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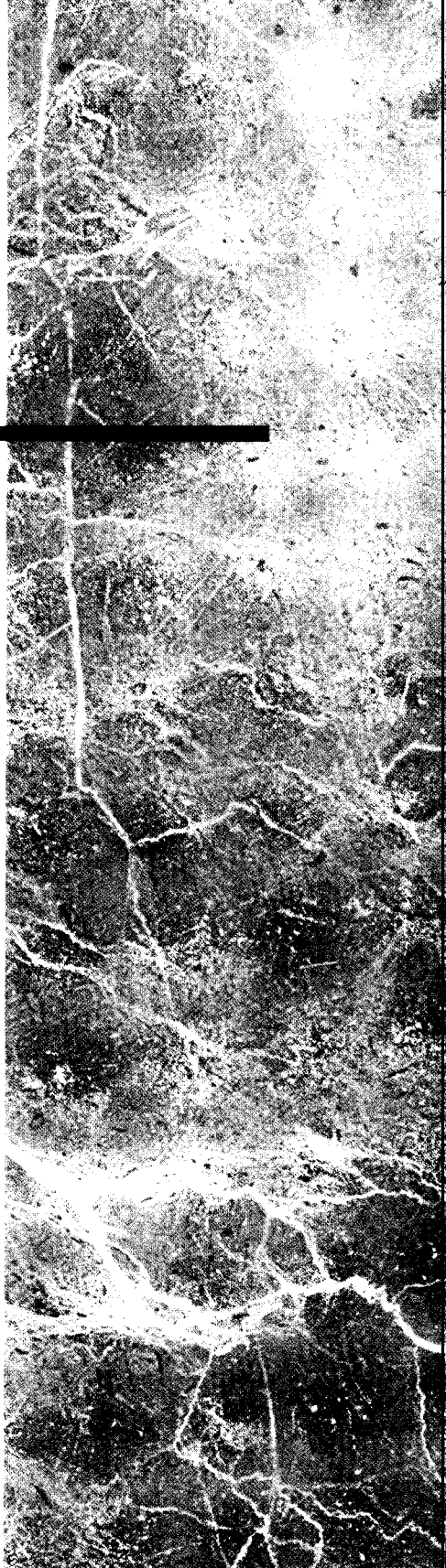
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SCXI™

SCXI-1127 User Manual



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SCXI™

SCXI-1127 User Manual

32-Channel High-Voltage Multiplexer/Matrix Module

NATIONAL INSTRUMENTS™

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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< >	Angle brackets containing numbers separated by an ellipsis represent a range of values associated with a port, bit, or signal name (for example, ACH<0..7> stands for the signals ACH0 through ACH7).
»	The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** options from the last dialog box.
	This icon to the left of bold italicized text denotes a note, which alerts you to important information.
	This icon to the left of bold italicized text denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.
	This icon to the left of bold italicized text denotes a warning, which advises you of precautions to take to avoid being electrically shocked.
bold	Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, Windows 95 tabs, or LEDs.
bold italic	Bold italic text denotes a note, caution, or warning.
italic	Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text from which you supply the appropriate word or value, as in CH*x*.
`monospace`	Text in this font denotes text or characters that you should literally 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 for statements and comments taken from programs.

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Installing and Configuring the SCXI-1127

The SCXI-1127 module is a high-voltage multiplexer/matrix module. It is a high-density armature relay module that provides a 32x1, two-wire multiplexer and several switch matrix configurations on an SCXI platform. The SCXI-1127 can also operate as two 16x1 or four 8x1, two-wire multiplexers allowing a single module to handle several multiplexing needs.

Through software-configurable switches, the module can also operate as a one-wire 64x1 multiplexer, enabling you to make a large number of common referenced measurements. It can also operate as a 16x1, four-wire multiplexer to make resistive measurements such as those needed for thermistors and RTDs. With the use of special terminal blocks, the SCXI-1127 can become an 8x4 or 32x1, two-wire matrix. A complete list of possible configurations is given in Table 1-1.

Table 1-1. SCXI-1127 Configuration

Scanning Configuration	Multiplexer	Matrix
One-wire	64x1	N/A
Two-wire	32x1	8x4 (Also 16x2, 32x1)
Four-wire	16x1	N/A

To handle large channel counts, you can expand the size of the multiplexer with additional SCXI-1127 modules. These modules support the analog bus through a special adapter, the high-voltage analog bus (HVAB) backplane adapter in the SCXI-1357/1358 kit, at the rear of the module. This adapter allows you to expand the HVAB without complicated wiring. For example, you can connect two SCXI-1127 modules using the HVAB-backplane adapter to create a 64x1, two-wire multiplexer.

In a matrix configuration, you can expand the columns of the matrix using the HVAB-backplane adapter. For example, you can connect two

SCXI-1127 modules via the HVAB-backplane adapter to create a 16x4 matrix. You can also expand the rows and columns of a matrix through the front connector of the SCXI-1127 using the SCXI-1332 and matrix expansion cables. Refer to Chapter 2, *Matrix Expansion*, for further information on matrix expansion.

The SCXI-1127 is designed to work well at both low and high voltages. For low-voltage measurements such as those taken with thermocouples, the SCXI-1127 uses relays with very low thermal offset to ensure accurate measurements. At high voltages, the SCXI-1127 can handle signals up to 250 V_{rms} at a 200 mA load and 30 VDC at a 1 A load. The SCXI-1127 complies with the CE low-voltage directive for an installation category II environment. Refer to Appendix A, *Specifications*, for detailed specifications of the SCXI-1127.

The following section explains how to install the software required to use the SCXI-1127, including installing the latest version of NI-SWITCH. After installing the software, install the SCXI-1127 hardware and its accessories, then configure and test the SCXI-1127.

Installing the Software

You can control the SCXI-1127 programmatically in an application development environment (ADE) using NI-SWITCH. The supported ADEs include LabVIEW, LabWindows/CVI, Visual Basic, and C or C++ environments. The following instructions describe the order for installing the software for your SCXI-1127.

1. Install your ADE if you have not already done so. National Instruments ADEs have release notes containing their software installation instructions.
2. Install the NI-SWITCH software that came on a CD with your SCXI-1127. The CD includes the software required to configure and program your SCXI-1127 module.
   a. Insert your National Instruments NI-SWITCH software CD into the CD-ROM drive.
   b. Click on the **Install NI-SWITCH Software** option in the installation window. The installer guides you through the rest of the installation process.

Installing the Hardware

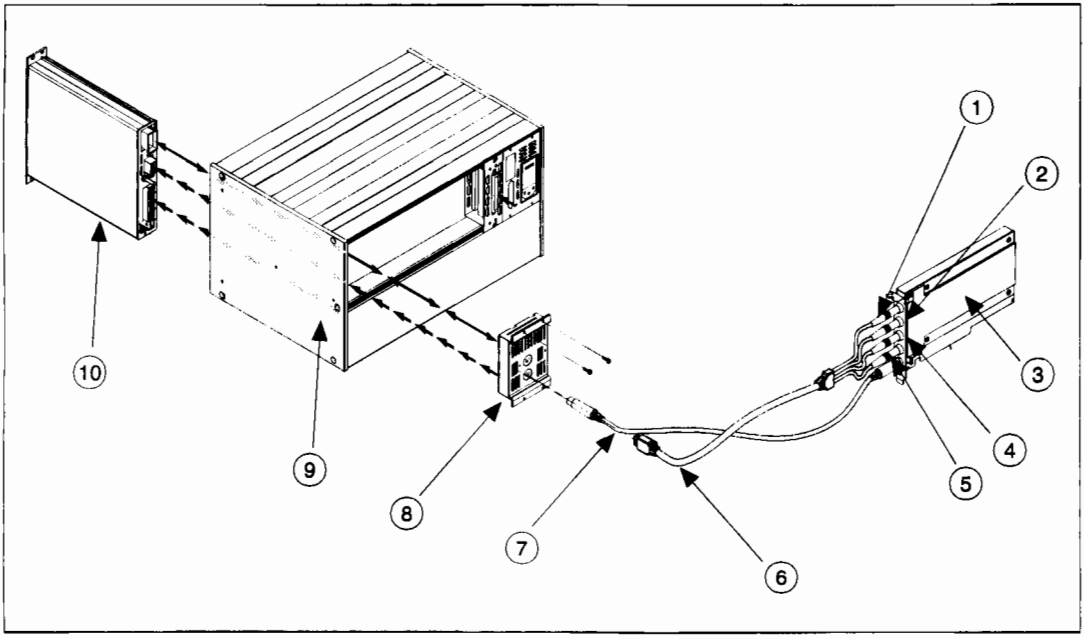
The following section describes how to install your SCXI-1127 for use with SCXI chassis, National Instruments DAQ devices, and National Instruments DMMs.

Installing the SCXI-1127 Module into the SCXI Chassis

You need the following items to complete the installation:

- SCXI-1127
- SCXI chassis
- 1/8 in. flathead screwdriver

Follow these steps to install your SCXI-1127 module into the SCXI chassis while referring to Figure 1-1.



1 AB0+	4 AB2+	8 2-Slot HVAB-Backplane Adapter
2 AB0-	5 AB2-	9 SCXI Chassis
3 NI 4060 for PCI	6 HV8-BAN4	10 SCXI-1127 Module
	7 SH9MD-9MD	

Figure 1-1. Installing the SCXI-1127 into an SCXI Chassis

1. Turn off the computer that contains the DAQ/DMM device or disconnect it from your SCXI chassis.
2. Turn off the SCXI chassis. Do not insert the SCXI-1127 module into a chassis that is turned on.
3. Insert the SCXI-1127 module into the rightmost slot. Gently guide the module into the module guides and push it to the back of the slot until the connectors make good contact. The module must be firmly engaged; however *do not* force the module into place.

Note ***When installing the SCXI-1127 module in an SCXI chassis, the rightmost slot (when the chassis is viewed from the front) must be filled first, then fill the slot to the left with the next SCXI-1127. Other SCXI modules can be loaded from left to right.***

4. Insert any other SCXI modules into the remaining slots in the same manner as described in step 3.
5. Secure all the SCXI-1127 modules to the SCXI chassis using both thumbscrews.

To finish installing your SCXI-1127, follow one of the procedures in the appropriate section below.

Connecting the SCXI-1127 to the NI-DMM in a Single Chassis System

You need the following items for this installation:

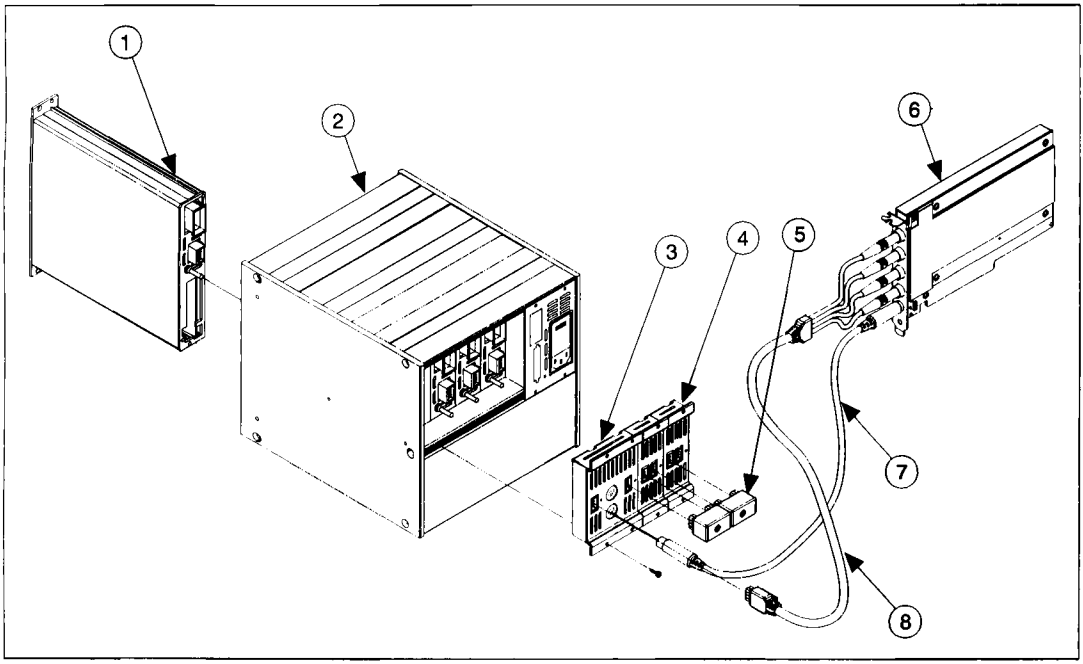
- SCXI-1000/1000DC/1001 chassis with the SCXI-1127 modules installed
- SCXI-1357 (4-slot)/1358 (12-slot) kit
  - 1-slot, 2-slot, and/or 8-slot HVAB-backplane adapter
  - HV8-to-BAN4 cable
  - SH9MD-9MD cable
  - Two or three 8-position high-voltage plugs
- NI-DMM
- 1/8 in. flathead screwdriver

Consult your SCXI chassis documentation and NI-DMM documentation for additional instructions and warnings. Your SCXI-1127 modules and any other SCXI modules should already be installed in the chassis according to their installation instructions. To connect the SCXI-1127 module with an NI-DMM, follow the steps in the following section that best describes your

test system. Before you proceed with your connections, make sure you turn off your SCXI chassis.

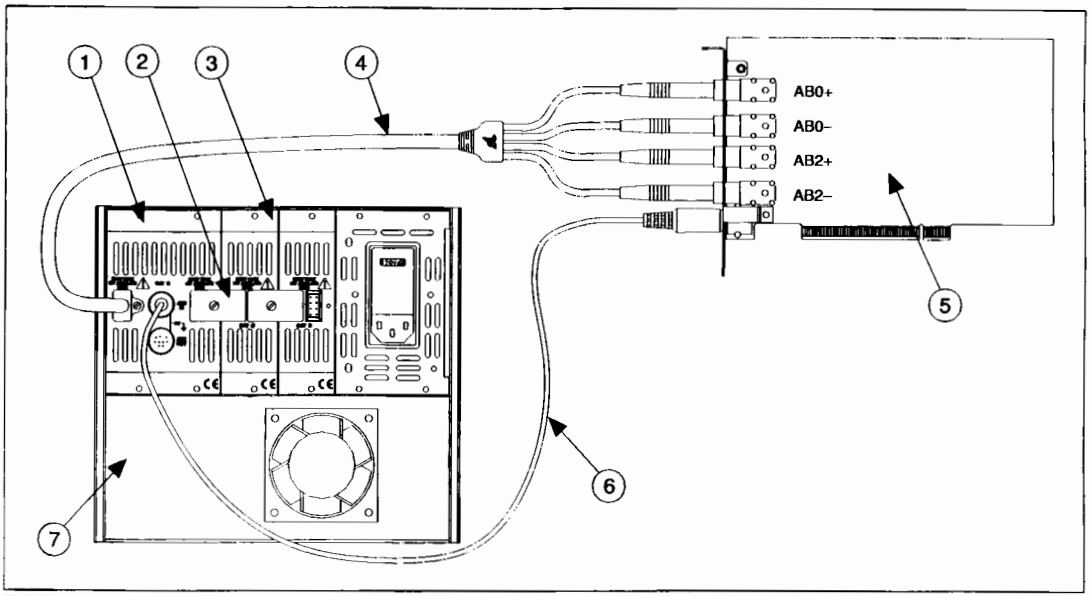
Single 4-Slot Chassis Configuration

Refer to Figure 1-2 and 1-3 to make connections in the single 4-slot chassis configuration.



1 SCXI-1127 Module	4 1-Slot HVAB-Backplane Adapter	6 NI 4060 for PCI
2 4-Slot SCXI Chassis	5 8-Position HVAB Plug	7 SH9MD-9MD Cable
3 2-Slot HVAB-Backplane Adapter		8 HV8-BAN4 Cable

Figure 1-2. 4-Slot Single Chassis Installation



1	2-Slot HVAB-Backplane Adapter	3	1-Slot HVAB-Backplane Adapter	5	NI 4060 for PCI
2	8-Position HVAB Plug	4	HV8-BAN4 Cable	6	SH9MD-9MD Cable
				7	4-Slot SCXI Chassis

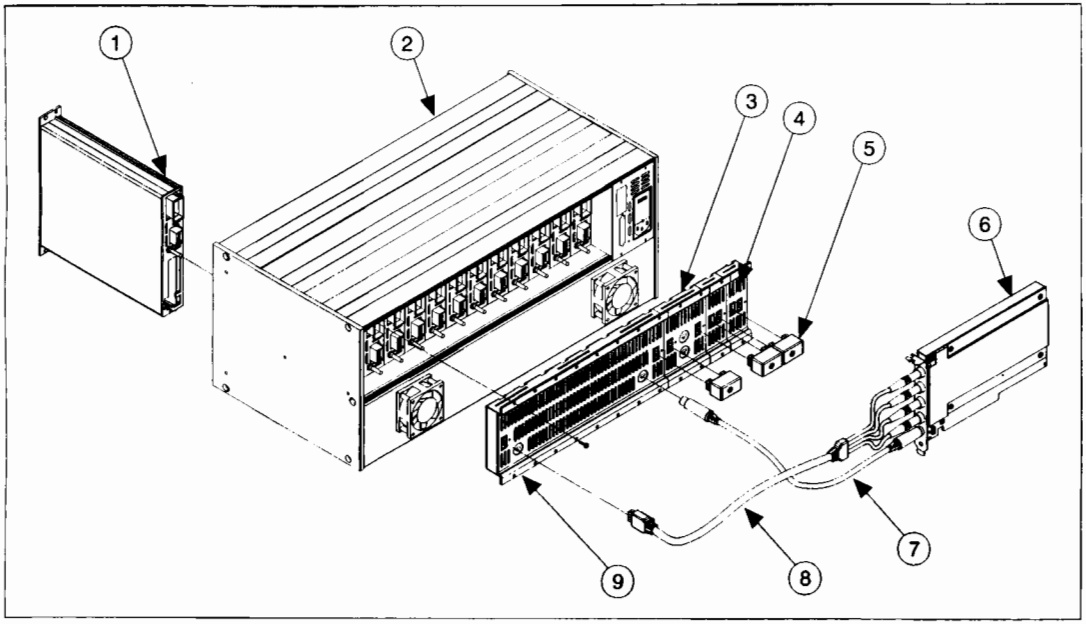
Figure 1-3. 4-Slot Configuration Parts Locator Diagram

1. Install the 2-slot HVAB-backplane adapter behind slots 3 and 4.
2. Install additional 1-slot HVAB-backplane adapters behind slots 1 and 2 if needed.
3. Install the 8-position HVAB plugs to connect the HVAB-backplane adapters as needed.
4. Connect the HV8-BAN4 cable from the DMM to the HVAB connector behind slot 4.
5. Connect the SH9MD-9MD cable from the DMM to the AUX IN connector.
6. You can install any additional SCXI-1127 modules in any slot that has an HVAB-backplane adapter behind it.

Note ***An SCXI-1127 is required in slot 4 to establish communication with the chassis. If slot 4 is empty, the system will not operate. It is this module that you must specify in the configuration utility as the cabled module to the DMM.***

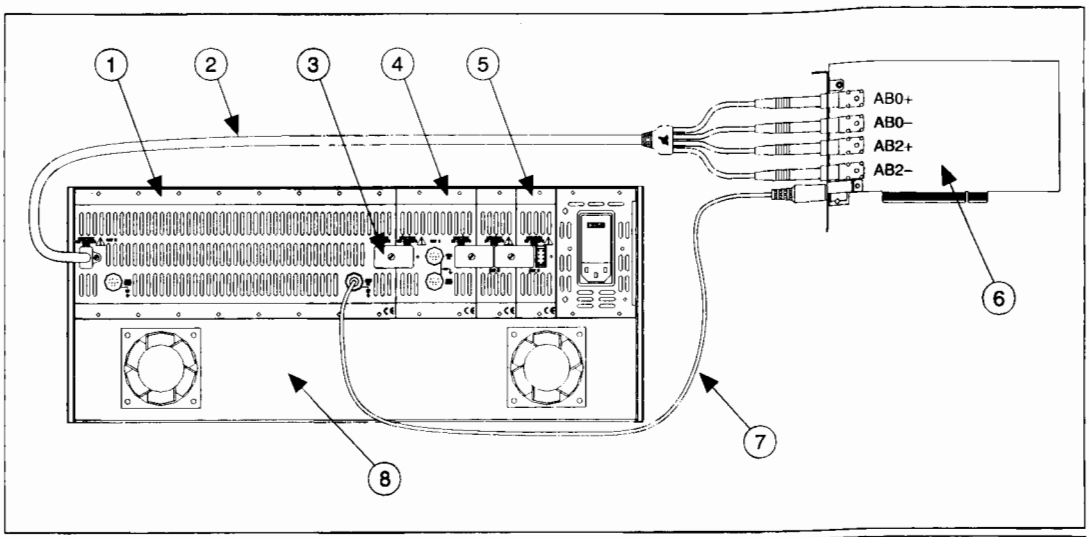
Single 12-Slot Chassis Configuration

Refer to Figure 1-4 and 1-5 to make connections in the single 12-slot chassis configuration.



1 SCXI-1127 Module	4 1-Slot HVAB-Backplane Adapter	6 NI 4060 for PCI
2 12-Slot SCXI Chassis	5 8-Position HVAB Plug	7 SH9MD-9MD Cable
3 2-Slot HVAB-Backplane Adapter		8 HV8-BAN4 Cable
		9 8-Slot HVAB-Backplane Adapter

Figure 1-4. 12-Slot Single Chassis Installation



1	8-Slot HVAB-Backplane Adapter	4	2-Slot HVAB-Backplane Adapter	6	NI 4060 for PCI
2	HV8-BAN4 Cable			7	SH9MD-9MD Cable
3	8-Position HVAB Plug	5	1-Slot HVAB-Backplane Adapter	8	12-Slot SCXI Chassis

Figure 1-5. 12-Slot Configuration Parts Locator Diagram

1. Install the 8-slot HVAB-backplane adapter behind slots 5 through 12.
2. Install additional 2-slot and 1-slot HVAB-backplane adapters behind slots 1 through 4 if needed.
3. Install the 8-position HVAB plugs to connect the HVAB-backplane adapters as needed.
4. Connect the HV8-BAN4 cable from the DMM to the HVAB connector behind slot 12.
5. Connect the SH9MD-9MD cable from the DMM to the AUX IN connector behind slot 5.
6. You can install any additional SCXI-1127 modules in any slot that has an HVAB-backplane adapter behind it.

Note ***Do not connect the SH9MD-9MD cable to the AUX IN connector behind slot 4 on the 2-slot HVAB-backplane adapter.***

An SCXI-1127 is required in slot 12 to establish communications with the chassis. If slot 12 is empty, the system will not operate. It is this module that you must specify in the configuration utility as the cabled module to the DMM.

Connecting the SCXI-1127 to the NI-DMM in a Multi-Chassis System

The following sections describe how to configure the following multi-chassis configurations:

- 4-slot and 4-slot multi-chassis configuration
- 4-slot and 12-slot multi-chassis configuration
- 12-slot and 12-slot multi-chassis configuration

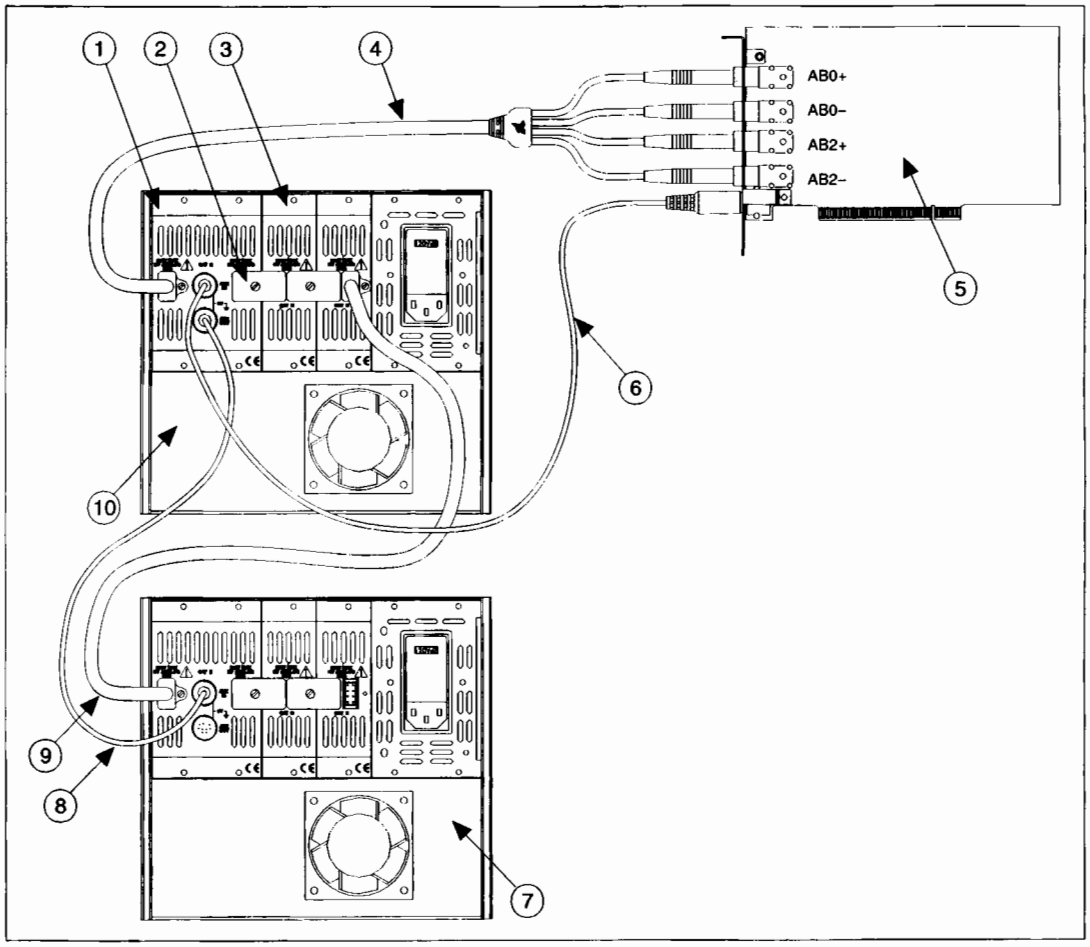
You can also create larger configurations.

4-Slot and 4-Slot Multi-Chassis Configuration

In addition to the items needed for a single chassis system, you need the following to install this configuration:

- SCXI-1357 multi-chassis expansion kit
  - HV8-HV8 cable
  - SH9MD-9MD cable
  - Two 8-position HVAB plugs
  - One 2-slot HVAB-backplane adapter
  - Two 1-slot HVAB-backplane adapters

Refer to Figure 1-6 to setup this multi-chassis configuration.



1 2-Slot HVAB-Backplane Adapter	3 1-Slot HVAB-Backplane Adapter	6 SH9MD-9MD Cable
2 8-Position HVAB Plug	4 HV8-BAN4 Cable	7 4-Slot SCXI Chassis
	5 NI 4060 for PCI	8 SH9MD-9MD Cable
		9 HV8-HV8 Cable
		10 4-Slot SCXI Chassis

Figure 1-6. 4-Slot to 4-Slot Multi-Chassis Configuration Parts Locator Diagram

1. Install the HVAB-backplane adapters and 8-position HVAB plugs in the next chassis as described in steps 1 through 3 in *Single 4-Slot Chassis Configuration.*
2. Connect the HV8-HV8 cable from the first chassis, normally the connector behind slot 1, to the HVAB connector (behind slot 4) of the next chassis.

3. Connect the SH9MD-9MD cable from the AUX OUT connector of the first chassis to the AUX IN connector of the next chassis.
4. Repeat steps 1 through 3 for each additional chassis.

Note ***An SCXI-1127 is required in slot 4 to establish communications with the chassis. If slot 4 is empty, the system will not operate. It is this module that you must specify in the configuration utility as the cabled module to the DMM.***

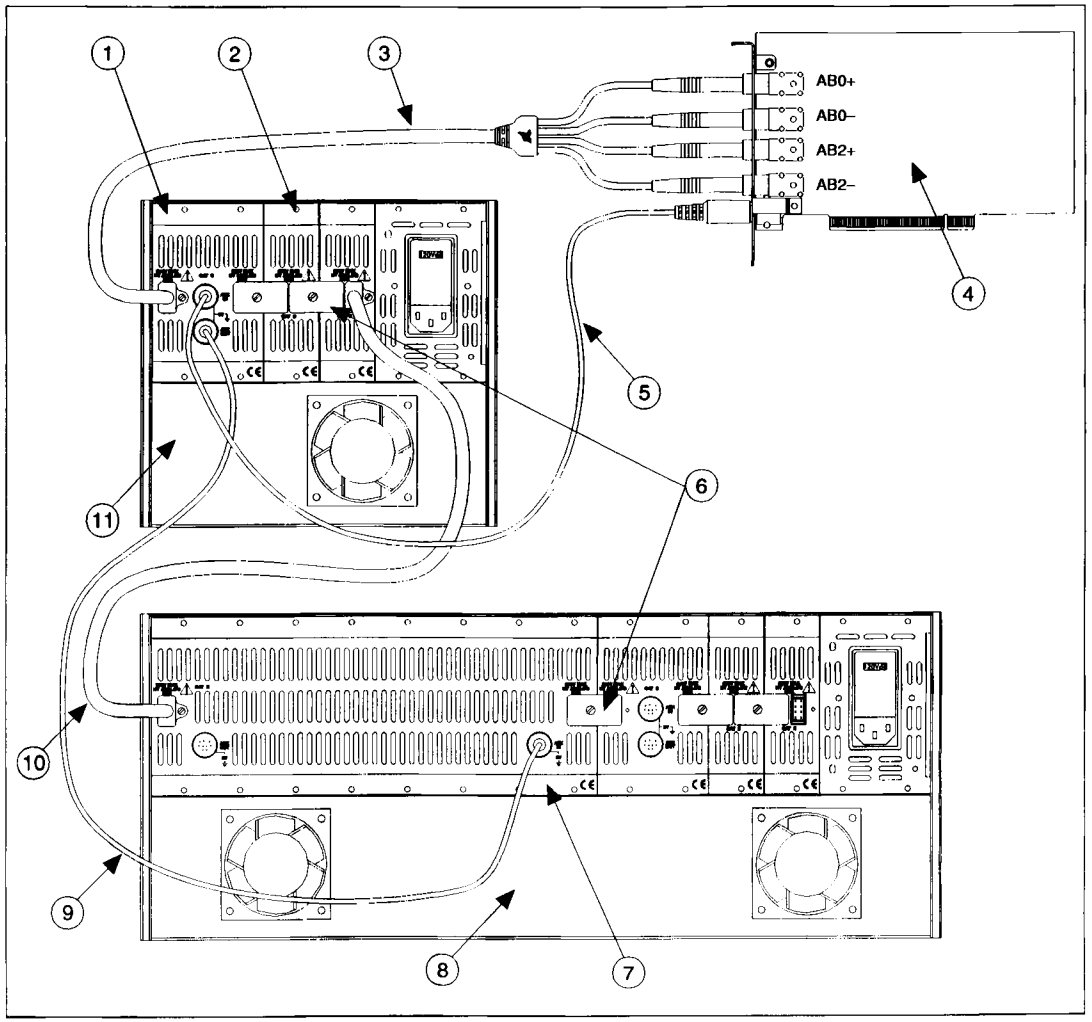
If a chassis is configured with less than four slots of the HVAB-backplane adapter, use the right-most available HVAB connector to extend to the next chassis. In this instance, right-most means the slot closest to slot 1 when the chassis is viewed from the back.

4-Slot and 12-Slot Multi-Chassis Configuration

In addition to the items needed for a single chassis system, you need the following items to install this configuration:

- SCXI-1358 multi-chassis expansion kit
  - HV8-HV8 cable
  - SH9MD-9MD cable
  - Three 8-position HVAB plugs
  - One 8-slot HVAB-backplane adapter
  - One 2-slot HVAB-backplane adapter
  - Two 1-slot HVAB-backplane adapters

Refer to Figure 1-7 to setup this multi-chassis configuration.



1 2-Slot HVAB-Backplane Adapter	4 NI 4060 for PCI	8 12-Slot SCXI Chassis
2 1-Slot HVAB-Backplane Adapter	5 SH9MD-9MD Cable	9 SH9MD-9MD Cable
3 HV8-BAN4 Cable	6 8-Position HVAB Plug	10 HV8-HV8 Cable
	7 8-Slot HVAB-Backplane Adapter	11 4-Slot SCXI Chassis

Figure 1-7. 4-Slot to 12-Slot Multi-Chassis Configuration Parts Locator Diagram

1. Install the HVAB-backplane adapters and jumper blocks in the 12-slot chassis as described in steps 1 through 3 in *Single 12-Slot Chassis Configuration.*
2. Connect the HV8-HV8 cable from the first chassis, normally the connector behind slot 1, to the HVAB connector (behind slot 12) of the next chassis.
3. Connect the SH9MD-9MD cable from the AUX OUT connector of the first chassis to the AUX IN connector (behind slot 5) of the next chassis.
4. Repeat steps 1 through 3 for each additional chassis.

Note ***Do not use the SH9MD-9MD cable behind slot 4 of the 2-slot HVAB-backplane adapter on the 12-slot chassis.***

An SCXI-1127 is required in slot 4 of the 4-slot chassis and slot 12 of the 12-slot chassis to establish communications with all the chassis in the system. If slot 4 is empty in the 4-slot chassis or slot 12 is empty in the 12-slot chassis, the chassis will not operate. It is this module that you must specify in the configuration utility as the cabled module to the DMM.

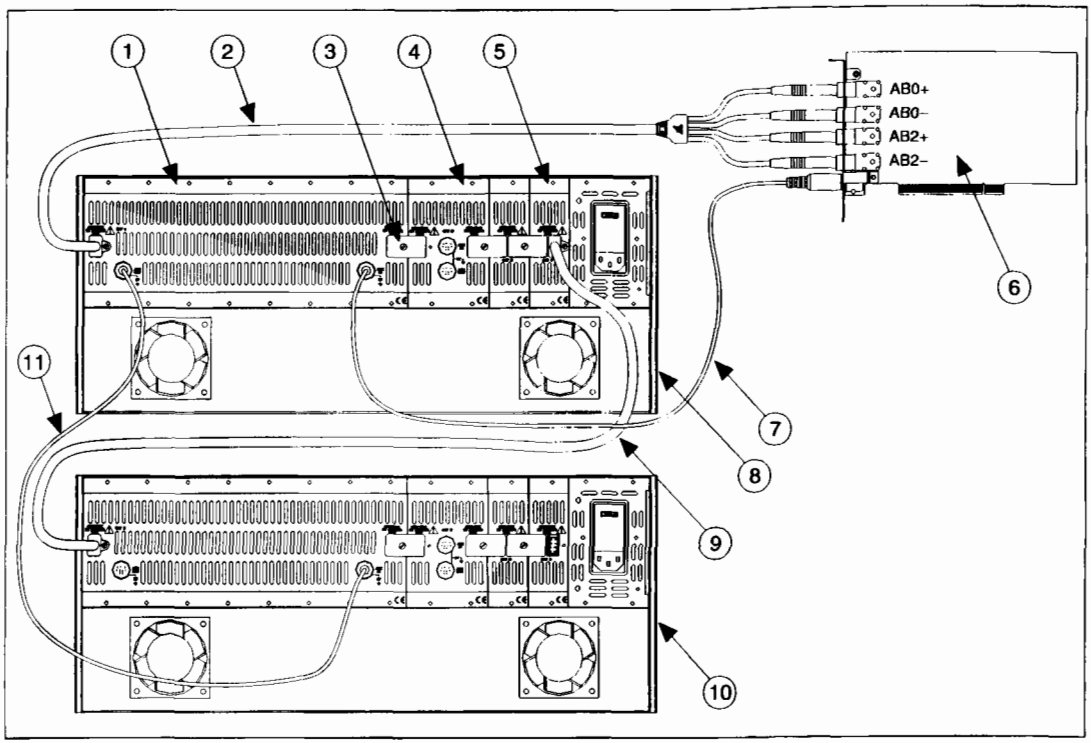
If the 4-slot chassis is configured with less than four slots of the HVAB-backplane adapter, use the right-most available HVAB connector to extend to the next chassis. In this instance, right-most means the slot closest to slot 1 when the chassis is viewed from the back.

12-Slot and 12-Slot Multi-Chassis Configuration

In addition to the items needed for a single chassis system, you need the following items to install this configuration:

- SCXI-1358 multi-chassis expansion kit
  - HV8-HV8 cable
  - SH9MD-9MD cable
  - Three 8-position HVAB plugs
  - One 8-slot HVAB-backplane adapter
  - One 2-slot HVAB-backplane adapter
  - Two 1-slot HVAB-backplane adapters

Refer to Figure 1-8 setup this multi-chassis configuration.



1	8-Slot HVAB-Backplane Adapter	4	2-Slot HVAB-Backplane Adapter	7	SH9MD-9MD Cable
2	HV8-BAN4 Cable	5	1-Slot HVAB-Backplane Adapter	8	12-Slot SCXI Chassis
3	8-Position HVAB Plug	6	NI 4060 for PCI	9	HV8-HV8 Cable
				10	12-Slot SCXI Chassis
				11	SH9MD-9MD Cable

Figure 1-8. 12-Slot to 12-Slot Multi-Chassis Configuration Parts Locator Diagram

1. Install the HVAB-backplane adapters and jumper blocks in the 12-slot chassis as described in steps 1 through 3 in *Single 12-Slot Chassis Configuration.*
2. Connect the HV8-HV8 cable from the first chassis, normally the connector behind slot 1, to the HVAB connector (behind slot 12) of the next chassis.
3. Connect the SH9MD-9MD cable from the AUX OUT connector of the first chassis to the AUX IN connector (behind slot 5) of the next chassis.
4. Repeat steps 1 through 3 for each additional chassis.

Note ***Do not connect the SH9MD-9MD cable to the 2-slot HVAB-backplane adapter.***

An SCXI-1127 is required in slot 12 of each 12-slot chassis to establish communications with all the chassis in the system. If slot 12 is empty, the chassis will not operate. It is this module that you must specify in the configuration utility as the cabled module to the DMM.

If a chassis is configured with less than 12 slots of the HVAB-backplane adapter, use the right-most available HVAB connector to extend to the next chassis. In this instance, right-most means the slot closest to slot 1 when the chassis is viewed from the back.

Connecting the SCXI-1127 to the NI-DMM in a PXI-1010 Chassis

You need the following items to complete the installation:

- PXI chassis with the SCXI-1127 modules installed
- SCXI-1357 kit
  - Two 1-slot HVAB-backplane adapters
  - One 2-slot HVAB-backplane adapter
  - HV8 to BAN4 cable
  - Two 8-position HVAB plugs
  - SH9MD-9MD cable
- NI-DMM
- 1/8 in. flathead screwdriver

Consult your PXI-1010 and NI-DMM documentation for additional instructions and warnings. Your SCXI-1127 modules and any other SCXI modules should already be installed in the chassis according to their installation instructions. To connect the SCXI-1127 module with an NI-DMM, follow the steps in the following section that best describes your test system. Before you proceed with your connections, make sure you turn off your SCXI chassis.

NI-DMM in PXI Slots 1 through 3 Configuration

To install your NI-DMM in slots 1 through 3 follow these steps:

1. Install your NI-DMM in any one of slots 1 through 3.
2. Install the 2-slot HVAB-backplane adapter behind slots 3 and 4.
3. Install additional 1-slot HVAB-backplane adapters behind slots 1 and 2 if needed.

4. Install the 8-position HVAB plugs to connect the HVAB-backplane adapters as needed.
5. Connect the HV8-BAN4 cable from the DMM to the HVAB connector behind slot 4.
6. Connect the SH9MD-9MD cable from the DMM to the AUX IN connector.
7. You can install any additional SCXI-1127 modules in any slot that has an HVAB-backplane adapter behind it.

NI-DMM in PXI Slot 4 Configuration

To install your NI-DMM in slot 4 follow these steps:

1. Install your NI-DMM in slot 4.
2. Install the 2-slot HVAB-backplane adapter behind slots 3 and 4.
3. Install additional 1-slot HVAB-backplane adapters behind slots 1 and 2 if needed.
4. Install the 8-position HVAB plugs to connect the HVAB-backplane adapters as needed.
5. Connect the HV8-BAN4 cable from the DMM to the HVAB connector behind slot 4.
6. You can install any additional SCXI-1127 modules in any slot that has an HVAB-backplane adapter behind it.

Note ***The SH9MD-9MD is not required for this configuration.***

Accessing the SCXI-1127 through Other SCXI Modules Using a DAQ Device

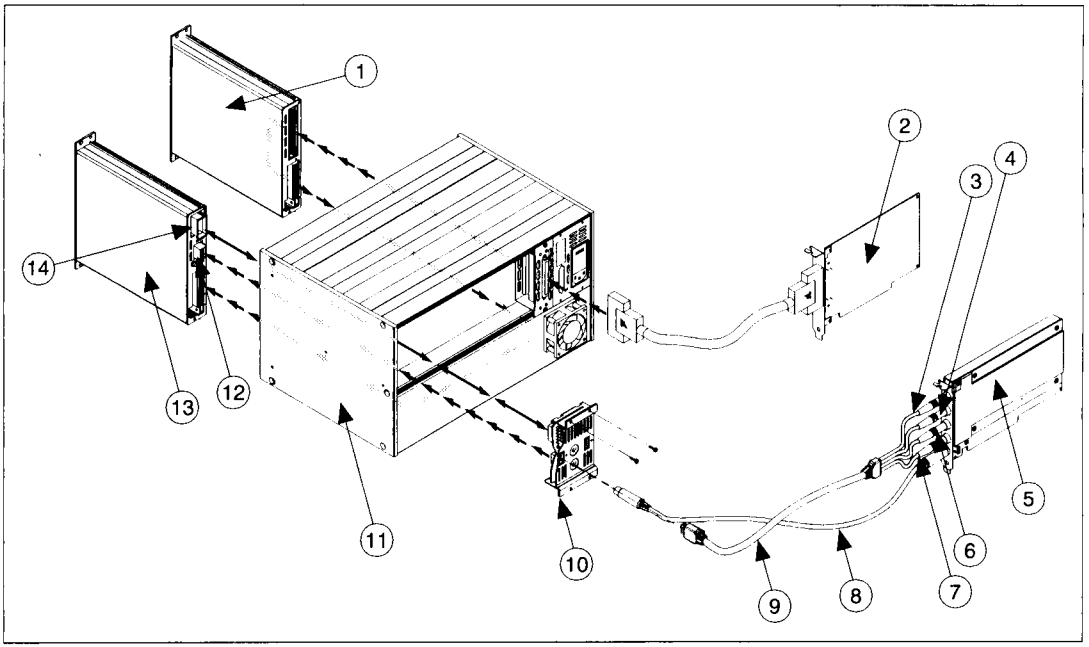
You need the following items to complete the installation:

- SCXI chassis with the SCXI-1127 modules installed (see the appropriate previous sections)
- DAQ device cable adapter
- National Instruments DAQ device
- DAQ cable
- 1/8 in. flathead screwdriver
- At least one other SCXI module other than the SCXI-1127, installed in the chassis

Consult the documentation for your SCXI chassis and other SCXI modules for additional instructions and warnings. Any non-SCXI-1127 modules should already be installed according to their installation instructions. To set up the SCXI-1127 module to be accessed by a DAQ device via another SCXI module, follow these steps while referring to Figure 1-9.

1. You should have already installed the SCXI-1127 modules and their HVAB-backplane adapters (1357/1358) according to the instructions found earlier in this chapter.
2. Connect the MIO/DIO cable adapter to the rear of a module that is not the SCXI-1127 module. Secure the adapter to the SCXI chassis using the screws provided.
3. Attach your DAQ cable to the cable adapter at the rear connector.
4. Attach the other end of the DAQ cable to the National Instruments DAQ device.
5. Check the installation.
6. Turn on the SCXI chassis.
7. Turn on the computer or reconnect it to your chassis.
8. If you already have the appropriate software installed, you are ready to configure the SCXI-1127 via an SCXI module other than the SCXI-1127 module.

Figure 1-9 shows the installation of the SCXI-1127 with two DAQ devices.



1 Non-SCXI-1127 Module	6 AB2+	11 SCXI Chassis
2 MIO or DIO Device	7 AB2–	12 Digital Signals Connector
3 AB0+	8 SH9MD-9MD Cable	13 SCXI-1127 Module
4 AB0–	9 HV8-BAN4 Cable	14 HVAB Connector
5 NI 4060 for PCI	10 2-Slot HVAB-Backplane Adapter	

Figure 1-9. Installing the SCXI-1127 with Two DAQ Devices

Connecting the SCXI-1127 to an External DMM

You need the following items to complete this installation:

- SCXI-2000/2400 chassis with the SCXI-1127 modules installed or SCXI chassis connected to a DAQ device with the SCXI-1127 modules installed
- SCXI-1357 or SCXI-1358 kit
  - 1-slot, 2-slot, and/or 8-slot HVAB-backplane adapter
  - SH9MD-9MD cable
  - 8-position HVAB plug
- External DMM (if needed)
- HV8-BAN4 or BAN2-BARE kit (two kits needed for four-wire)

- Cable or wires to connect the handshaking lines to the SCXI-1127
- 1/8 in. flathead screwdriver

Consult the documentation for your SCXI chassis and other SCXI modules for additional instructions and warnings. You should have installed your SCXI-1127 modules according to the instructions given in *Installing the SCXI-1127 Module into the SCXI Chassis* section. Any other SCXI modules should already be installed according to their installation instructions. To install the SCXI-1127 module with an SCXI chassis, follow these steps.

1. Install the SCXI-1127s in the chassis and install the HVAB as described in one of the Connecting the SCXI-1127 backplane sections.
2. To connect an SCXI-1127 to an external DMM device, you need two cables—the HV8-BAN4 or BAN2-BARE cable, and a cable to connect the handshaking lines from the SCXI-1127 to the DMM. Attach your HV8-BAN4 cable to the HVAB connector on the HVAB-backplane adapter or connect your BAN2-BARE cable to the OUT0 terminals on the SCXI-1331 terminal block. When making four-wire measurements you must also connect a BAN2-BARE cable to the OUT2 terminals.
3. Attach the other end of the HV8-BAN4 or BAN2-BARE cable to the inputs of your external DMM device.
4. Connect the handshaking lines from the front of the SCXI-1331 terminal block to the appropriate lines on the external DMM. See Chapter 2, *Handshaking Scanning*, for information on how to use the SCXI-1127 handshaking lines.
5. Check the installation.
6. Turn on the SCXI chassis.
7. Turn on the computer or reconnect it to your chassis.

The SCXI-1127 module is now installed.

Note ***For the system to function properly, it must either be controlled by a DAQ device or be a 2000 series SCXI chassis.***

Configuration and Self-Test

Run the **Measurement & Automation Explorer** to configure and test your SCXI-1127. If you need help during the configuration process, open the **Measurement & Automation Help** file by selecting **Help Topics** from the **Help** menu.

1. Run **Measurement & Automation Explorer** by double-clicking the icon on your desktop.
2. Add a new chassis to the configured **Devices and Interfaces** by holding down the right mouse button on **Devices and Interfaces** and selecting **Insert**. Select the appropriate chassis from the list box and click **OK**.
3. Configure the chassis by selecting the **Chassis ID**. This an arbitrary number you choose for use by the software to uniquely specify the chassis. Select the **Chassis Address** (refer to your *SCXI Chassis User Manual* for further information). For the SCXI-2000, you also need to select the **Baud Rate** and **COM Port**.
4. You now have the choice of auto-detecting your modules or manually adding them depending on your application. If you are using an MIO or DIO DAQ device you can either auto-detect or manually add the modules. If you are using an NI-DMM you must manually add the modules.

Auto-Detecting Modules

If you selected auto-detect and the chassis is not an SCXI-2000 remote chassis, you must have your chassis connected to your DAQ device.

1. Click **Next**.
2. Select your communication path, except in the case of the SCXI-2000, and click **Next**.
3. Select the module cabled to your communication path, except in the case of the SCXI-2000, and click **Finish**.

Your SCXI chassis and SCXI-1127 modules are now configured in the software with your modules. To configure the properties for a particular module, perform the following steps:

1. Display the list of Devices and Interfaces by clicking the + next to the **Devices and Interfaces** icon.
2. You will see the chassis selected in the list. Display the list of modules in the chassis by clicking the + next to the **Chassis** icon.
3. Right click on the module you want to configure and select **Properties**. You will be presented with tabs containing attributes for different properties of the module. You can select any tab to see and/or change any attributes.

Note ***For the SCXI-1127, the second tab allows you to configure the wire modes for each channel. The end of the pop-up list of channels allows you to select multiple channels.***

Manually Adding Modules

If you selected not to auto-detect your SCXI modules, you must add each of your modules separately.

1. Click **Finish** in the Chassis Configuration window.
2. Display the list of Devices and Interfaces by clicking the + next to the **Devices and Interfaces** icon.
3. You will see the chassis you selected in the list. Display the list of modules in the chassis by clicking the + next to the **Chassis** icon.
4. Right click on the slot that is cabled to your device and select **Insert**. For DAQ devices this is the slot cabled to the DAQ device. For NI-DMMs this is typically slot 4, on 4-slot chassis, and slot 12 on 12-slot chassis, based on the installation instructions in earlier sections used to configure the chassis.
5. Select the module that is intended for that slot and click **Next**.
6. You are now given the option to make this the module that controls the chassis. Select the DAQ device or DMM you cabled to the chassis using the **Connected to:** control. Confirm that there is a check in the checkbox labeled **This device will control the chassis** and click **Next**.
7. You are presented with a series of properties for the module. Select the appropriate values for the attributes and click **Next**. After making your selections, click **Finish**.

Note ***For the SCXI-1127, the second tab allows you to configure the wire modes for each channel. The end of the pop-up list of channels allows you to select multiple channels.***

You are now finished configuring the slot. Configure the rest of your modules in the same manner.

To remove a module or chassis, right-click on the chassis or module you want to remove and select **Delete**.

To test the chassis configuration, right-click on the chassis and select **Test**.

Safety Information

The following cautions contain important safety information concerning hazardous voltages.

Caution ***You MUST insulate all of your signal connections appropriately to the HIGHEST available voltage with which the SCXI-1127 may come in contact. ANY voltage connected to the SCXI-1127 connector may appear on any other pin of this connector.***

Equipment described in this document must be used in an Installation Category II or lower environment per IEC 60664.

DO NOT OPERATE THE MODULE IN AN EXPLOSIVE ATMOSPHERE OR WHERE THERE MAY BE FLAMMABLE GASES OR FUMES.

SHOCK HAZARD—This unit should only be opened by qualified personnel aware of the dangers involved. Disconnect all power before removing the cover. Always install the grounding screw. If signal wires are connected to the module or terminal block, dangerous voltages may exist even when the equipment is turned off. Before you remove any installed terminal block or module, disconnect the AC power line or any high-voltage sources, ($\geq$30 V_{rms} and 42.4 V_{peak}, or 60 VDC), that may be connected to any terminal block or module.

DO NOT OPERATE DAMAGED EQUIPMENT. The safety-protection features built into this module can be impaired if the module becomes damaged in any way. If it is damaged, turn the module off and do not use it until service-trained personnel can check its safety. If necessary, return the module to National Instruments for service and repair to ensure that its safety is not compromised.

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 module must be used in a UL listed SCXI chassis.

DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT. Because of the

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

When using the terminal block with high common-mode voltages, you MUST insulate your signal wires appropriately. National Instruments is NOT liable for any damages or injuries resulting from inadequate signal wire insulation.

Connections, including power signals to ground and vice versa, that exceed any of the maximum signal ratings on the SCXI-1127 can damage any or all of the modules connected to the SCXI chassis, the host computer, and the SCXI-1127 module. National Instruments is NOT LIABLE FOR ANY DAMAGES OR INJURIES resulting from incorrect signal connections.

If high voltages ($\geq$ 30 V_{rms} and 42.4 V_{peak}, or 60 VDC) are present, YOU MUST CONNECT SAFETY EARTH GROUND TO THE STRAIN-RELIEF TAB OF THE TERMINAL BLOCK. This maintains compliance with UL 3111 and IEC-61010, and protects against electric shock when the terminal block is not connected to the chassis. To connect the safety earth ground to the strain-relief tab, run an earth ground wire in the cable from the signal source to the terminal block. National Instruments is NOT liable for any damages or injuries resulting from inadequate safety earth ground connections.

Do not loosen or re-orient the safety ground solder lug hardware when connecting the safety ground wire; to do so reduces the safety isolation between the high voltage and safety ground.

2

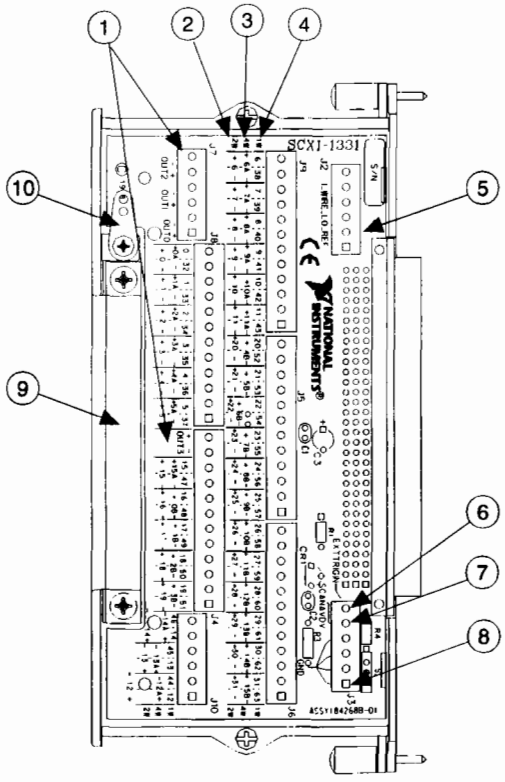
Using the SCXI-1127

This chapter discusses in detail the operation of the SCXI-1127. There are two major modes of operation—operation as a multiplexer and operation as a matrix. A third mode of operation, independent mode, allows you to access advanced features of the SCXI-1127.

Operating as a Multiplexer/Scanner

You can configure the SCXI-1127 to operate as a multiplexer/scanner. Using this mode of operation, you can configure channels in the scan in three different ways—two-wire, one-wire, and/or four-wire channel configurations. In all scanning modes, only one channel is closed at a time in the multiplexer.

The SCXI-1331 terminal block consists of a shielded board with 84 screw terminals for easy connection to the SCXI-1127 input connector. The SCXI-1331 is shown in Figure 2-1.



1	Multiplexer Outputs	5	1-Wire Lo Reference (1_WIRE_LO_REF)	8	Ground Reference for Trigger Signals
2	Two-Wire Mode Channel Numbering	6	External Trigger Input (EXT_TRIG_IN)	9	Cable Strain Relief
3	Four-Wire Mode Channel Numbering	7	Scanner Advanced Output (SCANADVD)	10	Safety Ground Solder Lug
4	One-Wire Mode Channel Numbering				

Figure 2-1. SCXI-1331 Signal Connections

Depending on the input mode configuration of the SCXI-1127, the SCXI-1331 has a maximum of 64 one-wire channels, 32 two-wire channels, or 16 four-wire channels. The SCXI-1331 also has terminals for external triggering signals. The SCXI-1127 supports the standard voltmeter complete and scanner advanced triggering signals. The following sections describe signal connections using the SCXI-1331 and the various input

mode configurations. For more information on scanning and triggering, consult the *Hardware and Software Scanning* section.

The SCXI-1127 contains a safety interlocking mechanism that prevents high voltages from appearing on the input connector when a terminal block is not present. However, when a SCXI-1331 or SCXI-1332 is plugged into the front of the SCXI-1127, the module detects its presence and allows the module to close relays.

If you are using a custom terminal block, you must provide this interlocking feature on your terminal block so that it is possible for the SCXI-1127 to detect that a terminal block is present. Please refer to Appendix D for information on how to do this.

Two-Wire Channel Scanning Configuration

You can use the SCXI-1127 as a 32-channel, two-wire (differential) multiplexer. Figure 2-2 shows the block diagram of the input switching structure in two-wire mode. You can connect up to 32 channels to the SCXI-1127 using the SCXI-1331 terminal block. The input signals are switched using a 32 to 1 multiplexer. The output of the multiplexer is available at the OUT0+ and OUT0- screw terminals on the SCXI-1331.

Note ***OUT0± is also referred to as the multiplexer common or COM0±.***

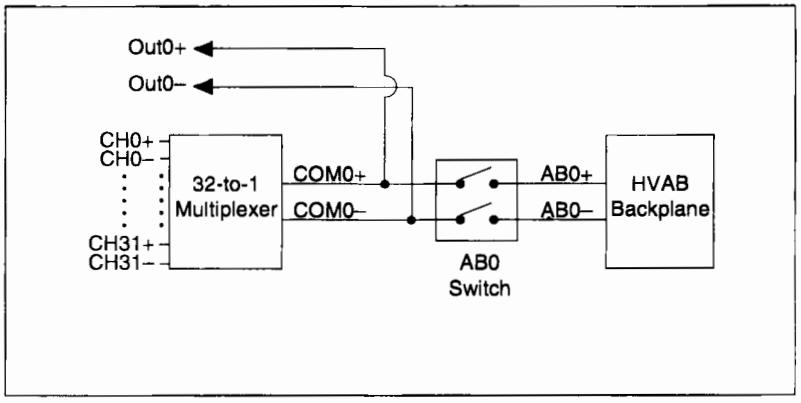


Figure 2-2. Two-Wire Block Diagram

You can also connect the output of the SCXI-1127 to the high-voltage backplane using switch AB0 to make the connection. On power up, switch AB0 is open, disconnecting the SCXI-1127 from the high-voltage bus. If you are using the module with a high-voltage backplane, you need to close

the AB0 switch to connect the multiplexer output to the high-voltage analog backplane. You can do this through NI-SWITCH.

Figure 2-3 shows an example of a two-wire configuration using the SCXI-1331 terminal block. The diagram shows the two-wire terminal block connections for channels 2, 5, 24, and 27. Channel 2 measures a voltage source (V_1). The positive terminal of channel 2 is labeled +2 with the negative channel labeled -2. The output of the multiplexer is available through the OUT0 bus.

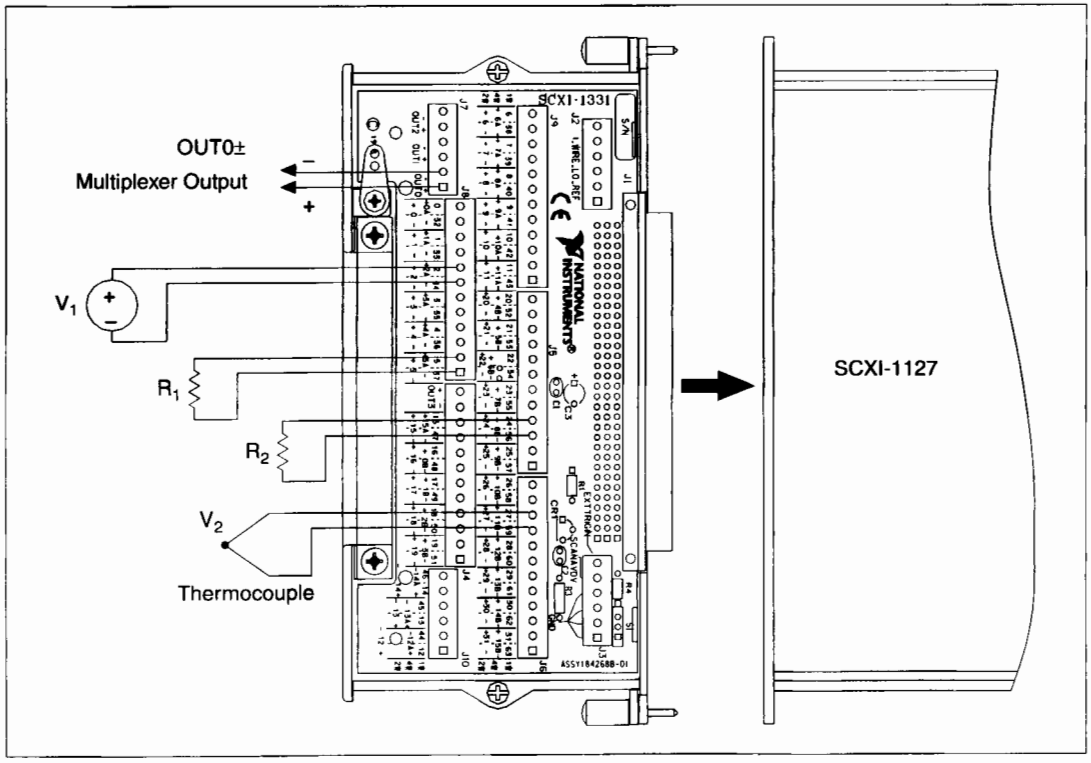


Figure 2-3. Two-Wire Wiring Diagram

You can connect different types of two-wire inputs to the SCXI-1127. For example, in Figure 2-3, a thermocouple (V_2) is shown connected to channel 27, and on channel 5 (R_1) and 24 (R_2) resistance measurements are being made. Consult the *Making Temperature Measurements* section for more information on temperature compensation measurements for making accurate thermocouple measurements.

One-Wire Channel Scanning Configuration

The SCXI-1127 has 64 one-wire channels in the multiplexer mode that are available through the SCXI-1331 terminal block. Figure 2-4 shows the SCXI-1127 configured as a 64-to-1 one-wire multiplexer. One-wire configuration provides a high channel count because all input signals have the same reference. This common reference, called 1_WIRE_LO_REF on the SCXI-1127, is available to you through the screw terminals on the SCXI-1331 terminal block.

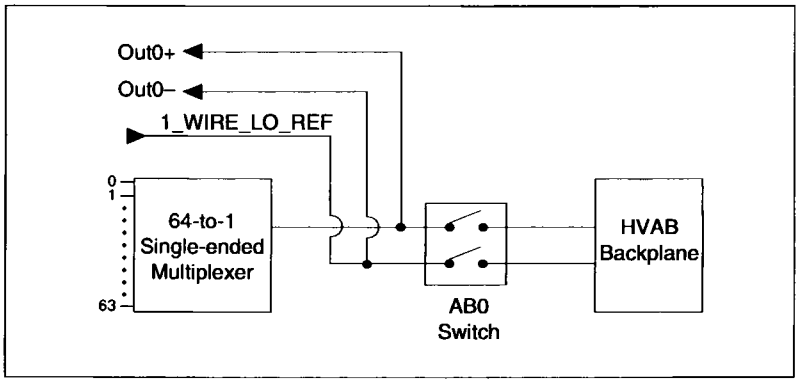


Figure 2-4. One-Wire Block Diagram

The output of the 64-to-1 multiplexer is available through the OUT0+ and OUT0- screw terminals on the SCXI-1331. You can also connect the output of the SCXI-1127 to the HVAB backplane using switch AB0 to make the connection.

On power up, switch AB0 is open, disconnecting the SCXI-1127 from the high-voltage bus. If you are using the module with a high-voltage backplane, you need to close the AB0 switch to connect the multiplexer output to the HVAB backplane. You can do this through NI-SWITCH.

Figure 2-5 shows an example of a one-wire configuration using the SCXI-1331 terminal block. The diagram shows the one-wire terminal block connections for channels 4, 24, and 59. Channel 4 (R_1) is measuring a resistance. The positive channel is labeled 4 while the negative terminal (common reference) is labeled 1_WIRE_LO_REF.

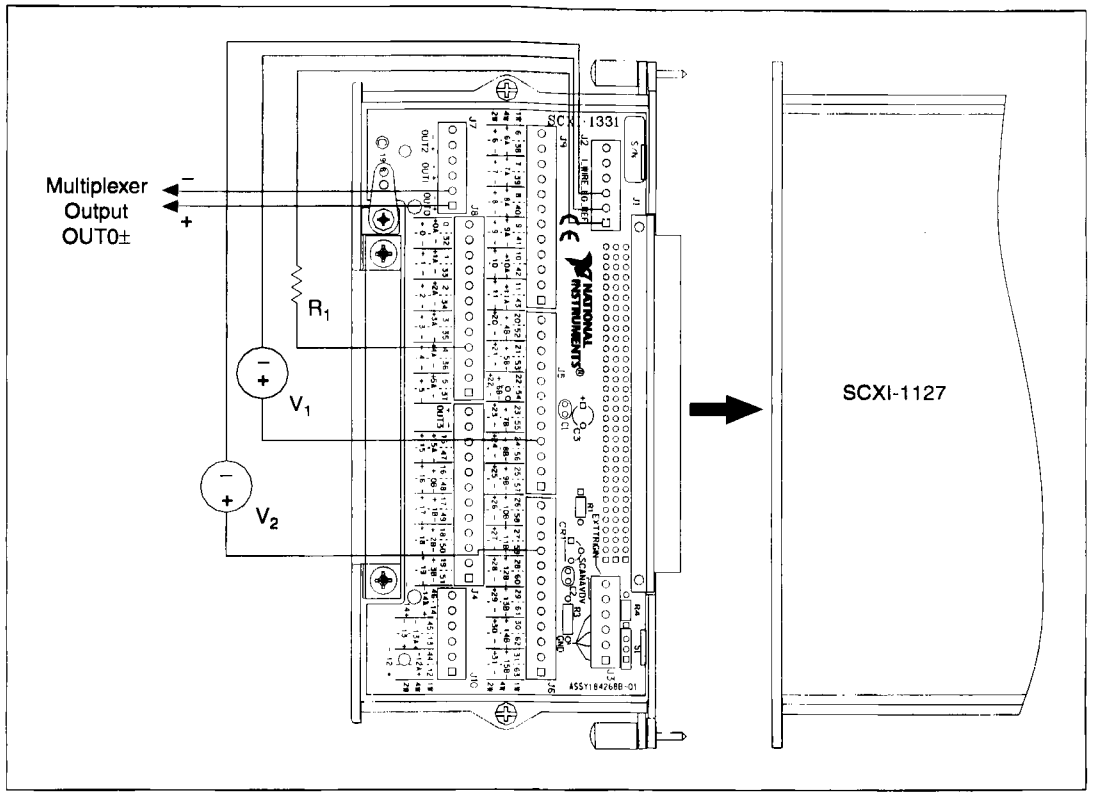


Figure 2-5. One-Wire Wiring Diagram

Both channel 24 (V_1) and 59 (V_2) are measuring voltage sources. The positive terminal of these sources go to screw terminals labeled 24 and 59 respectively. The negative terminals or the common reference for the voltage source is wired to the 1_WIRE_LO_REF screw terminals.

The output of the multiplexer is available through the OUT0 bus. Resistance is measured at channel 4 and voltage at channels 24 and 59.

Four-Wire Channel Scanning Configuration

You can use an SCXI-1127 as a 16-to-1 four-wire multiplexer. Figure 2-6 shows a block diagram of the input switching structure in four-wire mode. You can connect up to 16 four-wire channels to the SCXI-1127 using a SCXI-1331 terminal block. The four-wire multiplexer consists of dual 16-to-1 multiplexers.

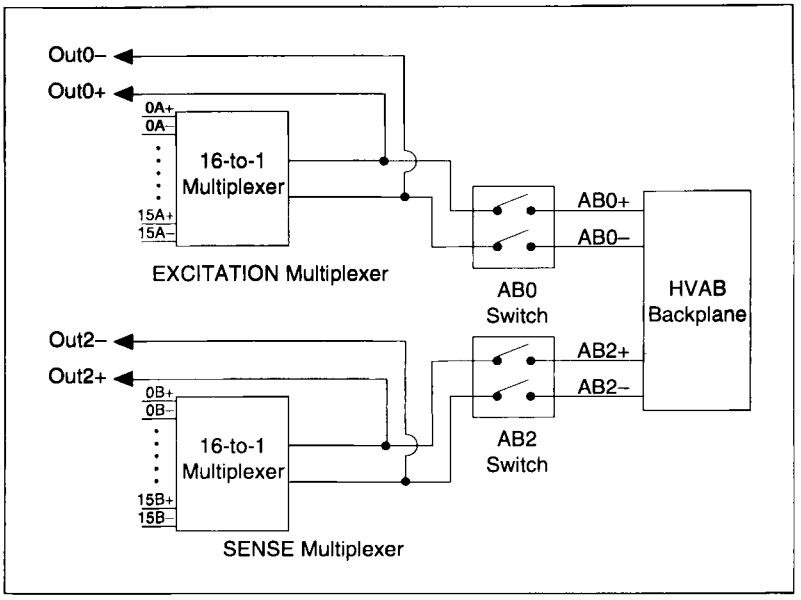


Figure 2-6. Four-Wire Block Diagram

When used with an NI-DMM for four-wire ohms measurement, the upper differential multiplexer provides the excitation source for the four-wire channel being scanned.

The EXCITATION input to the upper multiplexer is available through the OUT0+ and OUT0- screw terminals on the SCXI-1331. The SENSE output from the lower 16-to-1 multiplexer is available through the OUT2+ and OUT2- screw terminals on the SCXI-1331. You can also connect the EXCITATION and SENSE commons of the SCXI-1127 to the HVAB backplane. Use switches AB0 and AB2 to make this connection. You can do this through NI-SWITCH. This is the recommended usage with the NI-DMM.

Figure 2-7 shows an example of a four-wire channel configuration of the SCXI-1331 terminal block. Channel 6 consists of channel 6A+ and 6A-, and 6B+ and 6B-. Channel 6A of four-wire channel 6 is the excitation channel and channel 6B is the voltage sense channel. Therefore, to make a four-wire resistance measurement for example, a DMM should excite the current through high-voltage AB0 or OUT0 using channel 6A and sense the voltage across the resistor through AB2 or OUT2 using channel 6B.

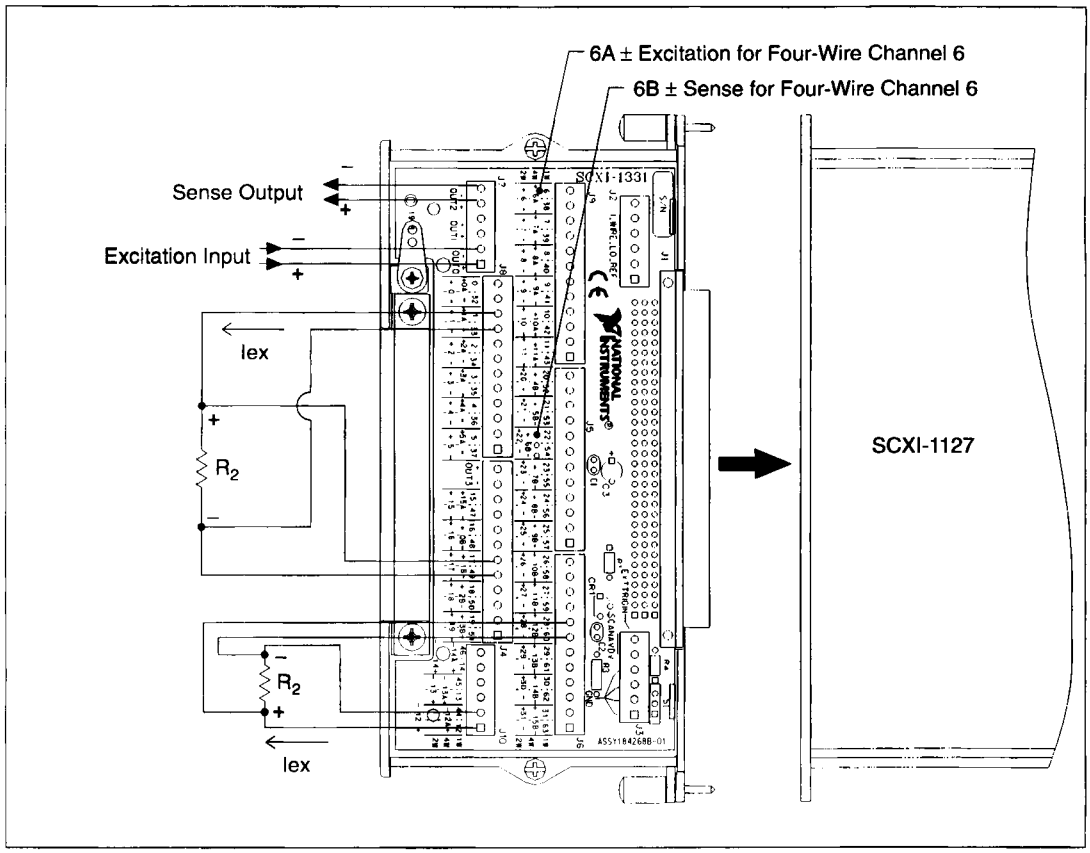


Figure 2-7. Four-Wire Wiring Diagram

On power up the AB0 and AB2 switches are open, disconnecting the SCXI-1127 from the high-voltage bus. If you are using this module with a high-voltage backplane, you need to close the AB0 and AB2 switches to connect the EXCITATION and SENSE commons to the HVAB backplane.

Figure 2-7 shows an example of a four-wire configuration using the SCXI-1331 terminal block. The diagram shows the four-wire terminal block connections for channels 1 and 12. Resistance is measured on both channels. Each channel has excitation pair + and - terminals labeled 1A and 12A and SENSE terminals labeled 1B and 12B respectively.

R1 is excited through the 12A + and - screw terminals and the voltage drop across the resistor is measured through the 12B + and - screw terminals.

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