Quick Start

Allen-Bradley

Logix5000 Control Systems: Connect PowerFlex 40 Drives over an EtherNet/IP Network

Catalog Numbers Logix5000 Controllers, PowerFlex 40 Drives

Allen-Bradley • Rockwell Software

Rockwell Automation

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://www.rockwellautomation.com/literature/) 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.
	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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Notes:

About This Publication

This quick start provides examples and procedures for integrating a PowerFlex® 40 drive in a Logix5000™ control system over an EtherNet/IP network. The programming examples are not complex, and offer easy solutions to verify that devices are functioning and communicating properly.

IMPORTANT	This publication describes **example tasks** you can complete when using a PowerFlex 40 drive on an EtherNet/IP network. The tasks described are **not** the only tasks you can complete with a PowerFlex 40 drive on an EtherNet/IP network.

Before Using This Publication

IMPORTANT	The cover that ships with your PowerFlex 40 drive is insufficient to complete the tasks described in this chapter. You must use either a 22B-CCB Frame B drive cover or 22B-CCC Frame C drive cover. This quick start describes tasks that use a 22B-CCB Frame B drive cover.

You can only use the tasks described in this publication after first completing some prerequisite tasks with a Logix5000 controller. For example, before you can add a PowerFlex 40 drive to an RSLogix™ 5000 project, as described on page 21, you must first create the project.

Table 1 describes the tasks you must complete before using this publication.

IMPORTANT	The example graphics shown in Table 1 - Required Tasks to Complete Before Using this Quick Start on page 6 are for CompactLogix™ 5370 L3 controllers. Depending on the Logix5000 controller you are using, the specific steps to complete the tasks described in the table might vary.

For more information on how to complete these tasks with specific Logix5000 controllers, see the Integrated Architecture™: Logix5000 Control Systems Quick Starts Quick Reference, publication IASIMP-QR024.

Table 1 - Required Tasks to Complete Before Using this Quick Start

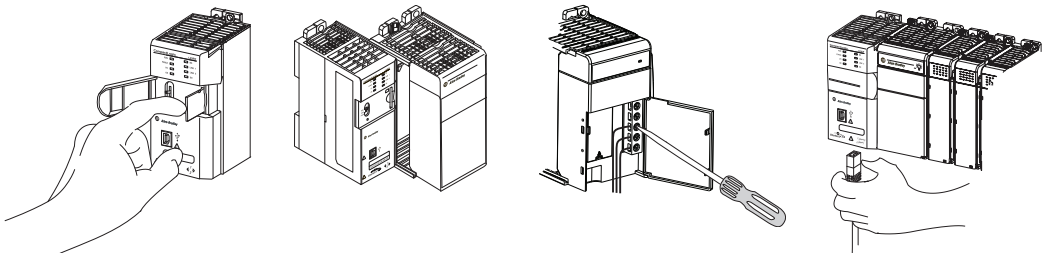
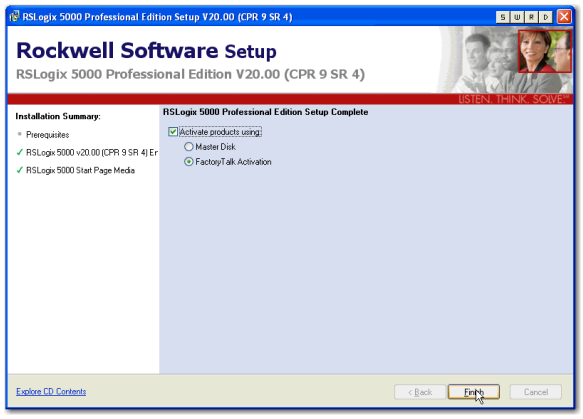
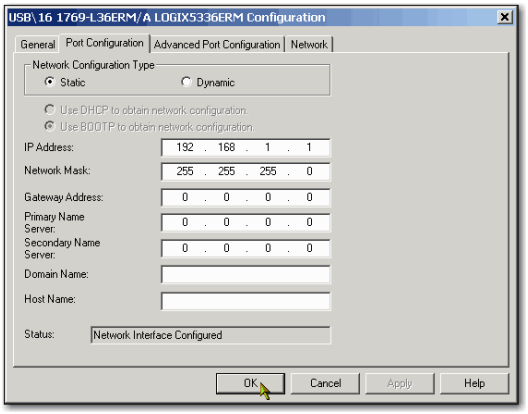
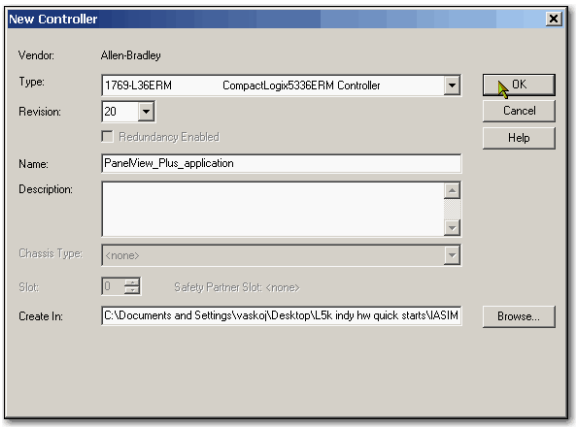
Task	Description
Prepare the Logix5000 control system hardware	Assembling the control system and connecting to communication networks. Some components, for example, the desired Logix5000 controller and system power supply, are required. Other components, for example, a network communication module, are optional. **IMPORTANT**: These graphics show the assembly of an example Logix5000 controller.  This task **does not** include installation of specific hardware components, for example, PowerFlex 40 drives, used over the networks included in your application.
Prepare the computer	Installing necessary software, such as RSLogix 5000 software, on your computer. 

Table 1 - Required Tasks to Complete Before Using this Quick Start

Task	Description
Configure the networks	Complete required tasks associated with the networks used in your application, such as assigning an IP address to the controller or a communication module in your Logix5000 control system. 
Create an RSLogix 5000 project	Project used with your Logix5000 controller that includes all desired control system components and necessary programming, for example, adding ladder logic to test tasks associated with individual system components. 

Controller and Other Component Quick Starts

This quick start describes how to use one device on one network in a Logix5000 control system. Typically, though, a Logix5000 control system includes more than the controller and one device on one network.

For example, if a Logix5000 control system operates on an EtherNet/IP network, in addition to a controller, power supply, and communication modules, the system might use remote I/O modules, drives, and HMI terminals.

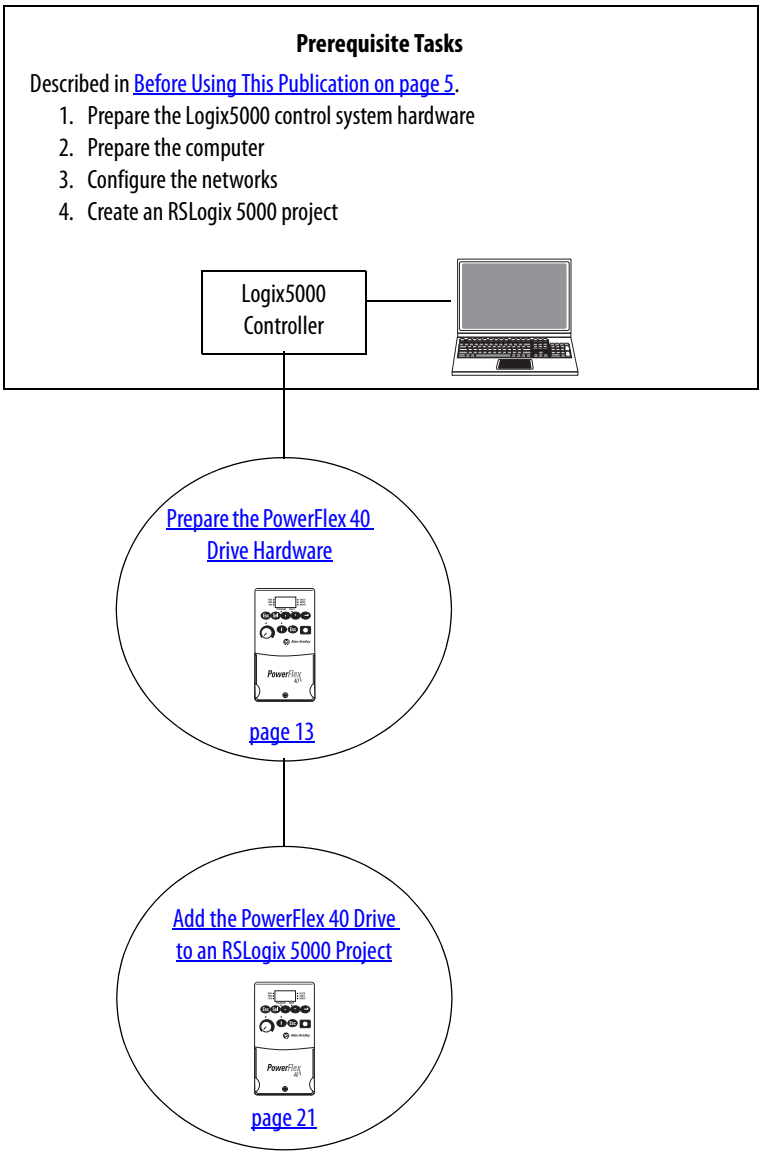
Other quick starts describe how to use different devices on different networks in Logix5000 control systems. For more information, see the Integrated Architecture: Logix5000 Control Systems Quick Starts Quick Reference, publication IASIMP-QR024.

Before You Begin

The beginning of each chapter contains the following information. You should read these sections before beginning work in each chapter:

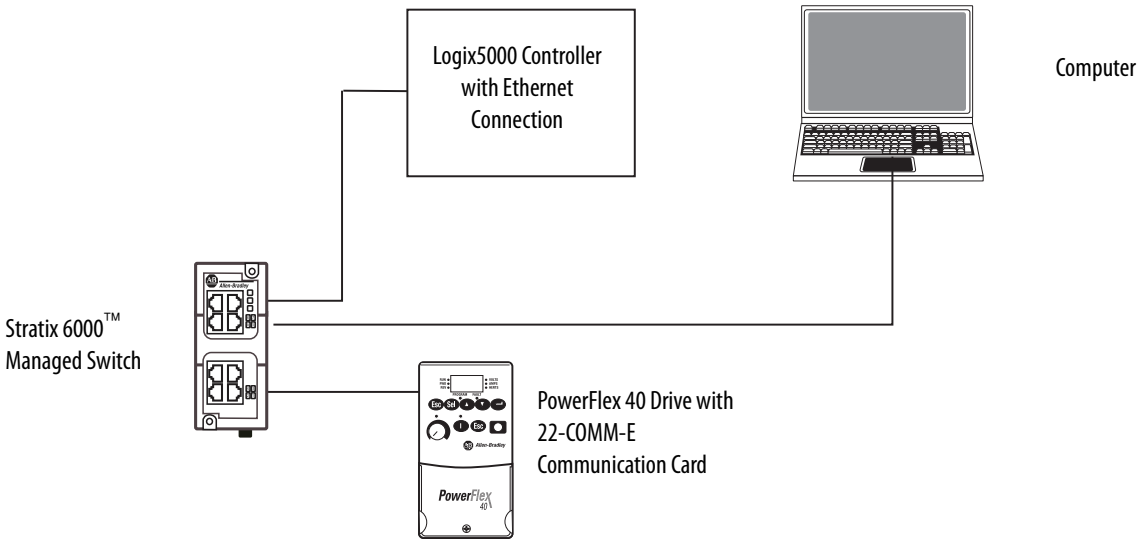
- **Before You Begin** - This section lists the tasks you must complete before starting the chapter.
- **What You Need** - This section lists the tools that are required to complete the tasks in the chapter.
- **Follow These Steps** - This section illustrates the steps in the current chapter.

Where to Start



How Hardware is Connected

This quick start demonstrates the following possible control system.



Required Software

To complete examples in this quick start, you need the software described in this table.

Software	Required Version	Required for This Task
RSLogix 5000	20.00.00 or later(1)	Create or change RSLogix 5000 projects to use PowerFlex 40 drives
BOOTP/DHCP utility	Version automatically installed with RSLogix 5000 software and varies according to that software's version.	Set IP address for PowerFlex 40 drive

(1) RSLogix 5000 software, version 20.00.00 or later, is required for use of this quick start because the example Logix5000 controller, and associated tasks, described herein are completed in a CompactLogix 5370 control system. CompactLogix 5370 control systems require RSLogix 5000 software, version 20.00.00 or later. If you connect a PowerFlex 40 drive over an EtherNet/IP network in a Logix5000 control system that uses a different controller, the minimum version may differ.

Parts List

You need these parts to complete the tasks described in this quick start.

✓	Quantity	Cat. No.	Description
	1	22B-V2P3N104	PowerFlex 40 drive AC drive
	1	22-COMM-E	Communication adapter for use with the PowerFlex 40 drive
	1	1585J-M8PBJM-2	RJ45-to-RJ45 patchcord Ethernet cables

For a list of parts required to complete the prerequisite tasks listed in Table 1 - Required Tasks to Complete Before Using this Quick Start on page 6, see the documentation describing those tasks.

Additional Resources

Use the additional resources listed in this table for more information when using PowerFlex 40 drives over an EtherNet/IP network in a Logix5000 controller project.

Resource	Description
PowerFlex 40 Adjustable Frequency AC Drive User Manual, publication 22B-UM001	Provides details on how to install, program, and edit parameters for the PowerFlex 40 drive.
PowerFlex 40 EtherNet/IP Adapter User Manual, publication 22COMM-UM004	Provides details on how to install, configure, and use the adapter.
EtherNet/IP Modules in Logix5000 Control Systems, publication ENET-UM001	Provides details regarding the installation, configuration, and operation of EtherNet/IP modules.
ControlLogix® Controllers Common Procedures Programming Manual, publication 1756-PM001	Provides details about adding and configuring modules, establishing communication, and writing ladder logic.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

Notes:

Prepare the PowerFlex 40 Drive Hardware

In this chapter, you learn how to complete the following tasks:

- Mount and wire power to a 22B-V2P3N104 drive.
- Configure EtherNet/IP communication for the drive.

Before You Begin

You must complete these tasks before using this chapter:

- The tasks described in Before Using This Publication on page 5, including:
  - Prepare the Logix5000 control system hardware
  - Prepare the computer
  - Configure the networks - The tasks described in this chapter require an EtherNet/IP network.
  - Create an RSLogix 5000 project

  The example RSLogix 5000 project used in this chapter uses a CompactLogix 5370 L3 controller.

What You Need

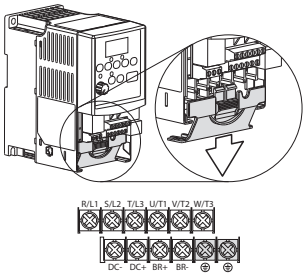
This table lists the products you need to complete the tasks described in this chapter.

Quantity	Cat. No.	Description
1	22B-V2P3N104	PowerFlex 40 drive AC drive
1	22-COMM-E	Communication adapter for use with the PowerFlex 40 drive
1	1585J-M8PBJM-2	RJ45-to-RJ45 patchcord Ethernet cables

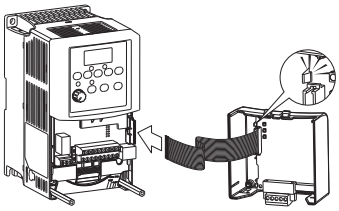
Follow These Steps

Mount the 22B-V2P3N104 Drive
page 15

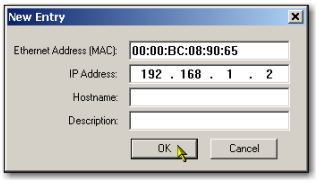
Wire Power
page 15



Connect the EtherNet/IP Adapter to the Drive
page 17



Configure the EtherNet/IP Adapter
page 19



Mount the 22B-V2P3N104 Drive

You should mount the drive upright on a flat, vertical, and level surface with considerations for minimum mounting clearance, ambient operating temperature, debris protection, and storage.

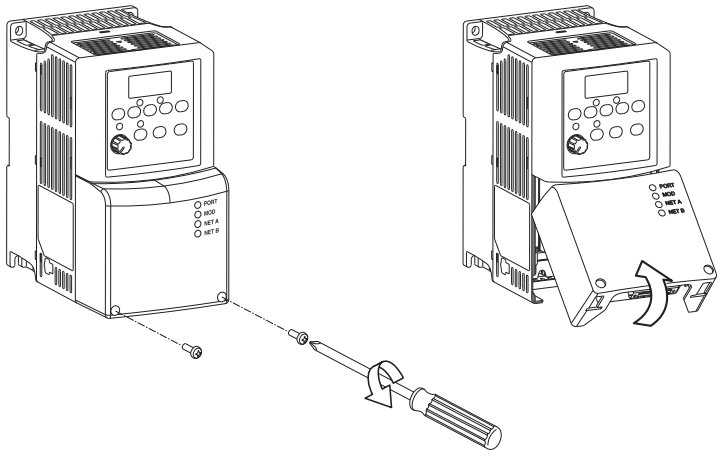
To complete the tasks described in this chapter, mount the 22B-V2P3N104 drive on a DIN rail. For complete mounting instructions, see the PowerFlex 40 Drives User Manual, publication 22B-UM001.

Wire Power

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

Do not turn incoming power on before connecting the EtherNet/IP adapter to the drive.

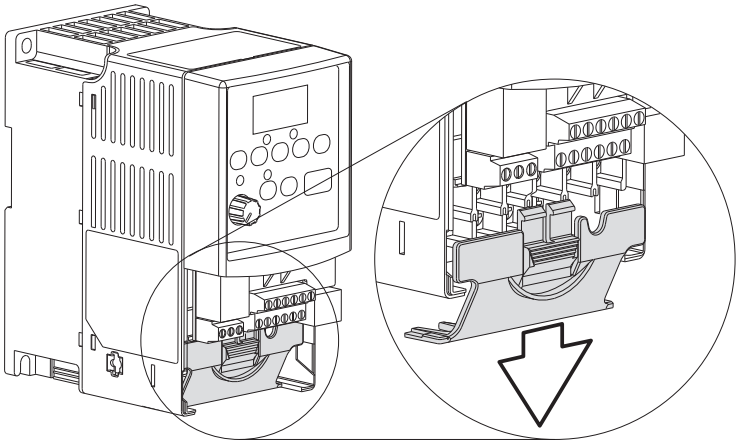
1. Loosen screws on bottom sides of the cover.
2. Pull the cover out and up to release.
3. Remove the cover.

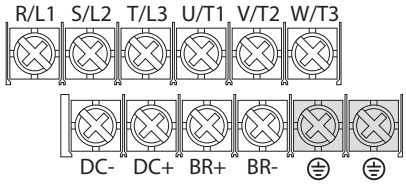


4. Remove the terminal block cover to access the power connections.

   The drive can use any of the following inputs:
   - 120V AC single phase
   - 230V AC single phase
   - 230V AC three phase
   - 480V AC three phase

   In this quick start, you use 120V AC single phase.





5. Connect the AC power conductors to the drive terminals as described in the following table and tighten the screws.

Table 2 - 120/230V AC Single Phase Connections

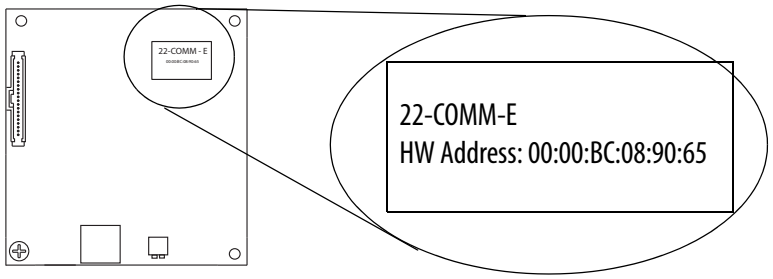
Connect	To
120/240V AC L1	R/L1
V AC COM L2	S/L2
Chassis ground	⏚

For complete information on wiring a PowerFlex 40 drive, see the PowerFlex 40 Adjustable Frequency AC Drive User Manual, publication 22B-UM001.

Connect the EtherNet/IP Adapter to the Drive

WARNING: Verify that all incoming power is turned off before connecting the adapter to the drive.

1. Before you connect the adapter to the 22B-V2P3N104 drive, record the Ethernet (MAC ID) address.

   You need this number to set an IP address for the adapter, as described in Configure the EtherNet/IP Adapter on page 19.

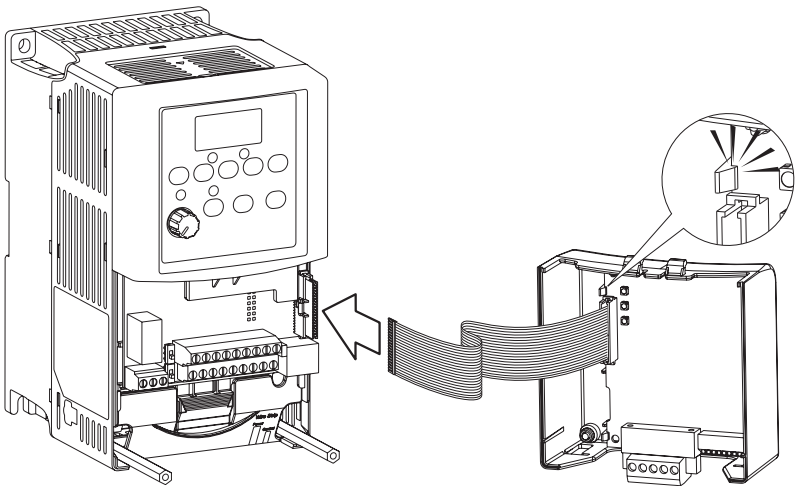
   The MAC ID address uses format *xx:xx:xx:xx:xx:xx* where each *x* represents a letter or numeral. The MAC ID is located on the adapter's product ID label as shown in the example graphic.

2. Mount the adapter on the drive cover.

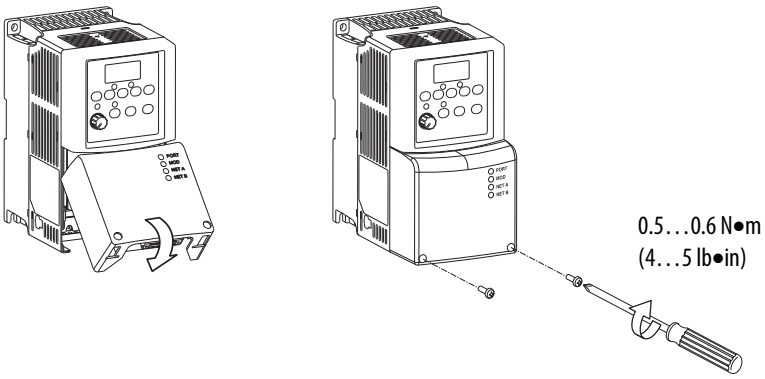
IMPORTANT You must use either a 22B-CCB Frame B drive cover or 22B-CCC Frame C drive cover with the PowerFlex 40 drive. These tasks use a Frame B drive cover.

3. Connect the Internal Interface cable to the DSI port on the drive.

4. Connect the mating DSI connector on the adapter.

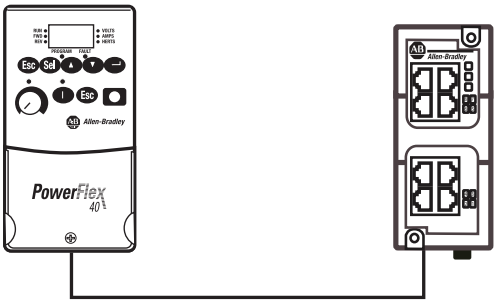


5. Install the drive cover onto the drive using both cover fasteners to ground the adapter.



6. Connect the adapter to the EtherNet/IP network via the EtherNet/IP port at the bottom of the drive.

7. Apply power to the PowerFlex 40 drive.



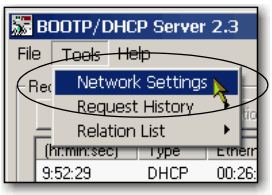
Configure the EtherNet/IP Adapter

The PowerFlex 40 EtherNet/IP network adapter requires a network IP address to operate on an EtherNet/IP network. Use the BOOTP/DHCP server to assign an IP address.

1. Retrieve the MAC ID you recorded in step 1 on page 17.

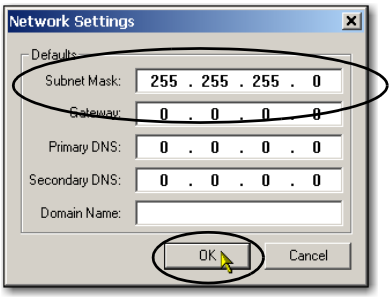
2. Start the BOOTP/DHCP utility.

3. From the Tools menu, choose Network Settings.



4. Type the Subnet Mask of the network.

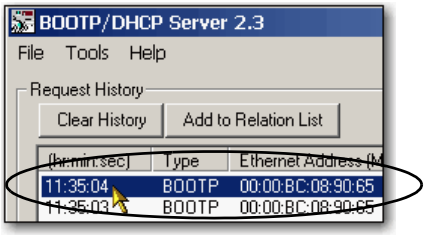
   The Gateway address, Primary and/or Secondary DNS address, and Domain Name fields are optional.



5. Click OK.

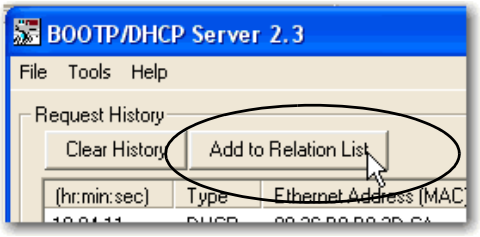
   The Request History panel appears with the hardware addresses of all devices issuing BOOTP requests.

6. Select the appropriate device, that is, the device with the MAC ID that matches your PowerFlex 40 drive.



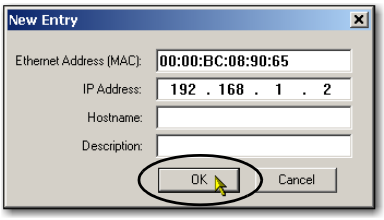
7. Click Add to Relation List.

   The New Entry dialog box appears.



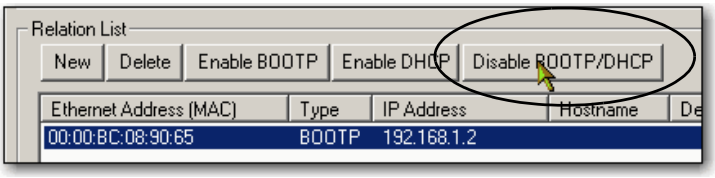
8. Type an IP Address, Hostname, and Description for the adapter.

9. Click OK.



10. To permanently assign this configuration to the adapter, wait for the adapter to appear in the Relation List panel and select it.

11. Click Disable BOOTP/DHCP.



When power is cycled, the adapter uses the assigned configuration and does not issue a BOOTP request.

IMPORTANT	If you do not click Disable BOOTP/DHCP, on a power cycle, the host controller clears the current IP configuration and begins sending BOOTP requests again.

Additional Resources

For a list of additional resources that might assist you when preparing the PowerFlex 40 drive hardware, see page 11.

Add the PowerFlex 40 Drive to an RSLogix 5000 Project

In this chapter, you add a 22B-V2P3N104 drive to an RSLogix 5000 project and configure it. You also download the project to the controller so you can verify communication with the drive.

Before You Begin

You must complete these tasks before using this chapter:

- The tasks described in Before Using This Publication on page 5, including:
  - Prepare the Logix5000 control system hardware
  - Prepare the computer
  - Configure the networks - The tasks described in this chapter require an EtherNet/IP network.
  - Create an RSLogix 5000 project

  The example RSLogix 5000 project used in this chapter uses a CompactLogix 5370 L3 controller.

- Prepare the 22B-V2P3N104 drive as described in Chapter 1, Prepare the PowerFlex 40 Drive Hardware on page 13, including:
  - Mount the 22B-V2P3N104 Drive
  - Wire Power
  - Connect the EtherNet/IP Adapter to the Drive
  - Configure the EtherNet/IP Adapter

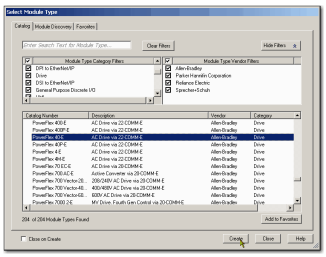
What You Need

You need RSLogix 5000 software to complete the tasks described in this chapter.

Follow These Steps

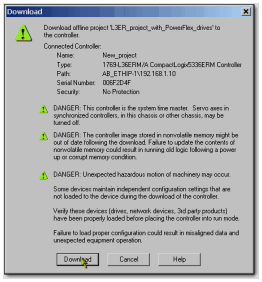
Add the 22B-V2P3N104 Drive to Your RSLogix 5000 Project

page 23



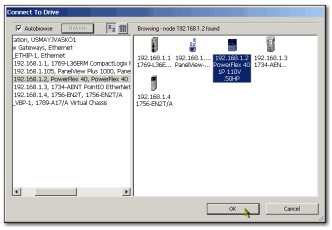
Download the Project to Your Logix5000 Controller

page 26



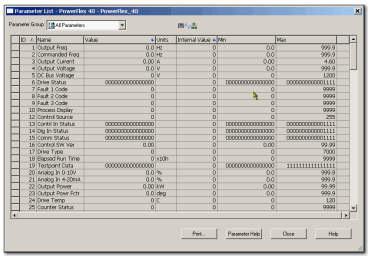
Connect to the 22B-V2P3N104 Drive

page 27



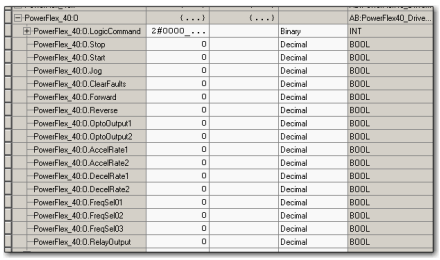
Edit the 22B-V2P3N104 Drive Parameters

page 29



Test the 22B-V2P3N104 Drive Tags

page 29

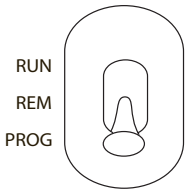


Add the 22B-V2P3N104 Drive to Your RSLogix 5000 Project

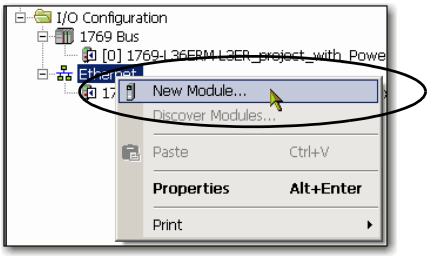
IMPORTANT The tasks described in this section use an RSLogix 5000 project for a CompactLogix 5370 L3 controller. CompactLogix 5370 L3 controllers require that you use RSLogix 5000 software, version 20.00.00 or later.

If your are using a different Logix5000 controller, your project's RSLogix 5000 software version requirements might be different.

1. Verify your RSLogix 5000 project is offline and the Logix5000 controller mode switch is in the PROG mode position.

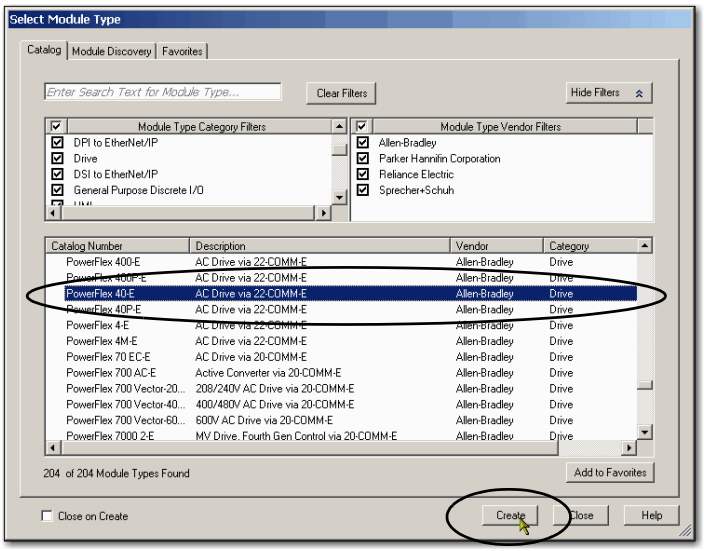


2. Right-click your network port and choose New Module.



3. Select the PowerFlex 40-E drive and click Create.

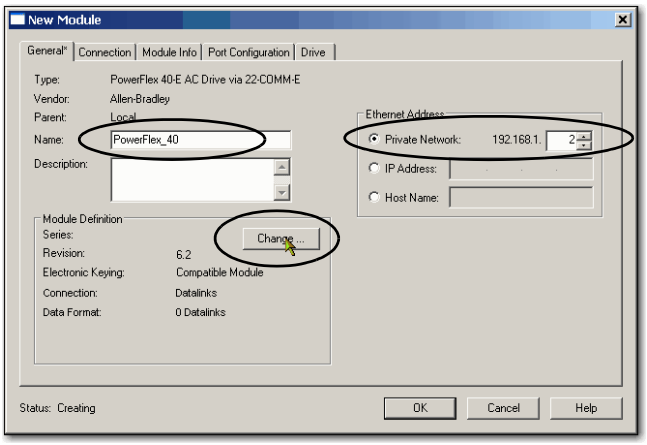
   The Select Module Type dialog box may appear differently depending on which Logix5000 controller your application uses and, thus, what version of RSLogix 5000 software is used.



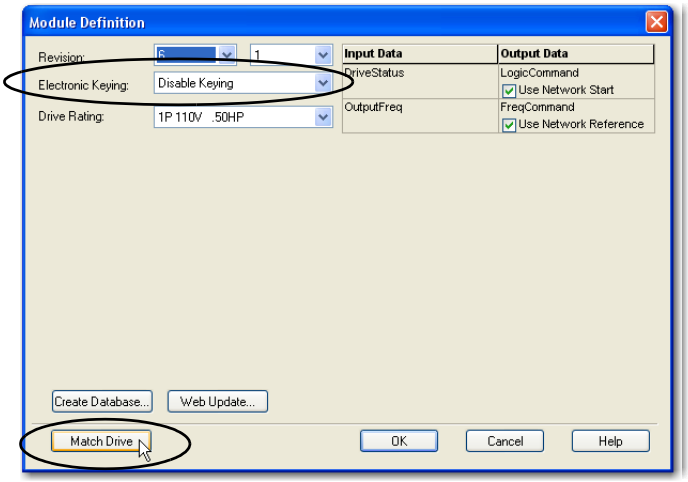
4. Enter a name for the drive.

5. Enter the same IP Address for the 22B-V2P3N104 drive in the project as you assigned in Configure the EtherNet/IP Adapter on page 19.

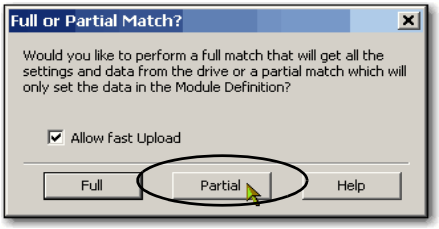
6. Click Change.



7. On the Module Definition dialog box, disable keying and click Match Drive.

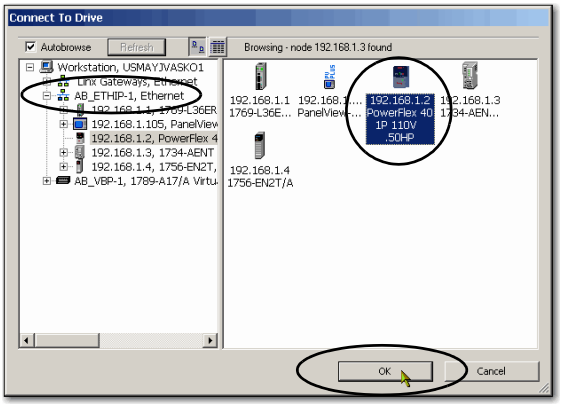


8. On the Full or Partial Match dialog box, click Partial.



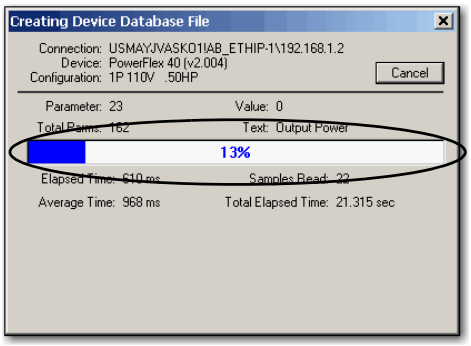
9. On the Connect to Drive dialog box, navigate to the drive.

10. Select the drive and click OK.



The software shows a Creating Device Database File dialog box that tracks the progress of the function.

No action is necessary.



IMPORTANT	If your computer already has a database on it, the software will not create a new one.

11. Click OK when the dialog box appears alerting you that the match to the online drive was successful.

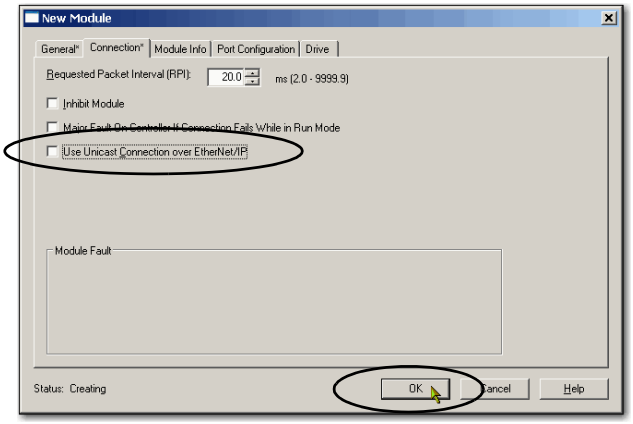
12. Click OK on the Module Definition dialog box to return the New Module dialog box.

13. Click the Connection tab.

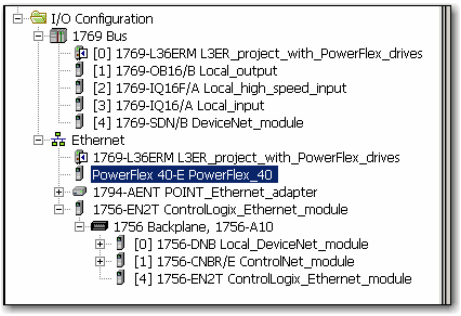
14. Clear Use Unicast Connection over EtherNet/IP and Click OK.

15. Click Close on the Select Module Type dialog box.

16. Save the project.

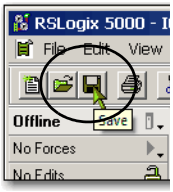


The 22B-V2P3N104 drive is added to the controller organizer.

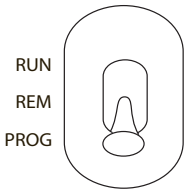


Download the Project to Your Logix5000 Controller

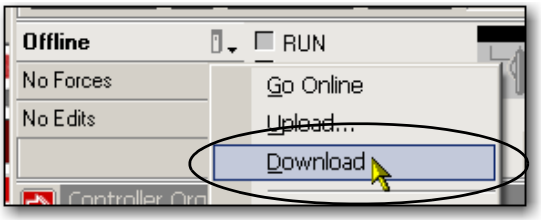
1. Save your changes.



2. Move the controller's mode switch to Program.

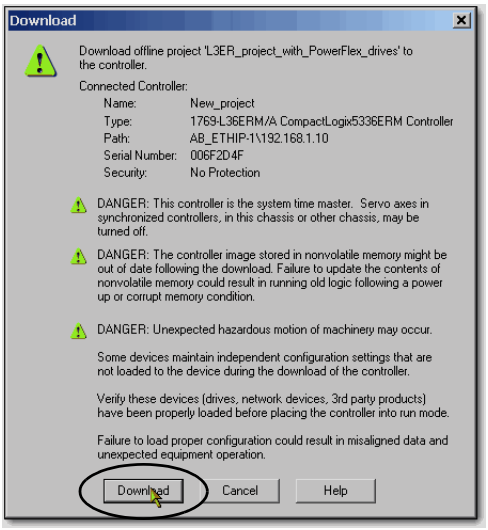


3. Click the Controller Status icon and choose Download.



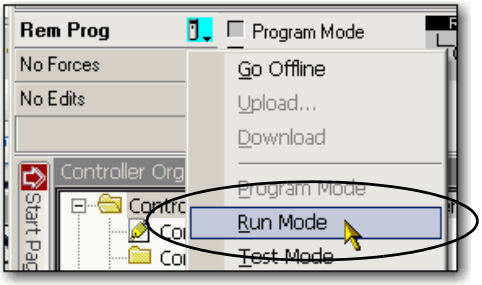
4. Click Download.

   The project downloads to the controller.



IMPORTANT If you receive a fault message on your 22B-V2P3N104 drive, press  on the keypad to clear the fault.

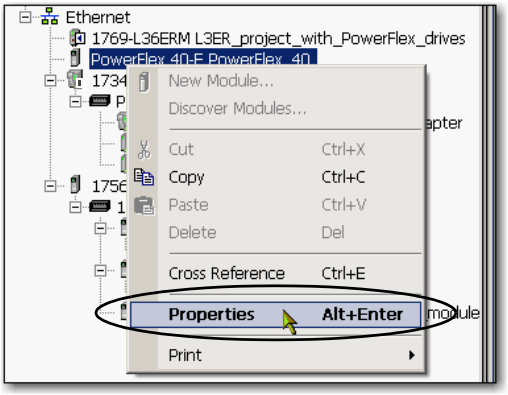
5. Put the controller mode switch in the REM position and change the project to Remote Run mode.



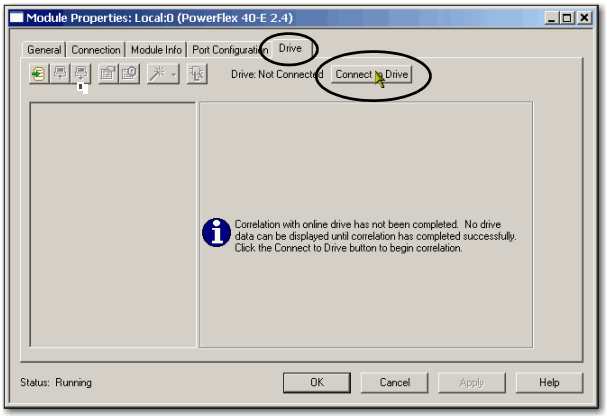
Connect to the 22B-V2P3N104 Drive

Complete these steps to connect to the 22B-V2P3N104 drive.

1. Right-click the 22B-V2P3N104 drive and choose Properties.

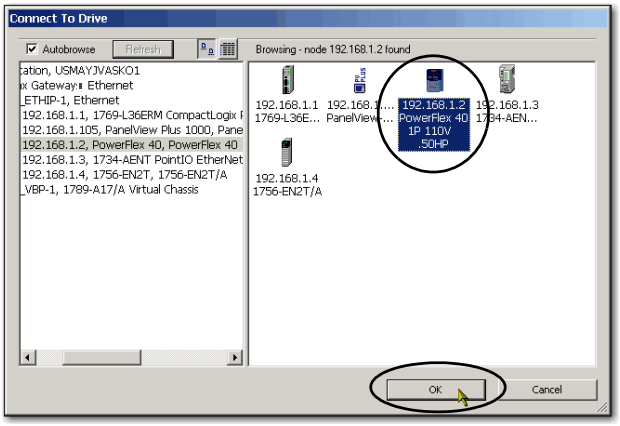


2. Click the Drive tab and click Connect to Drive.

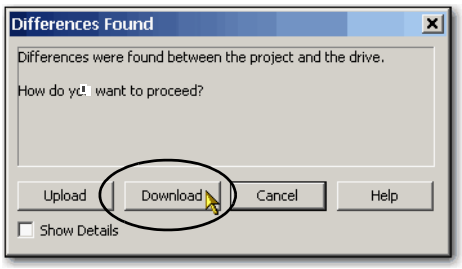


3. Select the 22B-V2P3N104 drive and click OK.

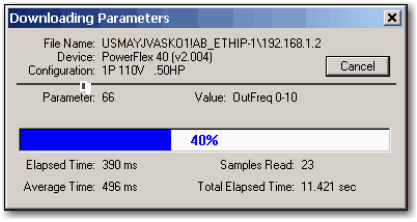
   If there are differences between the project and the drive, RSLogix 5000 software alerts you.



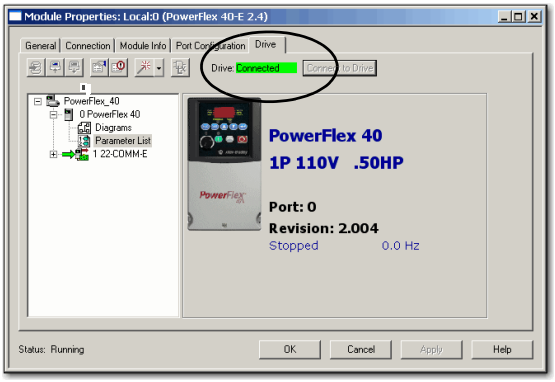
4. Click Download.



A drive database is created.



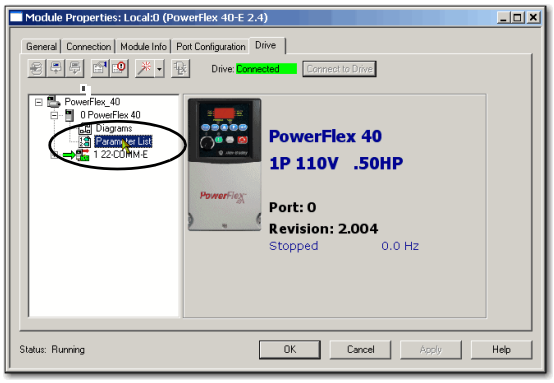
After the download and drive database creation are complete, the drive status changes to Connected.



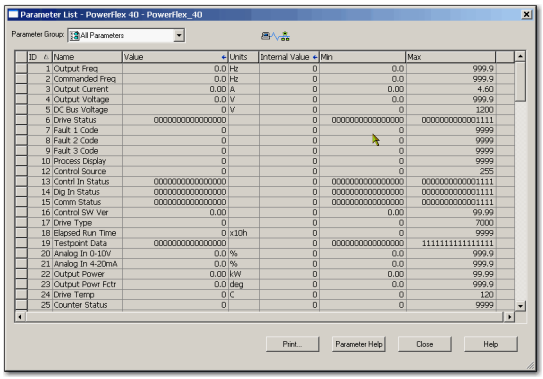
Edit the 22B-V2P3N104 Drive Parameters

You can use RSLogix 5000 software or the touchpad on your 22B-V2P3N104 drive to edit the drive parameters. This section describes how to edit the parameters in RSLogix 5000 software.

1. On the Drive tab, double-click Parameter List.



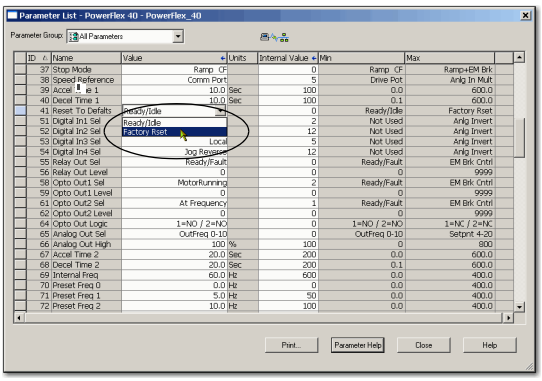
The Parameter List dialog box appears.



2. To change drive parameters, click the Value column cell for the parameter and make a change.

   Some Value cells use pull-down menus and others allow you to type a different value.

   For example, parameter 41 Reset to Defalts can be changed to Factory Rset to revert all parameters to the default values for the drive.



IMPORTANT The drive is reset and fault F048 is displayed and blinks. Press  on the touchpad to clear the fault.

3. Change the following parameters to the following values:

   - P036 = Comm Port
   - P038 = Comm Port

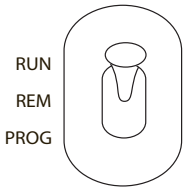
   Changing these parameter values gives you the option to control these functions from the RSLogix 5000 software tags.

4. Click Close.

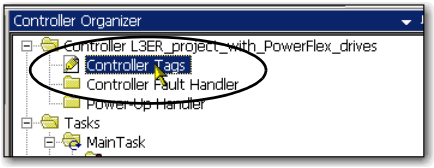
5. If required, upload parameters from the device.

Test the 22B-V2P3N104 Drive Tags

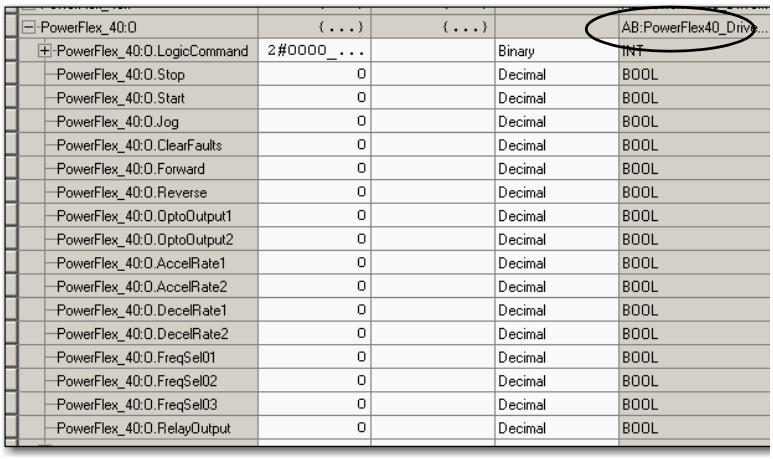
1. Move the controller switch to RUN mode.



2. Double-click Controller Tags.



The Monitor Tags tab appears.

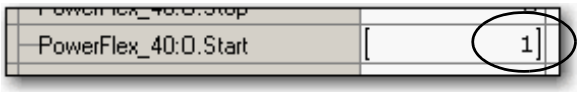


PowerFlex_40:O	{...}	{...}		AB:PowerFlex40_Drive...
PowerFlex_40:O.LogicCommand	2#0000_...		Binary	INT
PowerFlex_40:O.Stop	0		Decimal	BOOL
PowerFlex_40:O.Start	0		Decimal	BOOL
PowerFlex_40:O.Jog	0		Decimal	BOOL
PowerFlex_40:O.ClearFaults	0		Decimal	BOOL
PowerFlex_40:O.Forward	0		Decimal	BOOL
PowerFlex_40:O.Reverse	0		Decimal	BOOL
PowerFlex_40:O.OptoOutput1	0		Decimal	BOOL
PowerFlex_40:O.OptoOutput2	0		Decimal	BOOL
PowerFlex_40:O.AccelRate1	0		Decimal	BOOL
PowerFlex_40:O.AccelRate2	0		Decimal	BOOL
PowerFlex_40:O.DecelRate1	0		Decimal	BOOL
PowerFlex_40:O.DecelRate2	0		Decimal	BOOL
PowerFlex_40:O.FreqSel01	0		Decimal	BOOL
PowerFlex_40:O.FreqSel02	0		Decimal	BOOL
PowerFlex_40:O.FreqSel03	0		Decimal	BOOL
PowerFlex_40:O.RelayOutput	0		Decimal	BOOL

3. Change the O.FreqCommand tag to 10.

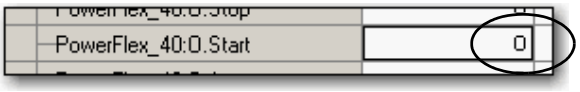
The value 10 equals 1.0 Hz.

4. Change the O.Start tag to 1.



The drive begins to run. The drive's display register its speed until it reaches 1.0 Hz.

5. After the drive has reached 1.0 Hz, change the O.Start tag to 0.



6. Change the O.Stop tag to 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. Choose Go Offline.

By starting and stopping the drive, you verified the following conditions exist in your application:

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

Additional Resources

For a list of additional resources that might assist you when preparing the PowerFlex 40 drive hardware, see page 11.

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, 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[SM] support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

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

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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Publication IASIMP-QS029A-EN-P - February 2012