

SCXI™-1305 AC/DC COUPLING BNC TERMINAL BLOCK

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

Introduction

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 $42 V_{\text{peak}}$ or DC. Exceeding this level may injure you. National Instruments is *not* liable for damage or injuries resulting from improper connection.

What You Need to Get Started

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

- SCXI-1305 terminal block
- SCXI-1305 AC/DC Coupling BNC Terminal Block Installation Guide*

- SCXI chassis
- One of the following modules:
 - SCXI-1120/D
 - SCXI-1121
 - SCXI-1125
 - SCXI-1126
 - SCXI-1140
 - SCXI-1141/1142/1143
- Number 1 and 2 Phillips-head screwdrivers
- 1/8 in. flathead screwdriver
- Long-nose pliers
- Wire cutter
- Wire insulation stripper
- SMB cable
- BNC cable

Conventions



The following conventions are used in this guide:

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.

italic

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, and code excerpts.

Safety Information



Caution Do *not* operate the device in an explosive atmosphere or where there may be flammable gases or fumes.

Do *not* operate damaged equipment. The safety protection features built into this device can become impaired if the device becomes damaged in any way. If the device is damaged, turn the device off and do *not* use it until service-trained personnel can check its safety. If necessary, return the device to National Instruments for service and repair to ensure that its safety is not compromised.

Do *not* operate this equipment in a manner that contradicts the information specified in this document. Misuse of this equipment could result in a shock hazard.

Do *not* substitute parts or modify equipment. Because of the danger of introducing additional hazards, do *not* install unauthorized parts or modify the device. Return the device to National Instruments for service and repair to ensure that its safety features are not compromised.

You *must* insulate all of your signal connections to the highest voltage with which the SCXI-1305 can come in contact.

Connections, including power signals to ground and vice versa, that exceed any of the maximum signal ratings on the SCXI device can create a shock or fire hazard, or can damage any or all of the boards connected to the SCXI chassis, the host computer, and the SCXI device. National Instruments is *not* liable for any damages or injuries resulting from incorrect signal connections.

Clean the module and accessories by brushing off light dust with a soft non-metallic brush. Remove other contaminants with a stiff non-metallic brush. The unit *must* be completely dry and free from contaminants before returning it to service. The terminal block *must* be used with a UL-listed SCXI chassis.

Configuring Floating or Ground-Referenced Signals

Before you install and use your terminal block, you need to determine what type of signal sources are in your 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 to be at the same potential as any other ground. Examples of floating sources include transformers, insulated thermocouples, optical isolators, isolation amplifiers, and battery-powered devices.

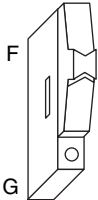

A *ground-referenced* source is connected to the building ground and shares a common ground with the DAQ device, assuming that your computer is connected to the building power supply. Examples of ground-referenced signals are the nonisolated outputs of any devices that plug into the building power supply,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

You should reference an input signal to ground at only one point. Therefore, 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 k Ω 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.

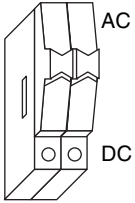
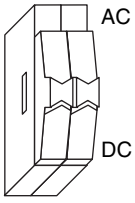
Configuring the Channels for AC or DC Coupling

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 you to set 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 μ F DC blocking capacitor and a 1 M Ω resistor to analog ground¹, 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 never exceed ± 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.

¹ For the SCXI-1120/D, SCXI-1121, SCXI-1125, and SCXI-1126, there is an effective 2 M Ω resistor instead of two 1 M Ω resistors. This 2 M Ω 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.

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.

Configuring the Clock

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

Connecting the Signals



Note Refer to the [Safety Information](#) section before removing equipment covers or connecting or disconnecting any signal wires.

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

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 your 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 your signal wires to the BNC and SMB connectors. Signal names printed in black are for the SCXI-1120/D, SCXI-1125, SCXI-1126, SCXI-1140, and SCXI-1141/1142/1143. Signal names printed in blue are for the SCXI-1121. When connecting your signals to the SCXI-1305, follow the labeling on the SCXI-1305 for the appropriate module.

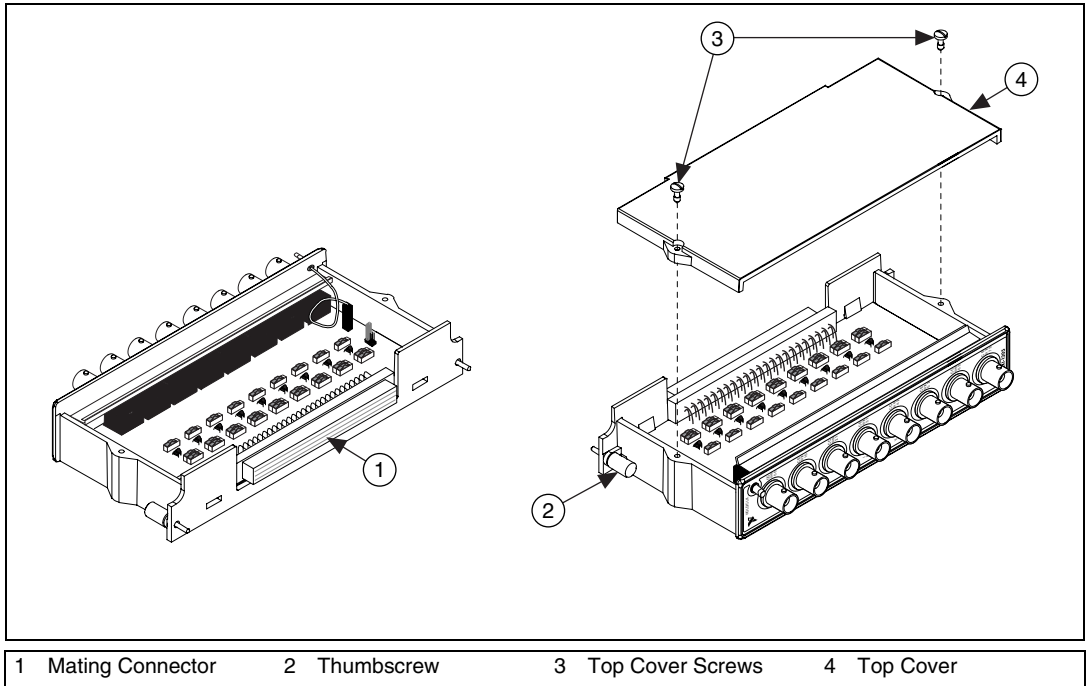


Figure 1. SCXI-1305 Parts Locator Diagram

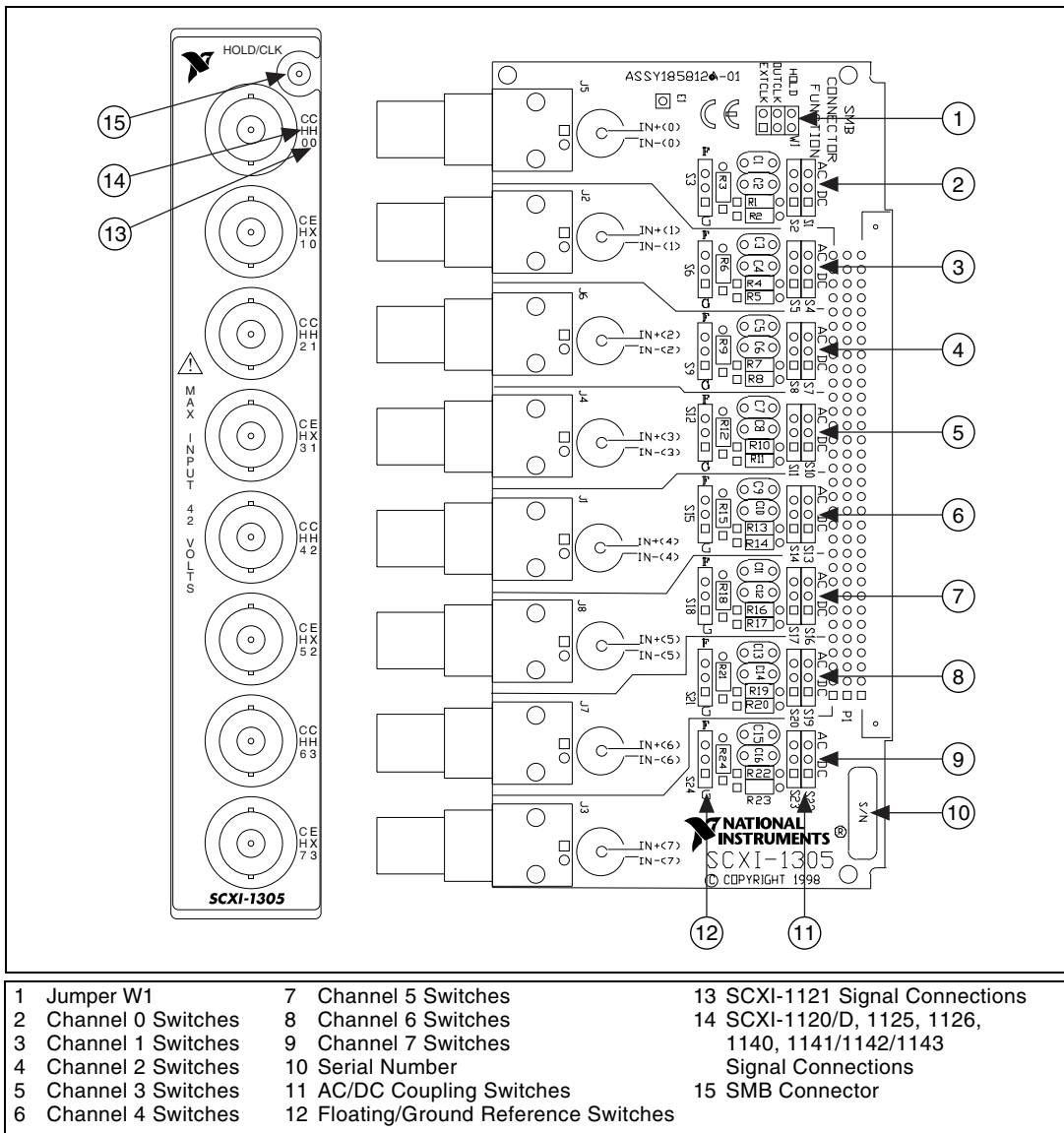


Figure 2. SCXI-1305 Signal Connections



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.

Installing the Terminal Block

To connect the terminal block to the SCXI module front connector, perform the following steps:

1. Connect the module front connector to its mating connector on the terminal block.
2. Tighten the top and bottom thumbscrews on the back of the terminal block to hold it securely in place.

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.

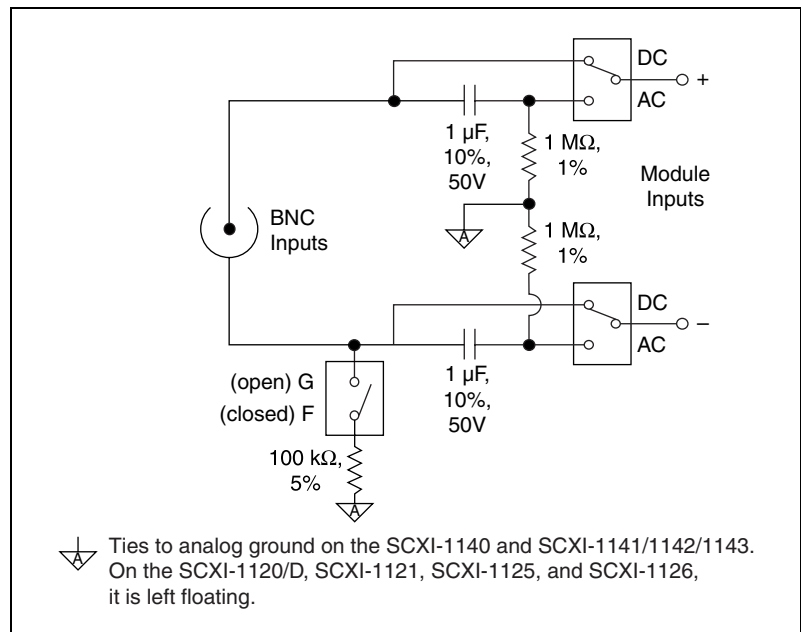


Figure 3. SCXI-1305 Circuit Diagram

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 and 4 excitation output channels ¹
SCXI-1125.....	8 input channels
SCXI-1126.....	8 input channels
SCXI-1140.....	8 input channels and one external clock signal
SCXI-1141.....	8 input channels and two clock signals
SCXI-1142.....	8 input channels and two clock signals
SCXI-1143.....	8 input channels and two clock signals

CouplingDC or AC (selectable on a per-channel basis using slide switches)²

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 ³

¹ The excitation output channels must be configured for DC coupling.

² 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.

³ Does not apply to the SCXI-1120/D, SCXI-1121, SCXI-1125, or SCXI-1126.

Maximum working voltage
(signal + common-mode)

- Channel to ground..... Each channel must remain within
42 V_{rms} or ±42 VDC of ground
- Channel to channel..... Each channel must remain
within 42 V_{rms} or ±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.

Mechanical

- Dimensions..... 17.8 by 9.7 by 3.0 cm
(7.0 by 3.125 by 1.2 in.)
- Weight..... 200 gm
(7 oz.)

Environmental

- Operating temperature..... 0 to 50 °C
- Storage temperature –20 to 70 °C
- Relative humidity 10 to 90% noncondensing
- Altitude (maximum)..... 2000 m

Safety

Designed in accordance with IEC 61010-1, UL 3111-1, and CAN/CSA C22.2 No. 1010.1 for electrical measuring and test equipment

Installation Category II

Pollution degree 2

Electromagnetic Compatibility

EMC/EMI	CE, C-Tick and FCC Part 15 (Class A) Compliant
Electrical emissions	EN 55011 Class A at 10 m, FCC Part 15A above 1 GHz
Electrical immunity	Evaluated to EN 61326:1998, Table 1



Note This device should only be operated with shielded cabling for full EMC and EMI compliance. See the Declaration of Conformity for this product for any additional regulatory compliance information.

Technical Support Resources

NI Web Support

National Instruments Web support is your first stop for help in solving installation, configuration, and application problems and questions. Online problem-solving and diagnostic resources include frequently asked questions, knowledge bases, product-specific troubleshooting wizards, manuals, drivers, software updates, and more. Web support is available through the Technical Support section of ni.com

Worldwide Support

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Canada (Ottawa) 613 233 5949, Canada (Québec) 514 694 8521,
China (Shanghai) 021 6555 7838, China (ShenZhen) 0755 3904939,
Denmark 45 76 26 00, Finland 09 725 725 11, France 01 48 14 24 24,
Germany 089 741 31 30, Greece 30 1 42 96 427, Hong Kong 2645 3186,
India 91805275406, Israel 03 6120092, Italy 02 413091,

Japan 03 5472 2970, Korea 02 596 7456, Mexico 5 280 7625,
Netherlands 0348 433466, New Zealand 09 914 0488,
Norway 32 27 73 00, Poland 0 22 528 94 06, Portugal 351 1 726 9011,
Singapore 2265886, Spain 91 640 0085, Sweden 08 587 895 00,
Switzerland 056 200 51 51, Taiwan 02 2528 7227,
United Kingdom 01635 523545



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