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SCXI™-1346 SHIELDED MULTI-CHASSIS CABLE ADAPTER

This guide describes how to connect and configure a multi-chassis SCXI system using the SCXI-1346 shielded multi-chassis cable adapter.

Introduction

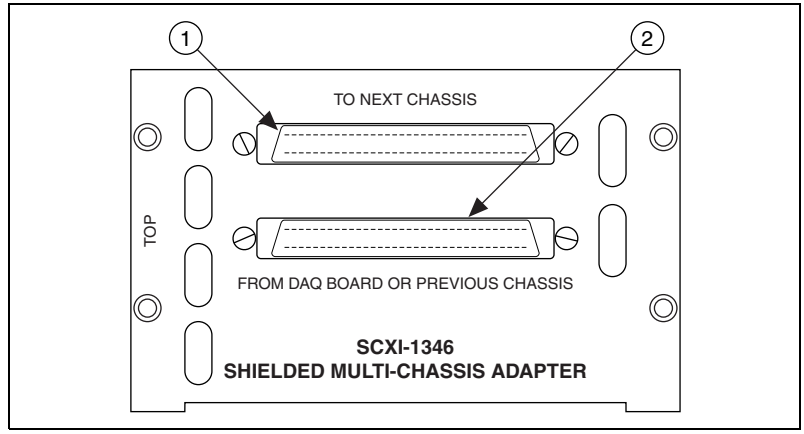
Using the SCXI-1346, you can connect a multi-chassis SCXI system to your data acquisition (DAQ) device. The SCXI-1346 connects any 68-pin E Series DAQ device, excluding 61*XX*E devices, to any SCXI module, excluding the SCXI-1127, SCXI-1128, SCXI-1190, and SCXI-1191.

The SCXI-1346 is a connector assembly with four connectors:

- A 68-pin male connector on the front panel of the adapter, labeled *TO NEXT CHASSIS*
- A 68-pin male connector on the front panel of the adapter, labeled *FROM DAQ BOARD OR PREVIOUS CHASSIS*
- A 50-pin, male breakout connector on the printed-circuit board of the adapter
- A 50-pin, bracket-mounted female connector on the rear of the adapter

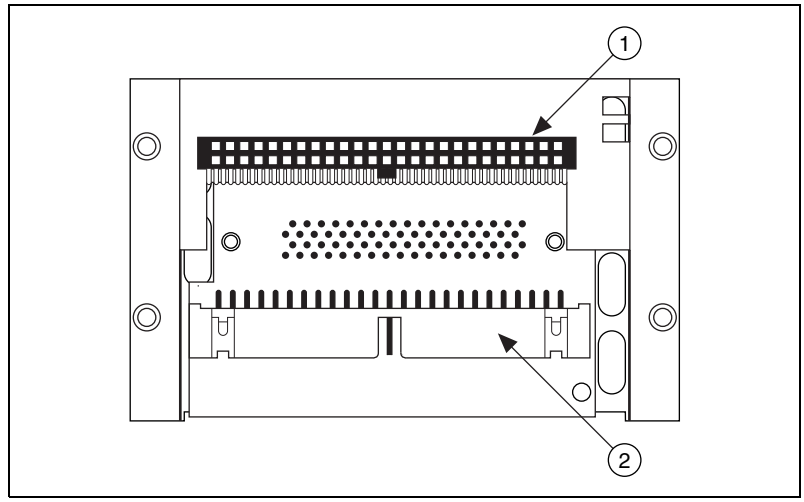
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1	68-Pin Male Connector, TO NEXT CHASSIS	2	68-Pin Male Connector, FROM DAQ BOARD OR PREVIOUS CHASSIS

Figure 1. Front of SCXI-1346



1	50-Pin, Bracket-Mounted Female Connector	2	50-Pin, Male Breakout Connector

Figure 2. Rear of SCXI-1346

Note The SCXI-1346 covers the rear connector of two modules. The module to the right of the one directly connected to the SCXI-1346 cannot have an external cable inserted into its rear 50-pin connector.

What You Need to Get Started

To set up and use your SCXI-1346 in a multi-chassis system, you need the following items:

- ❑ Computer
- ❑ *SCXI-1346 Shielded Multi-Chassis Cable Adapter Installation Guide*
- ❑ One 68-pin, E Series DAQ device
- ❑ SCXI-1001 or SCXI-1000 (revision K or higher) chassis—*n* number of chassis up to a maximum of eight
- ❑ At least one SCXI module per chassis (excluding the SCXI-1127, SCXI-1190, and SCXI-1191)
- ❑ SCXI-1349 shielded cable assembly (cable adapter and cable)
- ❑ SCXI-1346 shielded multi-chassis cable adapters (*n*-1 up to a maximum of seven adapters)
- ❑ 68-pin shielded cables (*n*-1 up to a maximum of seven cables)
- ❑ Small flathead screwdriver

Note You must not exceed 10 m of total cable length in a multi-chassis SCXI system for reliable operation.

Testing the Data Acquisition Device

An E Series DAQ device controls the SCXI chassis. Once the device is installed according to the *DAQ Quick Start Guide* shipped with the device, you need to test the device to make sure it is functioning correctly.

1. Double-click the **Measurement & Automation Explorer** (MAX) icon on your desktop.
2. Expand **Devices and Interfaces** by left-clicking the **+** symbol.

3. Right-click on the name of your device and choose **Properties**. This brings up a window that displays the device number and the resources the DAQ device is using.

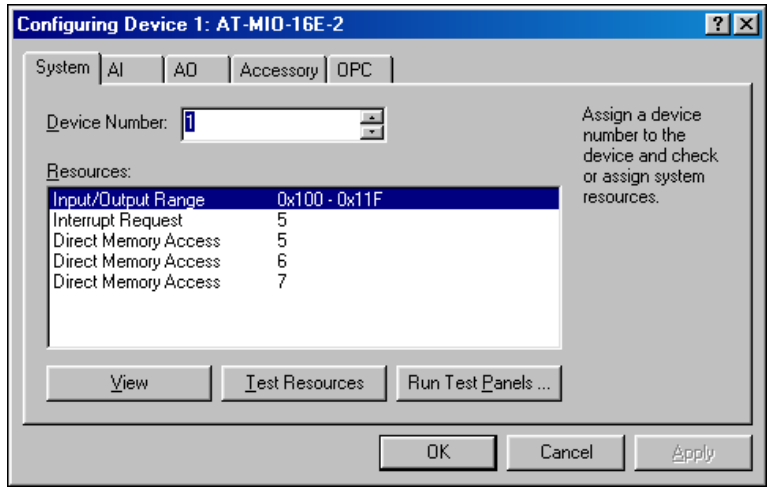


Figure 3. Properties Window in MAX

4. Left-click the **Test Resources** button in the properties window. The following dialog box should appear.



Figure 4. Successful Test Window

Note If the dialog box shown in Figure 4 does not appear, refer to the National Instruments website `ni.com/support` for troubleshooting tips.

The device *must* pass the resources test before you can continue configuring your SCXI system.

Installing Modules in Your SCXI Chassis

The following steps prepare each chassis for integration into the system:

1. Turn the power off in each chassis and unplug all of the SCXI-1000 and SCXI-1001 chassis.
2. Identify which SCXI modules to install in each chassis.

3. Within each SCXI chassis, identify the appropriate SCXI module to connect to each cable adapter. Pair the cable adapter with the first module that appears in the list below. Repeat this pairing for each chassis.
   a. SCXI-1140, SCXI-1520, SCXI-1530, or SCXI-1531
   b. SCXI-1100 to SCXI-1123
   c. SCXI-1125 to SCXI-1159 (except the SCXI-1127, SCXI-1128, SCXI-1129, and SCXI-1140)
   d. SCXI-1540
   e. SCXI-1160 to SCXI-1179
   f. SCXI-1124

Note It is important that you connect the adapter to modules from the list if they are available. If your chassis has none of the modules listed, connect the adapter to any remaining module.

4. For each module that has internal jumpers or DIP switches, set the jumpers or DIP switches for that module according to the instructions in the user manual provided with the module.
5. Insert the modules into the appropriate chassis and secure them.
6. Determine the order of each chassis in the multi-chassis system, starting with the chassis that is connected directly to the DAQ device. The chassis cabled directly to the DAQ device is referred to as chassis ID n (where $n \geq 1$)with each successively cabled chassis referred to as chassis ID n+1, chassis ID n+2, and so on.

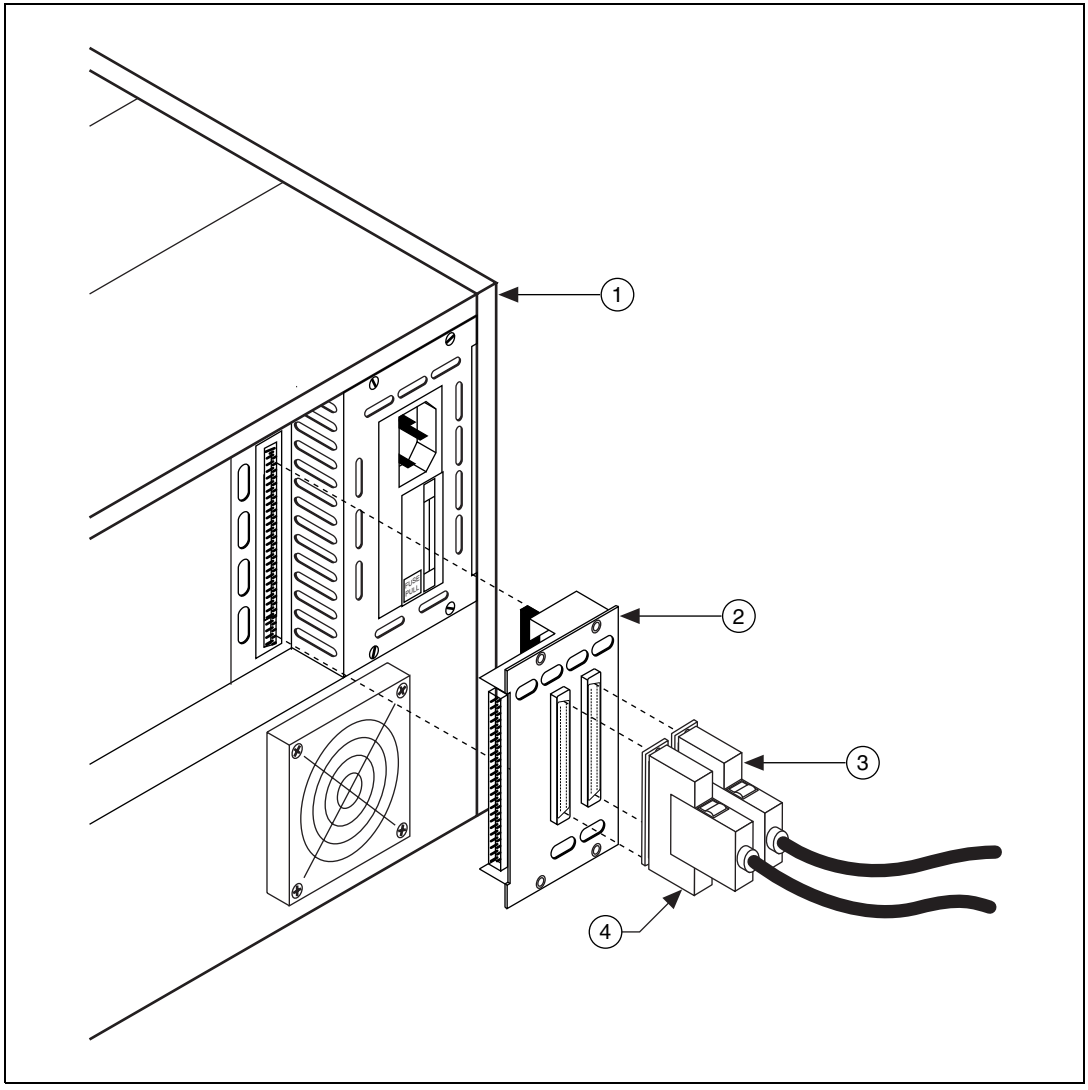
Connecting the Multi-Chassis System

After matching the correct modules in each chassis with the cable adapters in the *Installing Modules in Your SCXI Chassis* section, connect the multi-chassis system.

To connect the multi-chassis system, you must use one SCXI-1346 multi-chassis adapter for every chassis in the chain except the chassis furthest from the DAQ device. The last chassis uses the SCXI-1349 cable adapter.

1. Install the SCXI-1346 multi-chassis adapter by mating the 50-pin female connector on the rear of the SCXI-1346 with the 50-pin male connector on the rear of the appropriate SCXI module. (The appropriate module was determined in step 3 of *Installing Modules in Your SCXI Chassis*, located earlier in this guide.)

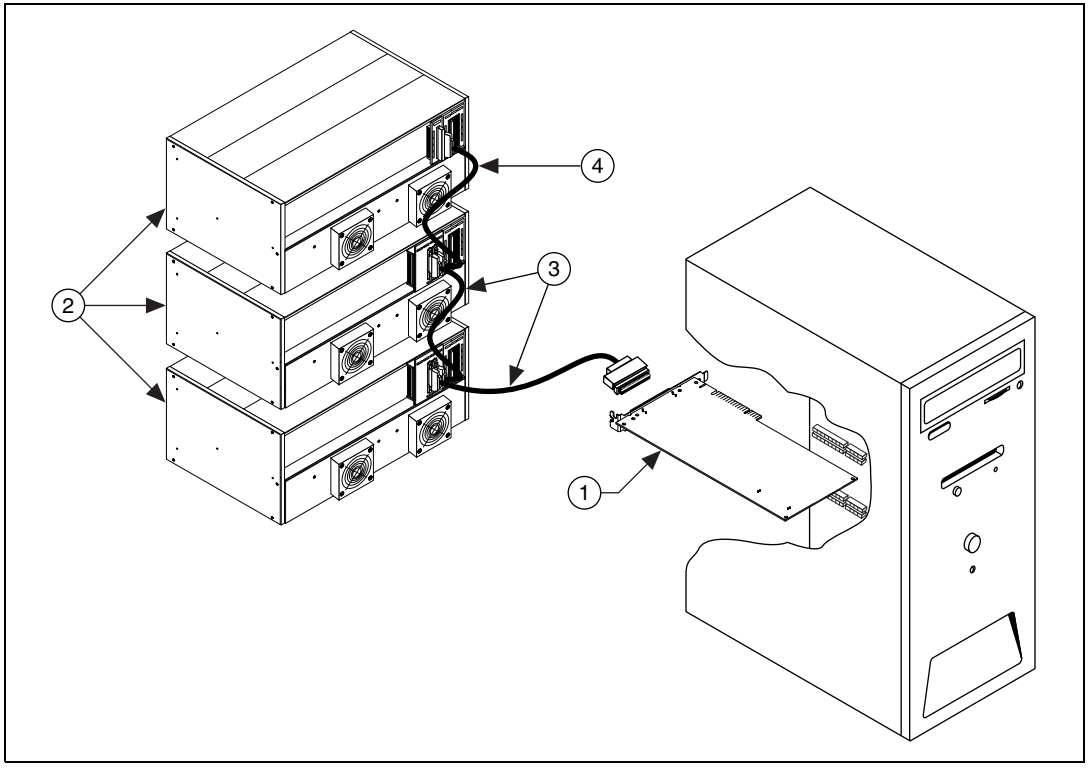
2. Using the four screws provided with the SCXI-1346 multi-chassis adapter kit and a flathead screwdriver, fasten the multi-chassis adapter to the rear of the SCXI chassis.
3. Repeat steps 1 and 2 for each SCXI chassis in the system, excluding the last SCXI chassis in the chain.



1 SCXI-1000 or SCXI-1001 Chassis
2 SCXI-1346 Cable Adapter
3 Shielded Cable Connecting to TO NEXT CHASSIS
4 Shielded Cable Connecting to FROM DAQ BOARD OR PREVIOUS CHASSIS

Figure 5. SCXI-1346 Cable Assembly

4. Install the SCXI-1349 chassis adapter into the last SCXI chassis in the chain. Mate the 50-pin female connection on the rear of the SCXI-1349 with the 50-pin male connector on the rear of the appropriate SCXI module. (The appropriate module was determined in step 3 of the *Installing Modules in Your SCXI Chassis* section earlier in this document.)
5. Using the two screws provided with the SCXI-1349 chassis adapter, fasten the adapter to the rear of the SCXI chassis.
6. Connect either end of one 68-pin shielded cable to the DAQ device. Connect the other end of the 68-pin shielded cable to the SCXI-1346 in chassis ID *n* labeled *FROM DAQ BOARD OR PREVIOUS CHASSIS*.
7. Connect a 68-pin shielded cable to the SCXI-1346 in chassis *n* labeled *TO NEXT CHASSIS*.
8. Connect the other end of the cable to the SCXI-1346 in chassis ID *n*+1 labeled *FROM DAQ BOARD OR PREVIOUS CHASSIS*.
9. Repeat steps 7 and 8 for the remaining chassis until you reach the last chassis.
10. Connect the 68-pin shielded cable to the next to the last chassis in the slot labeled *TO NEXT CHASSIS*.
11. Connect the other end of the cable to the SCXI-1349 in the last chassis.



1	68-Pin E Series DAQ Device	3	Shielded Cable Connected to SCXI-1346 Cable Adapter
2	SCXI-1000 or SCXI-1001 Chassis	4	Shielded Cable Connected to SCXI-1349 Cable Adapter

Figure 6. Complete SCXI Multi-Chassis System

Setting the Chassis Address

Select a unique address for each chassis in the system. Select the addresses in ascending order, starting with the chassis cabled directly to the DAQ device (chassis ID *n*). The chassis address is determined by setting the address switches in a specific on/off pattern. To view these switches, remove the small plastic cover from the front of the SCXI chassis.

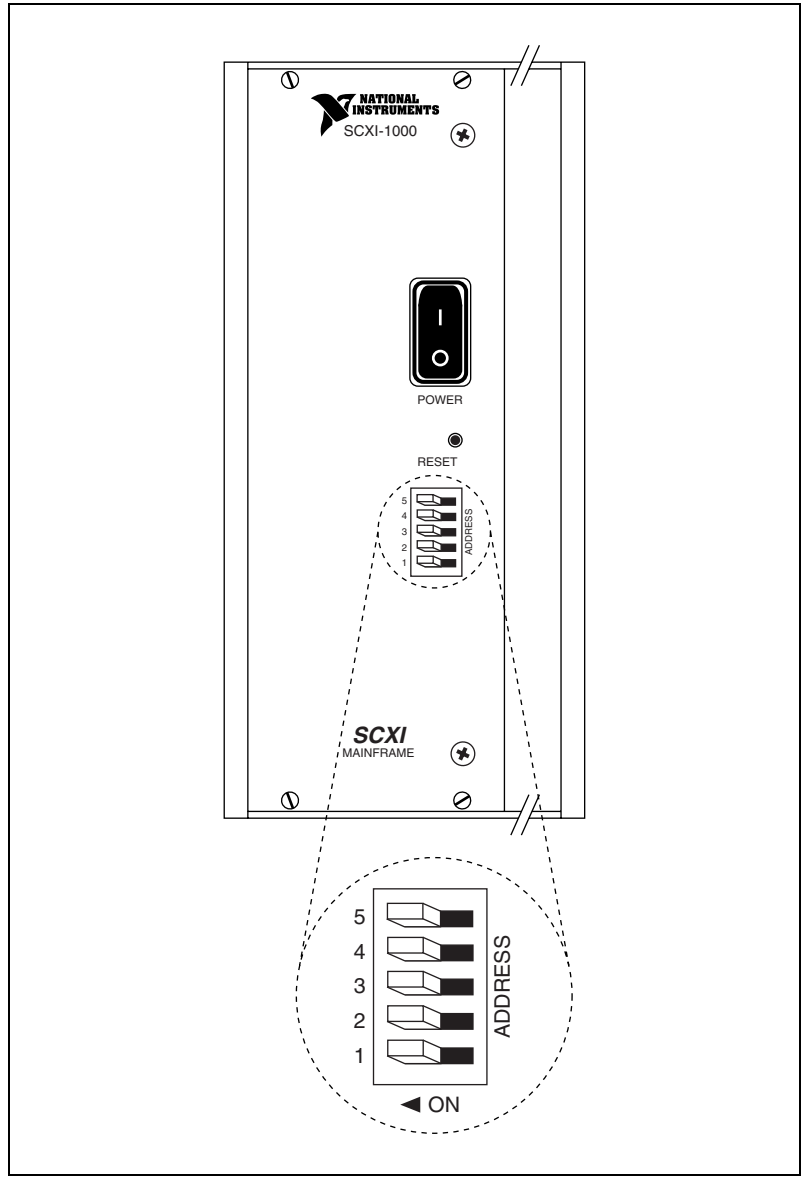


Figure 7. Chassis Address Switches

Table 1 indicates the value each address switch represents when it is in either the on or off position.

Table 1. Address Switch Number for Each Switch Position

Address Switch Number	On Position	Off Position
5	16	0
4	8	0
3	4	0
2	2	0
1	1	0

For example, if switch numbers 1 and 3 are set in the on position and the others are not, the chassis address is 5.

$$1 + 0 + 4 + 0 + 0 = 5$$

After you have set a unique address for each chassis, plug in and turn on all the chassis in the system, and replace the plastic cover on the address switches.

Configuring the Multi-Chassis SCXI System

Once the system is connected and you have assigned addresses to each chassis, you need to configure and verify each chassis using MAX.

Note Make sure all the SCXI chassis are turned on. MAX does not recognize unpowered SCXI chassis.

1. Double-click the **Measurement & Automation Explorer** icon on your desktop.
2. Expand **Devices and Interfaces** by left-clicking the **+** symbol. You should see your DAQ device name and number in the list.

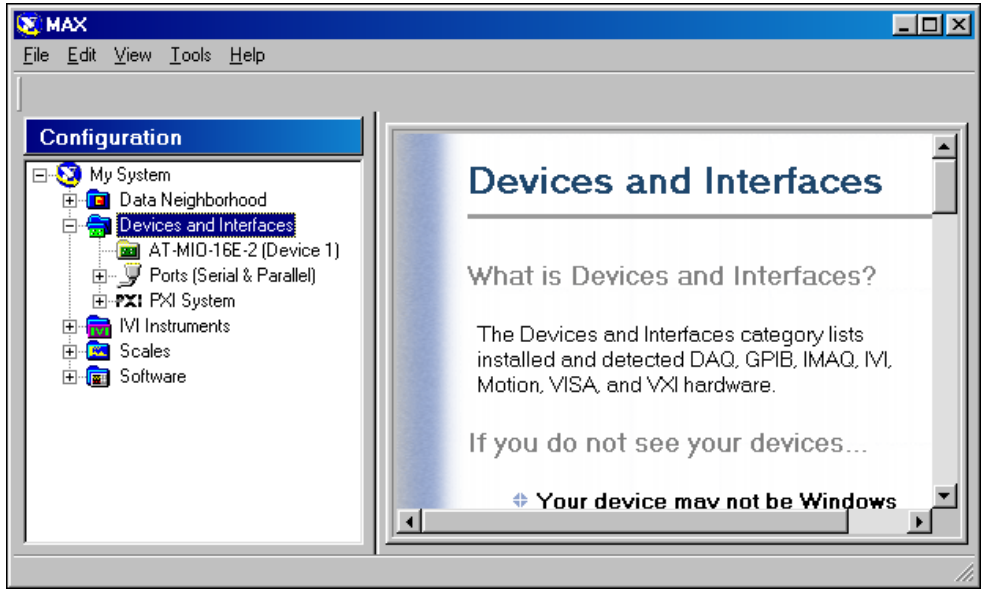


Figure 8. Devices and Interfaces Window

Note If your device does not show up in the list, refer to the National Instruments website `ni.com/support` for troubleshooting tips.

3. Insert a new SCXI chassis (SCXI-1001 or SCXI-1000) under **Devices and Interfaces** by right-clicking over **Devices and Interfaces** and selecting **Create New** from the menu. This causes a window to appear with a list of devices and chassis types.
4. From this list, choose the SCXI chassis type that is cabled directly to the DAQ device.

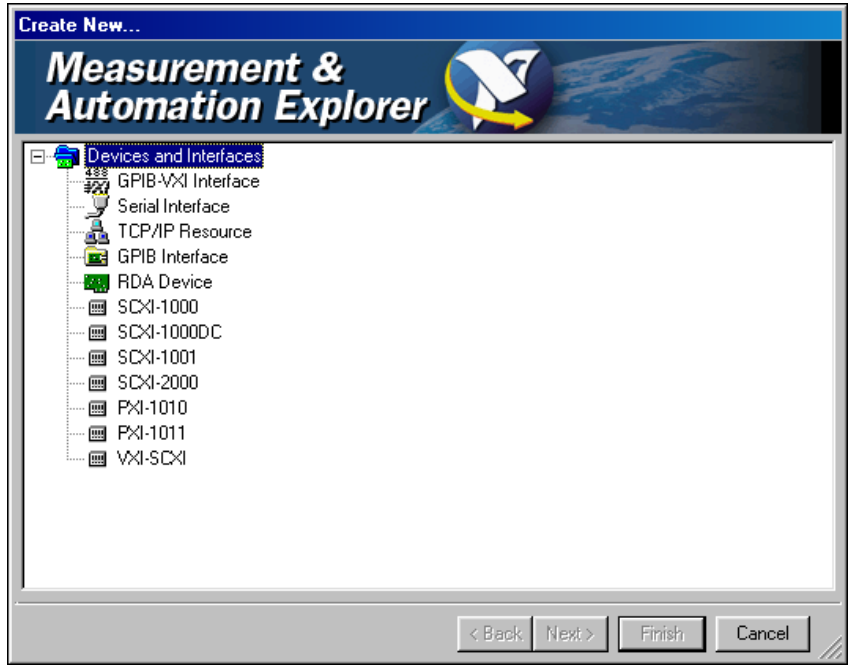


Figure 9. Choosing the Chassis Type

5. A window appears allowing you to choose the chassis ID and chassis address. Choose the lowest chassis ID available. The lowest chassis ID available is 1 if no other SCXI chassis are currently configured. For each subsequently cabled SCXI chassis, choose chassis ID values in ascending order from *n*.
6. Set the chassis address to the number that you set on the address switches on the particular SCXI chassis. Click **Next**.

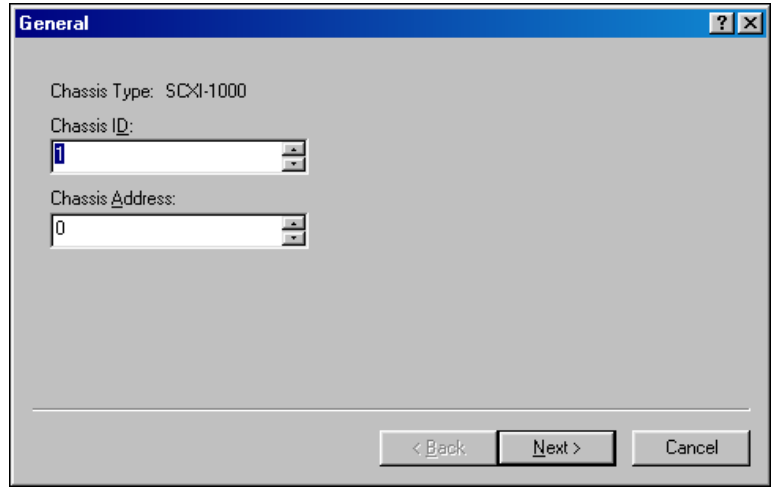


Figure 10. Setting the Chassis ID and Address

7. Choose **Yes** to allow the software to automatically detect the modules in the chassis. Click **Next**.

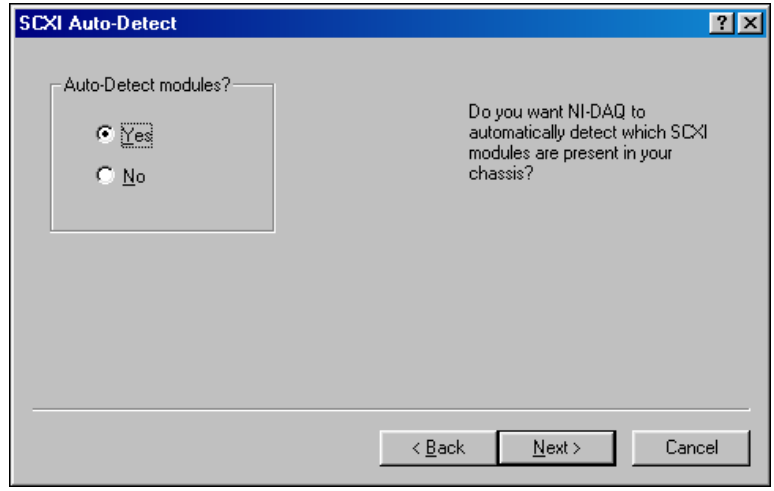


Figure 11. Auto-Detecting Modules

8. Choose the 68-pin E Series DAQ device you are using to communicate with the SCXI chassis, and click **Next**.

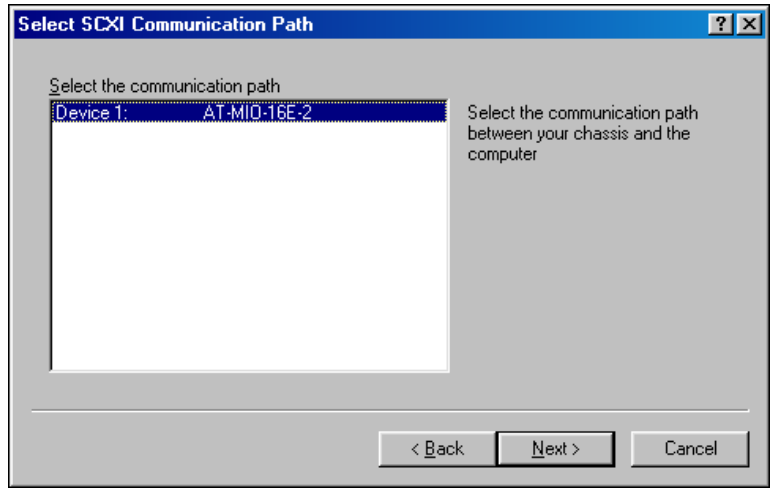


Figure 12. Selecting the DAQ Device

9. The next window shows the modules that were detected in the SCXI chassis. From the list, select the module that is cabled to the SCXI chassis cable adapter. Selecting this module allows it to control the SCXI chassis.

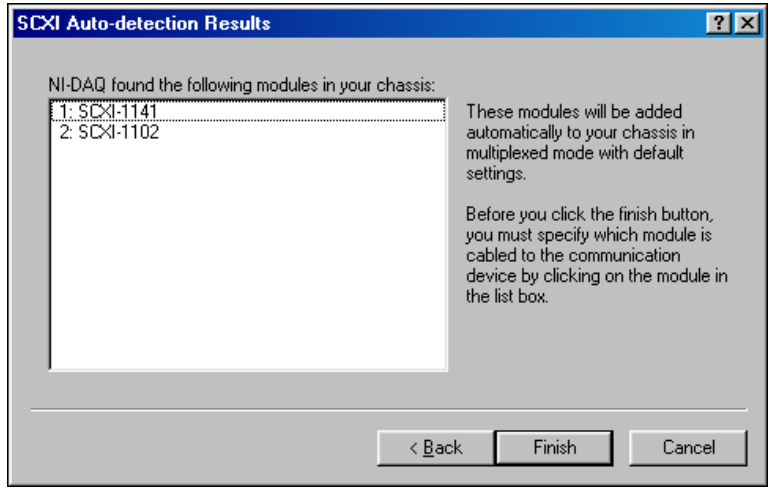


Figure 13. Selecting the Correct Module

10. Click **Finish**. The SCXI chassis that was added is listed under **Devices and Interfaces**.

11. Right-click the name of the SCXI chassis that was added, and choose **Test** from the menu. The following dialog box should appear.



Figure 14. Successful Test Window

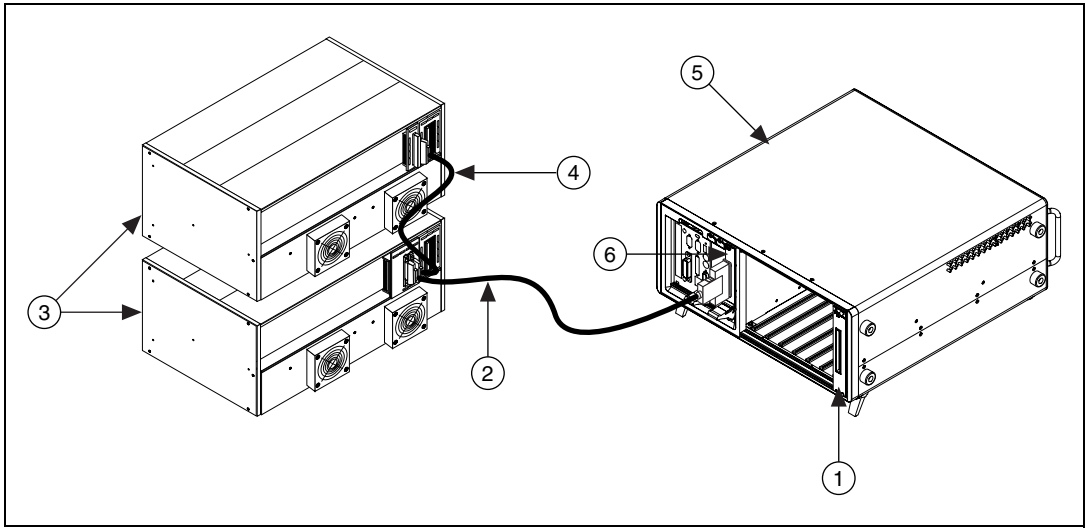
Note If the dialog box shown above does not appear, refer to the National Instruments website `ni.com/support` for troubleshooting tips.

12. Repeat steps 3 through 11 until every SCXI chassis in the system is shown under **Devices and Interfaces**.

Configuring a Multi-Chassis SCXI System with a PXI-1010 or PXI-1011 Chassis

When you use an external SCXI chassis with a PXI-1010 or PXI-1011 combination chassis, cable the SCXI chassis directly to the 68-pin connector located on the front of the PXI DAQ device that controls the internal SCXI chassis as shown in Figure 15. If you are using more than one external SCXI chassis, daisy-chain the SCXI chassis as shown in Figure 15 and configure them as outlined in *Configuring the Multi-Chassis SCXI System* with the following exceptions:

- PXI-1010/SCXI systems—Set the internal and external SCXI chassis ID and address in ascending order starting with the internal SCXI chassis and ending with the last external SCXI chassis (contains the SCXI-1349 cable adapter).
- PXI-1011/SCXI systems—The default setting of the internal SCXI chassis address is 0. Set the external SCXI chassis address(es) in ascending order starting with 1. The last external SCXI chassis (contains the SCXI-1349 adapter) has the highest address.



1	SCXI Module	4	Shielded Cable Connected to SCXI-1349 Cable Adapter
2	Shielded Cable Connected to SCXI-1346 Cable Adapter	5	PXI-1010 Combination Chassis
3	SCXI-1000 or SCXI-1001 Chassis	6	68-Pin PXI DAQ Device

Figure 15. Multi-Chassis System with a PXI-1011 and Two External SCXI Chassis

Addressing specific channels in a system with both SCXI chassis, and PXI-1010 or PXI-1011 combination chassis is slightly different than systems with only SCXI chassis and is covered in the *SCXI Chassis with PXI-1010 or PXI-1011 Chassis Systems* section.

Reading Channels from Multi-Chassis Systems

The following sections explain how to read channels from multi-chassis systems that use SCXI chassis exclusively and systems that use external SCXI chassis in conjunction with PXI-1010 or PXI-1011 combination chassis.

SCXI Chassis Systems

For LabVIEW, Measure, Visual Basic, and the MAX Test Panel, the channel string determines the sequence in which SCXI channels are scanned. In LabVIEW, an array of these channel strings configures multiple modules in the scan list. When the application program runs, the channel string is used for programming the channel information into the SCXI system. The format of the channel string is `obx ! scy ! mdz ! channels.`

obx is the onboard analog input channel on the DAQ device, with x representing a particular channel where the multiplexed channels are sent. Analog input channel 0 is used in a single-chassis system. In a multi-chassis or remote chassis system, however, the DAQ device channel x corresponds to chassis number *n*–1, where DAQ device channel x is used for scanning the *n*th chassis in the system.

scy is the SCXI chassis ID, where y is the number you chose when configuring your chassis.

mdz is the slot position where the module is located, with z being the particular slot number. The slots in a chassis are numbered from left to right, starting with 1.

Note The obx ! specifier is optional and causes the module and DAQ device gains to be set automatically to fit the input limits parameter. When this specifier is omitted, the default gain on the DAQ device, usually the lowest gain, is used.

The last parameter, **channels**, is the list of channels that are scanned for module z. It can have several formats:

- obx ! scy ! mdz ! **n**, where **n** is a single channel.
- obx ! scy ! mdz ! **n1:n2**, where **n1** and **n2** represent a sequential list of input channels, inclusive.
- obx ! scy ! mdz ! (**n1, n2, n3:n4, n1, n5, n2**), where **n1**, **n2**, and **n5** represent single channels, not necessarily sequential, and **n3** and **n4** represent the endpoints of a sequential list of channels, inclusive. In this case, channels **n1** and **n2** are explicitly repeated in the channel list.

Note Repeating channels out of sequence in a scan list (random scanning) is not supported in all SCXI modules. Please refer to your module user manual for information on this feature.

You have now connected and configured your multi-chassis SCXI system.

SCXI Chassis with PXI-1010 or PXI-1011 Chassis Systems

To address specific SCXI channels in an SCXI system that uses PXI-1010 or PXI-1011 combination chassis refer to the addresses shown in Figure 16 while doing the following:

1. Address the internal chassis as ob0 ! scy ! mdz ! **channels**.
2. Address the external chassis that is cabled directly to the PXI DAQ device front connector as ob0 ! scy+1 ! mdz ! **channels**.

3. Address each subsequent chassis in ascending order as `obn-1 ! scy+n ! mdz ! channels` where *n* is the number of external SCXI chassis.

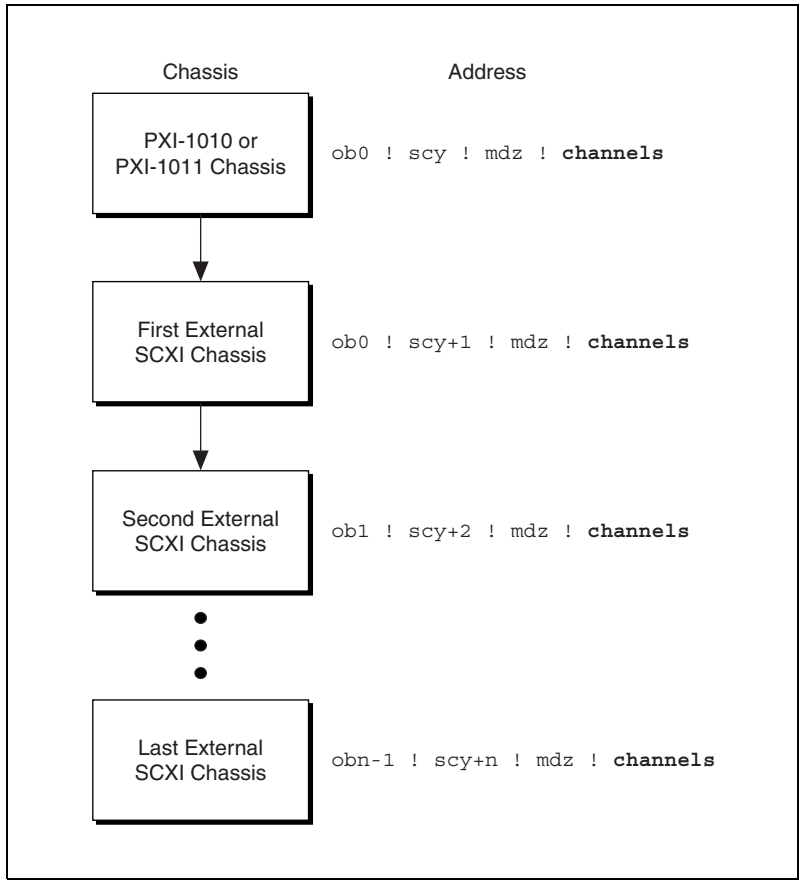


Figure 16. Multi-Chassis PXI-1010/1011 with External SCXI System Addressing

Note The internal SCXI chassis and the external SCXI chassis that is cabled directly to the PXI DAQ device front connector both use `ob0`. In this case, `scy`, uniquely specifies the SCXI chassis with which communication takes place.

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