

USER GUIDE

SCC-A10 Voltage Attenuator Module

The SCC-A10 voltage attenuator module accepts up to two voltage sources of 100 V maximum amplitude and attenuates each voltage by a factor of 10. A differential instrumentation amplifier buffers each input signal. The SCC-A10 contains circuitry capable of protecting E Series DAQ devices for input signals up to 250 V_{rms}.

Conventions

The following conventions are used in this guide:

<>

Angle brackets that contain numbers separated by an ellipsis represent a range of values associated with a bit or signal name—for example, P0.<3..0>.

»

The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a note, which alerts you to important information.



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on the product, refer to the *Read Me First: Safety and Radio-Frequency Interference* document, shipped with the product, for precautions to take.



When symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.



When symbol is marked on a product, it denotes a component that may be hot. Touching this component may result in bodily injury.

bold	Bold text denotes items that you must select in software, such as menu items and dialog box options. Bold text also denotes parameter names.
<i>italic</i>	Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text that is a placeholder for a word or value that you must supply.
monospace	Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.
SC-2345	SC-2345 refers to both the SC-2345 connector block and the SC-2345 configurable connector.
SCC	SCC refers to any SCC Series signal conditioning module.

What You Need to Get Started

To set up and use the SCC-A10, you need the following items:

- SC-2345/2350 with one of the following:
 - SCC-PWR01
 - SCC-PWR02 and the PS01 power supply
 - SCC-PWR03—requires a 7 to 42 VDC power supply (not included)
- One or more SCC-A10 modules
- SC-2345/2350 User Manual*, available at ni.com
- SCC Quick Start Guide*, available at ni.com
- SCC-A10 Voltage Attenuator Module User Guide*
- Read Me First: Safety and Radio-Frequency Interference*
- SC-2345 Quick Reference Label
- 68-pin E Series DAQ device, documentation, and 68-pin cable
- 1/8 in. flathead screwdriver
- Numbers 1 and 2 Phillips-head screwdrivers

- Wire insulation strippers
- NI-DAQ (current version) for Windows 2000/NT/XP/Me



Note Software scaling of measurements is not supported on the Macintosh operating system. Refer to the [Using the SCC-A10 when Scaling Voltage Measurements](#) section.

Device Specific Information



Note For general SCC module installation and signal connection information, and information about the SC-2350 carrier, refer to the *SCC Quick Start Guide*, available for download at ni.com/manuals.

Installing the Module



Caution Refer to the *Read Me First: Safety and Radio-Frequency Interference* document before removing equipment covers or connecting/disconnecting any signal wires.

You can plug the SCC-A10 into any analog input socket on the SC-2345. The socket you choose determines which E Series DAQ device channels receive the SCC-A10 signals, as explained in the *SCC Quick Start Guide*.

For single-stage input conditioning, plug the SCC-A10 into any socket J(X+1), where X is 0 to 7, and connect the input-signal wires to the module as described in the *SCC Quick Start Guide*.

If you use the SCC-A10 in a dual-stage configuration, the SCC-A10 *must* be the first-stage module. Plug it into any socket J(X+9) and plug the second-stage SCC into socket J(X+1), where X is 0 to 7. Connect the input-signal wires to the SCC-A10 as described in the *SCC Quick Start Guide*. The SC-2345 connects the output signals of the SCC-A10 to the inputs of the second-stage SCC. An example of dual-stage conditioning is an SCC-A10 followed by a lowpass filter module (SCC-LPXX).

Sockets J9 to J16 are also available for digital input/output (DIO) conditioning or control. Refer to the *SC-2345/2350 User Manual* for more information about configuring, connecting, and installing SCC modules.

Connecting the Input Signals



Note The signal names have changed. Refer to ni.com/info and enter `rdntng` to confirm the signal names.

Each screw terminal is labeled by pin number <1..4>. Pins 1 and 2 form a differential channel routed to E Series DAQ device channel $X+8$, and pins 3 and 4 form a second differential channel routed to E Series DAQ device channel X . The value of X is determined by the number of the SC-2345 socket where you plug in the module, $J(X+1)$ or $J(X+9)$.

The signal source can be floating or ground-referenced. Floating signal sources do not require bias resistors to ground with the SCC-A10. Figure 1 shows the SCC-A10 signal connections.

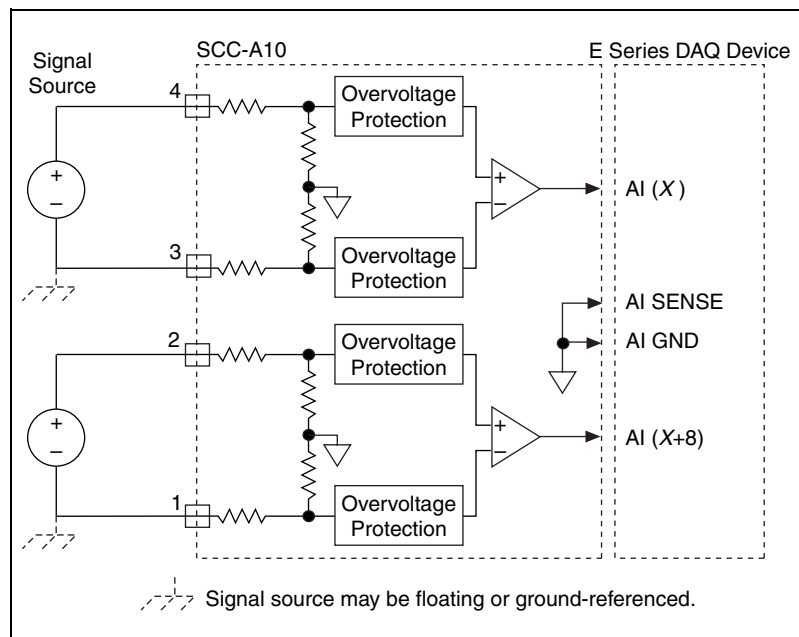


Figure 1. SCC-A10 Signal Connections

For information about how to configure the SCC-A10 module using NI-DAQmx, refer to the *SCC Quick Start Guide*.

Using the SCC-A10 when Scaling Voltage Measurements

If you configured the SCC-A10 using Measurement & Automation Explorer (MAX) and you are using NI-DAQ, the voltage reading you get from the E Series DAQ device accounts for the voltage scaling effect of the SCC-A10. Otherwise, because the voltage measurement from the E Series DAQ device is one-tenth of the voltage applied at the SCC-A10 input, you must multiply the voltage reading from the E Series DAQ device by 10 to get the correct SCC-A10 input voltage.

Specifications



Note In order for the SCC-A10 to perform according to the specifications in this guide, the ± 15 V power supply you use must be accurate to within 5%.

These ratings are typical at 25 °C unless otherwise stated.

Analog Input

Number of input channels	2 DIFF
Input range	± 100 VDC
Input impedance	1 M Ω (powered on or off)
Gain error	$\pm 0.14\%$ of reading max ¹
Gain-error temperature coefficient.....	$\pm 0.006\%$ of reading/ $^{\circ}$ C max
Offset error	± 6.5 mV max (referred to input [RTI] ²)
Offset-error temperature coefficient	± 80 μ V/ $^{\circ}$ C max (RTI)
Nonlinearity	$\pm 0.004\%$ of full scale
Common-mode rejection ratio	60 dB min (DC to 60 Hz)

¹ Temperature range is 23 °C \pm 5 °C.

² Calculated with respect to the input range

Dynamic Response

Bandwidth (–3 dB)	10 kHz
Output settling time to within 0.01% of nominal input voltage	15 μ s
Output slew rate.....	0.75 V/ μ s min

Power Requirement

Analog power	100 mW max
+15 V	3.2 mA max
–15 V	3.2 mA max
Digital power (+5 V)	0.0 mA

Physical

Dimensions	8.89 cm \times 2.92 cm \times 1.85 cm (3.5 in. \times 1.15 in. \times 0.73 in.)
I/O connectors.....	One 20-pin right-angle male connector, one 4-pin screw terminal
Wire gauge range.....	24 to 12 AWG

Maximum Working Voltage

Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth	100 V, Installation Category I
Channel-to-channel.....	100 V, Installation Category I

Environmental

Operating temperature	0 to 50 $^{\circ}$ C
Storage temperature	–20 to 70 $^{\circ}$ C
Humidity	10 to 90% RH, noncondensing
Maximum altitude.....	2,000 m
Pollution Degree (indoor use only)	2

Safety

The SCC-A10 meets the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 3111-1:UL 61010B-1
- CAN/CSA C22.2 No. 1010.1



Note For UL and other safety certifications, refer to the product label, or visit ni.com/hardref.nsf, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

Emissions EN 55011 Class A at 10 m
FCC Part 15A above 1 GHz

Immunity EN 61326:1997 + A2:2001,
Table 1

CE, C-Tick, and FCC Part 15 (Class A) Compliant



Note For full EMC compliance, operate this device with shielded cabling.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety) 73/23/ECC

Electromagnetic Compatibility
Directive (EMC) 89/336/EEC



Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit ni.com/hardref.nsf, search by model or product line, and click the appropriate link in the Certification column.

SCC-A10 Module Pin Assignments

Figure 2 shows the I/O connector pins on the bottom of the module.

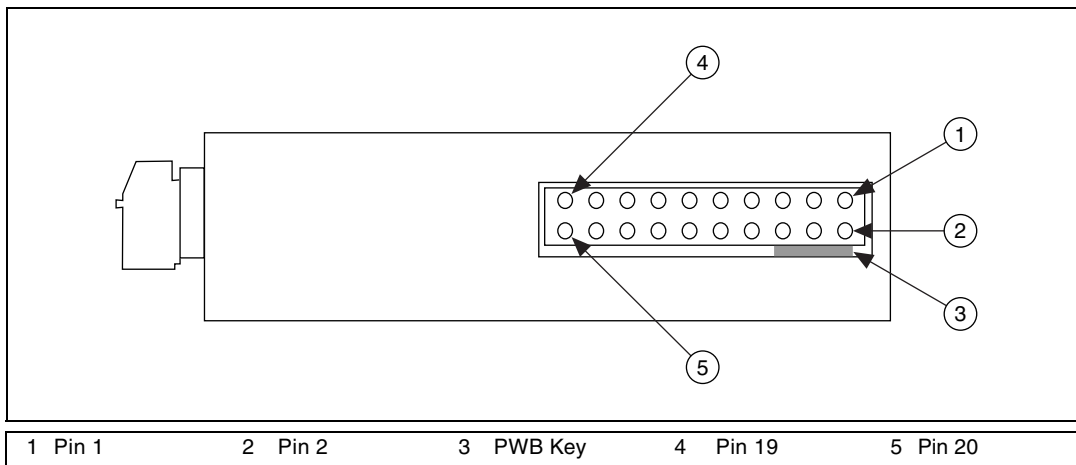


Figure 2. SCC Module Bottom View

Table 1 lists the signal corresponding to each pin. AI (X) and AI (X+8) are the analog input signal channels of the E Series DAQ device. AI GND is the analog input ground signal and is the reference for AI (X) and AI (X+8). A GND is the reference for the ± 15 V power supply. AI GND and A GND connect to the SC-2345 at the SCC-PWR connector.

Table 1. SCC-A10 Module Pin Assignments

Pin Number	Signal
1	E Series AI (X)
2	E Series AI GND [AI (X) REF]
3	—
4	E Series AI (X+8)
5	—
6	E Series AI GND
7	—
8	E Series AI GND [AI (X+8) REF]
9	—
10	—

Table 1. SCC-A10 Module Pin Assignments (Continued)

Pin Number	Signal
11	A GND
12	—
13	+15 V
14	-15 V
15	—
16	—
17	—
18	—
19	—
20	—

