

INSTALLATION GUIDE

BNC-2110

Desktop and DIN Rail-Mountable BNC Adapter for Multifunction DAQ Devices

This installation guide describes how to install and configure your BNC-2110 accessory with an E Series, S Series, or NI 671X/673X waveform generation Multifunction DAQ device.

The BNC-2110 is a desktop and DIN rail-mountable BNC adapter you can connect to data acquisition (DAQ) devices. The BNC-2110 includes 15 BNC connectors, a terminal block with 30 pins for signal connections, and a 68-pin I/O connector that connects to the E Series, S Series, and waveform generation Multifunction DAQ devices. The BNC-2110 is ideal for simplifying connections between your measurement apparatus and your DAQ device in laboratory, test, and production environments.

What You Need to Get Started

To set up and use your BNC-2110 accessory, you need the following:

- BNC-2110 BNC Adapter
- BNC-2110 Installation Guide*
- Multifunction DAQ device and the appropriate cable
- Small flathead screwdriver (supplied)

For detailed specifications for the BNC-2110, refer to the *Specifications* section.

Installing Your BNC-2110

To connect your BNC-2110 to your DAQ device, refer to Figure 1 as you complete the following steps. Consult your computer user manual or technical reference manual for specific instructions and warnings.



Note If you have not already installed your DAQ device, refer to the *DAQ Quick Start Guide* for instructions.

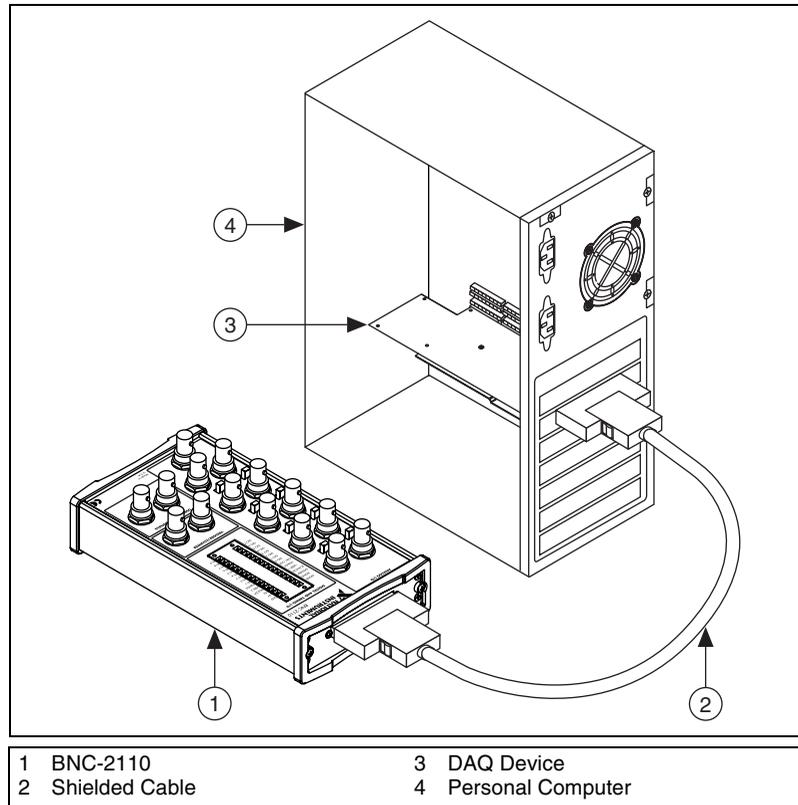


Figure 1. Connecting the BNC-2110 to Your DAQ Device

1. Place the BNC-2110 near the host computer or use the optional DIN rail-mounting kit, which you can order from National Instruments. For more information about the DIN rail-mounting kit, refer to the National Instruments Web site at ni.com or call the office nearest you.
2. With the DAQ device powered off, connect the BNC-2110 to your DAQ device using the appropriate cable. Refer to Table 1 to make sure that you have the proper cable for the DAQ device that you are using.

3. Make sure the floating source (FS)/ground-referenced source (GS) switches under BNC connectors AI <0..7> are set correctly for your application. Refer to the *Connecting Analog Inputs (E Series and S Series Devices Only)* section for more information.
4. Connect the field signals to the BNC connectors and/or digital spring terminal plugs. Refer to the *Configuring the BNC-2110* section for more information.
5. Refer to the *DAQ Quick Start Guide* to launch Measurement & Automation Explorer (MAX), confirm that your DAQ device is recognized, and configure your device settings. National Instruments recommends that you use your DAQ device in differential mode when using the BNC-2110.
6. Test specific device functionality, such as the ability to send and receive data. Refer to the *DAQ Quick Start Guide* for more detailed information about running test panels in MAX.

When you have finished using the BNC-2110, power off any external signals connected to the BNC-2110 before you power off your computer.



Caution The BNC-2110 is not designed for input voltages greater than 42 V, even if a user-installed voltage divider reduces the voltage to within the input range of the DAQ device. Input voltages greater than 42 V can damage the BNC-2110, any device connected to it, and the host computer. Overvoltage also can cause an electric shock hazard for the operator. National Instruments is *not* liable for damage or injury resulting from misuse.

Connecting the Cables



Caution Do not connect the BNC-2110 to any device other than National Instruments E Series, S Series, or waveform generation Multifunction DAQ devices. Doing so can damage the BNC-2110, the DAQ device, or the host computer. National Instruments is *not* liable for damage resulting from these connections.

The BNC-2110 has one 68-pin connector on the rear panel to connect to your DAQ device. Refer to Table 1 to make this connection.

Table 1. BNC-2110 Connection Options

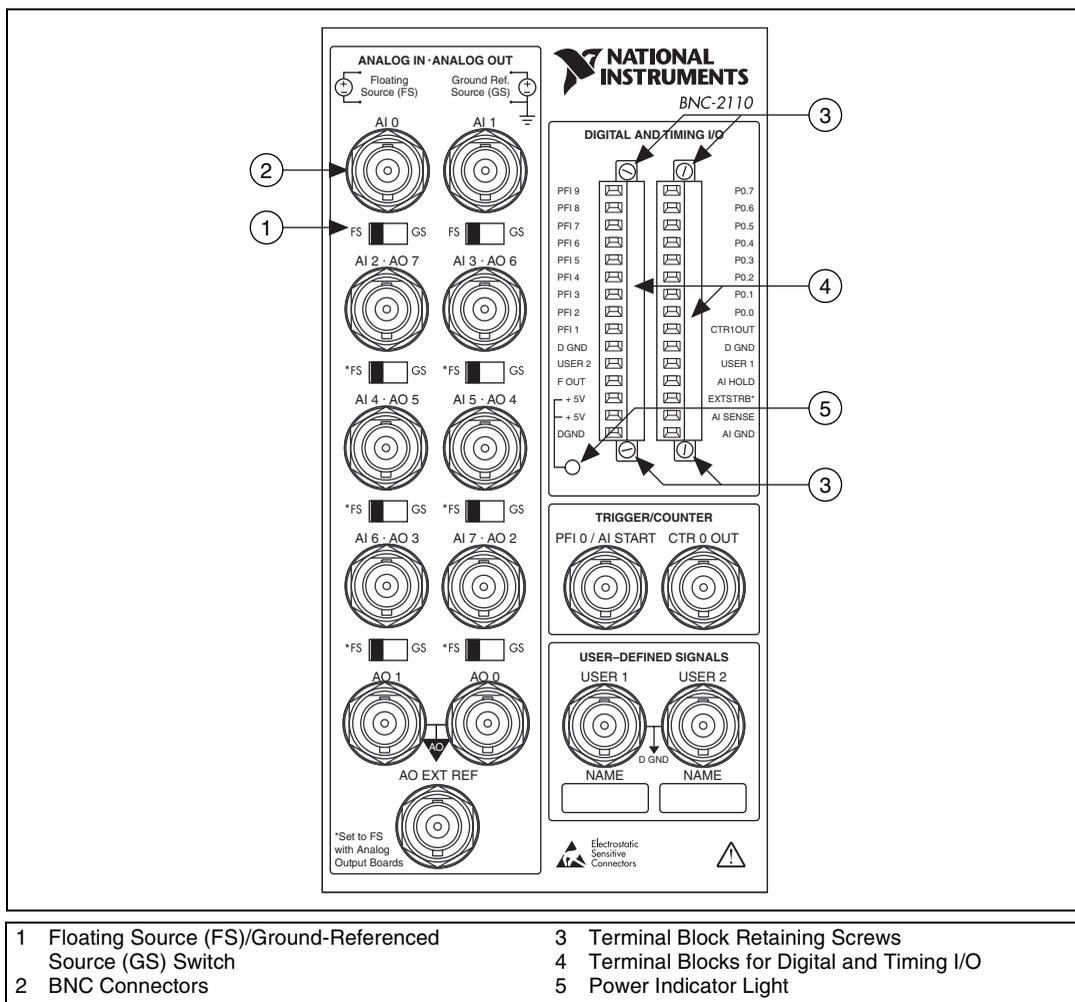
DAQ Device	Required Cable
100-pin SCSI connector	SH1006868
68-pin SCSI connector	SH6868, SH68-68-EP, or R6868
68-pin DAQCard (VHDCI) connector	SHC68-68-EP

Configuring the BNC-2110

This section describes how to configure your BNC-2110 accessory. Figure 2 shows the front panel of the BNC-2110.



Note With NI-DAQmx, National Instruments has revised its terminal names so they are easier to understand and more consistent among NI hardware and software products. The revised terminal names used in this document are usually similar to the names they replace. For a complete list of traditional NI-DAQ terminal names and their NI-DAQmx equivalents, refer to the *Terminal Name Equivalences* table in the *E Series Help* at ni.com/manuals.



- 1 Floating Source (FS)/Ground-Referenced Source (GS) Switch
- 2 BNC Connectors

- 3 Terminal Block Retaining Screws
- 4 Terminal Blocks for Digital and Timing I/O
- 5 Power Indicator Light

Figure 2. BNC-2110 Front Panel

The BNC-2110 is compatible with all E Series, S Series, and waveform generation Multifunction DAQ devices. Some of the connectors on this accessory may have a different function depending on the device to which it is connected.

Table 2 describes the BNC connectors on the front panel of the BNC-2110. Refer to the Connecting Digital/Timing I/O section for terminal block connector descriptions.

Table 2. BNC-2110 Connector Signal Descriptions

Front Panel BNC Connectors	Signal Description
AI <0..1>	Differential Analog Input channels 0 and 1 ¹
AI <2..7>/AO <7..2>	Differential Analog Input channels 2 through 7 ² or Analog Output channels 7 through 2 ³
AO <1..0>	Analog Output channels 1 and 0
AO EXT REF	External reference input connector for analog output circuitry
PFI 0/AI START TRIG	Programmable Function Input 0/Trigger 1—As an input, one of the PFIs or the source for the hardware analog trigger; as an output, the AI start trigger
CTR 0 OUT	Counter 0 Output—Output terminal from General-Purpose Counter 0
USER <1..2>	User-defined 1 and 2—Connected to USER 1 and USER 2 digital terminal blocks; allow you to use a BNC connector for a digital or timing I/O signal of your choice
¹ E Series devices only, reserved in waveform generation Multifunction DAQ devices ² When connected to E Series or S Series Multifunction DAQ devices ³ When connected to waveform generation Multifunction DAQ devices	

For more detailed information about how the accessory terminals correspond one-to-one to the Multifunction DAQ device, refer to the I/O Connector Pinouts Table in the *E Series Help* at ni.com/manuals.

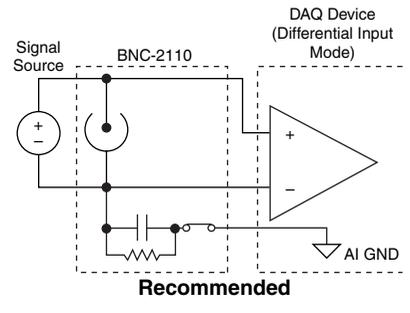
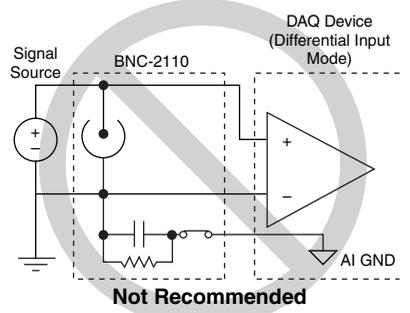
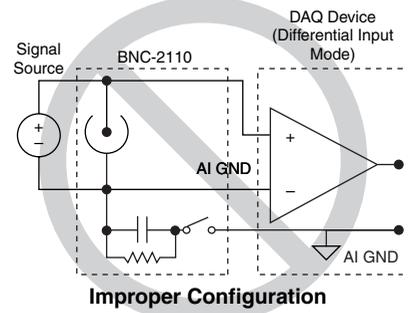
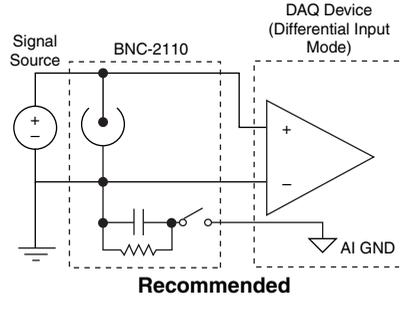
Connecting Analog Inputs (E Series and S Series Devices Only)

The BNC-2110 has BNC connectors for up to eight differential analog input channels. These connectors are labeled AI <0..7>. The number of connectors you use depends on your DAQ device and your application.

Measuring Floating Signals

You can use the BNC-2110 to measure floating and ground-referenced analog input signals. To measure floating signal sources, move the switch located below the BNC connector for the AI channel you are using to the floating source switch position (labeled FS). In the floating source switch position, the amplifier negative terminal connects to ground through a $5\text{ k}\Omega$ resistor in parallel with a $0.1\text{ }\mu\text{F}$ capacitor. Table 3 shows the BNC-2110 switch configuration options.

Table 3. Configuration Summary

BNC-2110 Switch Configuration	Signal Source Types for E Series Devices	
	Floating Source	Ground-Referenced Source
Floating Source (FS)	 <p style="text-align: center;">Recommended</p>	 <p style="text-align: center;">Not Recommended</p>
Ground-Referenced Source (GS)	 <p style="text-align: center;">Improper Configuration</p>	 <p style="text-align: center;">Recommended</p>

Measuring Ground-Referenced Signals

To measure ground-referenced signals, move the switch to either the floating or ground-referenced source position. For best results, use the ground-referenced source position (labeled GS) to avoid ground loops. Refer to your DAQ device documentation for more information on measuring floating and ground-referenced signals.

Connecting Analog Outputs

The BNC-2110 has BNC connectors for up to eight analog output channels. These connectors are labeled AO <0..7>. The number of AO connectors you use depends on the DAQ device connected to the adapter and your application. When using connectors AO <7..2>, make sure the switch is in the FS position.

Connecting Digital/Timing I/O

Use both the Digital and Timing I/O spring terminals and the user-defined BNC connectors to connect digital signals to your DAQ device. When connecting signals to the spring terminals, you can use up to 24 AWG wire with the insulation stripped to 0.28 in. Refer to Table 2 for a description of the terminal block connectors.

The terminal blocks on the BNC-2110 are spring terminals for easy access. You can change these blocks to screw terminals by installing the available screw terminal kit.

Two user-defined BNC connectors, USER 1 and USER 2, are connected to the terminal blocks on the BNC-2110 front panel. These terminals and their associated BNC connectors give you the flexibility to choose up to two additional digital/timing signals. For example, if an application requires access to AI HOLD COMP and CTR 1 OUT signals, you can wire the spring terminals labeled AI HOLD COMP and CTR 1 OUT to the spring terminals labeled USER 1 and USER 2, respectively. This setup configures BNC connector USER 1 as AI HOLD COMP and USER 2 as CTR 1 OUT.

All of the digital and timing signals from the E Series, S Series, and waveform generation Multifunction DAQ devices are available on the front panel of the BNC-2110. Refer to your DAQ device documentation for information on using these signals.

Table 4 describes the digital terminals on the front panel of the BNC-2110.

Table 4. BNC-2110 Digital Terminal Descriptions

Terminal	Description
PFI <1..9>	Programmable Function Input lines 1 through 9
D GND	Digital Ground—This pin supplies the reference for the digital signals at the I/O connector as well as the +5 VDC supply
USER 2	User-defined 2—Connected to USER 2 BNC, this terminal provides a user-definable BNC terminal
F OUT	Frequency Output—Output from the frequency generator

Table 4. BNC-2110 Digital Terminal Descriptions (Continued)

Terminal	Description
+5 V	+5 V power—These pins are fused on the DAQ device and are self-resetting; the current available depends on the product to which it is connected
P0.<7..0>	Digital input/output lines 7 through 0—P0.6 and 7 can control the up/down signal of General-Purpose Counters 0 and 1, respectively
CTR 1 OUT	Counter 1 Output—This is the output from General-Purpose Counter 1
USER 1	User-defined 1—Connected to USER 1 BNC, this terminal provides a user-definable BNC signal
AI HOLD	AI Hold Complete—This pin pulses once for each A/D conversion when enabled
EXSTRB*	External Strobe—This signal controls external devices under control of NI-DAQ
AI SENSE ¹	Analog Input Sense—This pin serves as the reference node for channels AI <0..15> in NRSE configurations
AI GND ²	Analog Input Ground—The analog input voltages are referenced to this node
<p>* Indicates active low</p> <p>¹ Refer to your DAQ device user manual for more information on using this signal.</p> <p>² E Series and S Series devices only</p>	

Specifications

This section lists the specifications of the BNC-2110. These specifications are typical at 25 °C unless otherwise specified.

Physical

Dimensions19.05 by 10.48 by 3.51 cm
(7.5 by 4.125 by 1.38 in.)

I/O connector68-pin male connector

Environment

Operating temperature0 to 70 °C

Storage temperature.....-55 to 125 °C

Relative humidity 5 to 90% noncondensing

Safety

The BNC-2110 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 to ni.com.

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, you *must* 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/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, click **Declarations of Conformity Information** at ni.com/hardref.nsf/. This Web site lists the DoCs by product family. Select the appropriate product family, followed by your product, and a link to the DoC appears in Adobe Acrobat format. Click the Acrobat icon to download or read the DoC.

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