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USER GUIDE

SCC-A10 Voltage Attenuator Module

The SCC-A10 voltage attenuator module accepts up to two voltage sources of 60 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/M Series DAQ devices for input signals up to 60 VDC.

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, AO <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.

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italic	Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. Italic text 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:

- ❑ Hardware
  - SCC-68

    or
  - 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
  - 68-pin E/M Series DAQ device
  - 68-pin cable
  - Quick Reference Label
- ❑ Software
  - The latest version of NI-DAQmx
- ❑ Documentation
  - *SCC-A10 Voltage Attenuator Module User Guide*
  - *SCC-68 User Guide*

    or
  - *SC-2345/2350 User Manual*
  - *SCC Quick Start Guide*

- *Read Me First: Safety and Radio-Frequency Interference*
- Documentation for your hardware
- Documentation for your software

❑ Tools
- 1/8 in. flathead screwdriver
- Numbers 1 and 2 Phillips screwdrivers
- Wire insulation stripper

Note Software scaling of measurements is not supported on the Macintosh operating system. Refer to the *SCC-A10 Module Pin Assignments* section.

You can download NI documents from `ni.com/manuals`. To download the latest version of NI-DAQmx, click **Download Software** at `ni.com`.

Device Specific Information

Note For general SCC module installation and signal connection information, and information about the SC-2345/2350 and SC-68, 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-2345/2350 or SCC-68. The socket you choose determines which E/M 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 slot of the SC-68, or any socket of the SC-2345/2350 J(*X*+1), where *X* is 0 to 7. 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 in an SC-2345, the SCC-A10 *must* be the first-stage module. Plug it into any socket J(*X*+0) 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-LP*XX*).

Sockets J9 to J16 of the SC-2345 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 `rdtntg` 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/M Series DAQ device channel *X*+8, and pins 3 and 4 form a second differential channel routed to E/M Series DAQ device channel *X*. The value of *X* is determined by the number of the SC-2345/2350 socket where you plug in the module, J(*X*+1) or J(*X*+9) or the slot number on the SCC-68.

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.

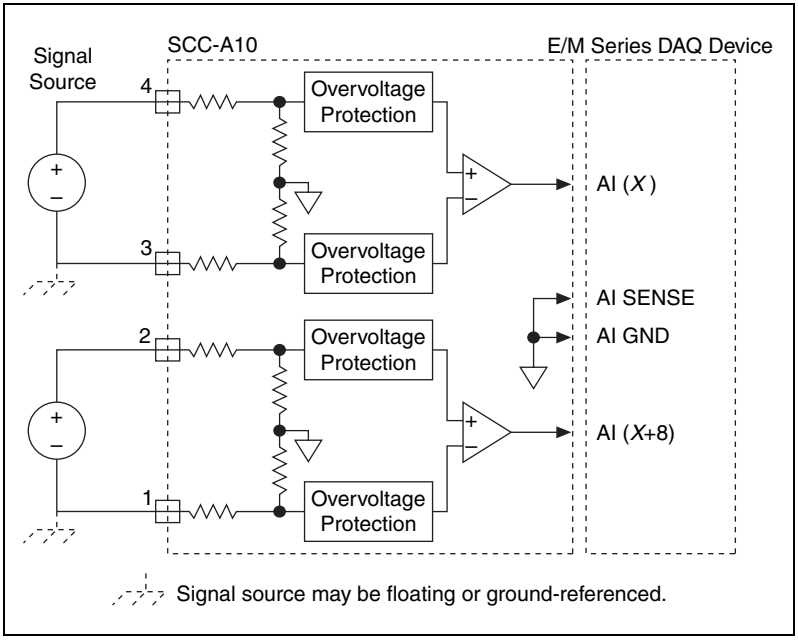


Figure 1. SCC-A10 Signal Connections

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/M Series DAQ device accounts for the voltage scaling effect of the SCC-A10. Otherwise, because the voltage measurement from the E/M Series DAQ device is one-tenth of the voltage applied at the SCC-A10 input, you must multiply the voltage reading from the E/M 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 ..... ±60 VDC

Input impedance ..... 1 MΩ (powered on or off)

Gain error ..... ±0.14% of reading max[1]

Gain-error temperature coefficient..... ±0.006% of reading/°C max

Offset error ..... ±6.5 mV max (referred to input [RTI][2])

Offset-error temperature coefficient..... ±80 µV/°C max (RTI)

Nonlinearity ..... ±0.004% of full scale

Common-mode rejection ratio ..... 60 dB min (DC to 60 Hz)

[1] Temperature range is 23 °C ±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 µs

Output slew rate.....0.75 V/µs 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

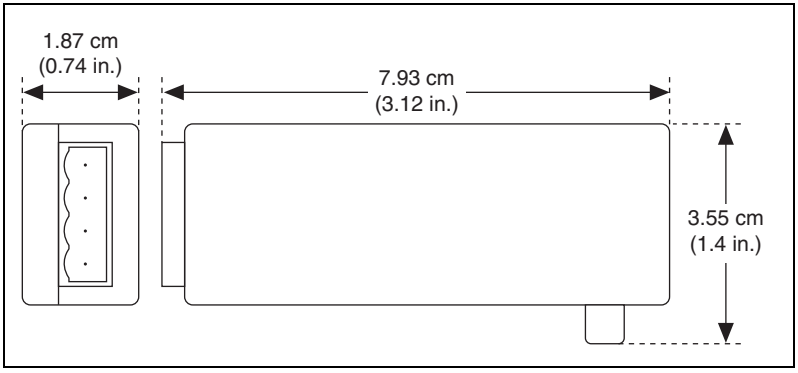


Figure 2. SCC-A10 Dimensions

Weight .....29 g (1.0 oz)

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

(Signal + common-mode) each input should remain within 60 VDC of ground.

Maximum working voltage refers to the signal voltage plus the CMV.

Channel-to-earth (inputs) ..... 60 VDC,
Measurement Category I

Channel-to-channel (inputs)..... 60 VDC,
Measurement Category I

Caution This device is rated for Measurement Category I and is intended to carry signal voltages no greater than 42.4 V_{peak} or 60 VDC. Do not use this device for connection to signals or for measurements within Categories II, III, or IV.

Environmental

Operating temperature..... 0 to 50 °C

Storage temperature ..... –20 to 70 °C

Humidity ..... 10 to 90% RH, noncondensing

Maximum altitude ..... 2,000 m

Pollution Degree (indoor use only)..... 2

Safety

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

- IEC 61010-1, EN 61010-1
- UL 61010-1
- CAN/CSA-C22.2 No. 61010-1

Note For UL and other safety certifications, refer to the product label, or visit `ni.com/certification`, 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

EMC/EMI .....CE, C-Tick, and FCC Part 15 (Class A) Compliant

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

CE Compliance

The SCC-A10 meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety).....73/23/EEC

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/certification`, search by model number or product line, and click the appropriate link in the Certification column.

SCC-A10 Module Pin Assignments

Figure 3 shows the I/O connector pins on the bottom of the module.

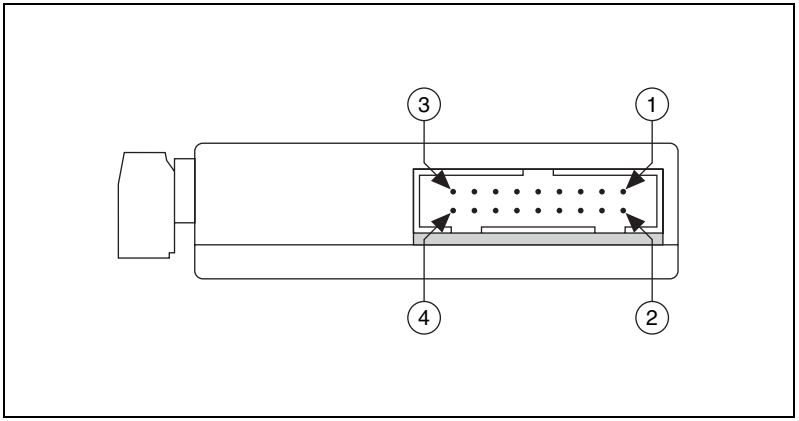


Figure 3. SCC Module Bottom View

Table 1 lists the signal corresponding to each pin. AI (*X*) and AI (*X*+8) are the analog input signal channels of the E/M 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-2345/2350 at the SCC-PWR connector.

Table 1. SCC-A10 Module Pin Assignments

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

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