or an existing one.
  - To use an XYY plot template on a new plot, choose Analysis >> XYY Plot. The XYY Properties window will open.
  - To use an XYY plot template on an existing plot, right-click the plot. A sub menu will appear. Choose Properties. The XYY Properties window will open.



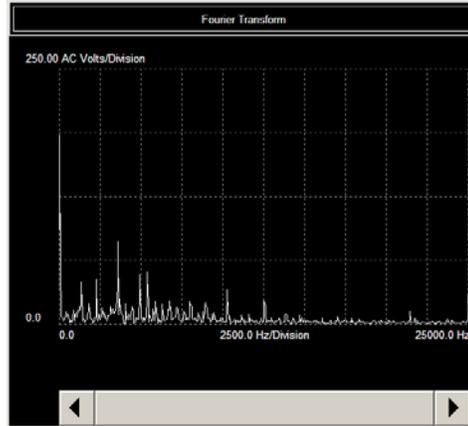
- 2 Configure any other XYY template options if needed.
- 3 Choose the Template Enable option. Then choose Browse and select an XYY template to load. Choose OK.
- 4 Choose OK in the XYY Properties window. The XYY plot will be displayed with the selected template.

## Adjusting XYY plot templates

- 1 Click the XY Plot window heading and drag it to the new location. Release the plot to lock it into position.

## Fourier Transform window

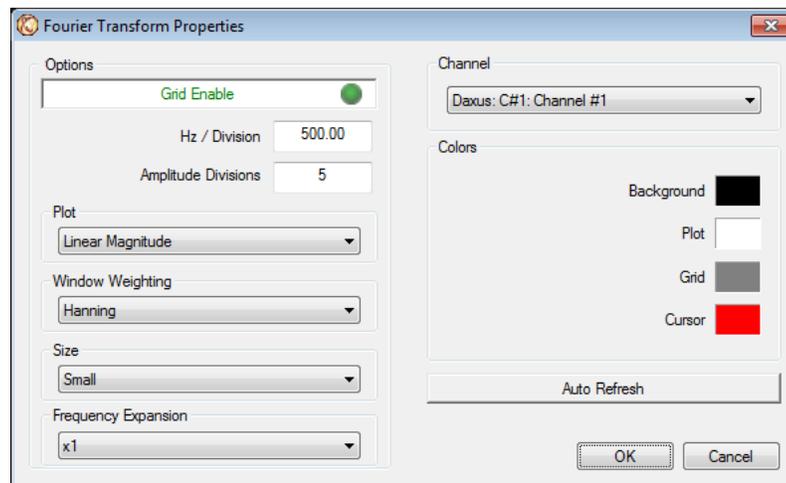
The Fourier Transform is created from the data displayed in the waveform display area. This data can consist of up to 1024 segments. Each segment consists of two points, a minimum and maximum, which represent the minimum and maximum signal values for each period.



Fourier Transform calculations require a single point for each period. The point used for the Fourier Transform calculation is the midpoint of the minimum and maximum. Therefore, a signal overlay compressed may not yield accurate Fourier Transform results.

### Adding Fourier Transform windows

- 1 Choose Analysis >> Fourier Transform. The Fourier Transform Properties window will open.



- 2 Select the channel to display in the Fourier Transform window.
- 3 To display a grid, choose the Grid Enable option. Then specify Hz/divisions and amplitude divisions values.
- 4 Use the plot option to choose between linear magnitude, logarithmic magnitude, or magnitude<sup>2</sup>.
- 5 Choose a window weight option. The following options are available: Hanning, Hamming, Blackman, Barlett, Triangle, Kaiser, Bman-Harris, and Rectangle.

- 6 Select whether to display a small, medium, or large size Fourier Transform window.
- 7 If necessary, use the Frequency Expansion option to expand the frequency axis and provide a more detailed view.
- 8 Select a color scheme for the Fourier Transform window.
  - To specify a background color, choose the Background color box. The Color window will open. Select a color and choose OK.
  - To specify a plot color, choose the Plot color box. The Color window will open. Select a color and choose OK.
  - To specify a color for the grid, choose the Grid color box. The Color window will open. Select a color and choose OK.
  - To specify a color for cursors, choose the Cursor color box. The Color window will open. Select a color and choose OK.
- 9 Choose OK. The Fourier Transform window will be displayed.
- 10 If necessary, you can print the Fourier Transform by right-clicking the Fourier Transform window. A sub menu will appear. Choose Print.

### **Editing Fourier Transform windows**

- 1 Right-click the Fourier Transform window. A sub menu will appear.
- 2 Choose Properties. The Fourier Transform Properties window will open.
- 3 Edit the Fourier Transform window options and choose OK.

### **Moving Fourier Transform windows**

- 1 Click the top area of the Fourier Transform window and drag it to the new location. Release the Fourier Transform window to lock it into position.

### **Resizing Fourier Transform windows**

- 1 Right-click the Fourier Transform window. A sub menu will appear.
- 2 Choose Small Size, Medium Size, or Large Size to resize the window.

### **Using Fourier Transform window cursors**

- 1 Right-click the Fourier Transform window. A sub menu will appear.

- 2 Choose Cursor A or Cursor B to toggle the cursor display.

Cursor measurements will be displayed in the bottom of the Fourier Transform window.

**Note:** *In Review mode, the cursor information shown at the bottom of the review screen and the Channel Information window will reflect the cursor measurements in either the XYY Plot, Zoom, or Fourier Transform window that is active and selected. If you have cursors on the review screen and the XYY Plot, Zoom, or Fourier Transform windows, you can toggle between measurements by touching the review screen and the appropriate analysis window.*

- 3 To move cursors, click and drag the cursor label.

## Removing Fourier Transform windows

- 1 Right-click the Fourier Transform window. A sub menu will appear.
- 2 Choose Close.

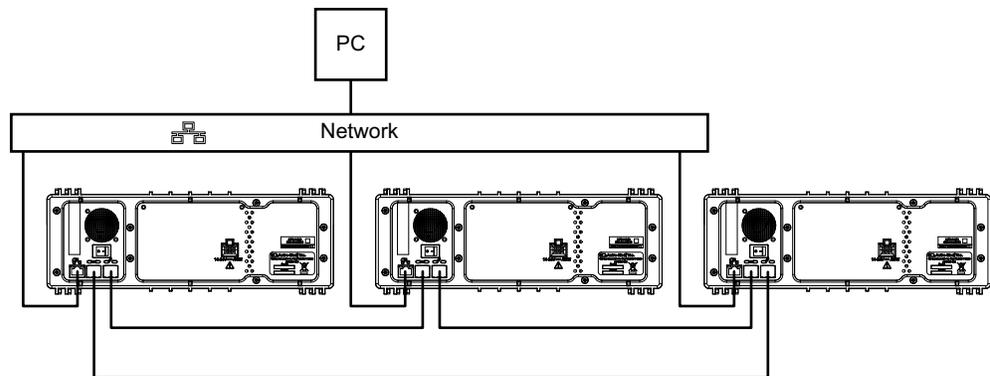
# 15

## Linking Daxus units

### About linking

Link ports provide a method of directly connecting multiple Daxus units. When units are connected with a link port, they can sample and capture data simultaneously with one unit providing the master sampling clock, arm signal, and abort signal. Up to ten units can be linked in this manner. Any unit can trigger a data capture.

The following diagram illustrates an example link port configuration. It assumes that each Daxus unit is also connected to the host computer via a network connection. A facility-wide network is not required. A local hub or switch can be used to connect multiple Daxus units to the PC.



**Note:** Linking Daxus units via the link port is not required. However, using a link port configuration provides the best synchronization during a data capture with multiple Daxus units.

The host computer connection is only required for setting up linked Daxus units. After setting up the linked Daxus units, you can perform data captures with or without a host computer and network connection.

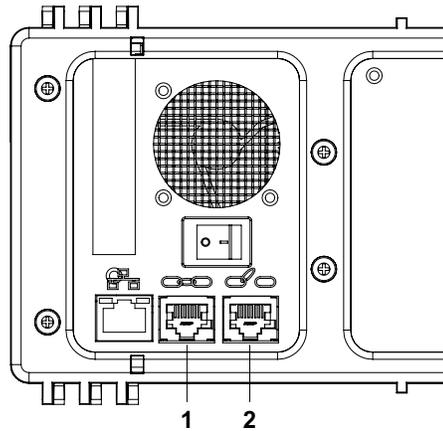
- **With a host computer** - You can control Daxus units in the usual manner with Daxus PC software.
- **Without a host computer (stand alone)** - You can arm and abort data captures locally by the front panel controls of the Daxus designated as the master unit. No network (i.e. Ethernet) communication is required between linked Daxus units.

### Connecting link ports

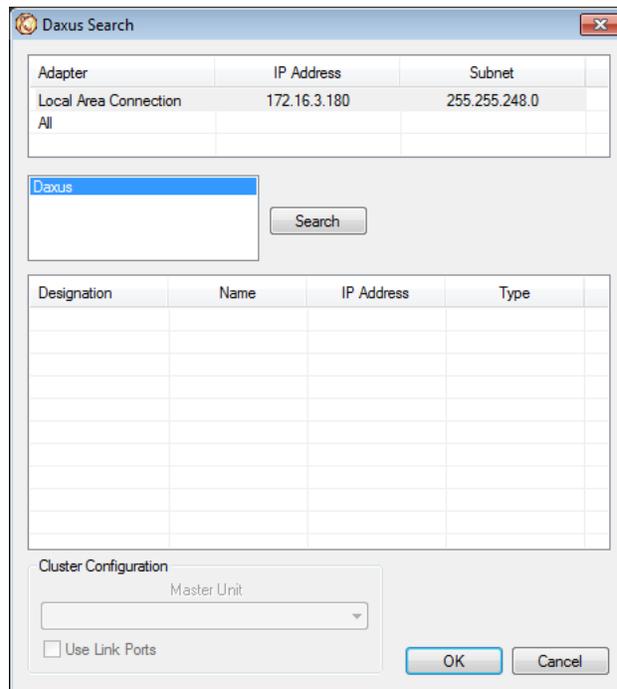
Link ports are connected using shielded category 5e or shielded category 6 cables with RJ-45 connectors. Each link port cable should not be longer than 100 meters. If you need a longer cable, please contact Technical Support.

- 1 Ensure the Daxus recorders are powered on and connected to the same network as your PC.

- 2 Locate the Link Out (2) and Link In (1) ports on the back of the Daxus units.



- 3 Connect the Daxus units in a circular configuration.  
Connect the Link Out from one Daxus to the Link In on the next Daxus in the circle. Repeat this process until the circular configuration is complete and all units are linked together.
- 4 Launch the Daxus software on your PC and choose to search for Daxus units.



- 5 Select the linked Daxus units. Then use the Cluster Configuration area to set linking options for the linked units.

Designation	Name	IP Address	Type
Dot9	Daxus-5020272	192.168.1.1	Daxus
RD1	Daxus-5030215	192.168.1.2	Daxus

Cluster Configuration

Master Unit

Dot9 - 192.168.1.1

Use Link Ports

OK Cancel

Select the **Master Unit**. The time source (i.e. time stamp) of the master is used when the captures are reviewed. If you check **Use Link Ports**, the master unit provides the master sampling clock, arm signal, and abort signal to all of the units in the system.

- 6 Choose OK.

## Linked unit application notes

The following notes apply when working with linked Daxus units.

- When selecting channels from a list, channels from all linked Daxus units will be available for selection.
- During a data capture, captured channels are saved on their respective Daxus units. The Daxus software manages this process and marks the component captures as part of a linked data capture set.
- When reviewing a data capture, ensure all Daxus units that were used in the linked capture are connected. If one of the Daxus units is not connected, or its data has been deleted, its captured channels will not be available for review.
- The link ID for the linked data capture set will be appended to the data capture file names. This can be used to identify the individual data capture files on each linked unit.

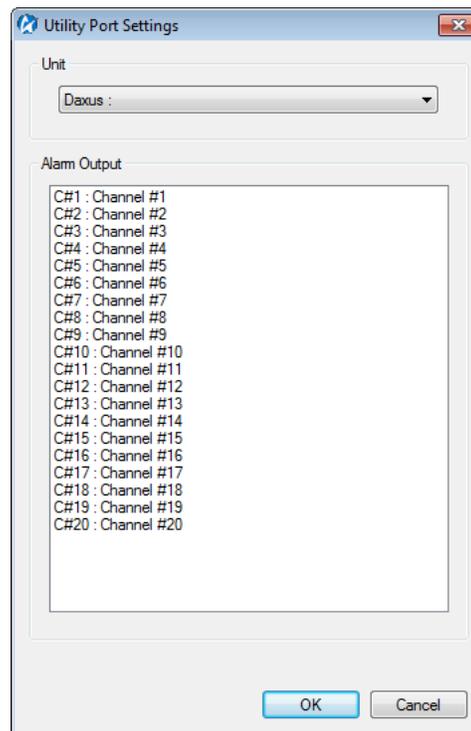


# 16

## Utilities and service options

### Setting up the utility / DIO port alarm outputs

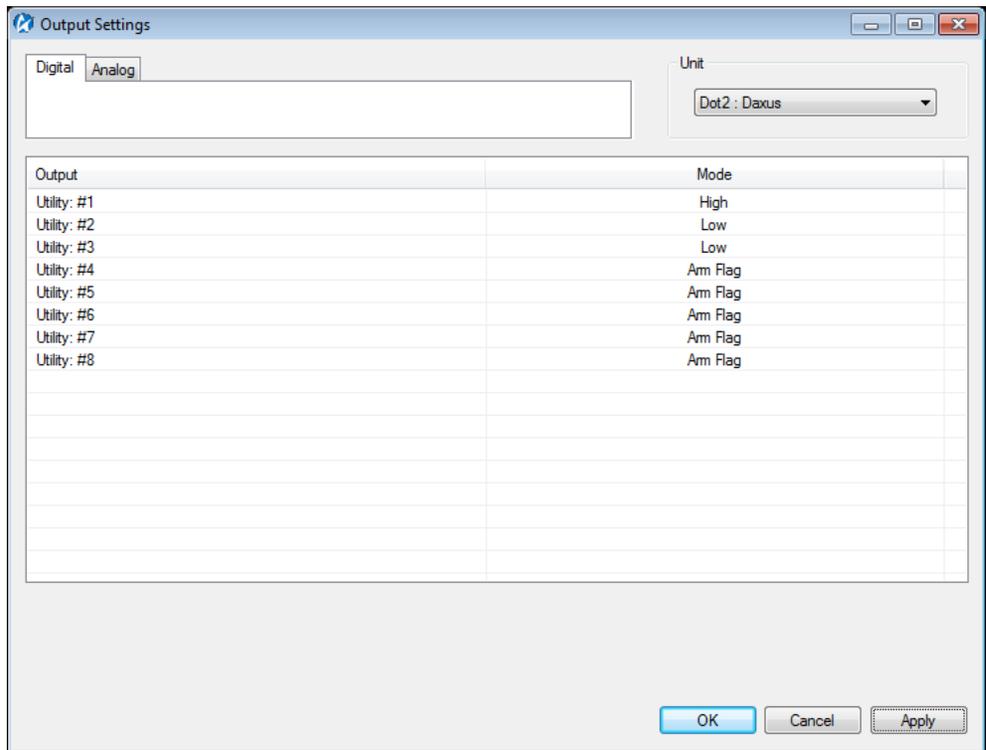
- 1 Choose Settings >> Utility Port. The Utility Port Settings window will open.



- 2 Select the Daxus from the Unit list.
- 3 To modify alarm output settings, select a channel (or multiple channels with "or" logic). When an alarm condition is met for the selected channels, the alarm output will occur.
- 4 Choose OK.

## Setting up the utility / DIO port programmable outputs

- 1 Choose Settings >> Outputs. The Output Settings window will open. Choose the Digital tab.

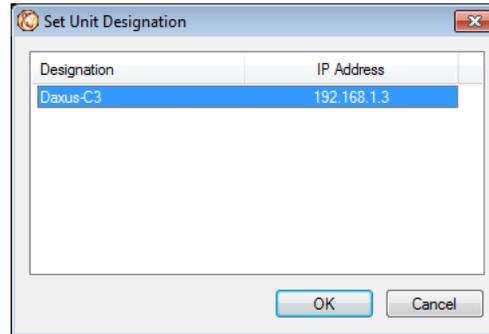


- 2 Select the Daxus from the Unit list.
- 3 To set programmable outputs, select the signal state for each output.
  - **Low** - The programmable output will be a TTL low signal.
  - **High** - The programmable output will be a TTL high signal.
  - **Data Capture Arm Flag** - The programmable output will be a TTL high signal when a data capture is armed.
- 4 Choose OK.

## Setting a unit designation

The unit designation is a label used to identify a Daxus unit. You can change the unit designation and assign a meaningful name to each Daxus unit. This is particularly helpful in environments with multiple Daxus recorders installed throughout a facility.

- 1 In Realtime mode, choose Settings >> Unit Settings >> Unit Designation. The Set Unit Designation window will open.

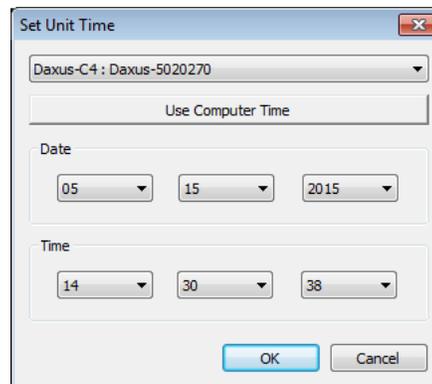


- 2 Select a Daxus unit. Then click the designation label to enable editing. Enter a designation and press Enter.
- 3 Choose OK.

## Setting the unit time

The unit time is the date and time stored on the Daxus unit. You can set the unit time based on your PC clock or by entering a custom date and time.

- 1 In Realtime mode, choose Settings >> Unit Settings >> Time. The Set Unit Time window will open.



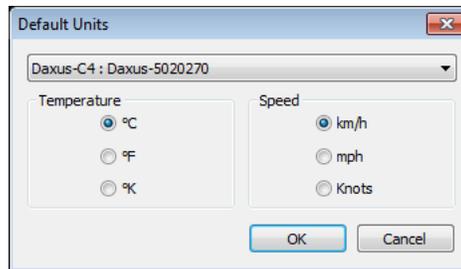
- 2 Select the Daxus from the Unit list.

- 3 Specify a date and time.
  - To set the date and time based on your PC date and time, choose Use Computer Time.
  - To set a specific date and time, set the date and time controls accordingly.
- 4 Choose OK.

## Setting default temperature and speed units

If you are using a thermocouple or RTD input to measure temperature, use this procedure to specify the unit of measure. If you are using the optional GPS features, you can use this procedure to set speed units.

- 1 In Realtime mode, choose Settings >> Unit Settings >> Default Units. The Unit Settings window will open.



- 2 Select the Daxus from the Unit list.
- 3 Select a temperature unit for the selected Daxus.
- 4 Select a speed unit for the selected Daxus.
- 5 Choose OK.

## Upgrading the Daxus unit software

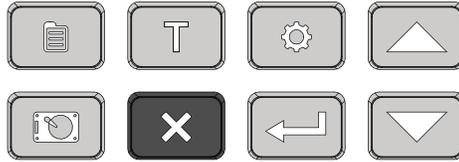
Software upgrades may be released in the future for the Daxus. Use the following instructions to upgrade the system software.

- 1 Use a PC to copy the Daxus upgrade software to the root folder of a USB drive.
- 2 Ensure the Daxus power is off. Then insert the USB drive into the Daxus USB port.
- 3 Power on the Daxus. An upgrade prompt will appear.

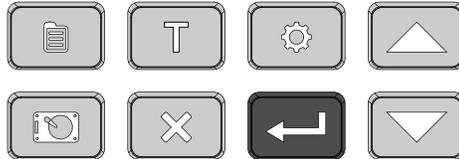
To start Daxus upgrade  
Press <ENTER>

To start Daxus normally  
Press <ABORT>

- To start the Daxus without upgrading the software, press the Abort key.



- To upgrade the software, press the Enter key.



The upgrade will start and the status will be displayed. The upgrade process may require several minutes.

When the upgrade has finished, you will be prompted to power down the Daxus.

- Power down the Daxus. Then remove the USB drive.



---

# A

# Specifications

## System

PC Connection	Gigabit Ethernet (10/100/1000Base-T)
Input Module Slots	2
Digital I/O	8 Events, alarms, programmable I/O
User Interface	Display with easy-to-use menu system and dedicated buttons for local control.

## Data Acquisition

Recording Method	Internal SATA disk drive
Maximum Sample Rate	200,000 samples/second/channel
Minimum Sample Rate	1 sample/minute
Multiple Sample Rates	Yes, up to 3 different rates
Total Capacity	500 GB (100GB, 200GB, or 400GB SSD optional)
Maximum Record	Limited to drive size
Time Stamp	Time and date automatically saved with data
Header	Information on units, range, sample rates, etc. saved with data
Events	Recorded with data
Trigger Point	Pre and post trigger is user adjustable
Auto Re-Arm	Allows automatic stacking of captures
QuickLook	Yes

## Signal Modules

UNIV-4	4-Channel Universal Module Voltage and DC Bridge (accepts up to 250 Vrms). Supports thermocouple, RTD and IEPE transducers with available adapters
ISEV-4	4-Channel Isolated Voltage Module (accepts up to 250 Vrms)
IHVM-4	4-Channel High Voltage Module (accepts up to 600 Vrms or 1000 VDC)
IHVM-4P	4-Channel High Voltage Power Module (accepts up to 600 Vrms or 1000 VDC)
NIDX-16	16-Channel Non-Isolated Differential Voltage Module (accepts up to 30Vrms or 40V DC).

## General

Maximum Channels	32 (module dependent)
Engineering Units	User defined units with $y=mx+b$ scaling
Pre-capture Filter	Lowpass, highpass, bandpass, bandstop
Advanced DSP	RMS, Integration, Differentiation
Post-capture Filter	Lowpass, highpass, bandpass, bandstop, RMS
Math Functions	Addition, Subtraction, Multiplication, Division, Trigonometric, Statistical and other general math functions
Calibration	Semi-automated to external reference

## Unit Power

Input Voltage	14-24 VDC
Power Consumption	60 W Max (40W Typical)

## AC Power Adapter

Input voltage	100-240 VAC
Frequency	50 - 60 Hz
Output voltage	19V DC
Maximum Power	70W

## Battery

Battery Type	Lithium Ion (rechargeable)
Charge Time	4 Hours
Battery Life	20 minutes on single charge

## Physical

Enclosure	Aluminum
Dimensions (inches)	324 mm W x 180 mm D x 120 mm H (12.8" W x 7" D x 4.7" H) with endcaps
Weight	3.2 kg (7 lbs.)

## Environmental

Operating Temp	0 to 40 °C (32 to 104 °F)
Storage Temp	-20 to 60 °C (-4 to 140 °F)
Operating Humidity	10% to 90% non condensing
Shock	MIL-810-F Method 516.5, Procedure I* *With solid state drive option

## UNIV-4 module

Channels Per Module	4
Rated Isolation	250 VRMS or DC, Cat II (iso-common to chassis and other iso-commons)
Frequency Counter Capability	Yes, all channels. Software selectable.
Counter Modes	Gated time frequency counter, cycle based frequency counter, pulse event counter, gated pulse event counter, quadrature counter, pulse width detector, period width detector, duty cycle detector, edge separation detector.
Frequency ctr range (menu)	Up to 80 KHz
Frequency ctr range (spec)	2 - 40 KHz
Frequency ctr accuracy	+/- 0.07% of Measurement + .002 Hz
Min counter input amplitude	25% of span for freq and pulse counters, 90% of span for all other modes
Pulse counter range	4000000000 maximum. (16 bit display resolution)
Pulse width accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Pulse width range	25 $\mu$ s - 2500000
Edge separation accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Edge separation range	25 $\mu$ s - 5000000 $\mu$ s
Period width accuracy	.001% of measurement + .00167% of span + 0.7 $\mu$ s
Period width range	25 $\mu$ s - 100000 $\mu$ s (10 Hz - 40 KHz)
Duty cycle accuracy	.5% (Inputs in the 1 Hz - 5 KHz range with 5% - 95% duty cycles)
Cold Start Drift	< 0.1% of attenuator (60 min.)
<b>Single Ended Input</b>	
Connector	Guarded banana jacks (red/black)
Input	Single-ended, AC/DC coupled
Sample Rate	200 KHz
A/D	16 bit SAR (one per channel)

Anti-Aliasing Filter	4 pole Bessel
Bandwidth	40 KHz (-3dB)
AC Coupled 3dB Point	< 0.54 Hz (0.47 Hz typ)
Off Ground Measurements	Yes
Zero Suppression	Yes, digital.
Attenuator Ranges	1, 10, 100, 200 and 400 Volt
Measurement Ranges	+/- 400 V (400 VFS or 800 VFS w/ zero offset) +/- 200 V (200 VFS or 400 VFS w/ zero offset) +/- 100 V (100 VFS or 200 VFS w/ zero offset) +/- 10 V (10 VFS or 20 VFS w/ zero offset) +/- 1 V (1 VFS or 2 VFS w/ zero offset. 0.1V min span)
Max Rated Input	250 Vrms or DC, Cat II
Max Transient Input	+/- 800 V peak (not to exceed 250Vrms)
DC Accuracy (25°C)	+/- 0.06% of attenuator
Overshoot	< 0.25%
Intrinsic Noise (pk-pk)	< 0.02% of attenuator + .02% of span (400V through 10V atts) < 0.16% of attenuator + .02% of span (1V att)
IMR at 60 Hz	Better than -80 dB
Min Input Impedance	> 1 Megohm
<b>Differential Input</b>	
Connector	8 wire screw terminal
Input	Differential, DC coupled
Sample Rate	200 KHz
A/D	16 bit SAR (one per channel)
Anti-Aliasing Filter	4 pole Bessel
Bandwidth	35 KHz

## Specifications

Measurement Ranges	+/- 1000 mV +/- 100 mV +/- 20 mV
Max Transient Input	+/- 20 V (no damage)
Common Mode Voltage	+/- 10V
Zero Suppression	Yes, digital.
DC Accuracy (25°C)	+/- 0.06% of attenuator
Overshoot	< 0.25%
Intrinsic Noise (pk-pk)	< 0.02% of attenuator + .02% of span (1000 mV Att) < 0.05% of attenuator + .02% of span (100 mV Att) < 0.18% of attenuator + .02% of span (20 mV Att)
Input Impedance	> 300 K $\Omega$ (150 K $\Omega$ balanced to isolated common)
CMR at 60 Hz	> 85 dB
Excitation	DC Voltage - adjustable, 0.1 to 10 V. 30 mA maximum
Excitation Accuracy	0.05 V voltage mode
<b>IEPE Input (ADP-I)</b>	
Connector	BNC on ADP-I adapter
Input	Single Ended, DC coupled
Sample Rate	200 KHz
A/D	16 bit SAR (one per channel)
Anti-Aliasing Filter	4 pole Bessel
Measurement Ranges	+/- 10 V
Max Transient Input	+/- 20 V (no damage)
Input Impedance	> 1 M $\Omega$
<b>DCVM Input</b>	
Connector	8 wire screw terminal
Input	Differential, DC coupled

Sample Rate	2.5 Hz
A/D	24 bit SigmaDelta (one per channel)
Anti-Aliasing Filter	Inherent
Measurement Ranges	-10 mV to + 100 mV
Max Transient Input	+/- 20 V (no damage)
Common Mode Voltage	+/- 10V
Zero Suppression	Yes, digital.
DC Accuracy (25°C)	+/- 0.04% of attenuator
Intrinsic Noise (pk-pk)	< 0.005% of attenuator
Input Impedance	> 300 K $\Omega$ (150 K $\Omega$ balanced to isolated common)
<b>Thermocouple Input (ADP-T)</b>	
Connector	Type U miniature thermocouple
Input	Differential, DC coupled
Sample Rate	2.5 Hz
A/D	24 bit SigmaDelta (one per channel)
Anti-Aliasing Filter	Inherent
Specified Range Type J	-210 to 1200 °C
Specified Range Type K	-200 to 1372 °C
Specified Range Type E	-200 to 1000 °C
Specified Range Type T	-200 to 400 °C
Specified Range Type N	-200 to 1300 °C
Specified Range Type B	600 to 1820 °C (250 to 1820 on menu)
Specified Range Type R	0 to 1767 °C (-20 to 1768 on menu)
Specified Range Type S	0 to 1767 °C (-20 to 1768 on menu)
Specified Range Type C	0 to 2316 °C
Max Transient Input	+/- 20 V (no damage)
Common Mode Voltage	+/- 10V

## Specifications

Resolution	0.01 °C
Thermocouple types	J,K,E,T,N,B,R,S,C
Accuracy (25°C) J (<0)	+/- 3.0 °C
Accuracy (25°C) J (0 to 1200)	+/- 1.0 °C
Accuracy (25°C) K (<0)	+/- 3.0 °C
Accuracy (25°C) K (0 to 1372)	+/- 1.0 °C
Accuracy (25°C) E (<-100)	+/- 3.0 °C
Accuracy (25°C) E (-100 to 1000)	+/- 1.5 °C
Accuracy (25°C) T (<-100)	+/- 2.5 °C
Accuracy (25°C) T (-100 to 400)	+/- 1.5 °C
Accuracy (25°C) N (<-50)	+/- 3.0 °C
Accuracy (25°C) N (-50 to 1300)	+/- 1.5 °C
Accuracy (25°C) B	+/- 4.5 °C.
Accuracy (25°C) R	+/- 5.5 °C
Accuracy (25°C) S	+/- 5.5 °C
Accuracy (25°C) C (W5ReM26Re)	+/- 3.0 °C
Cold Junction Compensation	Yes, both internal and external.
Compensation Error	Included in above accuracy specification
Linearization	NIST ITS-90
Input Impedance	> 300 KΩ (150 KΩ balanced to isolated common)
<b>RTD Input (ADP-R)</b>	
Connector	4 wire screw terminal
Input	Differential, DC coupled
Sample Rate	2.5 Hz
A/D	24 bit SigmaDelta (one per channel)
Anti-Aliasing Filter	Inherent

Measurement Ranges	Pt100(385) -200 to 800 °C Pt100(3916) -200 to 630 °C (-200 to 800 on menu)
Max Transient Input	+/- 20 V (no damage)
Resolution	0.01 °C
Supported RTD Probe types	Pt 100 - 385 (DIN 43760, IEC751 and ASTM 1137) Pt 100 - 3916 (JIS C1604)
Accuracy (25°C)	Pt 100 - 385 0.04% of measurement + 0.1 °C Pt 100 - 3916 (CONTACT FACTORY)
Linearization	Yes
<b>Resistance Input (ADP-R)</b>	
Connector	4 wire screw terminal
Input	Differential, DC coupled
Sample Rate	2.5 Hz
A/D	24 bit SigmaDelta (one per channel)
Anti-Aliasing Filter	Inherent
Measurement Ranges	0 to 1500 Ω
Max Transient Input	+/- 20 V (no damage)
Accuracy (25°C)	0.03% of measurement + 0.04 Ω

## ISEV-4 module

Channels Per Module	4
Rated Isolation	250 VRMS or DC, Cat II (iso-common to chassis and other iso-commons)
Sample Rate	200 KHz
A/D	16 bit SAR (one per channel)
Anti-Aliasing Filter	4 pole Bessel
Frequency Counter Capability	Yes, all channels. Software selectable.

Counter Modes	Gated time frequency counter, cycle based frequency counter, pulse event counter, gated pulse event counter, quadrature counter, pulse width detector, period width detector, duty cycle detector, edge separation detector.
Frequency ctr range (menu)	Up to 80 KHz
Frequency ctr range (spec)	2 - 40 KHz
Frequency ctr accuracy	+/- 0.07% of Measurement + .002 Hz
Min counter input amplitude	25% of span for freq and pulse counters, 90% of span for all other modes
Pulse counter range	4000000000 maximum. (16 bit display resolution)
Pulse width accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Pulse width range	25 $\mu$ s - 2500000
Edge separation accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Edge separation range	25 $\mu$ s - 5000000 $\mu$ s
Period width accuracy	.001% of measurement + .00167% of span + 0.7 $\mu$ s
Period width range	25 $\mu$ s - 100000 $\mu$ s (10 Hz - 40 KHz)
Duty cycle accuracy	.5% (Inputs in the 1 Hz - 5 KHz range with 5% - 95% duty cycles)
Cold Start Drift	< 0.1% of attenuator (60 min.)
<b>Single Ended Input</b>	
Connector	Guarded banana jacks (red/black)
Input	Single-ended, AC/DC coupled
Bandwidth	40 KHz (-3dB)
AC Coupled 3dB Point	< 0.54 Hz
Off Ground Measurements	Yes
Zero Suppression	Yes, digital.
Attenuator Ranges	1, 10, 100, 200 and 400 Volt

Measurement Ranges	+/- 400 V (400 VFS or 800 VFS w/ zero offset) +/- 200 V (200 VFS or 400 VFS w/ zero offset) +/- 100 V (100 VFS or 200 VFS w/ zero offset) +/- 10 V (10 VFS or 20 VFS w/ zero offset) +/- 1 V (1 VFS or 2 VFS w/ zero offset. 0.1V min span)
Max Rated Input	250 Vrms or DC, Cat II
Max Transient Input	+/- 800 V peak (not to exceed 250Vrms)
DC Accuracy (25°C)	+/- 0.06% of attenuator
Overshoot	< 0.25%
Intrinsic Noise (pk-pk)	< 0.02% of attenuator + .02% of span (400V through 10V atts) < 0.16% of attenuator + .02% of span (1V att)
IMR at 60 Hz	Better than -85 dB
Min Input Impedance	> 1 Megohm

## IHVM-4 module

Channels Per Module	4
Connector	Guarded banana jacks (red/black)
Input	Differential, DC coupled
Bandwidth	35 KHz (-3dB)
Rated Isolation	600 VRMS or DC, Cat III (channel to chassis and other channels) 1000 VDC, Cat II (channel to chassis and other channels)
Sample Rate	200 KHz
A/D	16 bit SAR (one per channel)
Anti-Aliasing Filter	4 pole Bessel
Frequency Counter Capability	Yes, all channels. Software selectable.

Counter Modes	Gated time frequency counter, cycle based frequency counter, pulse event counter, gated pulse event counter, quadrature counter, pulse width detector, period width detector, duty cycle detector, edge separation detector.
Frequency ctr range (menu)	Up to 80 KHz
Frequency ctr range (spec)	2 - 30 KHz
Frequency ctr accuracy	+/- 0.07% of Measurement + .002 Hz
Min counter input amplitude	25% of span for freq and pulse counters, 90% of span for all other modes
Pulse counter range	4000000000 maximum. (16 bit display resolution)
Pulse width accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Pulse width range	25 $\mu$ s - 2500000
Edge separation accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Edge separation range	25 $\mu$ s - 5000000 $\mu$ s
Period width accuracy	.001% of measurement + .00167% of span + 0.7 $\mu$ s
Period width range	25 $\mu$ s - 100000 $\mu$ s (10 Hz - 30 KHz)
Duty cycle accuracy	.5% (Inputs in the 1 Hz - 5 KHz range with 5% - 95% duty cycles)
Cold Start Drift	< 0.02% att + .02% span (60 min.)
Off Ground Measurements	Yes
Zero Suppression	Yes, digital.
Attenuator Ranges	40, 200 and 1000 Volt
Measurement Ranges	+/- 1000 V (1000 VFS or 2000 VFS w/ zero offset) +/- 200 V (200 VFS or 400 VFS w/ zero offset) +/- 40 V (40 VFS or 80 VFS w/ zero offset)
Minimum Span	1VFS (2VFS minimum when counters in use)
Max Rated Input	600 Vrms or DC, Cat III, 1000V DC, Cat II
DC Accuracy (25°C)	+/- 0.06% of attenuator
Overshoot	< 0.25%

Intrinsic Noise (pk-pk)	< 0.18% of attenuator + .05% of span (40V att) < 0.045% of attenuator + .02% of span (200V att) < 0.015% of attenuator + .025% of span (1000V att)
IMR at 60 Hz	Better than -70 dB
Min Input Impedance	> 10 Megohm

## IHVM-4P module

Channels Per Module	4
Viewable Channels Per Module	16 (includes processed math channels)
Connector	Guarded banana jacks (red/black)
Input	Differential, DC coupled
Bandwidth	14 KHz (-3dB)
Rated Isolation	600 VRMS or DC, Cat III (channel to chassis and other channels) 1000 VDC, Cat II (channel to chassis and other channels)
Sample Rate	50 KHz
A/D	16 bit SAR (one per channel)
Anti-Aliasing Filter	4 pole Bessel
Power Calculations	True power, apparent power, power factor, cycle based RMS voltage and cycle based RMS current (Power Mode)
Advanced Processing	Differentiation, integration, time based RMS, CycleBased RMS (Standard Mode)
Frequency Counter Capability	Yes, all channels. Software selectable.
Counter Modes	Gated time frequency counter, cycle based frequency counter, pulse width detector, period width detector, duty cycle detector.
Counter Modes (Power Mode)	Cycle based frequency counter (0.1 Hz resolution, 1.0 Hz minimum)
Frequency ctr range (menu)	Up to 20 KHz

## Specifications

Frequency ctr range (spec'd)	2 – 12 KHz (Standard Mode)
Frequency ctr accuracy	+/- 0.07% of Measurement + .002 Hz (Standard Mode)
Min counter input amplitude	25% of span for freq and pulse counters, 90% of span for all other modes
Pulse counter range	4000000000 maximum. (16 bit display resolution)
Pulse width accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Pulse width range	25 $\mu$ s - 2500000
Edge separation accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Edge separation range	25 $\mu$ s - 5000000 $\mu$ s
Period width accuracy	.001% of measurement + .00167% of span + 0.7 $\mu$ s
Period width range	25 $\mu$ s - 100000 $\mu$ s (10 Hz - 30 KHz)
Duty cycle accuracy	.5% (Inputs in the 1 Hz - 5 KHz range with 5% - 95% duty cycles)
Cold Start Drift	< 0.02% att + .02% span (60 min.)
Off Ground Measurements	Yes
Zero Suppression	Yes, digital.
Attenuator Ranges	40, 200 and 1000 Volt
Measurement Ranges	+/- 1000 V (1000 VFS or 2000 VFS w/ zero offset) +/- 200 V (200 VFS or 400 VFS w/ zero offset) +/- 40 V (40 VFS or 80 VFS w/ zero offset)
Minimum Span	2VFS
Max Rated Input	600 Vrms or DC, Cat III, 1000V DC, Cat II
DC Accuracy (25°C)	+/- 0.06% of attenuator
Overshoot	< 0.1%
Intrinsic Noise (pk-pk)	< 0.047% of attenuator + .013% of span (40V att) < 0.013% of attenuator + .02% of span (200V att) < 0.005% of attenuator + .024% of span (1000V att)
IMR at 60 Hz	Better than -75 dB

Crosstalk	Better than -80 dB
Min Input Impedance	> 10 Megohm

## NIDX-16 module

Channels Per Module	16
Connector	8 wire screw terminals (8 connectors with 2 channels per connector)
Input	Differential, DC coupled
Bandwidth	4.5 KHz (-3dB)
Sample Rate	20 KHz
A/D	16 bit SAR (one per channel)
Anti-Aliasing Filter	4 pole Bessel
Frequency Counter Capability	Yes, all channels. Software selectable.
Counter Modes	Gated time frequency counter, cycle based frequency counter, pulse event counter, gated pulse event counter, quadrature counter, pulse width detector, period width detector, duty cycle detector, edge separation detector.
Frequency ctr range (menu)	Up to 8 KHz
Frequency ctr range (spec)	2 - 3 KHz
Frequency ctr accuracy	+/- 0.07% of Measurement + .002 Hz
Min counter input amplitude	25% of span for freq and pulse counters, 90% of span for all other modes
Pulse counter range	4000000000 maximum. (16 bit display resolution)
Pulse width accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Pulse width range	25 $\mu$ s - 2500000
Edge separation accuracy	.002% of measurement + .00167% of span + 0.7 $\mu$ s
Edge separation range	25 $\mu$ s - 5000000 $\mu$ s
Period width accuracy	.001% of measurement + .00167% of span + 0.7 $\mu$ s

## Specifications

Period width range	25 $\mu$ s - 100000 $\mu$ s (10 Hz - 3 KHz)
Duty cycle accuracy	.5% (Inputs in the 1 Hz - 3 KHz range with 5% - 95% duty cycles)
Cold Start Drift	< 0.4% att (60 min.)
Off Ground Measurements	Yes
Zero Suppression	Yes, digital.
Attenuator Ranges	40, 20, 10, 5, 1, 0.5 Volt
Minimum Span	0.1 VFS
Measurement Ranges	+/- 40 V (40 VFS or 80 VFS w/ zero offset) +/- 20 V (20 VFS or 40 VFS w/ zero offset) +/- 10 V (10 VFS or 20 VFS w/ zero offset) +/- 5 V (5 VFS or 10 VFS w/ zero offset) +/- 1 V (1 VFS or 2 VFS w/ zero offset) +/- 0.5 V (0.5 VFS or 2 VFS w/ zero offset)
Max Rated Input	30 Vrms or 40 VDC
Max Common Mode Voltage	+/- 60V
DC Accuracy (25°C)	< 0.12% of attenuator (0.5V attenuator) < 0.10% of attenuator (1V attenuator) < 0.08% of attenuator (5V attenuator) < 0.04% of attenuator (10V, 20V and 40V attenuators)
Overshoot	< 0.5%
Intrinsic Noise (pk-pk)	< 0.05% of attenuator + 1mV (0.5V, 1V and 5V attenuators) < 0.04% of attenuator (10V attenuator) < 0.03% of attenuator (20V and 40V attenuators)
CMR at 60 Hz	Better than -70 dB (0.5 & 1V attenuators) Better than -65 dB (5V, 10V, 20V and 40V attenuators)
Min Input Impedance	> 500 Kohm

Output Voltage Capability	Yes, two channels. One associated with ch 1-8 and the other ch 9-16.
Output Voltage Range	Up to +/- 10V
Output Voltage Accuracy	+/- 0.04V
Output DAC resolution / speed	12 bit / 1 MHz maximum
Output Voltage Current	Up to 120 mA
Output Voltage Modes	DC, Arbitrary, Sine, Square and Pulse Train
Arbitrary Memory Length	32K per channel



# B

# Icon descriptions

## Realtime mode control panel

This section describes all icon buttons that can be added to the Realtime mode control panel.

Icon	Description
	<b>Print Screen</b> prints the contents of the display. This function is available only when a printer is installed. <i>File &gt;&gt; Print Screen</i>
	<b>Print Screen to PDF</b> saves the screen image as a PDF file. <i>File &gt;&gt; Print Screen to PDF</i>
	<b>Go to Scope</b> launches Scope mode. <i>Configuration &gt;&gt; Scope</i>
	<b>Go to Review</b> launches Review mode. <i>Configuration &gt;&gt; Review</i>
	<b>View Wizard</b> opens the Display Wizard window, which is used to set up grid and event display options. <i>View &gt;&gt; Wizard</i>
	<b>Add Grid</b> opens the Grid Properties window, which is used to set up a new grid. <i>View &gt;&gt; Add Grid</i>
	<b>Add Event</b> opens the Event Properties window, which is used to set up a new event. <i>View &gt;&gt; Add Event</i>
	<b>Monitor Run/Halt</b> starts and stops the on-screen display from running. <i>View &gt;&gt; Monitor Run/Halt</i>
	<b>Channel Information</b> displays and hides the Channel Information window, which is used in conjunction with cursors to measure signals. <i>Analysis &gt;&gt; Channel Information</i>

Icon	Description
	<p><b>Meter</b> opens the Meter Properties window, which is used to set up a meter.</p> <p><i>Analysis &gt;&gt; Meter</i></p>
	<p><b>XYY Plot</b> opens the XYY Properties window, which is used to set up an XYY plot.</p> <p><i>Analysis &gt;&gt; XYY</i></p>
	<p><b>Realtime Settings</b> opens the Realtime Settings window, which is used to configure Realtime mode.</p> <p><i>Settings &gt;&gt; Realtime</i></p>
	<p><b>Set Timebase</b> changes the speed of the on-screen chart. In this example, the chart speed will be changed to 5 seconds/division when the icon is pressed.</p> <p><i>Settings &gt;&gt; Timebase</i></p>
	<p><b>Highlight Settings</b> opens the Highlight Settings window, which is used to set up highlights.</p> <p><i>Settings &gt;&gt; Highlight</i></p>
	<p><b>Control Panel Settings</b> opens the Panel Settings window, which is used to set up control panel icons.</p> <p><i>Settings &gt;&gt; Control Panel</i></p>
	<p><b>Channel Settings</b> opens the Channel Settings window, which is used to set up amplifier inputs, base channels, derived channels, and event inputs.</p> <p><i>Settings &gt;&gt; Channels</i></p>
	<p><b>Outputs</b> opens the Output Settings window, which is used to set up digital and analog outputs.</p> <p><i>Settings &gt;&gt; Outputs</i></p>
	<p><b>Reset Counter</b> resets the frequency counter for the specified channel.</p> <p><i>Settings &gt;&gt; Counter Reset</i></p>
	<p><b>Integration Reset</b> resets the integration for the specified channel.</p> <p><i>Settings &gt;&gt; Integration Reset</i></p>
	<p><b>Cursor A</b> displays and hides cursor A.</p> <p><i>Cursors &gt;&gt; Cursor A</i></p>

Icon	Description
	<b>Cursor B</b> displays and hides cursor B. <i>Cursors &gt;&gt; Cursor B</i>
	<b>Active Cursor</b> changes the active cursor between A, B, or A & B. <i>Cursors &gt;&gt; Active Cursor</i>
	<b>Move Cursor Left</b> moves the active cursor(s) to the left each time the icon is pressed. <i>Cursors &gt;&gt; Move Left</i>
	<b>Move Cursor Right</b> moves the active cursor(s) to the right each time the icon is pressed. <i>Cursors &gt;&gt; Move Right</i>
	<b>Capture Settings</b> opens the Capture Settings window, which is used to configure data capture setup options. <i>Capture &gt;&gt; Capture Settings</i>
	<b>Trigger Settings</b> opens the Trigger Settings window, which is used to set up data capture triggers and aborts. <i>Capture &gt;&gt; Trigger/Abort Settings</i>
	<b>Arm Capture</b> arms (starts) a data capture using the configured data capture setup options. <i>Capture &gt;&gt; Arm</i>
	<b>Manual Trigger</b> triggers a data capture manually. <i>Capture &gt;&gt; Manual Trigger</i>
	<b>Abort Capture</b> cancels the data capture in progress. <i>Capture &gt;&gt; Manual Abort</i>
	<b>Trigger Indicator</b> indicates when a trigger occurs by displaying a yellow circle. <i>Capture &gt;&gt; Trigger Indicator</i>
	<b>Capture Indicator</b> indicates when a data capture is in progress by illuminating. <i>Capture &gt;&gt; Capture Indicator</i>
	<b>Operations Manual</b> opens the operations manual. <i>Help &gt;&gt; Operations Manual</i>

## Scope mode control panel

This section describes all icon buttons that can be added to the Scope mode control panel.

Icon	Description
	<p><b>Print Screen</b> prints the contents of the display. This function is available only when a printer is installed.</p> <p><i>File &gt;&gt; Print Screen</i></p>
	<p><b>Print Screen to PDF</b> saves the screen image as a PDF file.</p> <p><i>File &gt;&gt; Print Screen to PDF</i></p>
	<p><b>Send All to PDF</b> saves the entire capture as a PDF file.</p> <p><i>File &gt;&gt; Send All to PDF</i></p>
	<p><b>Send Cursors to PDF</b> saves the portion of the capture within cursors as a PDF file.</p> <p><i>File &gt;&gt; Send Cursors to PDF</i></p>
	<p><b>Save as Data Capture Record</b> archives an entire scope capture, the currently displayed page of the capture, or the portion of the capture between cursors.</p> <p><i>File &gt;&gt; Save as Data Capture Record</i></p>
	<p><b>Go to Realtime</b> launches Realtime mode.</p> <p><i>Configuration &gt;&gt; Realtime</i></p>
	<p><b>Go to Review</b> launches Review mode.</p> <p><i>Configuration &gt;&gt; Review</i></p>
	<p><b>View Wizard</b> opens the Display Wizard window, which is used to set up grid and event display options.</p> <p><i>View &gt;&gt; Wizard</i></p>
	<p><b>Add Grid</b> opens the Grid Properties window, which is used to set up a new grid.</p> <p><i>View &gt;&gt; Add Grid</i></p>
	<p><b>Add Event</b> opens the Event Properties window, which is used to set up a new event.</p> <p><i>View &gt;&gt; Add Event</i></p>

Icon	Description
	<p><b>Trigger Line</b> shows and hides the trigger line in the waveform display area.</p> <p><i>View &gt;&gt; Trigger Line</i></p>
	<p><b>IDs</b> displays an identification label for each channel in the waveform display area.</p> <p><i>View &gt;&gt; IDs</i></p>
	<p><b>Channel Information</b> displays and hides the Channel Information window, which is used in conjunction with cursors to measure signals.</p> <p><i>Analysis &gt;&gt; Channel Information</i></p>
	<p><b>Meter</b> opens the Meter Properties window, which is used to set up a meter.</p> <p><i>Analysis &gt;&gt; Meter</i></p>
	<p><b>XYY Plot</b> opens the XYY Properties window, which is used to set up an XYY plot.</p> <p><i>Analysis &gt;&gt; XYY</i></p>
	<p><b>Fourier Transform</b> opens the Fourier Transform Properties window.</p> <p><i>Analysis &gt;&gt; Fourier Transform</i></p>
	<p><b>Scope Settings</b> opens the Scope Settings window, which is used to configure scope captures.</p> <p><i>Settings &gt;&gt; Scope</i></p>
	<p><b>Channel Settings</b> opens the Channel Settings window, which is used to set up amplifier inputs, base channels, derived channels, and event inputs.</p> <p><i>Settings &gt;&gt; Channels</i></p>
	<p><b>Outputs</b> opens the Output Settings window, which is used to set up digital and analog outputs.</p> <p><i>Settings &gt;&gt; Outputs</i></p>
	<p><b>Control Panel Settings</b> opens the Panel Settings window, which is used to set up control panel icons.</p> <p><i>Settings &gt;&gt; Control Panel</i></p>
	<p><b>Increase Timebase</b> increases the timebase used for scope captures.</p> <p><i>Settings &gt;&gt; Timebase Up</i></p>

Icon	Description
	<p><b>Decrease Timebase</b> decreases the timebase used for scope captures.</p> <p><i>Settings &gt;&gt; Timebase Down</i></p>
	<p><b>Pre-Trigger Percent</b> opens the Pre-Trigger Percent window, which is used to enter the percent of the scope capture allocated for pre-trigger data.</p> <p><i>Settings &gt;&gt; Pre-Trigger Percent</i></p>
	<p><b>Scope Arm/Abort</b> arms and aborts scope captures.</p> <p><i>Settings &gt;&gt; Arm/Abort</i></p>
	<p><b>Reset Counter</b> resets the frequency counter for the specified channel.</p> <p><i>Settings &gt;&gt; Counter Reset</i></p>
	<p><b>Integration Reset</b> resets the integration for the specified channel.</p> <p><i>Settings &gt;&gt; Integration Reset</i></p>
	<p><b>Cursor A</b> displays and hides cursor A.</p> <p><i>Cursors &gt;&gt; Cursor A</i></p>
	<p><b>Cursor B</b> displays and hides cursor B.</p> <p><i>Cursors &gt;&gt; Cursor B</i></p>
	<p><b>Active Cursor</b> changes the active cursor between A, B, or A &amp; B.</p> <p><i>Cursors &gt;&gt; Active Cursor</i></p>
	<p><b>Move Cursor Left</b> moves the active cursor(s) to the left each time the icon is pressed.</p> <p><i>Cursors &gt;&gt; Move Left</i></p>
	<p><b>Move Cursor Right</b> moves the active cursor(s) to the right each time the icon is pressed.</p> <p><i>Cursors &gt;&gt; Move Right</i></p>
	<p><b>Capture Settings</b> opens the Capture Settings window, which is used to configure data capture setup options.</p> <p><i>Capture &gt;&gt; Capture Settings</i></p>
	<p><b>Trigger Settings</b> opens the Trigger Settings window, which is used to set up data capture triggers and aborts.</p> <p><i>Capture &gt;&gt; Trigger/Abort Settings</i></p>

Icon	Description
	<b>Arm Capture</b> arms (starts) a data capture using the configured data capture setup options. <i>Capture &gt;&gt; Arm</i>
	<b>Manual Trigger</b> triggers a data capture manually. <i>Capture &gt;&gt; Manual Trigger</i>
	<b>Abort Capture</b> cancels the data capture in progress. <i>Capture &gt;&gt; Manual Abort</i>
	<b>Trigger Indicator</b> indicates when a trigger occurs by displaying a yellow circle. <i>Capture &gt;&gt; Trigger Indicator</i>
	<b>Capture Indicator</b> indicates when a data capture is in progress by illuminating. <i>Capture &gt;&gt; Capture Indicator</i>
	<b>Operations Manual</b> opens the operations manual. <i>Help &gt;&gt; Operations Manual</i>

## Review mode control panel

This section describes all icon buttons that can be added to the Review mode control panel.

Icon	Description
	<b>Print Screen</b> prints the contents of the display. This function is available only when a printer is installed. <i>File &gt;&gt; Print Screen</i>
	<b>Print Screen to PDF</b> saves the screen image as a PDF file. <i>File &gt;&gt; Print Screen to PDF</i>
	<b>Send All to PDF</b> saves the entire capture as a PDF file. <i>File &gt;&gt; Send All to PDF</i>
	<b>Send Cursors to PDF</b> saves the portion of the capture within cursors as a PDF file. <i>File &gt;&gt; Send Cursors to PDF</i>

Icon	Description
	<p><b>Go to Realtime</b> launches Realtime mode. <i>Configuration &gt;&gt; Realtime</i></p>
	<p><b>Go to Scope</b> launches Scope mode. <i>Configuration &gt;&gt; Scope</i></p>
	<p><b>Status Text Samples</b> changes the status text format to display samples. <i>View &gt;&gt; Status Text Samples</i></p>
	<p><b>Status Text Relative Time</b> changes the status text format to display relative time. <i>View &gt;&gt; Status Text Relative Time</i></p>
	<p><b>Status Text Absolute Time</b> changes the status text format to display absolute time. <i>View &gt;&gt; Status Text Absolute Time</i></p>
	<p><b>Status Text Percent</b> changes the status text format to display percentages. <i>View &gt;&gt; Status Text Percent</i></p>
	<p><b>Status Text Reference Time</b> changes the status text format to display reference time. <i>View &gt;&gt; Status Text Reference</i></p>
	<p><b>View Wizard</b> opens the Display Wizard window, which is used to set up grid and event display options. <i>View &gt;&gt; Wizard</i></p>
	<p><b>Add Grid</b> opens the Grid Properties window, which is used to set up a new grid. <i>View &gt;&gt; Add Grid</i></p>
	<p><b>Add Event</b> opens the Event Properties window, which is used to set up a new event. <i>View &gt;&gt; Add Event</i></p>
	<p><b>Trigger Line</b> shows and hides the trigger line in the waveform display area. <i>View &gt;&gt; Trigger Line</i></p>

Icon	Description
	<p><b>IDs</b> displays an identification label for each channel in the waveform display area.</p> <p><i>View &gt;&gt; IDs</i></p>
	<p><b>Channel Information</b> displays and hides the Channel Information window, which is used in conjunction with cursors to measure signals.</p> <p><i>Analysis &gt;&gt; Channel Information</i></p>
	<p><b>Meter</b> opens the Meter Properties window, which is used to set up a meter.</p> <p><i>Analysis &gt;&gt; Meter</i></p>
	<p><b>XYY Plot</b> opens the XYY Properties window, which is used to set up an XYY plot.</p> <p><i>Analysis &gt;&gt; XYY</i></p>
	<p><b>Fourier Transform</b> opens the Fourier Transform Properties window.</p> <p><i>Analysis &gt;&gt; Fourier Transform</i></p>
	<p><b>Channel Settings</b> opens the Channel Settings window, which is used to set up amplifier inputs, base channels, derived channels, and event inputs.</p> <p><i>Settings &gt;&gt; Channels</i></p>
	<p><b>Control Panel Settings</b> opens the Panel Settings window, which is used to set up control panel icons.</p> <p><i>Settings &gt;&gt; Control Panel</i></p>
	<p><b>Go to Start</b> scrolls the display to the start of the file.</p> <p><i>Display &gt;&gt; Goto Start</i></p>
	<p><b>Go to End</b> scrolls the display to the end of the file.</p> <p><i>Display &gt;&gt; Goto End</i></p>
	<p><b>Go to Trigger</b> scrolls the display to the trigger point in a file.</p> <p><i>Display &gt;&gt; Goto Trigger</i></p>
	<p><b>Go to Cursor A</b> scrolls the display to the location of cursor A.</p> <p><i>Display &gt;&gt; Goto Cursor A</i></p>
	<p><b>Go to Cursor B</b> scrolls the display to the location of cursor B.</p> <p><i>Display &gt;&gt; Goto Cursor B</i></p>

Icon	Description
	<p><b>Go to Cursors A and B</b> compresses or expands the display to the portion of the file between cursors A and B.</p> <p><i>Display &gt;&gt; Goto Cursors A &lt;-&gt; B</i></p>
	<p><b>Go to Advanced</b> opens the Advanced Search window, which is used to navigate through the file using specific search criteria.</p> <p><i>Display &gt;&gt; Goto Advanced</i></p>
	<p><b>Show All</b> compresses the file to fit the entire file on the display.</p> <p><i>Display &gt;&gt; Show All</i></p>
	<p><b>Compress</b> compresses the display of files to fit more of the file on the screen.</p> <p><i>Display &gt;&gt; Compress</i></p>
	<p><b>Expand</b> expands the display of files to fit less of the file on the screen.</p> <p><i>Display &gt;&gt; Expand</i></p>
	<p><b>Scroll Forward</b> scrolls the chart forward.</p> <p><i>Display &gt;&gt; Scroll Forward</i></p>
	<p><b>Scroll Fast Forward</b> scrolls the chart forward quickly.</p> <p><i>Display &gt;&gt; Fast Forward</i></p>
	<p><b>Scroll Stop</b> stops the chart from scrolling.</p> <p><i>Display &gt;&gt; Scroll Stop</i></p>
	<p><b>Scroll Back</b> scrolls the chart backward.</p> <p><i>Display &gt;&gt; Scroll Backward</i></p>
	<p><b>Scroll Fast Back</b> scrolls the chart backward quickly.</p> <p><i>Display &gt;&gt; Rewind</i></p>
	<p><b>Cursor A</b> displays and hides cursor A.</p> <p><i>Cursors &gt;&gt; Cursor A</i></p>
	<p><b>Cursor B</b> displays and hides cursor B.</p> <p><i>Cursors &gt;&gt; Cursor B</i></p>
	<p><b>Active Cursor</b> changes the active cursor between A, B, or A &amp; B.</p> <p><i>Cursors &gt;&gt; Active Cursor</i></p>

Icon	Description
	<p><b>Move Cursor Left</b> moves the active cursor(s) to the left each time the icon is pressed.</p> <p><i>Cursors &gt;&gt; Move Left</i></p>
	<p><b>Move Cursor Right</b> moves the active cursor(s) to the right each time the icon is pressed.</p> <p><i>Cursors &gt;&gt; Move Right</i></p>
	<p><b>Capture Settings</b> opens the Capture Settings window, which is used to configure data capture setup options.</p> <p><i>Capture &gt;&gt; Capture Settings</i></p>
	<p><b>Trigger Settings</b> opens the Trigger Settings window, which is used to set up data capture triggers and aborts.</p> <p><i>Capture &gt;&gt; Trigger/Abort Settings</i></p>
	<p><b>Arm Capture</b> arms (starts) a data capture using the configured data capture setup options.</p> <p><i>Capture &gt;&gt; Arm</i></p>
	<p><b>Manual Trigger</b> triggers a data capture manually.</p> <p><i>Capture &gt;&gt; Manual Trigger</i></p>
	<p><b>Abort Capture</b> cancels the data capture in progress.</p> <p><i>Capture &gt;&gt; Manual Abort</i></p>
	<p><b>Trigger Indicator</b> indicates when a trigger occurs by displaying a yellow circle.</p> <p><i>Capture &gt;&gt; Trigger Indicator</i></p>
	<p><b>Capture Indicator</b> indicates when a data capture is in progress by illuminating.</p> <p><i>Capture &gt;&gt; Capture Indicator</i></p>
	<p><b>Operations Manual</b> opens the operations manual.</p> <p><i>Help &gt;&gt; Operations Manual</i></p>



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