

## INSTALLATION GUIDE

# SCXI™-1305 AC/DC Coupling BNC Terminal Block

This guide describes how to install and use the SCXI-1305 AC/DC coupling BNC terminal block.

The SCXI-1305 is a shielded terminal block with BNC and SMB connectors that you can connect to the SCXI-1120/D, SCXI-1121, SCXI-1125, SCXI-1126, SCXI-1140, or SCXI-1141/1142/1143 input connectors. You can configure each SCXI-1305 channel to AC- or DC-couple a signal to an SCXI module. Each channel can ground-reference a floating signal with a bias resistor.

The terminal block has eight BNC and one SMB connector for easy connection. The eight BNCs are for signal connections to the eight module inputs. The SMB provides access to module digital signals, HOLDTRIG for the SCXI-1140, and OUTCLK and EXTCLK for the SCXI-1141/1142/1143. These signals are not active on the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126.



**Caution** The SCXI-1305 limits the maximum common-mode voltage of the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126 to  $42 V_{pk}$  or DC. Exceeding this level may cause injury. National Instruments is *not* liable for damage or injuries resulting from improper connection.

## What You Need to Get Started

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To set up and use the SCXI-1305 terminal block, you need the following:

- Hardware
  - SCXI-1305 terminal block
  - SCXI or PXI/SCXI combination chassis

- One of the following modules:
  - SCXI-1120/D
  - SCXI-1121
  - SCXI-1125
  - SCXI-1126
  - SCXI-1140
  - SCXI-1141/1142/1143
- BNC cable
- SMB cable if using an SCXI-1140 or SCXI-1141/1142/1143

Tools

- Number 1 and 2 Phillips-head screwdrivers
- 1/8 in. flathead screwdriver
- Long-nose pliers
- Wire cutter
- Wire insulation stripper

Documentation

- *SCXI-1305 AC/DC Coupling BNC Terminal Block Installation Guide*
- *Read Me First: Safety and Radio-Frequency Interference*
- *DAQ Getting Started Guide*
- *SCXI Quick Start Guide*
- User manual for the module used
- SCXI chassis or PXI/SCXI combination chassis user manual
- *Technical Support Information*

You can download needed documents from [ni.com/manuals](http://ni.com/manuals).

## Conventions

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The following conventions are used in this guide:

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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 a product, refer to the *Read Me First: Safety and Radio-Frequency Interference* for information about 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.

*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.

## Configuring Floating or Ground-Referenced Signals

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Before installing and using the terminal block, you must determine what type of signal sources are in the SCXI system. Signal sources are either floating or ground-referenced.

A *floating source* is not connected in any way to the building ground system and has an isolated ground-reference point that you cannot assume is at the same potential as any other ground. Examples of floating sources include transformers, insulated thermocouples, optical isolators, isolation amplifiers, and battery-powered devices.

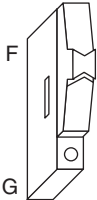

A *ground-referenced* source is connected to the building ground and shares a common ground with the DAQ device, assuming the computer is connected to the building power supply. Examples of ground-referenced signals are the nonisolated outputs of any device that plugs into the building power supply, such as signal generators and power supplies. Isolated outputs do not constitute ground-referenced sources and are treated as floating sources.

Reference an input signal to ground at only one point. Do *not* reference the input of a differential amplifier module to ground if the signal source is already ground-referenced. If you are measuring a floating source, reference the input to ground.

To ground-reference a floating signal for each channel, use the switch settings shown in Table 1. Each channel has one switch with two positions as follows:

- Use the F position with floating signal sources. Setting one of these switches to the F position connects a 100 kΩ resistor between the negative input for the channel and analog ground. This resistor supplies the necessary reference to ground for the channel. Do *not* use this position with the SCXI-1120/D, SCXI-1121, SCXI-1125, or SCXI-1126.
- Use the G position with ground-referenced sources. Setting the switch to the G position disconnects the resistor from the signal path. Always use this position on the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126.

**Table 1.** Floating and Ground-Referenced Signal Configuration

Switch Position	Description
	References floating signals to ground.
	Disconnects ground-reference resistor; use for signals that are already ground-referenced (factory setting). This is the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126 position.

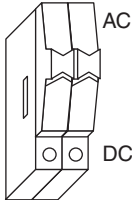
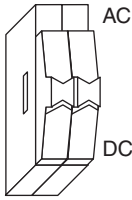
Refer to Figure 2 for the floating and ground-referenced signal configuration switch locations.

# Configuring the Channels for AC or DC Coupling

You can configure each channel for either AC or DC coupling using the switch settings shown in Table 2. Change any switch settings before you connect signals to the terminal block. Each channel requires setting two switches in the same position for the coupling circuitry to operate properly. Configure the channels as follows:

- For AC coupling, set both switches to the AC position. The AC position places single-pole highpass filters in the paths of both the positive and negative inputs for the channel. Each filter consists of a 1  $\mu$ F DC blocking capacitor and a 1 M $\Omega$  resistor to analog ground<sup>1</sup>, giving a -3 dB cutoff frequency of 0.16 Hz. The capacitors can block up to 50 VDC; however, voltages applied to the terminal block must *not* exceed  $\pm 42$  VDC.
- For DC coupling, set both switches to the DC position. DC coupling removes the filters from the signal paths and connects the BNCs directly to the module inputs. Always use this position on the SCXI-1121 excitation channels.

**Table 2.** AC/DC Coupling Configuration

Switch Position	Description
	Use for AC coupling of the input signal.
	Use for DC coupling of the input signal (factory setting). Use this position for the SCXI-1121 excitation channels.

Refer to Figure 2 for the AC/DC coupling configuration switch locations.

<sup>1</sup> For the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126, there is an effective 2 M $\Omega$  resistor instead of two 1 M $\Omega$  resistors. This 2 M $\Omega$  resistor is referenced to the negative input of the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126 instead of ground to maintain the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126 isolation.

# Configuring the Clock

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Due to space limitations, a jumper, W1, inside the terminal block is used to select the clock that goes to the SMB connector. Figure 2 shows the location of jumper W1. Refer to the *SCXI-1140 User Manual* or *SCXI-1141/1142/1143 User Manual* for the use of these clocks.

## Connecting the Signals

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

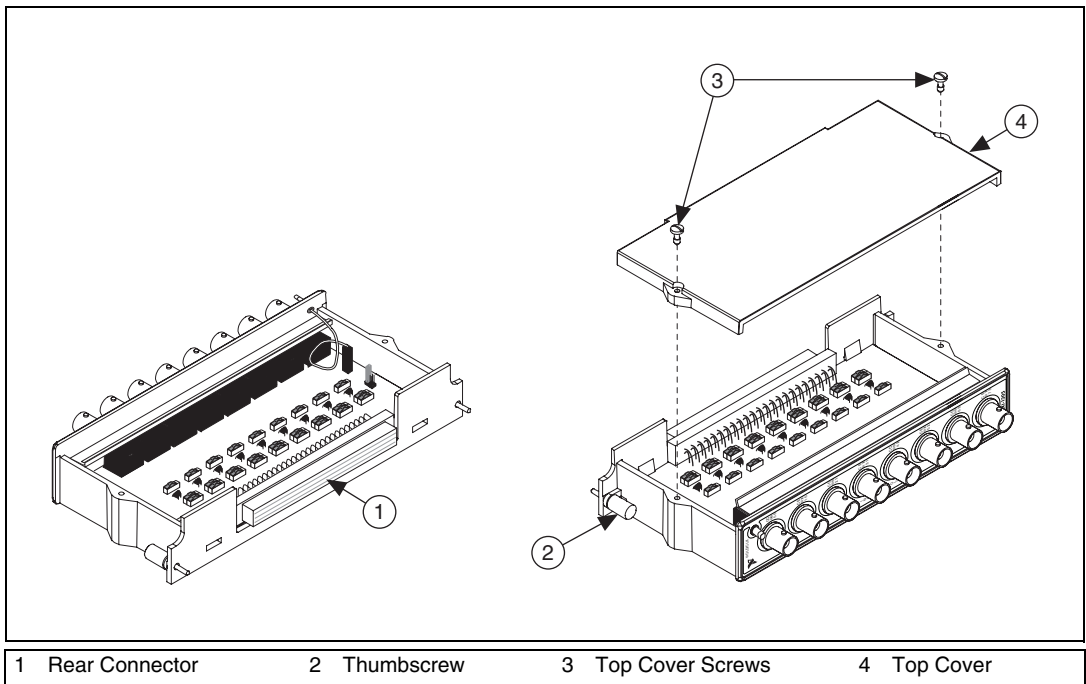
To connect the signal to the terminal block, perform the following steps, while referring to Figures 1 and 2:

1. Unscrew the top cover screws and remove the top cover.
2. Configure each of the AC/DC coupling and ground-referencing switches, depending on the signal you are measuring and the SCXI module you are using. The top set of switches (S1, S2, and S3) corresponds to input channel 0, the next set down (S4, S5, and S6) corresponds to input channel 1, and so on. The bottom set of switches (S22, S23, and S24) corresponds to input channel 7.
3. If using the SCXI-1305 with an SCXI-1140 or SCXI-1141/1142/1143, configure the SMB connector function (jumper W1).
4. Reinstall the top cover and tighten the top cover screws.
5. Connect the signal wires to the BNC and SMB connectors. When connecting the signals to the SCXI-1305, follow the labeling on the SCXI-1305 for the appropriate module.

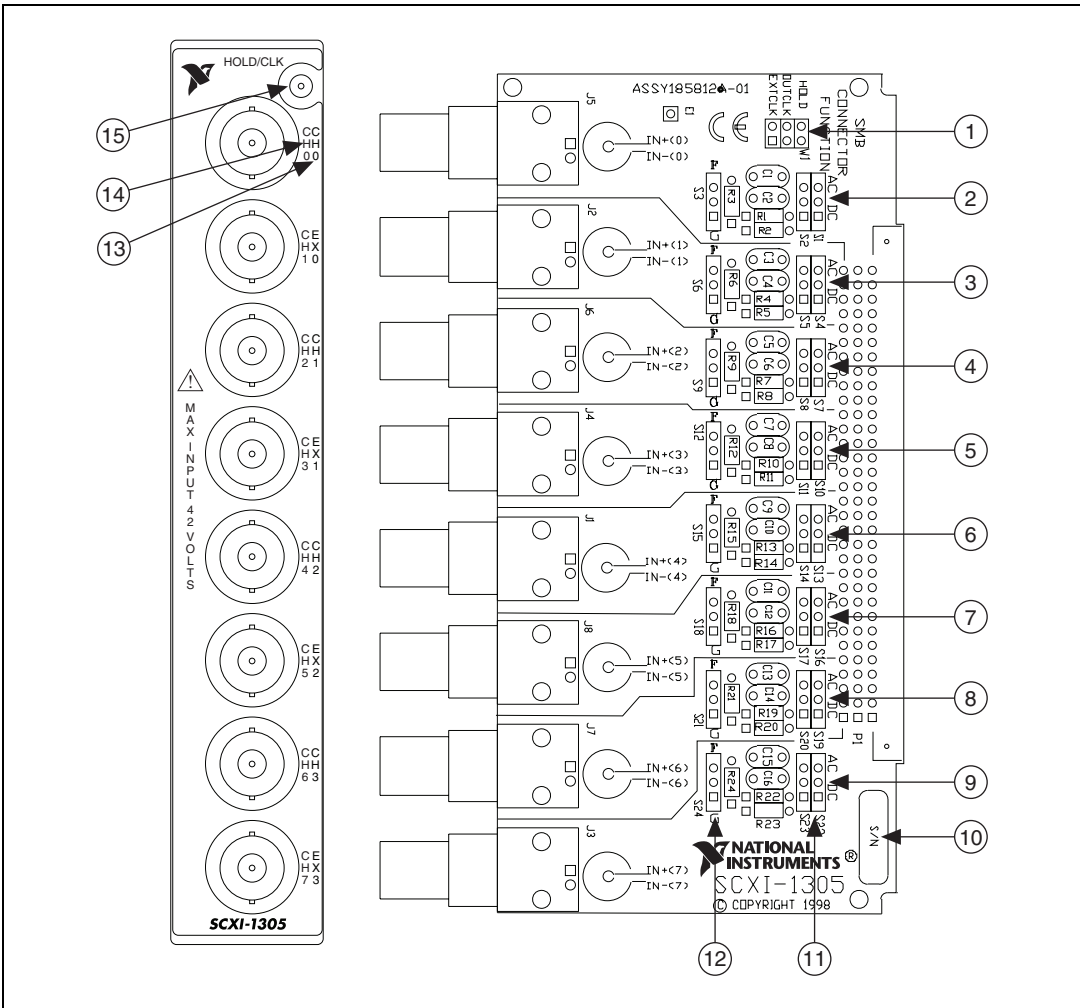


**Note** Signal names printed in black (the first name in the pair) are for the SCXI-1120/D, SCXI-1125, SCXI-1126, SCXI-1140, and SCXI-1141/1142/1143. Signal names printed in blue (the second name in the pair) are for the SCXI-1121.

6. Attach the SCXI-1305 to the SCXI module using the thumbscrews.
7. Refer to the *SCXI Quick Start Guide* to power on the SCXI chassis and configure the system in software.



**Figure 1.** SCXI-1305 Parts Locator Diagram

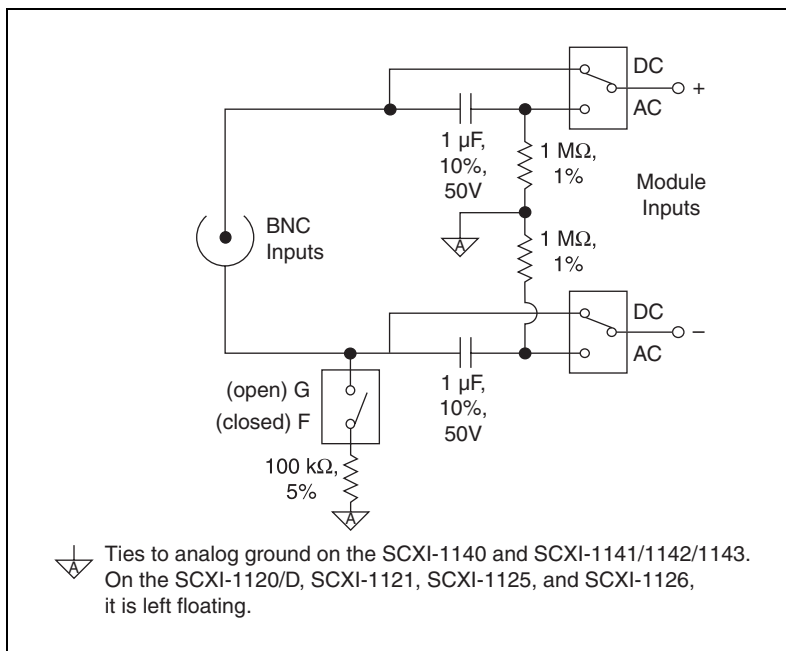


- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1 Jumper W1</li> <li>2 Channel 0 Switches</li> <li>3 Channel 1 Switches</li> <li>4 Channel 2 Switches</li> <li>5 Channel 3 Switches</li> <li>6 Channel 4 Switches</li> <li>7 Channel 5 Switches</li> <li>8 Channel 6 Switches</li> </ul> | <ul style="list-style-type: none"> <li>9 Channel 7 Switches</li> <li>10 Serial Number</li> <li>11 AC/DC Coupling Reference Switches</li> <li>12 Floating/Ground Reference Switches</li> <li>13 SCXI-1121 Signal Connections</li> <li>14 SCXI-1120/D, 1125, 1126, 1140, 1141/1142/1143 Signal Connections</li> <li>15 SMB Connector</li> </ul> |
|---|---|

**Figure 2.** SCXI-1305 Signal Connections

# Circuit Diagram

You do not need to read this section to operate the SCXI-1305. The circuit diagram in Figure 3 is optional information that you can use if you want more details about the SCXI-1305 circuitry. Figure 3 shows the circuitry for one of the eight analog channels.



**Figure 3.** SCXI-1305 Circuit Diagram

# Specifications

All specifications are typical at 25 °C unless otherwise specified.

## Electrical

### Compatible modules

SCXI-1120/D .....	8 input channels
SCXI-1121 .....	4 input channels, 4 excitation output channels <sup>1</sup>
SCXI-1125 .....	8 input channels
SCXI-1126 .....	8 input channels

<sup>1</sup> The excitation output channels must be configured for DC coupling.

SCXI-1140.....	8 input channels, one external clock signal
SCXI-1141/1142/1143 .....	8 input channels, two clock signals
Coupling .....	DC or AC (selectable on a per-channel basis using slide switches) <sup>1</sup>

#### AC coupling circuitry

Corner frequency (–3 dB).....	0.16 Hz
DC-rejection capacity .....	±42 VDC
Input impedance (minimum)	
Between CH+ and CH– terminals .....	2 MΩ
Between CH+ or CH– terminal and ground .....	1 MΩ <sup>2</sup>

#### Maximum working voltage (signal + common-mode)

Channel to ground .....	Each channel must remain within ±42 VDC of ground
Channel to channel .....	Each channel must remain within ±42 VDC of the voltage applied to any other channel

#### Field-wiring connectors

Signal connectors.....	8 female BNC connectors
Auxiliary connectors .....	1 female SMB connector
Signal connector spacing .....	1.8 cm (0.75 in.)

#### Ground-referencing

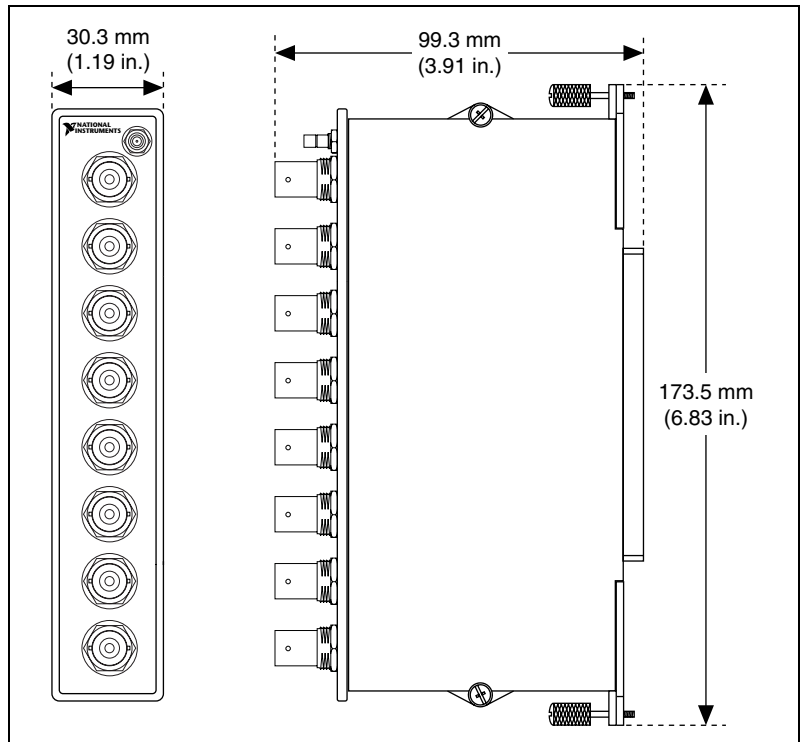
You can configure the SCXI-1305 for use with either ground-referenced or non-referenced (floating) signal sources on a per-channel basis using slide switches. When a channel is configured for use with a non-referenced (floating) signal source, CH– is connected to analog ground through a 100 kΩ resistor.

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<sup>1</sup> In instrumentation terminology, *DC coupling* means that both DC and AC signals are passed. *AC coupling* means that DC signals are blocked and AC signals are passed.

<sup>2</sup> Does not apply to the SCXI-1120/D, SCXI-1121, SCXI-1125, or SCXI-1126.

# Mechanical



**Figure 4.** SCXI-1305 Dimensions

Weight..... 412 gm  
(14.5 oz)

# Environment

Operating temperature..... 0 to 50 °C

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

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

Maximum altitude ..... 2,000 meters

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

## Safety

This product 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, CSA 61010-1



**Note** For UL and other safety certifications, refer to the product label or visit [ni.com/certification](http://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

## CE Compliance

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

- 2006/95/EC; Low-Voltage Directive (safety)



**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](http://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

## Environmental Management

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**EU Customers** At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit [ni.com/environment/weee.htm](http://ni.com/environment/weee.htm).



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