Logix5000 Control Systems: Connect PowerFlex 525 Drives over an EtherNet/IP Network

Catalog Numbers: Logix5000 Controllers, PowerFlex 525 Drives
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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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

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**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.
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Preface

About This Publication

This quick start provides examples and procedures for including a PowerFlex® 525 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 communicating and functioning properly.

**IMPORTANT**

This publication describes example tasks you complete when using a PowerFlex 525 drive on an EtherNet/IP network. The tasks described are not the only tasks you can complete with the PowerFlex 525 drive on an EtherNet/IP network.

Before Using This Publication

You can complete the tasks described in this publication only after first completing some prerequisite tasks with a Logix5000 controller. For example, before you can add a PowerFlex 525 drive to an RSLogix™ 5000 or Studio 5000™ Logix Designer application project, as described on page 12, you must first create the project in a Logix5000 controller.

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

**IMPORTANT**

The example graphics shown in the table 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 can vary.

Table 1 - Required Tasks to Complete before Using This Quick Start

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare the Logix5000 control system hardware</td>
<td>Assembling the control system and connecting to communication networks. Some components, for example, the Logix5000 controller and system power supply, are required. Other components, for example, a network communication module, are optional. These example graphics show the assembly of one Logix5000 controller.</td>
</tr>
</tbody>
</table>

**IMPORTANT**

This task does not include installation of specific hardware components, for example, PowerFlex 525 drives, used over the networks included in your application.
Table 1 - Required Tasks to Complete before Using This Quick Start (continued)

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare the computer</td>
<td>Installing the necessary software on your computer, for example, RSLogix 5000 software or Logix Designer application.</td>
</tr>
<tr>
<td>Configure the networks</td>
<td>Completing required tasks associated with the networks used in your application, such as assigning an IP address to the controller’s communication port or communication module in your Logix5000 control system.</td>
</tr>
<tr>
<td>Create a controller project</td>
<td>Creating a project used with and stored in 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.</td>
</tr>
</tbody>
</table>
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 can use remote I/O modules, drives, and graphic 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.

Use Each Chapter

The beginning of each chapter contains the following sections of information that must be read before you begin working in the chapter:

- **Before You Begin** - This section lists the tasks you must complete before starting the chapter.
- **What You Need** - This section lists the components 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

Prerequisite Tasks:
Described in Before Using This Publication on page 5.

Prepare the PowerFlex 525 Drive Hardware on page 11

Add a PowerFlex 525 Drive to a Controller Project on page 19
How Hardware is Connected

This quick start demonstrates the following possible control system.

![Diagram of hardware connections]

Required Software

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

<table>
<thead>
<tr>
<th>Software</th>
<th>Required Version</th>
<th>Required for This Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSLogix 5000</td>
<td>20.00.00 or later</td>
<td>Create or change RSLogix 5000 projects to use PowerFlex 525 drive</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studio 5000 Logix Designer</td>
<td>21.00.00 or later</td>
<td>Create or change the Studio 5000 Logix Designer project to use PowerFlex 525 drive</td>
</tr>
<tr>
<td>BOOTP/DHCP utility</td>
<td>Version automatically installed with RSLogix 5000 software and varies according to that software’s version</td>
<td>Set IP address for PowerFlex 525 drive</td>
</tr>
</tbody>
</table>

(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 525 drive over an EtherNet/IP network in a Logix5000 control system that uses a different controller, the minimum version can differ.
Part One

Preface

Parts List

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

<table>
<thead>
<tr>
<th>✓</th>
<th>Quantity</th>
<th>Cat. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25B-xyyyN1z4</td>
<td>PowerFlex 525 AC drive</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1585J-M8PBM-2</td>
<td>RJ45 to RJ45 Ethernet cable</td>
<td></td>
</tr>
</tbody>
</table>

For a list of parts required to complete the prerequisite tasks listed in Table 1 on page 5, see the documentation describing those tasks.

Additional Resources

Use the resources listed in this table for more information when using PowerFlex 525 drives over an EtherNet/IP network in a Logix5000 controller project.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerFlex 525 Adjustable Frequency AC Drive User Manual,</td>
<td>Provides basic information needed to install, start up, program, and</td>
</tr>
<tr>
<td>publication 520-UM001</td>
<td>troubleshoot the PowerFlex 525 AC drive.</td>
</tr>
<tr>
<td>EtherNet/IP Modules in Logix5000 Control Systems, publication</td>
<td>Describes how to install, configure, and operate EtherNet/IP modules.</td>
</tr>
<tr>
<td>ENET-UM001</td>
<td></td>
</tr>
<tr>
<td>ControlLogix® Controllers Common Procedures Programming</td>
<td>Provides details about adding and configuring modules, establishing</td>
</tr>
<tr>
<td>Manual, publication 1756-PM001</td>
<td>communication, and writing ladder logic.</td>
</tr>
<tr>
<td>Industrial Automation Wiring and Grounding Guidelines,</td>
<td>Provides general guidelines for installing a Rockwell Automation®</td>
</tr>
<tr>
<td>publication 1770-4.1</td>
<td>industrial system.</td>
</tr>
<tr>
<td>Product Certifications website, <a href="http://www.ab.com">http://www.ab.com</a></td>
<td>Provides declarations of conformity, certificates, and other certification</td>
</tr>
<tr>
<td></td>
<td>details.</td>
</tr>
</tbody>
</table>

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.
Chapter 1

Prepare the PowerFlex 525 Drive Hardware

In this chapter, you learn how to complete the following tasks:
- Mount and wire power to a PowerFlex 525 AC 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.

The example controller 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.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Cat. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25B-xyyyN1z4</td>
<td>PowerFlex 525 AC drive</td>
</tr>
<tr>
<td>1</td>
<td>1585J-M8PBJM-2</td>
<td>RJ45 to RJ45 Ethernet cable</td>
</tr>
</tbody>
</table>
Chapter 1  Prepare the PowerFlex 525 Drive Hardware

Follow These Steps

Mount the Drive on page 13

Install Power Wiring on page 13

Configure the Embedded EtherNet/IP Adapter on page 16
Prepare the PowerFlex 525 Drive Hardware

Chapter 1

Mount the Drive

The PowerFlex 525 drive must be mounted on a flat, vertical, and level surface (or DIN rail), following the requirements for minimum clearances, ambient operating temperature, and debris protection. For complete mounting instructions, see the PowerFlex 525 Adjustable Frequency AC Drive User Manual, publication 520-UM001.

Install Power Wiring

Follow these steps to access the power terminals and connect the power wires.

⚠️ ATTENTION: Verify that all incoming power is turned off before connecting power wires to the drive.

1. Access the power terminal block:

- For frames B…E drives, press in and hold down the latches on both sides of the power terminal cover and pull out and swing upwards to remove the cover.

Press Side Latches in and Pull Cover Up and Off of Drive

Power Terminal Cover
• For **frame A dives**, press down and pull out on the top cover of the control module, then hold the sides and pull the control module out of the power module.

2. Press and hold down the locking tab on the terminal guard, and slide the terminal guard down to remove from the power module.
3. Connect the AC power conductors to the drive terminals as described in the following table and tighten the screws according to the torque specifications listed in the drive user manual.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1/R, L2/S, L3/T</td>
<td>AC input line connections</td>
</tr>
<tr>
<td>T1/U, T2/V, T3/W</td>
<td>Motor connections</td>
</tr>
<tr>
<td>DC+, DC-</td>
<td>DC bus connections</td>
</tr>
<tr>
<td>BR+, BR-</td>
<td>Dynamic brake resistor connections</td>
</tr>
<tr>
<td>✧</td>
<td>Safety ground - PE connection</td>
</tr>
</tbody>
</table>

For complete information on wiring a PowerFlex 525 drive, see the PowerFlex 525 Adjustable Frequency AC Drives User Manual, publication 520-UM001.

4. Replace all covers.
Configure the Embedded EtherNet/IP Adapter

The PowerFlex 525 Embedded EtherNet/IP network adapter requires a network IP address to operate on an EtherNet/IP network. There are two methods for configuring the embedded EtherNet/IP adapter IP address:

- **BOOTP Server** – Use BOOTP if you prefer to control the IP addresses of devices with a server. The IP address, subnet mask, and gateway addresses are provided by the BOOTP server. BOOTP is enabled by default.

- **Adapter Parameters** – Use adapter parameters when you want more flexibility in setting up the IP address, or need to communicate outside of the control network with a gateway. The IP address, subnet mask, and gateway addresses then come from the adapter parameters you set.

### IMPORTANT
If you are setting your network addresses manually with parameters, you must set C128 [EN Addr Sel] to 1 ‘Parameters’.

### IMPORTANT
Regardless of the method used to set the adapter IP address, each node on the EtherNet/IP network must have a unique IP address. To change an IP address, you must set the new value and then remove and reapply power to (or reset) the adapter.

Follow these steps to configure the Embedded EtherNet/IP adapter with the BOOTP/DHCP utility.

1. Remove the control module cover by pressing and holding down the arrow on the front of the cover and slide the cover down and off of the drive.

2. Connect one end of an Ethernet cable to the Embedded Ethernet adapter port in the drive, routing the cable through the opening in the bottom of the control module.

3. Connect the other end of the cable to the system’s Ethernet switch.

4. Apply power to the drive.

5. Start the BOOTP/DHCP utility.
6. From the Tools menu, choose Network Settings.

7. Type the Subnet Mask of the network. The Gateway address, Primary and/or Secondary DNS address, and Domain Name fields are optional.

8. Click OK.

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

9. Select the appropriate device, that is, the device with the MAC ID that matches your PowerFlex 525 drive.

10. Click Add to Relation List.

The New Entry dialog box appears.

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

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

14. 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 can assist you when preparing the PowerFlex 525 drive hardware, see page 10.
Add a PowerFlex 525 Drive to a Controller Project

In this chapter, you add a PowerFlex 525 drive to a controller project and configure the drive. 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.
- Prepare the PowerFlex 525 drive as described in Chapter 1, Prepare the PowerFlex 525 Drive Hardware on page 11.

What You Need

You need RSLogix 5000 software or the Studio 5000 Logix Designer application to complete the tasks described in this chapter.
Follow These Steps

Add the Drive to the Controller Project on page 21

Download the Project and Connect to the Drive on page 25

Edit the Drive Parameters on page 26

Test the PowerFlex 525 Drive Tags on page 28
Add the Drive to the Controller Project

**IMPORTANT** The tasks described in this section use a 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. The Studio 5000 Logix Designer application version 21.00 or later can also be used. The steps are very similar to the RSLogix 5000 project shown in this section. If you are using a different Logix5000 controller, your project’s RSLogix 5000 software version requirement can be different.

1. Verify that your controller project is offline and the Logix5000 controller is in PROG mode.

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

The Select Module Type dialog box appears. Note that the Select Module Type dialog box can appear differently depending on which Logix5000 controller your application uses and, thus, what version of controller software is used.

3. Select the PowerFlex 525-EENET drive module.

4. Check Close on Create at the bottom of the dialog box.

5. Click Create.
Chapter 2  Add a PowerFlex 525 Drive to a Controller Project

The Module Properties dialog box for the drive appears.

6. Type a Name for the drive.

7. Type the same IP address for the drive as the IP address you assigned to the EtherNet/IP adapter in Configure the Embedded EtherNet/IP Adapter on page 16.

8. Click Change.

The Module Definition dialog box appears.

9. In the Module Definition dialog box, complete the following tasks.

   a. From the Drive Rating pull-down menu, choose the rating for your PowerFlex 525 drive.
   b. From the Electronic Keying pull-down menu, choose Disable Keying.
   c. Click OK.

A message box appears to indicate that the module data types and properties will be changed due to these selections.

10. Click Yes.
11. Click the Drive tab.

12. From the device toolbar, click Upload.

A Connection Browser appears.

13. Navigate to and select the desired drive.

14. Click OK.

If you have not previously connected to a PowerFlex 525 drive, a Creating Device Database File dialog box appears and shows the progress of the database creation. No action is necessary.

**IMPORTANT** If your computer already has a database, the software does not create a new one.

A Connecting dialog box appears and shows the progress of the connection.
When the connection is complete, the Upload dialog box appears.

15. Click Upload Entire Device.

An Upload dialog box appears and shows the progress of the upload.

If there are any differences between the drive in your project and the drive to which you are connecting, a Module Definition Differences Found dialog box appears and shows the differences. If this is the drive you want to add to your project, click OK. Otherwise, click Cancel and repeat step 12 through step 15.

16. When the Module Definition dialog box appears, click OK.

The PowerFlex 525 is added to the controller organizer under the network port.

17. Save the project.
Download the Project and Connect to the Drive

1. Click the Controller Status icon and choose Download.

   ![Download Icon]

   The Download Warning dialog box appears.

2. Click Download.

   The controller project goes online with the controller and the project is downloaded.

   Once the project has successfully downloaded to the controller, if the Module Properties window for the drive is open, a connection is made with the drive.

   **IMPORTANT** If a fault message appears on your PowerFlex 525 drive, press on the keypad to clear the fault.

3. Put the controller in REM mode and change the controller project to Remote Run mode.


**Edit the Drive Parameters**

1. If necessary, open the Module Properties dialog box for the drive and, on the Drive tab, click Parameters in the toolbar.

   The Parameter List dialog box appears.

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

   Depending on the Value cell, choose the appropriate value from pull-down menu or type your value.

![Parameter List dialog box for PowerFlex 525 drive](image-url)
3. Change the parameters listed in the following table to values shown.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter 40</td>
<td>Autotune</td>
<td>Ready/Idle</td>
</tr>
<tr>
<td>Parameter 47</td>
<td>Speed Reference1</td>
<td>EtherNet/IP</td>
</tr>
<tr>
<td>Parameter 62</td>
<td>DigIn TermBlk 02</td>
<td>Not Used</td>
</tr>
<tr>
<td>Parameter 63</td>
<td>DigIn TermBlk 03</td>
<td>Not Used</td>
</tr>
<tr>
<td>Parameter 64</td>
<td>2-Wire Mode</td>
<td>Edge Trigger</td>
</tr>
<tr>
<td>Parameter 65</td>
<td>DigIn TermBlk 05</td>
<td>Not Used</td>
</tr>
<tr>
<td>Parameter 66</td>
<td>DigIn TermBlk 06</td>
<td>Not Used</td>
</tr>
<tr>
<td>Parameter 67</td>
<td>DigIn TermBlk 07</td>
<td>Not Used</td>
</tr>
<tr>
<td>Parameter 68</td>
<td>DigIn TermBlk 08</td>
<td>Not Used</td>
</tr>
<tr>
<td>Parameter 153</td>
<td>EN Data In 1</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 154</td>
<td>EN Data In 2</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 155</td>
<td>EN Data In 3</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 156</td>
<td>EN Data In 4</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 157</td>
<td>EN Data Out 1</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 158</td>
<td>EN Data Out 2</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 159</td>
<td>EN Data Out 3</td>
<td>0</td>
</tr>
<tr>
<td>Parameter 160</td>
<td>EN Data Out 4</td>
<td>0</td>
</tr>
</tbody>
</table>

4. Close the Parameter List dialog box.

The parameters are saved in the drive.
Test the PowerFlex 525 Drive Tags

1. Put the controller in RUN mode.

2. Double-click Controller Tags.

3. On the Monitor Tags tab, expand the PowerFlex 525 drive output tag and change the ClearFaults tag to 1 to clear any initial faults.

4. Change the ClearFaults tag back to 0.

5. Expand the PowerFlex 525 drive input tag and verify that the Ready tag value is 1.

This tag indicates that the drive is ready to start.
6. In the drive output tags, change the CommandedFreq tag to 15000 engineering units (this is approximately 59.5 Hz).

7. Change the Start tag to 1.

**WARNING:** If there is a motor attached to your drive, completing the next step causes the motor to turn.

The display on the drive registers the speed increase in Hz until the value entered at the reference tag is reached.

8. Change the Start tag back to 0.
9. Change the Stop tag to 1.

The display on the drive shows a speed decrease until the drive reaches 0.00 Hz.

10. Change the Stop tag back to 0.


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 and execute simple commands.

**Additional Resources**

For a list of additional resources that can assist you when adding the drive to a controller project, see page 10.
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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 TechConnectSM 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.

<table>
<thead>
<tr>
<th>Installation Assistant</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States or Canada</td>
<td>1.440.646.3434</td>
</tr>
<tr>
<td>Outside United States or Canada</td>
<td>Use the Worldwide Locator at <a href="http://www.rockwellautomation.com/support/americas/iphone_en.html">http://www.rockwellautomation.com/support/americas/iphone_en.html</a>, or contact your local Rockwell Automation representative.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>New Product Satisfaction Return</th>
<th>Procedure Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>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.</td>
</tr>
<tr>
<td>Outside United States</td>
<td>Please contact your local Rockwell Automation representative for the return procedure.</td>
</tr>
</tbody>
</table>

Documentation Feedback

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