INSTALLATION GUIDE

BNC-2111

BNC Accessory for M Series and E Series Devices

This installation guide describes how to install and configure your BNC-2111 accessory. If you have not already installed your DAQ device, refer to the *DAQ Quick Start Guide* for instructions.

The BNC-2111 is an adapter you can connect to data acquisition (DAQ) devices. The BNC-2111 includes 24 BNC connectors that allow connections for 16 single-ended analog input signals, 2 analog output signals, 5 digital I/O / programmable function input (PFI) signals, and the external reference voltage for analog output. The BNC-2111 also includes a single two-position switch for selecting between floating source and ground-referenced analog input signals.

National Instruments offers two versions of the BNC-2111:

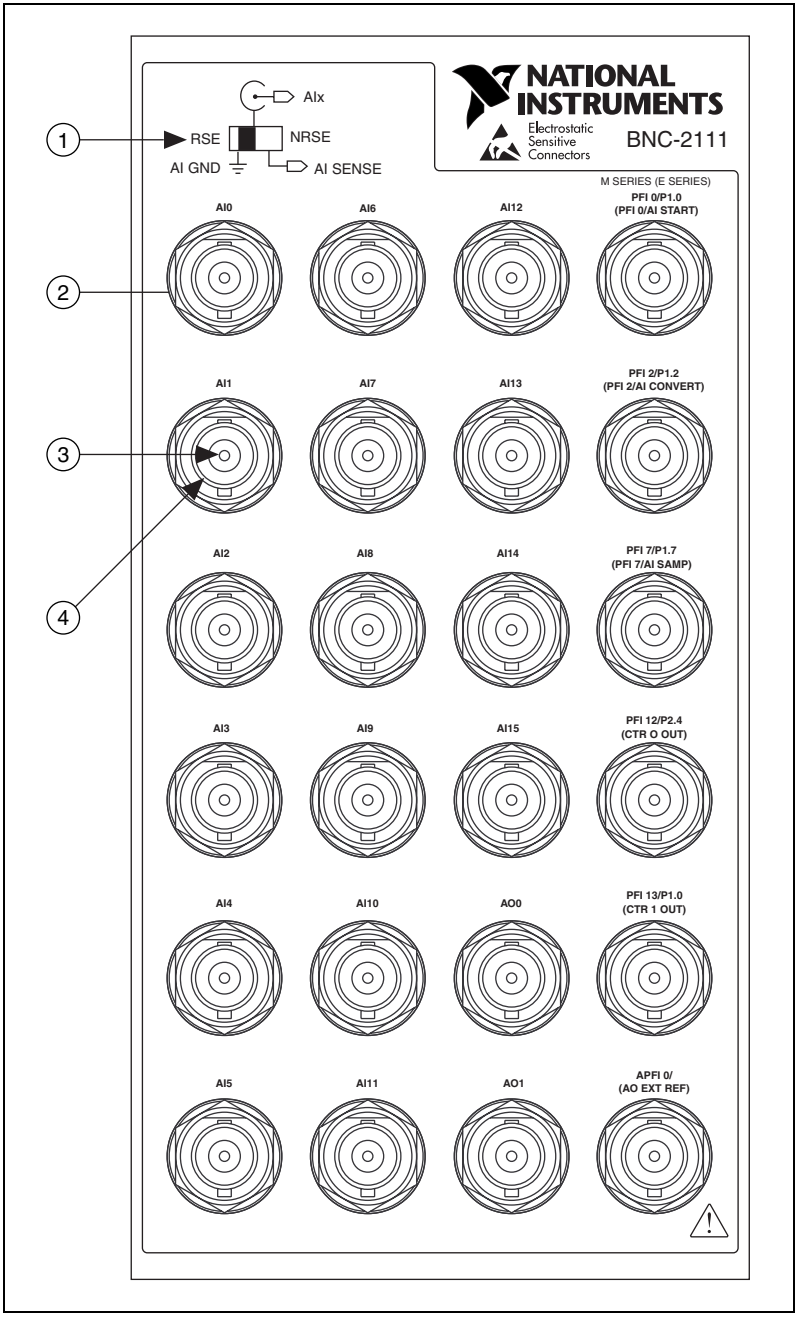
- With metal enclosure
- Without metal enclosure (board only)

Both versions of the BNC-2111 are suitable for desktop use. An optional DIN rail-mounting kit for the BNC-2111 with metal enclosure is available from NI.

The available signals on the BNC-2111 are listed in the *Specifications* section. If your application requires differential connections or other digital signals, consider other NI products such as the BNC-2090, BNC-2110, BNC-2115, or BNC-2120.

The BNC-2111 has one 68-pin connector to connect to your DAQ device. The BNC-2111 is ideal for simplifying connections between your measurement apparatus and your DAQ device in laboratory, test, and production environments.

NATIONAL INSTRUMENTS



1	Floating Source (RSE)/ Ground-Referenced Source (NRSE) Switch	3	BNC Center Pin
2	BNC Connectors	4	BNC Shield

Figure 1. BNC-2111 Front Panel (Shown with Metal Enclosure)

What You Need to Get Started

To set up and use your BNC-2111 accessory, you need the following:

- ❑ BNC-2111 BNC accessory
- ❑ *BNC-2111 Installation Guide*
- ❑ Cable for connecting your DAQ device to the BNC-2111. Refer to the *Choosing a Cable* section for information on which cable to use for your DAQ device.
- ❑ M Series or E Series Multifunction DAQ Device

For detailed specifications for the BNC-2111, refer to the *Specifications* section.

Caution Do *not* connect the BNC-2111 to any device other than the National Instruments devices listed in the *Choosing a Cable* section. Doing so can damage the BNC-2111, the DAQ device, or the host computer. National Instruments is not liable for damage resulting from these connections.

Choosing a Cable

Refer to Tables 1 through 5 to choose the correct cable for your DAQ device.

Table 1. 68-Position VHDCI I/O Connector

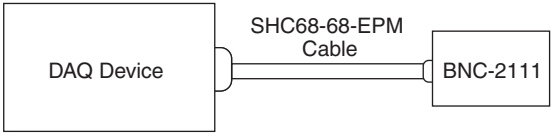
DAQ Device	Connector Diagram
NI 6220/6221	
NI 6250/6251	
NI 6280/6281	
NI DAQCard-6024E	
NI DAQCard-6036E	
NI DAQCard-6062E	

Table 2. 68-Pin SCSI-II I/O Connector

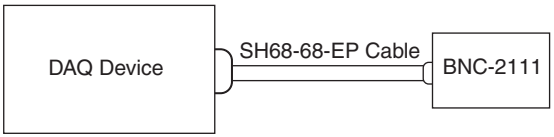
DAQ Device	Connector Diagram
NI 6013/6014	
DAQPad-6020E	
PCI-6023E/PCI-6024E	
NI 6030E/6032E	
NI 6034E/6035E/PCI-6036E	
NI 6040E	
NI 6052E/DAQPad-6052E	
NI-6070E/DAQPad-6070E	
PCI-MIO-16E-1	
PCI-MIO-16E-4	
PCI-MIO-16XE-10	
PCI-MIO-16XE-50	

Table 3. Double 68-Position VHDCI I/O Connector—32 AI Channels

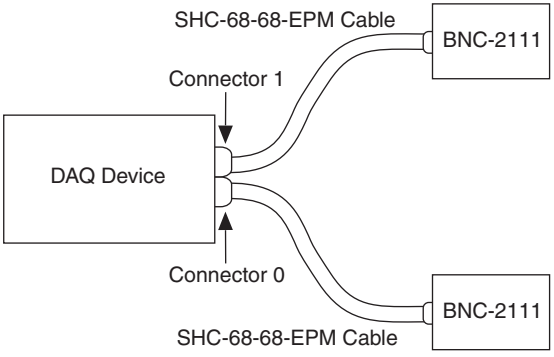
DAQ Device	Connector Diagram
NI 6224/6229	
NI 6254/6259	
NI 6284/6289	

Table 4. Double 68-Position VHDCI I/O Connector—80 AI Channels

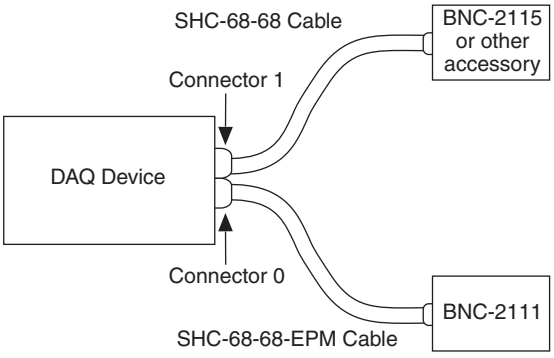
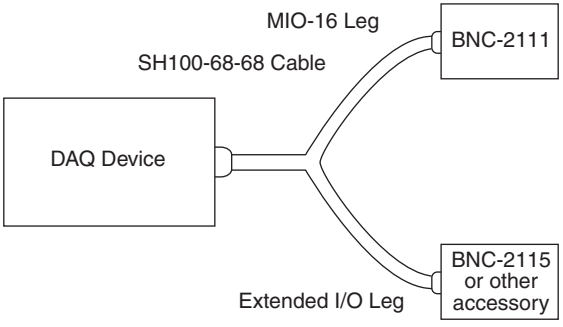
M Series Device	Connector Diagram
NI 6225	

Table 5. 100-Pin Female 0.050 D-Type I/O Connector

DAQ Device	Connector Diagram
NI 6025E	
NI 6031E/6033E	
NI 6071E	

Installing the BNC-2111

To connect the BNC-2111 to your DAQ device, 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.

1. Place the BNC-2111 near the host computer or use the optional DIN rail-mounting kit, which you can order from National Instruments. The DIN rail-mounting kit can only be used with the BNC-2111 with metal enclosure. For more information about the DIN rail-mounting kit, refer to the National Instruments Web site at `ni.com` or call the branch office nearest you.
2. With your DAQ device powered off, connect the BNC-2111 to your DAQ device with the selected cable.
3. Determine if your input signals are floating source or ground-referenced:
   - **Floating Signal Sources**—A floating signal source is not connected to the building ground system, but has an isolated ground-reference point. Some examples of floating signal sources are outputs of transformers, thermocouples, battery-powered devices, optical isolators, and isolation amplifiers. An instrument or device that has an isolated output is a floating signal source.
   - **Ground-Referenced Signal Sources**—A ground-referenced signal source is connected to the building system ground, so it is already connected to a common ground point with respect to the device, assuming that the computer is plugged into the same power system as the source. Nonisolated outputs of instruments and devices that plug into the building power system fall into this category.
4. Make sure the referenced single-ended (RSE)/nonreferenced single-ended (NRSE) switch is set correctly for your application. Set the switch to RSE to measure floating source signals, or to NRSE to measure ground-referenced signals. The switch setting will be applied to all 16 analog input BNC connectors. Refer to the *Connecting Signals to the BNC-2111* section for more information.

5. Set your DAQ device to function correctly in software. The device should be set to referenced single-ended mode (RSE) for measuring floating source signals, or nonreferenced single-ended mode (NRSE) for measuring ground-referenced signals.
   - NI-DAQmx
     - Set the appropriate terminal configuration when configuring your global virtual channels in Measurement & Automation Explorer (MAX).
     - Or set these modes by using the Input Terminal Configuration control of the DAQmx Create Virtual Channel VI or function in your ADE.
   - Traditional NI-DAQ (Legacy)
     - Set the appropriate input mode when configuring your global virtual channels or set the AI Mode property for your device by right-clicking it under **Devices and Interfaces** and selecting **Properties** in MAX.
     - Or set these modes by using the Coupling & Input Config control of the AI Config VI or by using the appropriate function for your ADE.
6. Connect the field signals to the BNC connectors. Refer to the *Connecting Signals to the BNC-2111* section for more information.
7. Refer to the *DAQ Quick Start Guide* to launch MAX, confirm that your device is recognized, and configure your device settings.
8. Test specific device functionality, such as the ability to send and receive data. Refer to the *DAQ Quick Start Guide* for more detailed information on running test panels in MAX.

When you have finished using the BNC-2111, power off any external signals connected to the BNC-2111 before you power off the computer.

Caution The BNC-2111 is not designed for input voltages greater than 42 V. Input voltages greater than 42 V can damage the BNC-2111, 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 Signals to the BNC-2111

This section describes how to configure the BNC-2111. Refer to the *Specifications* section for a list of available signals on the BNC-2111.

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 (Legacy) terminal names and their NI-DAQmx equivalents, refer to the *Terminal Name Equivalences* tables in the *M Series Help* for M Series devices or the *E Series Help* for E Series devices at `ni.com/manuals`.

Connecting Analog Input Signals

Measuring Floating Signal Sources

To measure floating signal sources, move the selector switch to the floating source switch position labeled RSE. When the selector switch is set to the RSE position, the outer shields of all 16 analog input BNC connectors are connected to the DAQ device's AI GND input, as shown in Figure 2 and Figure 3.

Note Measuring floating signal sources, such as isolated battery-powered equipment, with the NRSE setting results in incorrect measurements.

Measuring Ground-Referenced Signals

To measure ground-referenced signals, move the switch to the NRSE position. Refer to your DAQ device documentation for more information on measuring floating and ground-referenced signals. When the switch is in the NRSE position, the outer shields of all 16 analog input BNC connectors are connected to the DAQ device's AI SENSE input as shown in Figure 2 and Figure 3.

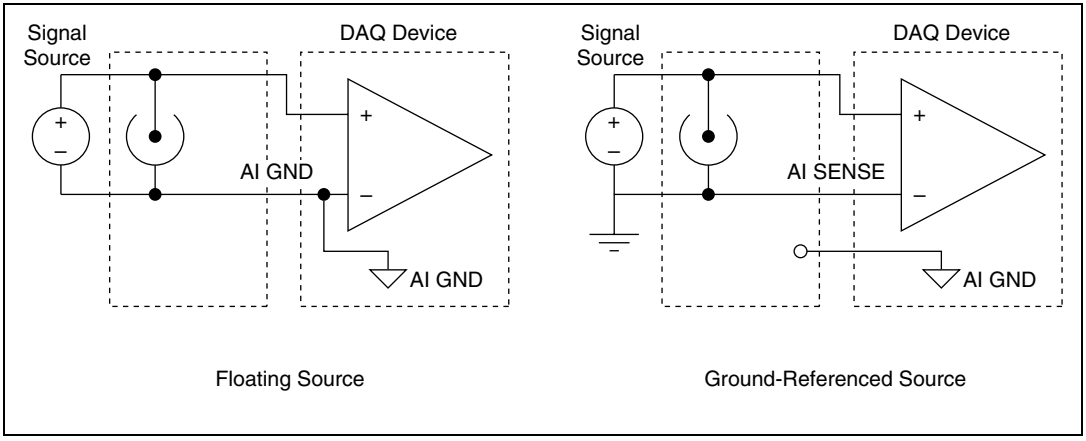


Figure 2. BNC-2111 Signal Source Types

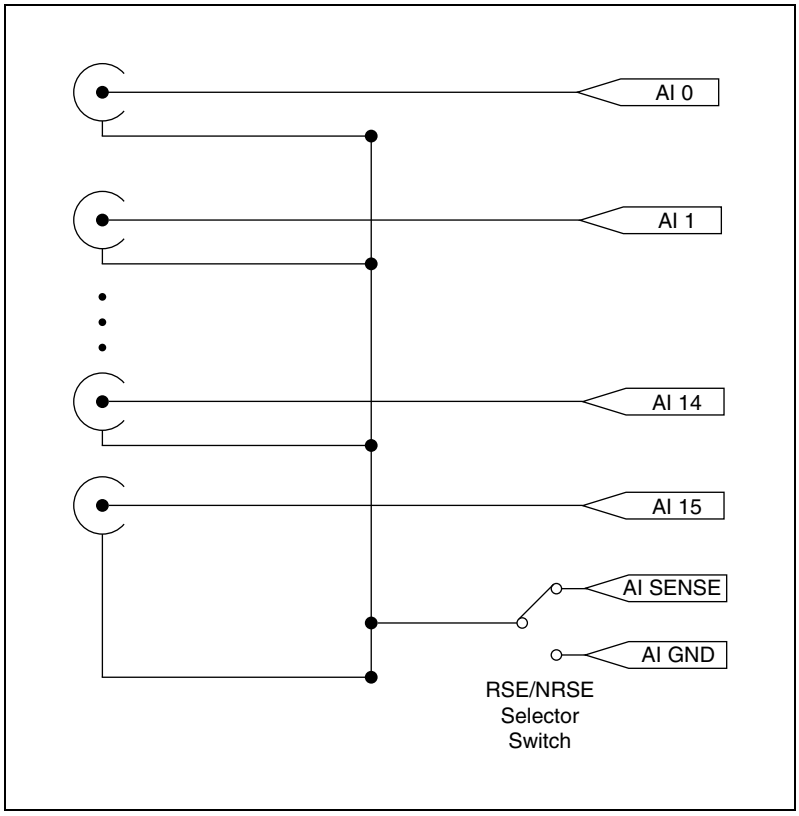


Figure 3. AI Channels 0–15 Connections

Connecting Analog Output and PFI Signals

Connect each AO signal to the appropriate BNC connector (AO Channels 0–1).

Use the BNC connectors to connect or access PFI signals on your DAQ device. Figure 4 shows these connections. Refer to Table 6 in the *Specifications* section for more information.

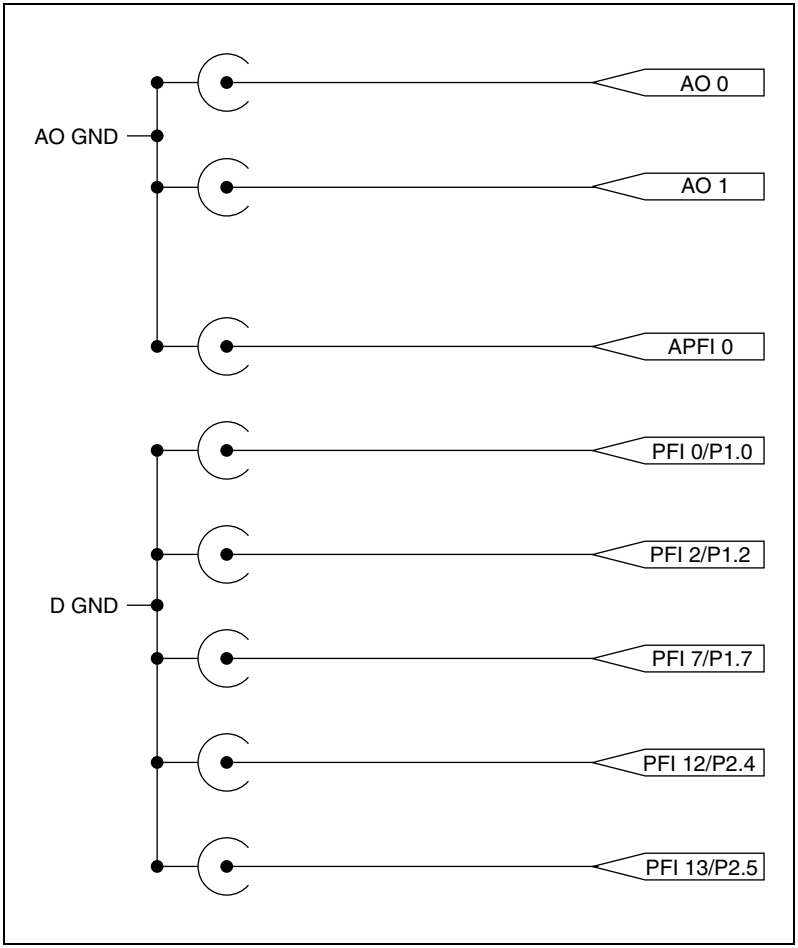


Figure 4. AO and PFI Connections

Specifications

This section lists the specifications of the BNC-2111. These specifications are typical at 25 °C unless otherwise specified.

Table 6. BNC-2111 Available Signals

BNC Connector	M Series Function	E Series Function
AI<0..15>	AI<0..15>	AI<0..15>
AO<0..1>	AO<0..1>	AO<0..1>
APFI 0	APFI 0	AO Ext Ref
PFI 0 / P1.0	PFI 0 / P1.0	PFI 0 / AI Start
PFI 2 / P1.2	PFI 2 / P1.2	PFI 2 / AI Convert
PFI 7 / P1.7	PFI 7 / P1.7	PFI 7 / AI Samp
PFI 12 / P2.4	PFI 12 / P2.4	CTR 0 Out
PFI 13 / P2.5	PFI 13 / P2.5	CTR 1 Out

The PFI / Digital I/O signals are referenced to digital ground from the connected DAQ board. APFI 0 is referenced to analog output ground from the connected DAQ board. The PFI signals can be accessed on the center pin of the applicable BNC connector, while digital ground (analog output ground for APFI 0) can be accessed on the outer shield of the BNC connector.

Figure 5. BNC-2111 Pin Assignments

Voltage

Refer to the device specifications for the voltage rating for your DAQ device.

Maximum voltage ..... 42 V

Physical

Dimensions

With metal enclosure ..... 19.05 by 10.48 by 3.51 cm (7.5 by 4.125 by 1.38 in.)

Without metal enclosure (board only)..... 18.796 by 8.89 by 5.034 cm (7.4 by 3.5 by 1.982 in.)

I/O connector..... 68-pin male connector

BNC connectors 24

Environment

Operating temperature..... 0 to 55 °C

Storage temperature ..... –55 to 125 °C

Relative humidity ..... 5 to 90%, noncondensing

Altitude..... 2,000 m

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

Safety

The BNC-2111 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 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 (BNC-2111 with Metal Enclosure Only)

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

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

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electronic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting `ni.com/certification`. If your product supports calibration, you can obtain the calibration certificate for your product at `ni.com/calibration`.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States,

create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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Korea 82 02 3451 3400, Lebanon 961 0 1 33 28 28,
Malaysia 1800 887710, Mexico 01 800 010 0793,
Netherlands 31 0 348 433 466, New Zealand 0800 553 322,
Norway 47 0 66 90 76 60, Poland 48 22 3390150,
Portugal 351 210 311 210, Russia 7 095 783 68 51,
Singapore 1800 226 5886, Slovenia 386 3 425 4200,
South Africa 27 0 11 805 8197, Spain 34 91 640 0085,
Sweden 46 0 8 587 895 00, Switzerland 41 56 200 51 51,
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