

1769 CompactLogix Packaged Controllers



Quick Start and User Manual

**(Catalog Numbers 1769-L23E-QB1B, 1769-L23E-QBFC1B,
and 1769-L23-QBFC1B)**

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

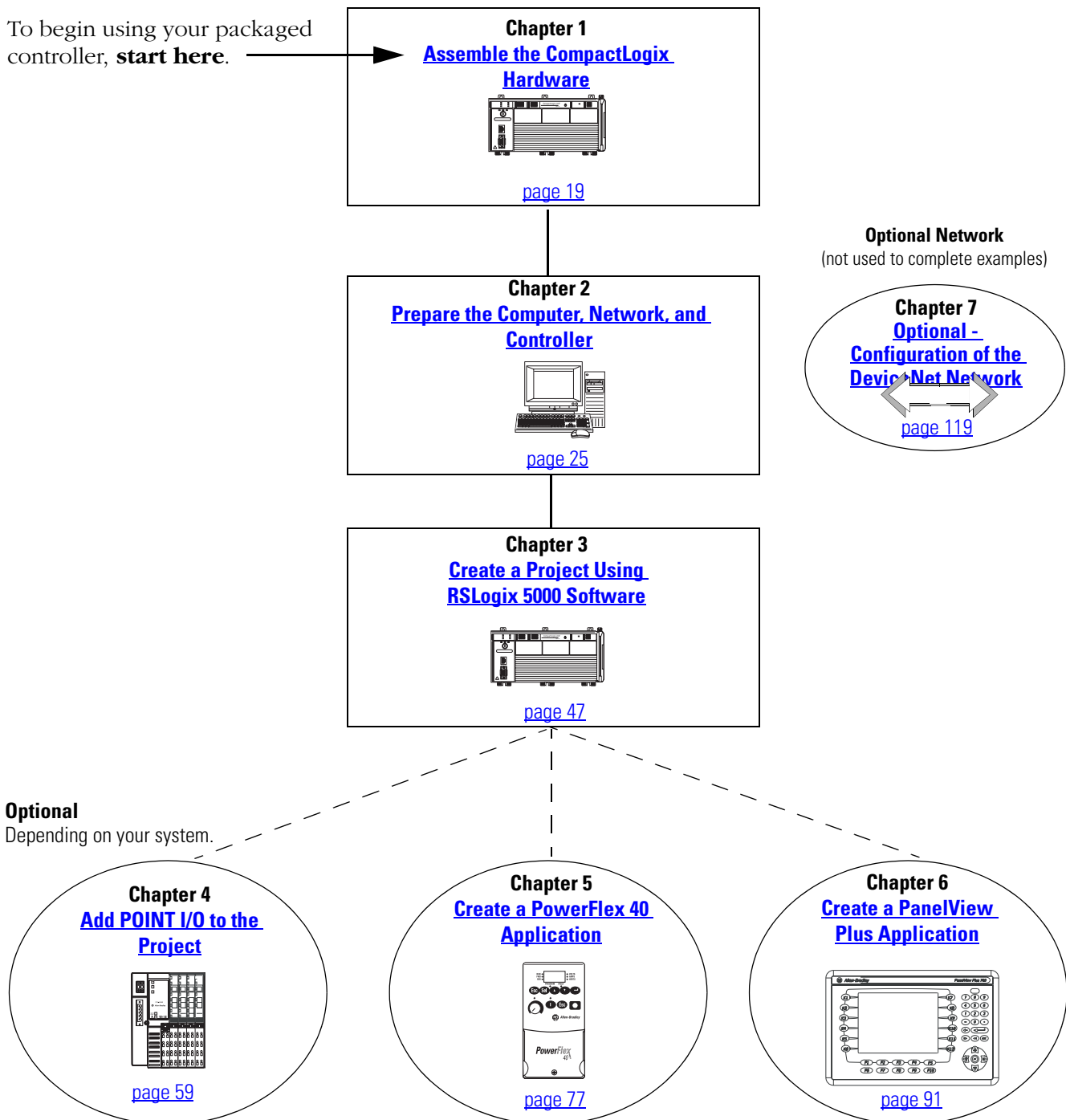
WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence
SHOCK HAZARD 	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

Allen-Bradley, CompactLogix, Compact I/O, Data Highway II, Data Highway Plus, FactoryTalk, FactoryTalk View Studio, Logix5000, NetLinx, MicroLogix, PanelView Plus, POINT I/O, PLC-5, PowerFlex 40, RSLinx, RSLinx Classic, RSLinx Enterprise, RSLogix 5000, RSNetWorx, RSNetWorx for EtherNet/IP, RSNetWorx for DeviceNet, Rockwell Automation, SLC 500, SLC 5/03, and TechConnect are trademarks of Rockwell Automation, Inc.

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For general information about your packaged controller start with the User Manual on [page 139](#).

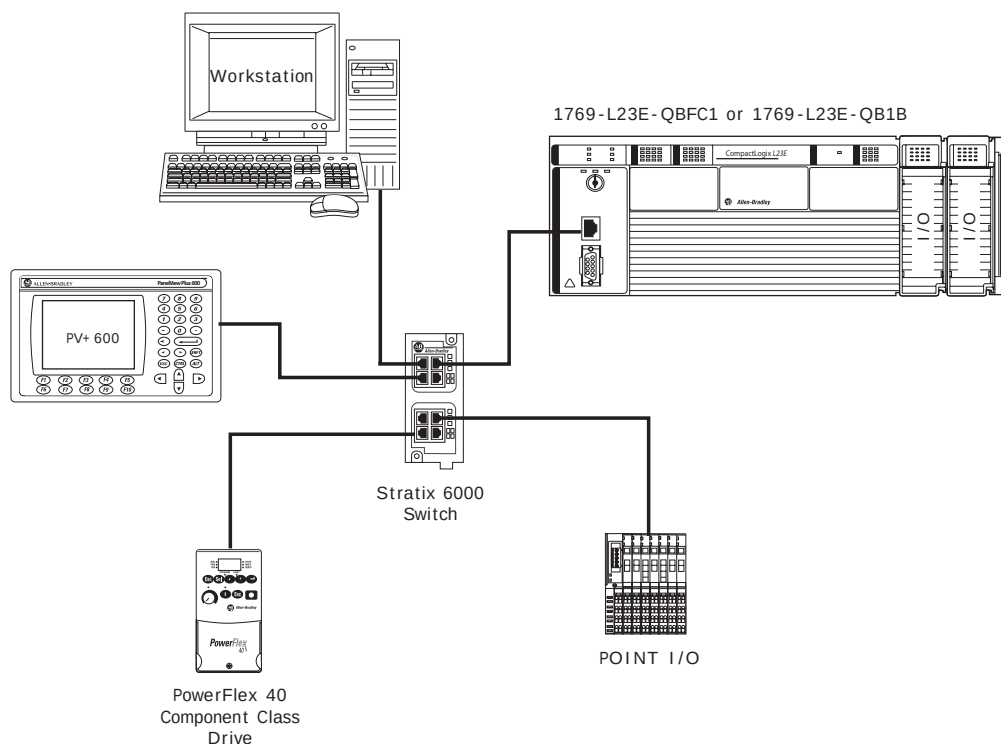
To begin using your packaged controller, **start here**.



Configurations for Quick Start

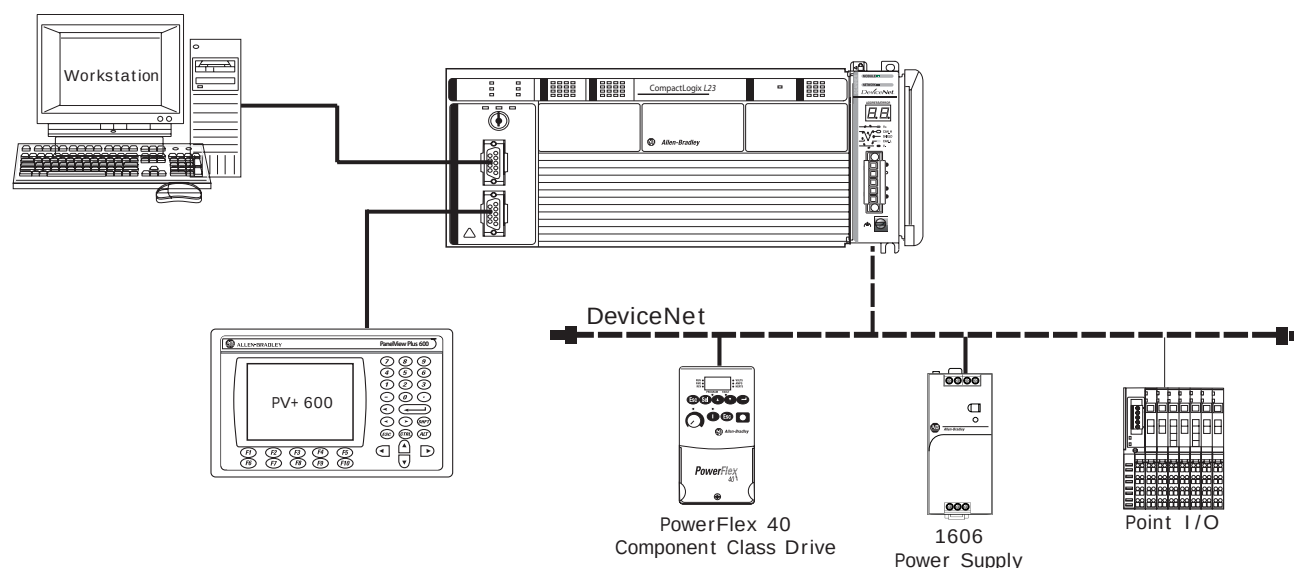
This quick start demonstrates the use of this hardware and network configuration.

Option 1: 1769-L23E Packaged Controller with an EtherNet/IP Network



An Ethernet switch other than the Stratix 6000 switch may be used. For this quick start, the Stratix 6000 switch is recommended.

Option 2: 1769-L23-QBFC1B Packaged Controller with a Serial Network⁽¹⁾



This option shows an example DeviceNet network that could be configured using the chapter Optional - Configuration of the DeviceNet Network (on [page 119](#)). While that chapter provides a brief description of how to use a DeviceNet network with a 1769-L23 packaged controller, full details for using a DeviceNet network with any Logix5000 controller are contained in the DeviceNet Modules in Logix5000 Control Systems User Manual, publication [DNET-UM004](#).

Once you have selected your configuration, use the Parts List on [page 15](#) to determine what hardware you need.

If you already have your hardware, proceed to Chapter 1, Assemble the CompactLogix Hardware, on [page 19](#).

⁽¹⁾

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	For information about the CompactLogix packaged controller status indicators or specifications , see the CompactLogix Packaged Controller Installation Instructions, publication 1769-IN082 .	

About This Quick Start

This quick start provides examples and procedures for the use of a CompactLogix packaged controller system. The procedures cover many of the most common user tasks, such as:

- connecting the controller to multiple devices (local and distributed I/O, a drive, and a PanelView Plus terminal).
- connecting and configuring networks (EtherNet/IP, DeviceNet, and serial) for use with CompactLogix systems.
- creating and monitoring controller programs.

The examples are designed to get devices installed and communicating with each other in the simplest way possible. The programming examples are not complex, and offer easy solutions to verify that devices are functioning and communicating properly.

The beginning of each chapter contains the following information. Read these sections carefully before beginning work in each chapter:

- **Before You Begin** - This section lists the steps that must be completed and decisions that must be made before starting that chapter. The chapters in this quick start do not have to be completed in the order in which they appear, but this section defines the minimum amount of preparation required before completing the current chapter.
- **What You Need** - This section lists the tools that are required to complete the steps in the current chapter. This includes, but is not limited to, hardware and software.
- **Follow These Steps** - This illustrates the steps in the current chapter and identifies which steps are required to complete the examples for specific networks or configurations.

Also, additional resources, such as websites, technical notes, and other Rockwell Automation publications are listed in the Additional Resources tables at the end of each chapter.

Required Software

Your software requirements depend upon the CompactLogix system components you are using. Use the sections below to determine the software required for your system components.

CompactLogix Packaged Controller Software Requirements

To complete any of the examples in this quick start, you need one of these editions of RSLogix 5000 software, version 17:

- Lite
- Mini
- Full
- Standard
- Professional

You install and use these utilities included with the RSLogix 5000 software to complete the examples in this quick start:

- BootP-DHCP server
- ControlFlash
- RSLinx Classic, version 2.54 or later

Verify that these utilities are included with your RSLogix 5000 software package.

POINT I/O and PowerFlex 40 Drive Software Requirements

If you are using POINT I/O or a PowerFlex 40 drive to complete examples in this quick start, only the software listed for the CompactLogix packaged controllers is required.

PanelView Plus Terminal Software Requirements

If you plan to complete the PanelView Plus examples within this quick start, FactoryTalkView Machine Edition software is required in addition to the software required for the use of the packaged controller.

DeviceNet Network Software Requirements

If you plan to use a DeviceNet network with your packaged controller, this software is required:

- RSNetWorx for DeviceNet
- DeviceNet Tag Generator (included with RSLogix 5000 software)

Parts List

This table lists the hardware used in this quick start. The hardware you need depends on the options and examples you choose to complete. Specific hardware requirements are listed at the beginning of each chapter.

✓	Quantity	Cat. No.	Description
General Configuration			
	1	1769-L23E-QB1B, 1769-L23E-QBFC1B, or 1769-L23-QBFC1B	CompactLogix Packaged Controller
	1	1769-ECR	Compact I/O Right End Cap/Terminator (included with packaged controller)
	1	1734-IB4 ⁽¹⁾	POINT I/O 4 Sink Input Module
	1	1734-OB4E ⁽²⁾	POINT I/O 4 Protected Output Module
	1	1734-OE2C ⁽¹⁾	POINT I/O 2 Current Output Analog Module
	1-3	1734-TB ⁽³⁾	Wiring Base w/ Removable IEC Screw Terminals
	1	1794-PS13	FLEX I/O 85...264V AC to 24V DC 1.3 A Power Supply
	1	22B-V2P3N104	PowerFlex 40 Drive
	1	22B-CCB	PowerFlex 40 Communication Adapter Cover
	1	2711P-T6C20A	PanelView Plus 6-inch Color Keypad Terminal with EtherNet/IP and RS-232 Networks
	1	1794-PS3 or 2711P-RSACDIN	Flex I/O Power Supply or Other General-use Power Supply to supply 70 W DC power to PanelView Plus (if DC power is required for your terminal)
	2	1756-CP3	RS-232 Cable
	1	2706-NC13	PanelView Plus Serial Cable
	2...3	N/A	DIN Rail (steel not aluminum)
	1	1606-XLS80E	DC Power Supply
EtherNet/IP Configuration			
	1	1734-AENT	POINT I/O EtherNet/IP Adapter
	1	22-COMM-E	EtherNet/IP Adapter for Use With the PowerFlex 40 Drive
	1	1783-EMS08T	Stratix 6000 Ethernet Switch (recommended), Stratix 2000 Ethernet Switch (for applications without remote I/O), or other Ethernet Switch
	6	1585J-M8	Industrial-grade Ethernet Cables ⁽⁵⁾ or Other Standard Ethernet Cables
Serial Configuration			
	1	1756-CP3	RS-232 cable
	1	2706-NC13	Point-to-point RS-232 Cable (required with 1769-L23-QBFC1B packaged controllers, optional with 1769-L23E packaged controllers)

✓	Quantity	Cat. No.	Description
DeviceNet Configuration			
	1	1769-SDN	Compact I/O DeviceNet Scanner
	1	1734-ADNX ⁽⁴⁾	POINT I/O DeviceNet Adapter
	1	22-COMM-D	DeviceNet Adapter for Use with the PowerFlex 40 Drive
	1	1606-XLDNET8	DeviceNet Power Supply
	N/A	1485C-P1E75	KwikLink Flat Cable
	2	1485A-T1E4	KwikLink Terminator/Resistor
	4	1485P-P1E4-R5	KwikLink Sealed Micro Connector
	4	1485K-P1F5-C	KwikLink Right-angle Male to Cable
	1	1485T-P1E4-B1	KwikLink Power Tap Module

⁽¹⁾ Use POINT I/O modules at series C or later to complete examples in this quick start.

⁽²⁾ The 1734-OB4E module is the only POINT I/O module used in this quick start. The other modules are added only as examples and are not required.

⁽³⁾ The number of wiring bases you need depends upon the number of POINT I/O modules you use in your system.

⁽⁴⁾ The examples in this quick start use the 1734-ADNX POINT I/O adapter. However, you may choose to use the 1734-ADN adapter instead.

⁽⁵⁾ For more information about industrial grade cables, see the Ethernet Connectivity product profile, publication [1585-PP001](#).

Conventions

This manual uses the following conventions.

Convention	Meaning	Example
bold	Bold text denotes menus, menu items, buttons, or options.	Click OK .
Check/uncheck	Click to activate/deactivate a checkbox.	Check the Open Module Properties checkbox.
Click	Click left mouse button once. (Assumes cursor is positioned on object or selection.)	Click Browse .
Courier font	Type or enter text exactly as shown.	Type cmd.
Double-click	Click left mouse button twice in quick succession. (Assumes cursor is positioned on object or selection.)	Double-click the H1 icon.
Expand	Click the + to the left of a given item /folder to show its contents.	In the H1-1 window, expand the FFLD.
Right-click	Click right mouse button once. (Assumes cursor is positioned on object or selection.)	Right-click the Fieldbus Networks icon.
Select	Click to highlight a menu item or list choice.	Select Properties from the pull-down menu.
>	Shows nested menu selections as menu name followed by menu selection.	Click File > Page Setup > Options .

Additional Resources

Resource	Description
1769 CompactLogix Controllers Selection Guide, publication 1769-SG001	Provides information and specifications for consideration when selecting CompactLogix controllers and software.
1769 Compact I/O Selection Guide, publication 1769-SG002	Provides information and specifications for consideration when selecting I/O modules for use with the CompactLogix system. It includes Compact I/O, POINT I/O, and FLEX I/O modules.
NetLinx Selection Guide, publication NETS-SG001	Provides information and specifications for consideration when selecting a network to use and which hardware and cables you need.
EtherNet/IP Media Planning and Installation Manual, publication ENET-IN001	Provides information about how to select and install your EtherNet/IP network physical media.
Ethernet Connectivity Product Profile, publication 1585-PP001	Provides information specific to the industrial-grade Ethernet Connectivity products, including RJ45 cables, offered by Rockwell Automation.

Publications are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Assemble the CompactLogix Hardware

In this chapter, you install your CompactLogix hardware packaged controller.

Before You Begin

Determine which of these networks and appropriate hardware to use:

- For the EtherNet/IP network (option 1), use either the 1769-L23E-QB1B or 1769-L23E-QBFC1B controller.
- For a serial connection (option 2), use the 1769-L23-QBFC1B controller.

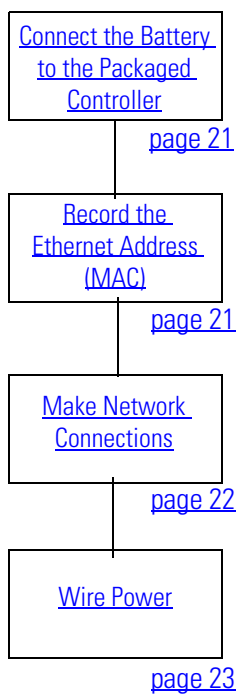
What You Need

- CompactLogix packaged controller: 1769-L23E-QB1B, 1769-L23E-QBFC1B, or 1769-L23-QBFC1B.
- CompactLogix controller battery: 1769-BA (included with your controller).
- Power supply: This quick start uses the 1606-XLS80E supply, but any DC power supply that meets the requirements for the 1769-L23 controllers may be used.
- Compact I/O end cap: 1769-ECR (included with your controller).
- Compact I/O DeviceNet scanner module: 1769-SDN (only if you are using a DeviceNet network).
- Network cable: Ethernet (1585J-M8 or similar), serial (1756-CP3).
- Stratix 6000 or other Ethernet switch.

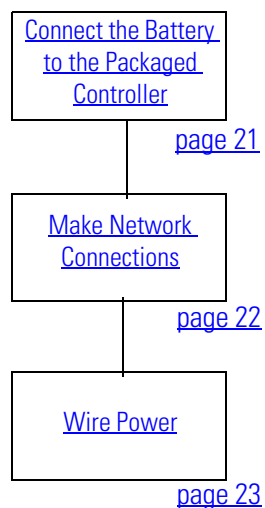
Follow These Steps

Complete the steps shown for your controller.

1769-L23E



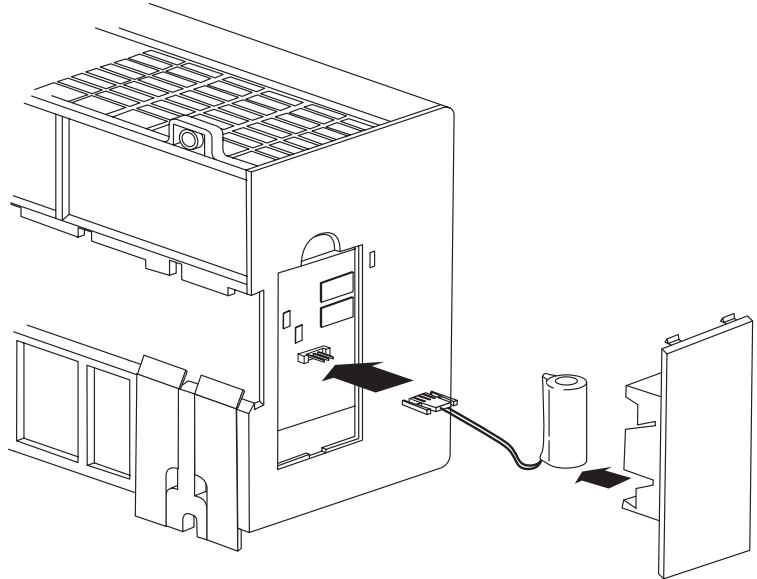
1769-L23



Connect the Battery to the Packaged Controller

Battery

1. Remove the battery door and connect the battery to the controller.
2. Insert the battery into the slot on the battery door.
3. Close the battery door.



Record the Ethernet Address (MAC)

1769-L23E controllers

The Ethernet address (MAC) is found on a label near the power-supply wiring terminal. This is an example address.

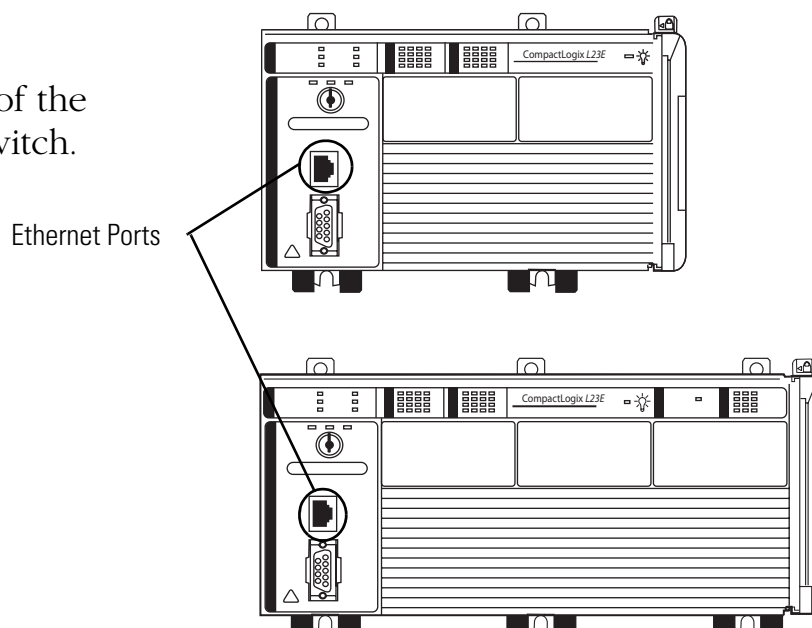
00:00:BC:21:D7:BE Ethernet Address

Record the Ethernet address (MAC) for the CompactLogix controller on the [Network Worksheet](#) at the back of this quick start. This address may be used to set the IP address later.

Make Network Connections

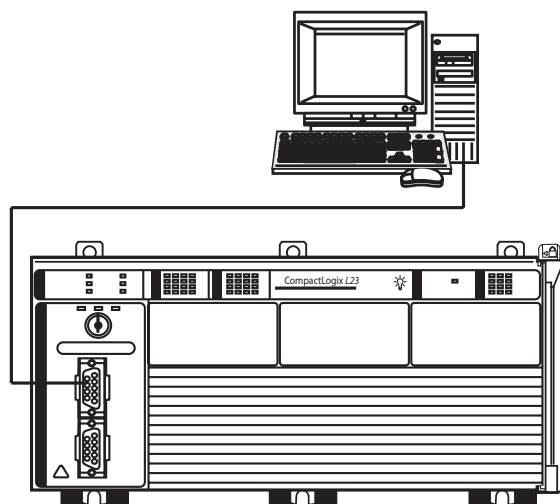
1769-L23E packaged controllers, option 1

1. Insert an Ethernet cable with an RJ45 connector.
2. Connect the other end of the cable to the Ethernet switch.



1769-L23 packaged controllers, option 2

1. Connect the 1756-CP3 cable to the channel 0 serial port on the controller.
2. Connect the other end of the cable to a COM port on the computer.



1769-L23-QBFC1B

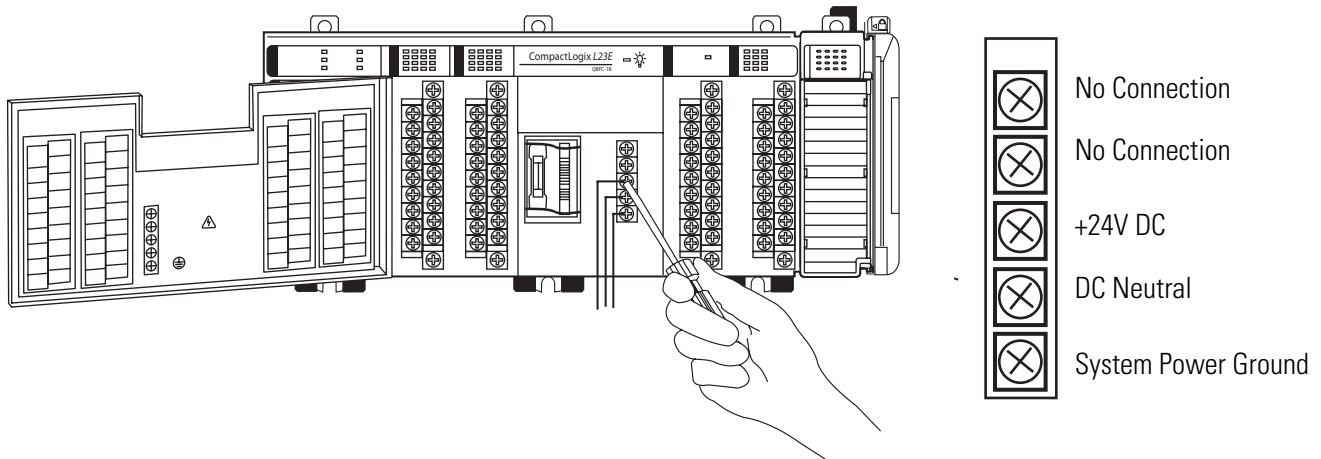
Wire Power

Power supply for all packaged controllers

WARNING

Verify that all incoming power is turned off before wiring power.

1. Insert the +24V DC, DC neutral, and ground wires and tighten the terminal screws.
2. Turn on incoming power.



Additional Resources

Resource	Description
Chapter 6 of the user manual, page 225	Provides detailed information about the use of the 1769-BA with the packaged controllers.
CompactLogix Packaged Controllers Installation Instructions, publication 1769-IN082	Provides details about assembling and mounting the controller and upgrading firmware as well as controller technical specifications.

Publications are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Prepare the Computer, Network, and Controller

In this chapter, you configure network communication on your computer and install the necessary programming and configuration software.

In this chapter, you also assign IP addresses to devices on an EtherNet/IP network. For more information about using the packaged controllers on an EtherNet/IP network, see Chapter 2 of the user manual, titled Network Communication ([page 151](#)).

Before You Begin

- Verify that your computer meets the software's system requirements for your edition of RSLogix 5000 software.

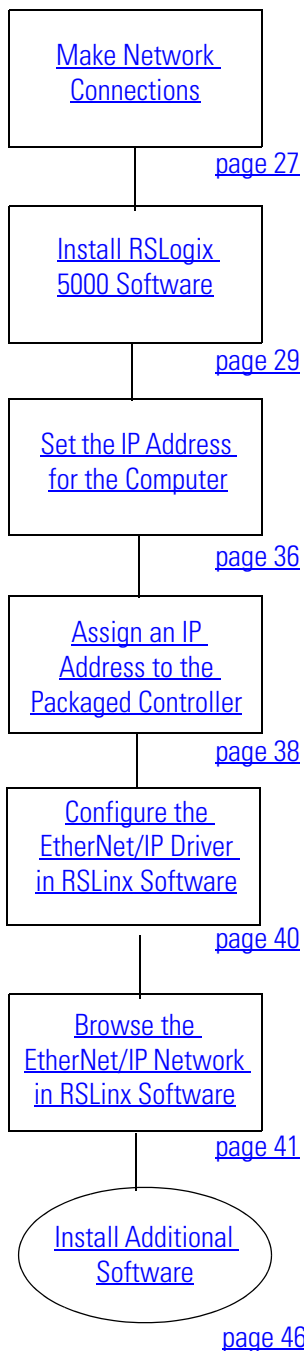
What You Need

- RSLogix 5000 software (see the Preface for version and edition information).
- ControlFlash software (packaged with RSLogix 5000 software).
- RLinux Classic software, version 2.54 or later (packaged with RSLogix 5000 software).
- BOOTP/DHCP server utility (packaged with RSLogix 5000 software).
- The computer needs a Network Interface Card (NIC) and its associated Windows driver installed (the NIC and driver are standard on most computers).
- An Ethernet Address (MAC) for each device. You recorded these addresses in the [Network Worksheet](#) on the back cover.
- A planned IP Address for each device. If you are using an isolated network, determine a numbering convention for your IP addresses. Record these addresses on the [Network Worksheet](#) inside the back cover.

Follow These Steps

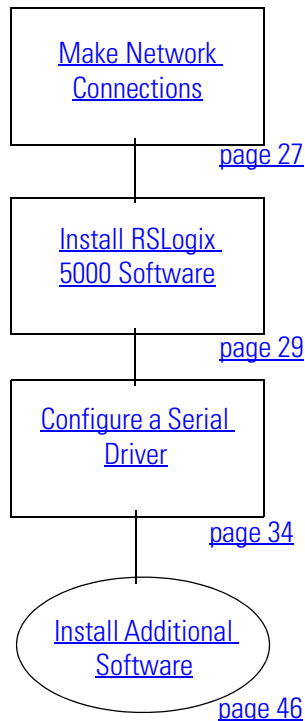
Complete these steps.

EtherNet/IP



Optional
Install additional software specific to your system.

Serial



Optional
Install additional software specific to your system.

Terminology

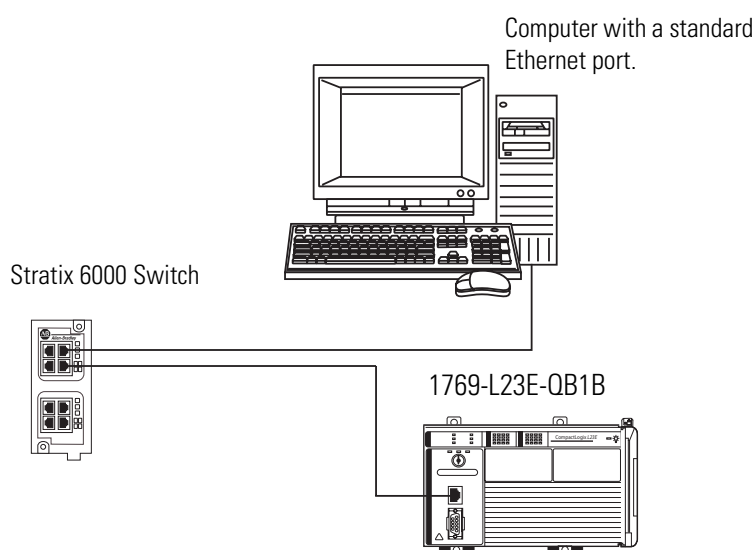
Ethernet networks use these types of addresses.

Term	Definition
Ethernet Address	Each Ethernet device has a unique Ethernet address (sometimes called a MAC address). The address appears as twelve digits separated by colons (for example, xx:xx:xx:xx:xx:xx). It is usually on a label on the device itself. Each digit is a number in hexadecimal (0 to 9 or A through F). No other device in the world will have the same address, and it can not be changed. You use the Ethernet address to identify a device so you can assign it an IP address.
IP Address	In addition to the Ethernet address, an IP address identifies a node on an Ethernet network. The IP address can be manually set, or you can use special software to automatically assign it. An IP Address consists of four decimal integers separated by periods (xxx.xxx.xxx.xxx). Each xxx is a decimal value from 0...255. For example, an IP Address could be 192.168.1.092. The selection of IP Addresses is beyond the scope of this quick start, so please contact your network administrator or use the ones provided in the examples. Once you set an IP address for a device, you generally reference the device by its IP address. The examples in this quick start use IP Addresses to define communication paths to the devices.

Make Network Connections

Required for option 1

1. Connect one end of the Ethernet cable to the computer.
2. Connect the other end to the Ethernet switch

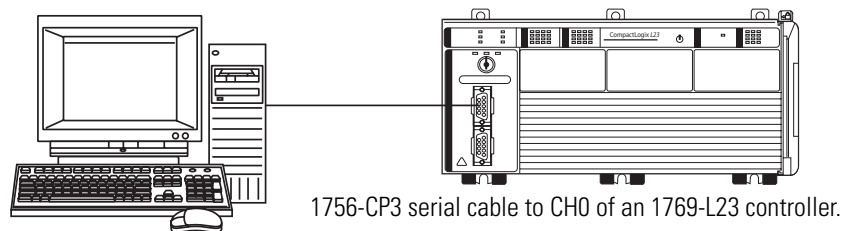


Serial connection - Required for option 2

TIP

If you are using an 1769-L23E packaged controller, you may choose to upgrade your controller firmware by using your Ethernet connection instead. If you use the Ethernet connection, you do not have to make this serial connection.

Verify that you connected a 1756-CP3 cable to a COM port on the computer and to the CH0 port on the controller as described in Chapter 1.



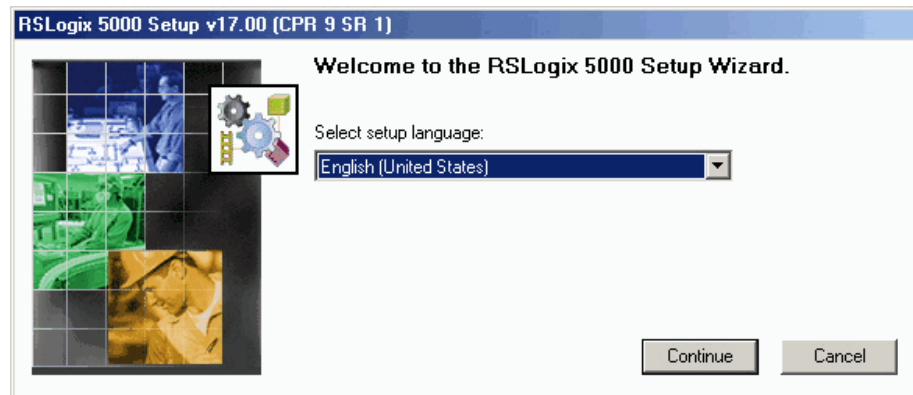
This connection will be used to update the controller firmware later in this chapter.

Install RSLogix 5000 Software

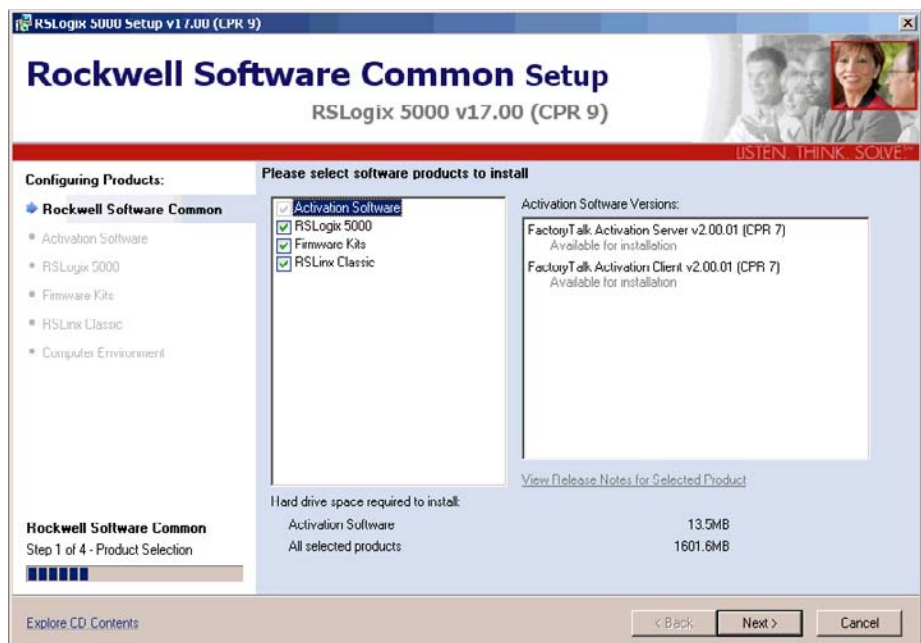
Required for all controllers

Throughout the installation, click **Next** to use default RSLogix 5000 installation settings except when indicated in the steps below.

1. Begin the RSLogix 5000 software installation.
2. Choose your language and click **Continue**.



3. Accept the default software products for installation and click **Next**.



4. Enter your user name, organization, and software serial number, then click **Next**.

Please enter the following information

User Name:

Organization:

Serial Number:

5. Accept the license agreement and click **Next**.

6. Click **Next** to install the program files to the default directory.

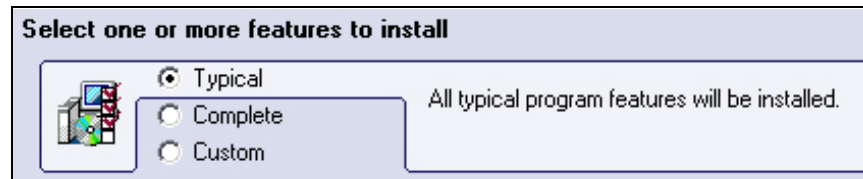
7. Select your activation type and click **Next**.

This quick start uses FactoryTalk Activation software to activate RSLogix 5000 software. For more information, see the FactoryTalk Activation FAQ, publication [FT00-FA001](#).

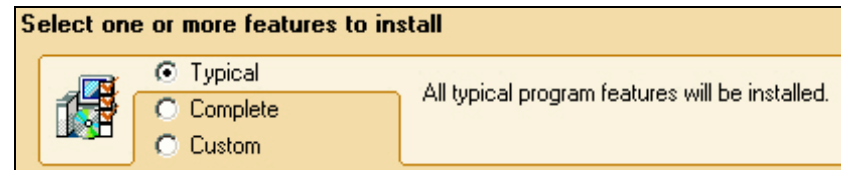
8. Click **Next** to install only the latest version of RSLogix 5000 software (version 17).

9. Verify that RSLogix 5000 Tools and Files is checked and click **Next**.

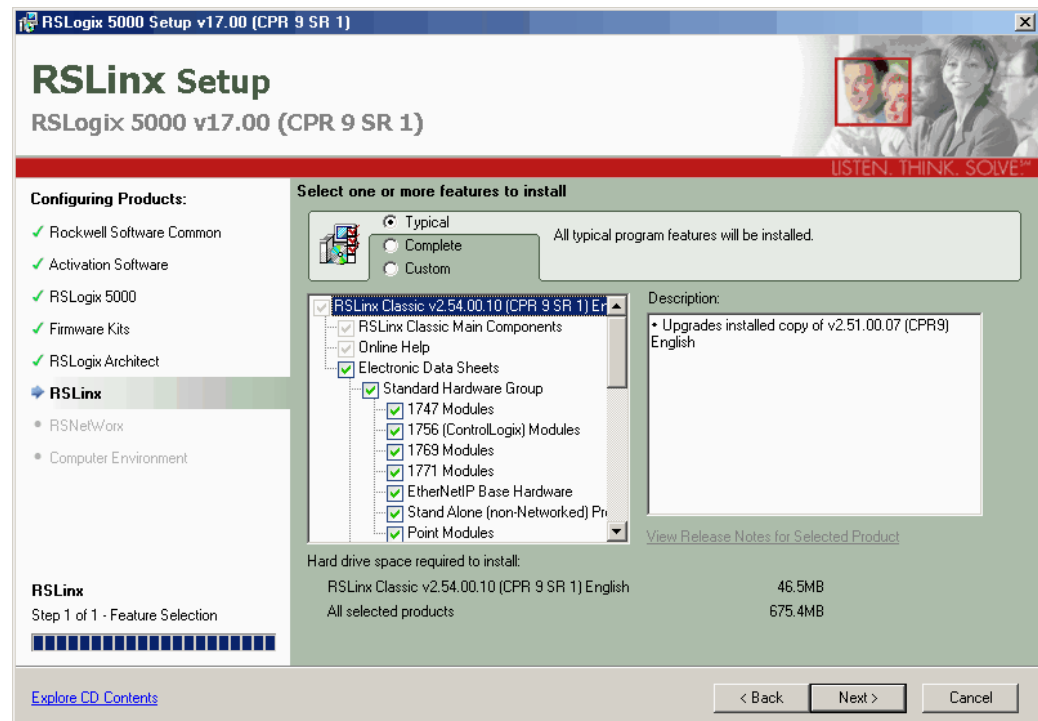
10. Click **Next** to install the typical firmware kits.



11. Click **Next** to install typical RSLogix Architect tools.

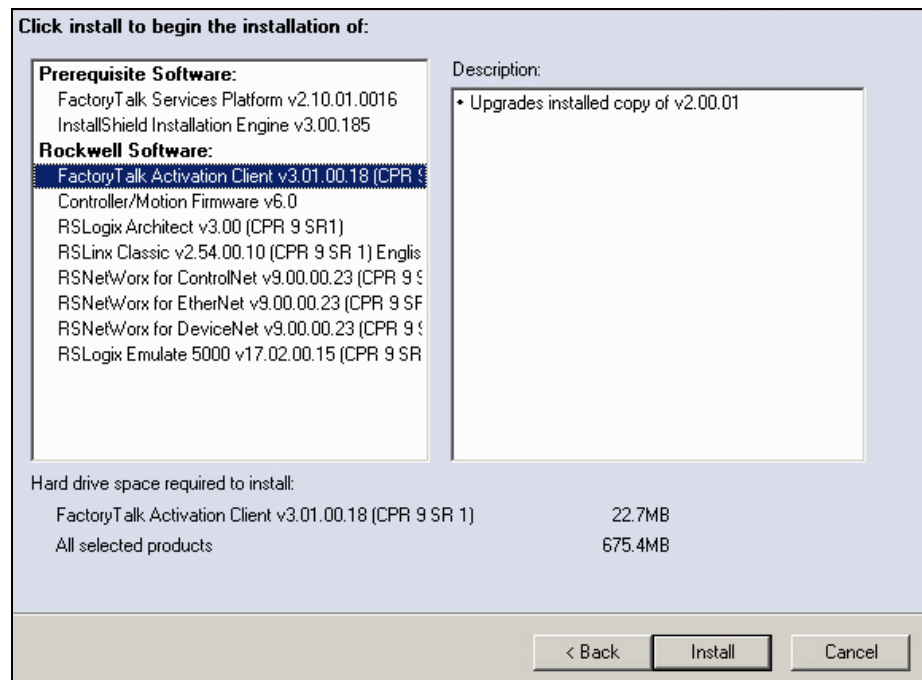


12. Click **Next** to install the typical set of EDS files and RSLinx software.



13. Click **Install** to complete the installation.

The installation dialog box displays progress while the software installs.

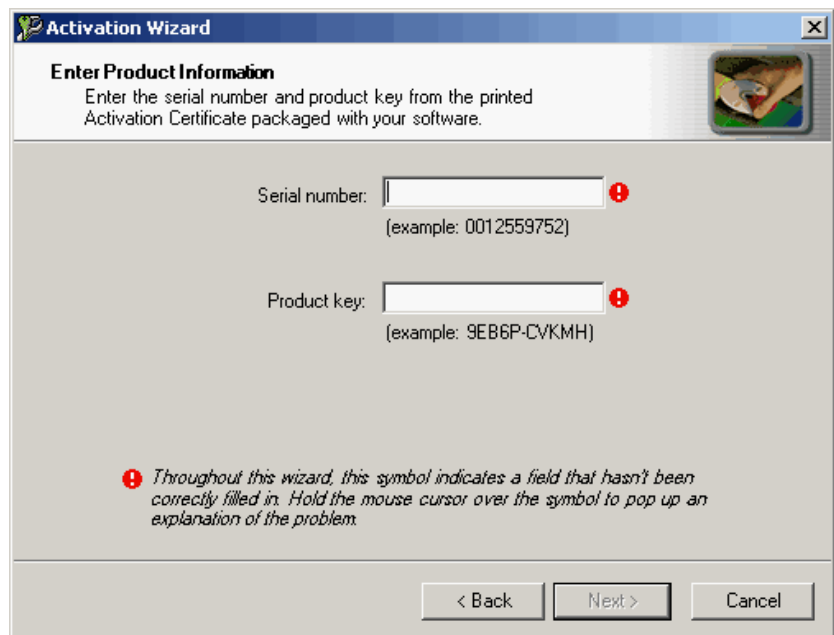


TIP

As the installation progresses, you may be prompted to complete additional set-up tasks depending on your system configuration. Follow those prompts and enter information as indicated in the dialog boxes to complete your installation.

After a few moments, the FactoryTalk Installation Wizard starts.

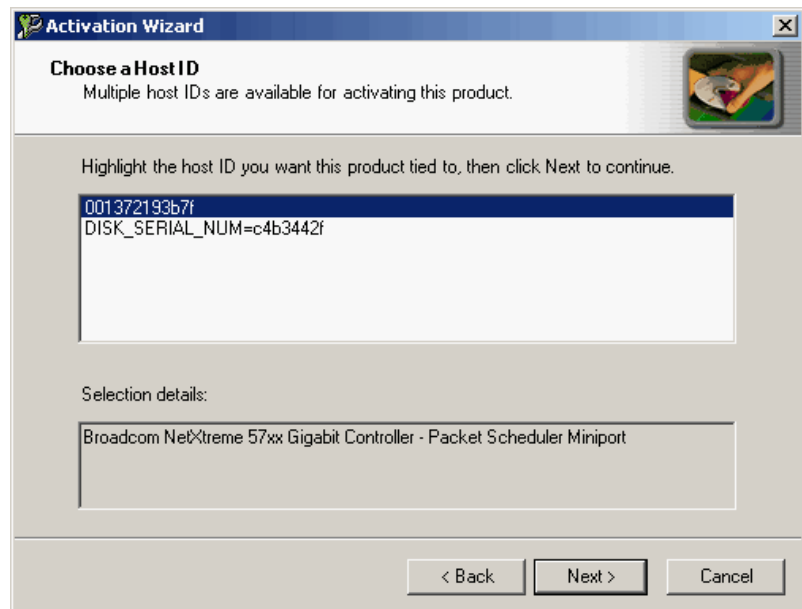
14. Click **Next**.
15. Enter the **Serial number** and **Product key** from the certification letter packaged with your software.
16. Click **Next**.



17. Select your host ID and click **Next**.

The activation completes if the computer is connected to the Internet.

If Internet access is not available, call Rockwell Automation Technical Support to complete your activation.

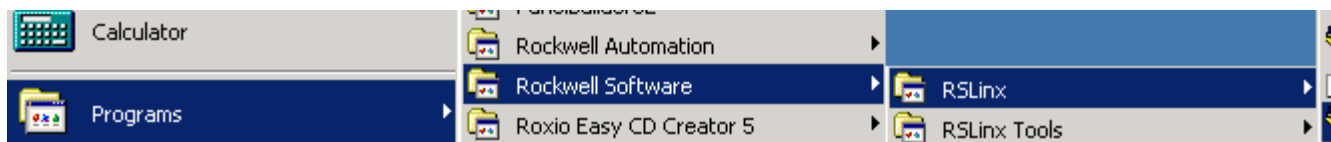


18. Click **Finish** to close the Activation Wizard.

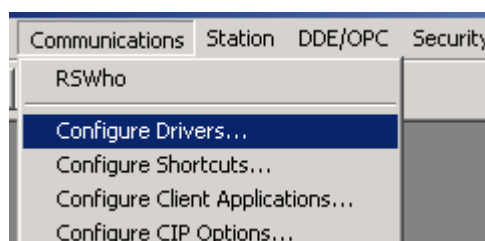
Configure a Serial Driver

Required for serial network (option 2)

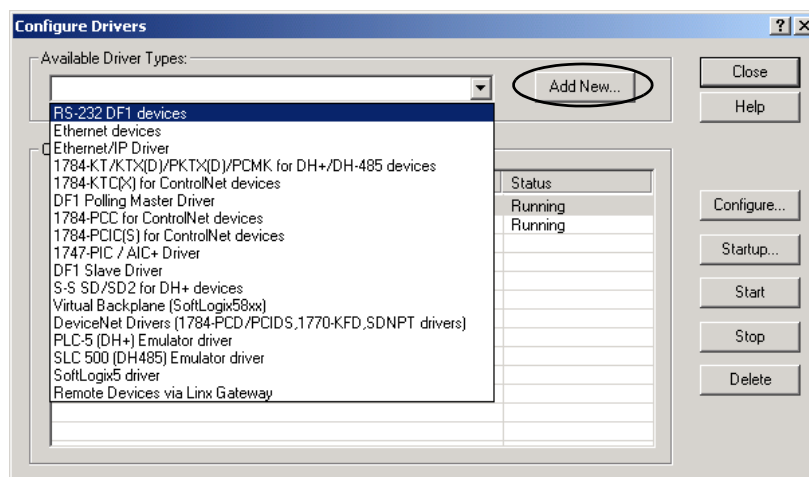
1. Launch RSLinx software.



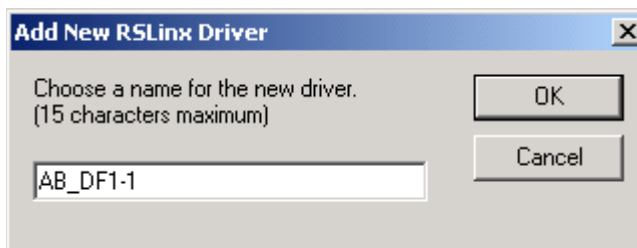
2. From the Communications menu, choose **Configure Drivers**.



3. Select **RS-232 DF1 devices**.

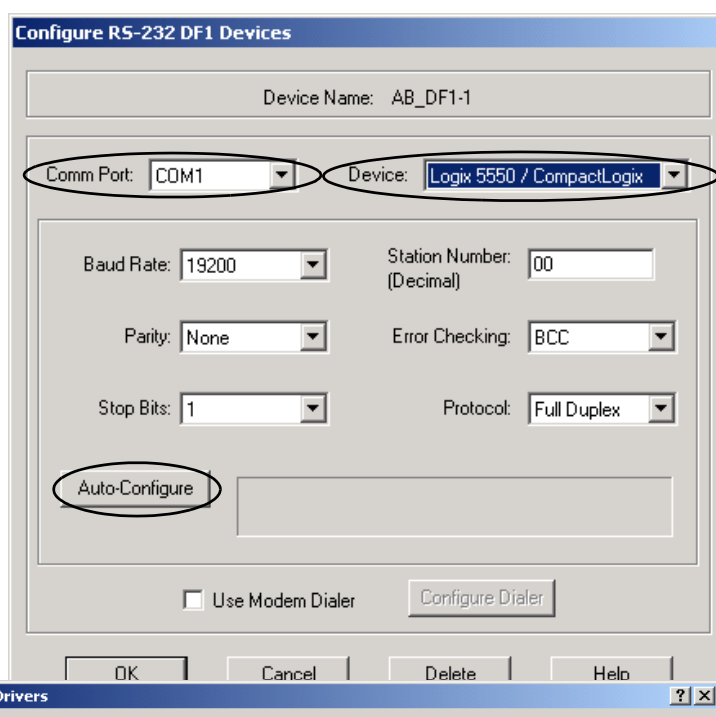


4. Click **Add New**.



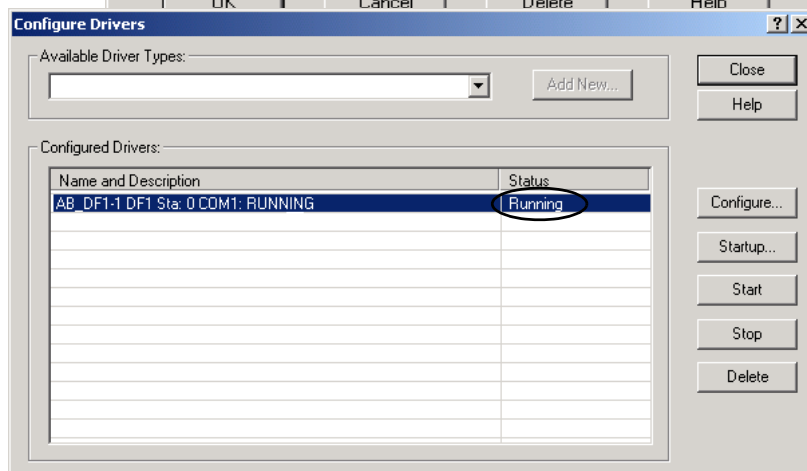
5. Click **OK** to keep the default name.

6. Select the Comm Port to which you connected the 1756-CP3 cable.
7. From the Device pull-down, select **Logix5550/CompactLogix**.
8. Click **Auto Configure**.
9. Click **OK**.



The Serial driver is added to the Configured Drivers list.

10. Verify that the Status of the driver is Running, and click **Close**.

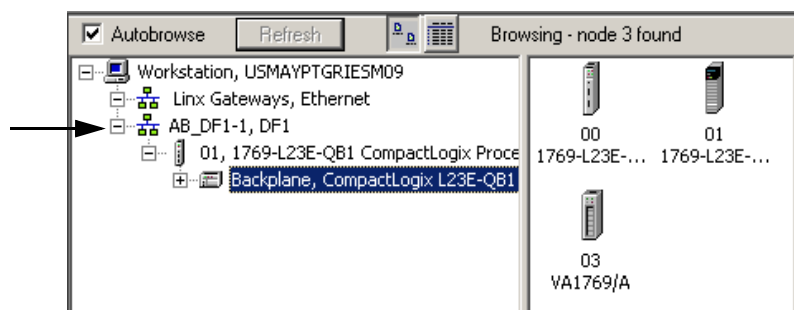


11. Click the **RSWho** icon to view the driver.



All of the configured, active drivers display.

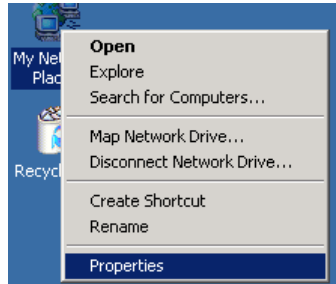
Expand the serial driver to see connected devices.



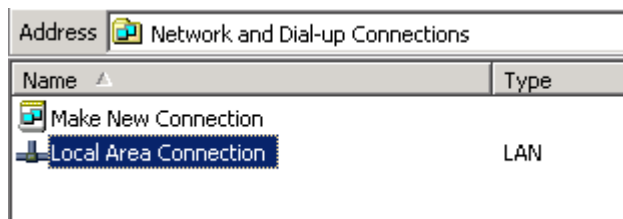
Set the IP Address for the Computer

Required for EtherNet/IP network (option1)

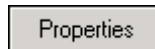
1. On your desktop, right-click **My Network Places** and choose **Properties**.



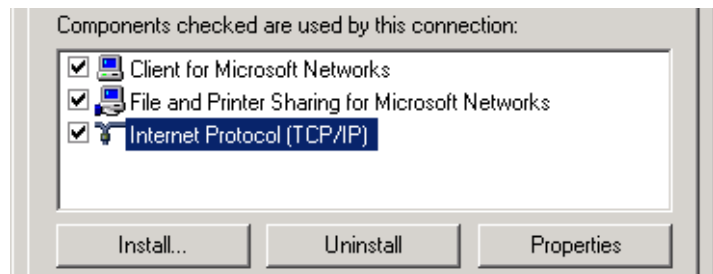
2. Double-click the Local Area Connection.



3. Click **Properties**.

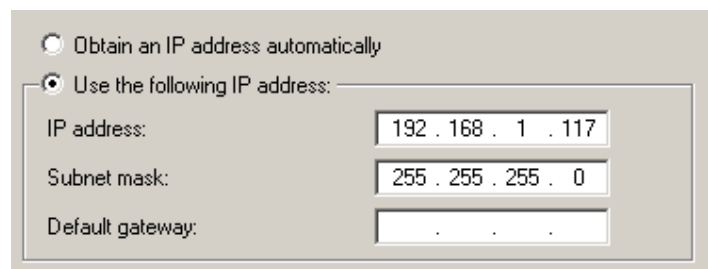


4. On the General tab, select **Internet Protocol (TCP/IP)** and click **Properties**.



5. Select **Use the following IP address** and enter an IP address and Subnet mask for your computer.

6. Click **OK**.



For more information about selecting an IP Address, see the information on [page 27](#).

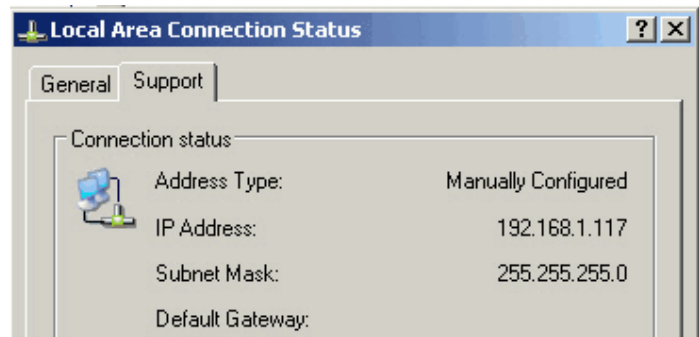
7. Record the IP address and subnet mask in the [Network Worksheet](#) inside the back cover.
8. Click **OK**.

9. Click the **Support** tab.



10. Verify that the IP Address and Subnet Mask match what you entered on the [Network Worksheet](#).

If these numbers do not match what you entered, contact your network administrator to verify that your IP address is correct.



11. Close the Local Area Connection Status dialog box.

Assign an IP Address to the Packaged Controller

1769-L23E packaged controllers

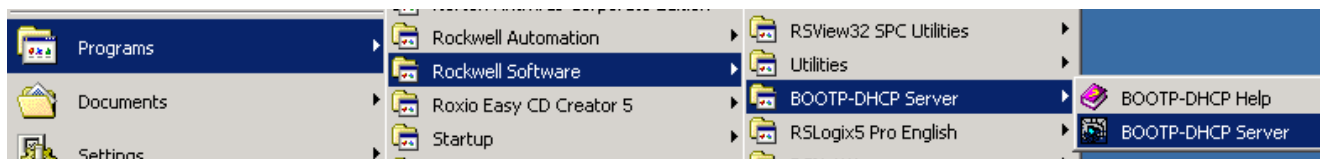
In this chapter, you use the BOOTP/DHCP server to assign an IP address to the packaged controller. You use the BOOTP server that you installed with RSLogix 5000 software.

TIP

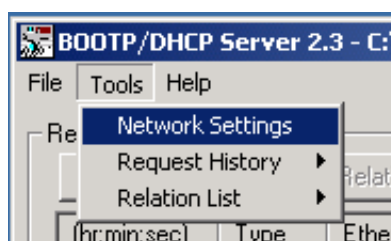
Devices on the EtherNet/IP network broadcast requests for IP addresses until the IP addresses have been assigned.

The procedure in this chapter uses the BOOTP server packaged with RSLogix 5000 software to assign IP addresses, however, any industry-standard BootP server can be used.

1. After you have installed and connected your packaged, launch the BOOTP/DHCP Server utility.

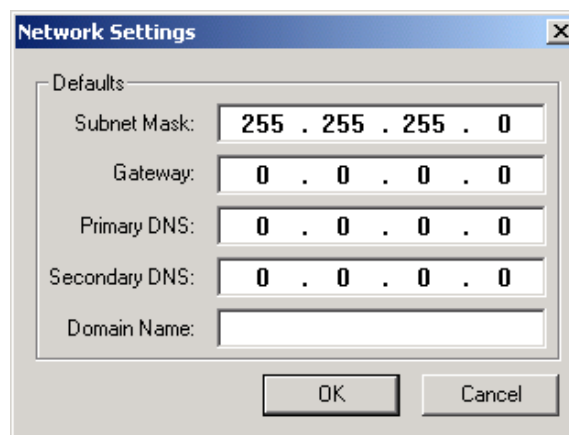


2. From the Tools menu, choose **Network Settings**.



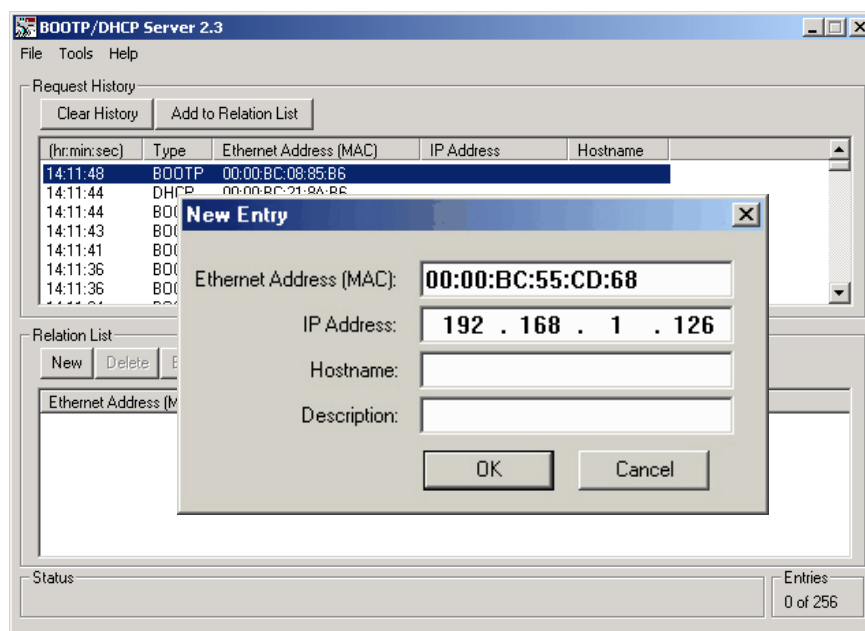
3. Enter the Subnet Mask from the [Network Worksheet](#).

4. Click **OK**.



The Request History displays all the devices, including the packaged controller, on your network that need an IP address. The Ethernet address (Mac ID) of the packaged controller corresponds with the address you recorded on [Network Worksheet](#).

- Double-click the request from your packaged controller.



- Enter the IP address and record it on the [Network Worksheet](#) inside the back cover.

IP Addresses Assigned Successfully

Ethernet Address (MAC)	Type	IP Address
00:00:BC:55:CD:68	BOOTP	192.168.1.126
00:00:BC:21:92:13	DHCP	192.168.1.127

If you are not using an isolated network, obtain these numbers from your network administrator.

- Click **OK**.

IMPORTANT

For a device to retain its IP address through a power cycle, BootP/DHCP must be disabled. Complete step 8 to disable BootP/DHCP for the packaged controller.

- Disable BootP/DHCP by selecting the packaged controller from the Relation List and clicking **Disable BOOTP/DHCP**.

Disable BOOTP/DHCP

[Disable BOOTP/DHCP] Command successful appears in the Status bar.

- Close the BOOTP/DHCP Server utility.

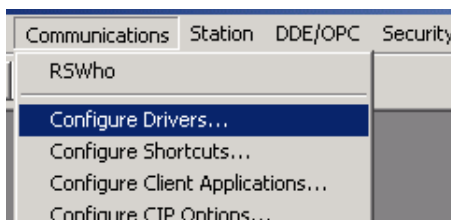
If you are prompted to save changes, click **No**.

Configure the EtherNet/IP Driver in RSLinx Software

Required for EtherNet/IP network (option 1)

1. If RSLinx software is not open, launch RSLinx software.

2. From the **Communications** menu, choose **Configure Drivers**.

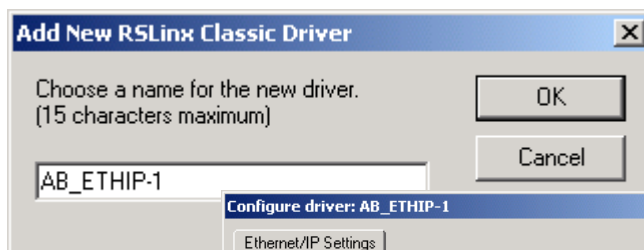


3. From the Available Driver Types, choose **Ethernet/IP Driver**.

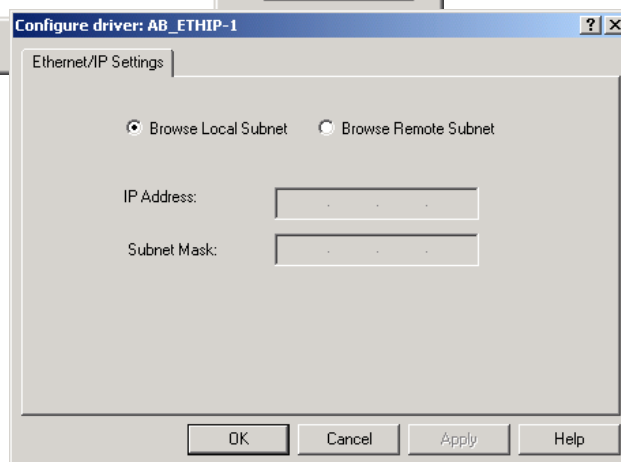


4. Click **Add New**.

5. Click **OK** to keep the default name.

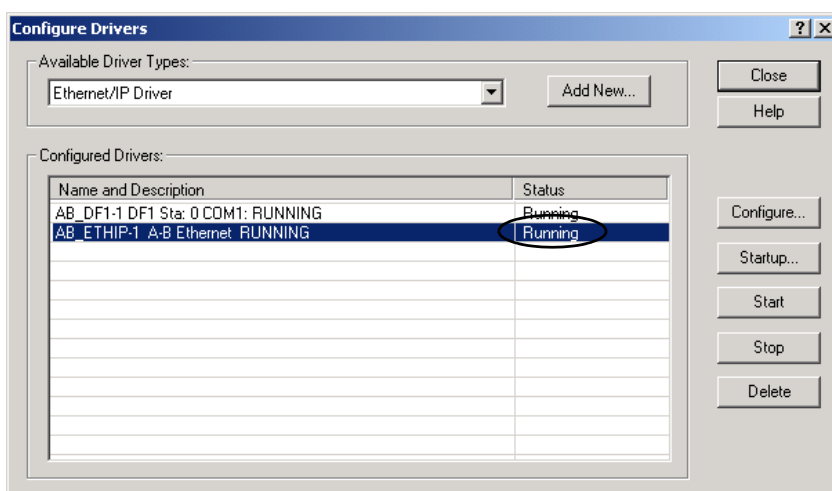


6. Click **OK** to Browse Local Subnet.



The EtherNet/IP driver is added to the Configured Drivers list.

7. Verify that the driver's Status is Running, and click **Close**.



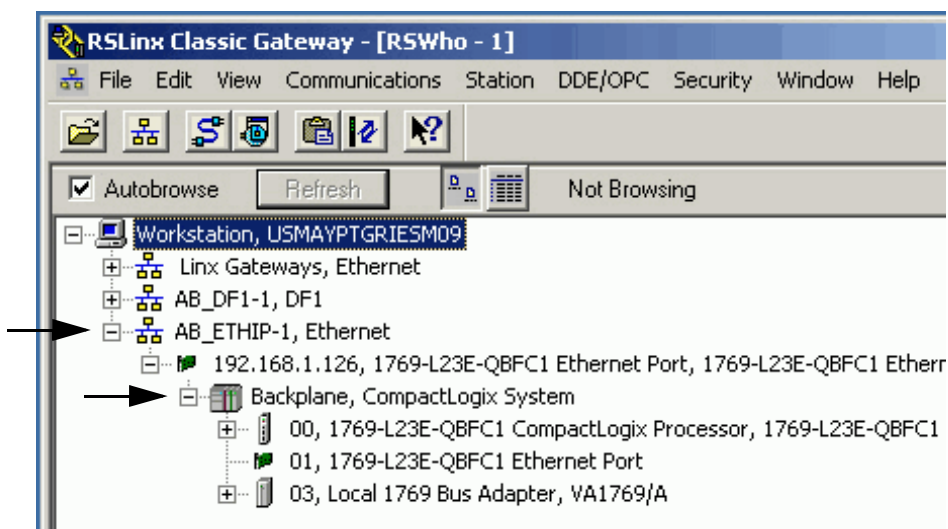
Browse the EtherNet/IP Network in RSLinx Software

1. In RSLinx Classic software, click the **RSWho** button.



The EtherNet/IP driver and network devices display.

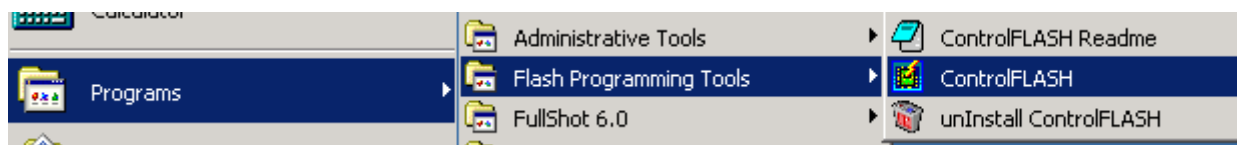
2. Expand the Ethernet Port and the backplane to view the packaged controller.
3. Close or minimize the RSLinx Classic window.



Load Firmware

Required for all packaged controllers

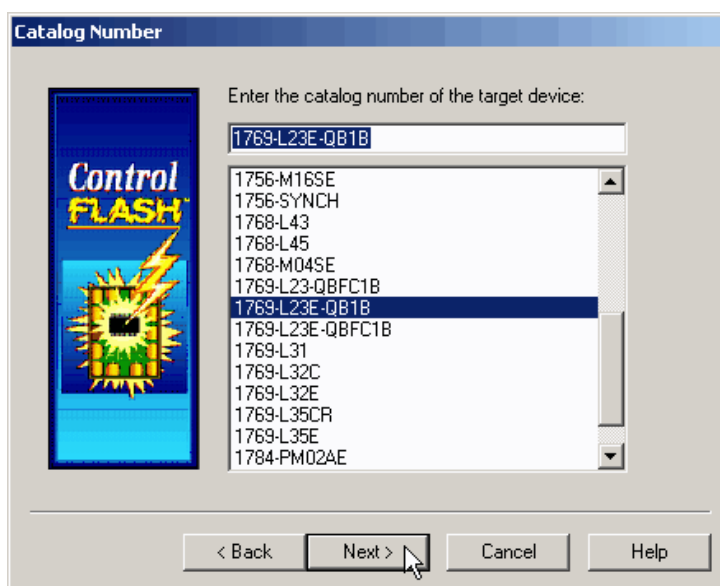
1. Launch ControlFlash software.



2. Click **Next**.



3. Select the controller catalog number and click **Next**.



4. Expand the driver associated with your packaged controller.

5. Select your packaged controller.

6. Click **OK**.

7. Move the keyswitch on the controller to PROG.

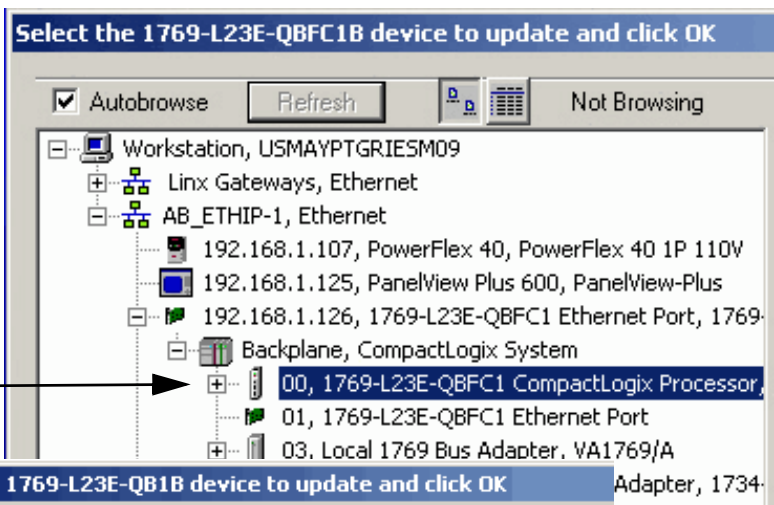


8. If the Current Revision matches the revision of firmware you want, click **Cancel** and skip to Chapter 3.

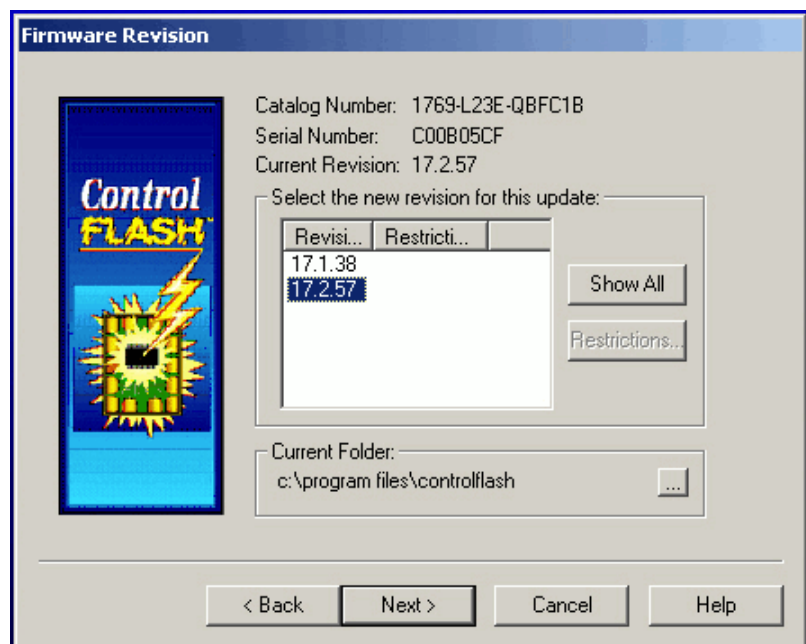
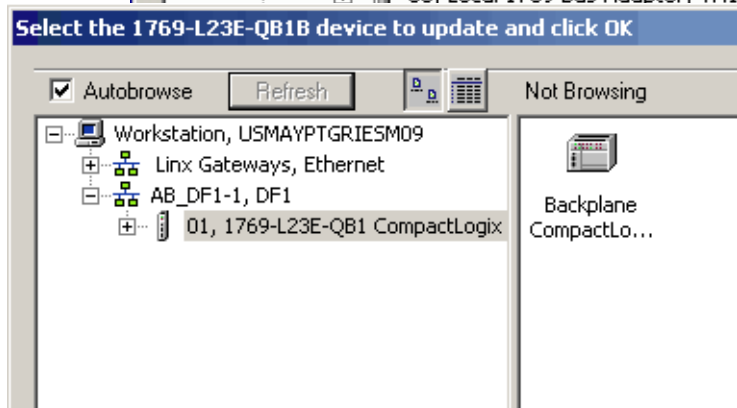
Otherwise, select the desired firmware revision and click **Next**.

Ethernet

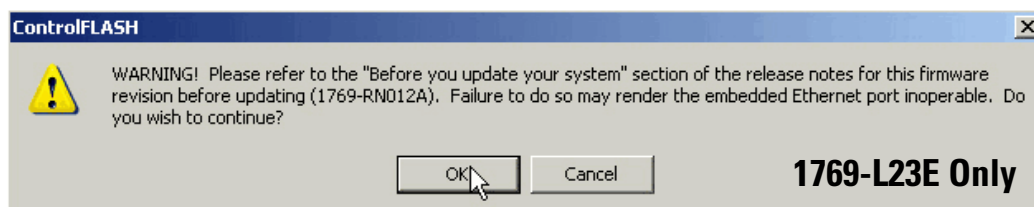
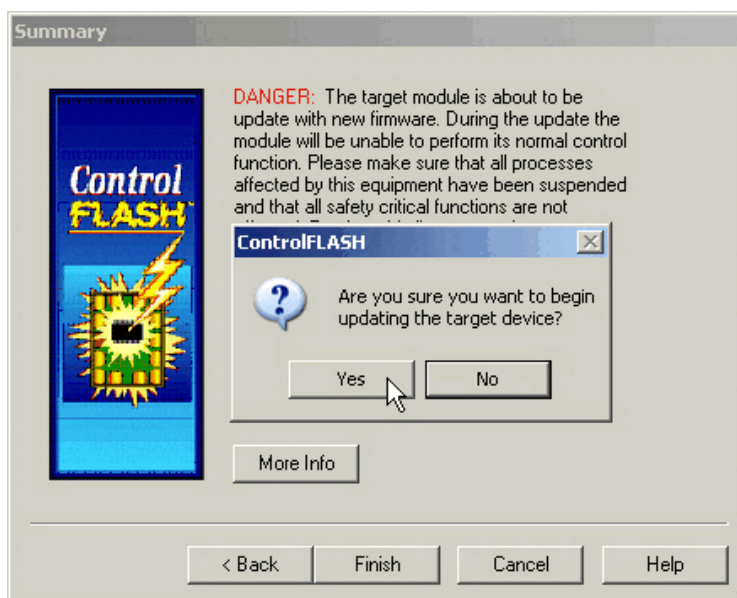
Packaged
Controller



Serial



9. Click **Finish** and then click **Yes**.



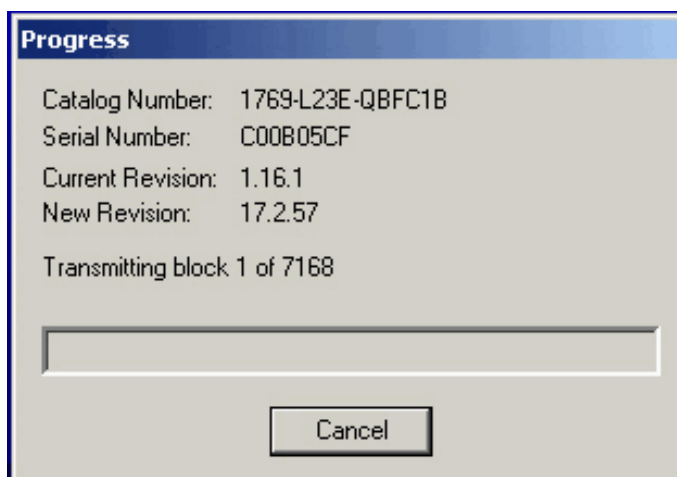
10. If updating a 1769-L23E packaged controller, click **OK** after reading the release notes.

The firmware upgrade begins.

IMPORTANT

Do not interrupt the firmware upgrade once it has begun.

Interrupting the firmware upgrade may result in an inoperable packaged controller. After the Upgrade Status dialog box indicates the upgrade is complete, you may proceed.

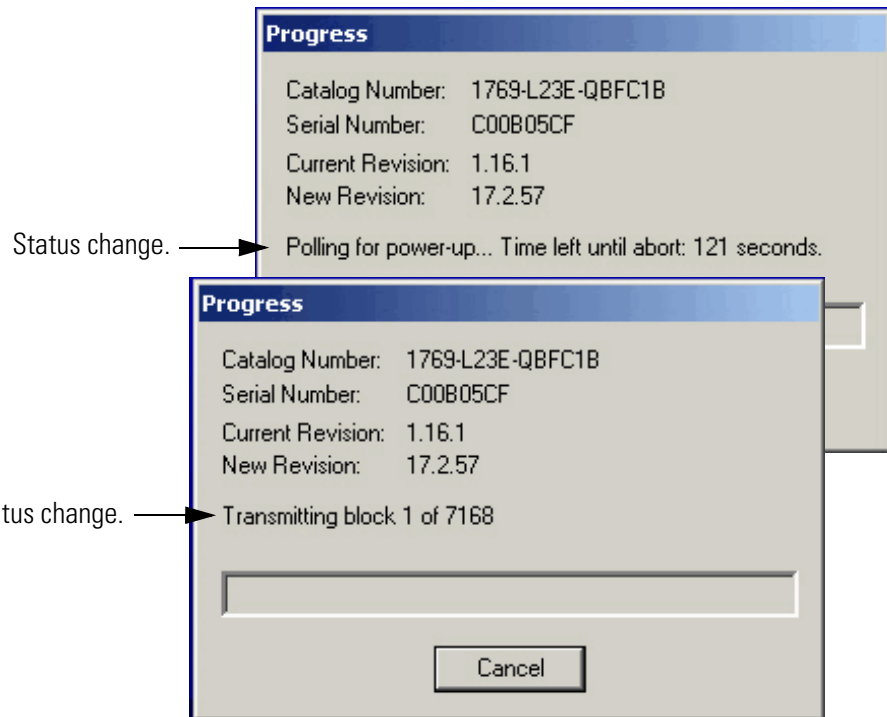


If using this connection	The estimated time to upgrade firmware is
Ethernet	10 min
Serial	40...60 min

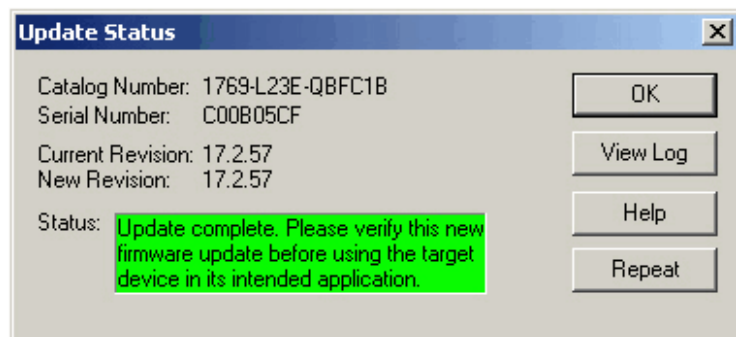
During the firmware upgrade, these Progress dialog boxes display 2 or 3 times.

Do not take any action while these status dialog boxes display.

These status changes indicate that the packaged controller is self-cycling (Polling for power-up) and continuing with the firmware upgrade (Transmitting block).



The Upgrade Status dialog box indicates that the firmware upgrade has been successfully completed.



11. Click **OK**.

12. To close the ControlFlash utility, click **Cancel** and then click **Yes**.

Install Additional Software

- If you are completing the PanelView Plus chapters in this quick start, install FactoryTalkView Machine Edition and RSLinx Enterprise software from the FactoryTalkView Machine Edition package. This software must be installed before you install any additional software.
- If you are using a DeviceNet network, install RSNetWorx for DeviceNet software.

Additional Resources

Resource	Description
CompactLogix Packaged Controllers Installation Instructions, publication 1769-IN082	Provides details about assembling and mounting the controller and upgrading firmware as well as controller technical specifications.
CompactLogix Packaged Controllers Release Notes, publication 1769-RN012	Provides descriptions of enhancements, anomalies (known and corrected), and restrictions specific to the firmware revision.
FactoryTalk Activation FAQ, publication FT00-FA001	Provides answers to FactoryTalk Activation questions, including how the FactoryTalk Activation differs from master disk activation.
ControlFlash Firmware Upgrade Kit, publication 1756-QS105	Provides details regarding the installation of ControlFlash software and execution of firmware upgrades.
Logix5000 Controllers Quick Start, publication 1756-QS001	Provides start-up procedures for all Logix5000 controllers with RSLogix 5000 software.
EtherNet/IP Modules in Logix5000 Control Systems, publication ENET-UM001	Provides details about using EtherNet/IP modules and devices with RSLogix 5000 and related software.

Publications are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Create a Project Using RSLogix 5000 Software

In this chapter you create a project in RSLogix 5000 software. In the project you use ladder logic to create a push button that controls a light on a digital output of the controller. This project is used in subsequent chapters to test communication with other devices.

For a programming quick reference and more information about programming your CompactLogix packaged controller, see Chapter 5 of the user manual, Programming the Packaged Controller, on [page 219](#).

Before You Begin

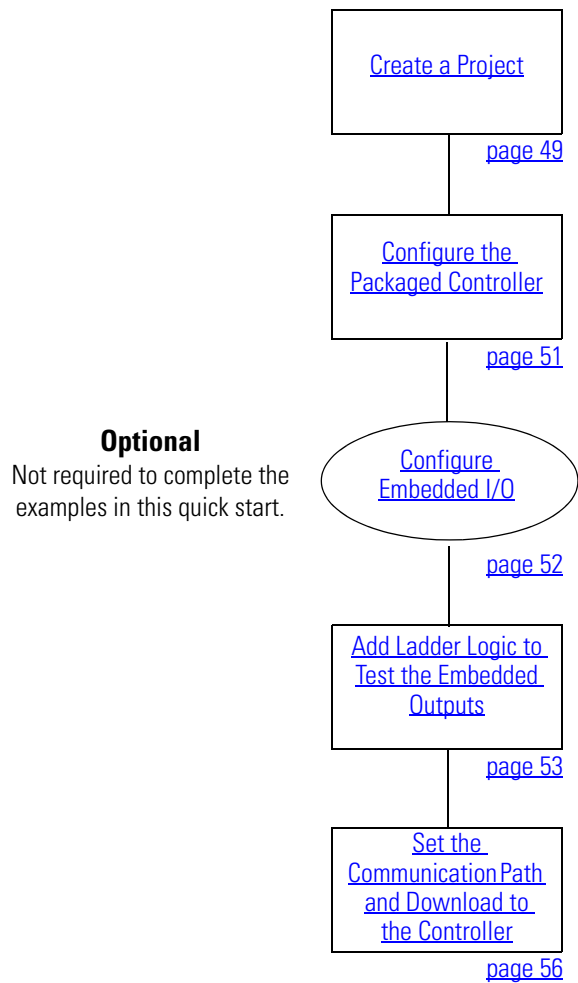
- Install the required software, see Chapter 2.
- Configure your network, see Chapter 2.

What You Need

- A CompactLogix packaged controller (1769-L23E-QB1B, 1769-L23-QBFC1B, or 1769-L23E-QBFC1B).

Follow These Steps

Complete these steps.



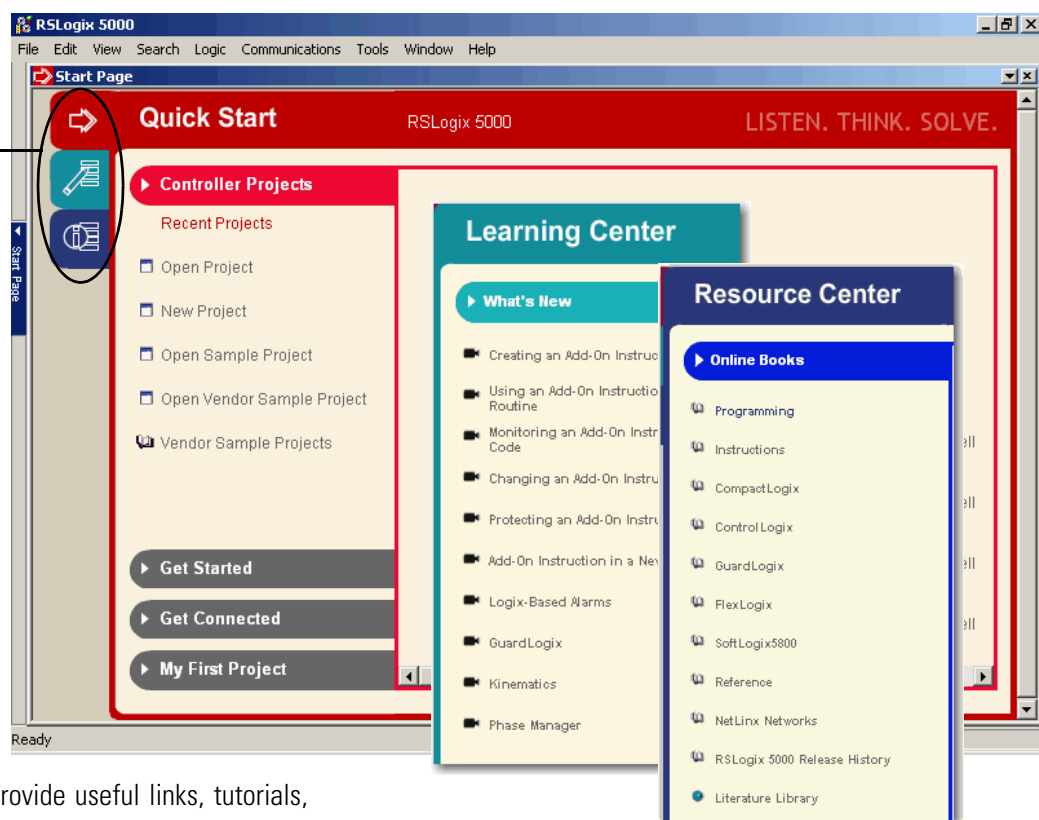
Create a Project

All controllers

1. Open RSLogix 5000 software by clicking **Start > Programs > Rockwell Software > RSLogix 5000 Enterprise Series > RSLogix 5000**.

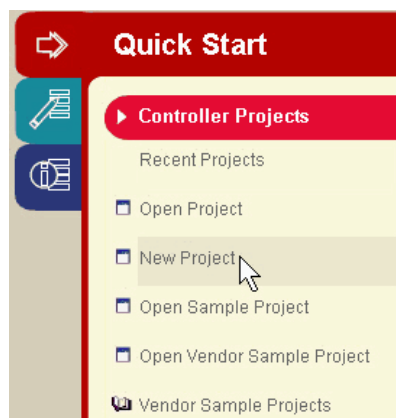
The Quick Start window displays in the RSLogix workspace.

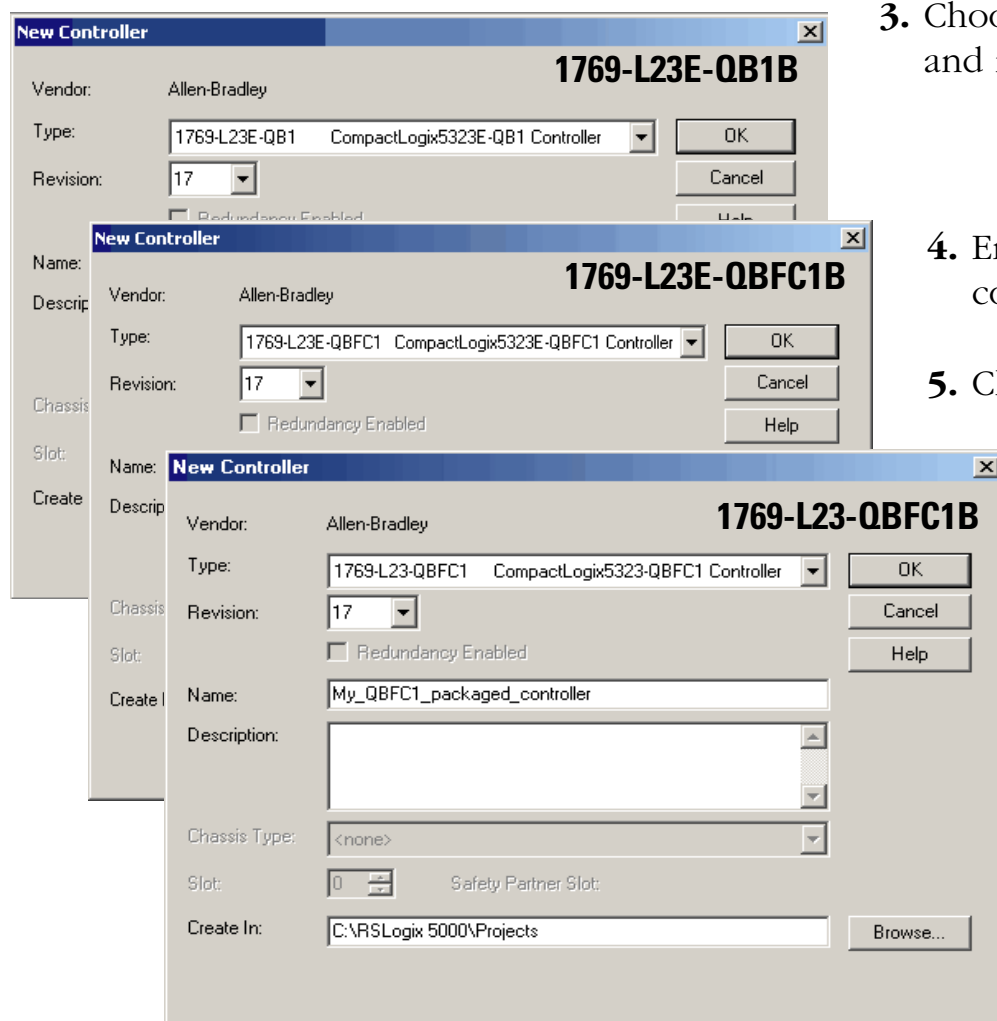
Navigation tabs for Quick Start, Learning Center, and Resource Center pages.



The Quick Start pages provide useful links, tutorials, training videos, and other tools you may choose to view before beginning your project.

2. Click **New Project**.





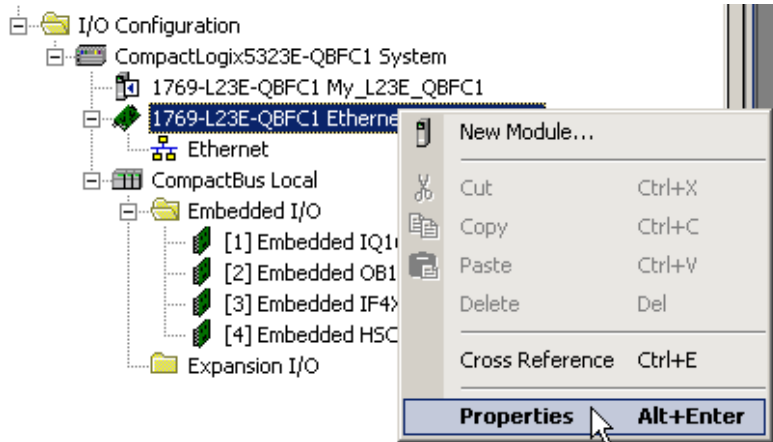
3. Choose your controller and revision number.

4. Enter a unique controller name.

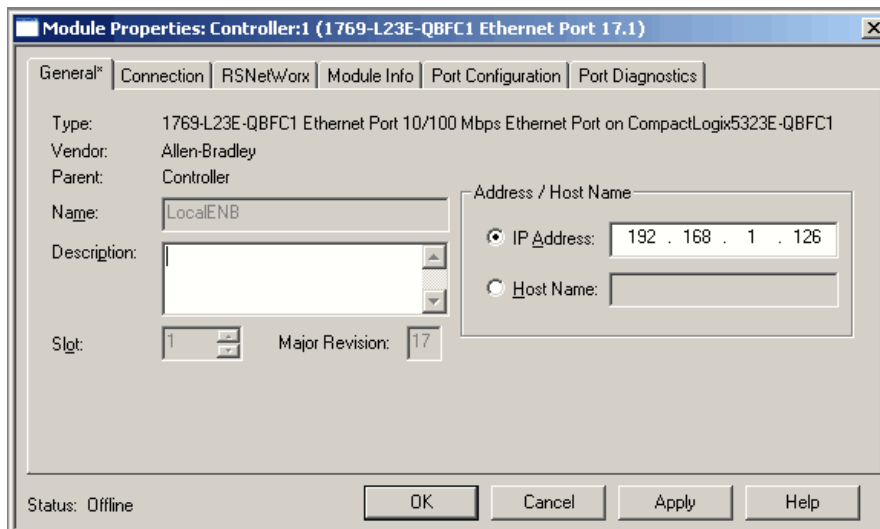
5. Click **OK**.

Configure the Packaged Controller

All 1769-L23E controllers



1. Right-click the Ethernet Port and choose **Properties**.

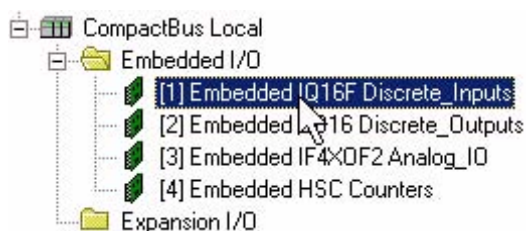


2. Enter the controller's IP address (recorded on the [Network Worksheet](#)) and click **OK**.

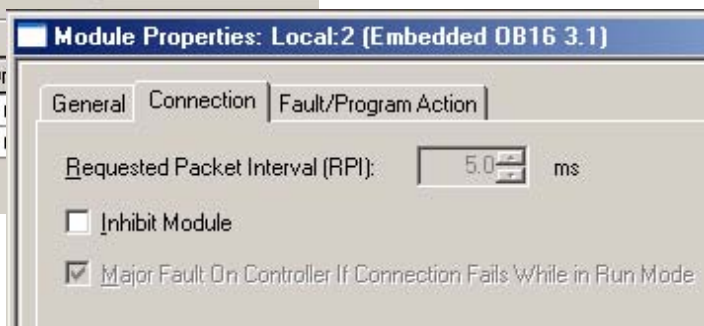
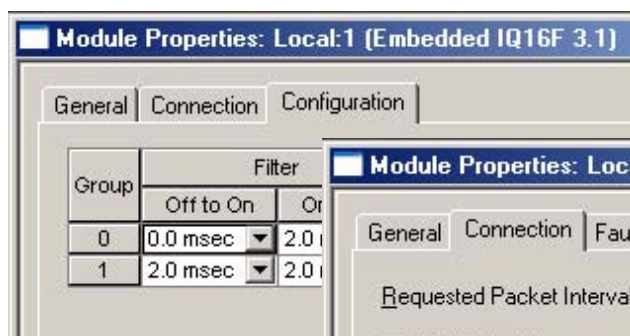
Configure Embedded I/O

Not required for quick start examples

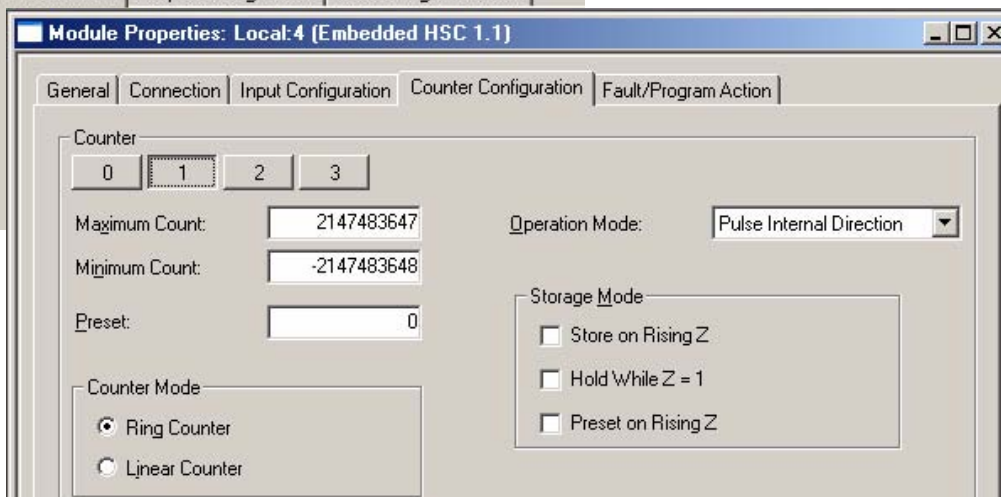
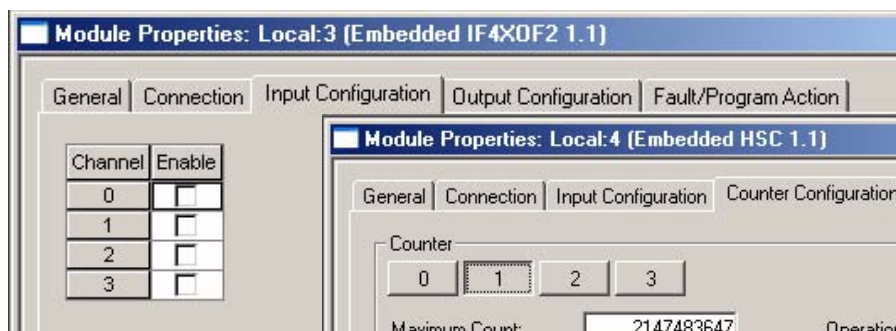
The quick start examples use the default configuration of the embedded I/O. Before you use the embedded I/O in your application, you may choose to configure the embedded I/O specific to your application.



1. Double-click the embedded I/O you need to configure.
2. Use the tabs and boxes within the Module Properties dialog box to specify your configuration parameters.



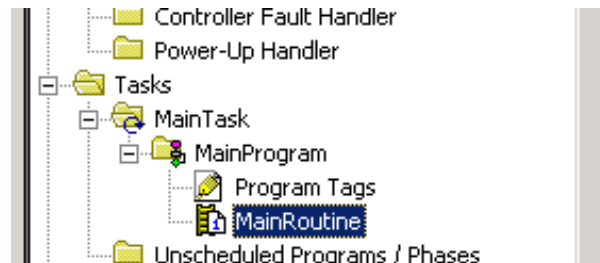
For detailed information about configuring your embedded I/O, see Chapter 3 of the user manual, Embedded I/O ([page 177](#)).



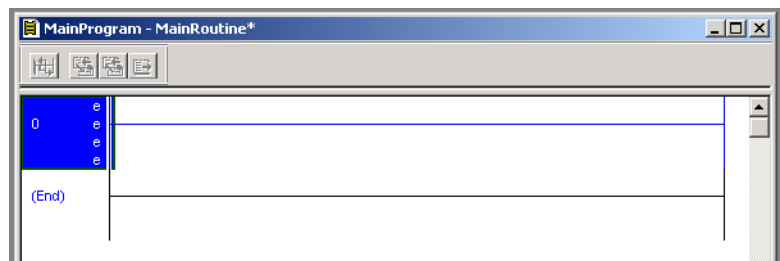
Add Ladder Logic to Test the Embedded Outputs

All controllers

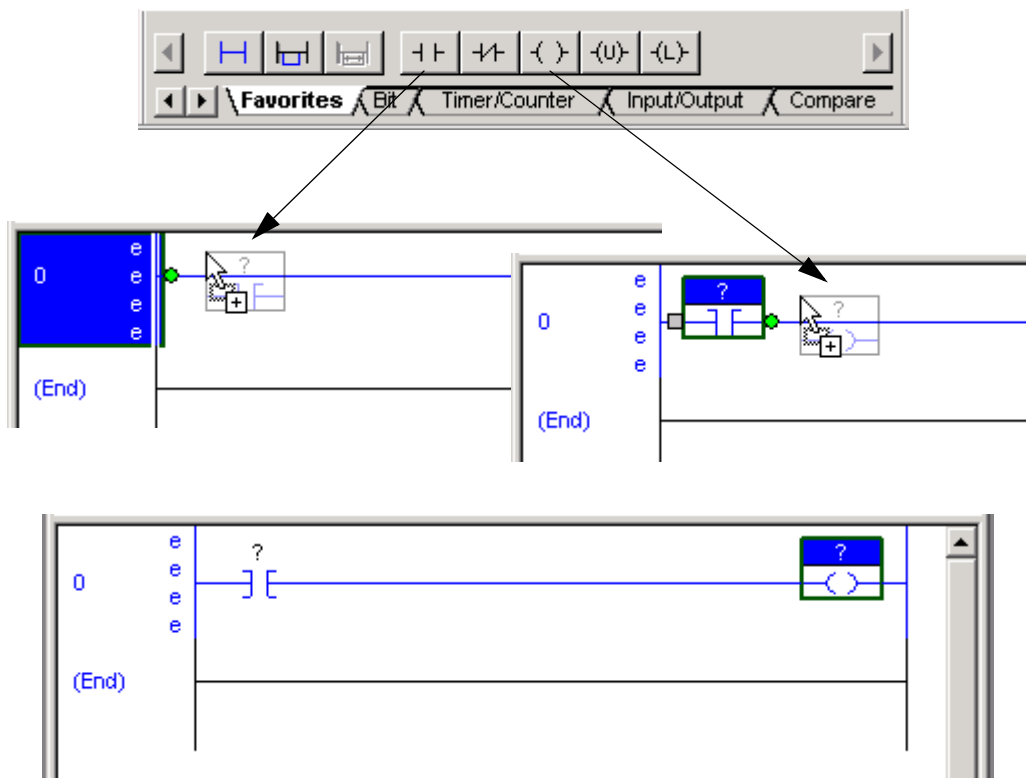
1. Expand the **Tasks** folders and double-click **MainRoutine**.



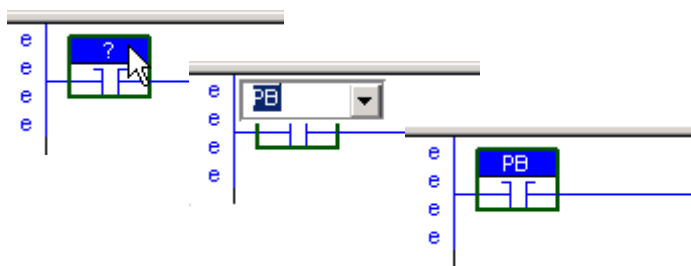
A blank MainRoutine opens.



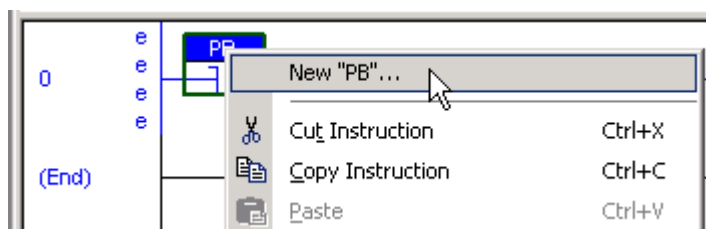
2. From the Element Toolbar, drag and drop an **Examine On** and an **Output Energize** element onto the rung.



3. Double-click the ? in the Examine On.
4. Type PB (for push button).
5. Press Enter.



6. Right-click PB and choose **New "PB"**.

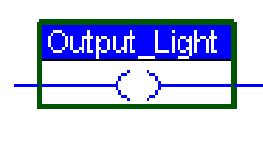


7. Click **OK** to keep the defaults.

8. Name the Output Energize **Output_Light**.

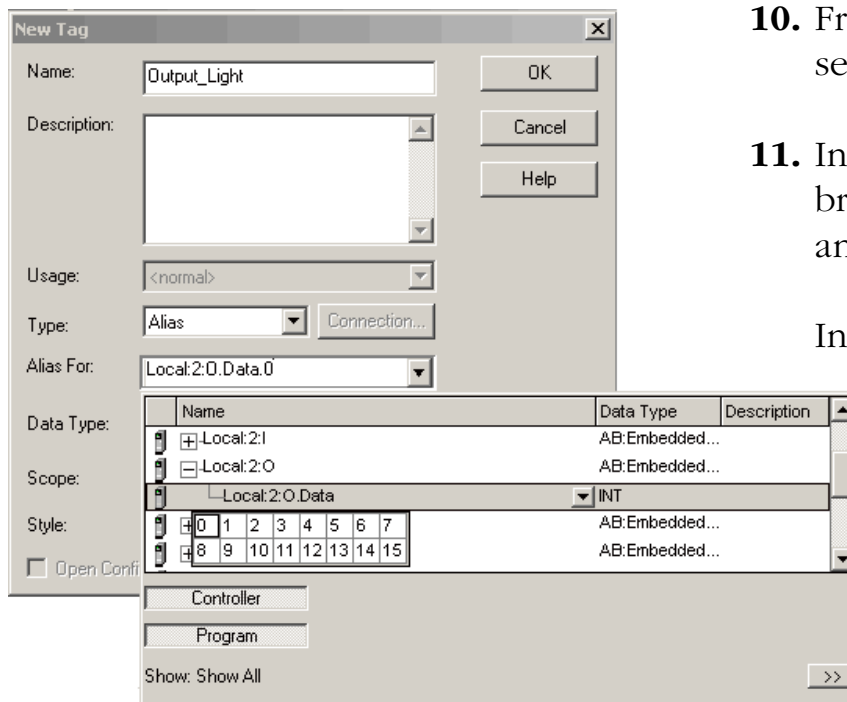
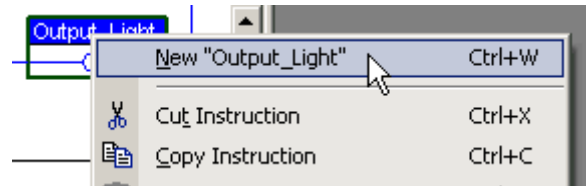
IMPORTANT

Do not use spaces in the tag name. Use underscores (_) instead.



9. Right-click the Output_Light tag name and choose **New "Output_Light"**.

Output_Light is an alias tag for the I/O point tag name. This lets you assign a simple name to a physical I/O point address.



10. From the Type pull-down menu, select **Alias**.

11. In the Alias For pull-down menu, browse to a local output point and select any bit.

In this example, Local:2:O.Data.0 is used.

12. Click **OK**.

The output shows the specified output.



Set the Communication Path and Download to the Controller

All 1769-L23 controllers



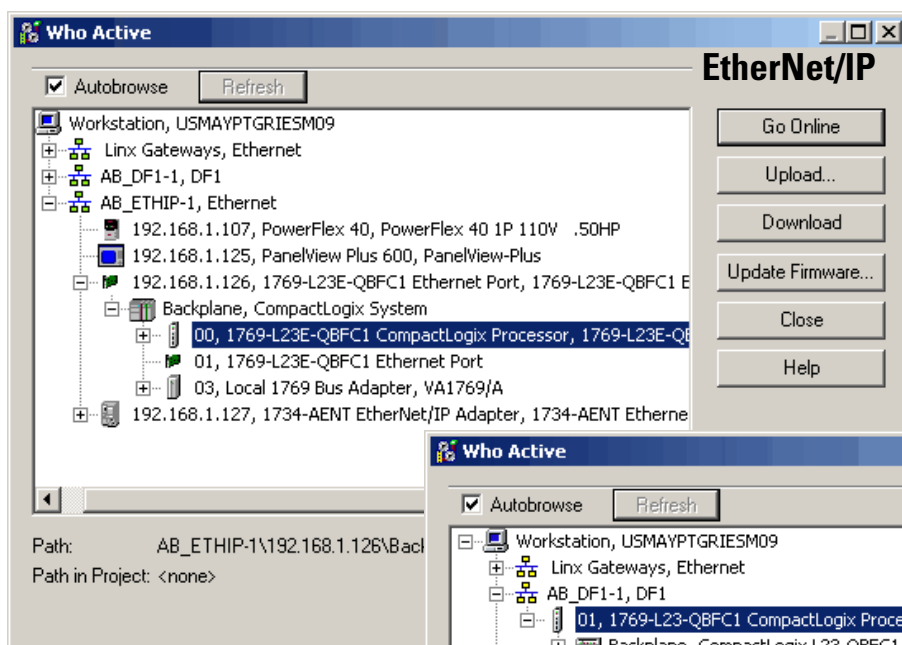
1. **Save** your changes.



2. Move the keyswitch on your controller to Program.



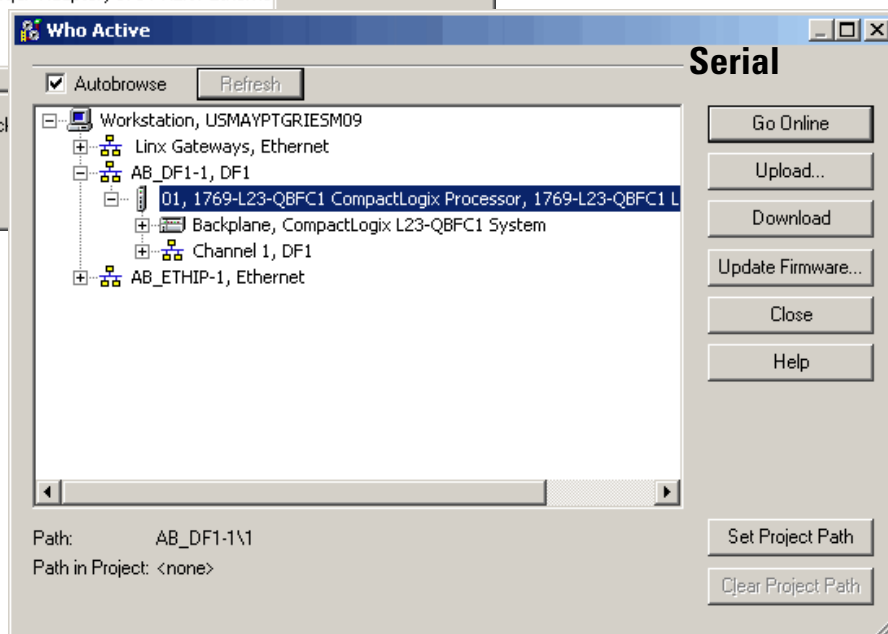
3. Click the **RSWho** button.



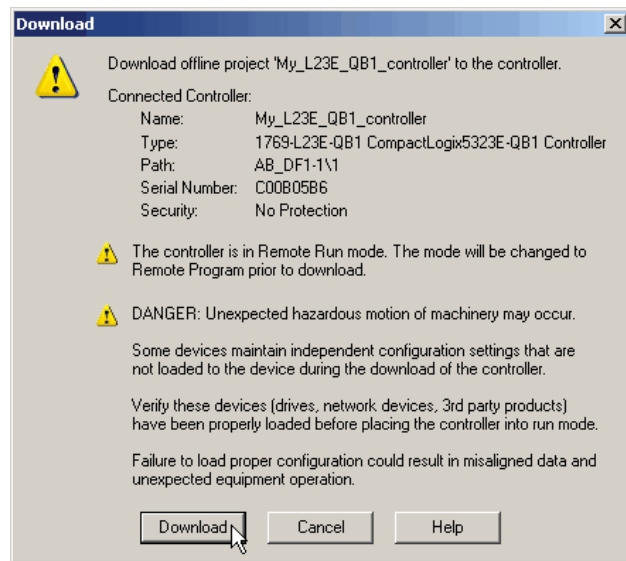
4. Expand the network tree.

5. Select your controller and click **Set Project Path**.

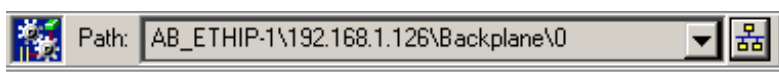
6. Click **Download**.



7. Click **Download**.



The project Path updates.



EtherNet/IP



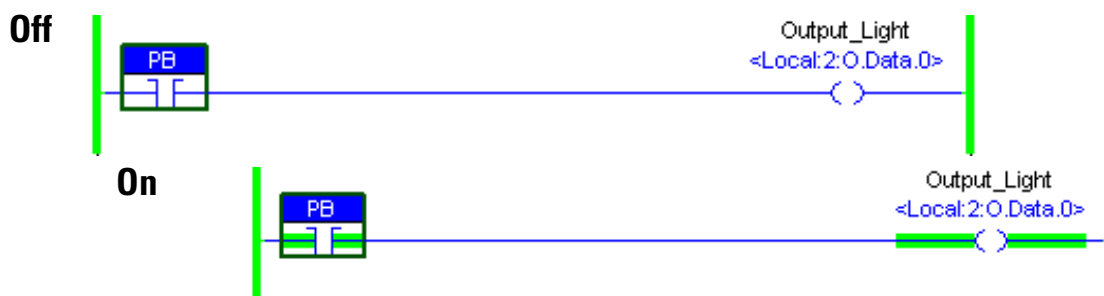
Serial

8. Move the keyswitch on your controller to Run.



9. Select the PB Examine On instruction and press Ctrl+T.

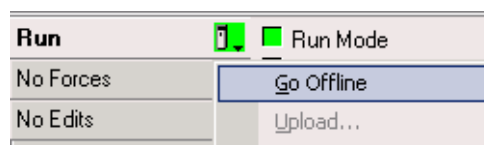
This toggles the state from 0 to 1 (off to on).



10. Verify that the LED indicator on the digital output of the controller turns on.

11. Press Ctrl+T to toggle the state back to 0 (off).

12. Go Offline.



Additional Resources

Resource	Description
Chapter 5 of the user manual, Programming the Packaged Controller, on page 219	Provides detail information about programming the packaged controllers, including available user memory, available programming languages, use of programs and equipment phases, and monitoring controller status.
Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001	Provides details about creating and editing a program, communicating with modules, and configuring modules.

These manuals are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Add POINT I/O to the Project

In this chapter, you install the 1734 POINT I/O network adapter and the 1734 POINT I/O modules. You then add POINT I/O modules to your project using RSLogix 5000 software. You also add ladder logic and download the project to the controller so you can test communication with an I/O module. This project builds upon the program created in Chapter 3.

Before You Begin

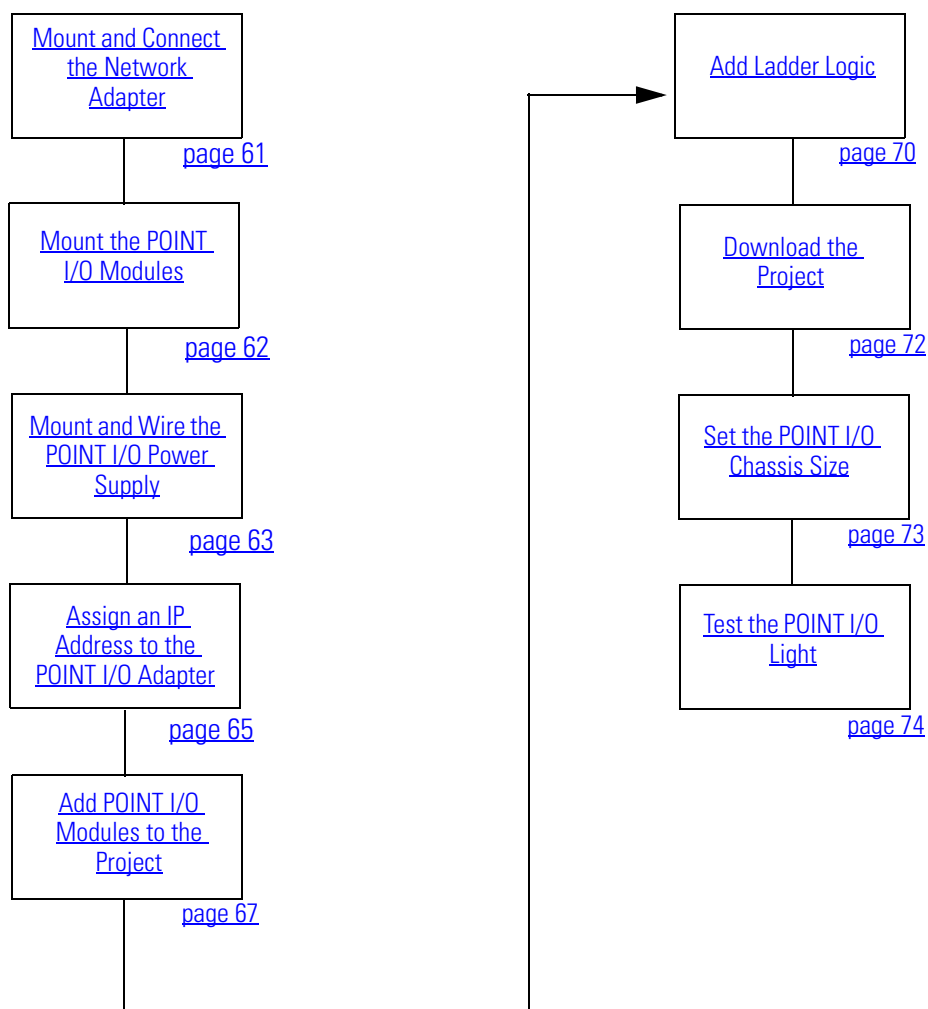
- Create a project in RSLogix 5000 software, see Chapter 3.
- Select the appropriate mounting base for I/O modules:
 - if you use a 1734-IT2I module, then use the 1734-TBCJC.
 - for all other I/O modules use the 1734-TB or 1734-TBS.

What You Need

- POINT I/O adapter: 1734-AENT for EtherNet/IP network.
- POINT I/O mounting bases: 1734-TB or 1734-TBS, and 1734-TBCJC.
- A digital-output POINT I/O module: The examples use a 1734-OB4E.
- Power supply: 1794-PS3 or 1794-PS13.
- This chapter also uses the 1734-IB4 module as an example, however, use of the module is not required.

Follow These Steps

If you are using POINT I/O modules, complete these steps.



Mount and Connect the Network Adapter

EtherNet/IP network

1. Locate the Ethernet address (MAC), found next to the label. Record the Ethernet address (MAC) for the POINT I/O adapter on the [Network Worksheet](#).

This address is used to set the IP address later in the quick start.

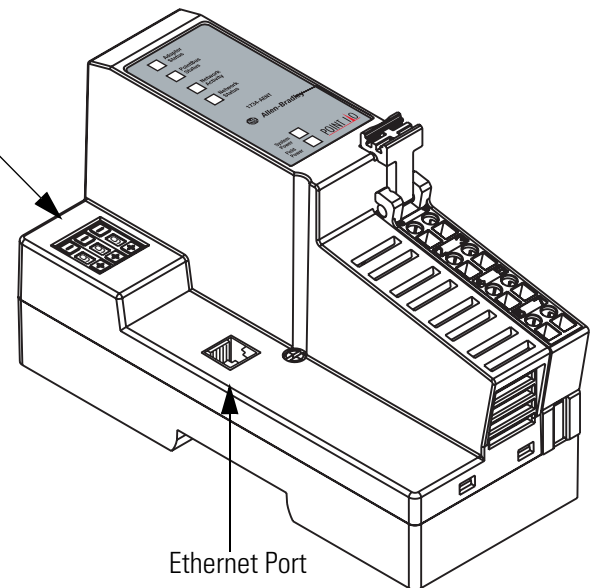
2. Set the address to a value greater than or equal to 256.

This example uses 999.

3. Remove the safety end cap.
4. Press the adapter onto the DIN rail.
5. Insert an Ethernet cable.

Example Address
(Found on the right side of the module.)

00:00:BC:21:8A:B6
Ethernet Address



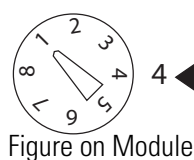
Mount the POINT I/O Modules

All controllers, POINT I/O modules, and wiring bases

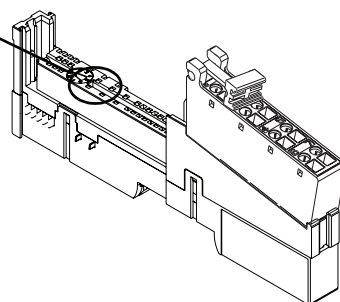
IMPORTANT

The 1734-IT2I module must be mounted in the 1734-TBCJC wiring base. All other modules can be mounted in either of the 1734-TB or 1734-TBS wiring bases.

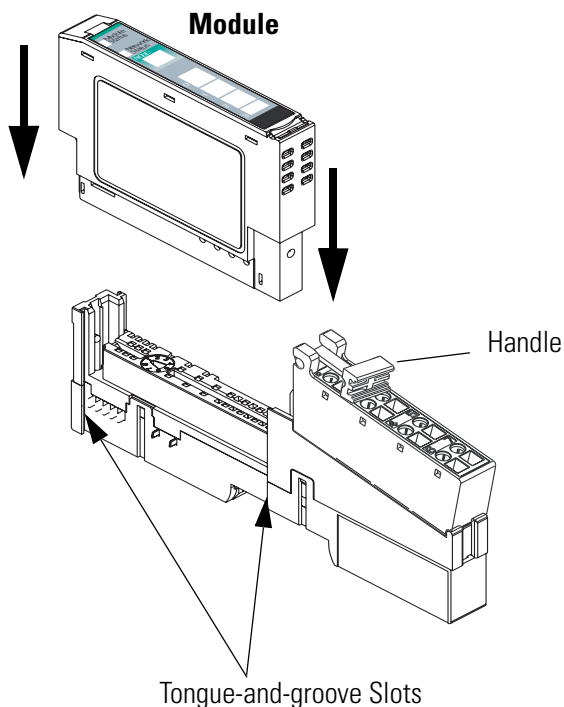
1. Using a small, flathead screwdriver, rotate the keyswitch to match the figure on the I/O module.



Wiring Base



2. Press the module into the wiring base.
3. Snap the handle up.
4. Complete steps 1–3 with all POINT I/O modules.
5. Slide the first module and wiring base assembly along the adapter and press it onto the DIN rail.
6. Repeat with all of the I/O assemblies.



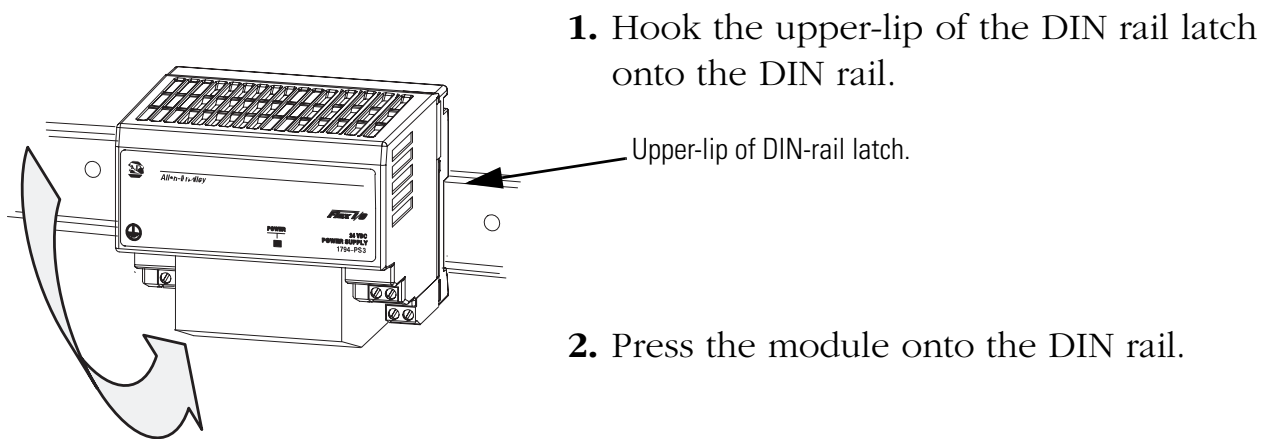
Mount and Wire the POINT I/O Power Supply

1794-PS3 or 1794-PS13 power supplies

TIP

You can choose to power your POINT I/O with the listed POINT I/O power supplies, or, use the DC power supply powering your packaged controller. Any 24V DC power supply can be used with the POINT I/O.

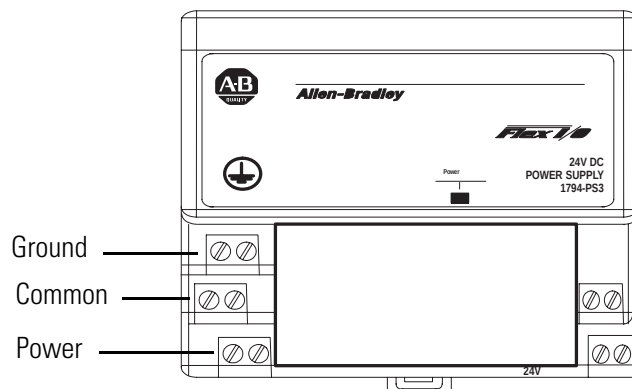
Verify that any power supply you use is disconnected before wiring power.



WARNING



Verify that all incoming power is turned off before wiring power.

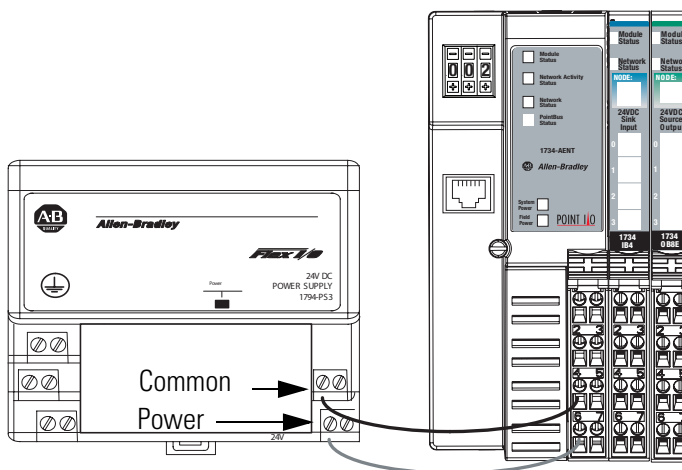


3. Connect the 120/230V AC power, 120/230V AC common and AC Ground wires.

Wire the Adapter and I/O Modules to the Power Supply

POINT I/O adapter, I/O modules, and power supply

1. Connect the 12/24V DC common and 12/24V DC power wires from the power supply to the adapter.
2. Refer to the individual POINT I/O installation instructions for wiring the I/O modules.
3. Turn on incoming power.



Assign an IP Address to the POINT I/O Adapter

EtherNet/IP network

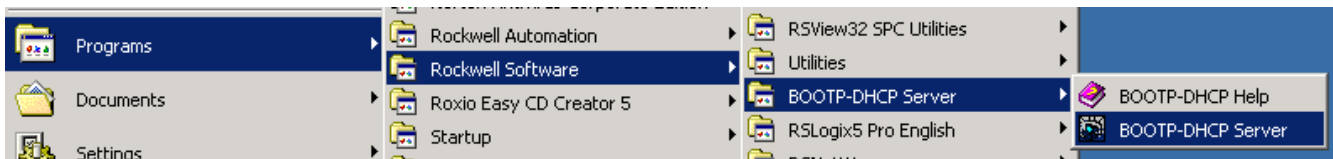
In this chapter, you use the BOOTP/DHCP server to assign an IP address to the POINT I/O adapter. You use the BootP server that was installed with RSLogix 5000 software.

TIP

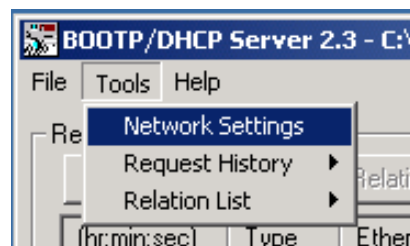
Devices on the EtherNet/IP network broadcast requests for IP addresses until the IP addresses have been assigned.

The procedure in this chapter uses the BOOTP server packaged with RSLogix 5000 software to assign IP addresses, however, any industry-standard BootP server can be used.

1. After you have installed and connected your adapter, launch the BOOTP/DHCP Server utility.

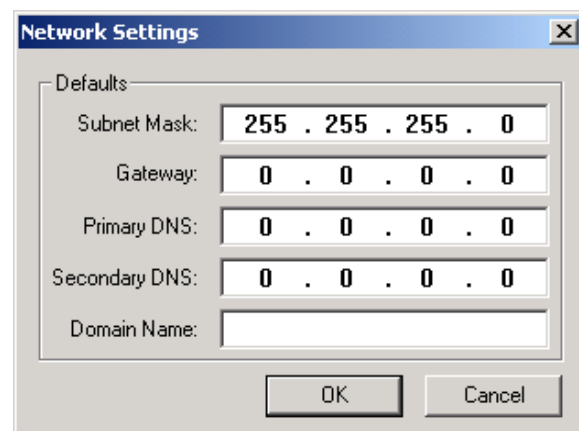


2. From the Tools menu, choose **Network Settings**.



3. Enter the Subnet Mask from the [Network Worksheet](#).

4. Click **OK**.

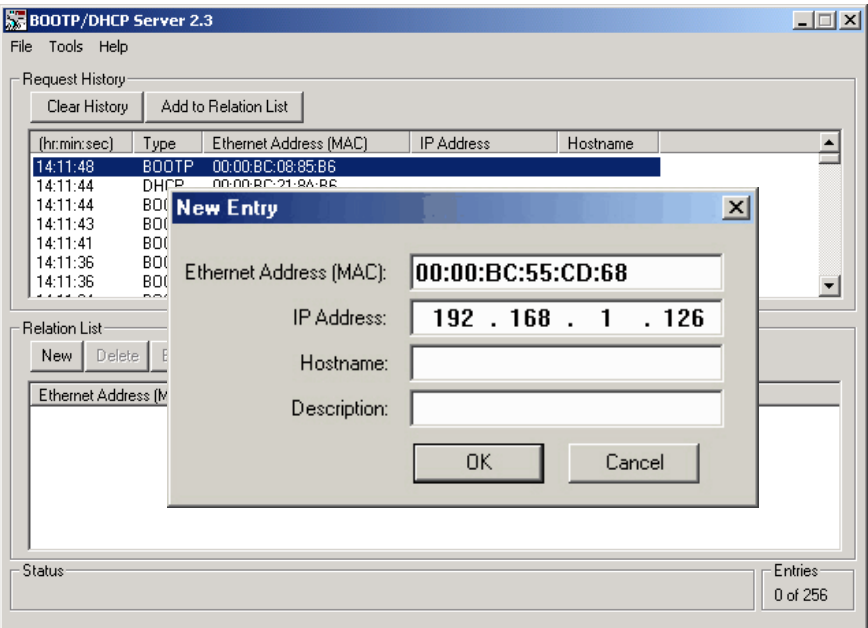


The Request History displays all the devices, including the packaged controller, on your network that need an IP address. The Ethernet address (MAC ID) of the adapter corresponds with the address you recorded on [Network Worksheet](#).

- 5. Double-click the request from your adapter.
- 6. Enter the IP address and record it on the [Network Worksheet](#) inside the back cover.

If you are not using an isolated network, obtain these numbers from your network administrator.

- 7. Click **OK**.



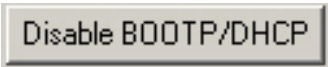
IP Addresses Assigned Successfully

Ethernet Address (MAC)	Type	IP Address
00:00:BC:55:CD:68	BOOTP	192.168.1.126
00:00:BC:21:92:13	DHCP	192.168.1.127

IMPORTANT

For a device to retain its IP address through a power cycle, BootP/DHCP must be disabled. Complete step 8 to disable BootP/DHCP for the adapter.

- 8. To disable BootP/DHCP, select the adapter from the Relation List and click **Disable BOOTP/DHCP**.

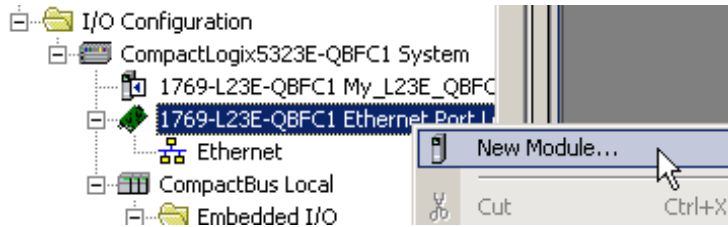


[Disable BOOTP/DHCP] Command successful appears in the Status bar.

- 9. Close the BOOTP/DHCP Server utility.

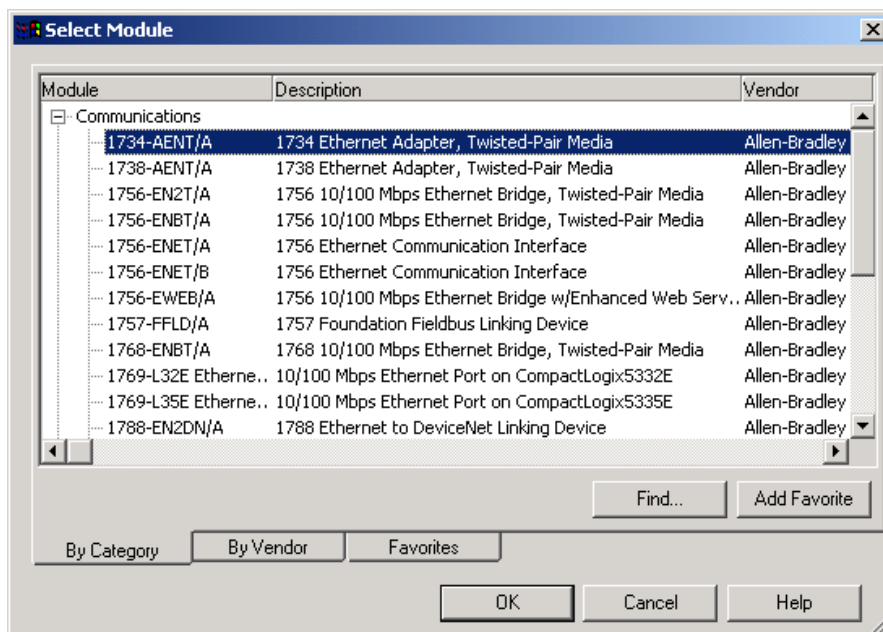
If you are prompted to save changes, click **No**.

Add POINT I/O Modules to the Project

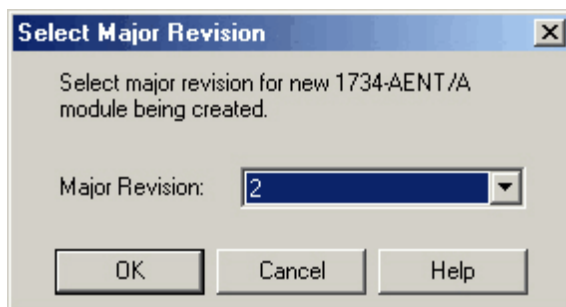


1. Verify that your project is Offline.

2. Right-click the network port and choose **New Module**.

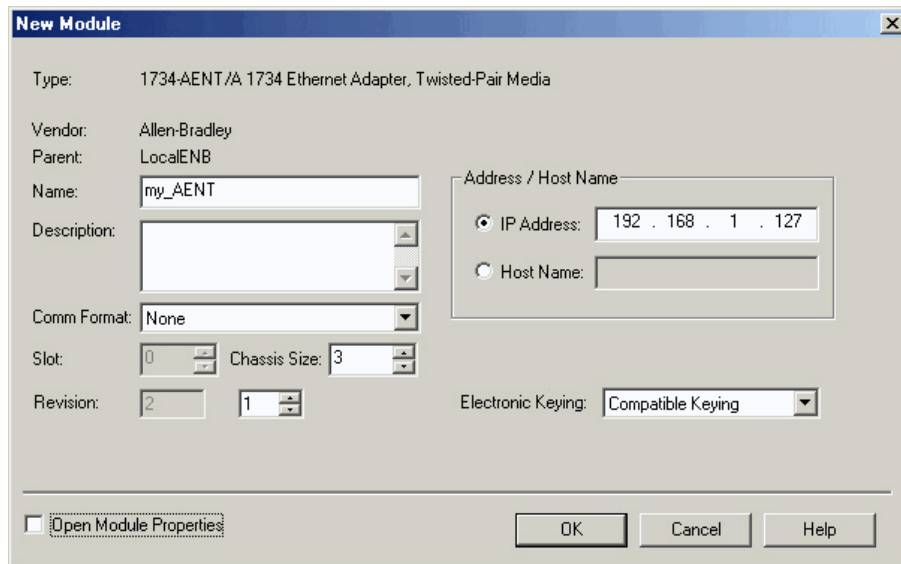


3. Select the 1734-AENT POINT I/O network adapter and click **OK**.



4. Specify the major revision and click **OK**.

Module Properties dialog box opens.



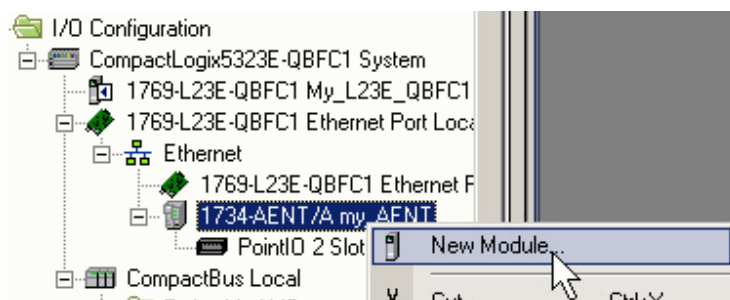
5. Type a **name** for the adapter.

6. Type the **IP address**.

Use the [Network Worksheet](#) located inside the back cover as a reference.

7. Select the **Chassis Size** (exact number of POINT I/O modules + 1 for the adapter).

8. Verify that **Open Module Properties** is unchecked and click **OK**.



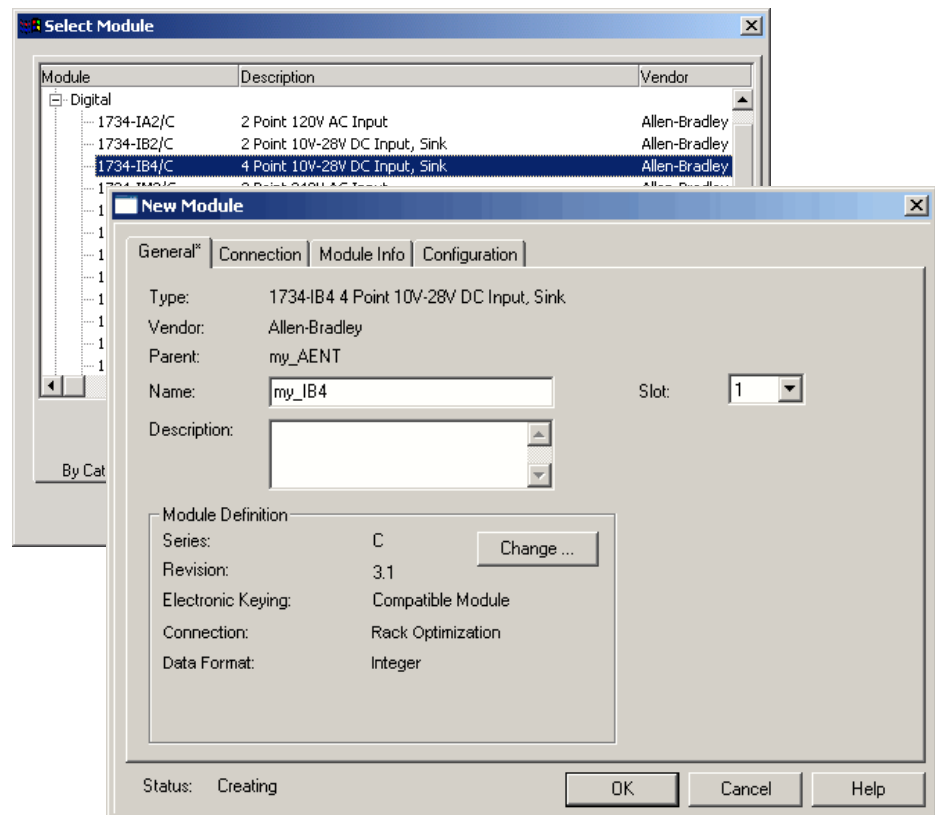
The adapter is added to the I/O configuration.

9. Right-click the 1734 POINT network adapter module and choose **New Module**.

10. Select the left-most POINT I/O module in your chassis and click **OK**.

11. Enter a name.

12. Click **OK**.

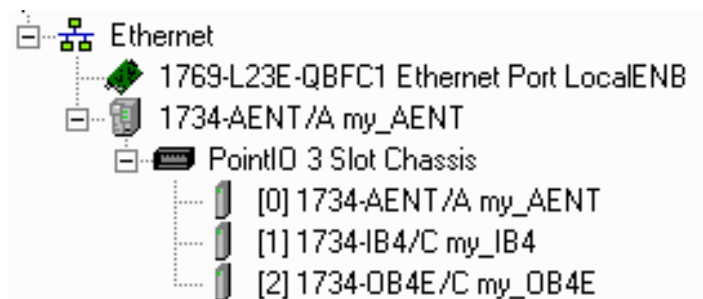


The module is added to the I/O Configuration.

13. Repeat steps 9...12 until all of your POINT I/O modules are added in order from left to right.

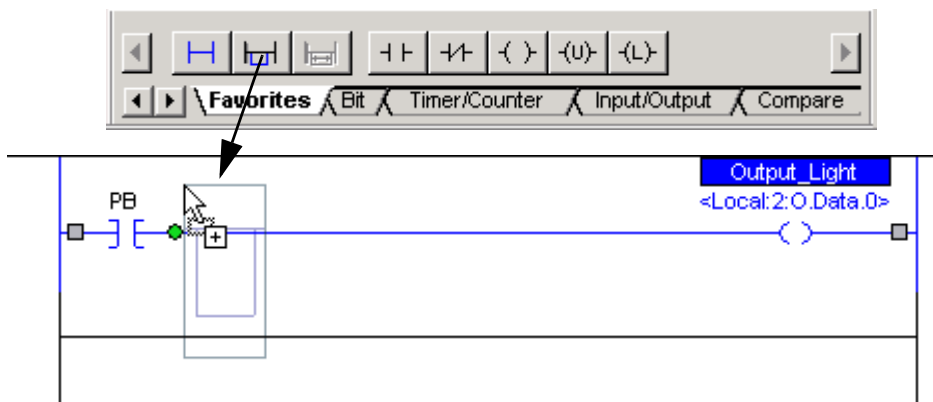
After you have completed adding your POINT I/O modules, go to Add Ladder Logic on [page 70](#).

Completed Configuration of POINT I/O Modules

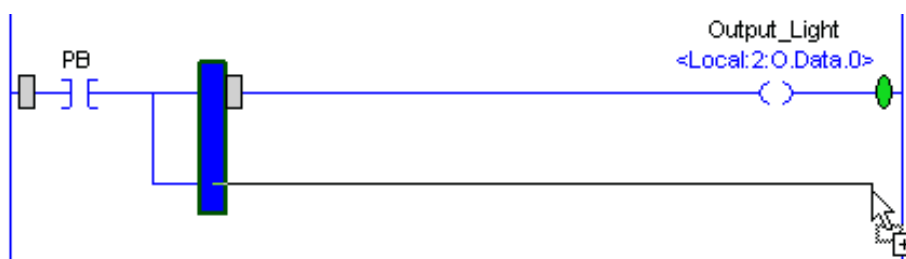


Add Ladder Logic

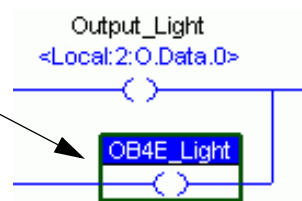
1. In the Main Routine, drag and drop a Branch onto the rung.



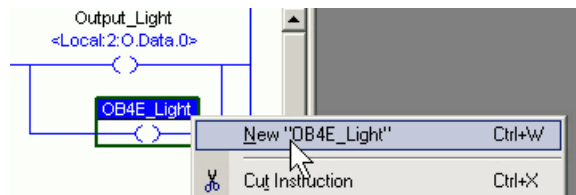
2. Expand the branch to the right side of Output_Light.



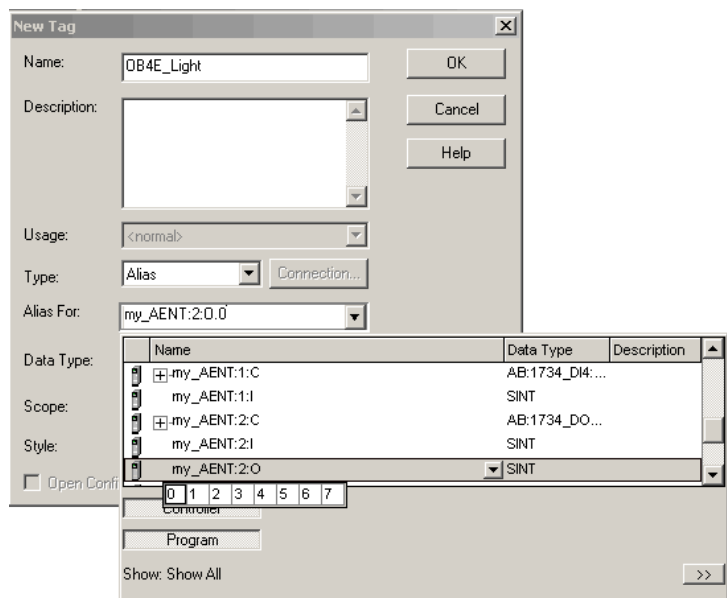
3. Drag and drop another Output Energize element onto the Branch and name it xxxx_Light (where xxxx identifies your output module).



4. Right-click the Light and choose **New "xxxx_Light"**.



5. From the Type pull-down, choose **Alias**.
6. From the **Alias For** pull-down menu, browse to find your 1734 output module.
7. Click the output point you want to use.



8. Click **OK**.

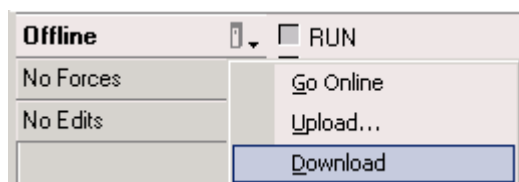
9. Click **Save**.



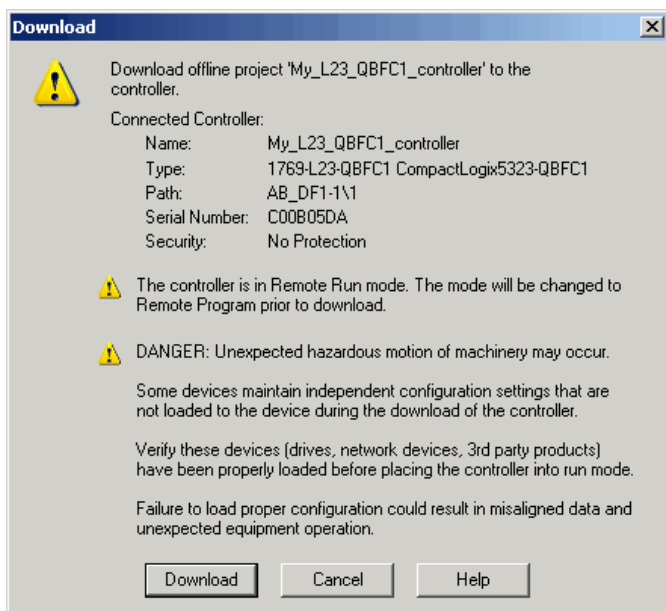
Download the Project



1. Move the keyswitch on your controller to Program.



2. Click the Controller Status icon and choose **Download**.



3. Click **Download**.

If you have no loads wired to your output modules, the red status LEDs indicators may start blinking.

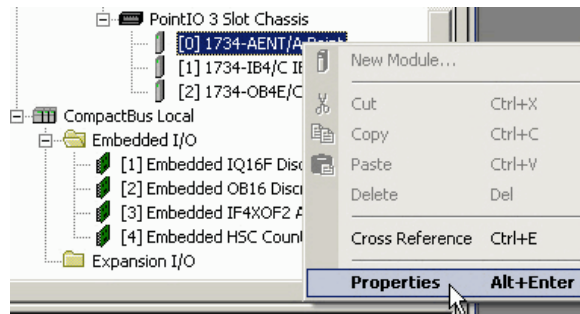
If you are using an EtherNet/IP network, after you download to the controller, the 1734 modules may show faults. Setting the chassis size as shown in the next section should resolve these faults.

Set the POINT I/O Chassis Size

1. Right-click the 1734-AENT and choose **Properties**.

2. Click the **Chassis Size** tab.

Chassis Size



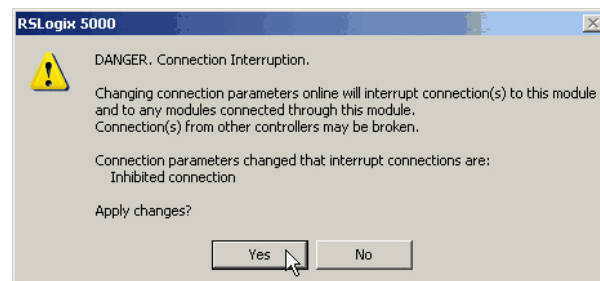
If the both the chassis sizes match, skip to step 1 on [page 74](#).

If the numbers **do not** match, continue with step 3.

3. On the Connection tab, check the **Inhibit Module** checkbox and click **Apply**.



4. Click **Yes**.

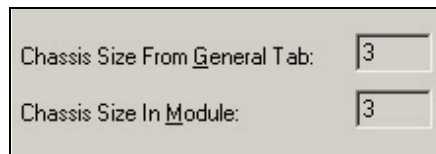


5. On the Chassis size tab, click **Set Chassis Size in Module**.

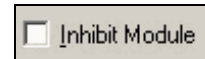
Set Chassis Size in Module

6. Click **OK** at the warning.

The Module chassis size updates.



7. On the Connection Tab, uncheck the **Inhibit Module** checkbox and click **OK**.



8. Click **Yes**.

You have set the POINT I/O chassis size.

9. Click **Save**.

Test the POINT I/O Light

1. Move the keyswitch on your controller to RUN.
2. Select the PB and press Ctrl+T.

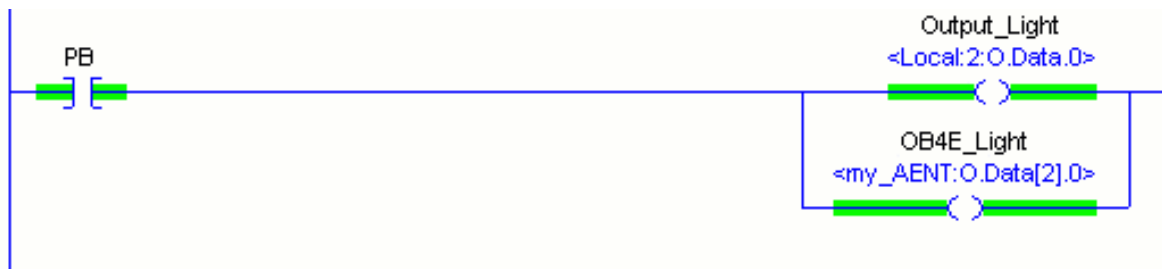


This toggles the state from 0 to 1 (off to on).

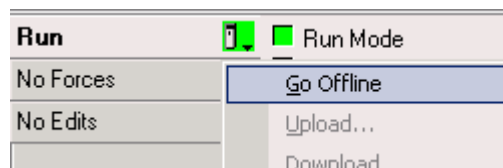
Off



On



3. Verify that the lights on both the embedded and POINT digital output modules turn on.
4. Press **Ctrl+T** to toggle the state back to 0 (off).
5. Choose **Go Offline**.



Additional Resources

Resource	Description
Point I/O Ethernet Adapter Installation Instructions, publication 1734-IN590	Provides details regarding installation of the adapter and technical specifications.
1734 Point I/O ControlNet Adapter Installation Instructions, publication 1734-IN582	Provides details regarding installation of the adapter and technical specifications.
Point I/O DeviceNet Adapter Installation Instructions, publication 1734-IN026	Provides details regarding installation of the adapter and technical specifications.
POINT I/O Wiring Base Assembly Installation Instructions, publication 1734-IN511	Provides details regarding installation of the POINT I/O wiring base.
Cold Junction Compensated Terminal Block Installation Instructions, publication 1734-IN583	Provides details regarding installation of the Cold Junction Compensated Terminal Block wiring base.
Point I/O Protected Output Module Installation Instructions, publication 1734-IN056	Provides details about the installation and wiring of POINT I/O Protected Output Modules.
FLEX I/O DC Power Supply Modules Installation Instructions, publication 1794-IN069	Provides details about the installation and wiring of FLEX I/O power supplies.
ControlLogix Controllers Common Procedures Programming Manual, publication 1756-PM001	Provides details about adding and configuring modules, establishing communication, and writing ladder logic.

Publications are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Notes:

Create a PowerFlex 40 Application

In this chapter, you mount and wire power to a PowerFlex 40 drive, configure your communication adapter, and make network connections. You then configure a PowerFlex 40 drive using the drive keypad and add the drive to your project using RSLogix 5000 software. This project builds upon the project created in Chapter 3.

Before You Begin

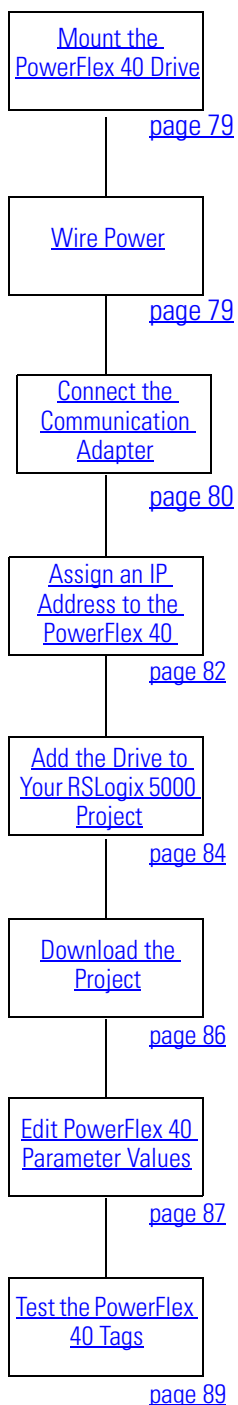
- Create a project using RSLogix 5000 software, see Chapter 3.

What You Need

- PowerFlex 40 drive.
- Communication adapter for use with the PowerFlex 40 drive (22-COMM-E, EtherNet/IP adapter).
- Communication adapter cover for use with the PowerFlex 40 drive.
- No additional software is required.

Follow These Steps

If you have a PowerFlex 40 drive, complete these steps for your network.

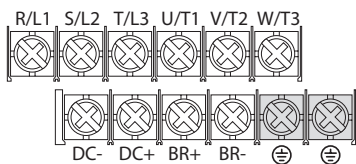
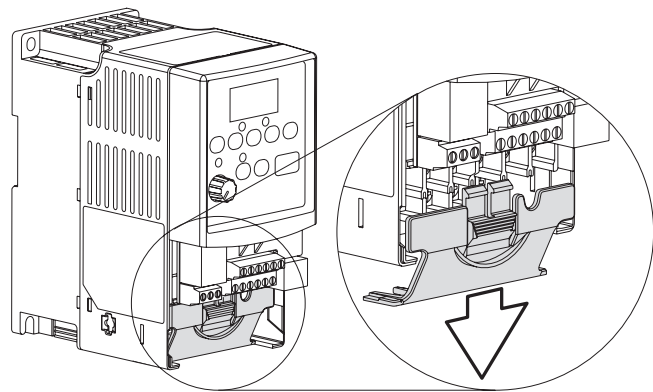
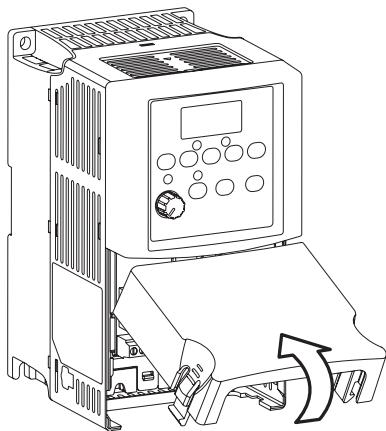


Mount the PowerFlex 40 Drive

For this quick start, the PowerFlex 40 drive is simply placed on a desktop.

For complete mounting instructions, see the PowerFlex 40 Drive User Manual, publication [22B-UM001](#).

Wire Power



WARNING



Verify that all incoming power is turned off before wiring power.

1. Remove the cover.
2. Remove the terminal block cover to access the power connections.
3. Insert the 120/240V AC, V AC COM and chassis ground wires and tighten the terminal screws.

Connect	To
120/240V AC	R/L1
V AC COM	S/L2
Chassis ground	⊕

Connect the Communication Adapter

1. Attach the extending screws.

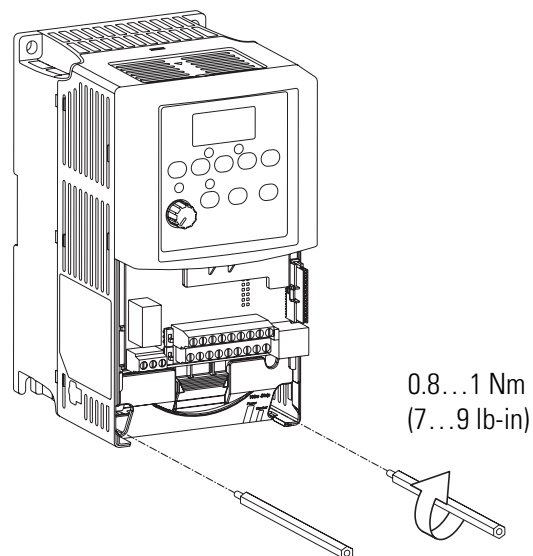
1. Record the Ethernet address (MAC ID) of the Ethernet adapter on the [Network Worksheet](#).

The Ethernet address is found on the label on the back of the Ethernet adapter.

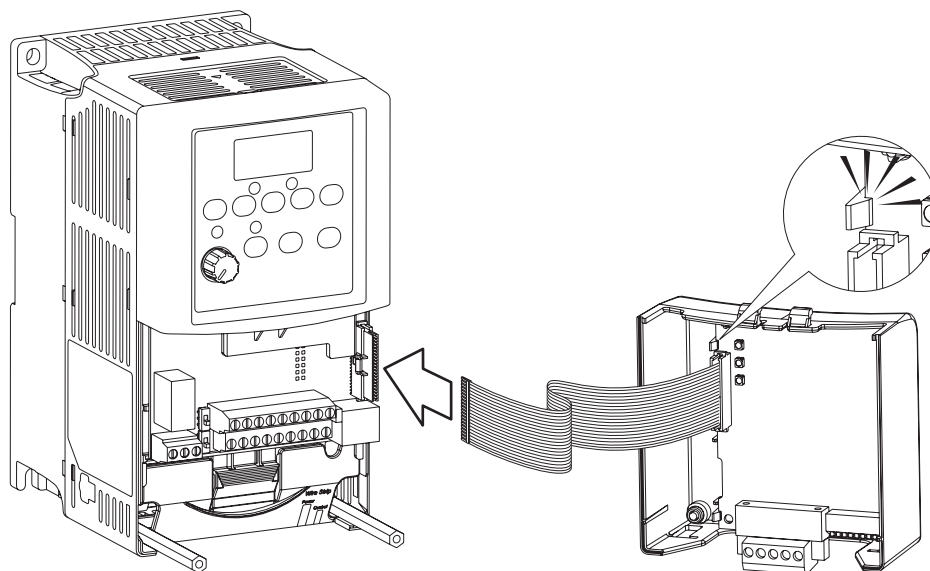
Ethernet Adapter Label

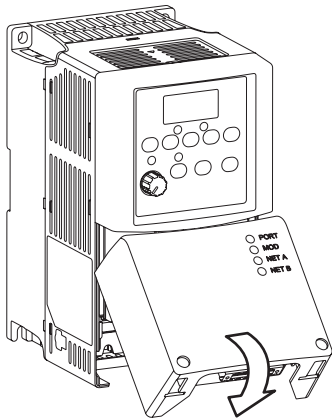
Allen-Bradley
22-COMM-E

SERIES A
FRN: V1.003
SN: 40018FB6
DEVICE: 5VDC 350mA
HW ADDRESS: 00:00:BC:08:85:B6



2. Snap the adapter into the cover and connect the cable from the adapter to the PowerFlex 40 drive.



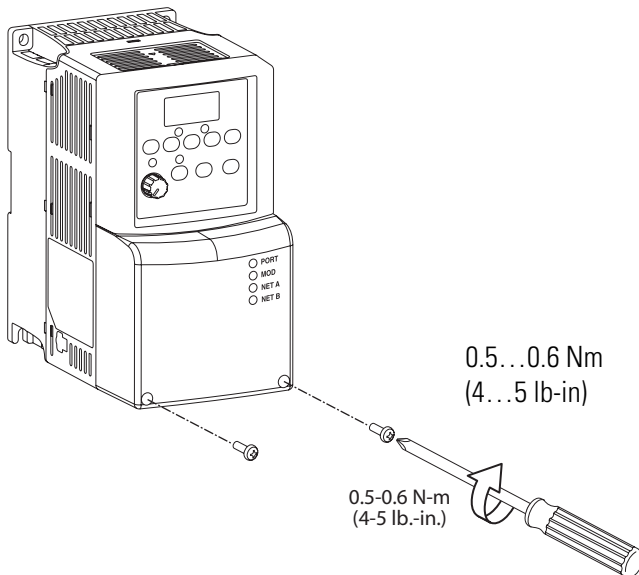


3. Place the adapter cover on the PowerFlex drive.

4. Tighten the screws.

5. Connect the network cable to the adapter.

6. Apply power to the PowerFlex 40 drive.



Assign an IP Address to the PowerFlex 40 Drive

EtherNet/IP network

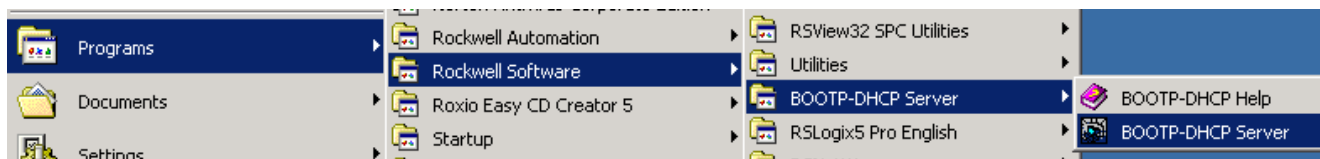
In this chapter, you use the BOOTP/DHCP server to assign an IP address to the PowerFlex 40 drive. You use the BootP server that was installed with RSLogix 5000 software.

TIP

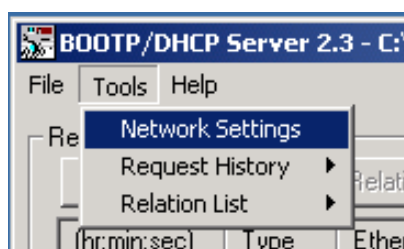
Devices on the EtherNet/IP network broadcast requests for IP addresses until the IP addresses have been assigned.

The procedure in this chapter uses the BOOTP server packaged with RSLogix 5000 software to assign IP addresses, however, any industry-standard BootP server can be used.

1. After you have installed and connected your adapter, launch the BOOTP/DHCP Server utility.

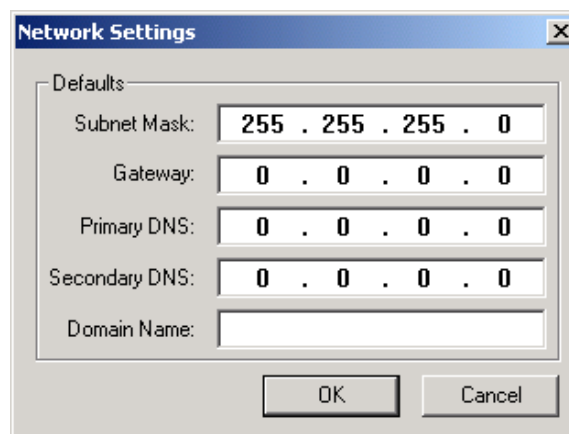


2. From the Tools menu, choose **Network Settings**.



3. Enter the Subnet Mask from the [Network Worksheet](#).

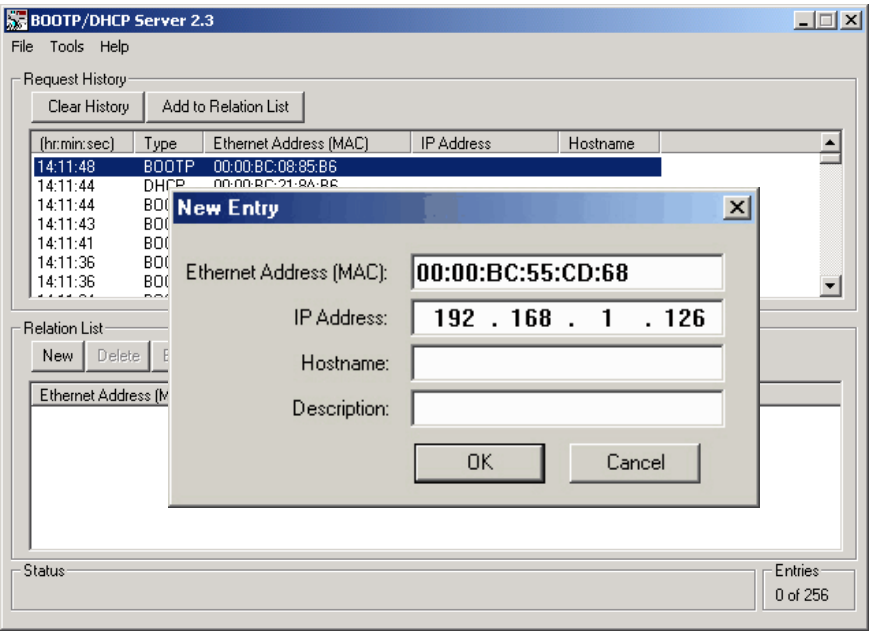
4. Click **OK**.



The Request History displays all the devices, including the drive, on your network that need an IP address. The Ethernet address (MAC ID) of the drive corresponds with the address you recorded on [Network Worksheet](#).

- 5. Double-click the request from your adapter.
- 6. Enter the IP address and record it on the [Network Worksheet](#) inside the back cover.

If you are not using an isolated network, obtain these numbers from your network administrator.



IP Addresses Assigned Successfully

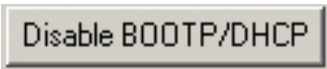
Ethernet Address (MAC)	Type	IP Address
00:00:BC:55:CD:68	BOOTP	192.168.1.126
00:00:BC:21:92:13	DHCP	192.168.1.127

- 7. Click **OK**.

IMPORTANT

For a device to retain its IP address through a power cycle, BootP/DHCP must be disabled. Complete step 8 to disable BootP/DHCP for the drive.

- 8. To disable BootP/DHCP, select the drive from the Relation List and click **Disable BOOTP/DHCP**.



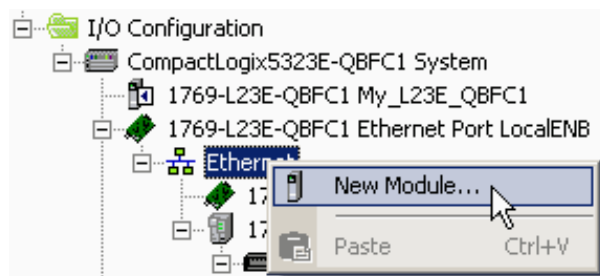
[Disable BOOTP/DHCP] Command successful appears in the Status bar.

- 9. Close the BOOTP/DHCP Server utility.

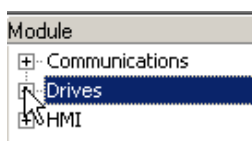
If you are prompted to save changes, click **No**.

Add the Drive to Your RSLogix 5000 Project

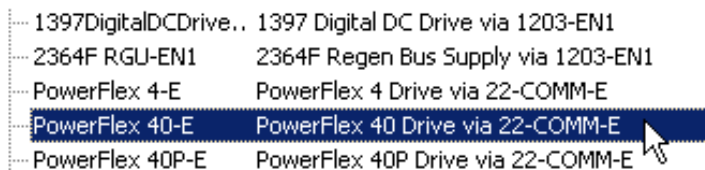
1. Verify that you are not online with the packaged controller.
2. Right-click your network port and choose **New Module**.



3. Expand **Drives**.



4. Select the **PowerFlex 40-E**.



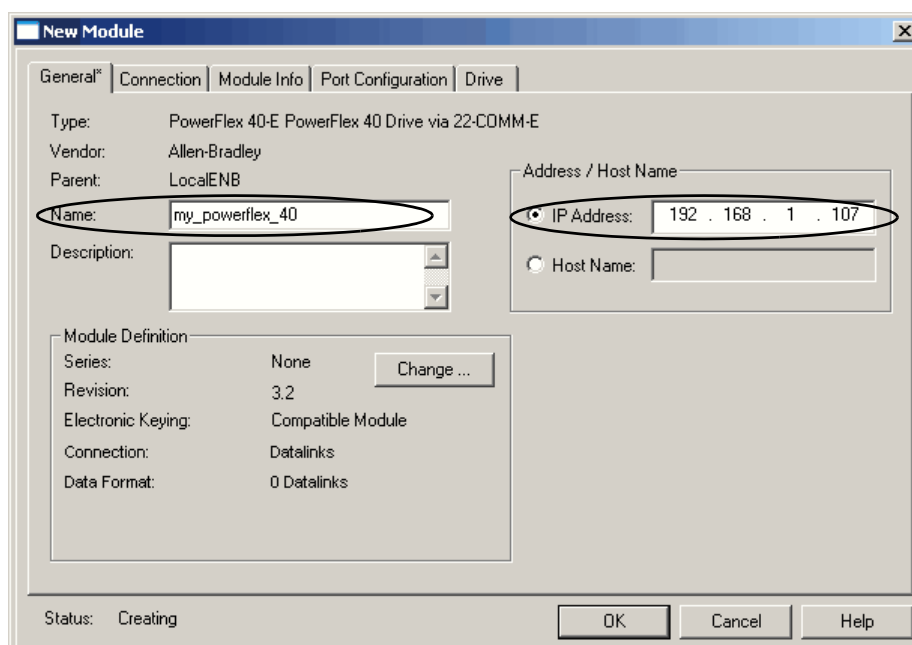
5. Click **OK**.

6. In the Name box, type a name for the drive.

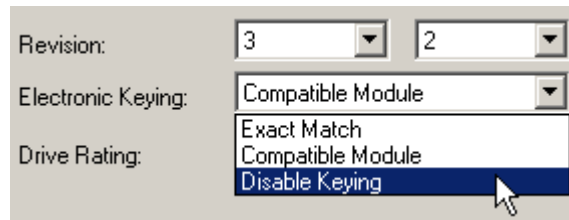
7. Enter the **IP Address** for your drive.

Use the [Network Worksheet](#) as a reference.

8. Click **Change**.



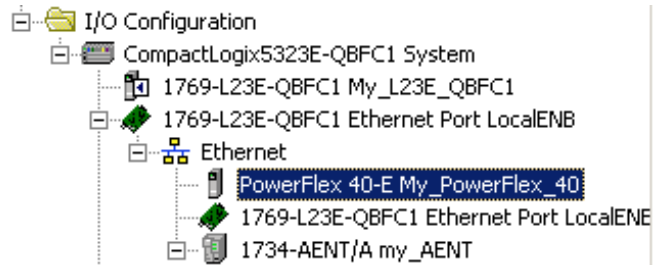
9. From the Electronic Keying pull-down menu, select **Disable Keying**.



10. Click **OK**.

11. Click **OK** again.

The PowerFlex 40 is added to the controller organizer.



Download the Project

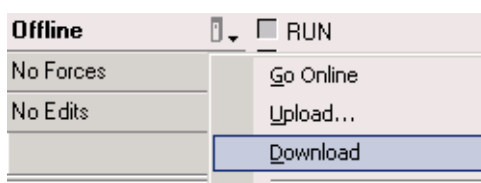
TIP

If you receive a fault message on your PowerFlex 40, press  on the keypad to clear the fault.

1. If you have not already done so, move the keyswitch on your controller to PROG.

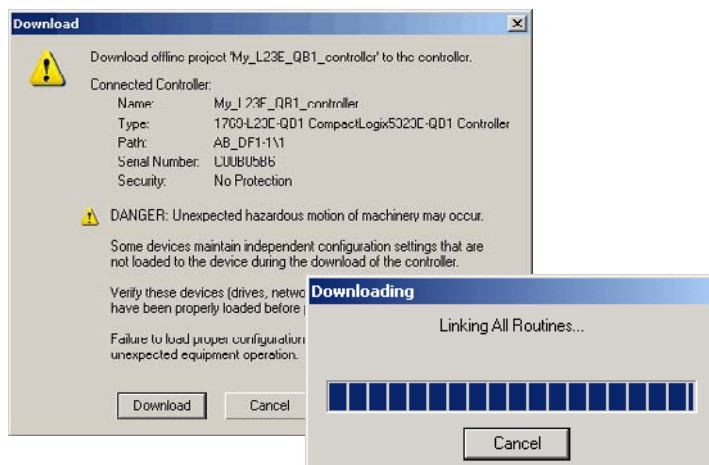


2. Click the Controller Status icon and choose **Download**.



3. Click **Download**.

The project downloads to the controller.



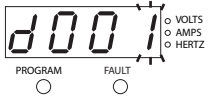
Edit PowerFlex 40 Parameter Values

TIP

Use the table below as a reference when editing parameter values as instructed on page 88.

When power is first applied to the PowerFlex 40 drive, the display defaults to the current value.

Reference for Editing Parameters

Step	Displayed
1. Press  . The parameter number is displayed and blinks.	
2. Press  to select the group letter. The group letter blinks.	
3. Press  or  to scroll through the group letters.	
4. Press  to select the desired group letter. The parameter number blinks.	
5. Press  or  to scroll through the parameter numbers.	
6. Press  to select the desired parameter number. The parameter value is displayed.	
7. Press  or  to scroll through the parameter values. The values blink as you scroll through them.	
8. Press  to select the desired parameter value. The parameter stops blinking.	
9. Press  to return to the parameter number.	
10. Follow this procedure to change other parameter values, or press  repeatedly to return to the value display.	

Use the reference on [page 87](#) to make the following parameter value edits on your PowerFlex 40.

- 1.** If your PowerFlex 40 has been previously used, reset it to factory defaults.

- a. Change the value of parameter P041 from 0 to 1.

The drive is reset and fault F048 is displayed and blinks.

- b. Press  to clear the fault.

- c. Press  to return to editing parameters.

- 2.** Change the value of parameters P036 and P038 from 0 to 5.

Changing these parameters switches control the Start Source and the Speed Reference from the keypad to the communication port. This enables you to control these functions by using RSLogix 5000 tags.

- 3.** Press  to accept parameter edits.

- 4.** Press  to return to the speed display.

Test the PowerFlex 40 Tags

TIP

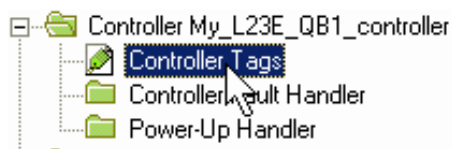
To change a tag in RSLogix 5000 software:

1. Select the tag value.
2. Enter or select the desired value.
3. Press <Enter>.

1. Move the controller keyswitch to **RUN**.



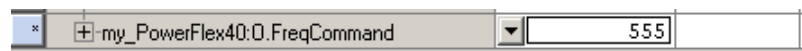
2. Double-click **Controller Tags**.



3. **Expand** the PowerFlex 40 output tag.

My_PowerFlex_40:0	{...}	{...}	AB:PowerFlex40_...
My_PowerFlex_40:0.LogicCommand	2#...		INT
My_PowerFlex_40:0.Stop	0		BOOL
My_PowerFlex_40:0.Start	0		BOOL
My_PowerFlex_40:0.Jog	0		BOOL
My_PowerFlex_40:0.ClearFaults	0		BOOL
My_PowerFlex_40:0.Forward	0		BOOL
My_PowerFlex_40:0.Reverse	0		BOOL
My_PowerFlex_40:0.LocalControl	0		BOOL
My_PowerFlex_40:0.MOPIncrement	0		BOOL
My_PowerFlex_40:0.AccelRate1	0		BOOL
My_PowerFlex_40:0.AccelRate2	0		BOOL
My_PowerFlex_40:0.DecelRate1	0		BOOL
My_PowerFlex_40:0.DecelRate2	0		BOOL
My_PowerFlex_40:0.FreqSel01	0		BOOL
My_PowerFlex_40:0.FreqSel02	0		BOOL
My_PowerFlex_40:0.FreqSel03	0		BOOL
My_PowerFlex_40:0.MOPDecrement	0		BOOL
My_PowerFlex_40:0.FreqCommand	0		INT

4. At the O.FreqCommand Tag, enter **555**.



The value 555 equals 55.5 Hz.

4. At the O.Start tag, enter **1**.



The drive begins to run and the display registers the drive's speed until it reaches 55.5 Hz.

5. After the drive has reached 55.5 Hz, enter **0** at the O.Start tag.



6. At the O.Stop tag, enter **1**.

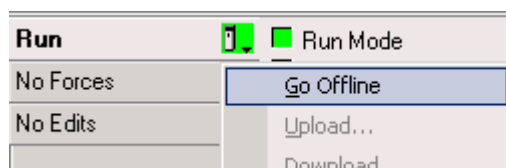


The drive begins to slow until reaching 0.0 Hz.

7. When the drive reaches 0.0 Hz, enter **0** at the O.Stop tag.



8. Go Offline.



By starting and stopping the drive, you verified that:

- the controller is correctly communicating with the drive.
- the drive can receive simple commands.

Additional Resources

Resource	Topic
Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001	Provides details about adding and configuring modules, establishing communication, and writing ladder logic.
PowerFlex 40 Adjustable Frequency AC Drive User Manual, publication 22B-UM001	Provides information about installing, programming, editing parameters, and troubleshooting the PowerFlex 70 drive.

Publications are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Create a PanelView Plus Application

In this chapter, you mount and wire power to a PanelView Plus terminal, configure network communication, and make network connections. You also use RSView software to create indicators to represent the push button and output you created in Chapter 3. You transfer the application to the PanelView Plus terminal so you can test communication with the controller.

Before You Begin

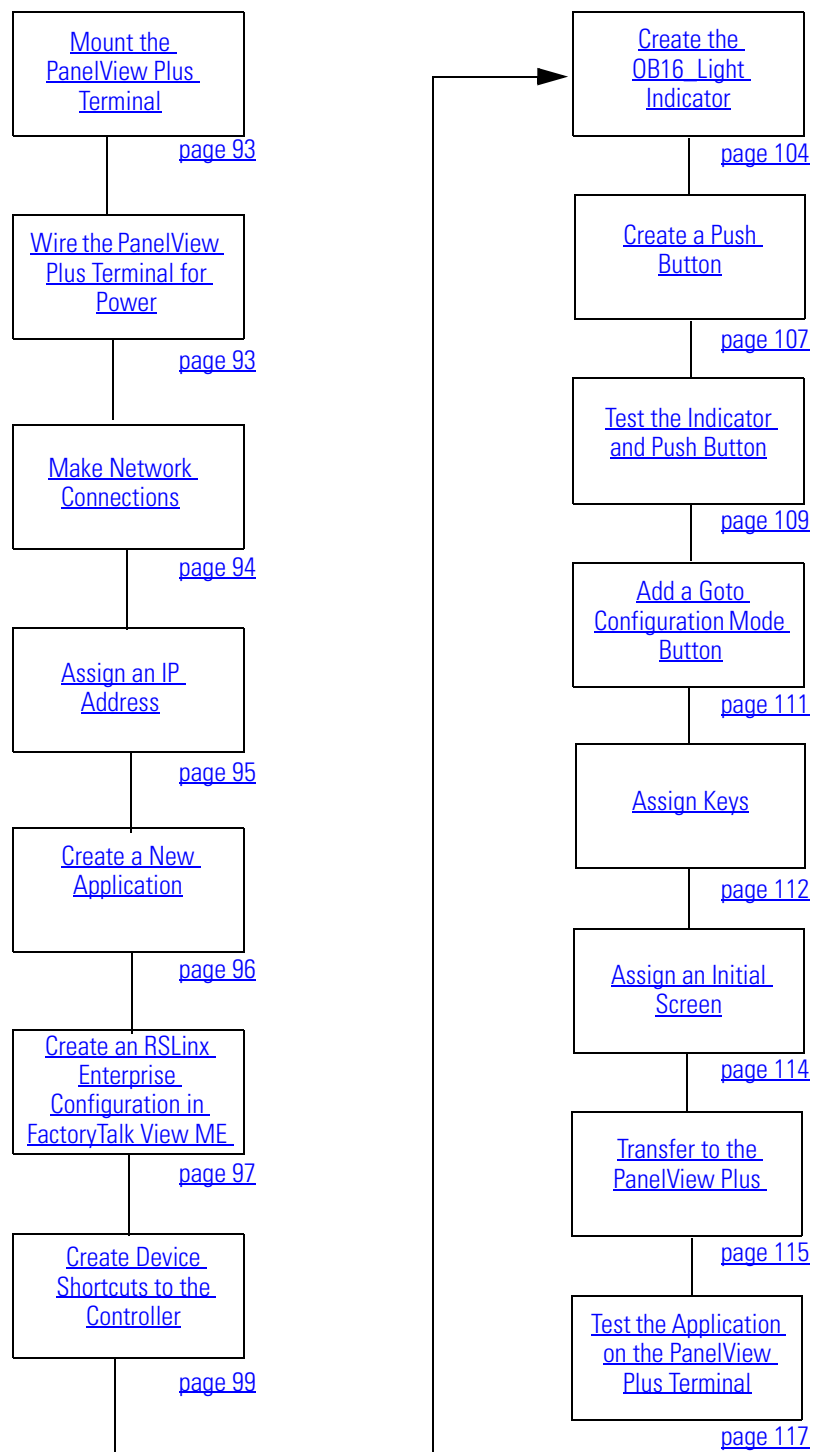
- Create a project in RSLogix 5000, see Chapter 3.
- Install and configure your network, see Chapters 1 and 2.

What You Need

- FactoryTalk View Studio Machine Edition software.
- PanelView Plus terminal - this quick start uses a PanelView Plus 600 terminal.
- One power supply, if you are using a PanelView Plus powered by DC power. We recommend either a 1794-PS3 or a 2711P-RSACDIN, but any DC power supply can be used.
- Ethernet cable and switch.
- For a serial connection, 2706-NC13 cable.

Follow These Steps

If you have a PanelView Plus terminal, complete these steps.



Mount the PanelView Plus Terminal

2711P-K10C4D1 terminal and all packaged controllers

For the purpose of this quick start, the PanelView Plus terminal can be propped on a desktop.

For further mounting instructions, see the PanelView Plus Terminals User Manual, publication [2711P-UM001](#).

Wire the PanelView Plus Terminal for Power

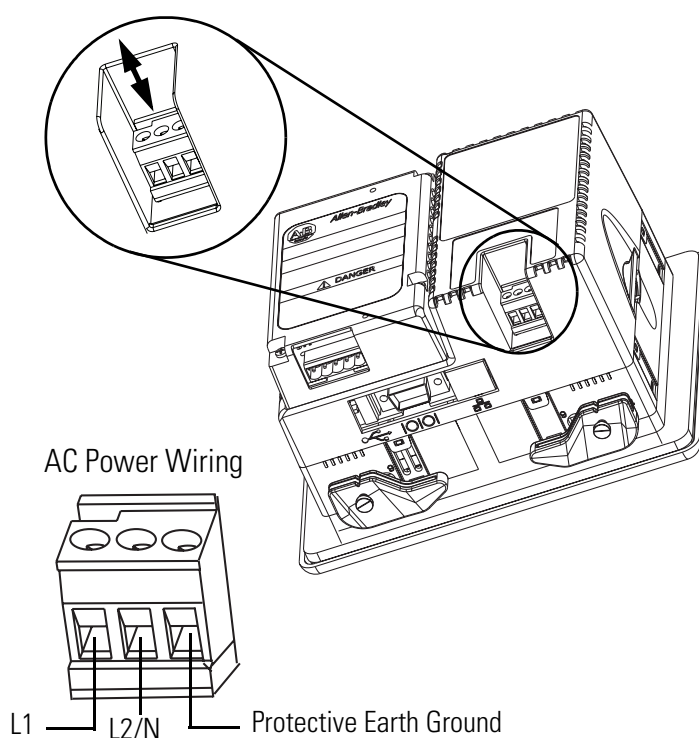
WARNING



Verify that all incoming power is turned off before wiring power.

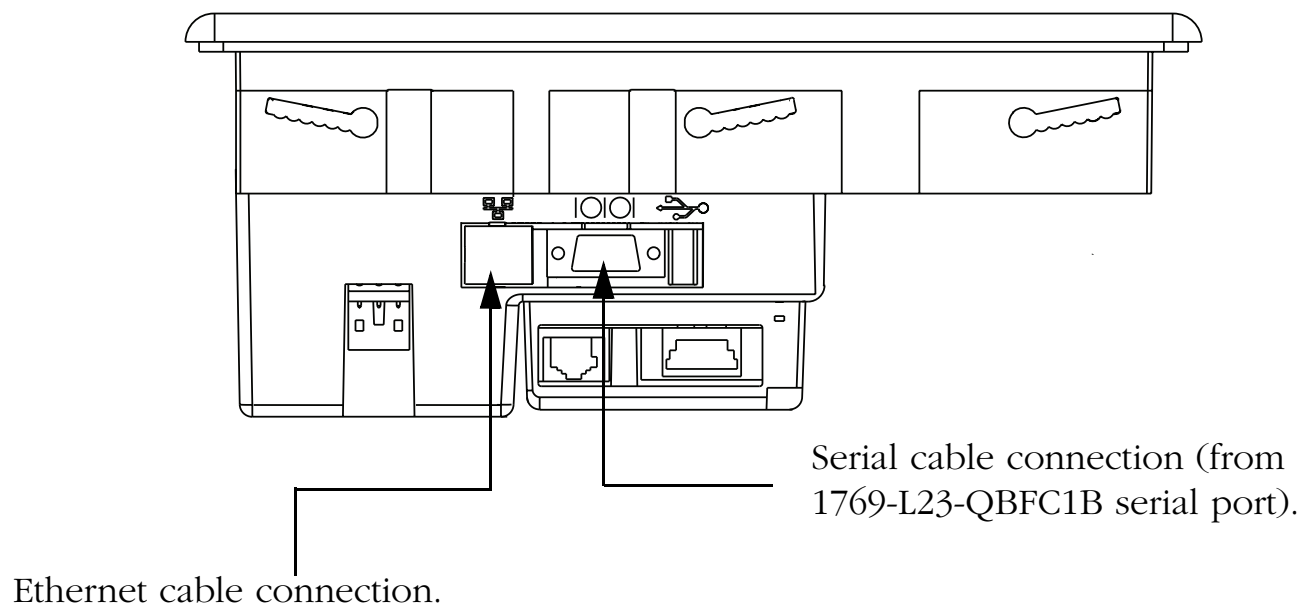
For additional information about wiring power for the PanelView Plus 600 terminal, see the PanelView Plus 400 and 600 Terminals Installation Instructions, publication [2711P-IN002](#).

1. Remove the wiring terminal block using a flat-blade screwdriver to gently pry the terminal block from the slot.
2. Connect power wires as shown in the diagram.
3. Insert the wiring terminal block and press it into place.



Make Network Connections

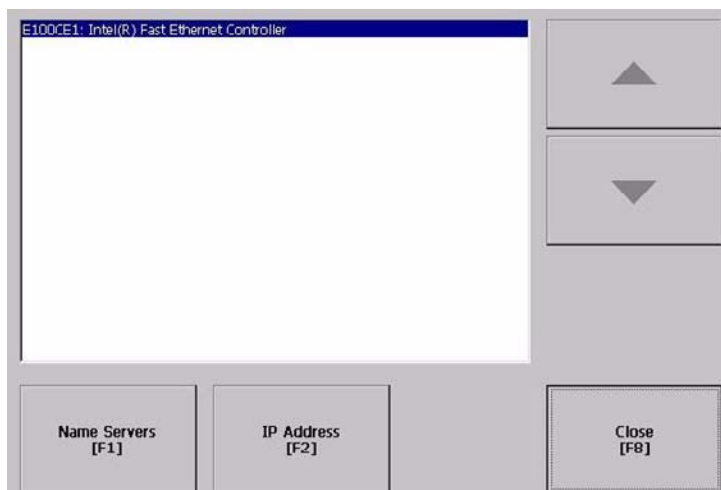
Required for all controllers



Assign an IP Address

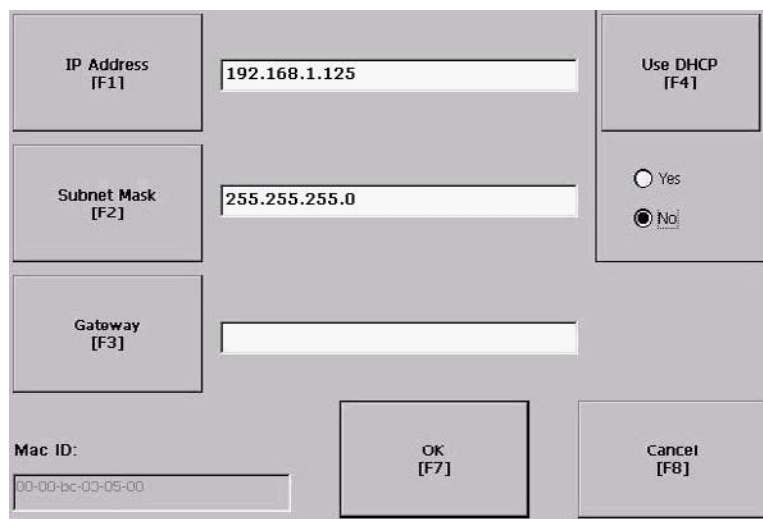
Required for all controllers

1. On the PanelView Plus terminal's main page, press **Terminal Settings [F4]**.
2. Navigate to:
Networks and Communications > Network Connection > Network Adaptors > Built-in Ethernet Controller.
3. Press **IP Address [F2]**.
4. Press **IP Address [F1]** and enter an IP address.



For more information about IP addresses, see Chapter 2, on [page 91](#).

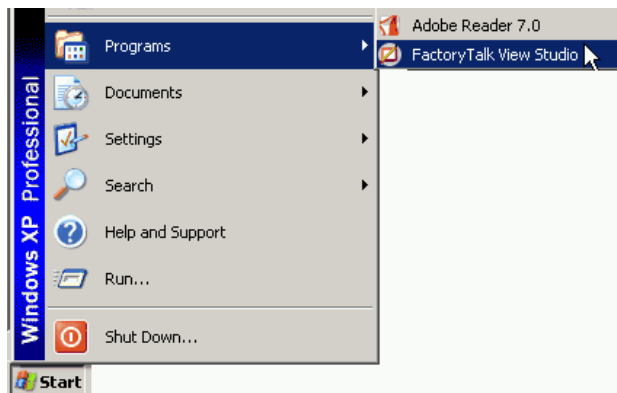
5. Record the IP address on the [Network Worksheet](#) and press **Enter**.
6. Select **Subnet Mask [F2]**.
7. Enter the subnet mask you wrote on the [Network Worksheet](#) located inside the back cover.
8. Press **Enter**.
9. Press **OK [F7]**, then Press **OK [F7]** again.
10. Press **Close [F8]** until you return to the



Create a New Application

All controllers

1. Launch FactoryTalk View Studio software.

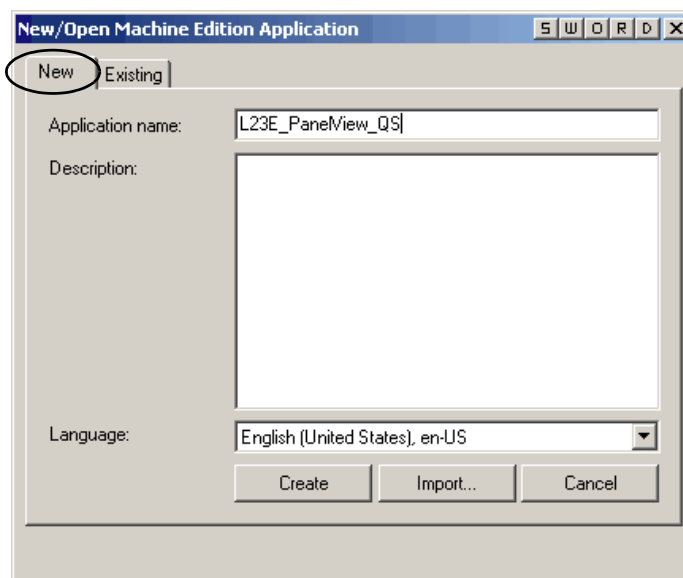


FactoryTalk View software opens.



2. In the Application name box, type a name and click **Create**.

Do not use spaces in the tag name. Use underscores (_) instead.



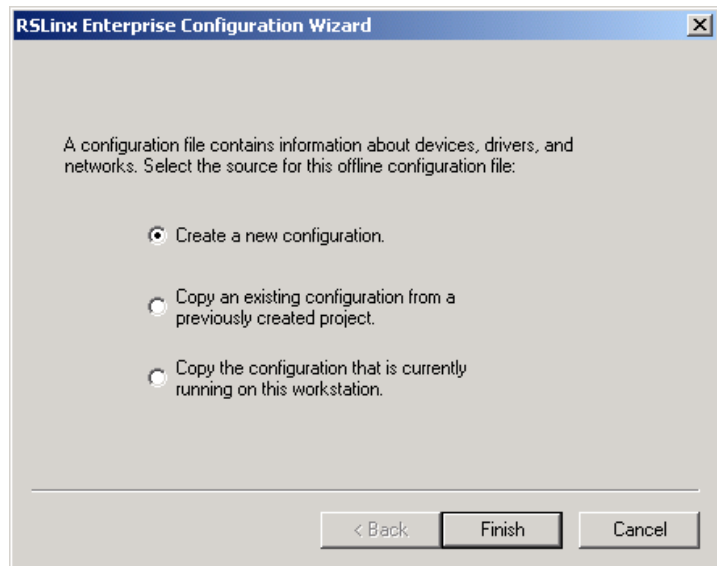
Create an RSLinx Enterprise Configuration in FactoryTalk View ME Software

All controllers

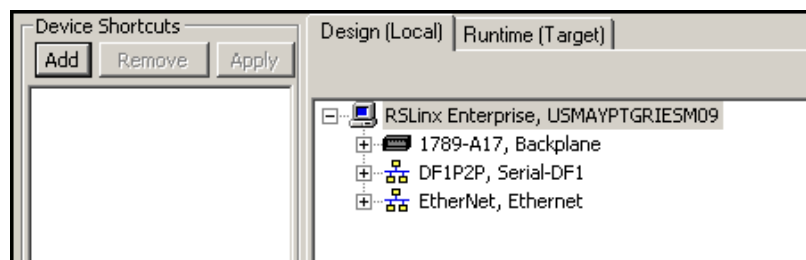
1. In the organization tree, expand **RSLinx Enterprise** and double-click **Communication Setup**.



2. Click **Finish**.

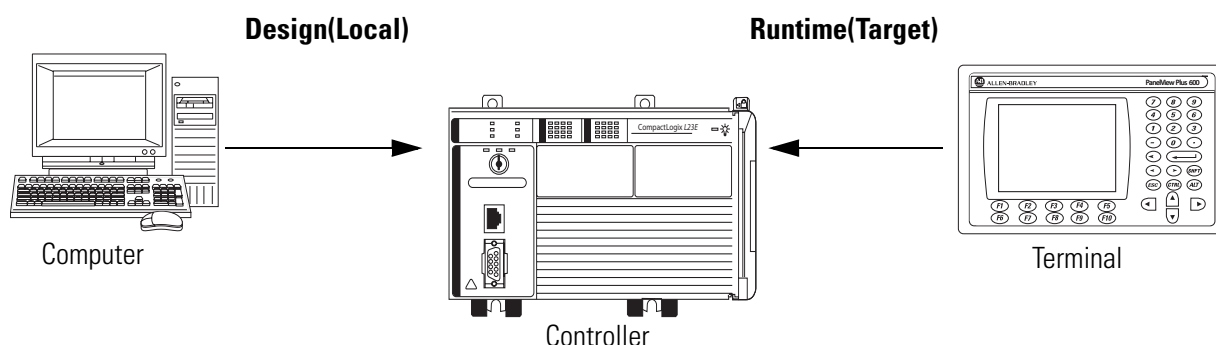


RSLinx Enterprise opens.



About the Design(Local) and Runtime(Target) Paths

- The **Design(Local)** tab defines the path from the computer to the controller. The local path is the communication path used when in Test Run mode and when browsing tags during online application of an HMI display.
- The **Runtime(Target)** tab defines the path from the PanelView Plus terminal to the controller. The PanelView Plus terminal also needs to communicate with the controller, but sometimes a different path is used.



If you are using an Ethernet network (that is, either a 1769-L23E-QB1B or 1769-L23E-QBFC1B controller), go to Create Device Shortcuts to the Controller on [page 99](#).

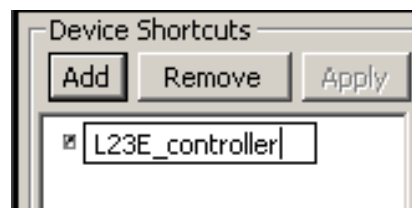
If you are using a serial network (that is, a 1769-L23-QBFC1B controller), go to Create Device Shortcuts to the Controller on [page 101](#).

Create Device Shortcuts to the Controller

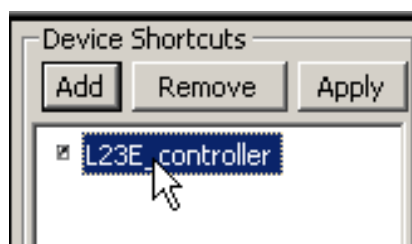
1769-L23E packaged controllers

(for a 1769-L23 controller, skip to [page 101](#))

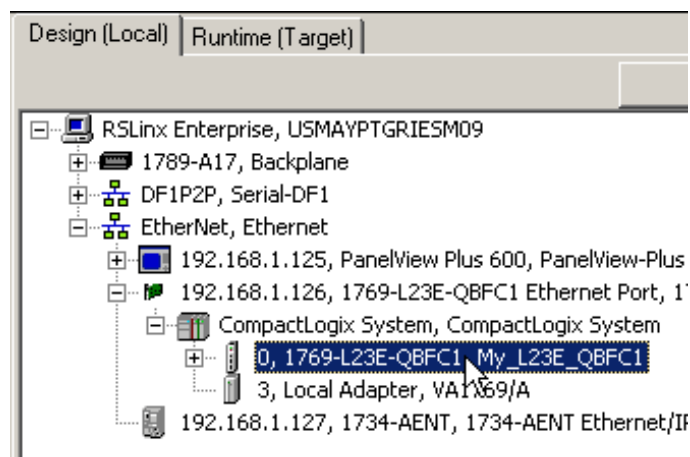
1. Click **Add** and type a shortcut name.



2. Select the newly-named shortcut.



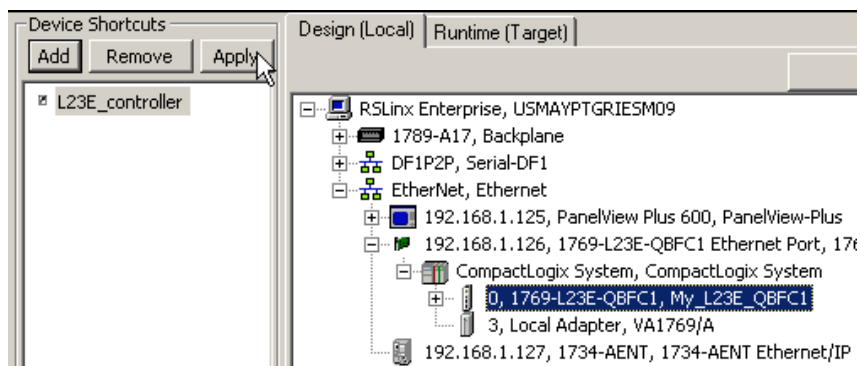
3. In the **Design(Local)** tab, browse to and select your controller.



4. Click **Apply**.

The shortcut to the controller is now created.

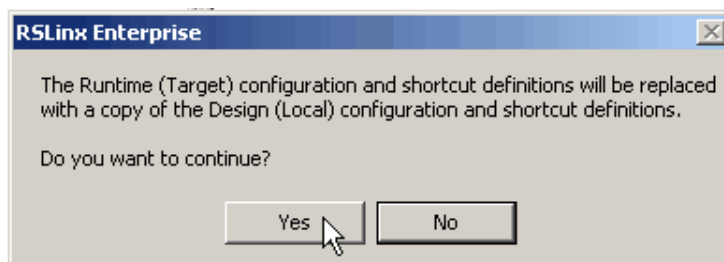
5. Click **Yes**.



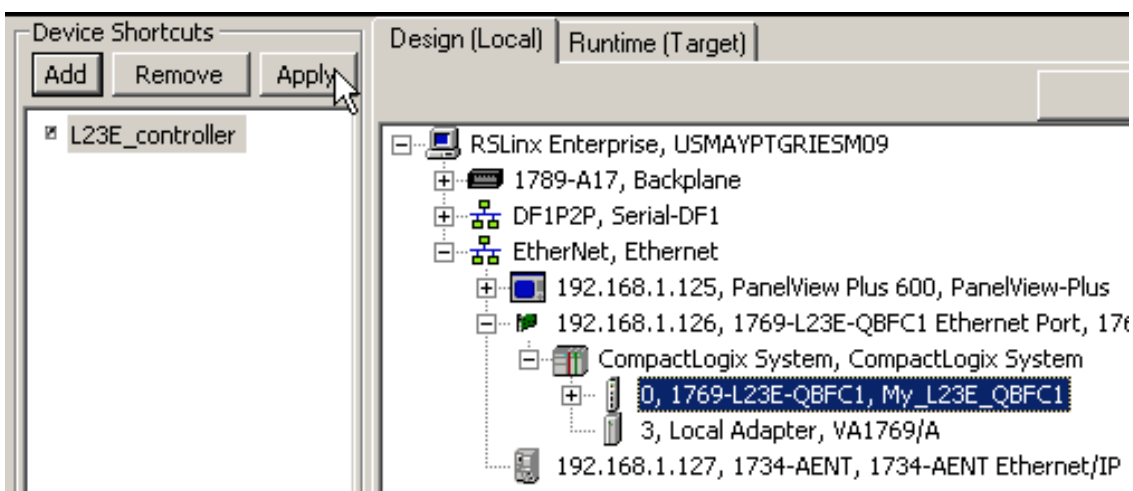
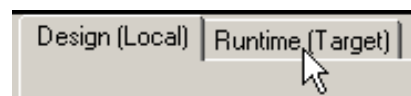
6. With the shortcut highlighted, click **Copy from Design to Runtime**.



7. Click **Yes**.



8. Click the **Runtime(Target)** tab to view the path from the PanelView Plus terminal to the controller.



9. Verify that the shortcut path in this Runtime(Target) tab is the same as the shortcut path specified in the Design(Local) tab.

Go to Create the OB16_Light Indicator on [page 104](#).

1769-L23 controller

(to complete this step on the 1769-L23E controllers, see [page 99](#).)

IMPORTANT

Before you add the Serial driver in the following steps, you must stop and delete the Serial driver in RSLinx Classic.

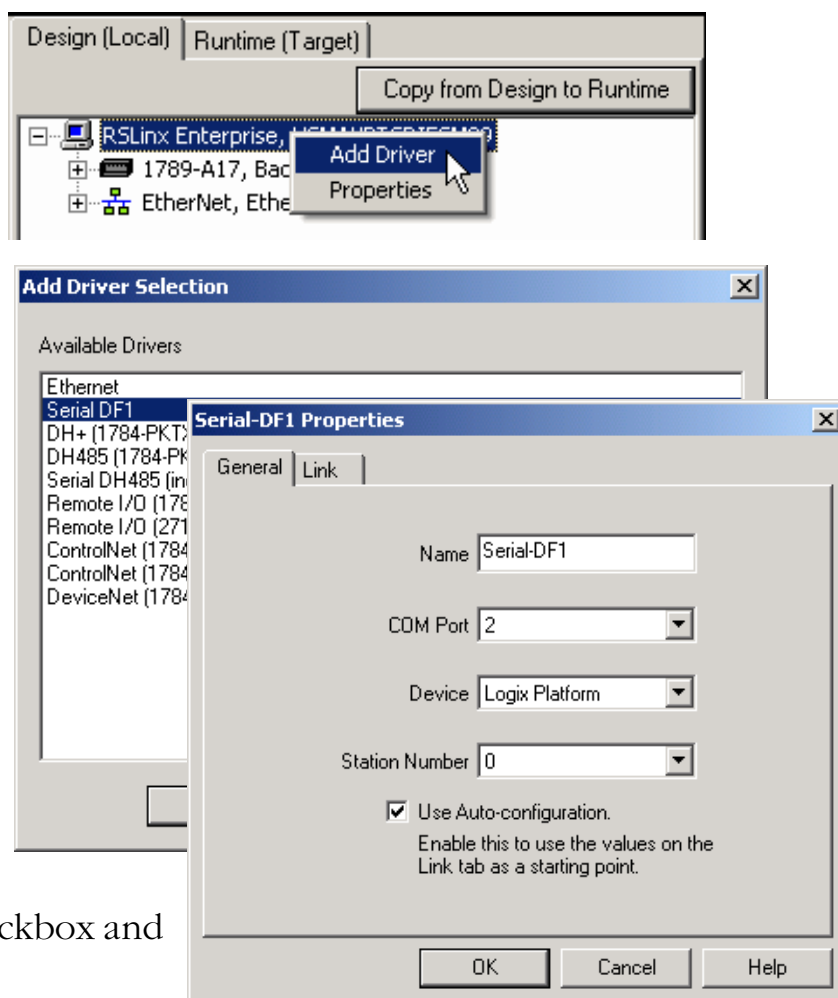
Depending on the messages that display, you might have to take all programming and configuration software offline. To do so, from the RSLinx Classic File menu, choose **Exit and Shutdown**.

TIP

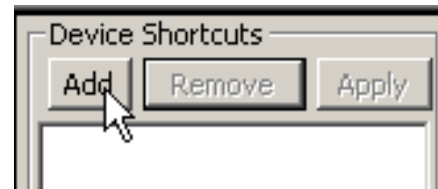
If RSLinx Enterprise has been previously configured with a DF1 serial driver, the driver displays in the RSLinx Enterprise browser.

If the DF1 driver displays in the browser, you do not need to add a serial driver. Skip to step 6 if you do not need to add the serial driver.

1. Right-click your workstation in the RSLinx Enterprise browser and choose **Add Driver**.
2. Select the **Serial DF1** driver and click **OK**.
3. Select the Comm Port on your computer to which you connected the 1756-CP3 cable.
4. From the **Devices** pull-down, select **Logix Platform**.
5. Check the **Use Auto-configuration** checkbox and click **OK**.



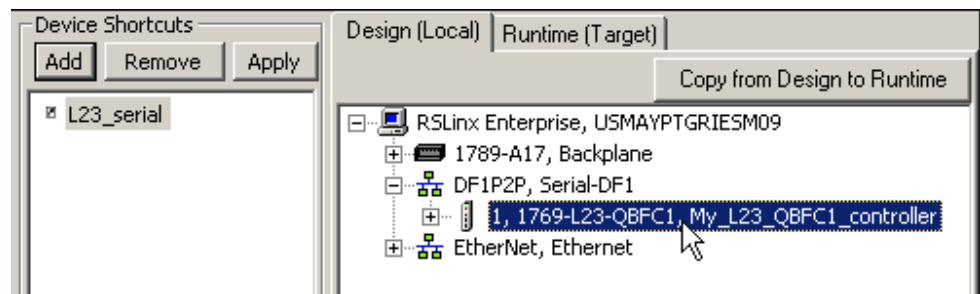
6. Below Device Shortcuts, click **Add**.



7. Type a shortcut name.

8. Select the newly-named shortcut.

9. In the **Design(Local)** tab, browse to and select your controller.



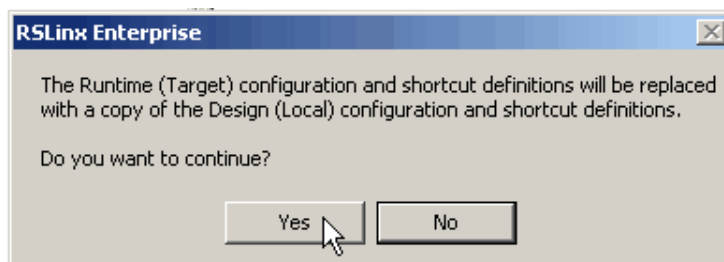
10. Click **Apply**.

The shortcut to the controller is now created.

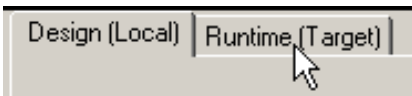
11. With the shortcut highlighted, click **Copy from Design to Runtime**.

A rectangular button with a light gray background and a thin black border. The text "Copy from Design to Runtime" is centered in a black, sans-serif font.

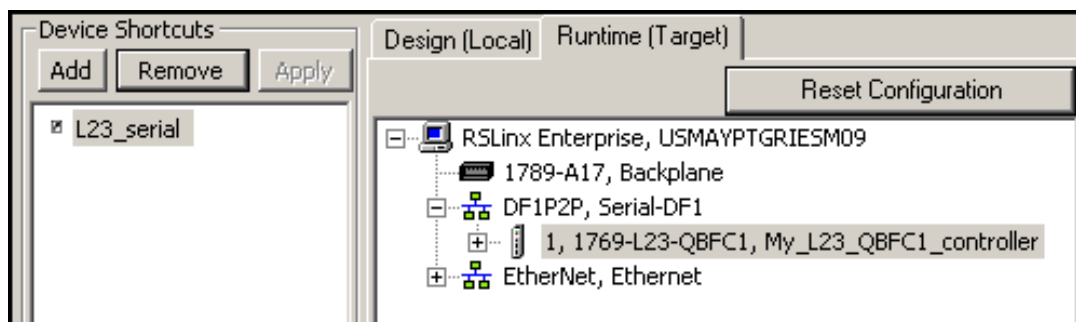
12. Click **Yes**.



13. Click the **Runtime(Target)** tab to view the path from the PanelView Plus terminal to the controller.

A tabbed interface showing two tabs: "Design (Local)" and "Runtime (Target)". The "Runtime (Target)" tab is selected and highlighted with a darker background. A mouse cursor is pointing at the "Runtime (Target)" tab.

14. Verify that the shortcut path in this Runtime(Target) tab is the same as the shortcut path specified in the Design(Local) tab.

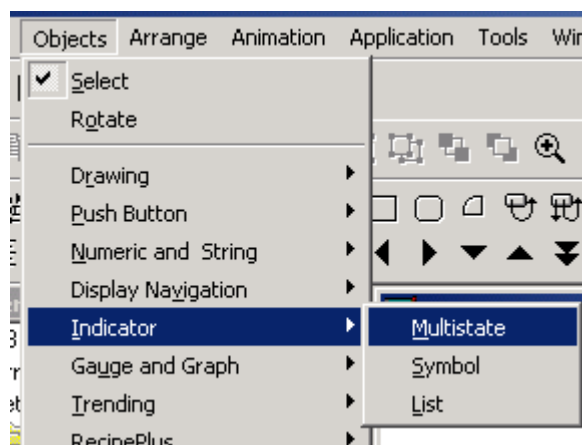


Go to Create the OB16_Light Indicator on [page 104](#).

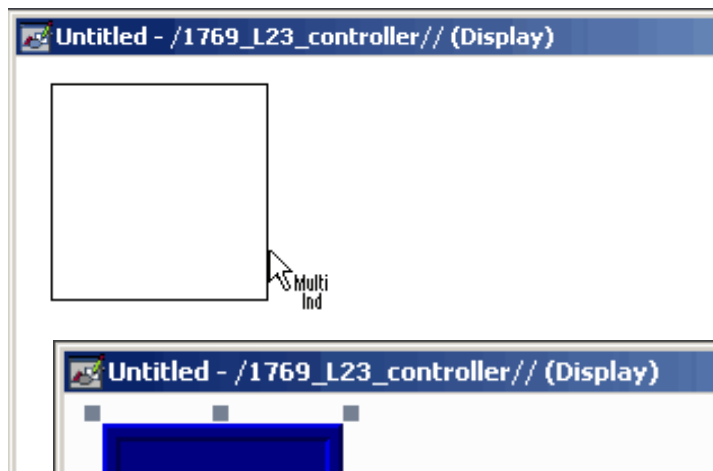
Create the OB16_Light Indicator

All controllers

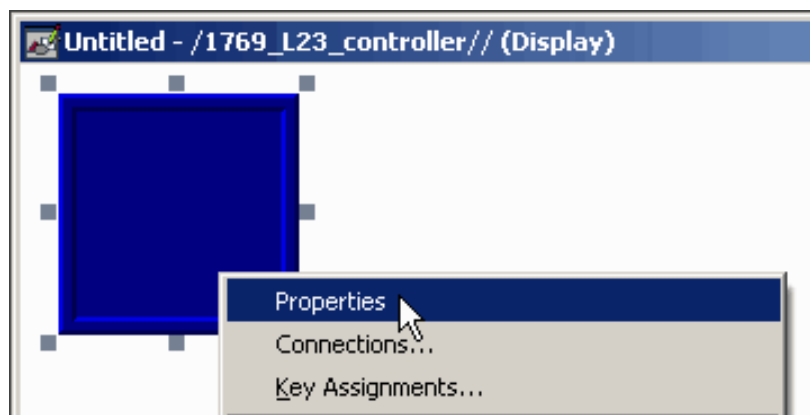
1. In FactoryTalk View organization tree, expand **Graphics**.
2. Right-click **Displays** and choose **New**.
3. From the Objects, choose **Indicator** > **Multistate**.



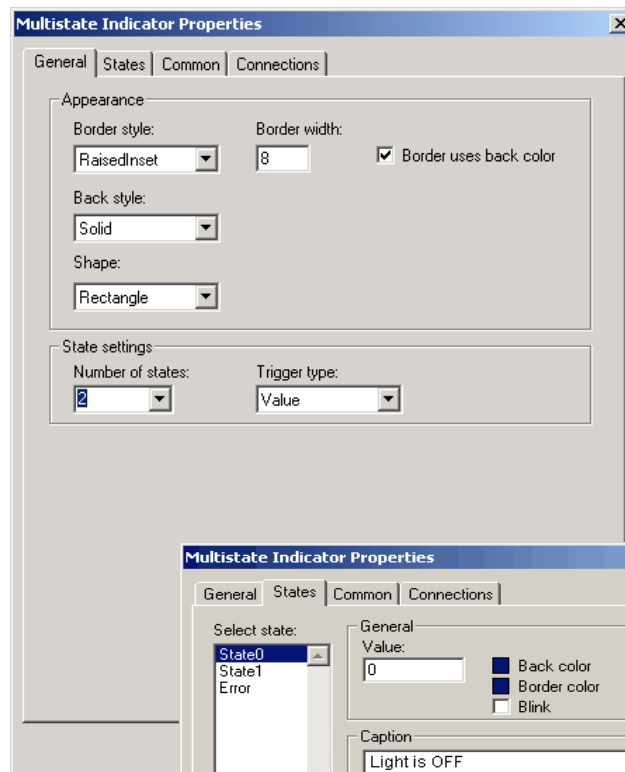
4. Click and drag in the display window to create the indicator.



5. Right-click the indicator and choose **Properties**.



6. On the General tab, in Number of states pull-down choose 2.



7. On the States tab, verify that **State0** is selected.

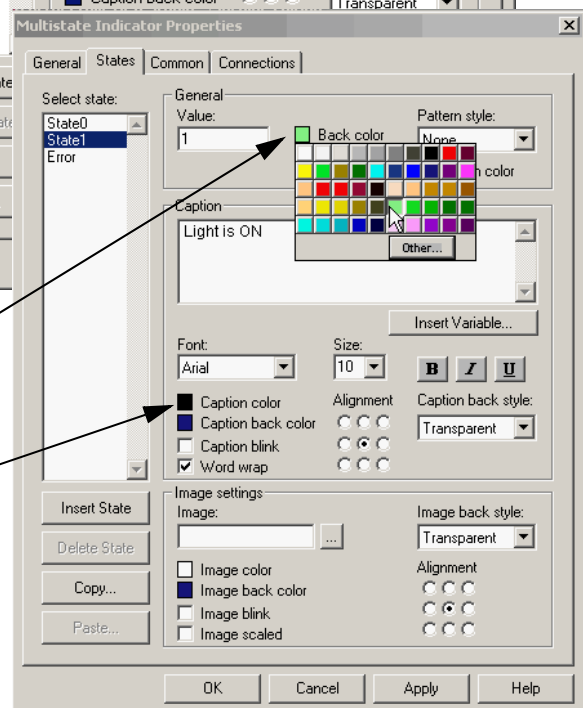
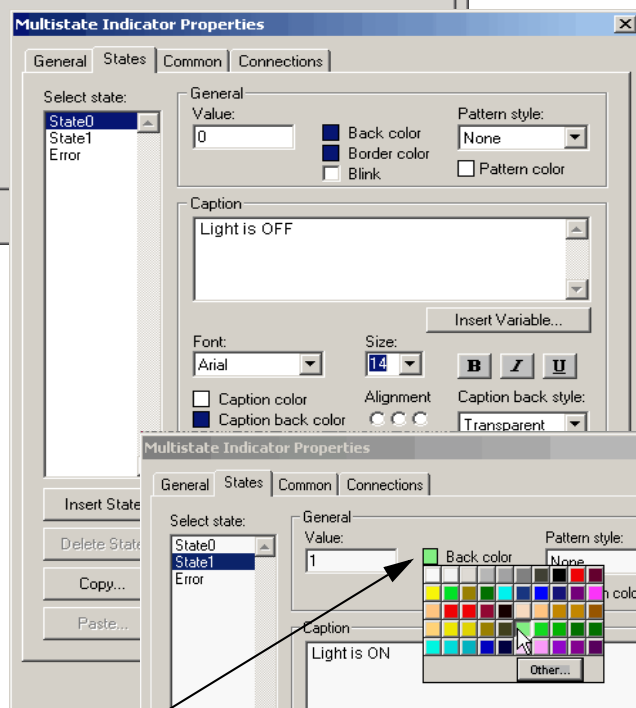
8. In the Caption, type Light is OFF.

9. Select **State1**.

10. In the Caption, type Light is ON.

11. Change the Back color to green.

12. Change the Caption color to black..



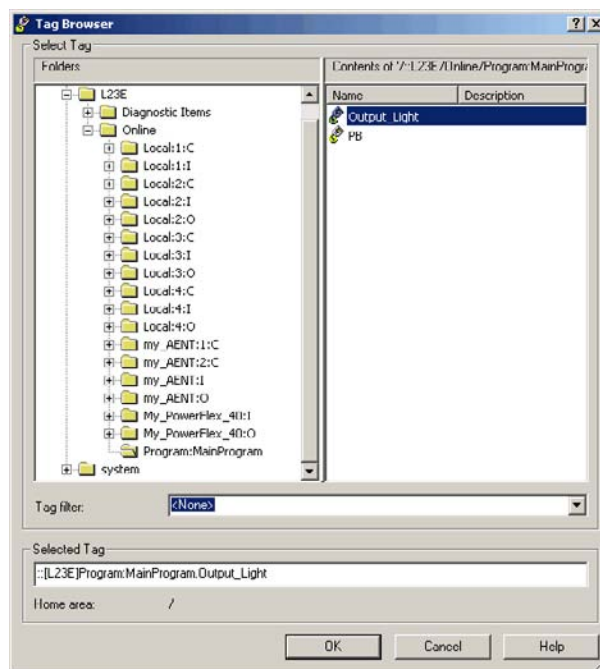
13. On the Connections tab, click ... under Tag.



14. Right click your project and choose **Refresh All Folders**.

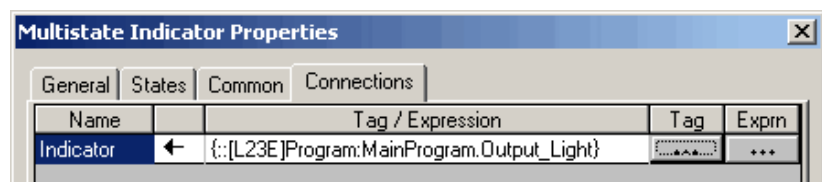


17. Expand the controller shortcut and select **Online > Program: Main Program**.



18. Select **Output_Light** (the name of your output used in ladder logic) and click **OK**.

The Indicator tag is populated.

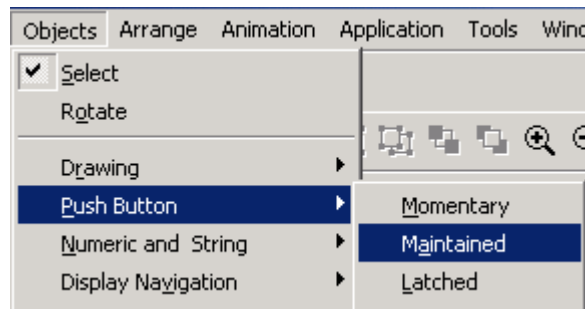


19. Click **OK**.

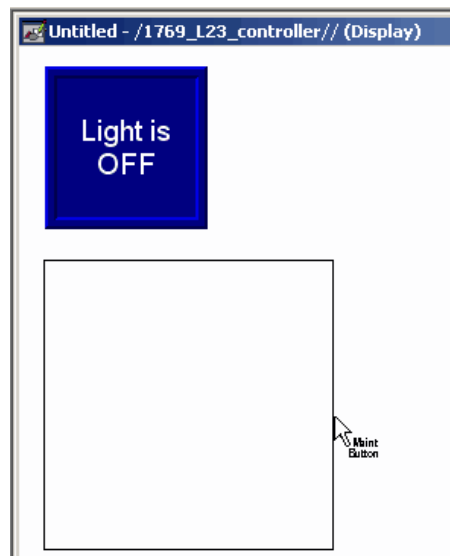
Create a Push Button

All controllers

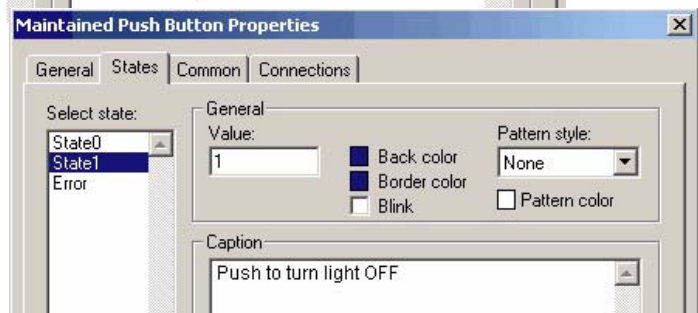
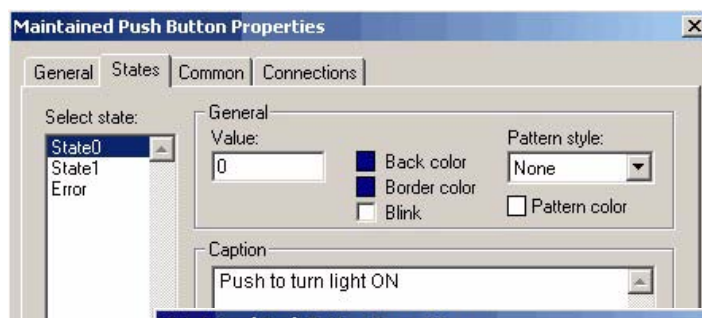
1. From the Objects menu, choose **Push Button > Maintained**.



2. Click and drag to create the push button beneath the indicator.
3. Right-click the push button you just created and choose **Properties**.

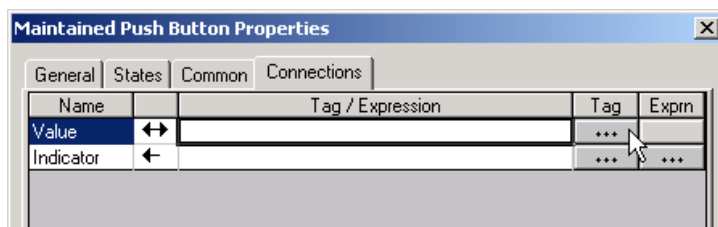


4. On the States tab, verify that **State0** is selected.
5. In the Caption, type Push to turn light ON.
6. Select **State1**.
7. In the Caption, type Push to turn light OFF.

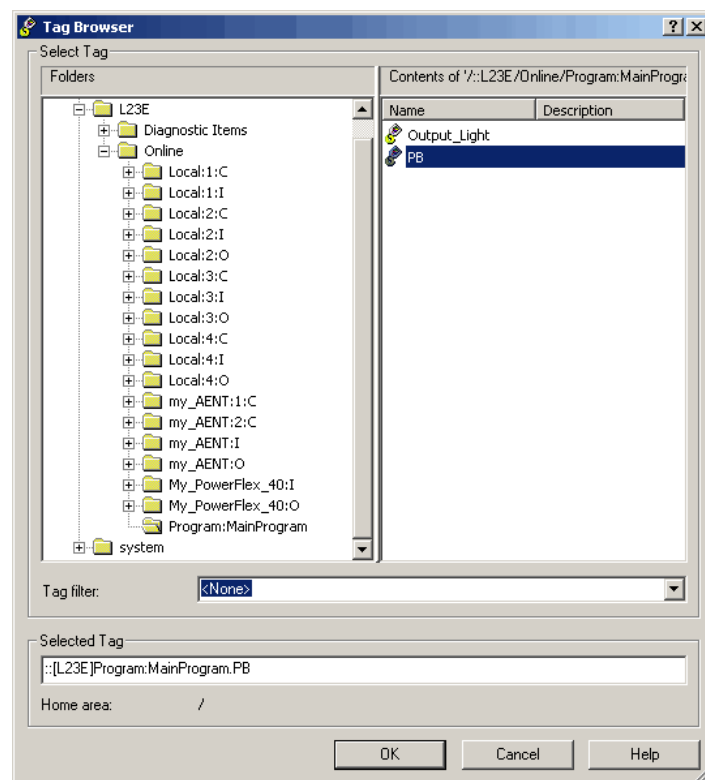


8. Click the **Connections** tab.

9. In the Value row, click ... under Tag.

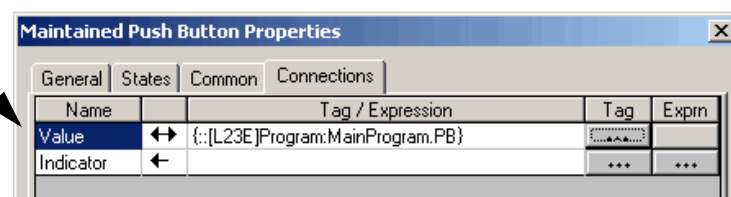


10. Expand your controller shortcut and choose **Online > Program; MainProgram**.



11. Select **PB** and click **OK**.

The Value tag is populated.

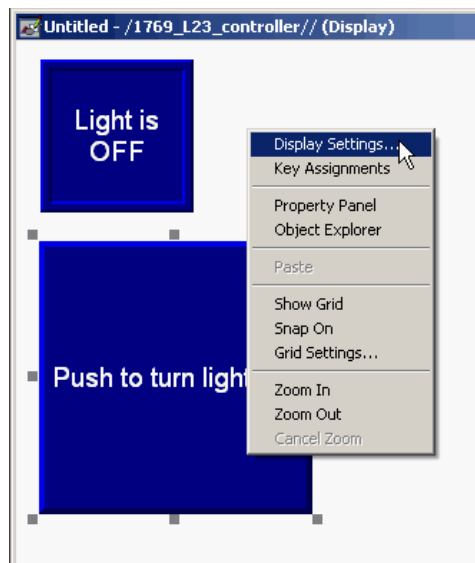


12. Click **OK** to close the properties dialog box.

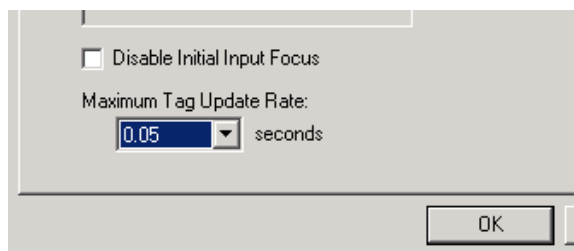
Test the Indicator and Push Button

All controllers

1. Verify that the keyswitch on your controller is moved to Run.
2. Right-click an unused area of the display and select **Display Settings**.



3. Change the Maximum Tag Update Rate to **0.05**.
4. Click **OK** and then click **OK** again.

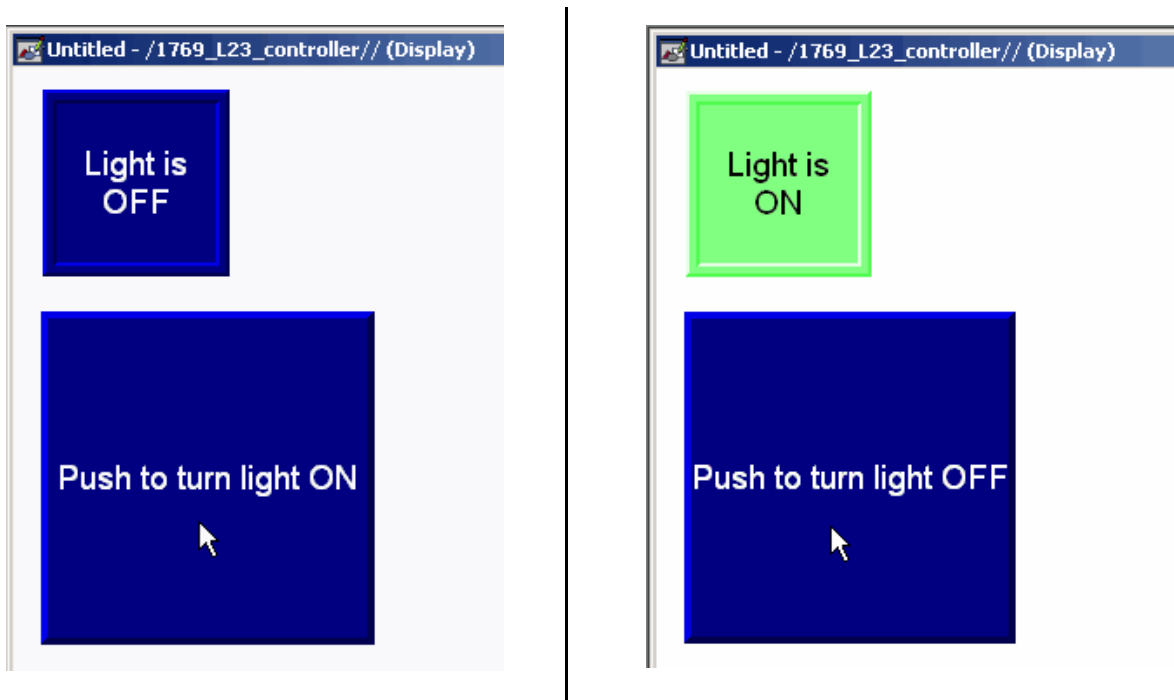


5. Click the Play button.



- Click the Push Button to toggle the state and turn the light on and off.

You can also view the connected logic in the Main Program of the project you created in Chapter 3.



- Click the Stop button.



- Save your changes.

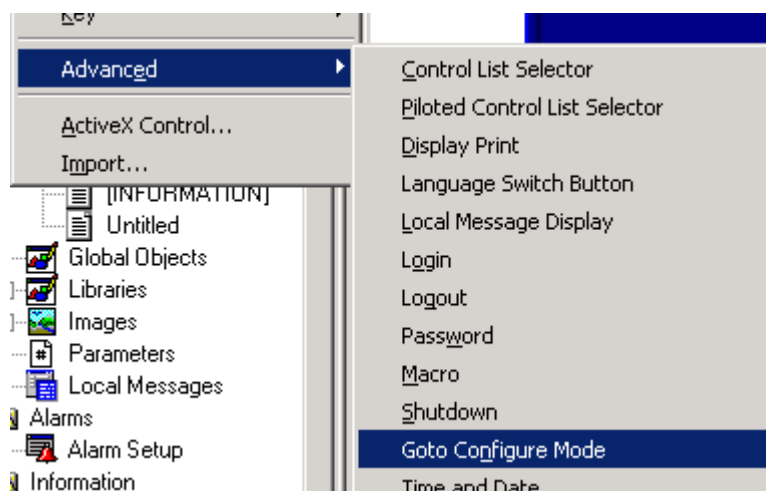


When prompted for a title for the display, type `test_logic`.

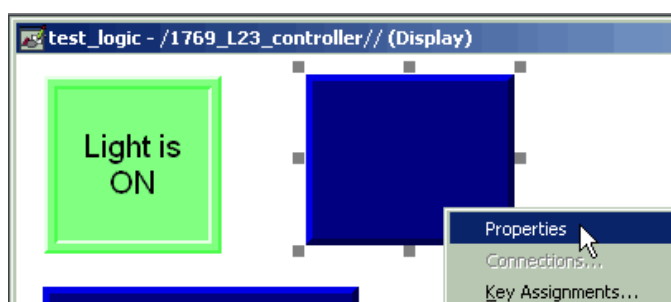
Add a Goto Configuration Mode Button

All controllers

1. From the Objects menu, choose **Advanced > Goto Configure Mode**.

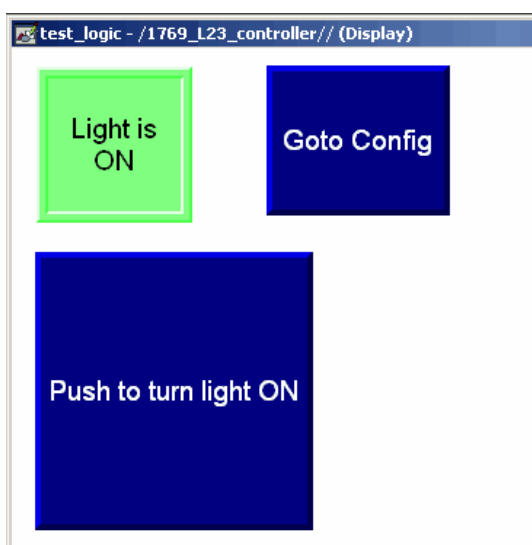


2. In the Display window, click and drag to create the Goto button.
3. Right-click the new pushbutton and select **Properties**.



4. On the Label tab, enter **Goto Config** for the caption.
5. Click **OK**.

Goto Configuration Button Complete



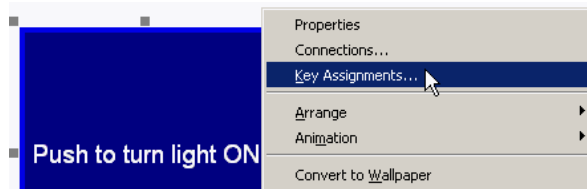
Assign Keys

All controllers with PanelView Plus terminals without a touchscreen

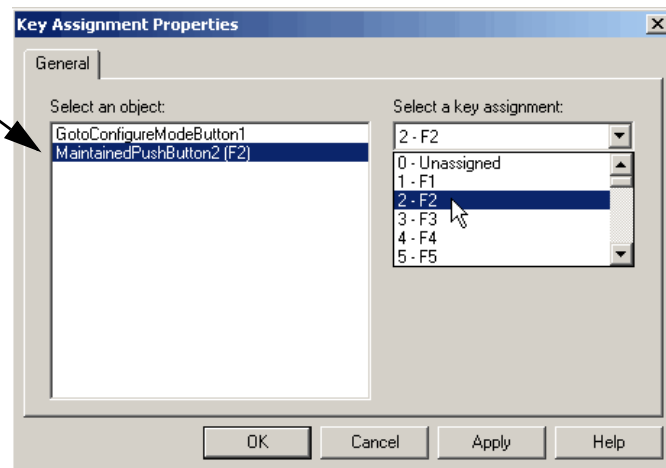
If your PanelView Plus **does not** have a touch screen, you must assign functions keys to the display buttons.

If your PanelView Plus has a touchscreen, skip to [page 114](#).

1. Right-click the Push Button and choose **Key Assignments**.



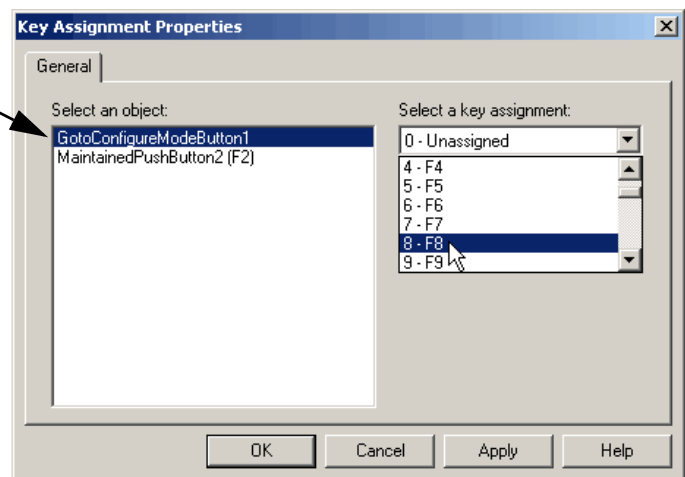
2. In the Select an object list, verify that MaintainedPushButton is selected.



3. Select a function key and click **Apply**.

This example uses F2.

4. In the Select an object list, select GotoConfigureMode.



5. Select a different function key and click **Apply**.

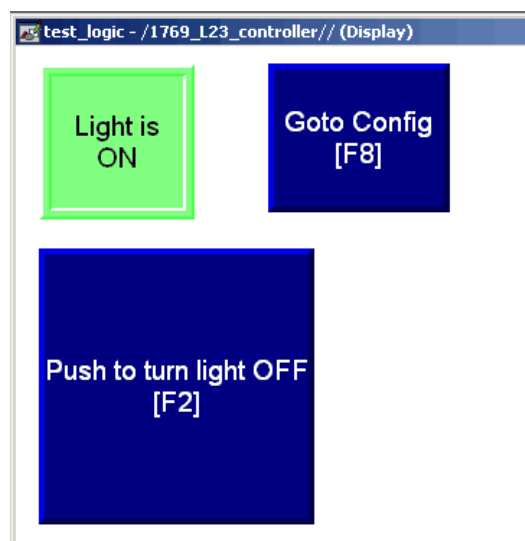
This example uses F8.

6. Click **OK**.

7. Add the function key names to the button captions (including both states of the indicator).

Add the function key names by using the State tab of the button's Properties dialog box to add the text (for example, [F2]) to the Caption box.

8. **Save** your changes.



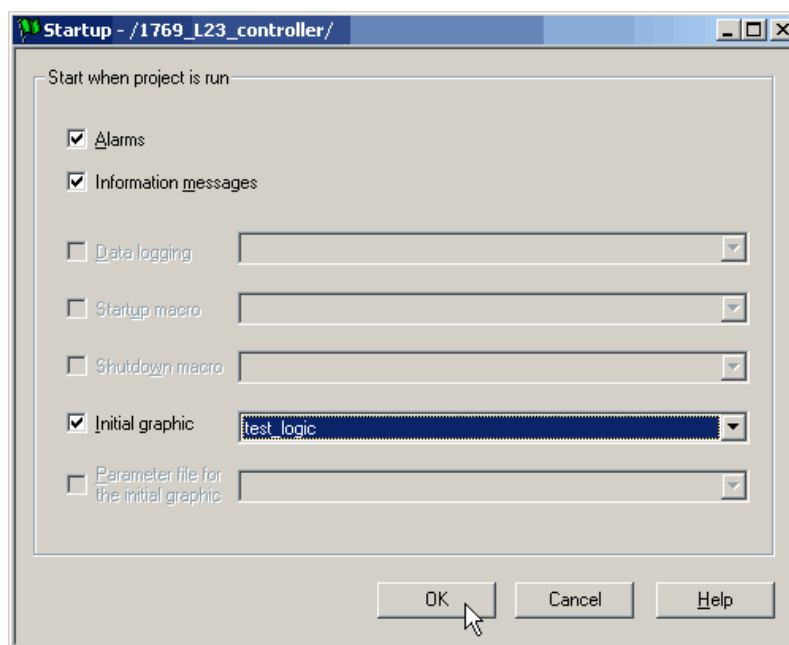
Assign an Initial Screen

All controllers

1. Under System, double-click **Startup**.



2. Check the **Initial graphic** checkbox and select **test_logic**.
3. Click **OK**.
4. Save your changes.



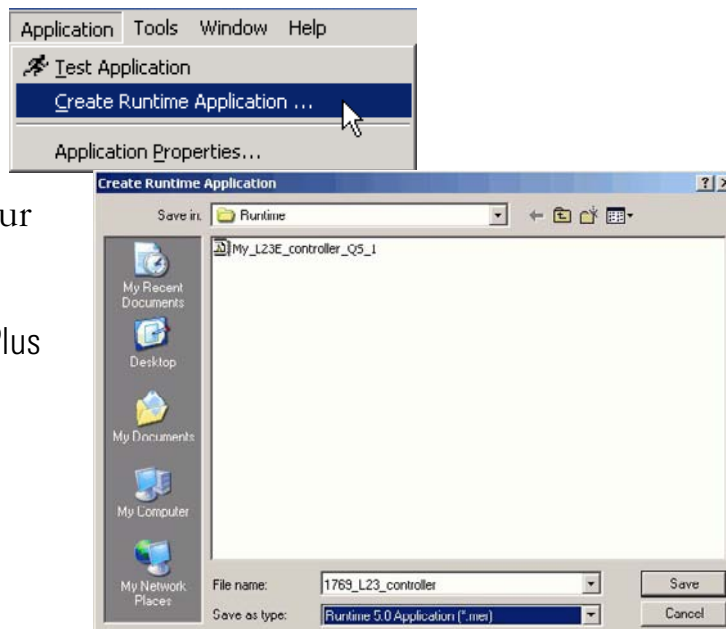
Transfer to the PanelView Plus Terminal

All controllers

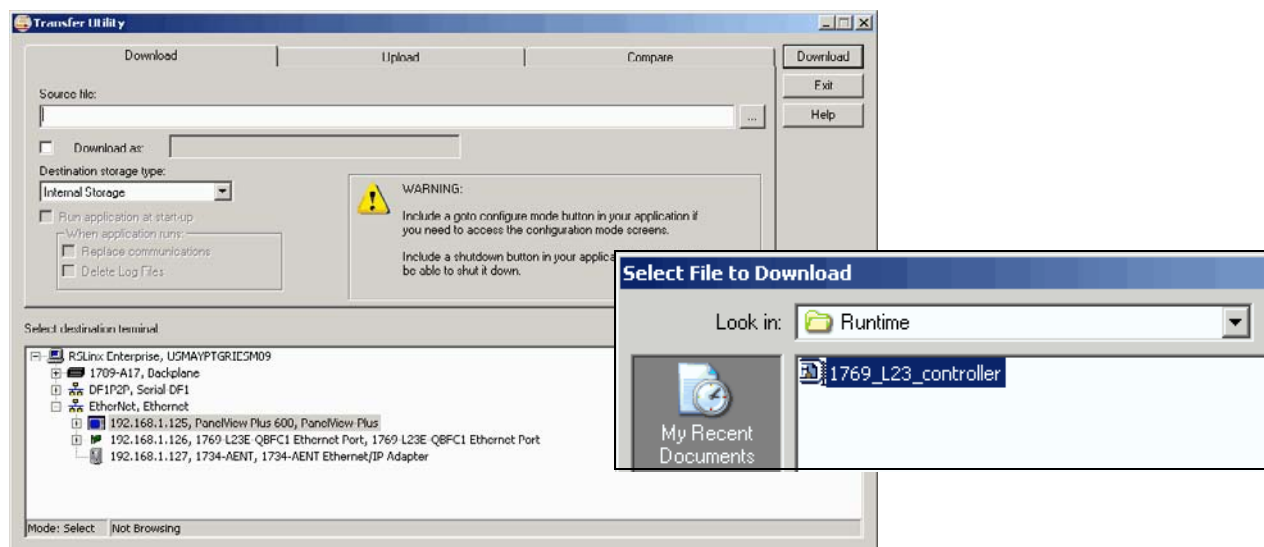
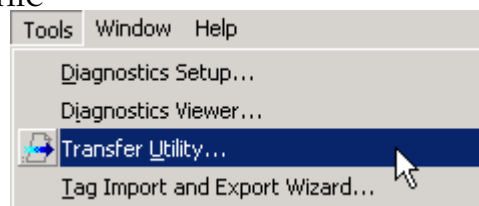
1. Under Application, choose **Create Runtime Application**.
2. In Save as type, select the Runtime version that matches your PanelView Plus firmware.

TIP

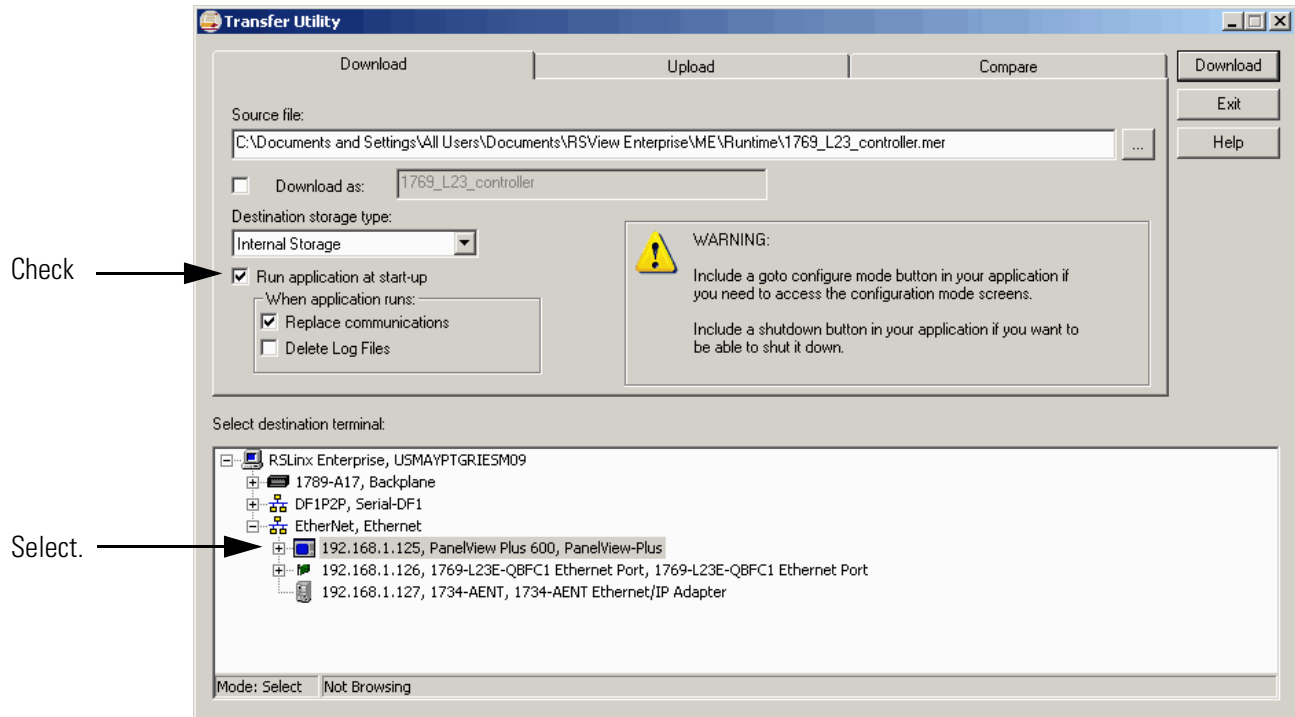
To check the PanelView Plus firmware revision, on the terminal select **Terminal Setting [F4] > System Information > About FactoryTalkViewME Station**.



3. Click **Save** to accept the default file name.
4. From the Tools menu, choose **Transfer Utility**.
5. Click the ... button, select the .mer file you just created and click **Open**.

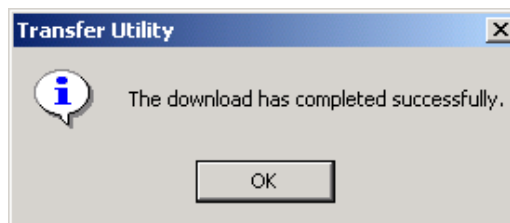


6. Verify that the **Replace communications** checkbox is checked and verify that your PanelView Plus is selected for the destination terminal.



7. Click **Download**.

8. Click **OK**.



After the download is complete, your PanelView Plus terminal may restart. After the restart, the application file you specified is loaded.

- If your application has been loaded onto the PanelView Plus terminal, skip to step 5 of Test the Application on the PanelView Plus Terminal, on [page 117](#).
- If the PanelView Plus terminal does not restart and load the application file, then skip to step 1 of Test the Application on the PanelView Plus Terminal, on [page 117](#).

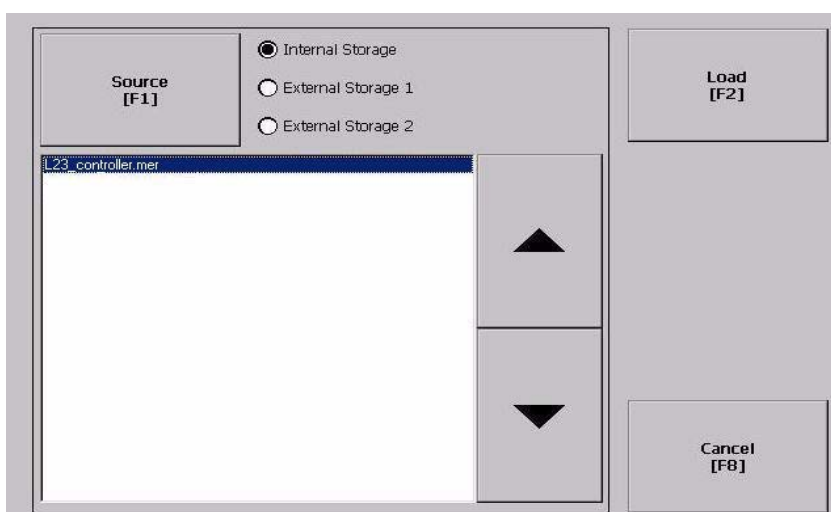
Test the Application on the PanelView Plus Terminal

All controllers

1. On the PanelView Plus, press **Load Application [F1]**.



2. Select your .mer file and press **Run Application [F2]**.



3. Press **Yes [F7]**.



4. After the application loads, press **Run Application [F2]**.



5. Press the Push Button. Verify that the indicator turns on and that the light on the Compact digital output module turns on.
6. Press the Push Button again and verify that the indicator and light turn off.

Additional Resources

Resource	Description
FactoryTalk View online help	Contains procedures and information for all RSView-specific topics.
PanelView Plus Terminal User Manual, publication 2711p-UM001	Provides descriptions and procedures for the use of the PanelView Plus terminal.
PanelView Plus 400 and 600 Terminals Installation Instructions, publication 2711P-IN002	Provides details related to the installation of the PanelView Plus terminal, including wiring diagrams (AC and DC), mounting instructions, and specifications.

These manuals are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

Optional - Configuration of the DeviceNet Network

This chapter describes some of the tasks required to set-up and configure a DeviceNet network with your packaged controller.

IMPORTANT

This chapter **does not** provide complete details for the installation and configuration of a DeviceNet network.

If you need additional information about configuring your DeviceNet network or using other devices, such as the 1734-ADN adapter, with the packaged controllers, see the Additional Resources at the end of this chapter.

The examples shown in this quick start use an example DeviceNet network configuration as depicted in configuration Option 2, on [page 5](#).

Before You Begin

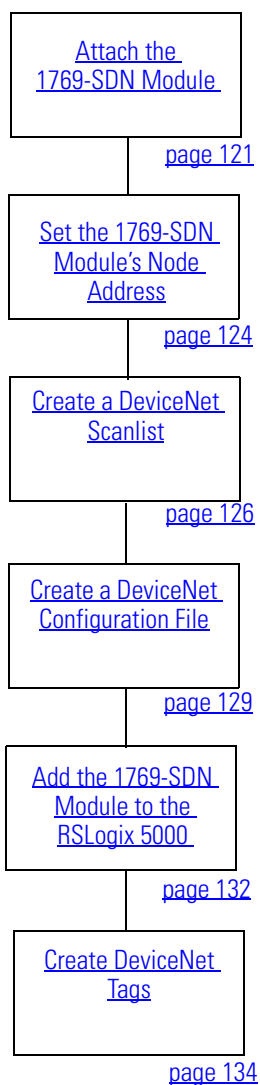
- Prepare the computer, see Chapter 2.
- Assemble and configure components of the DeviceNet network. This includes the creation of a main DeviceNet configuration file in RSNetWorx for DeviceNet.

What You Need

- Power supply and tap for the DeviceNet network
(this example uses the 1606-XLDNET8 and a KwikLink power tap module)
- 1769-SDN DeviceNet scanner
- RSNetWorx for DeviceNet software
- DeviceNet Tag Generator utility (installed with RSLogix 5000 software)

Follow These Steps

If you are using a DeviceNet network, you may need to complete these tasks.



Attach the 1769-SDN Module to the Packaged Controller

1. On the top of the 1769-SDN module, verify that the locking tab is unlocked.
2. Use the tongue-and-groove slots to slide the 1769-SDN onto the end of the controller.
3. Lock the locking tabs.
4. Record the series letter from the 1769-SDN module label on the [Network Worksheet](#) inside the back cover of this quick start.

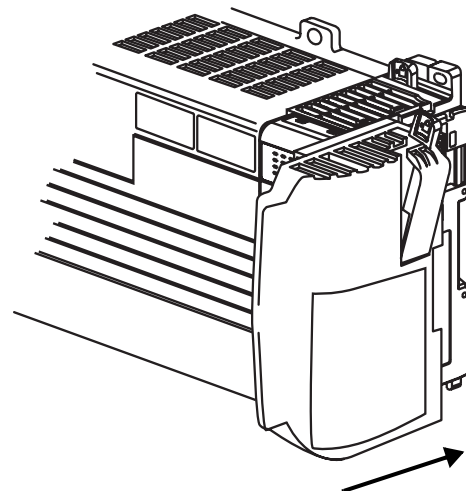
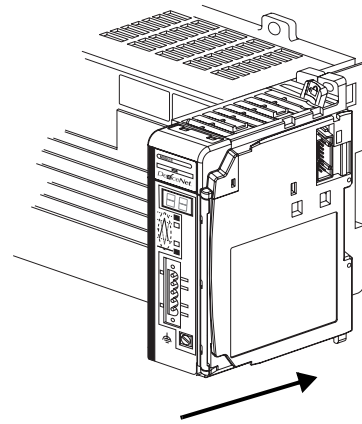
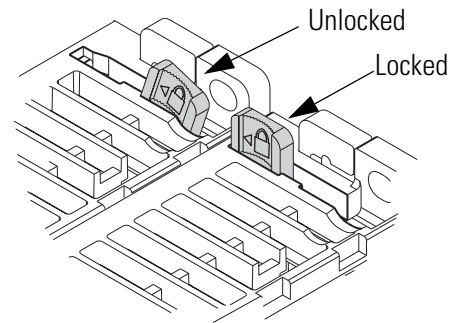
IMPORTANT

This quick start uses only the 1769-SDN module as an expansion module.

Packaged controllers support one communication module or two I/O modules for expansion.

See Chapter 4 of the user manual, Using Expansion Modules (on [page 215](#)) for more information about the number of expansion modules that can be used with your packaged controller.

5. Lock the locking tab on the top of the 1769-SDN module.
6. Slide the end cap terminator on and lock the locking tab.
7. Press the assembled system onto a DIN rail.

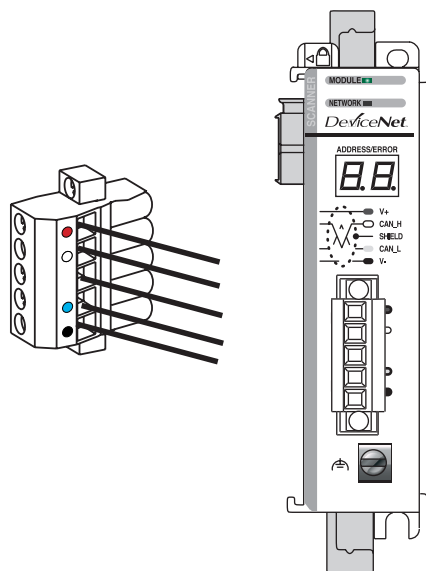


Connect the 1769-SDN Module to the Network

A DeviceNet network requires a power supply (see [Connect and Apply Power to the DeviceNet Network on page 123](#)) and a terminated network. For further details on DeviceNet networks, see the DeviceNet Media Design and Installation Guide, publication [DNET-UM072](#).

1. Connect a DeviceNet cable to the removable connector.

Connect	To
Red	V+
White	CAN High
Bare	Shield
Blue	CAN Low
Black	V-



2. Connect the removable connector to the module.
3. Connect the other end of the DeviceNet cable to your DeviceNet network.

Connect and Apply Power to the DeviceNet Network

1606-XLDNET8 power supply

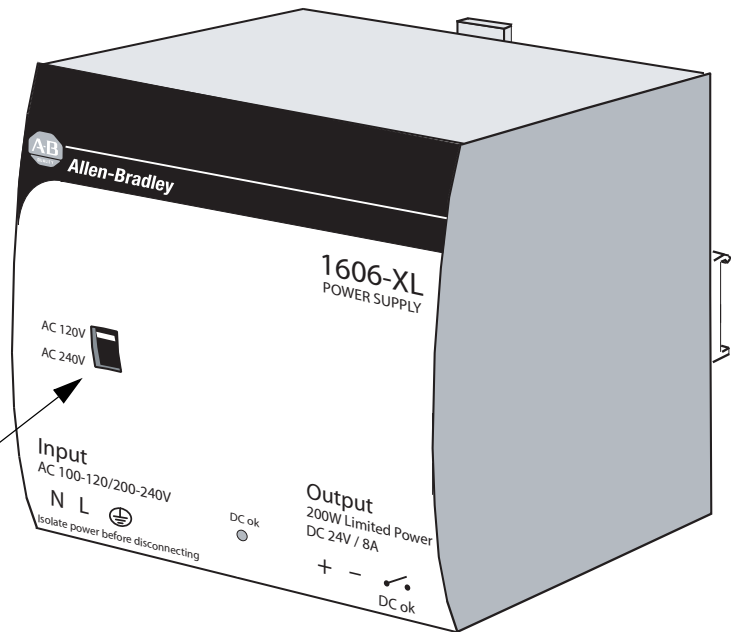
WARNING


Verify that all incoming power is turned off before wiring power.

1. Connect incoming power to the power supply.

Connect	To
V AC COM	N (neutral)
120/240V AC	L (line)
Ground	

2. Place the switch in the position that matches your supply voltage.



3. Connect the DeviceNet power tap to the power supply.

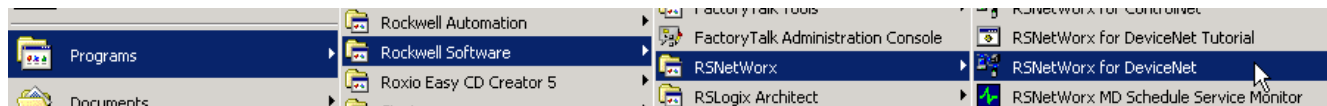
Connect	To
Red	+
White	N/A
Shield	N/A
Blue	N/A
Black	-

For this example, there is no need to connect the DC ok relay on the power supply to anything.

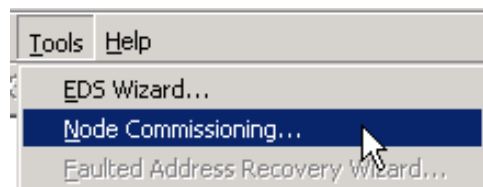
4. If you have unused DeviceNet wires, make sure they do not come into contact with the other wires.
5. Connect the DeviceNet power tap to the DeviceNet network.
6. Turn on incoming power.

Set the 1769-SDN Module's Node Address

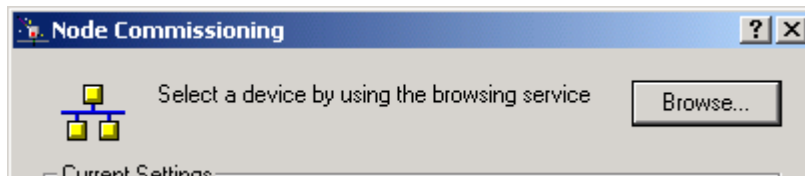
1. Launch RSNetWorx for DeviceNet software.



2. From the **Tools** menu, choose **Node Commissioning**.

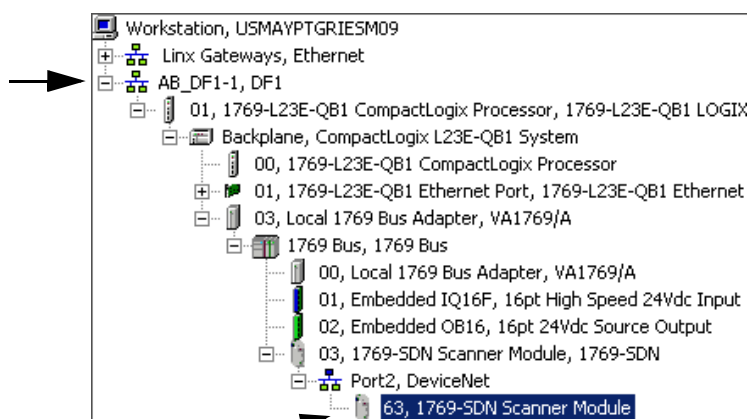


3. Click **Browse**.



4. Expand to the CompactLogix Backplane and the 1769 Bus.

Depending on your system, you might choose browse to the 1769-SDN via the EtherNet/IP network.



5. Expand the 1769-SDN and the DeviceNet Port, and select the **1769-SDN**.

6. Click **OK**.

7. If you receive a linking device warning, click **Yes**.

The Node Commissioning dialog box is populated with the 1769-SDN module's current settings.

8. Select an available node **Address** for the 1769-SDN module and click **Apply**.

This example uses node address 1.

The node address is applied and a confirmation is given in the Messages box.

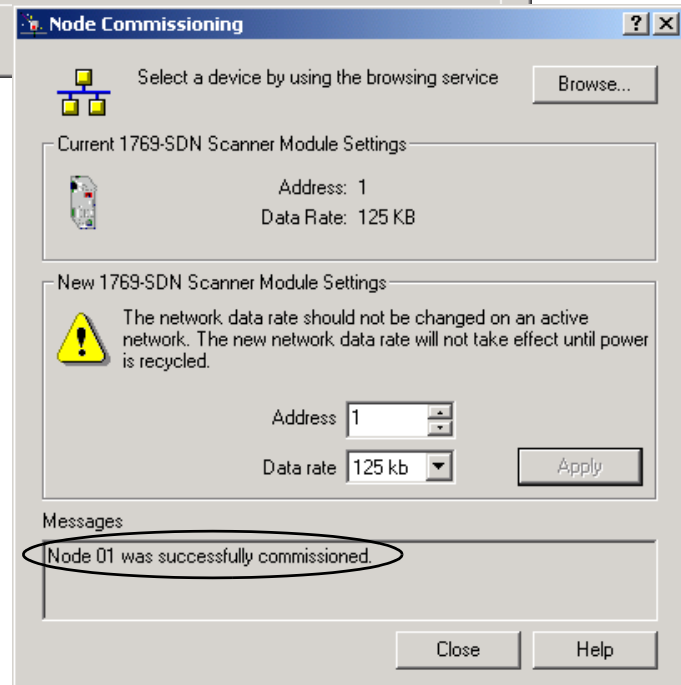
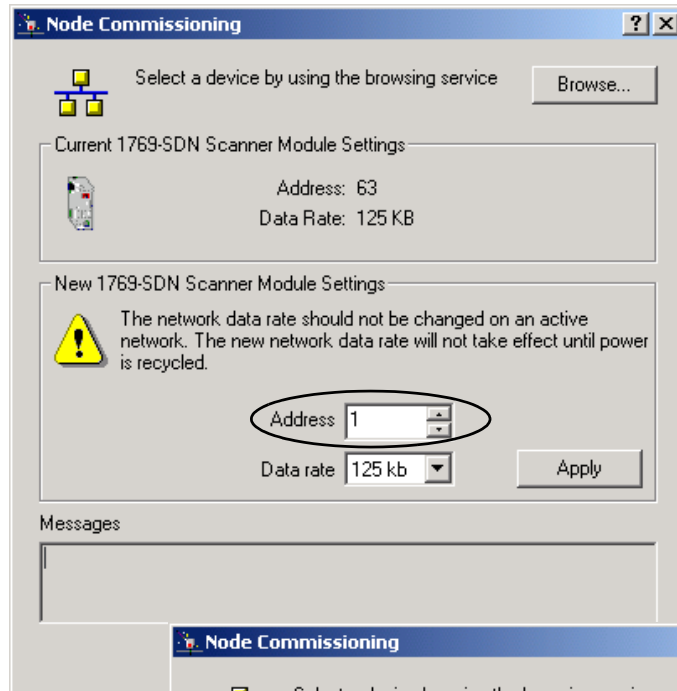
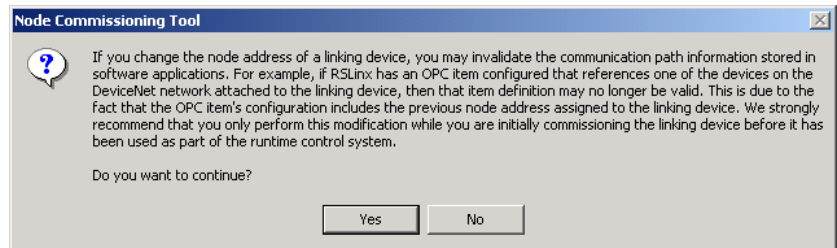
TIP

If you receive an communication error, verify that the scanner is not running.

To determine if the scanner is running, examine the commandregister.run tag in RSLogix 5000 software and verify it is at 0.

9. Record the node address on the [Network Worksheet](#).

10. Click **Close**.



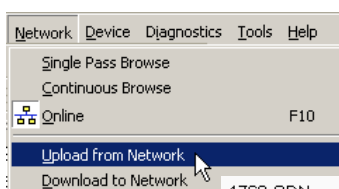
Create a DeviceNet Scanlist

Required with the use of any DeviceNet device

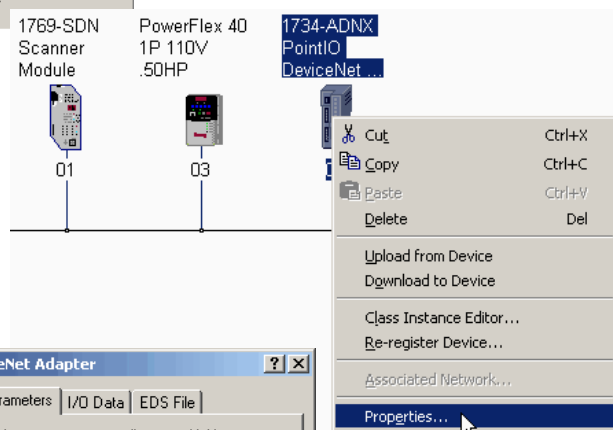
This procedure is required if you use any devices on the DeviceNet network - you must create a scanlist that includes all of the DeviceNet devices in your network.

The examples in this section use a 1734-ADNX adapter that has already been configured.

1. Select **Network** > **Upload from Network**.

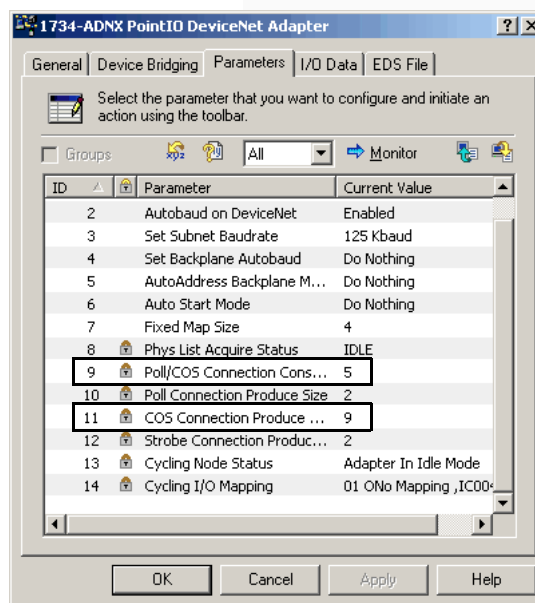


2. Right-click the 1734-ADNX adapter and select **Properties**.



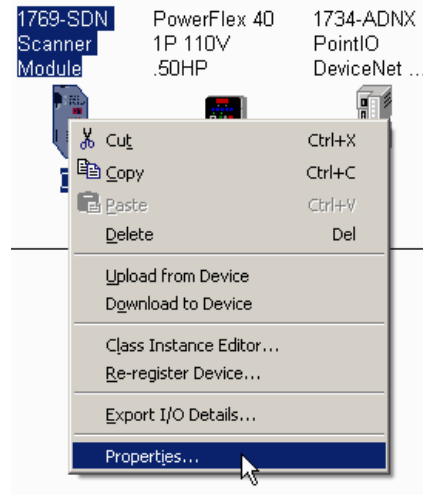
3. Click the **Parameters** tab and note the parameters shown.

You verify these parameters at step 10.



4. Click **OK**.

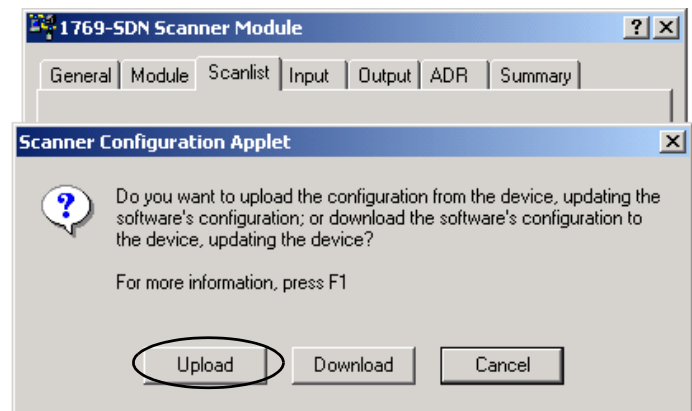
5. Right-click the 1769-SDN module and select **Properties**.



6. Click the **Scanlist** tab.

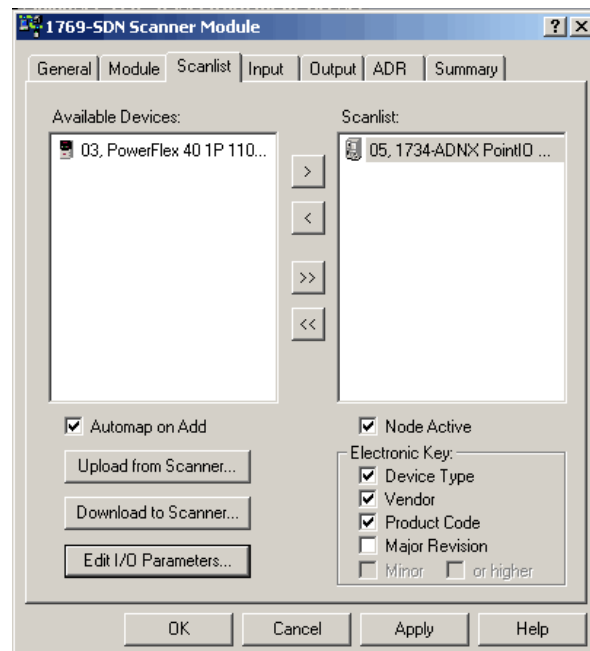
7. Click **Upload**.

The configuration is uploaded from the device.



8. Select the 1734-ADNX adapter and move it to the Scanlist.

9. Click **Edit I/O Parameters**.



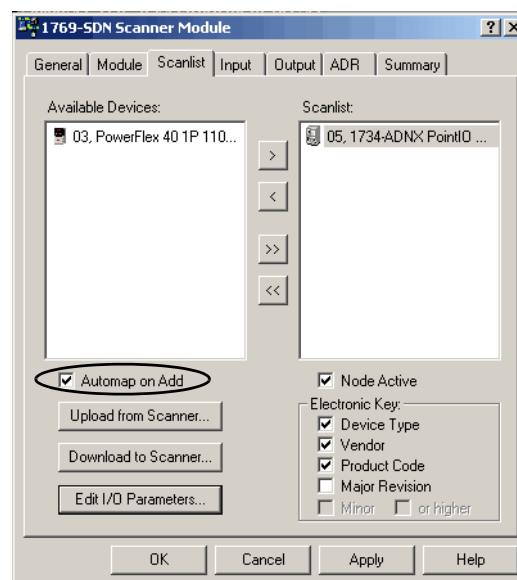
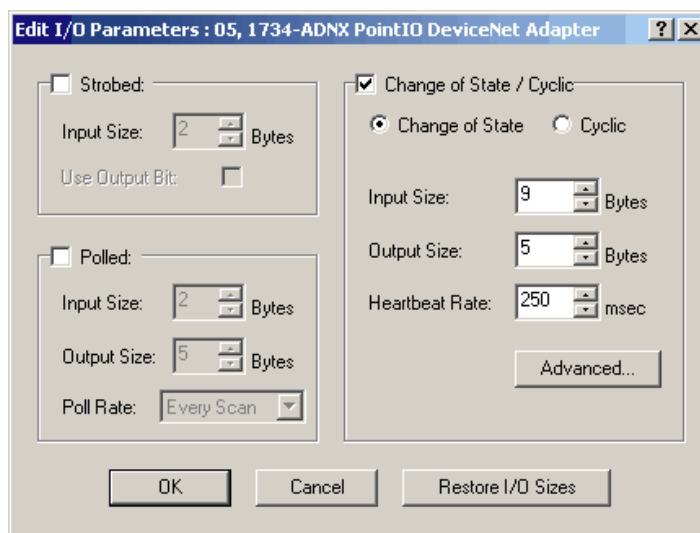
10. Verify that the I/O parameters match those verified at step 3.

If these parameters do not match those at step 3, check your adapter and output module configurations.

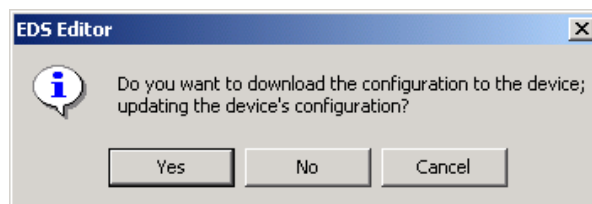
Depending on the POINT output module you use, these parameters may be different than those shown here.

11. Click **OK**.

12. Verify that **Automap on Add** is checked and click **Apply**.



13. Click **Yes**.



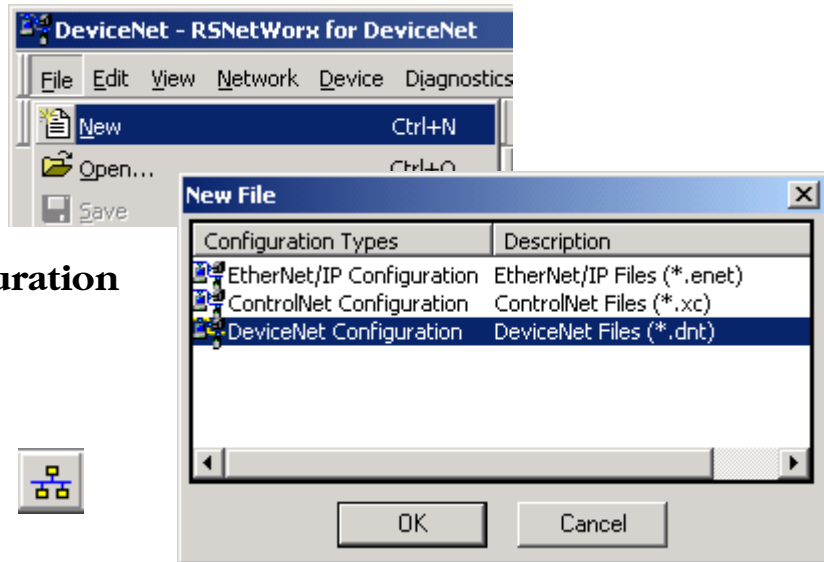
14. **Save** the configuration file.

15. **Close** RSNetworkx for DeviceNet software.

Create a DeviceNet Configuration File

This example shows the steps required create a DeviceNet configuration file using a network that has already been configured. If you are starting with a network that has not been configured, the steps are the same, however, the network will appear differently than shown here.

1. Open RSNetWorx for DeviceNet software.
2. From the File menu, select **New**.
3. Select **DeviceNet Configuration** and click **OK**.

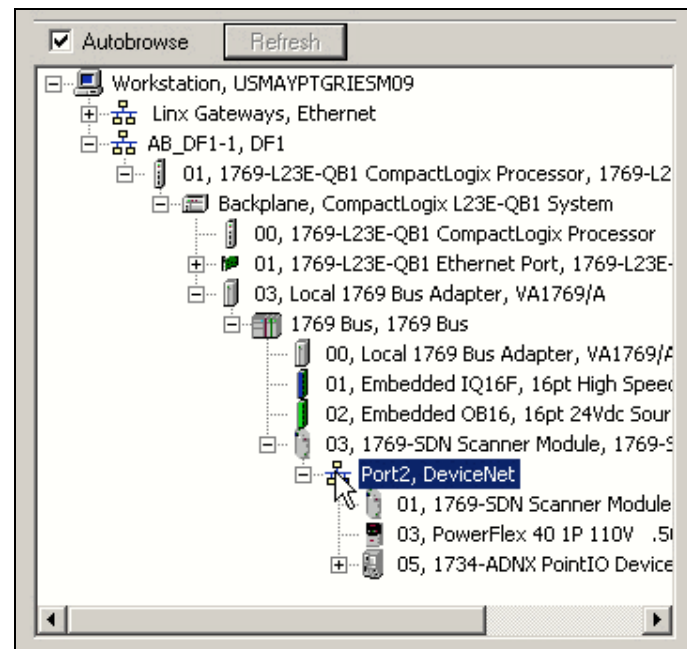


4. Click Who Active to go online.



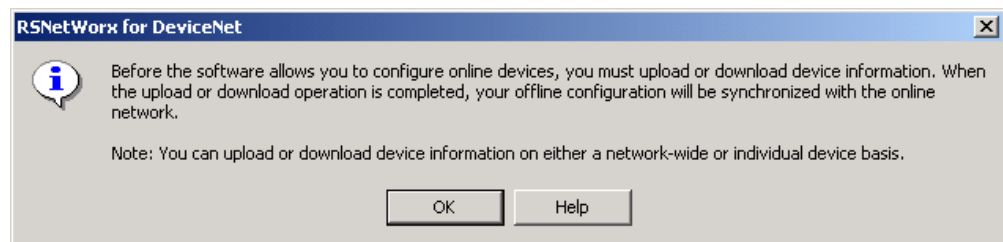
5. Expand to the CompactLogix Backplane and the 1769 Bus.
6. Expand the 1769-SDN and the DeviceNet Port.
7. Record the 1769-SDN module's slot number on the [Network Worksheet](#).

In this example, the 1769-SDN module is in slot 3 of the 1769 Bus and is in node 1 of the DeviceNet network.



8. Select Port2, DeviceNet and click **OK**.

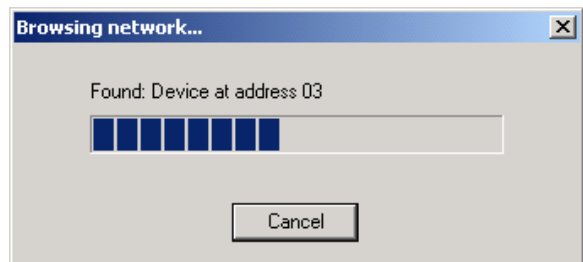
9. Click **OK**.



RSNetWorx software begins browsing the network.

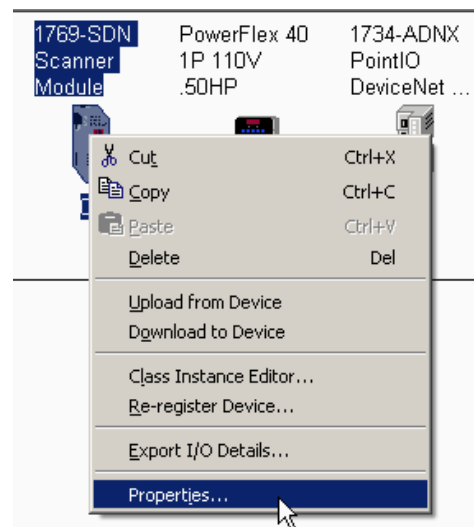
TIP

Once all of the devices on your DeviceNet network appear, you can click Cancel.



If a question mark displays instead of the PowerFlex drive, see [Uploading an EDS File From a Drive](#), Knowledgebase ID 20539.

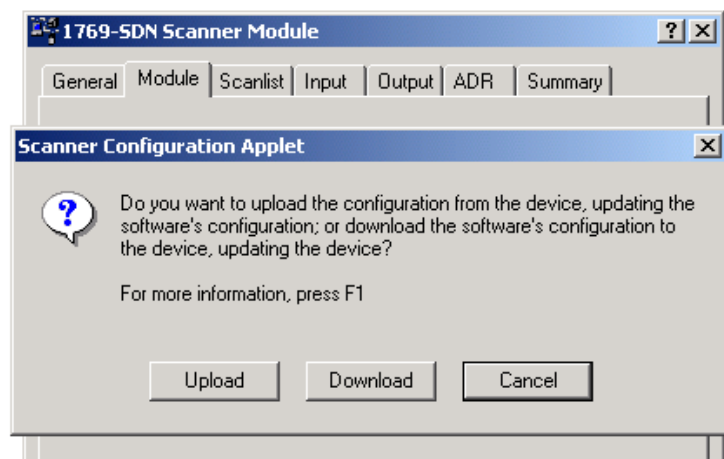
10. Right-click the 1769-SDN module and choose **Properties**.



11. Click the **Module** tab.

12. Click **Download**.

This clears all configuration from the 1769-SDN module, synching the software with the device.



13. From the **Platform** pull-down menu, select CompactLogix.
14. Enter the slot number of the 1769-SDN you recorded on the [Network Worksheet](#).

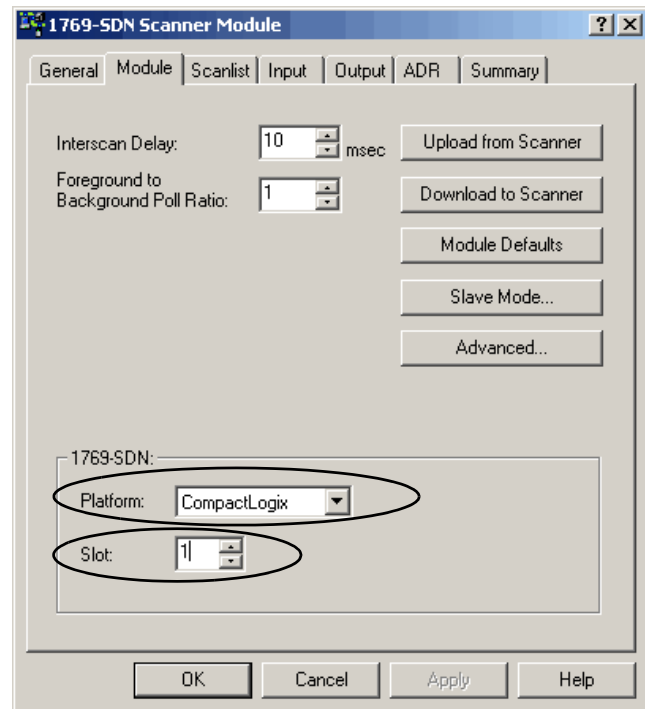
15. Click **OK**.

16. **Save** the file and record the file name and path on the [Network Worksheet](#).



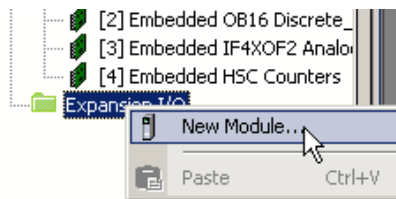
This quick start uses the example file name MainDNet_L2x.dnt

17. Close RSNetWorx for DeviceNet software.

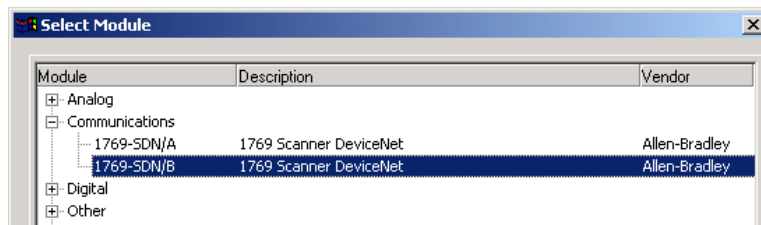


Add the 1769-SDN Module to the RSLogix 5000 Project

1. In the RSLogix 5000 configuration tree, right-click **CompactBus Local** and select **New Module**.

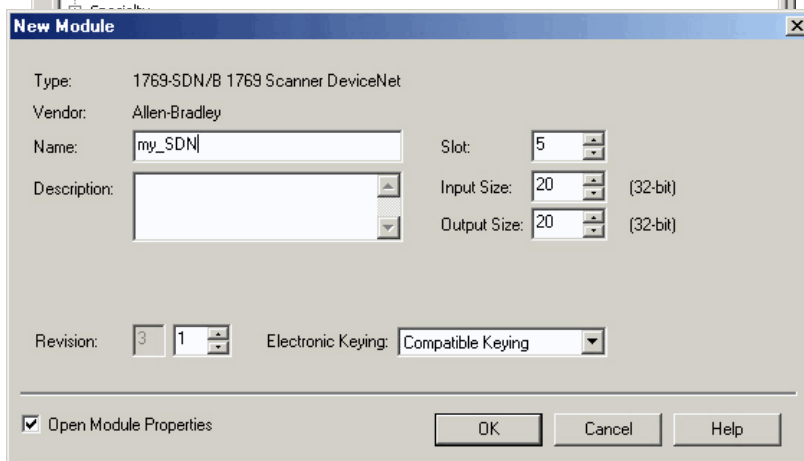


2. Under **Communications**, select 1769-SDN with the series letter recorded on the [Network Worksheet](#) and click **OK**.



3. In the Name box, type a name for your SDN module.
4. In the Slot box, type or choose the **Slot** number.

The slot number you specify depends on which 1769-L23 controller you use.



5. In the Input Size and Output Size boxes, type or choose values to accommodate the input and output sizes of the modules in your system.

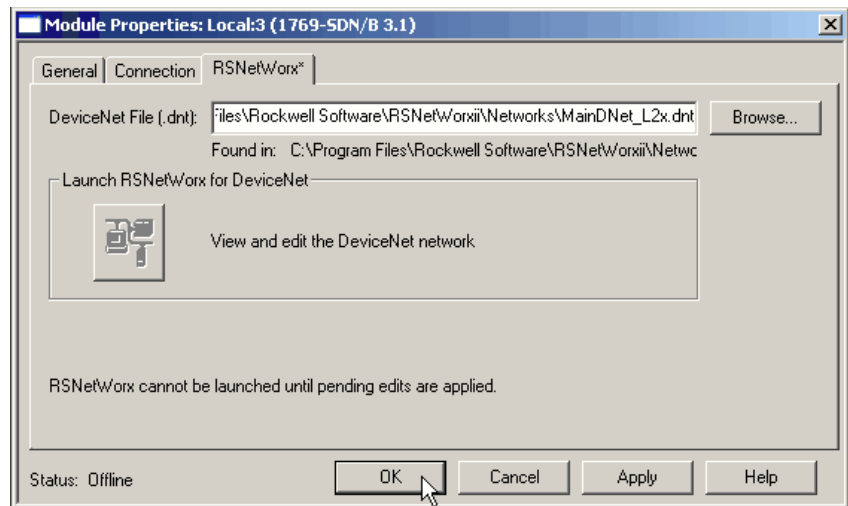
This example uses 20.

For more information about determining input and output sizes, see the DeviceNet Modules in Logix5000 Control Systems User Manual, publication [DNET-UM004](#).

6. From the Electronic Keying pull-down, choose **Compatible Keying**.
7. Check the **Open Module Properties** check box and click **OK**.

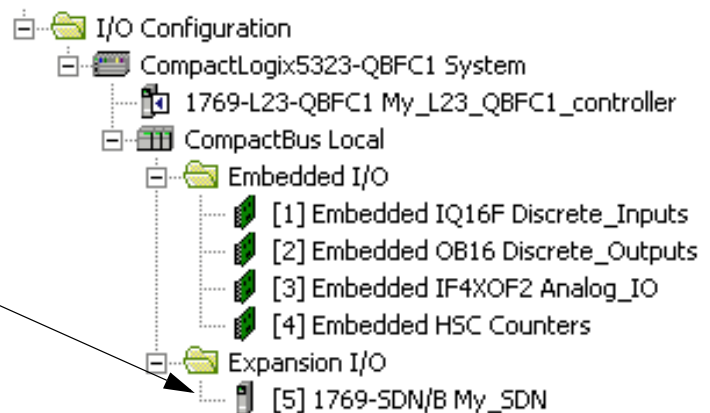
8. On the RSNetWorx tab, click **Browse** to find the configuration (.dnt) file recorded on the [Network Worksheet](#).

Use the configuration file name you saved on [page 131](#). This quick start uses MainDNet_L2x.dnt.



9. Click **OK**.

The module is added to the I/O Configuration.



Create DeviceNet Tags

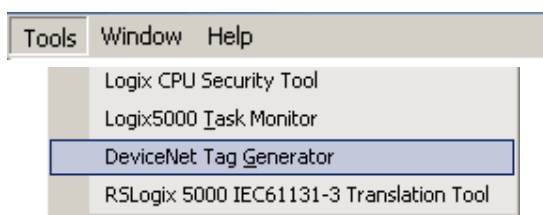
Recommended for any DeviceNet device

Complete these steps after you have configured your DeviceNet network and devices and are ready to begin programming.

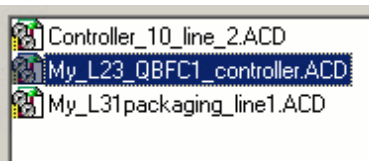
IMPORTANT

Before running the DeviceNet Tag Generator, verify that RSNetWorx for DeviceNet software is closed.

1. In RSLogix 5000 software, from the Tools menu, choose **DeviceNet Tag Generator**.



2. Select your RSLogix 5000 project.



3. Click **Select Scanner**.



4. Select the 1769-SDN scanner that scans the network where the 1734 adapter is located.

Module Name	Parent Name : Module Address	Type
My_SDN	Local:5	1769-SDN/B

5. Click **Select RSNetWorx Project**.



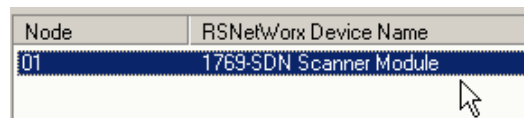
6. Select main DeviceNet configuration file recorded on the [Network Worksheet](#).



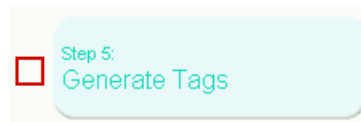
7. Click **Select Scanner Node**.



8. Select the node of the 1769-SDN scanner as recorded on the [Network Worksheet](#).



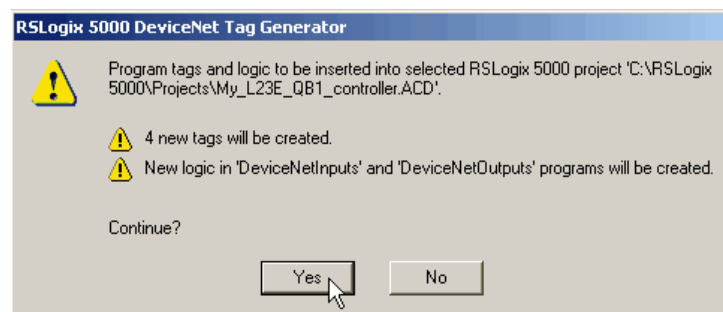
9. Click **Generate Tags**.



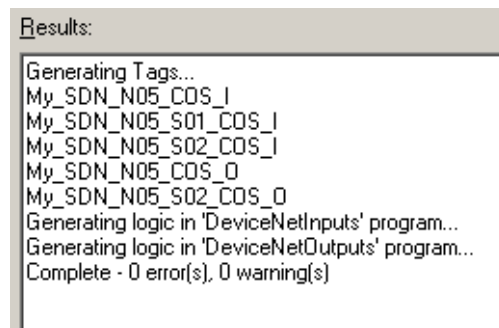
10. Click **Generate Tags**.



11. Click **Yes**.



When tag generation is complete, the text log displays.

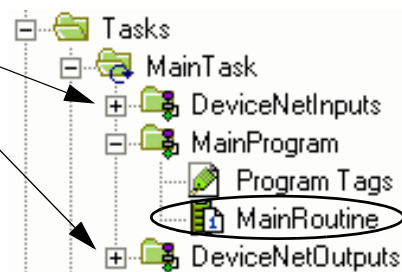


12. **Close** the DeviceNet Tag Generator.



Note that new programs and tags have been added to the controller organizer. These tasks were created by the Tag Generator.

After you have generated your DeviceNet tags, edit your program to implement them accordingly.



Additional Resources

Resource	Description
1769-SDN Compact I/O DeviceNet Scanner Module Installation Instructions, publication 1769-IN060	Provides information about installing the 1769-SDN module and technical specifications.
DeviceNet Modules in Logix5000 Control Systems, publication DNET-UM004	Provides details regarding the installation, configuration, and operation of DeviceNet modules.
POINT I/O DeviceNet Adapter User Manual, publication 1734-UM002	Provides information related to the use of 1734-ADN and 1734-ADNX modules on a DeviceNet network.
DeviceNet Media Design and Installation Guide, publication DNET-UM072	Provides comprehensive information about planning, designing, and installing components of a DeviceNet network.
CompactLogix System Quick Start, publication IASIMP-QS001	Provides procedural information related to the use of 1769-L3x CompactLogix controllers, including detailed explanations for use of a 1734-ADN adapter and PowerFlex 40 drive with a DeviceNet network. The procedures in this publication are also applicable to the use of a CompactLogix packaged controller.
Chapter 2 of the user manual, Network Communication, on page 151	Describes the DeviceNet module and software that are compatible for use with the packaged controllers.

These publications are available for viewing or electronic download at <http://literature.rockwellautomation.com>.

1769 CompactLogix Packaged Controllers User Manual

(Catalog Numbers 1769-L23E-QB1B, 1769-L23E-
QBFC1B, and 1769-L23-QBFC1B)

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence
SHOCK HAZARD 	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

Allen-Bradley, CompactLogix, Compact I/O, EtherNet/IP, FactoryTalk, FactoryTalk View Studio, Logix5000, POINT I/O, PowerFlex 40, RSLinx, RSLinx Classic, RSLinx Enterprise, RSLogix 5000, RSNetWorx, RSNetWorx for DeviceNet, Rockwell Automation, and TechConnect are trademarks of Rockwell Automation, Inc.

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For information about the CompactLogix packaged controller **status indicators** or **specifications**, see the CompactLogix Packaged Controller Installation Instructions, publication [1769-IN082](#).

Notes:

Notes:

Notes:

About This User Manual

Use this manual to become familiar with the CompactLogix packaged controllers' hardware and corresponding RSLogix 5000 software, version 17 features.

This user manual is written for use with the quick start provided at the front of this publication. The quick start describes common procedures specific to the packaged controllers while this user manual provides reference information that may be useful during the planning, implementation, use, and maintenance of your packaged controller.

Additional Resources

Additional resources, such as websites, technical notes, and other Rockwell Automation publications are listed in the Additional Resources tables at the end of each chapter of this user manual.

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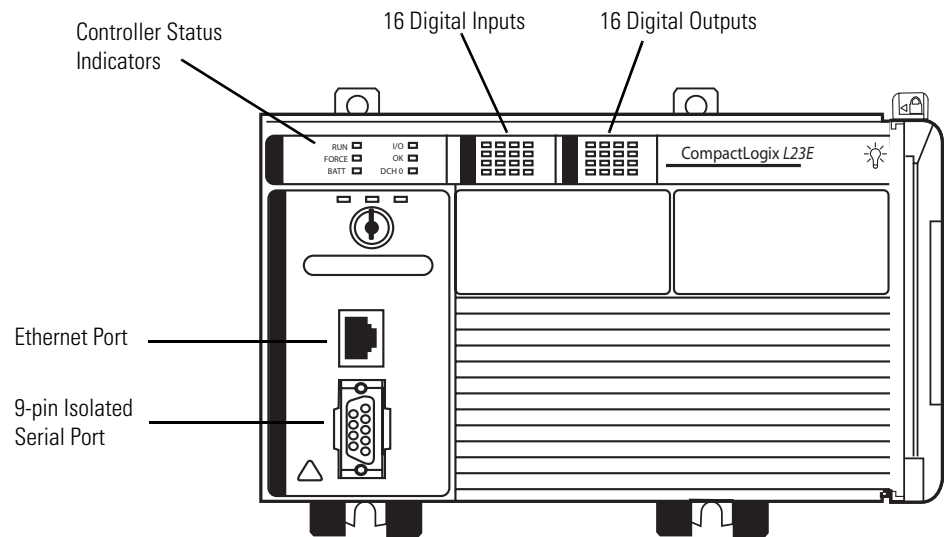
Features of the Packaged Controllers

The CompactLogix packaged controllers provide a complete system solution for small applications by providing these features:

- Configurable embedded I/O
- Capacity for expansion I/O
- Isolated serial connection
- Built-in Ethernet interface (1769-L23E packaged controllers)
- Nonisolated serial connection (1769-L23-QBFC1B packaged controller only)
- Programming via RSLogix 5000 software, version 17 or later
- Network configuration and monitoring via RSLinx and RSNetWorx software
- Mountable to panel or DIN rail

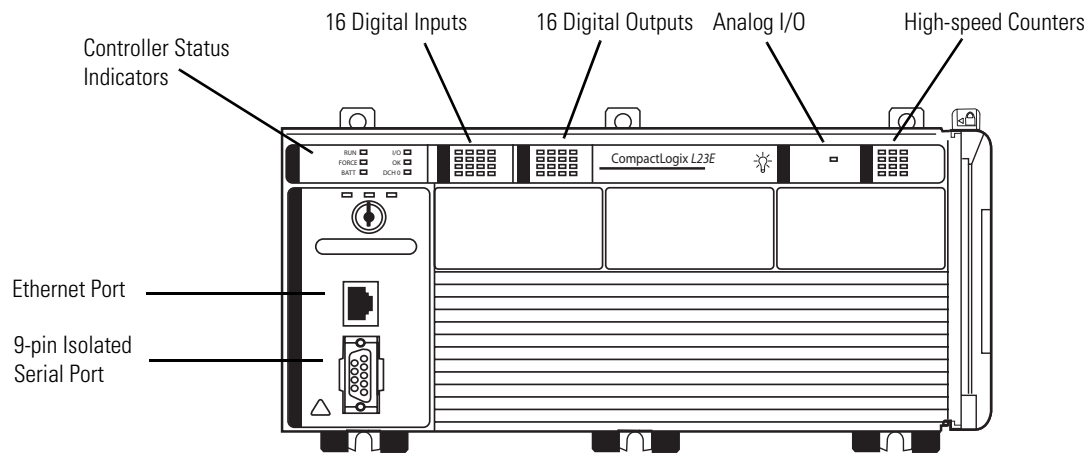
About the 1769-L23E-QB1B Packaged Controller

The 1769-L23E-QB1B packaged controller has these hardware features.



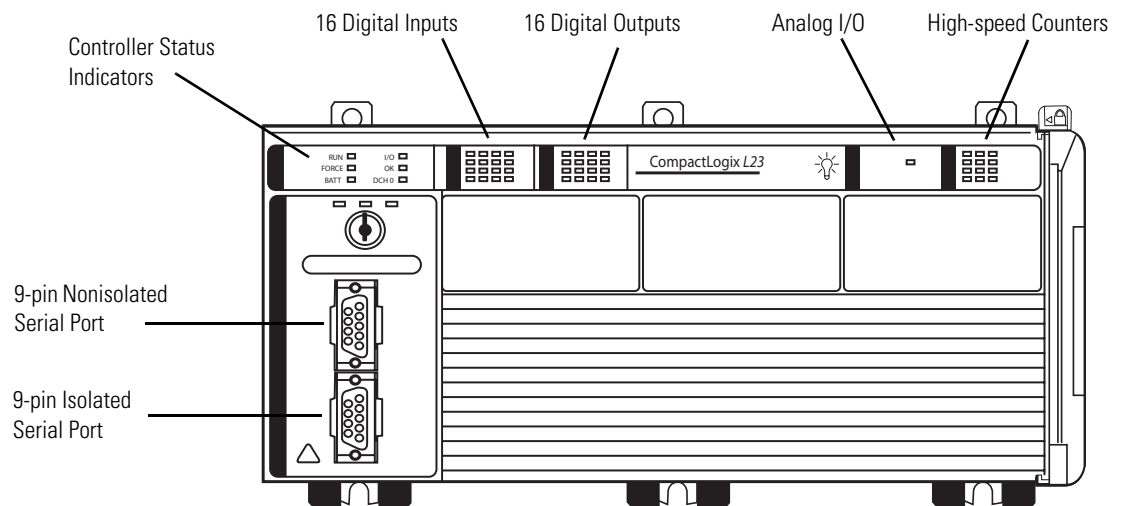
About the 1769-L23E-QBFC1B Packaged Controller

The 1769-L23E-QBFC1B packaged controller has these hardware features.



About the 1769-L23-QBFC1B Packaged Controller

The 1769-L23-QBFC1B packaged controller has these hardware features.



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Network Communication

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EtherNet/IP Network Communication

The EtherNet/IP network offers a full suite of control, configuration, and data collection services by layering the Common Industrial Protocol (CIP) over the standard Internet protocols, such as TCP/IP and UDP. This combination of well-accepted standards provides the capability required to both support information data exchange and control applications.

The EtherNet/IP network also uses commercial, off-the-shelf Ethernet components and physical media, providing you with a cost-effective plant-floor solution.

For EtherNet/IP networks, you can use these CompactLogix packaged controllers with a built-in EtherNet/IP communication port:

- 1769-L23E-QB1B CompactLogix packaged controller
- 1769-L23E-QBFC CompactLogix packaged controller

Software for Use with an EtherNet/IP Network

These software utilities specific to the use of an EtherNet/IP network may be used with the 1769 CompactLogix packaged controller.

EtherNet/IP Network Software

Software	Functions	Required for System
RSLogix 5000 programming software	• Configure the CompactLogix project • Define EtherNet/IP communication	Yes
BOOTP/DHCP utility (packaged with RSLogix 5000 software)	Assign IP addresses to devices on an EtherNet/IP network	No
RSNetWorx for EtherNet/IP software	Configure EtherNet/IP devices by IP addresses and/or host names	No

EtherNet/IP Network Features

When used with the CompactLogix packaged controller, the EtherNet/IP communication network provides these features:

- Supports messaging, produced/consumed tags, HMI, and distributed I/O
- Encapsulation of messages within standard TCP/UDP/IP protocol
- Use of a shared application layer with the DeviceNet network
- Easily interfaces via RJ45, category 5, unshielded, twisted-pair cable
- Supports half/full-duplex 10 Mbps or 100 Mbps operation
- Supports the use of standard switches
- Does not require network scheduling
- Does not require the use of routing tables

To view an example of an EtherNet/IP network that includes an 1769-L23E packaged controller, see the network configurations shown in the section Configurations for Quick Start on [page 4](#).

About EtherNet/IP Network Connections

You indirectly determine the number of connections the controller uses by configuring the controller to communicate with other devices in the system. Connections are allocations of resources that provide more reliable communication between devices than unconnected messages.

A connection is a point-to-point communication mechanism used to transfer data between a transmitter and a receiver. An EtherNet/IP CIP connection transfers data from an application running on one end-node to an application running on another end-node. A CIP connection is established over a TCP connection. A single TCP connection can support multiple CIP connections.

For more information about CIP and TCP connections, see the Ethernet Performance Application Solution, publication [ENET-AP001](#).

Packaged Controllers, EtherNet/IP Connections, and RPI

The built-in EtherNet/IP port of the packaged controller supports 32 CIP connections over an EtherNet/IP network. With these controllers,

the number of end-node connections effectively supported depends on a connection's RPI. Use this table as a reference when determining how to configure your Ethernet network RPI.

Ethernet Interface Connections According to RPI

Requested Packet Interval	Ethernet Interface Connections, max
2 ms	2
4 ms	5
8 ms	10
16 ms	18
32 ms+	25+

We recommend that you leave some connections available for tasks, such as going online and non-I/O purposes.

Maximum Ethernet Interface Connections

The maximum connection specifications for the Ethernet interface of the 1769-L23E controllers are listed in this table.

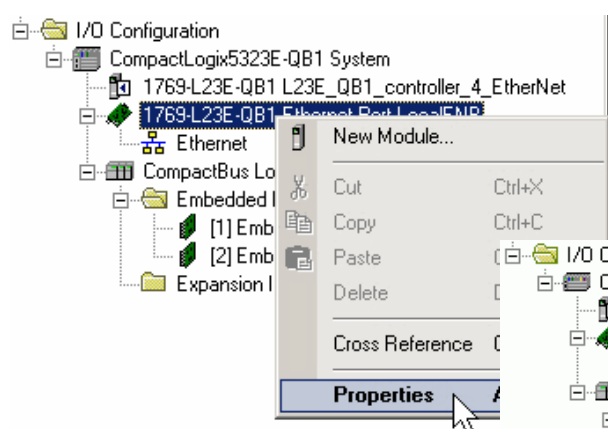
Connection Type	Number of Connections, max
TCP	8
CIP, Class 1 (I/O and Produce/Consume)	32
CIP, Class 3 (Messaging)	32

Configure the 1769-L23E Ethernet Interface

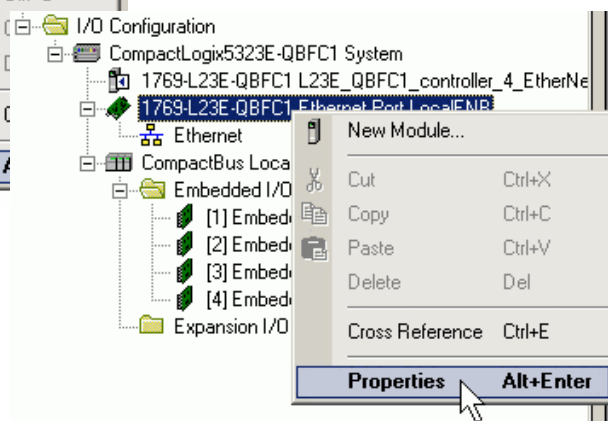
You may choose to configure your packaged controller's Ethernet interface by using a BOOTP server as shown in Chapter 2 of the quick start ([page 25](#)) or by using RSLogix 5000 software.

To configure your 1769-L23E packaged controller Ethernet interface in RSLogix 5000 software, right-click the Ethernet port and choose Properties.

1769-L23E-QB1B



1769-L23E-QBFC1B



Use the Properties dialog box that displays to specify the Ethernet interface configuration.

1769-L23E-QB1B

Module Properties: Controller:1 (1769-L23E-QB1 Ethernet Port 17.1)

General | Connection | RSNetWorx | Module Info | Port Configuration | Port Diagnostics

Type: 1769-L23E-QB1 Ethernet Port 10/100 Mbps Ethernet Port on CompactLogix5323E-QB1
Vendor: Allen-Bradley
Parent: Controller
Name: LocalENB
Description:
Slot: 1 Major Revision: 17

Address / Host Name
☒ IP Address:
☐ Host Name:
Status: Offline

1769-L23E-QBFC1B

Module Properties: Controller:1 (1769-L23E-QB1 Ethernet Port 17.1)

General | Connection | RSNetWorx | Module Info | Port Configuration | Port Diagnostics

Type: 1769-L23E-QB1 Ethernet Port 10/100 Mbps Ethernet Port on CompactLogix5323E-QB1
Vendor: Allen-Bradley
Parent: Controller
Name: LocalENB
Description:
Slot: 1 Major Revision: 17

Address / Host Name
☒ IP Address:
☐ Host Name:
Status: Offline

OK Cancel Apply Help

Additional Resources for EtherNet/IP Networks

Resource	Description
Prepare the Computer, Network, and Controller, page 25 of the quick start in this publication	This chapter describes how to assign an IP address to an Ethernet module and shows how the Ethernet networks appear in RSLinx software.
EtherNet/IP Modules in Logix5000 Control Systems User Manual, publication ENET-UM001	This manual describes how you can use EtherNet/IP modules with your Logix controller.
EtherNet/IP Performance Application Guide, publication ENET-AP001	This publication helps you plan your EtherNet/IP network and describes considerations for improving overall network performance.

Rockwell Automation publications are available for electronic download at <http://literature.rockwellautomation.com> or by contacting your distributor.

DeviceNet Network Communication

The DeviceNet network uses the Common Industrial Protocol (CIP) to provide the control, configuration, and data collection capabilities for industrial devices. The DeviceNet network uses the proven Controller Area Network (CAN) technology, which lowers installation costs and decreases installation time and costly downtime.

A DeviceNet network provides access to the processing features of your field devices by letting you network plant-floor controllers to the field device without having to hard wire each device to an I/O module.

CompactLogix DeviceNet Scanner

To use your 1769-L23 or 1769-L23E packaged controller on a DeviceNet network, you must use a DeviceNet module in an expansion slot.

Use a CompactLogix DeviceNet scanner (1769-SDN) if your application:

- requires communication with other DeviceNet devices.
- uses the packaged controller as a master or slave on the DeviceNet network.
- uses a packaged controller and its Ethernet or serial port for other communications.

For more information about other DeviceNet modules that maybe be used on the DeviceNet network, see the DeviceNet Modules in Logix5000 Systems User Manual, publication [DNET-UM004](#).

Software for Use with a DeviceNet Network

You must use these software packages with a 1769 CompactLogix packaged controller on a DeviceNet network.

Software	Is used to
RSLogix 5000 programming software, version 17 or later	Configure the CompactLogix project. (Includes the addition and configuration of DeviceNet modules.)
RSLink Classic software, version 2.54 or later	Configure and monitor the DeviceNet network.
RSNetWorx for DeviceNet software, version 9.00 or later	• Configure DeviceNet devices and networks. • Define the scan list for DeviceNet devices.

DeviceNet Network Features

When used with the CompactLogix packaged controller, the use of DeviceNet communication modules on a DeviceNet network provide these features:

- Support for messaging to devices (not controller to controller)
- Shares a common application layer with an EtherNet/IP network
- Offers diagnostics for improved data collection and fault detection
- Requires less wiring than traditional, hardwired systems

To view an example of a DeviceNet network that includes an 1769-L23 packaged controller, see the network configurations shown in the section Configurations for Quick Start on [page 4](#) of the quick start in this publication.

Using DeviceNet Modules with the CompactLogix Controller

For information about configuring a DeviceNet network for use with the CompactLogix packaged controller, see the chapter titled Optional - Configuration of the DeviceNet Network on [page 119](#) of the quick start in this publication.

For information about adding a DeviceNet module to your I/O Configuration tree in RSLogix 5000 software, see the section titled Add the 1769-SDN Module to the RSLogix 5000 Project on [page 132](#) of the quick start in this publication.

Additional Resources for DeviceNet Networks

Resource	Description
Optional - Configuration of the DeviceNet Network, (page 119) of the quick start in this publication	This chapter describes how to: • wire and apply power to the DeviceNet network. • set DeviceNet module node addresses. • configure a DeviceNet network.
DeviceNet Modules in Logix5000 Control Systems, publication DNET-UM004	This manual describes how you can use DeviceNet modules with your Logix controller.

Rockwell Automation publications are available for electronic download at <http://literature.rockwellautomation.com> or by contacting your distributor.

Additional Resources for Linking Networks

Resource	Description
DeviceNet Modules in Logix5000 Control Systems, publication DNET-UM004	This manual describes how you can use the 1788-EN2DN device to link to and from your DeviceNet network.

Rockwell Automation publications are available for electronic download at <http://literature.rockwellautomation.com> or by contacting your distributor.

Serial Communication

Each of the CompactLogix packaged controllers has a built-in RS-232 port.

- 1769-L23E-QB1B and 1769-L23E-QBFC1B CompactLogix packaged controllers have one built-in RS-232 port. By default, that port is channel 0 on these controllers.
- The 1769-L23-QBFC1B CompactLogix controller has two RS-232 ports that are able to use either DF1 or ASCII protocols.

IMPORTANT

Limit the length of serial (RS-232) cables to 15.2 m (50 ft).

You can configure the serial port of the controllers for several modes. This table lists the modes available and describes what functionality each mode offers.

CompactLogix Serial Port Configuration

Mode	Functions
DF1 Point-to-Point	Communication between the controller and one other DF1-protocol-compatible device. This mode is typically used when downloading and uploading a program to the controller and is the default mode that the serial port operates in. Default parameters include: • Baud Rate: 19,200 • Data Bits: 8 • Parity: None • Stop Bits: 1 • Control Line: No Handshake • RTS send Delay: 0 • RTS Off Delay: 0
DF1 Master	Control polling and message transmission between the master and slave nodes. • The master/slave network includes one controller configured as the master node and as many as 254 slave nodes. Link slave nodes by using modems or line drivers. • A master/slave network can have node numbers from 0...254. Each node must have a unique node address. Also, at least two nodes must exist to define your link as a network (one master and one slave station are the two nodes).
DF1 Slave	Use a controller as a slave station in a master/slave serial communication network. • When there are multiple slave stations on the network, link slave stations by using modems or line drivers to the master. When you have a single slave station on the network, you do not need a modem to connect the slave station to the master. You can configure the control parameters for no handshaking. You can connect 2...255 nodes to a single link. In DF1 Slave mode, a controller uses DF1 half-duplex protocol. • One node is designated as the master and it controls which node has access to the link. All the other nodes are slave stations and must wait for permission from the master before transmitting.
DF1 Radio Modem	Compatible with SLC 500 and MicroLogix 1500 controllers, this mode supports: • Master and Slave modes. • Store and Forward mode.

CompactLogix Serial Port Configuration

Mode	Functions
User	Communication with ASCII devices. Use of this mode requires you to use ASCII instructions in your program to transmit data to and from ASCII devices.
DH-485	Communicate with other DH-485 devices. This multi-master, token-passing network allows programming and peer-to-peer messaging.

Determine Need for Isolator and Cable for Connection

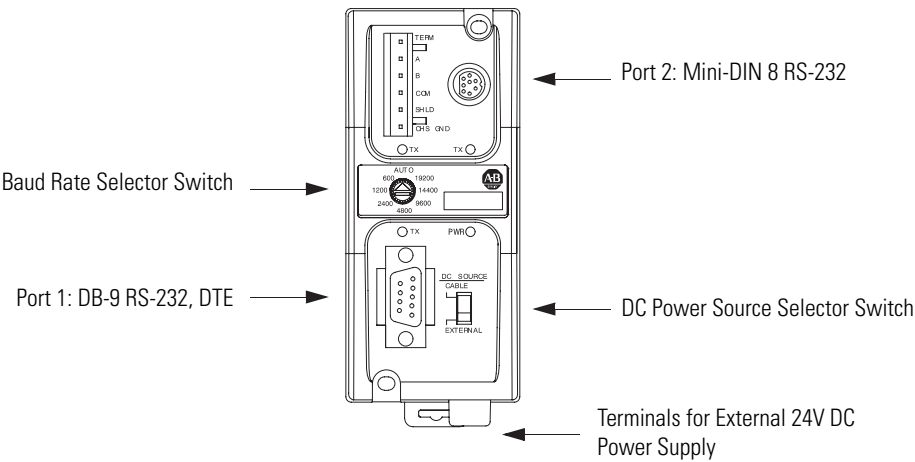
Channel 0 on the CompactLogix controllers is fully isolated and does not need a separate isolation device. Channel 1 on the 1769-L23-QBFC1B packaged controller is not an isolated serial port.

You should consider installing an isolator in these situations:

- between the controller and modem or ASCII device.
- when connecting directly to the controller from a workstation.

An isolator that you might consider using is the 1761-NET-AIC interface converter shown here.

1761-NET-AIC Interface Converter



After you have determined if you are using an isolator, use this table to determine what cable you need to use.

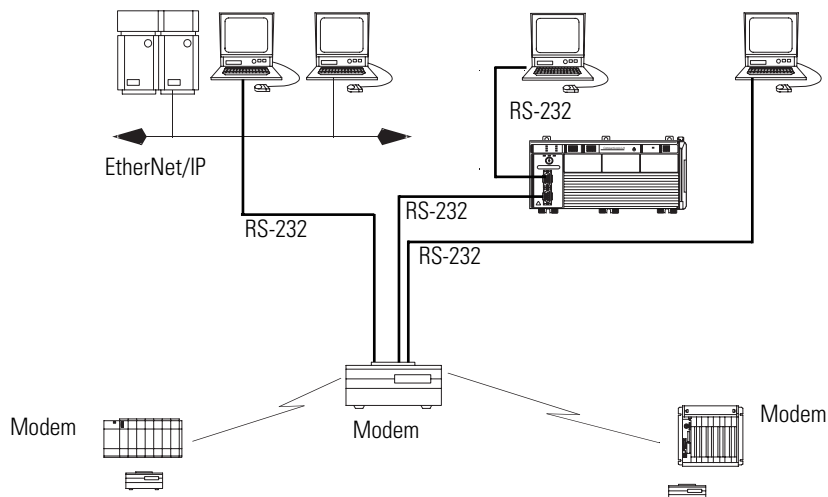
Serial Port Cable Options

If you are using an isolator	Then use this cable																														
No	The 1756-CP3 cable attaches the controller directly to the controller. 1 CD 2 RDX 3 TXD 4 DTR COMMON 6 DSR 7 RTS 8 CTS 9 1 CD 2 RDX 3 TXD 4 DTR COMMON 6 DSR 7 RTS 8 CTS 9 If you make your own cable, it must be shielded. The shields must be tied to the metal shell (that surrounds the pins) on both ends of the cable. You can also use a 1747-CP3 cable from the SLC product family. This cable has a taller right-angle connector housing than that of the 1756-CP3 cable.																														
Yes	The 1761-CBL-AP00 cable (right-angle connector to controller) or the 1761-CBL-PM02 cable (straight connector to the controller) attaches the controller to port 2 on the 1761-NET-AIC isolator. The mini-DIN connector is not commercially available, so you cannot make this cable. 6 7 8 9 1 2 3 4 5 DB-9 Right-angle or Straight Cable End 6 7 8 3 4 1 2 5 8-pin, Mini-DIN Cable End <table><tr><th>Pin</th><th>DB-9 End</th><th>Mini-DIN End</th></tr><tr><td>1</td><td>DCD</td><td>DCD</td></tr><tr><td>2</td><td>RxD</td><td>RxD</td></tr><tr><td>3</td><td>TxD</td><td>TxD</td></tr><tr><td>4</td><td>DTR</td><td>DTR</td></tr><tr><td>5</td><td>Ground</td><td>Ground</td></tr><tr><td>6</td><td>DSR</td><td>DSR</td></tr><tr><td>7</td><td>RTS</td><td>RTS</td></tr><tr><td>8</td><td>CTS</td><td>CTS</td></tr><tr><td>9</td><td>N/A</td><td>N/A</td></tr></table>	Pin	DB-9 End	Mini-DIN End	1	DCD	DCD	2	RxD	RxD	3	TxD	TxD	4	DTR	DTR	5	Ground	Ground	6	DSR	DSR	7	RTS	RTS	8	CTS	CTS	9	N/A	N/A
Pin	DB-9 End	Mini-DIN End																													
1	DCD	DCD																													
2	RxD	RxD																													
3	TxD	TxD																													
4	DTR	DTR																													
5	Ground	Ground																													
6	DSR	DSR																													
7	RTS	RTS																													
8	CTS	CTS																													
9	N/A	N/A																													

Communicate with DF1 Devices

You can configure the controller as a master or slave on a serial communication network. Use a serial network when:

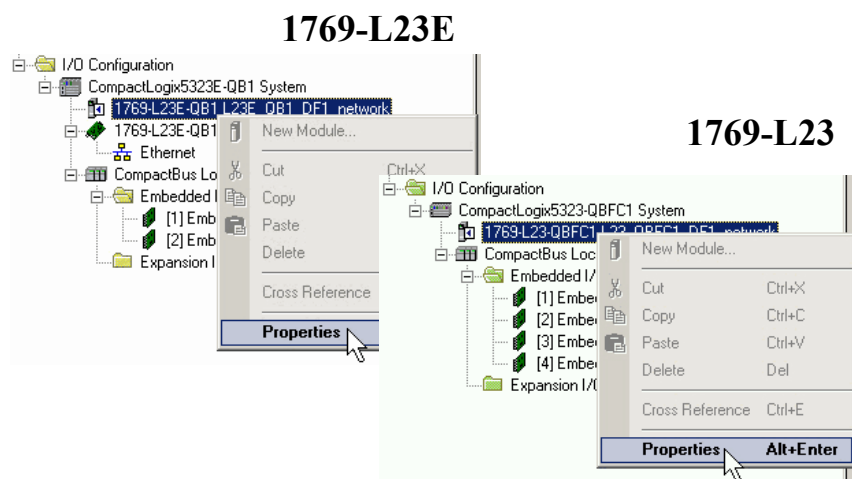
- the system contains three or more stations.
- communication occurs regularly and require leased-line, radio, or power-line modems.



DF1 Configuration Procedure

Configure the controller for DF1 communication by performing this procedure in RSLogix 5000 software.

1. In your I/O Configuration tree, right-click your controller and choose Properties.

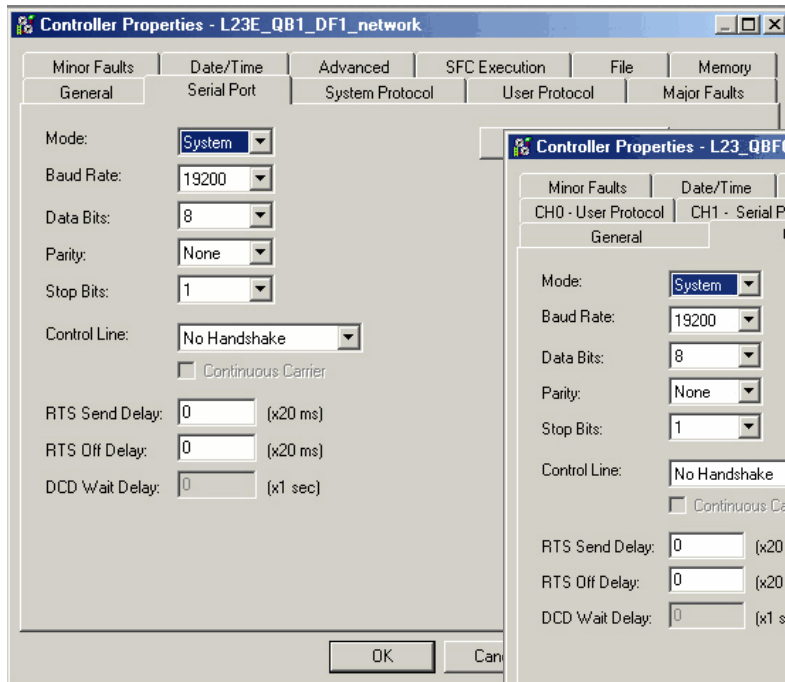


The Controller Properties dialog box displays.

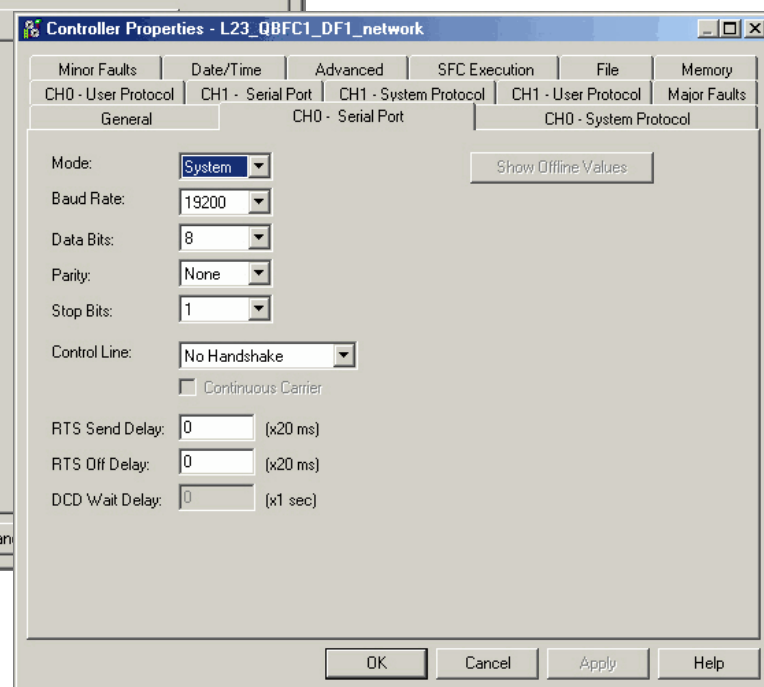
2. If you are configuring a 1769-L23E serial port, click the Serial Port tab.

If you are configuring a 1769-L23-QBFC1B controller, click the serial port tab for the port you want to configure (for example, CH0-Serial Port).

1769-L23E



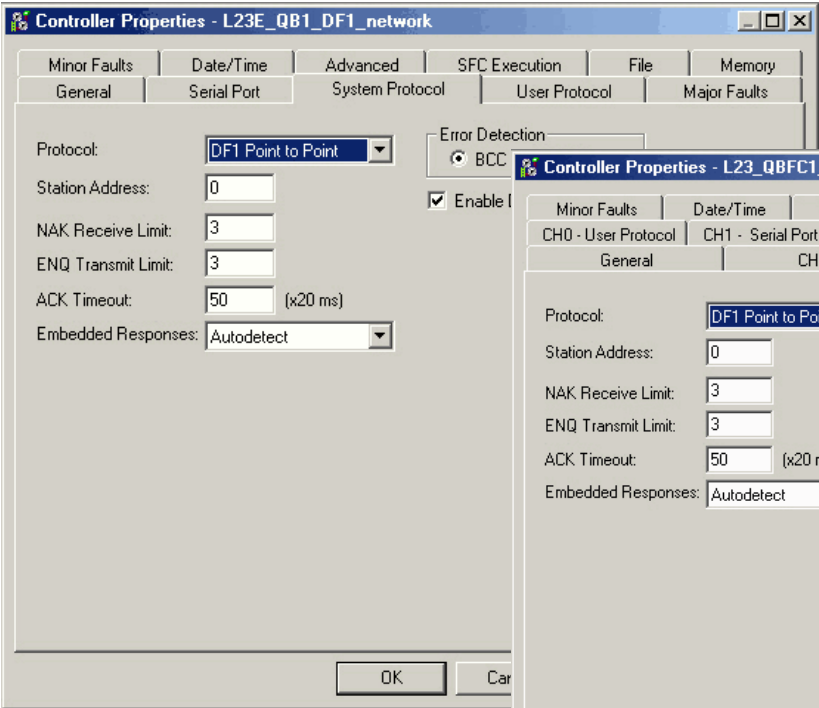
1769-L23



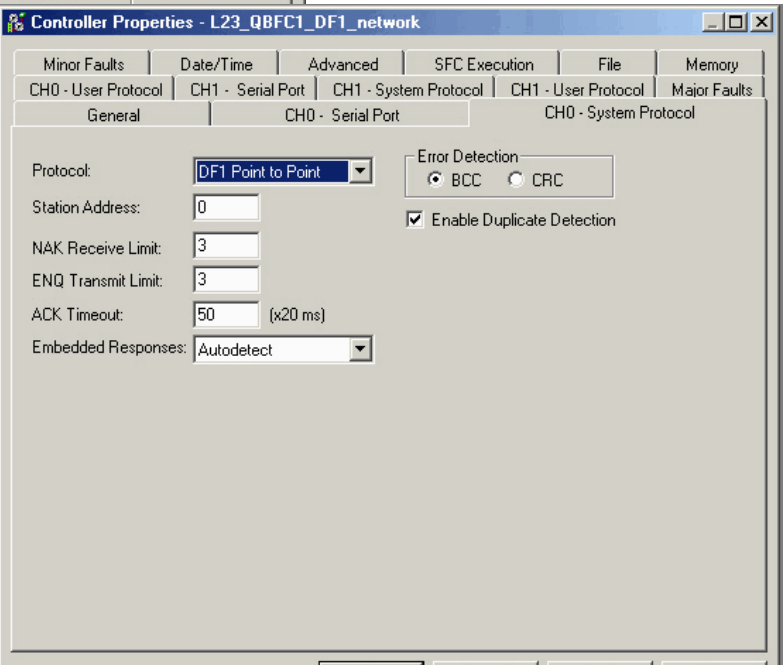
3. From the Mode pull-down menu, choose System.
4. Specify the remaining communication settings according to your system.
5. If you are configuring a 1769-L23E serial port, click the System Protocol tab.

If you are configuring a 1769-L23-QBFC1B controller, click the system protocol tab that corresponds to the serial port you configured in [step 2](#) (for example, CH0-System Protocol).

1769-L23E



1769-L23



- 6. From the Protocol pull-down menu, choose a DF1 protocol.
- 7. Specify DF1 settings according to your system.

Communicate with ASCII Devices

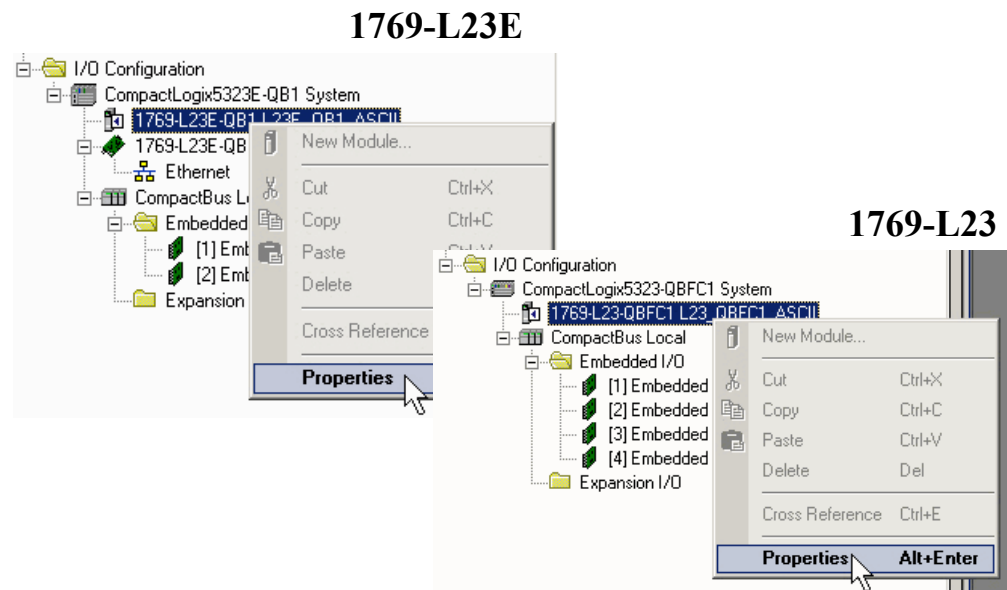
You can use the serial port to interface with ASCII devices when the controller is configured for user mode. For example, you can use the serial port to:

- read ASCII characters from a weigh scale module or bar code reader.
- send and receive messages from an ASCII triggered device.

ASCII Configuration Procedure

To configure the controller for ASCII communication, complete this procedure.

1. In RSLogix 5000 programming software, right-click your controller and choose Properties.

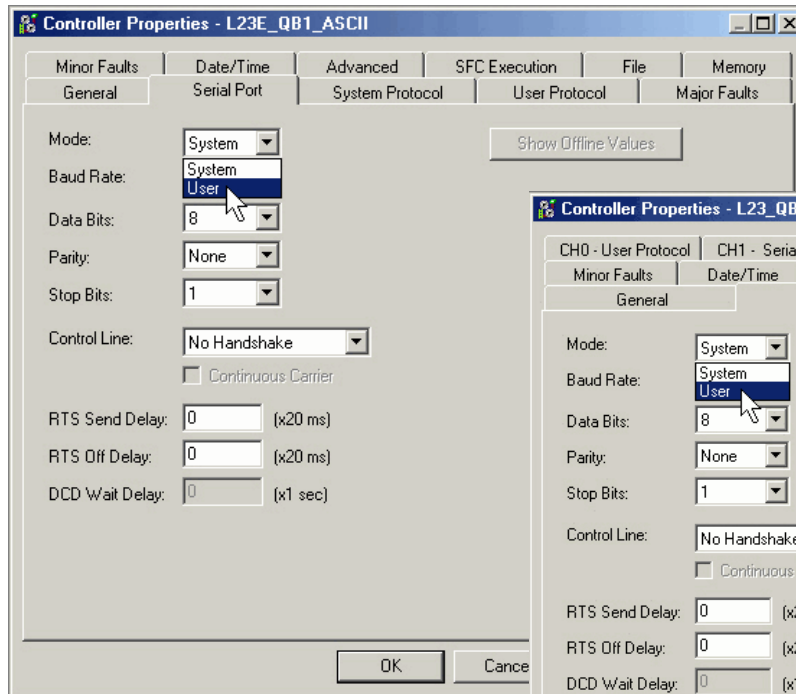


The Controller Properties dialog box displays.

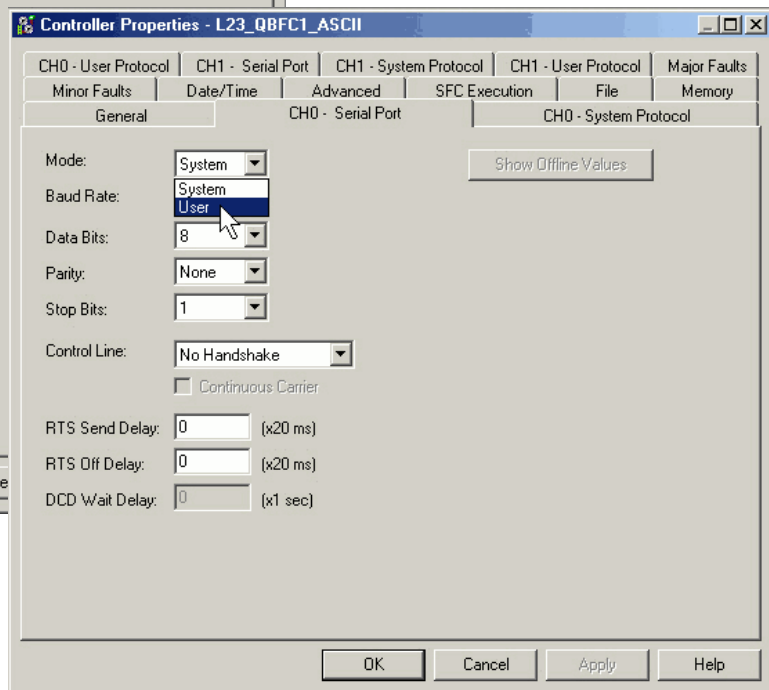
2. If you are configuring a 1769-L23E serial port, click the Serial Port tab.

If you are configuring a 1769-L23-QBFC1B controller, click the serial port tab for the port you want to configure (for example, CH0-Serial Port).

1769-L23E



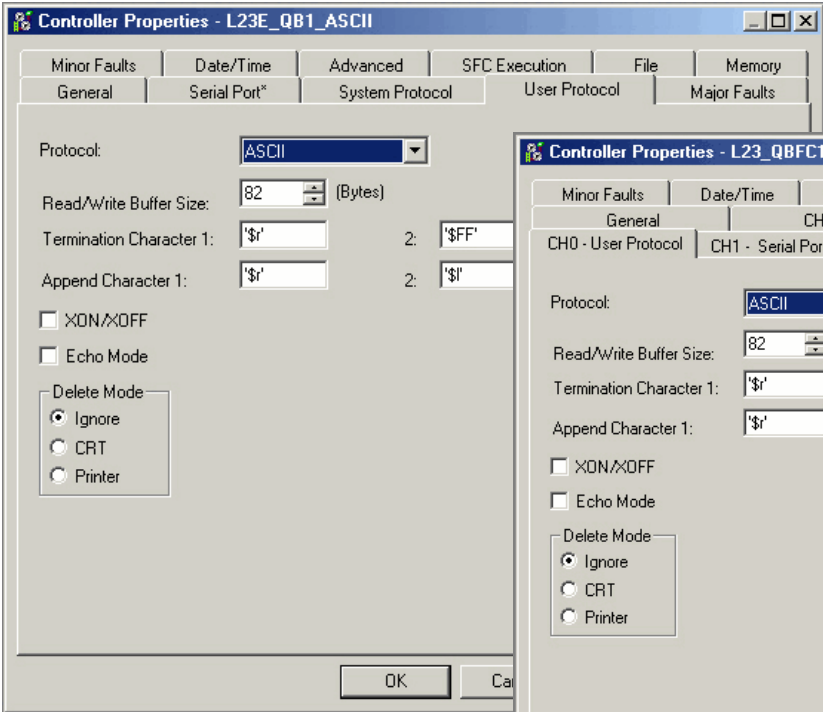
1769-L23



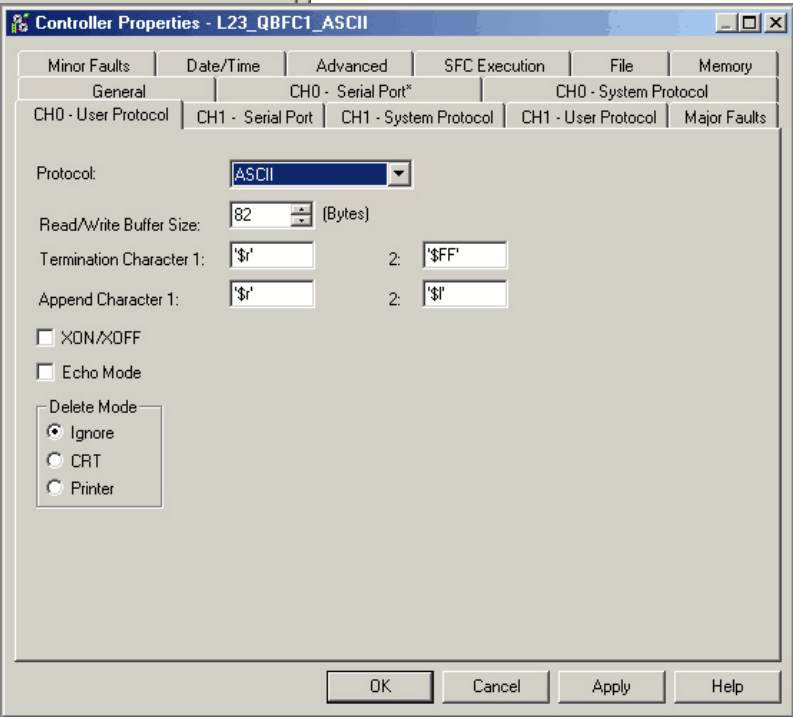
3. From the Mode pull-down menu, choose User.
4. Specify communication settings according to you system.
5. If you are configuring a 1769-L23E serial port, click the System Protocol tab.

If you are configuring a 1769-L23-QBFC1B controller, click the system protocol tab that corresponds to the serial port you configured in [step 2](#) (for example, CH0-System Protocol).

1769-L23E



1769-L23



6. From the Protocol pull-down menu, choose ASCII.
7. Specify ASCII settings according to your system.

ASCII Instructions

The controller supports several instructions to manipulate ASCII characters. The instructions are available in ladder diagram (LD) and structured text (ST).

Read and Write ASCII Characters

Instruction Code	Description
ABL	Determine when the buffer contains termination characters
ACB	Count the characters in the buffer
ACL	Clear the buffer
	Clear out ASCII Serial Port instructions that are currently executing or are in the queue
AHL	Obtain the status of the serial port control lines
	Turn on or off the DTR signal
	Turn on or off the RTS signal
ARD	Read a fixed number of characters
ARL	Read a varying number of characters, up to and including the first set of termination characters
AWA	Send characters and automatically append one or two additional characters to mark the end of the data
AWT	Send characters

Create and Modify Strings of ASCII Characters

Instruction Code	Description
CONCAT	Add characters to the end of a string
DELETE	Delete characters from a string
FIND	Determine the starting character of a substring
INSERT	Insert characters into a string
MID	Extract characters from a string

Convert Data to or from ASCII Characters

Instruction Code	Description
STOD	Convert the ASCII representation of an integer value to a SINT, INT, DINT, or REAL value
STOR	Convert the ASCII representation of a floating-point value to a REAL value
DTOS	Convert a SINT, INT, DINT, or REAL value to a string of ASCII characters
RTOS	Convert a REAL value to a string of ASCII characters
UPPER	Convert the letters in a string of ASCII characters to upper case
LOWER	Convert the letters in a string of ASCII characters to lower case

DH-485 Network Communication

The serial ports of CompactLogix packaged controllers are also able to communicate by using DH-485 protocol. By using a 1761-NET-AIC converter and the appropriate RS-232 cable (catalog numbers 1756-CP3 or 1747-CP3), a CompactLogix controller can send and receive data on a DH-485 network.

However, with all CompactLogix controllers, we recommend that you use NetLinx networks, such as EtherNet/IP or DeviceNet, because excessive traffic on a DH-485 network may make it impractical to connect to a controller with RSLogix 5000 programming software.

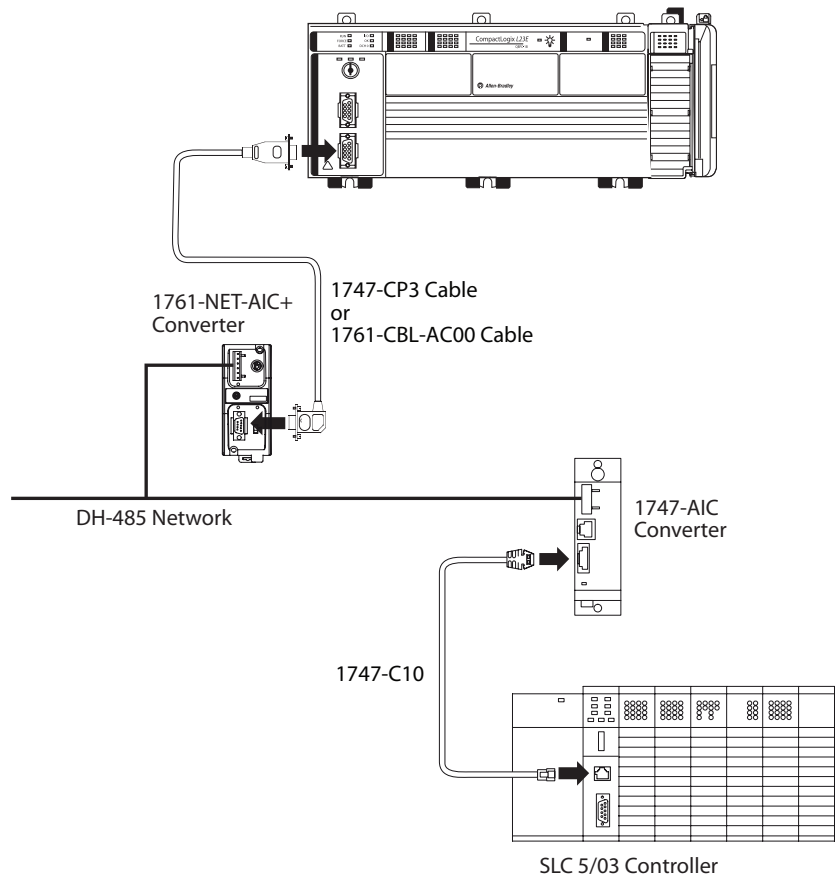
IMPORTANT

If your application uses connections to DH-485 networks, select built-in serial ports.

The DH-485 protocol uses RS-485 half-duplex as its physical interface. RS-485 is a definition of electrical characteristics, not a protocol. You can configure the CompactLogix controller's RS-232 port to act as a DH-485 interface.

This graphic depicts how the CompactLogix packaged controller can be connected to the DH-485 network.

CompactLogix DH-485 Communication Network Example



On the DH-485 network, the CompactLogix controller can send and receive messages to and from other controllers.

IMPORTANT

A DH-485 network consists of multiple cable segments. Limit the total length of all the segments to 1219 m (4000 ft).

For the controller to operate on a DH-485 network, you need a 1761-NET-AIC interface converter for each controller you want to put on the DH-485 network.

You can have one packaged controller for each 1761-NET-AIC converter.

Configuration for a DH-485 Network

To establish DH-485 communication, complete this procedure.

1. Connect the serial port of the controller to either port 1 or port 2 of the 1761-NET-AIC converter.
2. Use the RS-485 port to connect the converter to the DH-485 network.

The cable you use to connect the controller depends on the port you use on the 1761-NET-AIC converter.

Connection	Required Cable
Port 1 DB-9 RS-232, DTE connection	1747-CP3 or 1761-CBL-AC00
Port 2 mini-DIN 8 RS-232 connection	1761-CBL-AP00 or 1761-CBL-PM02

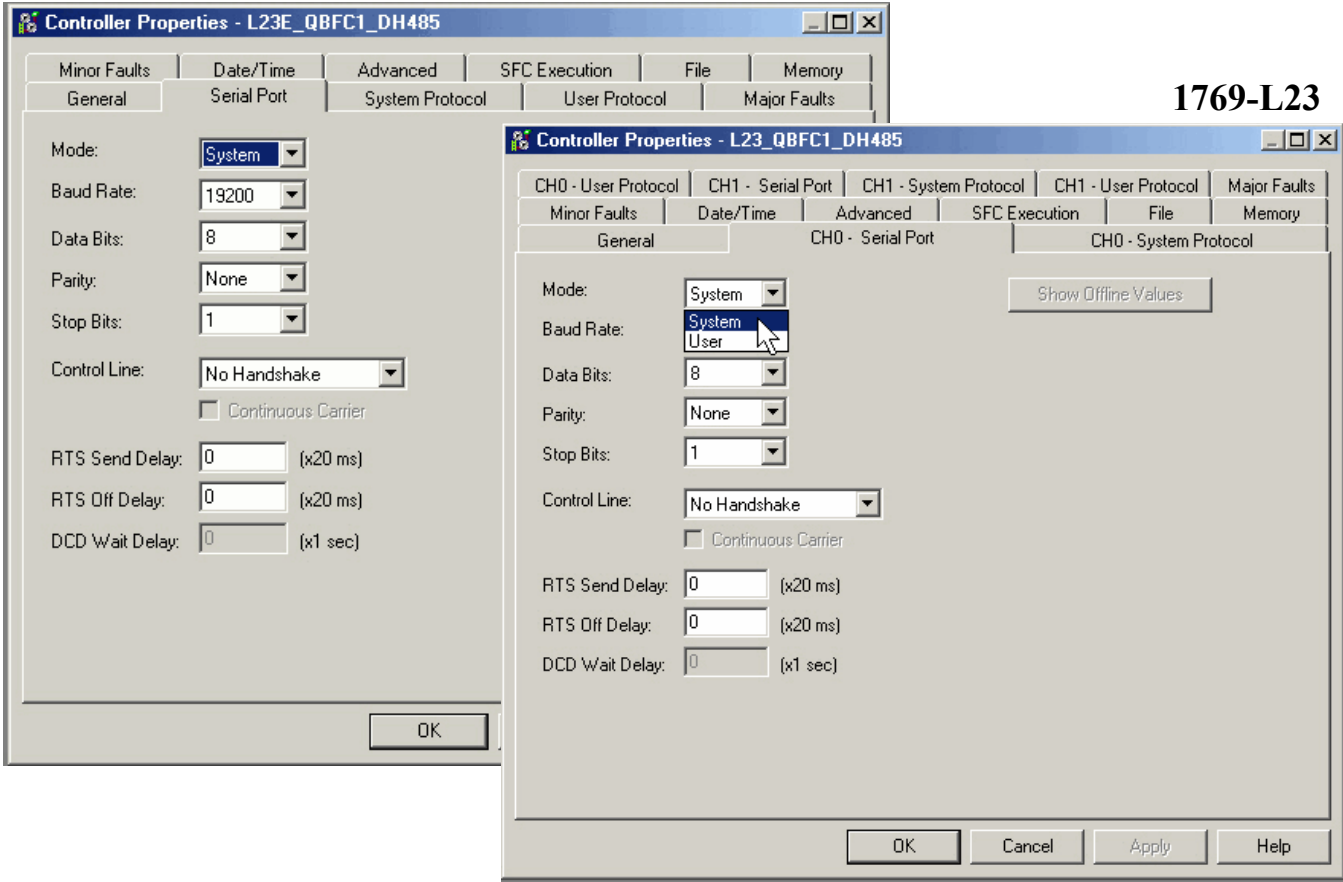
3. In RSLogix 5000, open the Controller Properties dialog box by right-clicking the packaged controller and choosing Properties.

4. If you are configuring a 1769-L23E serial port, click the Serial Port tab.

If you are configuring a 1769-L23-QBFC1B controller, click the serial port tab for the port you want to configure (for example, CH0-Serial Port).

1769-L23E

1769-L23



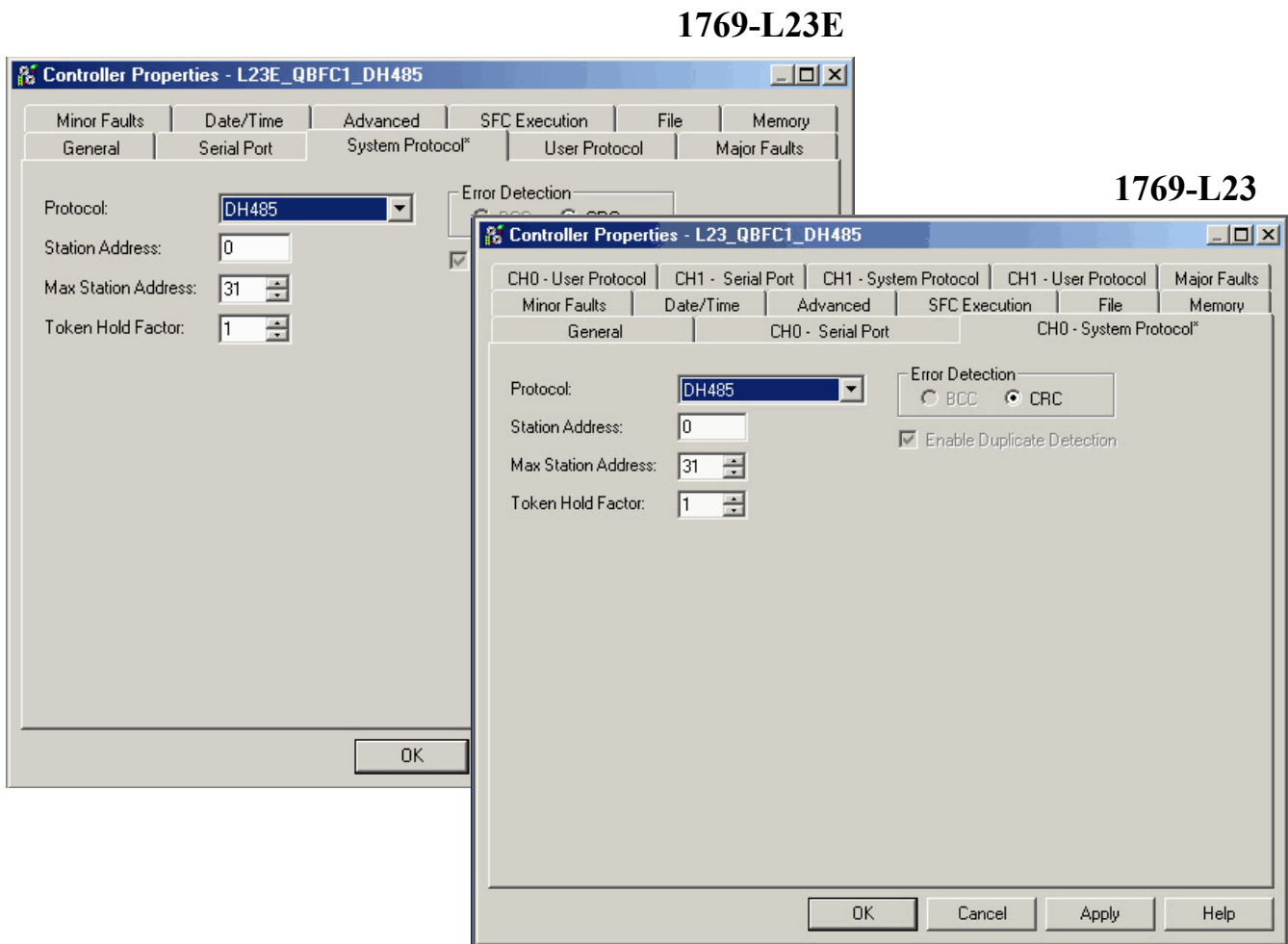
5. From the Mode pull-down menu, choose System.
6. Specify communication settings according to your system.

IMPORTANT

The baud rate specifies the communication rate for the DH-485 port. All devices on the same DH-485 network must be configured for the same baud rate. Select 9600 or 19200 KB.

7. If you are configuring a 1769-L23E serial port, click the System Protocol tab.

If you are configuring a 1769-L23-QBFC1B controller, click the system protocol tab that corresponds to the serial port you configured in [step 2](#) (for example, CH0-System Protocol).



8. From the Protocol pull-down menu, choose DH485.

9. Use the table below as a reference to specify the DH-485 settings specific to your system.

DH-485 System Protocol Specifications

Characteristic	Description
Station Address	Specifies the node address of the controller on the DH-485 network. Select a number 1...31 decimal, inclusive. To optimize network performance, assign node addresses in sequential order. Initiators, such as personal computers, should be assigned the lowest address numbers to minimize the time required to initialize the network.
Token Hold Factor	Number of transmissions plus retries that a node holding a token can send onto the data link each time it receives the token. Enter a value between 1...4. The default is 1.
Maximum Station Address	Specifies the maximum node address of all the devices on the DH-485 network. Select a number 1...31 decimal, inclusive. To optimize network performance, make sure: - the maximum node address is the highest node number being used on the network. - that all the devices on the same DH-485 network have the same maximum node address.

Additional Resources for DH-485 Communication

Resource	Description
Data Highway/Data Highway Plus/Data Highway II/Data Highway 485 Cable Installation Instructions, publication 1770-6.2.2	This manual explains how to install various Data Highway cable networks, including the DH-485 network.

Rockwell Automation publications are available for electronic download at <http://literature.rockwellautomation.com> or by contacting your distributor.

Modbus Support

To use Logix5000 controllers with the Modbus protocol, connect the controllers through the serial port and execute specific ladder logic routines.

A sample controller project is available with RSLogix 5000 Enterprise programming software by clicking Help and choosing Vendor Sample Projects.

Additional Resources for Serial Communication

Resource	Description
Logix5000 Controllers Common Procedures Manual, publication 1756-PM001	This manual explains a variety of topics specific to programming Logix controllers, including ASCII strings and Structured Text.
Logix5000 Controllers General Instructions Reference Manual, publication 1756-RM003	This manual contains several chapters that explain the use of ASCII instructions.
SCADA System Application Guide, publication AG-UM008	This publication describes how to configure a SCADA system using the DF1 protocol.
Logix5000 Controllers as Masters or Slaves on Modbus Application Solution, publication CIG-AP129	This application solution describes how to configure your Logix5000 controller as a master or slave when the Modbus protocol is used.

Rockwell Automation publications are available for electronic download at <http://literature.rockwellautomation.com> or by contacting your distributor.

Embedded I/O

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DC Input Filtering	181
Configuring the DC Inputs	181
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About Embedded I/O

Each of the 1769-L23 and 1769-L23E packaged controllers has embedded inputs and outputs that function similarly to other, independent, 1769 Compact I/O modules.

This table lists the embedded I/O available with each packaged controller.

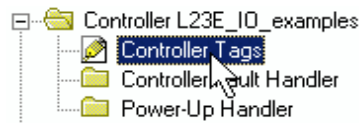
Packaged Controller Embedded I/O

Packaged Controller	Embedded I/O Available	See Page
1769-L23E-QB1B	16 DC inputs	180
	16 DC outputs	184
1769-L23E-QBFC1B, 1769-L23-QBFC1B	16 DC inputs	180
	16 DC outputs	184
	4 differential or single-ended analog inputs and 2 single-ended analog outputs	186
	6 HSC inputs and 4 HSC outputs	193

Embedded I/O Tags

After you create your 1769-L23 or 1769-L23E controller project in RSLogix 5000 software, the Controller Tags window contains all of the configuration, input, and output tags for all of the controller's embedded I/O.

To view the tag structures, double-click Controller Tags in the RSLogix 5000 software organization tree.



The tag structures for the packaged controllers' embedded I/O are shown here.

Embedded I/O Tags

1769-L23E-QB1B

Scope: L23E_QB1_IO_e Show... Show All																									
	<table><thead><tr><th>Name</th><th>Alias</th><th>F</th><th>Data Type</th></tr></thead><tbody><tr><td> Local:1:C</td><td></td><td></td><td>AB:Embedded_IQ16F:C:0</td></tr><tr><td> Local:1:I</td><td></td><td></td><td>AB:Embedded_IQ16F:I:0</td></tr><tr><td> Local:2:C</td><td></td><td></td><td>AB:Embedded_OB16:C:0</td></tr><tr><td> Local:2:I</td><td></td><td></td><td>AB:Embedded_OB16:I:0</td></tr><tr><td> Local:2:O</td><td></td><td></td><td>AB:Embedded_OB16:O:0</td></tr></tbody></table>	Name	Alias	F	Data Type	Local:1:C			AB:Embedded_IQ16F:C:0	Local:1:I			AB:Embedded_IQ16F:I:0	Local:2:C			AB:Embedded_OB16:C:0	Local:2:I			AB:Embedded_OB16:I:0	Local:2:O			AB:Embedded_OB16:O:0
Name	Alias	F	Data Type																						
Local:1:C			AB:Embedded_IQ16F:C:0																						
Local:1:I			AB:Embedded_IQ16F:I:0																						
Local:2:C			AB:Embedded_OB16:C:0																						
Local:2:I			AB:Embedded_OB16:I:0																						
Local:2:O			AB:Embedded_OB16:O:0																						

DC Input Tags

DC Output Tags

DC Input Tags

DC Output Tags

1769-L23E-QBFC1B and 1769-L23-QBFC1B

Scope: L23E_IO_examp Show... Show All			

DC Input Tags

DC Output Tags

Analog I/O Tags

High-speed
Counter Tags

For more information about the embedded I/O tags, see the embedded I/O section specific to the type of I/O you are using.

I/O Type	See Page
Digital Inputs	180
Digital Outputs	184
Analog I/O	186
High-speed Counters	193

About the Digital Inputs

Each of the 1769-L23 and 1769-L23E packaged controllers provides 16 DC sink/source high-speed inputs. This section describes how to wire and configure the DC inputs.

DC Input Wiring

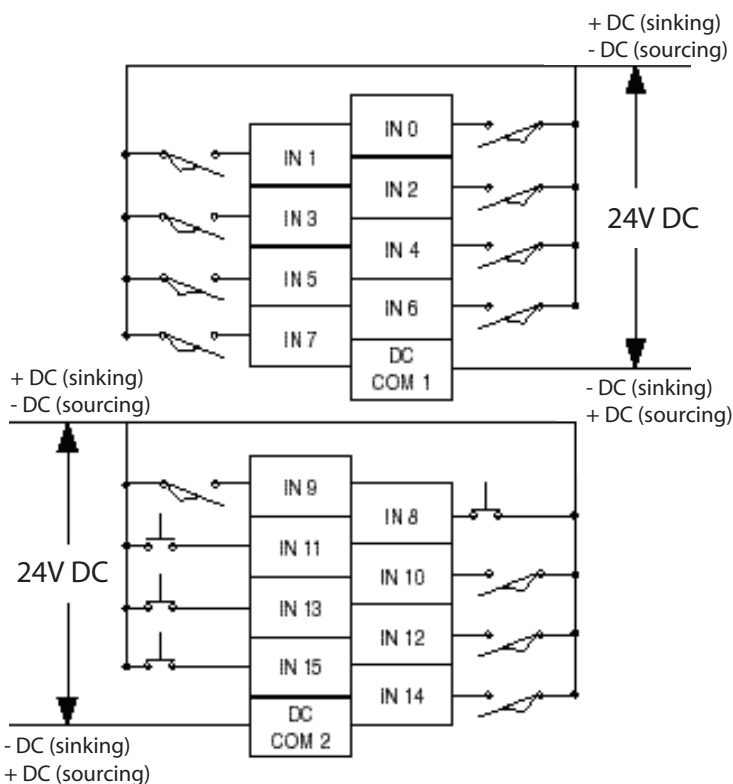
This diagram shows wiring for the DC input points⁽¹⁾ of the packaged controller.

ATTENTION



Miswiring of the inputs to an AC power source will damage the embedded inputs.

Be careful when stripping wires. Wire fragments that fall into a wiring terminal could cause damage at powerup. Once wiring is complete, make sure the terminal is free of all metal fragments.



⁽¹⁾ **Sinking/Sourcing Inputs** - Sourcing/sinking describes the current flow between the I/O and the field device. Sourcing I/O circuits supply (source) current to sinking field devices. Sinking I/O circuits are driven by a current sourcing field device. Field devices connected to the negative side (DC Common) of the field power supply are sinking field devices. Field devices connected to the positive side (+V) of the field supply are sourcing field devices. **Europe:** DC sinking input and sourcing output circuits are the commonly used options.

DC Input Filtering

The embedded IQ16F inputs can be configured to use digital filtering by input group. Filter times can be specified for both the OFF to ON and ON to OFF transitions.

Group 0 is used to configure inputs 0...7, and group 1 is used to configure inputs 8...15.

Default input-filtering values are 2.0 ms. You can specify 2.0 ms, 1.0 ms, 0.5 ms, 0.1 ms, and 0.0 ms for any transition as required by your program application.

Configuring the DC Inputs

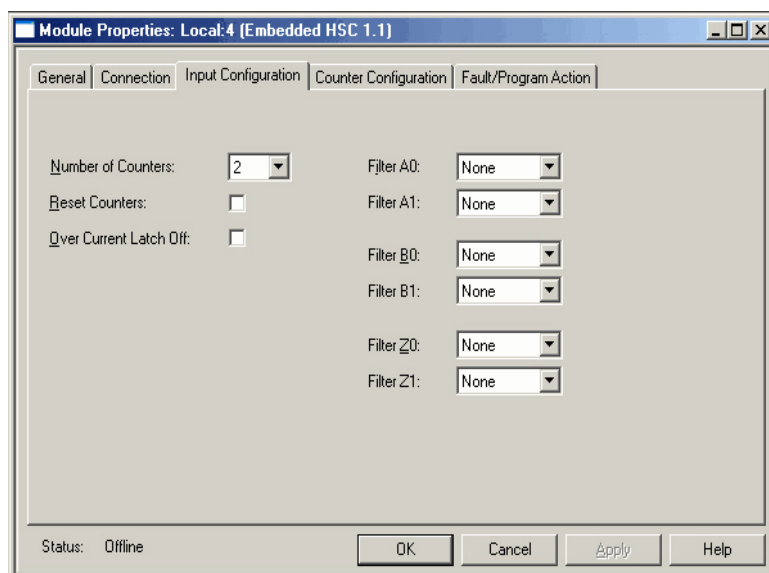
Configuration of the DC inputs is typically completed by using RSLogix 5000 software during the initial system configuration.

To configure input filter settings in RSLogix 5000 software, complete these steps.

IMPORTANT

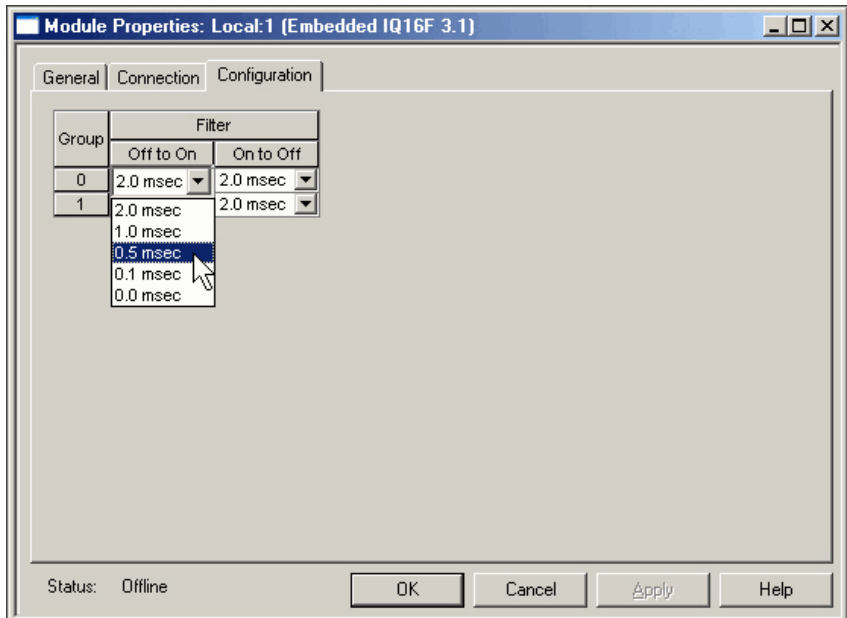
DC input configuration can be carried-out only when the packaged controller is in Program or Remote Run modes.

1. In the I/O Configuration tree, right-click slot 1, Embedded IF16Q Discrete Inputs and choose Properties.



2. Click the Configuration tab.
3. Use the pull-down menus to select your filter times.

For more information about digital input filtering, see the section titled DC Input Filtering on [page 181](#).



4. Click OK.

DC Input Tags

As indicated in the Embedded I/O Tags section on [page 178](#), the tags for the embedded I/O are located in the Controller Tags folder at the creation of the packaged controller project.

Tags specific to the use of the DC inputs are described here.

DC Input Tags

Name △		Data Type	Style
 Local:1:C		AB:Embedded_IQ16F:C:0	
 Local:1:I		AB:Embedded_IQ16F:I:0	
 Local:1:I.Fault		DINT	Binary
 Local:1:I.Data		INT	Binary

Input Point Fault Data

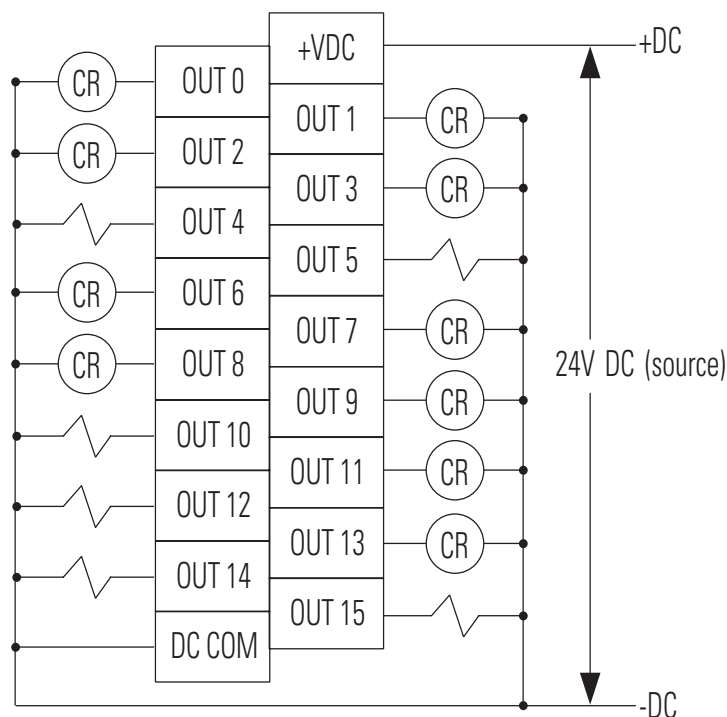
Input Data Points

About the Digital Outputs

Each of the 1769-L23 and 1769-L23E packaged controllers provides 16 solid state DC outputs. This section describes how to wire and configure the OB16 DC outputs.

DC Output Wiring

Basic wiring⁽¹⁾ of for the embedded OB16 Discrete Outputs (sourcing outputs)⁽²⁾ is shown below.



ATTENTION



Miswiring the outputs to an AC power source or applying reverse polarity causes damage to the outputs.

Be careful when stripping wires. Wire fragments that fall into a wiring terminal could cause damage at powerup. Once wiring is complete, make sure the terminal is free of all metal fragments.

⁽¹⁾ Recommended Surge Suppression - Use a 1N4004 diode reverse-wired across the load for transistor outputs switching 24V DC inductive loads. For additional details, refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication [1770-4.1](#).

⁽²⁾ Sourcing Output - Source describes the current flow between the I/O and the field device. Sourcing output circuits supply (source) current to sinking field devices. Field devices connected to the negative side (DC Common) of the field power supply are sinking field devices. Field devices connected to the positive side (+V) of the field supply are sourcing field devices. **Europe:** DC sinking input and sourcing output circuits are the commonly used options.

Configuring the DC Outputs

IMPORTANT

The embedded OB16 discrete outputs **cannot** be configured for Program and Fault mode output states. If output states are specified in the OB16 Discrete Outputs Module Properties dialog box, those states are not implemented in the program.

The DC outputs simply go to 0 (OFF) in the event of the controller being in Program or Fault modes.

DC Output Tags

As indicated in the Embedded I/O Tags section on [page 178](#), the tags for the embedded I/O are located in the Controller Tags folder at the creation of the packaged controller project.

Tags specific to the use of the DC outputs are described here.

DC Output Tags

Name		Data Type	Style
+ Local:2:C		AB:Embedded_OB16:C:0	
- Local:2:I		AB:Embedded_OB16:I:0	
DC Output Input (Status) Tags	+ Local:2:I.Fault	DINT	Binary
	+ Local:2:I.ReadBack	INT	Binary
- Local:2:O		AB:Embedded_OB16:O:0	
DC Output Data Tags	+ Local:2:O.Data	INT	Binary

About Analog I/O

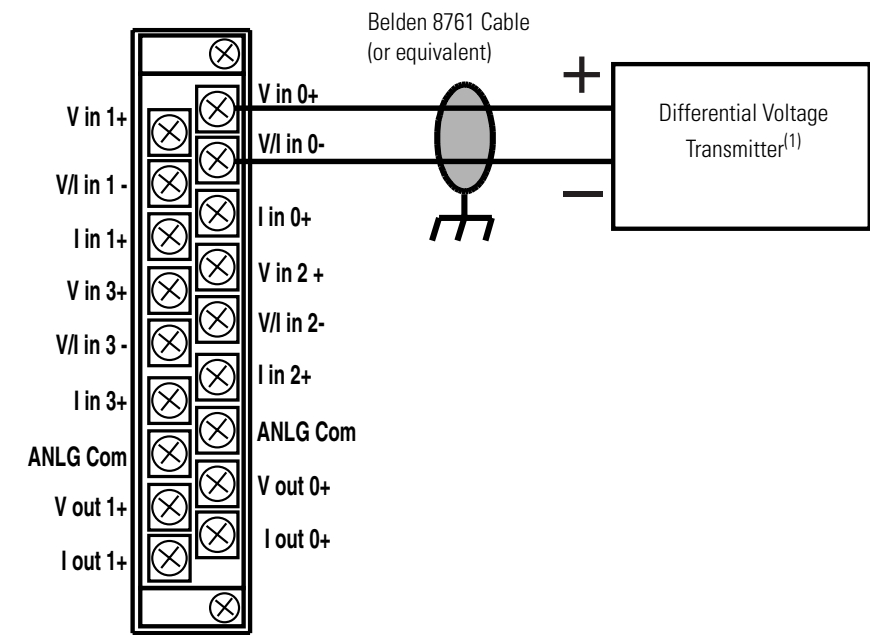
The 1769-L23-QBFC1B and 1769-L23E-QBFC1B packaged controllers provide four differential or single-ended analog inputs and two single-ended analog outputs.

This section contains wiring options and diagrams, configuration procedures, and tag information for the embedded IF4XOF2 analog I/O channels.

Analog I/O Wiring Diagrams

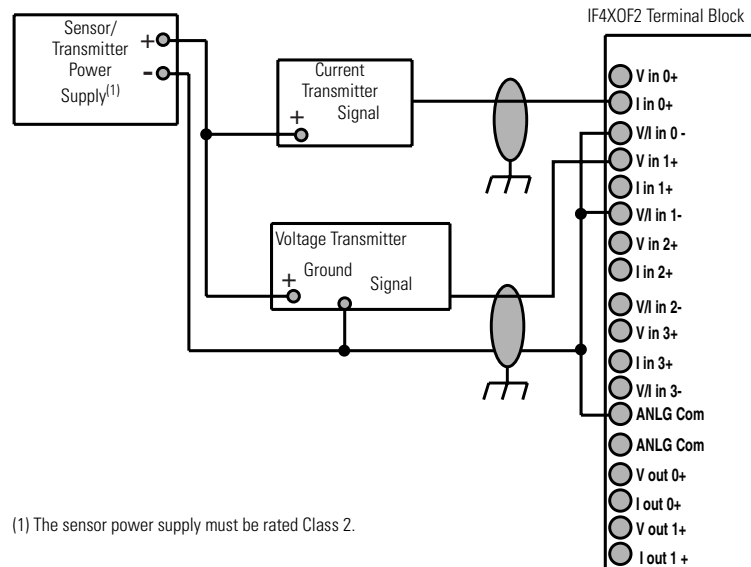
Use these wiring diagrams as a reference when wiring your analog I/O.

Wiring Differential Inputs

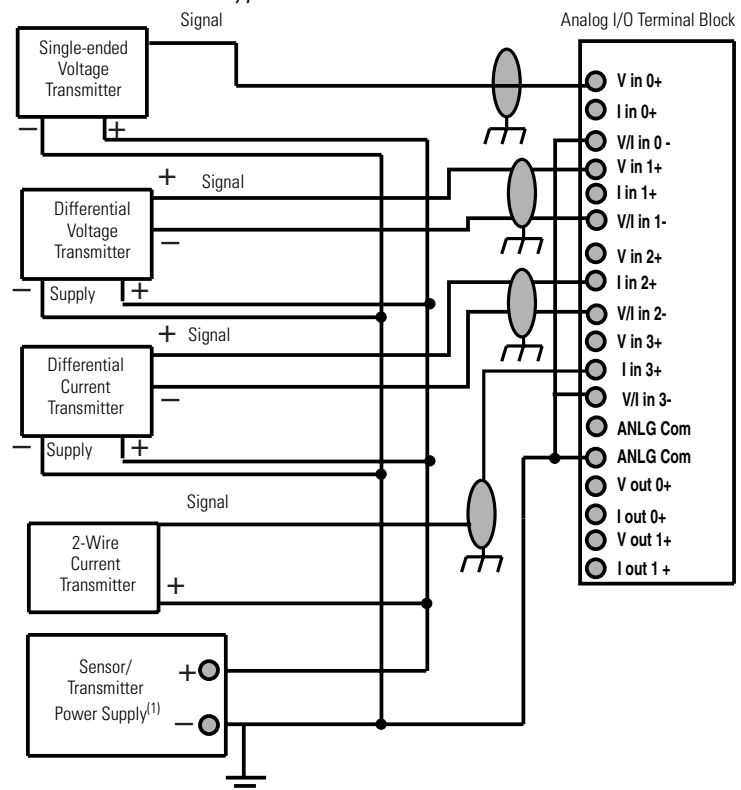


⁽¹⁾ The sensor power supply must be rated Class 2.

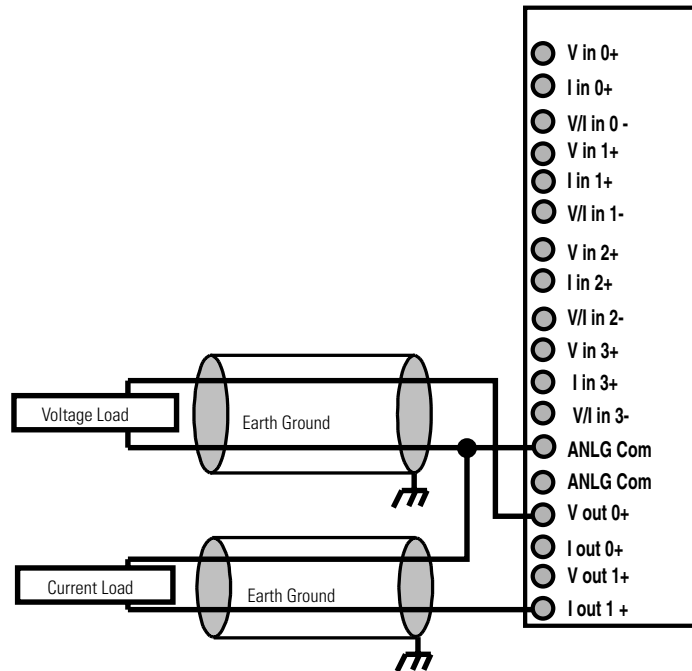
Wiring Single-ended Sensor/Transmitter Types



Wiring Mixed Transmitter Types



Wiring Analog Outputs



ATTENTION



Analog outputs may fluctuate for less than a second when power is applied or removed. This characteristic is common to most analog outputs. While the majority of loads will not recognize this short signal, take preventive measures to make sure that connected equipment is not affected.

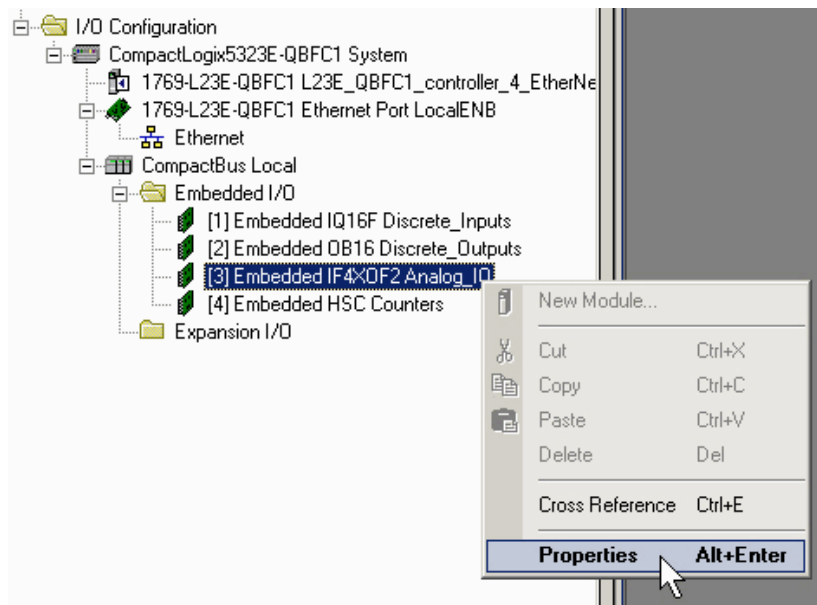
Configure the Analog I/O

The analog I/O Module Properties dialog box lets you specify the analog inputs and outputs you want to enable in your application.

Configuration of the analog I/O is typically completed by using RSLogix 5000 software during the initial system configuration.

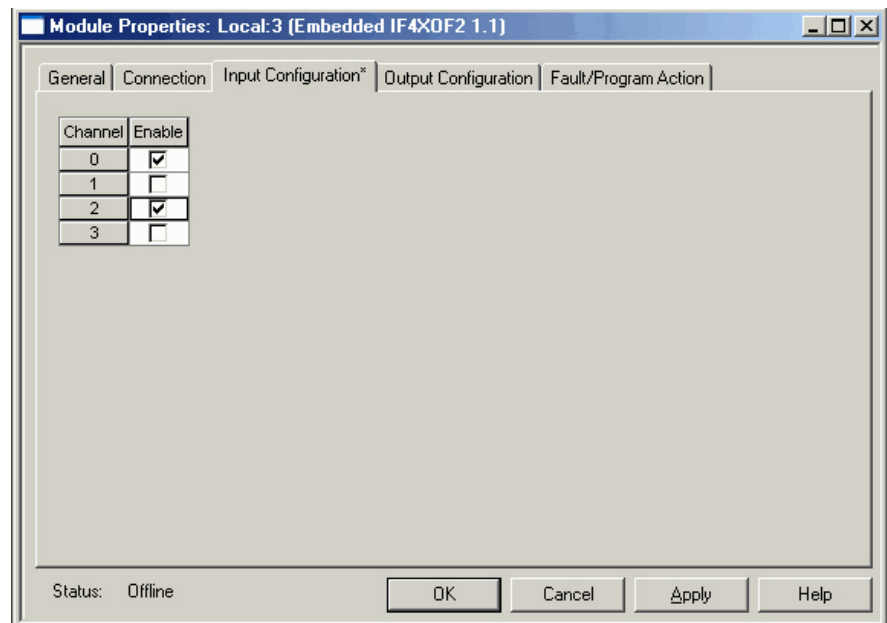
To configure your analog I/O in RSLogix 5000 software, complete these steps.

1. In the I/O Configuration tree, right-click slot 3, Embedded IF4XOF2 Analog I/O and choose Properties.

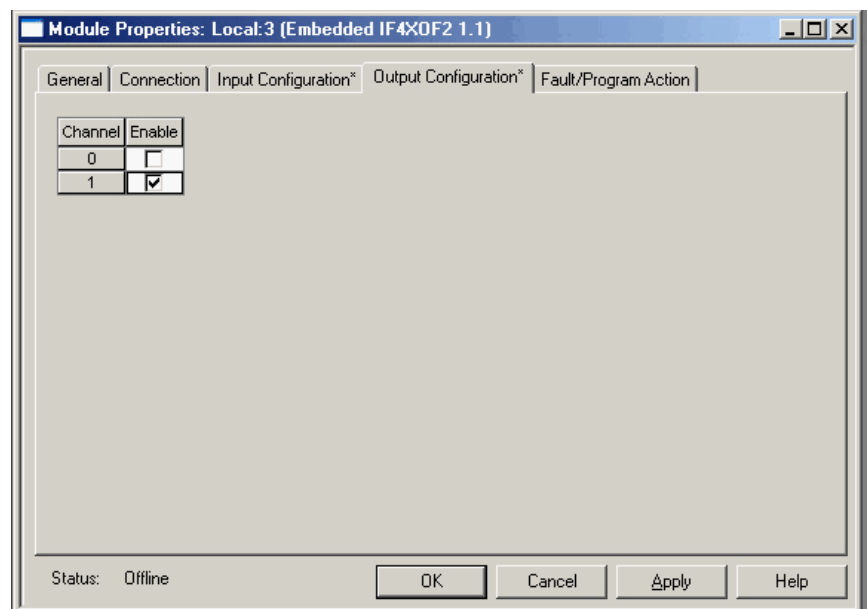


2. Click the Input Configuration tab.

3. Check the checkboxes that correspond to the input channels you need to enable.



4. Click the Output Configuration tab.
5. Check the boxes that correspond to the output channels you need to enable.



6. Click OK.

Analog I/O Tags

As indicated in the Embedded I/O Tags section on [page 178](#), the tags for the embedded I/O are located in the Controller Tags folder at the creation of the packaged controller project.

Tags specific to the use of the analog I/O are described here.

Analog I/O Tags⁽¹⁾

	Name	Data Type	Style
Configuration Tags (Analog I/O configuration is completed via the Module Properties dialog box.)	+ Local:3:C	AB:Embedded_IF4XOF2:C:0	
	- Local:3:I	AB:Embedded_IF4XOF2:I:0	
Input Data and Status Tags	+ Local:3:I.Fault	DINT	Binary
	+ Local:3:I.Ch0Data	INT	Decimal
	+ Local:3:I.Ch1Data	INT	Decimal
	+ Local:3:I.Ch2Data	INT	Decimal
	+ Local:3:I.Ch3Data	INT	Decimal
	+ Local:3:I.InputRangeFlag	INT	Binary
	- Local:3:I.Ch0InputOverRange	BOOL	Decimal
	- Local:3:I.Ch1InputOverRange	BOOL	Decimal
	- Local:3:I.Ch2InputOverRange	BOOL	Decimal
	- Local:3:I.Ch3InputOverRange	BOOL	Decimal
	+ Local:3:I.OutputRangeFlag	INT	Binary
	- Local:3:I.Ch0OutputOverRange	BOOL	Decimal
	- Local:3:I.Ch1OutputOverRange	BOOL	Decimal
	- Local:3:I.Ch0DataInvalid	BOOL	Decimal
	- Local:3:I.Ch1DataInvalid	BOOL	Decimal
	+ Local:3:I.Ch0Readback	INT	Decimal
	+ Local:3:I.Ch1Readback	INT	Decimal
Output Data	- Local:3:O	AB:Embedded_IF4XOF2:O:0	
	+ Local:3:O.Ch0Data	INT	Decimal
	+ Local:3:O.Ch1Data	INT	Decimal

⁽¹⁾ See the Analog I/O Tag descriptions on following page for further explanation of these tags.

Analog I/O Tag Descriptions

Tag Name	Description
Local:3:I	Tags that contain analog input data.
Local:3:I.Fault	The bits of this word are set to 1 (ON) if a fault occurs with the analog I/O ⁽¹⁾ .
Local:3:I.Ch0Data	Channel input data for channel 0.
Local:3:I.Ch1Data	Channel input data for channel 1.
Local:3:I.Ch2Data	Channel input data for channel 2.
Local:3:I.Ch3Data	Channel input data for channel 3.
Local:3:I.InputRangeFlag	Indicate the range status of the input signal by channel.
Local:3:I.Ch0InputOverRange	Indicates if the input channel is over range. ⁽²⁾
Local:3:I.Ch1InputOverRange	Indicates if the input channel is over range. ⁽²⁾
Local:3:I.Ch2InputOverRange	Indicates if the input channel is over range. ⁽²⁾
Local:3:I.Ch3InputOverRange	Indicates if the input channel is over range. ⁽²⁾
Local:3:I.OutputRangeFlag	Indicate the range status of the output signal by channel.
Local:3:I.Ch0OutputOverRange	Indicates if the output channel is over range. ⁽³⁾
Local:3:I.Ch1OutputOverRange	Indicates if the output channel is over range. ⁽³⁾
Local:3:I.Ch0DataInvalid	Indicates if 1 (ON) data is being written to bits 0...6 or bit 15 of this channel. ⁽⁴⁾
Local:3:I.Ch1DataInvalid	Indicates if 1 (ON) data is being written to bits 0...6 or bit 15 of this channel. ⁽⁴⁾
Local:3:I.Ch0Readback	Data echo values of the analog output channels.
Local:3:I.Ch1Readback	Data echo values of the analog output channels.
Local:3:O	Analog output channel data.
Local:3:O.Ch0Data	Analog output data value for channel 0.
Local:3:O.Ch1Data	Analog output data value for channel 1.

⁽¹⁾ For example, this data is at 1 (ON) if the analog I/O terminal block is removed from the packaged controller while the controller is in Run mode.

⁽²⁾ The operating range of the analog inputs is voltage 0...10V DC or current 0...20 mA. The input range is dependent upon the wiring option you use.

⁽³⁾ The operating range of the analog outputs is voltage 0...10V DC or current 0...20 mA. The output range is dependent upon the wiring option you use.

⁽⁴⁾ Bits 0...6 and bit 15 of both output data channels (Ch0Data and Ch1Data) should always be set to 0 in your control program. If they are not set to 0, the corresponding DataInvalid tag is set for that channel. While the DataInvalid tag indicates the 1 (ON) data for the specified bits, the channel will continue to operate with the previously converted channel value. For more information about the data specific to these bits, see the Compact 8-Bit Low Resolution Analog I/O Combination Module User Manual, publication [1769-UM008](#).

About the High-speed Counters

Both the 1769-L23-QBFC1B and 1769-L23E-QBFC1B packaged controllers provide high-speed counter functionality similar to that of the 1769-HSC module.

While many features of the 1769-HSC module are available with the embedded high-speed counters, some of the features of the 1769-HSC module are not available with the embedded high-speed counters of the CompactLogix packaged controllers. Features not available on the embedded high-speed counters include rate/timer functions and limited output range control (4 ranges instead of the 16 available with the 1769-HSC module).

This section provides wiring diagrams, configuration procedures, and tag descriptions for the embedded high-speed counters.

High-speed Counters Wiring Diagrams

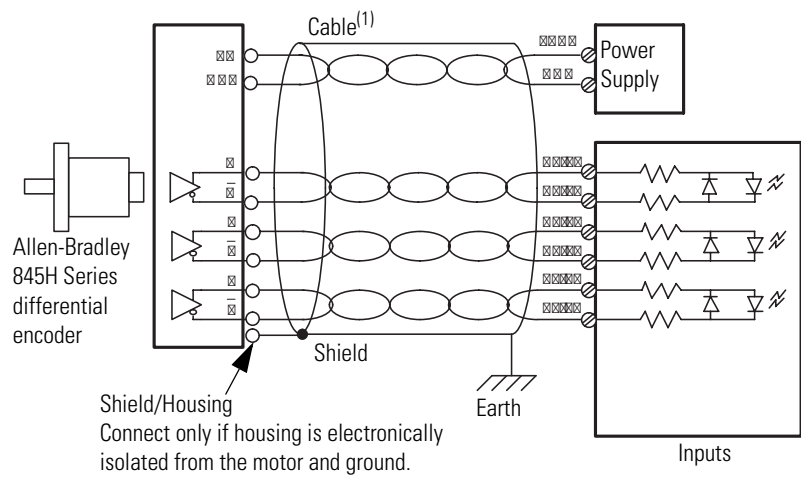
This section describes wiring options for the high-speed counter terminals of the 1769-L23-QBFC1B and 1769-L23E-QBFC1B packaged controllers.

Input Wiring

The embedded high-speed counter uses differential inputs. Therefore, two input terminals are required for each input point. For example, the A0+ and A0- terminals are required for input point A0. Each input point is isolated from other input points, the packaged controller, and the entire output terminal group.

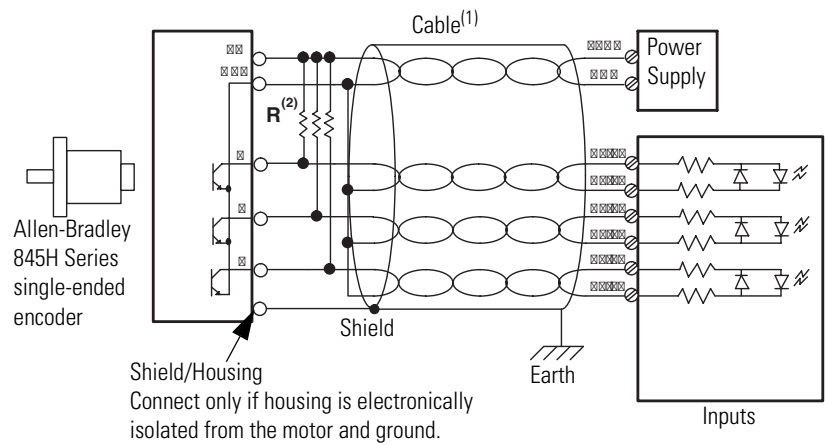
The inputs are compatible with standard differential-line driver output devices as well as single-ended devices such as limit switches, photo-eyes, and proximity sensors. Examples of differential and single-ended circuits are shown in these wiring diagrams.

Differential Encoder Wiring



(1) Refer to your encoder manual for proper cable type. The type of cable used should be twisted pair, individually shielded cable with a maximum length of 300 m (1000 ft).

Single-ended Encoder Wiring



- (1) Refer to your encoder manual for proper cable type. The type of cable used should be twisted-pair, individually shielded cable with a maximum length of 300 m (1000 ft).
- (2) External resistors are required if they are not internal to the encoder. The pull-up resistor (R) value depends on the power supply value. The table below shows the maximum resistor values for typical supply voltages. To calculate the maximum resistor value, use this formula:

$$R = \frac{(V_{dc} - V_{min})}{I_{min}}$$

where:

- R = maximum pull-up resistor value
- V DC = power supply voltage
- Vmin = 2.6V DC
- Imin = 6.8 mA

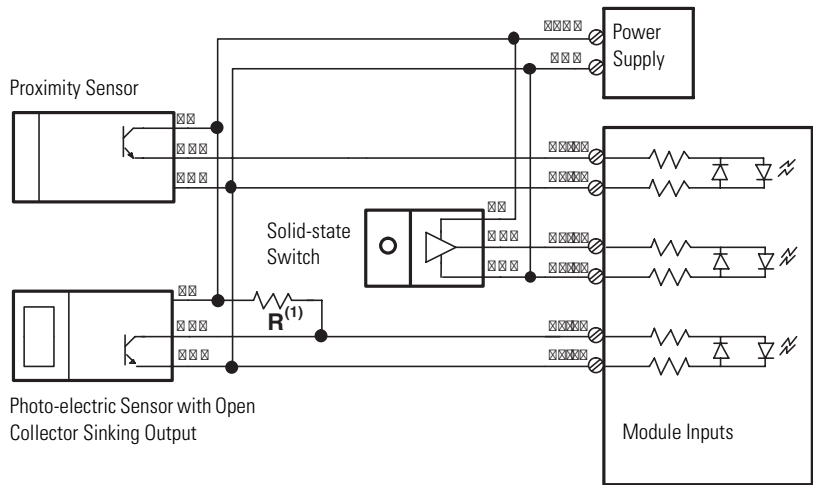
Resistor Values for Supply Voltages

Power Supply Voltage	Pull-up Resistor Value (R), max ⁽¹⁾
5V DC	352 Ω
12V DC	1382 Ω
24V DC	3147 Ω

⁽¹⁾ Resistance values may change, depending upon your application.

The minimum resistor (R) value depends on the current sinking capability of the encoder. Refer to your encoder's documentation.

HSC Discrete Device Wiring



- (1) External resistors are required if they are not internal to the sensor. The pull-up resistor (R) value depends on the power supply value. The table below shows the maximum resistor values for typical supply voltages. To calculate the maximum resistor value, use the following formula:

$$R = \frac{(V_{dc} - V_{min})}{I_{min}}$$

where:

R = maximum pull-up resistor value
V_{dc} = power supply voltage
V_{min} = 2.6V dc
I_{min} = 6.8 mA

Resistor Values for Supply Voltages

Power Supply Voltage	Pull-up Resistor Value (R), max ⁽¹⁾
5V DC	352 Ω
12V DC	1382 Ω
24V DC	3147 Ω

- (1) Resistance values may change, depending upon your application.

The minimum resistor (R) value depends on the current sinking capability of the sensor. Refer to your sensor's documentation.

Output Wiring

The four output terminals must be powered by a user-supplied external source. User power range is from 5...30V DC. There is no isolation between the outputs, however the outputs are isolated from the inputs and the 1769 packaged controller.

High-speed Counters Output Wiring

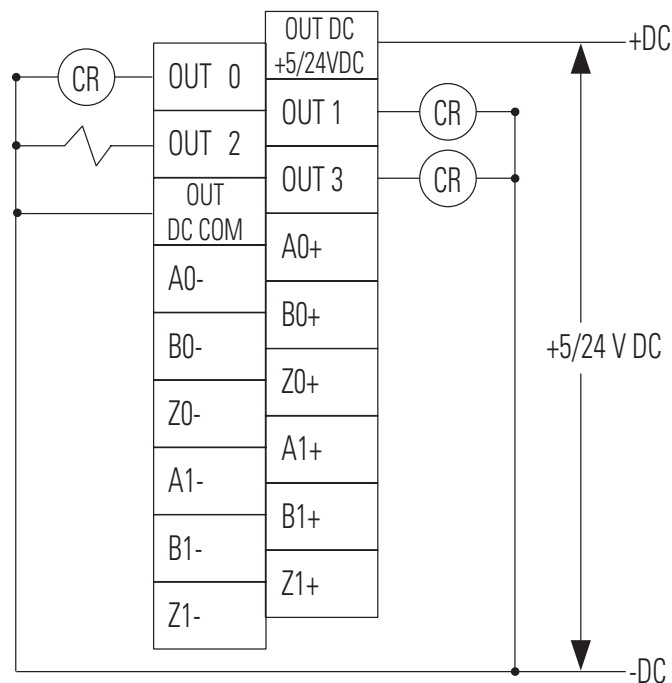
Basic wiring⁽¹⁾ of outputs⁽²⁾ for the high-speed counters is shown below.

ATTENTION



Miswiring of the embedded HSC to an AC power source or applying reverse polarity causes damage to the embedded HSC.

Be careful when stripping wires. Wire fragments that fall into a wiring terminal could cause damage at powerup. Once wiring is complete, make sure the terminal is free of all metal fragments.



⁽¹⁾ Recommended Surge Suppression - The embedded HSC has built-in suppression which is sufficient for most applications, however, for high-noise applications, use a 1N4004 diode reverse-wired across the load for transistor outputs switching 24V DC inductive loads. For additional details, refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication [1770-4.1](#).

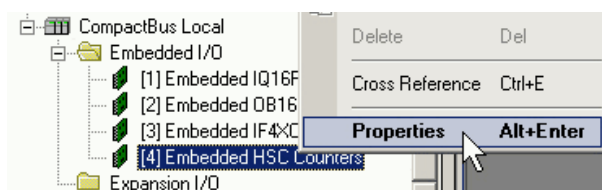
⁽²⁾ Sourcing Output - Source describes the current flow between the I/O and the field device. Sourcing output circuits supply (source) current to sinking field devices. Field devices connected to the negative side (DC Common) of the field power supply are sinking field devices. Field devices connected to the positive side (+V) of the field supply are sourcing field devices. **Europe:** DC sinking input and sourcing output circuits are the commonly used options.

Configure the High-speed Counters

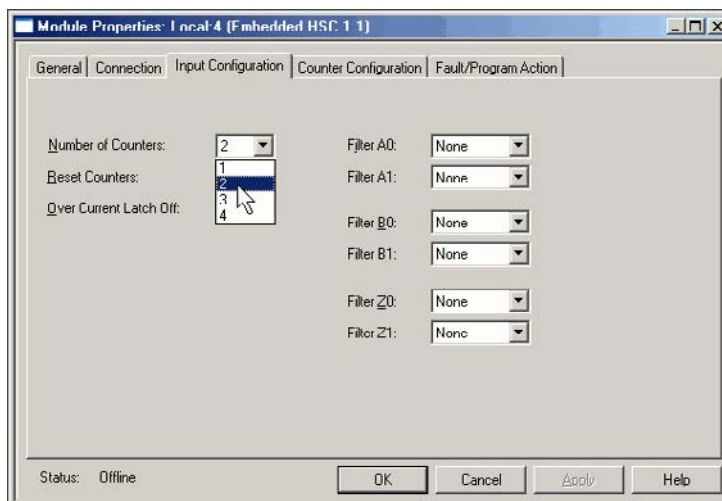
The Embedded HSC Counters Module Properties dialog box lets you configure the high-speed counters for your application. Configuration of the counters is typically completed by using RSLogix 5000 software during the initial system configuration.

To configure your HSC Counters in RSLogix 5000 software, complete these steps.

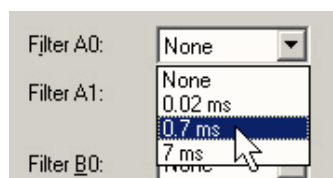
1. In the I/O Configuration tree, right-click slot 4, Embedded HSC Counters and choose Properties.



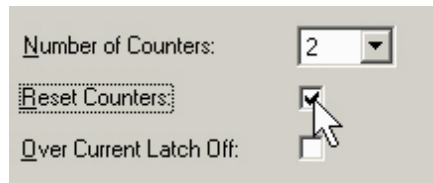
2. Click the Input Configuration tab.
3. Specify the number of counters you are using.



4. If you are using the built-in low-pass input filters, use the pull-down menus to specify your input filter times.



5. Check Reset Counters if your application requires that the counters and related tags be reset when the packaged controller is placed in RUN mode or when the inhibit bit transitions to 0 (OFF).

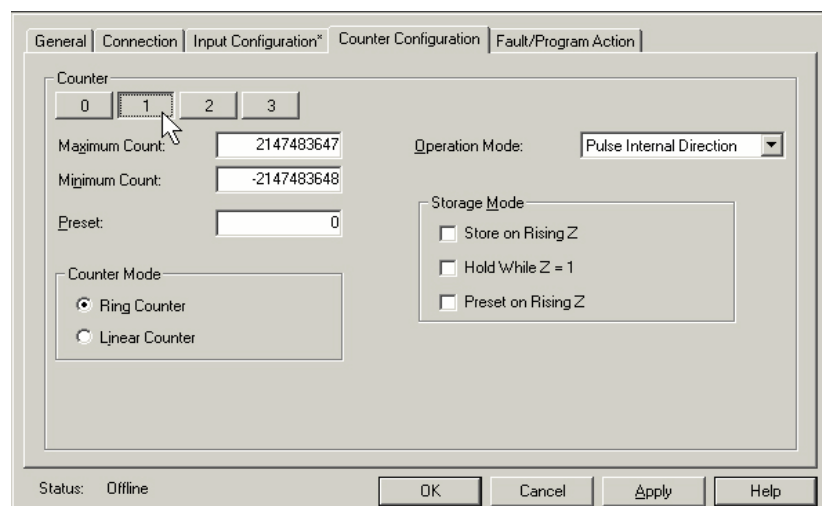


6. Check Over Current Latch Off if your application requires that outputs be individually latched off in the event of an over current condition on the outputs.



Note that if an over current condition occurs and this feature is enabled (checked), the outputs remain latched off until the ResetBlownFuse bit transition from 0 to 1.

7. Click the Counter Configuration tab.
8. Click a counter for configuration.



9. Enter the counter's maximum and minimum counts.

The highest maximum count you can use is +2147483647. The lowest minimum count limit you can use is -2147483648.

A screenshot of a software interface for configuring a counter. It has two input fields. The first field is labeled 'Maximum Count:' and contains the value '12500000'. The second field is labeled 'Minimum Count:' and contains the value '0'.

10. Specify the counter mode you need for your application.

Use this counter mode	When your application requires this behavior
Ring Counter	If the current count value is counting up and exceeds the maximum count, the counter begins counting again from the minimum count. If the current count value is counting down and exceeds the minimum count, the counter begins counting again from the maximum count.
Linear Counter	If the current count value is over or under the maximum and minimum counts specified, counting stops and overflow/underflow bits are set.

A screenshot of a 'Counter Mode' selection window. It contains two radio buttons. The first is labeled 'Ring Counter' and is unselected. The second is labeled 'Linear Counter' and is selected, with a mouse cursor clicking on it.

11. Use the Operational Mode pull-down menu to select the counter's operational mode.

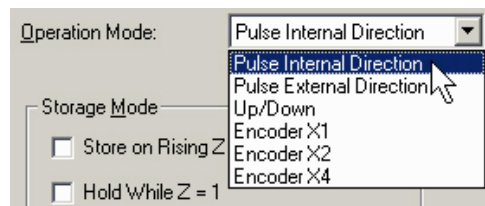
TIP

The operational modes that are available depend upon the number of HSC counters you are using.

Use this table as a reference when determining what operation modes you can use in your application.

Number of Counters	Counter	Operational Mode	Gate or Preset Functionality
1	0	Any	All
	1...3	Not available	
2	0	Any	All
	1	Any	All
	2 and 3	Not available	

Number of Counters	Counter	Operational Mode	Gate or Preset Functionality
3	0	Any	All
	1	Pulse/Internal Direction	All
	2	Pulse/Internal Direction	None
	3	Not available	
4	0	Pulse/Internal Direction	All
	1	Pulse/Internal Direction	All
	2	Pulse/Internal Direction	None
	3	Pulse/Internal Direction	None



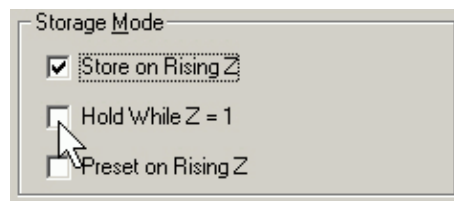
12. Check the storage modes required for your application.

Use this table as a reference when determining the storage modes required for your application.

Use this Storage mode	To achieve this behavior
Store on Rising Z ⁽¹⁾	Store count occurs at on rising edge of Z and is written to the CtrXStoredCount tag. ⁽²⁾
Hold While Z = 1	Hold the counter at its current value while Z = 1.
Preset on Rising Z	Preset the count value to the value in the preset word on the rising edge of Z.

⁽¹⁾ If both a store and preset function are configured, the stored count is captured before the preset operation takes place.

⁽²⁾ Where X is the corresponding channel number.



13. Click OK.

You have completed configuring your embedded HSC counters.

High-speed Counter Tags

As indicated in the Embedded I/O Tags section on [page 178](#), the tags for the embedded I/O are located in the Controller Tags folder at the creation of the packaged controller project.

Tags specific to the use of the HSC counters are described here.

HSC Tags⁽¹⁾

Configuration Tags
(Configuration is completed via the Module Properties dialog box.)

Input Data and Status Tags

Local:4:C	AB:Embedded_HSC:C:0	
Local:4:I	AB:Embedded_HSC:I:0	
Local:4:I.Fault	DINT	Binary
Local:4:I.InputState	SINT	Binary
Local:4:I.InputStateA0	BOOL	Decimal
Local:4:I.InputStateB0	BOOL	Decimal
Local:4:I.InputStateZ0	BOOL	Decimal
Local:4:I.InputStateA1	BOOL	Decimal
Local:4:I.InputStateB1	BOOL	Decimal
Local:4:I.InputStateZ1	BOOL	Decimal
Local:4:I.Readback	INT	Binary
Local:4:I.Status	INT	Binary
Local:4:I.Out0OverCurrent	BOOL	Decimal
Local:4:I.Out1OverCurrent	BOOL	Decimal
Local:4:I.Out2OverCurrent	BOOL	Decimal
Local:4:I.Out3OverCurrent	BOOL	Decimal
Local:4:I.ModConfig	BOOL	Decimal
Local:4:I.InvalidOutput	BOOL	Decimal
Local:4:I.GenError	BOOL	Decimal
Local:4:I.InvalidCtrAssignToRange0	BOOL	Decimal
Local:4:I.InvalidCtrAssignToRange1	BOOL	Decimal
Local:4:I.InvalidCtrAssignToRange2	BOOL	Decimal
Local:4:I.InvalidCtrAssignToRange3	BOOL	Decimal
Local:4:I.InvalidRangeLimit0	BOOL	Decimal
Local:4:I.InvalidRangeLimit1	BOOL	Decimal
Local:4:I.InvalidRangeLimit2	BOOL	Decimal
Local:4:I.InvalidRangeLimit3	BOOL	Decimal
Local:4:I.Range0Active	BOOL	Decimal
Local:4:I.Range1Active	BOOL	Decimal
Local:4:I.Range2Active	BOOL	Decimal
Local:4:I.Range3Active	BOOL	Decimal
Local:4:I.Ctr0CurrentCount	DINT	Decimal
Local:4:I.Ctr0StoredCount	DINT	Decimal
Local:4:I.Ctr0Status	INT	Binary
Local:4:I.Ctr0Overflow	BOOL	Decimal
Local:4:I.Ctr0Underflow	BOOL	Decimal
Local:4:I.Ctr0RisingEdgeZ	BOOL	Decimal
Local:4:I.Ctr0InvalidDirectWrite	BOOL	Decimal
Local:4:I.Ctr0PresetWarning	BOOL	Decimal
Local:4:I.Ctr1CurrentCount	DINT	Decimal
Local:4:I.Ctr1StoredCount	DINT	Decimal

⁽¹⁾ See the HSC Counter Tag descriptions on the following pages for further explanation of these tags.

HSC Tags (con't)⁽¹⁾

Input Data and Status Tags (con't)

+	Local:4:I.Ctr0Status	INT	Binary
-	Local:4:I.Ctr0Overflow	BOOL	Decimal
-	Local:4:I.Ctr0Underflow	BOOL	Decimal
-	Local:4:I.Ctr0RisingEdgeZ	BOOL	Decimal
-	Local:4:I.Ctr0InvalidDirectWrite	BOOL	Decimal
-	Local:4:I.Ctr0PresetWarning	BOOL	Decimal
+	Local:4:I.Ctr1CurrentCount	DINT	Decimal
+	Local:4:I.Ctr1StoredCount	DINT	Decimal
+	Local:4:I.Ctr1Status	INT	Binary
-	Local:4:I.Ctr1Overflow	BOOL	Decimal
-	Local:4:I.Ctr1Underflow	BOOL	Decimal
-	Local:4:I.Ctr1RisingEdgeZ	BOOL	Decimal
-	Local:4:I.Ctr1InvalidDirectWrite	BOOL	Decimal
-	Local:4:I.Ctr1InvalidCounter	BOOL	Decimal
-	Local:4:I.Ctr1PresetWarning	BOOL	Decimal
+	Local:4:I.Ctr2CurrentCount	DINT	Decimal
+	Local:4:I.Ctr2Status	INT	Binary
-	Local:4:I.Ctr2Overflow	BOOL	Decimal
-	Local:4:I.Ctr2Underflow	BOOL	Decimal
-	Local:4:I.Ctr2InvalidDirectWrite	BOOL	Decimal
-	Local:4:I.Ctr2InvalidCounter	BOOL	Decimal
-	Local:4:I.Ctr2PresetWarning	BOOL	Decimal
+	Local:4:I.Ctr3CurrentCount	DINT	Decimal
+	Local:4:I.Ctr3Status	INT	Binary
-	Local:4:I.Ctr3Overflow	BOOL	Decimal
-	Local:4:I.Ctr3Underflow	BOOL	Decimal
-	Local:4:I.Ctr3InvalidDirectWrite	BOOL	Decimal
-	Local:4:I.Ctr3InvalidCounter	BOOL	Decimal
-	Local:4:I.Ctr3PresetWarning	BOOL	Decimal

Output Data and Status Tags

-	Local:4:O	AB:Embedded_HSC:0:0	
+	Local:4:O.OutputOnMask	INT	Binary
+	Local:4:O.OutputOffMask	INT	Binary
+	Local:4:O.RangeEn	INT	Binary
-	Local:4:O.Range0En	BOOL	Decimal
-	Local:4:O.Range1En	BOOL	Decimal
-	Local:4:O.Range2En	BOOL	Decimal
-	Local:4:O.Range3En	BOOL	Decimal
-	Local:4:O.ResetBlownFuse	BOOL	Decimal
+	Local:4:O.Ctr0	INT	Binary
-	Local:4:O.Ctr0En	BOOL	Decimal
-	Local:4:O.Ctr0SoftPreset	BOOL	Decimal
-	Local:4:O.Ctr0ResetCountOverflow	BOOL	Decimal
-	Local:4:O.Ctr0ResetCountUnderflow	BOOL	Decimal
-	Local:4:O.Ctr0DirectionInvert	BOOL	Decimal
-	Local:4:O.Ctr0DirectionInhibit	BOOL	Decimal
-	Local:4:O.Ctr0ZInvert	BOOL	Decimal
-	Local:4:O.Ctr0ZInhibit	BOOL	Decimal
-	Local:4:O.Ctr0ResetRisingEdgeZ	BOOL	Decimal
-	Local:4:O.Ctr0ResetCtrPresetWarning	BOOL	Decimal

⁽¹⁾ See the HSC Counter Tag descriptions on the following pages for further explanation of these tags.

HSC Tags (con't)⁽¹⁾

Output Data and Status Tags (con't)

+	Local:4:0.Ctr1	INT	Binary
-	Local:4:0.Ctr1En	BOOL	Decimal
-	Local:4:0.Ctr1SoftPreset	BOOL	Decimal
-	Local:4:0.Ctr1ResetCountOverflow	BOOL	Decimal
-	Local:4:0.Ctr1ResetCountUnderflow	BOOL	Decimal
-	Local:4:0.Ctr1DirectionInvert	BOOL	Decimal
-	Local:4:0.Ctr1DirectionInhibit	BOOL	Decimal
-	Local:4:0.Ctr1ZIinvert	BOOL	Decimal
-	Local:4:0.Ctr1ZIinhibit	BOOL	Decimal
-	Local:4:0.Ctr1ResetRisingEdgeZ	BOOL	Decimal
-	Local:4:0.Ctr1ResetCtrPresetWarning	BOOL	Decimal
+	Local:4:0.Ctr2	INT	Binary
-	Local:4:0.Ctr2En	BOOL	Decimal
-	Local:4:0.Ctr2SoftPreset	BOOL	Decimal
-	Local:4:0.Ctr2ResetCountOverflow	BOOL	Decimal
-	Local:4:0.Ctr2ResetCountUnderflow	BOOL	Decimal
-	Local:4:0.Ctr2DirectionInvert	BOOL	Decimal
-	Local:4:0.Ctr2ResetCtrPresetWarning	BOOL	Decimal
+	Local:4:0.Ctr3	INT	Binary
-	Local:4:0.Ctr3En	BOOL	Decimal
-	Local:4:0.Ctr3SoftPreset	BOOL	Decimal
-	Local:4:0.Ctr3ResetCountOverflow	BOOL	Decimal
-	Local:4:0.Ctr3ResetCountUnderflow	BOOL	Decimal
-	Local:4:0.Ctr3DirectionInvert	BOOL	Decimal
-	Local:4:0.Ctr3ResetCtrPresetWarning	BOOL	Decimal

⁽¹⁾ See the HSC Counter Tag descriptions on the following pages for further explanation of these tags.

HSC Tags (con't)⁽¹⁾

Output Range Configuration Tags

[-] Local:4:O.Range0To3	AB:Embedded_HSC_Struct_...	
[-] Local:4:O.Range0To3[0]	AB:Embedded_HSC_Struct_...	
[+] Local:4:O.Range0To3[0].HiLimOrDirWr	DINT	Decimal
[+] Local:4:O.Range0To3[0].LowLimit	DINT	Decimal
[+] Local:4:O.Range0To3[0].OutputControl	INT	Binary
[+] Local:4:O.Range0To3[0].Config	INT	Binary
[-] Local:4:O.Range0To3[0].ToThisCounter_0	BOOL	Decimal
[-] Local:4:O.Range0To3[0].ToThisCounter_1	BOOL	Decimal
[-] Local:4:O.Range0To3[0].LoadDirectWrite	BOOL	Decimal
[-] Local:4:O.Range0To3[0].Invert	BOOL	Decimal
[-] Local:4:O.Range0To3[1]	AB:Embedded_HSC_Struct_...	
[+] Local:4:O.Range0To3[1].HiLimOrDirWr	DINT	Decimal
[+] Local:4:O.Range0To3[1].LowLimit	DINT	Decimal
[+] Local:4:O.Range0To3[1].OutputControl	INT	Binary
[+] Local:4:O.Range0To3[1].Config	INT	Binary
[-] Local:4:O.Range0To3[1].ToThisCounter_0	BOOL	Decimal
[-] Local:4:O.Range0To3[1].ToThisCounter_1	BOOL	Decimal
[-] Local:4:O.Range0To3[1].LoadDirectWrite	BOOL	Decimal
[-] Local:4:O.Range0To3[1].Invert	BOOL	Decimal
[-] Local:4:O.Range0To3[2]	AB:Embedded_HSC_Struct_...	
[+] Local:4:O.Range0To3[2].HiLimOrDirWr	DINT	Decimal
[+] Local:4:O.Range0To3[2].LowLimit	DINT	Decimal
[+] Local:4:O.Range0To3[2].OutputControl	INT	Binary
[+] Local:4:O.Range0To3[2].Config	INT	Binary
[-] Local:4:O.Range0To3[2].ToThisCounter_0	BOOL	Decimal
[-] Local:4:O.Range0To3[2].ToThisCounter_1	BOOL	Decimal
[-] Local:4:O.Range0To3[2].LoadDirectWrite	BOOL	Decimal
[-] Local:4:O.Range0To3[2].Invert	BOOL	Decimal
[-] Local:4:O.Range0To3[3]	AB:Embedded_HSC_Struct_...	
[+] Local:4:O.Range0To3[3].HiLimOrDirWr	DINT	Decimal
[+] Local:4:O.Range0To3[3].LowLimit	DINT	Decimal
[+] Local:4:O.Range0To3[3].OutputControl	INT	Binary
[+] Local:4:O.Range0To3[3].Config	INT	Binary
[-] Local:4:O.Range0To3[3].ToThisCounter_0	BOOL	Decimal
[-] Local:4:O.Range0To3[3].ToThisCounter_1	BOOL	Decimal
[-] Local:4:O.Range0To3[3].LoadDirectWrite	BOOL	Decimal
[-] Local:4:O.Range0To3[3].Invert	BOOL	Decimal

⁽¹⁾ See the HSC Counter Tag descriptions on the following pages for further explanation of these tags.

HSC Tag Descriptions

Tag Name	Description
Local:4:I	Input data and status tags for the HSC counters.
Local:4:I.Fault	The bits of this word are set to 1 (ON) if a fault occurs with the HSC counters ⁽²⁾ .
Local:4:I.InputState	Data at this bit reflects the most recent sample of data from each input signal.
Local:4:I.InputStateA0	Data at this bit reflects the most recent sample of data from input A0.
Local:4:I.InputStateB0	Data at this bit reflects the most recent sample of data from input B0.
Local:4:I.InputStateZ0	Data at this bit reflects the most recent sample of data from input Z0.
Local:4:I.InputStateA1	Data at this bit reflects the most recent sample of data from input A1.
Local:4:I.InputStateB1	Data at this bit reflects the most recent sample of data from input B1.
Local:4:I.InputStateZ1	Data at this bit reflects the most recent sample of data from input Z1.
Local:4:I.Readback	Data in this word indicates the last commanded output states. Because the HSC counter has the ability to command an output state independent of the controller program, use the bits in these tags to determine the output states commanded by the counter.
Local:4:I.Status	These tags provide a variety of status data related the HSC counters.
Local:4:I.OutXOverCurrent	Data at this tag represents the over-current status of the specified output channel (where X represents the specified output). If the Over Current Latch is enabled (as specified when you configured your HSC counters), then logic used to clear these latched bits (achieved via the ResetBlownFuse tag) should examine these OverCurrent tag values.
Local:4:I.ModConfig	This bit indicates whether the last configuration array sent to the embedded HSC has been accepted with no errors detected. If this bit is 0, either: - the last configuration array sent to the embedded HSC has not been accepted as error-free. - The HSC counter is still in the process of checking the validity of the previously sent configuration array.
Local:4:I.InvalidOutput	This status bit indicates whether the current output array has any of the unused or reserved bits set to 1. If any of the unused or reserved bits are set to 1, this status bit is set to 1 and the entire output array is rejected until this condition is cleared. When the unused or reserved bits are cleared, this status bit goes to 0.
Local:4:I.GenError	This status bit is used as a composite input array error bit. This bit is set to 1 (ON) if any of the individual error status bits for the HSC counters is set. When all of the individual error status bits are clear, this bit is at 0 (OFF).
Local:4:I.InvalidCtrAssignToRangeX	This tag indicates if an error is present where the counter assigned for controlling a range (in corresponding range output tag Range0To3[X].Config) is not within the number of counters configured. The output arrays sent with this error are ignored and these bits are set until an output array without the error is received by the counters.

HSC Tag Descriptions

Tag Name	Description
Local:4:I.InvalidRangeLimitX	This error status bit indicates that either the high or low limit values (or both) set for the range in output array tags Range0to3[X]HiLimOrDirWr and/or Range0to3[X]LowLimit are invalid. The output arrays sent with this error are not processed and these bits are set until an output array without the error is received by the embedded HSC.
Local:4:I.RangeXActive	This bit indicates whether a range is active based on your configuration of the range. If the current count meets the configuration parameters of the range, the corresponding RangeXActive tag is set to 1.
Local:4:I.CtrXCurrentCount	This 32-bit tag contains the current count value of counter X.
Local:4:I.CtrXStoredCount	This 32-bit tag contains the last stored count value of counter X. Stored count values are triggered based upon your configuration of this function.
Local:4:I.CtrXStatus	This tag contains the status and individual error flags for counter X.
Local:4:I.CtrXOverflow	Depending on the counter mode you configured, this tag indicates one of the following: • For a linear counter, that counter X is, or has been in, an overflow condition. • For a ring counter, it indicates that counter X has rolled over while counting up. If an overflow occurs, this bit is latched. It must be unlatched via the CtrControlBits tag in the output array.
Local:4:I.CtrXUnderflow	Depending on the counter mode you configured, this tag indicates one of the following: • For a linear counter, counter X is, or has been in, an underflow condition. • For a ring counter, counter X has rolled over while counting down. If an underflow occurs, this bit is latched. It must be unlatched via the CtrControlBits tag in the output array.
Local:4:I.CtrXRisingEdgeZ	This tag indicates that the Z input for counter X has had a rising edge occur. This bit is set to 1 and latched on a rising edge of the Z input signal. It must be cleared to 0 by using the CtrResetRisingEdgeZ bit of CtrControlBits tag in the output array.
Local:4:I.CtrXInvalidDirectWrite	This tag indicates that an invalid value has been written during a direct write attempt to the Range0to3[X]HiLimOrDirWr tag for counter X when the Range0to3[X]LoadDirectWrite bit (within the Range0to3[X]ConfigFlags tag) transitions from 0 to 1.
Local:4:I.CtrXInvalidCounter ⁽¹⁾	This tag bit indicates that one or more counter control bits for counter X (in the output array CtrControlBits tag) are set when the number of counters was configured at less than X+1.
Local:4:I.CtrXPresetWarning	This tag indicates that the embedded HSC has independently set counter X to the counter X preset value. This PresetWarning tag is set when one of the following occurs: • a configuration is sent to the embedded HSC where the counter minimum value is greater than the current count value. • a configuration is sent to the embedded HSC where the counter maximum value is less than the current count value.
Local:4:0	Output data and status tags for the HSC counters.

HSC Tag Descriptions

Tag Name	Description
Local:4:0.OutputOnMask	Setting a bit in this tag to 1 turns ON the corresponding HSC output, regardless of the counter-controlled range results. Setting a bit to 1 in this tag turns ON the corresponding HSC output, even if the HSC (that can control the outputs independently) commands the opposite. If a HSC output has both its OutputOnMask bit set to 1 and its OutputOffMask bit set to 0, the OutputOffMask is precedent and the output is in the OFF state. Use this tag in your program logic for direct control of the embedded HSC outputs.
Local:4:0.OutputOffMask	Setting a bit in this tag to 0 turns OFF the corresponding HSC output regardless of the counter-controlled range results or the value specified in the OutputOnMask bit. Setting a bit to 0 in this tag turns OFF the corresponding HSC output, even if the HSC (that can control the outputs independently) commands the opposite. To allow an HSC output to be controlled (that is, to be turned ON), either by the program logic or the HSC's range results, set the corresponding output's OutputOffMask bit to 1.
Local:4:0.RangeEnX	These tags provide control bits for enabling range results output control.
Local:4:0.ResetBlownFuse	Use this tag to reset the outputs' overcurrent status bits (in the input array tag StatusFlags) if the over current latch is on.
Local:4:0.CtrX	The bits of this tag are used to control counter <i>X</i> operation settings.
Local:4:0.CtrXEn	This tag value controls whether the HSC inputs can affect the counter's current count value. Setting the bit to 1 enables counting, setting the bit to 0 disables counting.
Local:4:0.CtrXSoftPreset	Use this tag to force a preset of counter <i>X</i> to the CtrPreset value. The transition of the SoftPreset from 0 to 1 causes the counter to transition to the preset value.
Local:4:0.CtrXResetCountOverflow	Use this tag to clear the counter overflow bit for counter <i>X</i> (the Overflow tag for the counter is located in the array Local:4:I.CtrXStatus). The transition of the ResetCountOverflow tag from 0 to 1 causes the CtrXOverflow tag value to be cleared.
Local:4:0.CtrXResetCountUnderflow	Use this tag to clear the counter underflow bit for counter <i>X</i> (the underflow tag for the counter is located in the array Local:4:I.CtrXStatus). The transition of the ResetCountUnderflow tag from 0 to 1 causes the CtrXUnderflow tag value to be cleared.
Local:4:0.CtrXDirectionInvert	Use this tag to control the count direction (higher or lower) of counter <i>X</i> if the CtrDirectionInhibit tag for the counter is set. A 0 value in this DirectionInvert tag causes the count to increase when the counter's input signals dictate a change in count. A 1 value in this DirectionInvert tag causes the count to decrease when the counter's input signals dictate a change in count.
Local:4:0.CtrDirectionInhibit	Use this tag to control the count direction source for counter <i>X</i>. A 0 value in this DirectInhibit tag allows the HSC inputs to control the count direction. A 1 value in this DirectionInhibit tag allows the controller (that is, the value of the DirectionInvert tag) to control the count direction.

HSC Tag Descriptions

Tag Name	Description
Local:4:0.CtrXZInvert	Use this tag to control the Z inputs of counter <i>X</i> when the ZInhibit tag for the same counter is set. A 0 value in this ZInvert tag causes the Z input value to be 0. A 1 value in this ZInvert tag causes the Z input value to be 1.
Local:4:0.CtrXZInhibit	Use this tag to control the counter <i>X</i> Z input source. A 0 value in this ZInhibit tag allows HSC input to control the Z input. A 1 value in this ZInhibit tag allows the controller (that is, the value of the ZInvert tag) to control the Z input.
Local:4:0.CtrResetRisingEdgeZ	Use this tag value to clear the latched rising edge of the Z input for counter <i>X</i> (that is, the CtrXRisingEdgeZ tag value). The value of this CTRResetRisingEdgeZ tag must transition from 0 to 1 in order to clear the CtrXRisingEdgeZ tag value.
Local:4:0.CtrXResetCtrPresetWarning	Use this tag to clear the CtrXPresetWarning tag (located in the CtrXStatus array). To clear the CtrXPresetWarning tag, this tag value must transition from 0 to 1.
Local:4:0.Range0To3	Range control tags. Use these tags to specify the behavior of the ranges when using range output control of the counters. ⁽³⁾
Local:4:0.Range0To3[X]	Range control tags specific to range <i>X</i> .
Local:4:0.Range0To3[X].HiLimOrDirWr	When range <i>X</i> 's LoadDirectWrite tag is set to 0, this tag contains the range <i>X</i> High Limit value used in the range comparison. When the LoadDirectWrite tag (located within tag Range0To3[X].Config) transitions from 0 to 1, this tag value is written to counter <i>X</i> 's current count.
Local:4:0.Range0To3[X].LowLimit	When range <i>X</i> 's LoadDirectWrite tag is set to 0, this tag contains the range <i>X</i> Low Limit value used in the range comparison. When the LoadDirectWrite tag (located within tag Range0To3[X].Config) is set to 0 to 1, this tag value is not used.
Local:4:0.Range0To3[X].OutputControl	Use this tag to designate the HSC outputs (real and virtual) that are to be turned ON when the range comparison results in range <i>X</i> are active. Each output that has 1 specified in these tags is turned ON when the range <i>X</i> comparison result is active. ⁽⁴⁾
Local:4:0.Range0To3[X].Config	Use the tags in this Config group to configure range <i>X</i> parameters.
Local:4:0.Range0To3[X].ToThisCounter_0	Use this tag value (along with the next tag - this is two-bit control field) to indicate the counter to be used by range <i>X</i> in its range comparison.

HSC Tag Descriptions

Tag Name	Description
Local:4:0.Range0To3[X].ToThisCounter_1	Use this tag value (along with the tag above - this is two-bit control field) to indicate the counter to be used by range <i>X</i> in its range comparison.
Local:4:0.Range0To3[X].LoadDirectWrite	When this tag value is 0, the value in the Range0To3[X].HiLimOrDirWr tag is used as the high limit for range <i>X</i>. When this tag value transitions from 0 to 1, the value in the Range0To3[X].HiLimOrDirWr tag is used as the value to load to counter <i>X</i>. When this tag value is 1, the range high limit, low limit, and output control tag values are not used and the range is essentially disabled.
Local:4:0.Range0To3[X].Invert	This tag value defines when range <i>X</i> is considered active. When this tag value is at 0, the range is active when the selected counter's value (that is, the ToThisCounter tag value) is at or between the range's high limit and low limit. When this tag value is at 1, the range is active when the selected counter's value (indicated by the ToThisCounter tag value) is at or outside the range's high limit and low limit.

⁽¹⁾ This tag is applicable only to counters 1...3. It is not available for counter 0.

⁽²⁾ For example, this data might be at 1 (ON) if an internal error occurs in the HSC while the controller is in Run mode.

⁽³⁾ For more information about the range features of the HSC counter outputs, see the section titled About Range Control of the HSC on [page 211](#).

⁽⁴⁾ IMPORTANT: Because each output is available for use with each range, each output shared by one or more ranges is controlled through the use of a logical OR function in HSC hardware to process the range results of the ranges that have designated the output to be under HSC range control. Any range result in the active state turns ON the shared output. The shared output is turned OFF only when all range results that use the output are inactive.

About Range Control of the HSC

The range control feature of the embedded HSC lets you program your HSC to operate independently of the controller's logic program.

Four dynamically-configurable ranges are available. The four ranges can be configured to compare a low limit and high limit to the current count value of a designated counter. Using output tag control logic, you can specify a range to be active when the designated counter's current count value is equal to or between the range low/high limit values you specified. Or, you can specify that the range be active when the designated counter's current count value is equal to or outside of the range's low/high limit values.

Using the Range0to3 output tags, you then specify a combination of HSC outputs (options include 4 real outputs and 12 virtual outputs) to be turned ON when that range is active.

Any combination the HSC counter outputs (0...15) may be configured to transition to ON when the range is active. If an individual HSC output is selected to be ON by more than one of the ranges, then the state of that output is controlled through the use of a logical OR function in HSC hardware to process the range results for the ranges that have designated the output to be under HSC range control.

If any range that controls an output has transitioned to the active state, then that output transitions to the ON state. The output transitions to OFF only when all of the ranges that control the output have transitioned to the inactive state.

For more information about configuring the ranges, see the HSC range tag descriptions in the HSC Tags table on [page 202](#).

Other Configuration Parameters

While each type of embedded I/O has type-specific parameters, for example the embedded HSC has Operation and Storage mode parameters, there are several configuration parameters that are common to both embedded I/O and expansion I/O module configuration.

Use these tables that describe common configuration parameters as a reference when configuring your embedded I/O and expansion I/O modules.

I/O Configuration Options

Configuration Option	Description
Requested packet interval (RPI)	The RPI specifies the interval at which data updates over a connection. For example, an input module sends data to a controller at the RPI that you assign to the module. - Typically, you configure an RPI in milliseconds (ms). The range is 0.2 ms...750 ms. - If a ControlNet network connects the devices, the RPI reserves a slot in the stream of data flowing across the ControlNet network. The timing of this slot may not coincide with the exact value of the RPI, but the control system guarantees that the data transfers at least as often as the RPI.
Change of state (COS)	Digital I/O modules use COS to determine when to send data to the controller. If a COS does not occur within the RPI timeframe, the module multicasts data at the RPI. Because the RPI and COS functions are asynchronous to the logic scan, it is possible for an input to change state during program scan execution. If this is a concern, buffer input data so your logic has a stable copy of data during its scan. Use the Synchronous Copy (CPS) instruction to copy the input data from your input tags to another structure and use the data from that structure.
Communication format	Many I/O modules support different formats. The communication format that you choose also determines: - data structure of tags. - connections. - network usage. - ownership. - returning of diagnostic information.
Electronic keying	When you configure a module, you specify the slot number for the module. However, it is possible to purposely or accidentally place a different module in that slot. Electronic keying lets you protect your system against the accidental placement of the wrong module in a slot. The chosen keying option determines how closely any module in a slot must match the configuration for that slot before the controller opens a connection to the module. There are different keying options depending on your application needs.

Additional Resources

Resource	Description
Compact 8-Bit Low Resolution Analog I/O Combination Module User Manual, publication 1769-UM008	This manual provides further detail regarding the use of the 1769-IF4XOF2 module and the embedded analog I/O.
Compact High-speed Counter Module User Manual, publication 1769-UM006	This manual provides further detail regarding the use of the 1769-HSC module and the embedded HSC counters.

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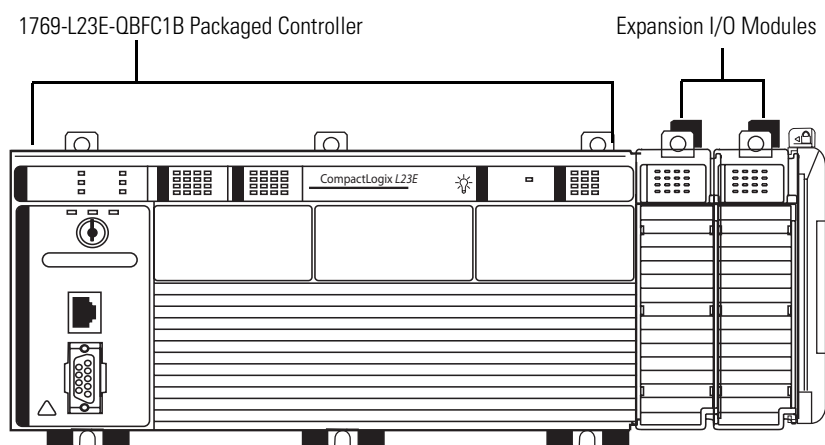
Using Expansion Modules

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About Expansion Modules

You can add up to two 1769 CompactLogix modules to the 1769-L23E-QB1B, 1769-L23E-QBFC1B, and 1769-L23-QBFC1B packaged controllers.

For example, you can add a 1769-IF8 analog input module and a 1769-OF8C analog output module.



Determine Your Expansion Module Limits

The maximum amount of expansion modules that can be used with the packaged controllers is two. Within that limit, the number of expansion I/O modules that can be attached to the packaged controller depends on the bus current draw of the modules being attached.

Each packaged controller has a specified amount of available bus current as shown in this table.

Packaged Controller Bus Current and Expansion Module Limits

Cat. No.	Total Available 5V DC Bus Current	Total Available 24V DC Bus Current
1769-L23E-QB1B	1 A (1000 mA)	710 mA
1769-L23E-QBFC1B	450 mA	550 mA
1769-L23-QBFC1B	800 mA	600 mA

To determine the number of expansion I/O modules you can add, total the bus current draw (maximum) of your planned expansion I/O modules and the end cap. If your result is less than the packaged controller's maximum available bus current, you are within the expansion I/O limit of your packaged controller.

Example of Expansion I/O Calculation

In this example, these expansion I/O modules and bus current draws are planned for use with the 1769-L23E-QBFC1B packaged controller.

Planned Expansion I/O Module	5V DC Bus Current Draw, max ⁽¹⁾	24V DC Bus Current Draw, max ⁽¹⁾
1769-OV16 Sink Output Module	200 mA	0 mA
1769-IF4 Analog Input Module	105 mA	60 mA
1769-ECR End Cap	5 mA	0 mA
Total Bus Current Draw	310 mA	60 mA

⁽¹⁾ The maximum bus current draw specification for each Compact I/O module is available in the Compact I/O Selection Guide, publication [1769-SG002](#). This publication also provides further explanation of and a table for the calculation of Compact I/O power supply requirements.

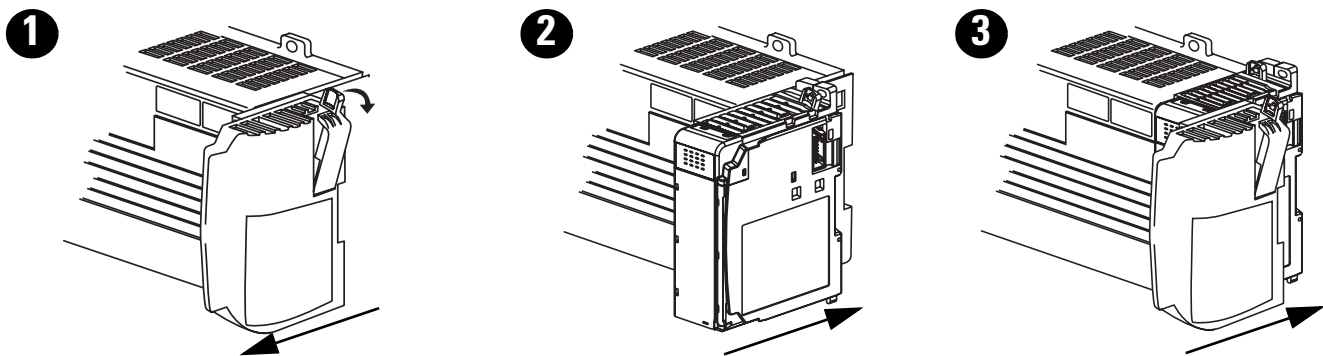
The total bus current draw of the Compact I/O modules (310 mA at 5V DC, or, 60 mA at 24V DC) is less than the total available bus current of the packaged controller (450 mA at 5V DC, or, 600 mA at 24V DC). These planned expansion I/O modules are within the limits of the 1769-L23E-QBFC1B packaged controller.

Adding Expansion I/O Modules

This section explains how to add expansion I/O modules to the packaged controller.

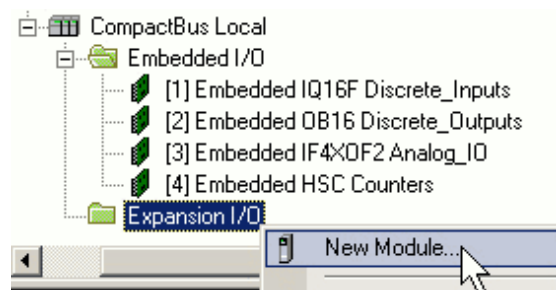
Hardware

All expansion I/O modules are attached on the right of the packaged controller. You must attach the end cap to the last expansion module.



Software

To add an expansion module to the I/O configuration tree in RSLogix 5000 software, simply right-click the Expansion I/O folder and select New Module.



Then select the module you are adding and specify the module's properties.

Expansion I/O RPI

Any I/O modules added as expansion I/O have a minimum backplane RPI of 1 ms. This is the same RPI of the embedded I/O of the packaged controller.

Remember that RPI reflects how quickly the I/O modules can be scanned, not how quickly a program can use the data.

Additional Resources

For more information about the expansion I/O module you are adding, see your module's installation instructions and user manual.

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Programming the Packaged Controller

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Quick Reference - Programming Specifications of the CompactLogix Packaged Controllers

Program Attribute	Value	For More Information See
Memory size	512 KB	Logix5000 Controllers Execution Time and Memory Use Reference Manual, publication 1756-RM087
Programming Languages	• Ladder Diagram • Function Block • Structured Text • Sequential Function Chart	Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001
Tasks, total available	3	• Using Tasks on page 220 • Logix5000 Controllers Design Considerations Reference Manual, publication 1756-RM094 • Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001
Programs or equipment phases, total available	4	• Using Programs and Equipment Phases on page 221 • Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001
Trends, total available	1	• Using Trends on page 221 • Logix5000 Controllers Quick Start, publication 1756-QS001
TCP connections available	8	Maximum Ethernet Interface Connections on page 154
CIP connections available	32	Maximum Ethernet Interface Connections on page 154

Programming the Controller

This chapter provides information about programming your CompactLogix packaged controller using RSLogix 5000 programming software.

Using Tasks

The CompactLogix packaged controllers can be programmed to implement up to three tasks. These three tasks can be any combination of Event and Periodic tasks with a limit of one continuous task.

When programming your packaged controller, you can use multiple tasks to schedule and prioritize the execution of your programs based on specific criteria. Doing so divides your packaged controller's processing time among the different operations in your application.

When programming your packaged controller's tasks, remember that:

- the controller executes only one task at one time.
- one exception task can interrupt another and take control.
- in any given task, only one program executes at one time.

Add a Task

To add a controller task, right-click the Tasks folder in the RSLogix 5000 software configuration tree and choose New Task.



Specify the task's properties according to your application requirements.

For more information about using and managing tasks, see these publications:

- Logix5000 Controllers Design Considerations Reference Manual, publication [1756-RM094](#)
- Logix5000 Controllers Common Procedures Programming Manual, publication [1756-PM001](#)

Using Programs and Equipment Phases

The CompactLogix packaged controllers support up to four scheduled programs or equipment phases. This means that the total of programs for all tasks cannot exceed four programs. However, this limit does not include Controller Fault Handler programs, Power-Up Handler programs, unscheduled programs, or unscheduled equipment phases.

RSLogix 5000 software indicates if you are trying to exceed the four-program limit when you attempt to add another program after the fourth. The indicator is that you are unable to select New Program from the task's menu (that is, New Program is dimmed).

Add a Program or Equipment Phase

To add a program or equipment phase, right-click the task you want to add the program to and choose New Program or New Equipment Phase.



Then specify your program or equipment phase properties.

For more information about developing and implementing your packaged controller program, see the Logix5000 Controllers Common Procedures Programming Manual, publication [1756-PM001](#).

Using Trends

Trends let you view sampled tag data over a period of time on a graphical display. Tag data is sampled by the controller and then displayed as points on a trend chart. The CompactLogix packaged controller supports the use of one trend in your application.

For information about creating and using a trend, see the Logix5000 Controllers Quick Start, publication [1756-QS001](#).

Monitoring Controller Status

The CompactLogix controller uses Get System Value (GSV) and Set System Value (SSV) instructions to get and set (change) controller data. The controller stores system data in objects. There is no status file, as with the PLC-5 processor.

The GSV instruction retrieves the specified information and places it in the destination. The SSV instruction sets the specified attribute with data from the source.

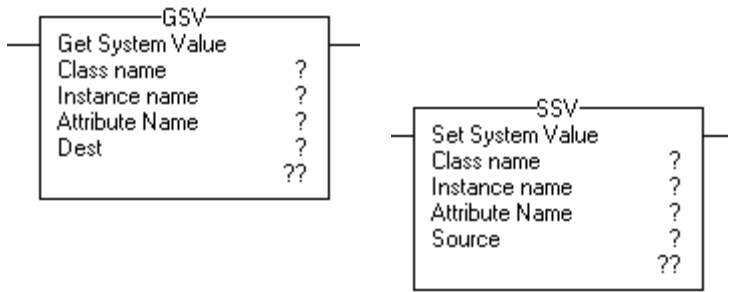
When you enter a GSV/SSV instruction, the programming software displays the:

- valid object classes.
- object names.
- attribute names.

For the GSV instruction, you can get values for all the available attributes. For the SSV instruction, the software displays only those attributes you are allowed to set.

In some cases, there will be more than one of the same type of object, so you might also have to specify the object name. For example, there can be several tasks in your application. Each task has its own TASK object that you access by the task name.

GSV and SSV Instructions for Controller Status



Additional Resources

Resource	Description
Logix5000 Controllers Execution Time and Memory Use Reference Manual, publication 1756-RM087	Provides information about estimating the amount of user memory that your program uses.
Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001	Provides detailed information about using various instructions and features of RSLogix 5000 software to program your controller.
Logix5000 Controllers Design Considerations Reference Manual, publication 1756-RM094	Provides information about creating your RSLogix 5000 program, including managing tasks, programs, and tags.
Logix5000 Controllers Quick Start, publication 1756-QS001	Provides information about completing common programming-related tasks on Logix5000 controllers.

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Notes:

Battery Maintenance

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Battery for Use with Packaged Controllers

Use battery 1769-BA with the CompactLogix packaged controllers.

ATTENTION



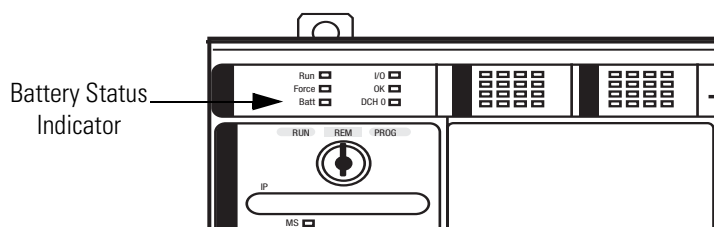
The 1769-BA battery is the only battery you can use with the CompactLogix packaged controllers.

The 1747-BA battery is not compatible with the CompactLogix packaged controllers and may cause problems if used with a packaged controller.

Check Battery Power Level

Use the BATT status indicator to determine the battery power level.

Battery Status Indicator



When the packaged controller is powered, the battery indicator provides battery power status as described in this table.

If the BATT status indicator is	Then
Off	The battery has sufficient charge.
On (Red)	The battery is 95% discharged and will not retain memory in the event of a power loss.

If the packaged controller is not powered, you cannot determine the battery power level.

Estimate 1769-BA Battery Life

Certain conditions affect typical battery life. Use this table to estimate your battery life in varying conditions.

Battery Life Estimation

Controller Power	At 25 °C (77 °F)	At 40 °C (104 °F)	At 60 °C (140 °F)
Always Off	14 months	12 months	9 months
On 8 hours per day, 5 days per week	18 months	15 months	12 months
On 16 hours per day, 5 days per week	26 months	22 months	16 months
Always On	There is almost no drain on the battery when the controller is always on.		

After the BATT indicator first indicates a low battery, use this table to determine the amount of time you have until the battery can no longer support memory in the event of a power loss.

If the temperature is approx.	Then change the battery within
60 °C (140 °F)	8 days
25 °C (77 °F)	25 days

Store Batteries

ATTENTION



Follow these general rules to store your batteries:

- Store batteries in a cool, dry environment. We recommend 25 °C (77 °F) with 40...60% relative humidity.
- You may store batteries for up to 30 days between -45...85 °C (-49...185 °F), such as during transportation.
- To avoid leakage or other hazards, do not store batteries above 60 °C (140 °F) for more than 30 days.

Additional Resources

For more information, consult Guidelines for Handling Lithium Batteries, publication [AG 5.4](#), which comes with your replacement battery.

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Network Worksheet

EtherNet/IP Network

Enter EtherNet/IP network data in the following table. Ethernet addresses (MAC) should be entered by using digits 1...9 and letters A through F. An example Ethernet address (MAC) is 00:00:BC:21:D7:BE.

Data For	Ethernet Address (MAC)	Assigned IP Address	Example Assigned IP Address
Controller			192.168.1.126
Computer	Not needed.		192.168.1.117
POINT I/O adapter			192.168.1.127
PowerFlex 40 drive			192.168.1.107
PanelView Plus terminal	Not needed.		192.168.1.125

For all EtherNet/IP addresses, the subnet mask is (from [page 36](#)): _____.

This quick start uses the example EtherNet/IP subnet mask: 255 . 255 . 255 . 0

DeviceNet Network

1769-SDN Module Information

Series No. (from page 121)	Node No. (from page 125)	Slot No. (from page 129)
B (example)	1 (example)	03 (example)

RSNetWorx for DeviceNet Configuration File Information

Main configuration file name (from [page 131](#)): _____ .dnt

Subnet configuration file name and path (from [page 131](#)): _____ .dnt

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Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States	1.440.646.3434 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

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