

# PowerFlex 40 and 40P Drives to PowerFlex 525 Drives

Catalog Numbers 22B, 22D, 25B



## Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

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.

---

### IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

---

Labels may also be on or inside the equipment to provide specific precautions.



**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.



**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

---

This manual contains new and updated information.

### New and Updated Information

This table contains the changes made to this revision.

Topic	Page
Changed the BACnet and LonWorks entries to N/A for the PowerFlex 525 drive to in the Specifications and Features Comparisons table.	<a href="#">20</a>

**Notes:**

<b>Preface</b>	Overview.....	7
	General Precautions.....	8
	Qualified Personnel .....	8
	Product Safety .....	8
	Pre-Migration .....	8
	Best Practices .....	8
	General Information.....	9
	Additional Resources.....	10
	<b>Chapter 1</b>	
<b>Drive Selection Considerations</b>	Circuit Protection.....	13
	Motor Control.....	13
	Control Wiring.....	13
	Enable.....	13
	Analog Speed Reference.....	14
	Preset Speed Reference.....	14
	Velocity Step Logic, Basic Logic and Timer Counter Functions ..	14
	Encoder Usage and Position StepLogic Application (PowerFlex 40P and 525).....	14
	Optional Accessory Installation .....	16
	Specifications and Features Comparisons .....	17
	Drive Catalog Numbers Explanations.....	21
	Drive Ratings Comparisons .....	26
	Drive Dimension Comparisons.....	28
	Fuse and Circuit Breaker Ratings.....	42
	PowerFlex 40 and PowerFlex 40P Drives .....	42
	PowerFlex 525 Drive .....	45
	Fusing.....	45
	Circuit Breakers.....	45
	Power Terminal Comparisons.....	50
	PowerFlex 40 and 40P Drive Power Terminal Block.....	50
	PowerFlex 525 Drive Power Terminal Block.....	51
	Power Terminal Block .....	53
	Control Terminal Comparisons.....	54
	Motor Start/Stop Precautions .....	54
	PowerFlex 40 Control Wiring and Terminals.....	55
	PowerFlex 40P Control Wiring and Terminals .....	58
	PowerFlex 525 Control Wiring and Terminals.....	62
	Terminal Comparison Summary .....	67
	Accessories and Dimensions .....	68
	PowerFlex 40 .....	68
	PowerFlex 40P .....	79
	PowerFlex 525 .....	88

	<b>Chapter 2</b>	
<b>Drive Configuration</b>	General Notes.....	105
	Sink (SNK)/Source (SRC) Mode.....	105
	3-Wire Control, Pot Speed Reference.....	106
	2-Wire Control, Analog Input Speed Reference.....	109
	Preset Speeds.....	112
	Step Logic Velocity Profile.....	117
	Step Logic Position Profile.....	118
	<b>Chapter 3</b>	
<b>Network Communication</b>	Overview.....	119
	Communication Adapters.....	119

The purpose of this migration guide is to assist you in migrating a PowerFlex® 40 or PowerFlex 40P variable speed drive to a PowerFlex 525 AC drive. Use this migration guide to help you understand some basic migration requirements.

---

**IMPORTANT** This migration guide provides some initial migration guidelines. You also need to review additional product literature to understand the technical similarities and differences between the PowerFlex 40, PowerFlex 40P, and PowerFlex 525 drives, and to help you determine the proper solution for your migration.

Download the installation instructions, technical data, programming, and wiring manuals listed in Additional Resources section on page [10](#) and use them to help you understand the technical similarities and differences of your existing PowerFlex 40 or PowerFlex 40P Drive and the PowerFlex 525 drive.

Many sections of this migration guide direct you to additional details and information available in these additional publications.

---

## Overview

This publication contains these three chapters:

- Chapter 1: Drive Selection Considerations beginning on page [13](#).

This chapter provides comparisons of the specifications, features, dimensions, and power and control terminals of the PowerFlex 40 and PowerFlex 40P drives to the PowerFlex 525 drive.

- Chapter 2: Drive Configuration beginning on page [105](#).

This chapter provides comparisons of the drive configuration, control wiring, and parameters of the PowerFlex 40 and PowerFlex 40P drives to the PowerFlex 525 drive.

- Chapter 3: Network Communication beginning on page [119](#).

This chapter identifies the network options that can be migrated to the PowerFlex 525. This section also provides overview information for velocity reference/feedback, and using I/O adapters and 16 bit-based processors (PLC-5®).

## General Precautions

Be aware of the following general precautions when working with the drives. See the installation instructions for each drive, listed in Additional Resources on page [10](#), for additional precautions specific to each drive.

## Qualified Personnel



**ATTENTION:** Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, startup and subsequent maintenance of the system. Failure to comply can result in personal injury and/or equipment damage.

---

## Product Safety



**ATTENTION:** This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage can result if ESD control procedures are not followed. If you are not familiar with static control procedures, publication [8000-4.5.2](#), "Guarding Against Electrostatic Damage" or any other applicable ESD protection handbook.

---

## Pre-Migration

### Best Practices

Follow these best practices to be sure that your migration is successful.

- Upload and save the drive parameters via Connected Components Workbench™ software or DriveExecutive™ software. If you cannot connect to the drive online, manually record the drive parameter values.
- Record the motor nameplate data, and record and label all power, motor, and digital and analog I/O control wiring.
- Upload and save any network files and programmable logic controller (PLC) programs.



---

## General Information

See the Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives Installation Instructions, publication [DRIVES-IN001](#), for information regarding the topics listed below.

### *Wire/Cable Type*

- General
- Input power
- Output motor
- Discrete drive I/O
- Analog signal and encoder
- Communication

### *Power Distribution*

- System configurations
- AC line voltage
- Surge protection MOVs and common mode capacitors
- AC line impedance
- PowerFlex drives used with regenerative units
- DC bus wiring guidelines

### *Grounding*

- Safety grounds
- Noise related grounds

### *Installation Practices*

- Mounting
- Conduit entry
- Ground connections
- Wire routing
- Conduit
- Cable trays
- Shield termination
- Conductor termination
- Moisture

### *Reflective Wave*

- Description
- Effects on wire types
- Length restrictions for motor protection

*Electromagnetic Interference*

- Causes and containing common mode noise
- Causes and preventing/mitigating transient interference
- Enclosure lighting
- Bearing current

*Motor Cable Length Tables*

- PowerFlex 40 drives
- PowerFlex 40P drives
- PowerFlex 525 drives

Note: Check for PowerFlex 525 data in a future release of this manual.

**Additional Resources**

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
<b>PowerFlex 40 and PowerFlex 40P Drives Product Literature</b>	
PowerFlex 40 Adjustable Frequency AC Drive, FRN 1.xx . . . 6.xx, User Manual, publication <a href="#">22B-UM001</a>	Provides the basic information needed to install, start-up and troubleshoot the PowerFlex 40 adjustable frequency AC drive.
PowerFlex 40P Adjustable Frequency AC Drive FRN 1.xx . . . 3.xx User Manual, publication <a href="#">22D-UM001</a>	Provides the basic information needed to install, start-up and troubleshoot the PowerFlex 40P adjustable frequency AC drive.
PowerFlex 40 Adjustable Frequency AC Drive, FRN 5.xx . . . 6.xx, Quick Start, publication <a href="#">22B-QS001</a>	Summarizes the basic steps needed to install, start-up and program the PowerFlex 40 adjustable frequency AC drive.
PowerFlex 40P Adjustable Frequency AC Drive, FRN 1.xx . . . 3.xx, Quick Start, publication <a href="#">22D-QS001</a>	Summarizes the basic steps needed to install, start-up and program the PowerFlex 40P adjustable frequency AC drive.
PowerFlex 4 and 40 AC Drives Technical Data, publication <a href="#">22-TD001</a>	Provides detailed PowerFlex 4 and 40 drive and option specifications and ratings.
PowerFlex 40P AC Drive Technical Data, publication <a href="#">22D-TD001</a>	Provides detailed PowerFlex 40P drive and option specifications and ratings.
PowerFlex 40P AC Drive Product Profile, publication <a href="#">22D-PP001</a>	Provides an overview of product benefits and features.
PowerFlex 40 Input RFI Filter with Integral Reactor Installation Instructions, publication <a href="#">22B-IN010</a>	Provides installation instructions for the PowerFlex 40 input RFI filter with integral reactor.
PowerFlex 40/400/40P IP30/NEMA 1/UL Type 1 Conversion Kit for Communication Option (Series B) Installation Instructions, publication <a href="#">22-IN006</a>	Provides installation instructions for the PowerFlex 40/400/40P IP30/NEMA 1/UL Type 1 conversion kit for communication option (Series B).
PowerFlex 4/40/400 IP 30/NEMA 1/UL Type 1 Option Kit Installation Instructions, publication <a href="#">22-IN002</a>	Provides installation instructions for the PowerFlex 4/40/400 IP 30/NEMA 1/UL Type 1 option kit.
PowerFlex 4/40/400 Flange Mount Drive and Replacement Plate Drive Installation Instructions, publication <a href="#">22-IN003</a>	Provides installation instructions for the PowerFlex 4/40/400 flange mount drive and replacement plate drive.
PowerFlex 4/40/40P Replacement Cover Installation Instructions, publication <a href="#">22-IN004</a>	Provides installation instructions for the PowerFlex 4/40/40P replacement cover.
PowerFlex 40 Custom Firmware - Option AF Installation Instructions, publication <a href="#">22B-IN002</a>	Provides installation instructions for the PowerFlex 40 Custom Firmware - Option AF.

Resource	Description
PowerFlex EtherNet/IP™ Adapter, 22-COMM-E User Manual, publication <a href="#">22COMM-UM004</a>	Provides information on installing, configuring, troubleshooting and programming the adapter.
PowerFlex DeviceNet™ Adapter, 22-COMM-D User Manual, publication <a href="#">22COMM-UM003</a>	Provides information on installing, configuring, troubleshooting and programming the adapter.
PowerFlex Profibus™ Adapter, 22-COMM-P User Manual, publication <a href="#">22COMM-UM005</a>	Provides information on installing, configuring, troubleshooting and programming the adapter.
PowerFlex 1769-SM2 Compact I/O DSI/Modbus Communication Module User Manual, publication <a href="#">1769-UM013</a>	Provides information on installing, configuring, troubleshooting and programming the adapter.
DriveGuard® Safe Torque Off Option (Series B) for PowerFlex 40P and PowerFlex 70 Enhanced Control AC Drives User Manual, publication <a href="#">PFLEX-UM003</a>	Provides information on installing, wiring and operation of the DriveGuard Safe Torque Off Option.
<b>PowerFlex 525 Drives Product Literature</b>	
PowerFlex 520-Series Adjustable Frequency AC Drive User Manual, publication <a href="#">520-UM001</a>	Provides basic information needed to install, start-up and troubleshoot PowerFlex 520-Series drives.
PowerFlex 520-Series AC Drive Specifications Technical Data, publication <a href="#">520-TD001</a>	Provides detailed PowerFlex 520-Series drive and option specifications and ratings.
PowerFlex 525 Sample Specification, publication <a href="#">25B-SR001</a>	Provides technical product, design, programming, features, and dimensions specifications.
PowerFlex 525 Embedded EtherNet/IP Adapter User Manual, publication <a href="#">520COM-UM001</a>	Provides information about the EtherNet/IP adapter embedded on the main control board in PowerFlex 525 drives, and using it for network communication.
PowerFlex 525 DeviceNet Adapter User Manual, publication <a href="#">520COM-UM002</a>	Provides information about the DeviceNet adapter and using it with PowerFlex 525 drives for network communication.
PowerFlex 25-COMM-E2P Dual-Port EtherNet/IP Adapter User Manual, publication <a href="#">520COM-UM003</a>	Provides information about the Dual-port EtherNet/IP adapter and using it with PowerFlex 520-Series drives for network communication.
PowerFlex 25-COMM-P Profibus DPV1 Adapter User Manual, publication <a href="#">520COM-UM004</a>	Provides information about the PowerFlex Profibus DPV1 adapter and using it with PowerFlex 520-series drives for network communication.
PowerFlex 520-Series Communication Adapters Installation Instructions, publication <a href="#">520COM-IN001</a>	Provides instructions for installing PowerFlex 520-Series communication adapters.
PowerFlex 520-Series Control and Power Module Installation Instructions, publication <a href="#">520-IN002</a>	Provides instructions for installing the PowerFlex 520-Series control and power module.
PowerFlex 520-Series Heatsink Fan Kit Installation Instructions, publication <a href="#">520-IN003</a>	Provides instructions for installing the PowerFlex 520-Series heatsink fan kit.
PowerFlex 520-Series Control Module Fan Kit Installation Instructions, publication <a href="#">520-IN004</a>	Provides instructions for installing the PowerFlex 520-Series control module fan kit.
PowerFlex 520-Series Replacement Power Terminal Guard Installation Instructions, publication <a href="#">520-IN005</a>	Provides instructions for installing the PowerFlex 520-Series replacement power terminal guard.
PowerFlex 520-Series EMC Filter Installation Instructions, publication <a href="#">520-IN006</a>	Provides instructions for installing the PowerFlex 520-Series EMC filter.
PowerFlex 520-Series EMC Plate Installation Instructions, publication <a href="#">520-IN007</a>	Provides instructions for installing the PowerFlex 520-Series EMC plate.
PowerFlex 520-Series IP30/NEMA 1/UL Type 1 Kit Installation Instructions, publication <a href="#">520-IN008</a>	Provides instructions for installing the PowerFlex 520-Series IP30/NEMA 1/UL Type 1 kit.
PowerFlex 525 Incremental Encoder Input Installation Instructions, publication <a href="#">520-IN009</a>	Provides instructions for installing the PowerFlex 520-Series incremental encoder input.
<b>General Information</b>	
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.

Resource	Description
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives Installation Instructions, publication <a href="#">DRIVES-IN001</a>	Provides the basic information needed to properly wire and ground Pulse Width Modulated (PWM) AC drives.
PowerFlex AC Drives in Common Bus Configurations Application Guidelines, publication <a href="#">DRIVES-AT002</a>	Provides the necessary guidelines, considerations, and limitations for the proper application of PowerFlex drives used in common bus configurations.
Common DC Bus Selection Guide, publication <a href="#">DRIVES-SG001</a>	Provides selection information for common bus products.
DeviceNet Network Configuration User Manual, publication <a href="#">DNET-UM004</a>	Describes how to use DeviceNet modules with Logix5000 controllers and communicate with various devices on the DeviceNet network.
Product Certifications website, <a href="http://www.ab.com">http://www.ab.com</a>	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.

Follow these steps to view all available PowerFlex 40, 40P, or 525 drives publications on the Rockwell Automation Literature Library.

1. On the Literature Library Home page, click Drives (Allen-Bradley).
2. Below Component Class AC Drives, click PowerFlex 40, PowerFlex 40P, or PowerFlex 525.

## Drive Selection Considerations

To select a PowerFlex 525 drive to replace your PowerFlex 40 or 40P drive, you must consider the hardware and control differences between these drives. This chapter describes some of the primary differences. Additional chapters will provide in-depth drive comparisons.

### Circuit Protection

Protective device (fuses and circuit breakers) sizing may be different between equivalent PowerFlex 40 or 40P drives and PowerFlex 525 drives. Verify that you have chosen the correct sizes when selecting and installing a PowerFlex 525 drive.

### Motor Control

The default motor control mode for the PowerFlex 40 and 40P drives is Sensorless Vector. They can also be programmed for Volts per Hertz operation. The default setting for PowerFlex 525 is also Sensorless Vector with optional control mode of Volts per Hertz.

### Control Wiring

For control of the discrete inputs, the PowerFlex 40 and 40P drives can use the internal or external 24V supply. The PowerFlex 525 drive digital I/O has the ability to use an internal or external +24V DC supply. To replicate the wiring of the PowerFlex 40 or 40P drive, the wiring diagrams will show the respective drives internally sourced (referenced to common) and externally sourced (+24V DC user supply), as examples.

### Enable

The DriveGuard® Safe Torque-Off option, when used with PowerFlex 40P drives and other safety components, provides a safety function which inhibits torque generation in the motor(s) powered by the drive. When used with PowerFlex 40P drive, the DriveGuard Safe Torque-Off option has been certified to meet the requirements for SIL 2 according to EN/IEC 61800-5-2 and IEC 61508, and PL d and Category 3 according to EN ISO 13849-1. The DriveGuard Safe Torque-Off option is just one component in a safety control system. Components in the system must be chosen and applied appropriately to achieve the desired level of safeguarding.

The PowerFlex 525 drive is shipped with a jumper installed between I/O terminals 01 and 11. Remove this jumper when using I/O terminal 01 as a stop or enable input. An alternative is to use the Safe Torque-Off feature embedded in the PowerFlex 525 drive. The Safe Torque-Off function disables the drive's output IGBT's by breaking the link with the drive microcontroller. The safety circuit uses only solid-state switches, therefore no feedback channel is required. If needed, the PowerFlex 525 Safe Torque-Off status can be shown using one of the normal digital outputs. When used in combination with a safety input device, the system satisfies the requirements of EN ISO 13849 and EN62061 for Safe Torque-Off and helps protect against restart.

**Note:** See the examples in Appendix G of the PowerFlex 520-Series AC Drives User Manual, publication [520-UM001](#), for more information.

## Analog Speed Reference

PowerFlex 40 and 40P drives can accept a bipolar (+/-10V DC) speed reference. The direction is set by the polarity of the speed reference. This feature is also available on the PowerFlex 525 drive.

## Preset Speed Reference

The PowerFlex 40 and 40P drives have eight preset speeds set by three digital inputs. The PowerFlex 525 drive has 16 preset speeds set and four digital inputs.

## Velocity Step Logic, Basic Logic and Timer Counter Functions

Four logic functions within the PowerFlex 40 and 40P drives provide the capability to program simple logic functions without a separate controller. The Power Flex 525 provides the same four logic functions.

## Encoder Usage and Position StepLogic Application (PowerFlex 40P and 525)

The PowerFlex 40P drive includes a pulse-train/encoder input. When parameter E216 [Motor Fdbk Type] is set to a value other than zero, the drive is set to use an encoder. The drive will use the encoder in several ways depending on the settings of other parameters. The drive will use the encoder as shown below (listed in order of priority):

1. If enabled by parameter P038 [Speed Reference], the encoder will be used directly as a commanded speed (normally used with a pulse train) or as a position reference (normally used with a quadrature encoder).

2. If not enabled by parameter P038 [Speed Reference], when the PID Feedback or PID Reference are set to use an encoder than the PID function will use the encoder or pulse train input.
3. If not enabled by parameter P038 [Speed Reference] or the PID parameters, then if parameter E216 [Motor Fdbk Type] is set the encoder is used for direct feedback and trim of the speed command. The normal slip compensation is not used in this case. Instead the drive will use the encoder to determine actual output frequency and adjust the output frequency to match the command. Parameters E220 [Ki Speed Loop] and E221 [Kp Speed Loop] are used in this control loop. The primary benefit of this mode is increased speed accuracy when compared to open-loop slip compensation. It does not provide speed bandwidth improvement.

The PowerFlex 525 drive includes a pulse train input built into the terminal block. PowerFlex 525 drives also support an optional encoder card. The pulse train and encoder can be used for many of the same functions, but the pulse train supports up to 100 kHz at 24V, and uses the drive built-in terminal block. The encoder supports up to 250 kHz dual channel at 5, 12 or 24V and requires the optional encoder board to be installed. When parameter A535 [Motor Fdbk Type] is set to a value other than zero, the drive is set to use an encoder or pulse train. The drive will use the encoder or pulse train in several ways like the PowerFlex 40 and 40P drives depending on the settings of other parameters. The drive will use the encoder or pulse train to increase speed accuracy. It does not provide speed bandwidth improvement.

### *Use Over Communications*

If eight steps are not adequate for the application or if dynamic program changes are required, many of the positioning functions can be controlled via an active communication network.

The Enhanced Control Word in the PowerFlex 40P drive (parameter E248) and in the PowerFlex 525 drive (parameter A560) allow many of the positioning functions to be completed via parameter control using an explicit message. This provides for operation over communications instead of with hardware inputs.

Options relating to positioning are:

- Bit 0 “Home Limit”
- Bit 1 “Find Home”
- Bit 2 “Hold Step”
- Bit 3 “Pos Redefine”
- Bit 4 “Syn Enable”
- Bit 5 “Traverse Dis”
- Bit 6 “Logic In 1”
- Bit 7 “Logic In 2”

### *RS485 (DSI) Protocol*

PowerFlex 40 and 40P drives support the RS485 (DSI) protocol, providing efficient operation with Rockwell Automation peripherals. In addition, some Modbus functions are supported to provide networking. They can be multi-dropped on an RS485 network by using the Modbus protocol in RTU mode. The PowerFlex 525 drive also supports the RS485 (DSI) protocol to provide operation of peripherals and can be multi-dropped on an RS485 network by using the Modbus protocol in RTU mode. For more information regarding network communications, see Network Communication on page [119](#).

## **Optional Accessory Installation**

Optional accessories for the PowerFlex 40, 40P and 525 drives are not installed at the factory. All optional accessories should be installed by qualified service personal.



## Specifications and Features Comparisons

The following table compares the ratings, specifications, and features of the PowerFlex 40, 40P and 525 drives.

Table Legend	
(S)	Standard
(O)	Optional
N/A	Not Available

Drive		PowerFlex 40	PowerFlex 40P	PowerFlex 525	
Cat. No.		22B...	22D...	25B...	
<b>Power</b>	<b>Input Power</b>	Ratings 100...115V AC 1Ø Input / 3Ø 230V Output	0.37...1.1 kW 0.5...1.5 Hp	N/A	0.37...1.1 kW 0.5...1.5 Hp
		Ratings 200...240V AC	0.37...7.5 kW 0.5...10 Hp	0.37...7.5 kW 0.5...10 Hp	0.37...15 kW 0.5...20 Hp
		Ratings 400...480V AC	0.37...11 kW 0.5...15 Hp	0.37...11 kW 0.5...15 Hp	0.37...22 kW 0.5...30 Hp
		Ratings 500...600V AC	0.75...11 kW 1...15 Hp	0.75...11 kW 1...15 Hp	0.37...22 kW 0.5...30 Hp
		Ratings 690V AC	N/A	N/A	N/A
		Single phase	100...120V; 200...240V	65% derate of drive rated current	100...120V; 200...240V 65% derate of drive rated current for 3-phase drives
		Input inductor	N/A	N/A	N/A, except 18.5 kW (25 Hp) and 22 kW (30 Hp) ratings
		Logic Ride-thru	0.5 seconds minimum; 2 seconds typical	0.5 seconds minimum; 2 seconds typical	0.5 seconds minimum; 2 seconds typical
		Power Ride-thru	100 ms	100 ms	100 ms
		Transient protection	MOV	MOV	MOV
		DC input terminals (Only PF40P and PF525 can be used with a common DC input)	DC+, DC-	DC+, DC-	DC+, DC-
	<b>Output Power</b>	Carrier frequency	2...16 kHz	2...16 kHz	2...16 kHz
		Output frequency range	0...400 Hz	0...500 Hz	0...500 Hz
		Efficiency	97.5% typical	97.5% typical	97.5% typical
		Power factor	0.98 across entire speed range	0.98 across entire speed range	0.98 across entire speed range
		Overload capability	150% for 60 s 200% for 3 s	150% for 60 s 200% for 3 s	ND 110% Overload capability for 60 s, 150% for 3 s. Applies to power ratings above 15 kW (20 Hp) only. Based on 480V drive rating. HD 150% Overload capability for 60 s, 180% for 3 s (200% programmable)

Drive		PowerFlex 40	PowerFlex 40P	PowerFlex 525	
Cat. No.		22B...	22D...	25B...	
Power	Environmental Ratings	Enclosure types w/ambient temperature limit	IP20/NEMA/UL Type Open: -10 °C...50 °C (14 °F...122 °F) IP30/NEMA 1/UL Type 1: -10 °C...40 °C (14 °F...104 °F)	IP20/NEMA/UL Type Open: -10 °C...50 °C (14 °F...122 °F) IP30/NEMA 1/UL Type 1: -10 °C...40 °C (14 °F...104 °F)	IP20 Open Type: -20 °C...50 °C (-4 °F...122 °F) IP 30/NEMA 1/UL Type 1: -20 °C...45 °C (-4 °F...113 °F)
		Flange enclosure types w/ambient temperature limit	Inside: IP20 = 50 °C (122 °F) Heatsink: IP56, NEMA 4X/12 = 40 °C (104 °F) (indoor) Flange = 50 °C (122 °F)	Inside: IP20 = 50 °C (122 °F) Heatsink: IP56, NEMA 4X/12 = 40 °C (104 °F) (indoor) Plate drive version 0 for user supplied heatsink, details in user manual	N/A
		Enclosure types	IP20 / IP20 zero stacked / IP30 / IP66	IP20 / IP20 zero stacked / IP30 / IP66	IP20 / IP30
		Storage temperature - max	85 °C (185 °F)	85 °C (185 °F)	85 °C (185 °F) Frame E only = 70 °C (158 °F)
		Storage temperature - min	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)
		Operating temperature - max	IP20: 50 °C (122 °F) IP30: 40 °C (104 °F) IP66: 40 °C (104 °F)	IP20: 50 °C (122 °F) IP30: 40 °C (104 °F) IP66: 40 °C (104 °F)	IP20: 70 °C (158 °F) (w/optional fan kit w/ derate) IP30: 55 °C (131 °F w/derate)
		Operating temperature - min	-10 °C (14 °F)	-10 °C (14 °F)	-20 °C (-4 °F)
	Standards / Certifications	UL	(S)	(S)	(S)
		CE	(S)	(S)	(S)
		CSA	(S)	(S)	(S)
		C-Tick	(S)	(S)	(S)
		TUV-FS	N/A	Category 3 / PL (d) / SIL 2	Category 3 / PL (d) / SIL 2
		ROHS	N/A	N/A	(S)
	Protection	Motor overload protection	(S)	(S)	(S)
		Output short circuit protection	(S)	(S)	(S)
		Output ground fault protection	(S)	(S)	(S)
		Under and over voltage protection	(S)	(S)	(S)
		Dynamic braking	Internal IGBT	Internal IGBT	Internal IGBT
		Common mode choke	External option	External option	External option (except 25 Hp and above)
		Safety input	N/A	(S) w/DriveGuard 20A-DG01 option	(S)
Hardware enable		(S)	(S)	(S)	
EMC filters		Integral and external filters available	External	Integral and external filters available	

Drive		PowerFlex 40	PowerFlex 40P	PowerFlex 525			
Cat. No.		22B...	22D...	25B...			
Drive Control	Performance	Motor control type	Volts/Hertz (V/Hz) Sensorless Vector (SVC) Slip Compensation	Volts/Hertz (V/Hz) Sensorless Vector (SVC) Slip Compensation or Encoder Trim	Volts/Hertz (V/Hz) Sensorless Vector (SVC) Closed Loop Velocity Vector Control (VVC) Slip Compensation		
		Induction V/Hz	(S)	(S)	(S)		
		Induction SVC	(S)	(S)	(S)		
		Induction SVC/W Economizer	N/A	N/A	(S)		
		VVC	N/A	N/A	(S)		
		Surface permanent magnet	N/A	N/A	(Future enhancement)		
		Interior permanent magnet	N/A	N/A	(Future enhancement)		
		Operating speed range	60:1	80:1	1000:1 (with optional encoder)		
		Speed regulation (across operating speed range)	1% of base speed with 60:1 speed range	Open loop with slip compensation: • ±1% of base speed across a 80:1 speed range With encoder: • ±0.3% of base speed across a 80:1 speed range • ±0.05% of base speed across a 20:1 speed range	Open Loop: • V/Hz: ±1% of base speed across a 60:1 speed range • SVC: ±0.5% of base speed across a 100:1 speed range • SVC Economizer: ±0.5% of base speed across a 100:1 speed range • VVC: ±0.5% of base speed across a 60:1 speed range With Encoder: • SVC: ±0.1% of base speed across a 100:1 speed range • SVC Economizer: ±0.1% of base speed across a 100:1 speed range • VVC: ±0.1% of base speed across a 1000:1 speed range		
		Slip compensation	(S)	(S)	(S)		
		Droop	N/A	N/A	(S)		
		Drive Control	Features	Flying start	(S)	(S)	(S)
				Bus regulator	(S)	(S)	(S)
S - curve	(S)			(S)	(S)		
Drive overload protection	(S)			(S)	(S)		
Advanced diagnostics	(S)			(S)	(S)		
Input phase loss	(S)			(S)	(S)		
Output phase loss	N/A			N/A	(S)		
Preset speeds	8			8	16		
Process control loop	(S)			(S)	(S)		
Feedback loss switchover	N/A			(S)	(S)		
Start on power-up	(S)			(S)	(S)		
Speed/Position profiler	(S), Speed only			(S)	(S)		
Conformal coating	N/A			N/A	(S)		
Timer / Counter functions	(S)		(S)	(S)			
Feedback Devices	Incremental encoder feedback	N/A	(S)	(O)			
	Pulse train input	N/A	(S)	(S)			

Drive		PowerFlex 40	PowerFlex 40P	PowerFlex 525	
Cat. No.		22B...	22D...	25B...	
Drive Interface	User Interface	HIM / operator interface	Local keypad Remote HIM DriveExplorer DriveExecutive Connected Components Workbench™ Studio 5000™ Logix Designer (or RSLogix™ 5000)	4 Digit LED display and fault reset Remote HIM DriveExplorer DriveExecutive Connected Components Workbench™ Studio 5000™ Logix Designer (or RSLogix™ 5000)	5 digit, 16 segment scrolling text display Remote HIM Connected Components Workbench™ Studio 5000™ Logix Designer (or RSLogix™ 5000)
		Lines and characters	(S) - LED, single line	(S) - LED, single line	(S) - LED, single line
		Start push button	(S)	(0) - need HIM	(S)
		Stop push button	(S)	(0) - need HIM	(S)
		Jog push button	(S)	(0) - need HIM	(0) - need HIM
		Direction push button	(S)	(0) - need HIM	(S)
		Analog potentiometer	(S)	(0) - need HIM	(S)
		Digital increase/decrease push buttons	(S)	(0) - need HIM	(S)
		Number of languages (0)	0	0	9
		Remote HIM	(0)	(0)	(0)
		Software configuration tools	(0)	(0)	(0)
		Set tools or wizards	(0)	(0)	(0)
Drive Interface	Communications Options	DF1	(0)	(0)	(0) (Requires 22-XCOMM-DC-BASE)
		BACnet	(0)	(0)	N/A
		ControlNet™	(0)	(0)	(0) (Requires 22-XCOMM-DC-BASE)
		DeviceNet	(0)	(0)	(0)
		EtherNet/IP	(0)	(0)	(S)
		LonWorks®	(0)	(0)	N/A
		Modbus RTU	(S)	(S)	(S)
		PROFIBUS DP	(0)	(0)	(0)
		USB	(0)	(0)	(S)
Drive Interface	Input / Output	I/O terminal configuration	<ul style="list-style-type: none"> <li>Two analog inputs</li> <li>Three fixed and four programmable digital inputs</li> <li>One analog output</li> <li>Two opto outputs and one form C relay output</li> </ul>	<ul style="list-style-type: none"> <li>Two semi-programmable digital inputs</li> <li>Five fully programmable digital inputs</li> <li>One programmable form C relay output and two opto outputs</li> <li>One analog output</li> <li>One analog input</li> </ul>	<ul style="list-style-type: none"> <li>Seven semi-programmable digital inputs</li> <li>Five fully programmable digital inputs</li> <li>One form A and one form B relay output and two opto outputs</li> <li>One analog output</li> <li>Two analog inputs</li> </ul>
		Terminal type	Fixed	Fixed	Fixed
		Standard analog inputs	<ul style="list-style-type: none"> <li>Qty. 1 - Bipolar, single ended (voltage and current) (10 bit)</li> <li>Qty. 1 - Unipolar, differential (voltage and current)</li> </ul>	<ul style="list-style-type: none"> <li>Qty. 1 - Bipolar, single ended (voltage and current) (10 bit)</li> <li>Qty. 1 - Unipolar, differential (voltage and current)</li> </ul>	<ul style="list-style-type: none"> <li>Qty. 1 - Bipolar, single ended (voltage and current) (10 bit)</li> <li>Qty. 1 - Unipolar, differential (voltage and current)</li> </ul>
		Standard digital inputs	3 dedicated, 4 programmable, 24V sink or source	2 dedicated, 5 programmable, 24V sink or source	1 dedicated, 6 programmable, 24V sink or source
		Standard analog outputs	Qty. 1, 0...10V or 0...20 mA	Qty. 1 - 0...10V or 0...20 mA	Qty. 1 - 0...10V or 0...20 mA
	Standard digital outputs	Qty. 1, Form C relay Qty. 2, Opto coupled	Qty. 1, Form C relay Qty. 2, Opto coupled	Qty. 1, Form A relay Qty. 1, Form B relay Qty. 2, Opto outputs	

## Drive Catalog Numbers Explanations

### PowerFlex 40 Drive

Figure 1 describes the catalog numbering scheme for the PowerFlex 40 drive.

Figure 1 - Catalog Number Code Explanation

1-3	4	5	6-8	9	10	11	12 <sup>(1)</sup>	13-14
<b>22B</b>	<b>-</b>	<b>A</b>	<b>1P5</b>	<b>N</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>AA</b>
Drive	Dash	Voltage Rating	Rating	Enclosure	HIM	Emission Class	Type	Optional

<table border="1"> <thead> <tr> <th>Code</th> <th>Voltage</th> <th>Ph.</th> </tr> </thead> <tbody> <tr> <td>V</td> <td>120V AC</td> <td>1</td> </tr> <tr> <td>A</td> <td>240V AC</td> <td>1</td> </tr> <tr> <td>B</td> <td>240V AC</td> <td>3</td> </tr> <tr> <td>D</td> <td>480V AC</td> <td>3</td> </tr> <tr> <td>E</td> <td>600V AC</td> <td>3</td> </tr> </tbody> </table>	Code	Voltage	Ph.	V	120V AC	1	A	240V AC	1	B	240V AC	3	D	480V AC	3	E	600V AC	3	<table border="1"> <thead> <tr> <th>Code</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Not Filtered</td> </tr> <tr> <td>1</td> <td>Filtered</td> </tr> </tbody> </table>	Code	Rating	0	Not Filtered	1	Filtered	<table border="1"> <thead> <tr> <th>Code</th> <th>Interface Module</th> <th>Code</th> <th>Purpose</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Fixed Keypad</td> <td>AA</td> <td>Reserved for thru custom firmware</td> </tr> <tr> <td></td> <td></td> <td>ZZ</td> <td></td> </tr> </tbody> </table>	Code	Interface Module	Code	Purpose	1	Fixed Keypad	AA	Reserved for thru custom firmware			ZZ		<table border="1"> <thead> <tr> <th>Code</th> <th>Enclosure</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Panel Mount - IP20, NEMA/UL Type Open</td> </tr> <tr> <td>C</td> <td>Panel Mount - IP66, NEMA/UL Type 4X</td> </tr> <tr> <td>F</td> <td>Flange Mount - IP20, NEMA/UL Type Open</td> </tr> <tr> <td>H</td> <td>Replacement Plate Drive - IP20, NEMA/UL Type Open</td> </tr> </tbody> </table> <p>- Contact factory for ordering information.</p>	Code	Enclosure	N	Panel Mount - IP20, NEMA/UL Type Open	C	Panel Mount - IP66, NEMA/UL Type 4X	F	Flange Mount - IP20, NEMA/UL Type Open	H	Replacement Plate Drive - IP20, NEMA/UL Type Open																																									
Code	Voltage	Ph.																																																																																								
V	120V AC	1																																																																																								
A	240V AC	1																																																																																								
B	240V AC	3																																																																																								
D	480V AC	3																																																																																								
E	600V AC	3																																																																																								
Code	Rating																																																																																									
0	Not Filtered																																																																																									
1	Filtered																																																																																									
Code	Interface Module	Code	Purpose																																																																																							
1	Fixed Keypad	AA	Reserved for thru custom firmware																																																																																							
		ZZ																																																																																								
Code	Enclosure																																																																																									
N	Panel Mount - IP20, NEMA/UL Type Open																																																																																									
C	Panel Mount - IP66, NEMA/UL Type 4X																																																																																									
F	Flange Mount - IP20, NEMA/UL Type Open																																																																																									
H	Replacement Plate Drive - IP20, NEMA/UL Type Open																																																																																									
<p>Output Current @ 100...120V 50/60 Hz Input</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Amps</th> <th>kW (Hp)</th> </tr> </thead> <tbody> <tr> <td>2P3</td> <td>2.3</td> <td>0.4 (0.5)</td> </tr> <tr> <td>5P0</td> <td>5.0</td> <td>0.75 (1.0)</td> </tr> <tr> <td>6P0</td> <td>6.0</td> <td>1.1 (1.5)</td> </tr> </tbody> </table>	Code	Amps	kW (Hp)	2P3	2.3	0.4 (0.5)	5P0	5.0	0.75 (1.0)	6P0	6.0	1.1 (1.5)	<p>Output Current @ 200...240V 50/60 Hz Input</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Amps</th> <th>kW (Hp)</th> </tr> </thead> <tbody> <tr> <td>2P3</td> <td>2.3</td> <td>0.4 (0.5)</td> </tr> <tr> <td>5P0</td> <td>5.0</td> <td>0.75 (1.0)</td> </tr> <tr> <td>8P0</td> <td>8.0</td> <td>1.5 (2.0)</td> </tr> <tr> <td>012</td> <td>12</td> <td>2.2 (3.0)</td> </tr> <tr> <td>017</td> <td>17.5</td> <td>3.7 (5.0)</td> </tr> <tr> <td>024</td> <td>24</td> <td>5.5 (7.5)</td> </tr> <tr> <td>033</td> <td>33</td> <td>7.5 (10)</td> </tr> </tbody> </table>	Code	Amps	kW (Hp)	2P3	2.3	0.4 (0.5)	5P0	5.0	0.75 (1.0)	8P0	8.0	1.5 (2.0)	012	12	2.2 (3.0)	017	17.5	3.7 (5.0)	024	24	5.5 (7.5)	033	33	7.5 (10)	<p>Output Current @ 380...480V 50/60 Hz Input</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Amps</th> <th>kW (Hp)</th> </tr> </thead> <tbody> <tr> <td>1P4</td> <td>1.4</td> <td>0.4 (0.5)</td> </tr> <tr> <td>2P3</td> <td>2.3</td> <td>0.75 (1.0)</td> </tr> <tr> <td>4P0</td> <td>4.0</td> <td>1.5 (2.0)</td> </tr> <tr> <td>6P0</td> <td>6.0</td> <td>2.2 (3.0)</td> </tr> <tr> <td>010</td> <td>10.5</td> <td>4.0 (5.0)</td> </tr> <tr> <td>012</td> <td>12</td> <td>5.5 (7.5)</td> </tr> <tr> <td>017</td> <td>17</td> <td>7.5 (10)</td> </tr> <tr> <td>024</td> <td>24</td> <td>11 (15)</td> </tr> </tbody> </table>	Code	Amps	kW (Hp)	1P4	1.4	0.4 (0.5)	2P3	2.3	0.75 (1.0)	4P0	4.0	1.5 (2.0)	6P0	6.0	2.2 (3.0)	010	10.5	4.0 (5.0)	012	12	5.5 (7.5)	017	17	7.5 (10)	024	24	11 (15)	<p>Output Current @ 500...600V 50/60 Hz Input</p> <table border="1"> <thead> <tr> <th>Code</th> <th>Amps</th> <th>kW (Hp)</th> </tr> </thead> <tbody> <tr> <td>1P7</td> <td>1.7</td> <td>0.75 (1.0)</td> </tr> <tr> <td>3P0</td> <td>3.0</td> <td>1.5 (2.0)</td> </tr> <tr> <td>4P2</td> <td>4.2</td> <td>2.2 (3.0)</td> </tr> <tr> <td>6P6</td> <td>6.6</td> <td>4.0 (5.0)</td> </tr> <tr> <td>9P9</td> <td>9.9</td> <td>5.5 (7.5)</td> </tr> <tr> <td>012</td> <td>12.2</td> <td>7.5 (10)</td> </tr> <tr> <td>019</td> <td>19</td> <td>11 (15)</td> </tr> </tbody> </table>	Code	Amps	kW (Hp)	1P7	1.7	0.75 (1.0)	3P0	3.0	1.5 (2.0)	4P2	4.2	2.2 (3.0)	6P6	6.6	4.0 (5.0)	9P9	9.9	5.5 (7.5)	012	12.2	7.5 (10)	019	19	11 (15)
Code	Amps	kW (Hp)																																																																																								
2P3	2.3	0.4 (0.5)																																																																																								
5P0	5.0	0.75 (1.0)																																																																																								
6P0	6.0	1.1 (1.5)																																																																																								
Code	Amps	kW (Hp)																																																																																								
2P3	2.3	0.4 (0.5)																																																																																								
5P0	5.0	0.75 (1.0)																																																																																								
8P0	8.0	1.5 (2.0)																																																																																								
012	12	2.2 (3.0)																																																																																								
017	17.5	3.7 (5.0)																																																																																								
024	24	5.5 (7.5)																																																																																								
033	33	7.5 (10)																																																																																								
Code	Amps	kW (Hp)																																																																																								
1P4	1.4	0.4 (0.5)																																																																																								
2P3	2.3	0.75 (1.0)																																																																																								
4P0	4.0	1.5 (2.0)																																																																																								
6P0	6.0	2.2 (3.0)																																																																																								
010	10.5	4.0 (5.0)																																																																																								
012	12	5.5 (7.5)																																																																																								
017	17	7.5 (10)																																																																																								
024	24	11 (15)																																																																																								
Code	Amps	kW (Hp)																																																																																								
1P7	1.7	0.75 (1.0)																																																																																								
3P0	3.0	1.5 (2.0)																																																																																								
4P2	4.2	2.2 (3.0)																																																																																								
6P6	6.6	4.0 (5.0)																																																																																								
9P9	9.9	5.5 (7.5)																																																																																								
012	12.2	7.5 (10)																																																																																								
019	19	11 (15)																																																																																								

(1) Position 12 of the catalog number indicates drive type. All PowerFlex 40 drives are equipped with RS485 communication. Additional accessories, options and adapters are available. See Appendix B of the PowerFlex 40 AC Drive User Manual, publication [22B-UM001](#), for details.

The drive data nameplate is located on the side of the drive. Additional accessories, options, and adapters are available. See the PowerFlex 40 AC Drive User Manual, publication [22B-UM001](#), for details.

**Figure 2 - PowerFlex 40 Drive Data Nameplate Information**



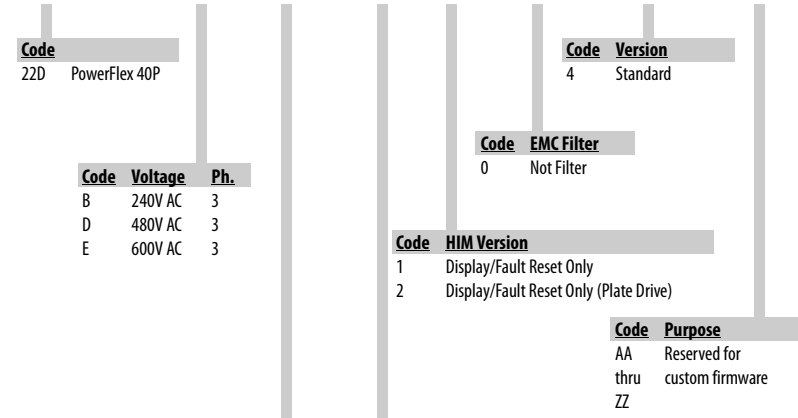
1	Catalog number (Cat. No.)
2	Series letter (SERIES)
3	Enclosure rating (IPxx)
4	Date code (MFD)
5	Serial number (S/N)
6	Firmware version (FRN)

PowerFlex 40P Drive

Figure 2 describes the catalog numbering scheme for the PowerFlex 40P drive.

**Figure 3 - Catalog Number Code Explanation**

1-3	4	5	6-8	9	10	11	12	13-14
<b>22D</b>	<b>-</b>	<b>B</b>	<b>2P3</b>	<b>N</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>AA</b>
Drive	Dash	Voltage Rating	Rating	Enclosure	HIM	Emission Class	Version	Optional



<b>Code</b>	<b>Enclosure</b>
N	Panel Mount - IP 20 (NEMA Type Open)
F	Flange Mount - IP 20 (NEMA Type Open)
H	Plate Drive - IP 20 (NEMA Type Open)

Output Current @ 200...240V Input			Output Current @ 380...480V Input			Output Current @ 460...600V Input		
Code	Amps	kW (Hp)	Code	Amps	kW (Hp)	Code	Amps	kW (Hp)
2P3	2.3	0.4 (0.5)	1P4	1.4	0.4 (0.5)	1P7	1.7	0.75 (1.0)
5P0	5.0	0.75 (1.0)	2P3	2.3	0.75 (1.0)	3P0	3.0	1.5 (2.0)
8P0	8.0	1.5 (2.0)	4P0	4.0	1.5 (2.0)	4P2	4.2	2.2 (3.0)
012	12	2.2 (3.0)	6P0	6.0	2.2 (3.0)	6P6	6.6	4.0 (5.0)
017	17.5	3.7 (5.0)	010	10.5	4.0 (5.0)	9P9	9.9	5.5 (7.5)
024	24	5.5 (7.5)	012	12	5.5 (7.5)	012	12	7.5 (10)
033	33	7.5 (10)	017	17	7.5 (10)	019	19	11 (15)
			024	24	11 (15)			

Additional accessories, options and adapters are available. See Appendix B of the PowerFlex 40P AC Drive User Manual, publication [22D-UM001](#), for details.

The drive data nameplate is located on the side of the drive. Additional accessories, options, and adapters are available. See the PowerFlex 40P AC Drive User Manual, publication [22D-UM001](#), for details.

**Figure 4 - PowerFlex 40P Drive Data Nameplate Information**



1	Catalog number (Cat. No.)
2	Series letter (SERIES)
3	Enclosure rating (IPxx)
4	Date code (MFD)
5	Serial number (S/N)
6	Firmware version (FRN)



PowerFlex 525 Drive

Figure 3 on page 23 describes the catalog numbering scheme for the PowerFlex 525 drive.

Figure 5 - Catalog Number Code Explanation

1-3	4	5	6-8	9	10	11	12	13	14
<b>25B</b>	–	<b>B</b>	<b>2P3</b>	<b>N</b>	<b>1</b>	<b>1</b>	<b>4</b>	–	–
Drive	Dash	Voltage Rating	Rating	Enclosure	Reserved	Emission Class	Reserved	Dash	Dash

Code	Type
25A	PowerFlex 523
25B	PowerFlex 525

Code	Voltage	Phase
V	120V AC	1
A	240V AC	1
B	240V AC	3
D	480V AC	3
E	600V AC	3

Code	EMC Filter
0	No Filter
1	Filter

Code	Braking
4	Standard

Code	Interface Module
1	Standard

Code	Enclosure
N	IP20 NEMA / Open

Output Current @ 1 Phase, 100...120V Input						
Code	Amps	Frame	ND		HD	
			Hp	kW	Hp	kW
2P5	2.5	A	0.5	0.4	0.5	0.4
4P8	4.8	B	1.0	0.75	1.0	0.75
6P0	6.0	B	1.5	1.1	1.5	1.1

Output Current @ 3 Phase, 380...480V Input						
Code	Amps	Frame	ND		HD	
			Hp	kW	Hp	kW
1P4	1.4	A	0.5	0.4	0.5	0.4
2P3	2.3	A	1.0	0.75	1.0	0.75
4P0	4.0	A	2.0	1.5	2.0	1.5
6P0	6.0	A	3.0	2.2	3.0	2.2
010	10.5	B	5.0	4.0	5.0	4.0
013	13.0	C	7.5	5.5	7.5	5.5
017	17.0	C	10.0	7.5	10.0	7.5
024	24.0	D	15.0	11.0	15.0	11.0
030 <sup>(1)</sup>	30.0	D	20.0	15.0	15.0	11.0
037 <sup>(1)</sup>	37.0	E	25.0	18.5	20.0	15.0
043 <sup>(1)</sup>	43.0	E	30.0	22.0	25.0	18.5

Output Current @ 1 Phase, 200...240V Input						
Code	Amps	Frame	ND		HD	
			HP	kW	HP	kW
2P5	2.5	A	0.5	0.4	0.5	0.4
4P8	4.8	A	1.0	0.75	1.0	0.75
8P0	8.0	B	2.0	1.5	2.0	1.5
011	11.0	B	3.0	2.2	3.0	2.2

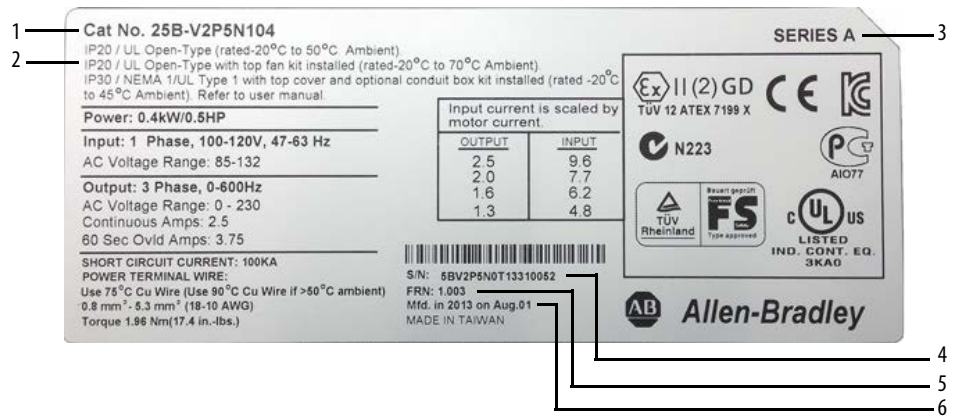
Output Current @ 3Phase, 200...240V Input						
Code	Amps	Frame	ND		HD	
			Hp	kW	Hp	kW
2P5	2.5	A	0.5	0.4	0.5	0.4
5P0	5.0	A	1.0	0.75	1.0	0.75
8P0	8.0	A	2.0	1.5	2.0	1.5
011	11.0	A	3.0	2.2	3.0	2.2
017	17.5	B	5.0	4.0	5.0	4.0
024	24.0	C	7.5	5.5	7.5	5.5
032	32.2	D	10.0	7.5	10.0	7.5
048 <sup>(1)</sup>	48.3	E	15.0	11.0	10.0	7.5
062 <sup>(1)</sup>	62.1	E	20.0	15.0	15.0	11.0

Output Current @ 3 Phase, 525...600V Input						
Code	Amps	Frame	ND		HD	
			Hp	kW	Hp	kW
0P9	0.9	A	0.5	0.4	0.5	0.4
1P7	1.7	A	1.0	0.75	1.0	0.75
3P0	3.0	A	2.0	1.5	2.0	1.5
4P2	4.2	A	3.0	2.2	3.0	2.2
6P6	6.6	B	5.0	4.0	5.0	4.0
9P9	9.9	C	7.5	5.5	7.5	5.5
012	12.0	C	10.0	7.5	10.0	7.5
019	19.0	D	15.0	11.0	15.0	11.0
022 <sup>(1)</sup>	22.0	D	20.0	15.0	15.0	11.0
027 <sup>(1)</sup>	27.0	E	25.0	18.5	20.0	15.0
032 <sup>(1)</sup>	32.0	E	30.0	22.0	25.0	18.5

(1) Normal and Heavy Duty ratings are available for this drive.

The PowerFlex 525 drive data nameplate is located on the side of the drive.

Figure 6 - PowerFlex 525 Drive Data Nameplate Information



1	Catalog number (Cat No.)
2	Enclosure rating (IPxx)
3	Series letter (SERIES)
4	Serial number (S/N)
5	Firmware version (FRN)
6	Date code (MFD)

### Drive Ratings Comparisons

The following tables compare ratings, codes, output amps and horsepower for migrating your PowerFlex 40 or PowerFlex 40P to a PowerFlex 525 drive. See the table that corresponds to your existing PowerFlex 40 or 40P drive. All the drives listed are rated for Heavy Duty.

**Note:** Some ratings are available with an EMC filter. Catalog suffix changes from N104 to N114. Check the appropriate user manual for availability. PowerFlex 525 drives are not available for flange mounting (F104) or in a NEMA 4X/IP66 (C104) enclosures at the time of print.

PowerFlex 40/40P input line voltage tolerance is -/+10%  
 PowerFlex 525 input line voltage tolerance is -15%/+10%

Table 1 - 120V AC - Single Phase Drive Ratings

PowerFlex 40 Drives					PowerFlex 525 Drives				
Rating Code	Output Amps	Hp	kW	Frame	Rating Code	Output Amps	Hp	kW	Frame
22B-V2P3	2.3	0.5	0.4	B	25B-V2P5	2.5	0.5	0.4	A
22B-V5P0	5.0	1	0.75	B	25B-V4P8 <sup>(1)</sup>	4.8	1	0.75	B
22B-V6P0	6.0	1.5	1.1	B	25B-V6P0	6.0	1.5	1.1	B

(1) The continuous rated output current for these drives do not match. Consider the application requirements before choosing a replacement PowerFlex 525 drive.

**Table 2 - 240V AC - Single Phase Drive Ratings**

PowerFlex 40 Drives					PowerFlex 525 Drives				
Rating Code	Output Amps	Hp	kW	Frame	Rating Code	Output Amps	Hp	kW	Frame
22B-A2P3	2.3	0.5	0.4	B	25B-A2P5	2.5	0.5	0.4	A
22B-A5P0 <sup>(1)</sup>	5.0	1	0.75	B	25B-A4P8 <sup>(1)</sup>	4.8	1	0.75	A
22B-A8P0	8.0	2	1.5	B	25B-A8P0	8.0	2	1.5	B
22B-A012 <sup>(2)</sup>	12.0	3	2.2	C	25B-A011 <sup>(2)</sup>	11.0	3	2.2	B

- (1) The continuous rated output current for these drives do not match. Consider the application requirements before choosing a replacement PowerFlex 525 drive.
- (2) The continuous rated output current for these drives do not match. Consider the application requirements before choosing a replacement PowerFlex 525 drive.

**Table 3 - 240V AC - Three Phase Drive Ratings**

PowerFlex 40 and 40P Drives					PowerFlex 525 Drives				
Rating Code	Output Amps	Hp	kW	Frame	Rating Code	Output Amps	Hp	kW	Frame
22(B/D)-B2P3	2.3	0.5	0.4	B	25B-B2P5	2.5	0.5	0.4	A
22(B/D)-B5P0	5.0	1	0.75	B	25B-B5P0	5.0	1	0.75	A
22(B/D)-B8P0	8.0	2	1.5	B	25B-B8P0	8.0	2	1.5	A
22(B/D)-B012 <sup>(1)</sup>	12.0	3	2.2	B	25B-B011 <sup>(1)</sup>	11.0	3	2.2	A
22(B/D)-B017	17.5	5	3.7	B	25B-B017	17.5	5	3.7	B
22(B/D)-B024	24.0	7.5	5.5	C	25B-B024	24.0	7.5	5.5	C
22(B/D)-B033 <sup>(2)</sup>	33.0	10	7.5	C	25B-B032 <sup>(2)</sup>	32.2	10	7.5	D
					25B-B048	48.3	15	11	E

- (1) The continuous rated output current for these drives do not match. Consider the application requirements before choosing a replacement PowerFlex 525 drive.
- (2) The continuous rated output current for these drives do not match. Consider the application requirements before choosing a replacement PowerFlex 525 drive.

**Table 4 - 480V AC - Three Phase Drive Ratings**

PowerFlex 40 and 40P Drives					PowerFlex 525 Drives				
Rating Code	Output Amps	Hp	kW	Frame	Rating Code	Output Amps	Hp	kW	Frame
22(B/D)-D1P4	1.4	0.5	0.4	B	25B-D1P4	1.4	0.5	0.4	A
22(B/D)-D2P3	2.3	1	0.75	B	25B-D2P3	2.3	1	0.75	A
22(B/D)-D4P0	4.0	2	1.5	B	25B-D4P0	4.0	2	1.5	A
22(B/D)-D6P0	6.0	3	2.2	B	25B-D6P0	6.0	3	2.2	A
22(B/D)-D010	10.5	5	4	B	25B-D010	10.5	5	4	B
22(B/D)-D012	12.0	7.5	5.5	C	25B-D013	13.0	7.5	5.5	C
22(B/D)-D017	17.0	10	7.5	C	25B-D017	17.0	10	7.5	C
22(B/D)-D024	24.0	15	11	C	25B-D024	24.0	15	11	D

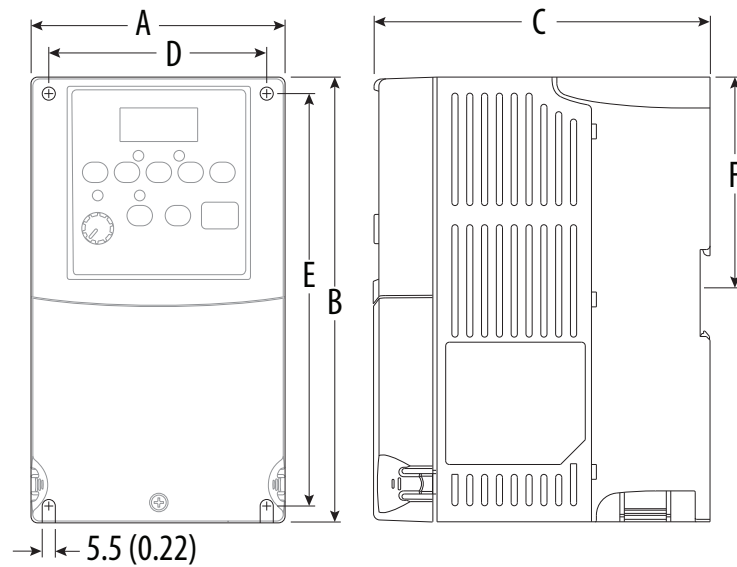
**Table 5 - 600V AC - Three Phase Drive Ratings**

PowerFlex 40 and 40P Drives					PowerFlex 525 Drives				
Rating Code	Output Amps	Hp	kW	Frame	Rating Code	Output Amps	Hp	kW	Frame
22(B/D)-E1P7	1.7	1	0.75	B	25B-E1P7	1.7	1	0.75	A
22(B/D)-E3P0	3.0	2	1.5	B	25B-E3P0	3.0	2	1.5	A
22(B/D)-E4P2	4.2	3	2.2	B	25B-E4P2	4.2	3	2.2	A
22(B/D)-E6P6	6.6	5	4	B	25B-E6P6	6.6	5	4	B
22(B/D)-E9P9	9.9	7.5	5.5	C	25B-E9P9	9.9	7.5	5.5	C
22(B/D)-E012	12.0	10	7.5	C	25B-E012	12.0	10	7.5	C
22(B/D)-E019	19.0	15	11	C	25B-E019	19.0	15	11	D

### Drive Dimension Comparisons

#### PowerFlex 40 Drive

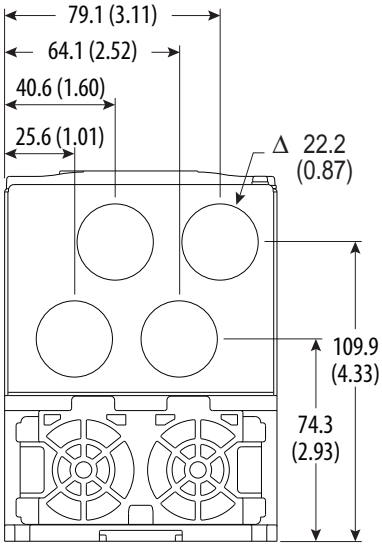
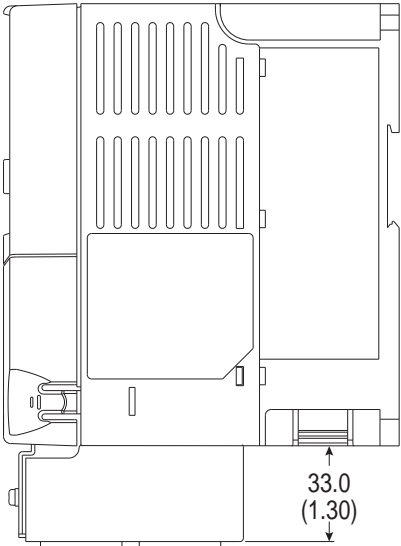
**Figure 7 - IP20, NEMA/UL Type Open**



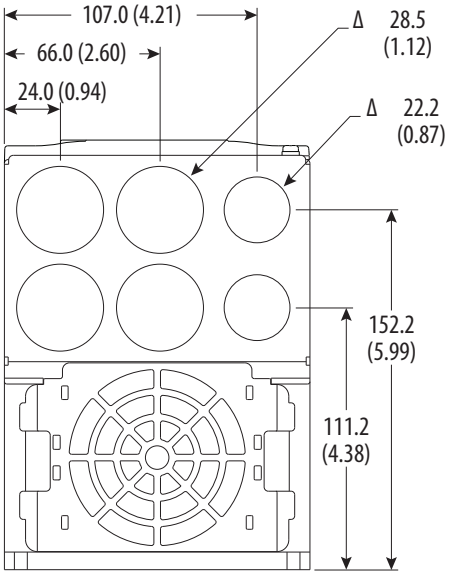
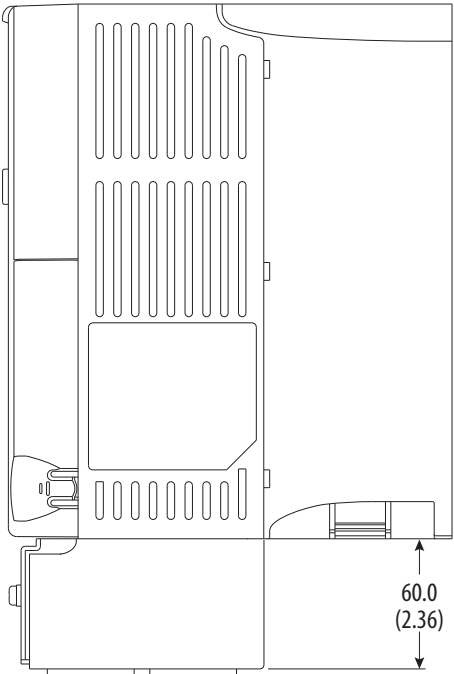
Frame	A mm (in.)	B mm (in.)	C mm (in.)	D mm (in.)	E mm (in.)	F mm (in.)	Ship Weight kg (lb)
B	100 (3.94)	180 (7.09)	136 (5.35)	87 (3.43)	168 (6.61)	87.4 (3.44)	2.2 (4.9)
C	130 (5.1)	260 (10.2)	180 (7.1)	116 (4.57)	246 (9.7)	—	4.3 (9.5)

**Figure 8 - IP30, NEMA/UL Type 1 Option Kit without Communication Option**

All dimensions are in millimeters (inches)



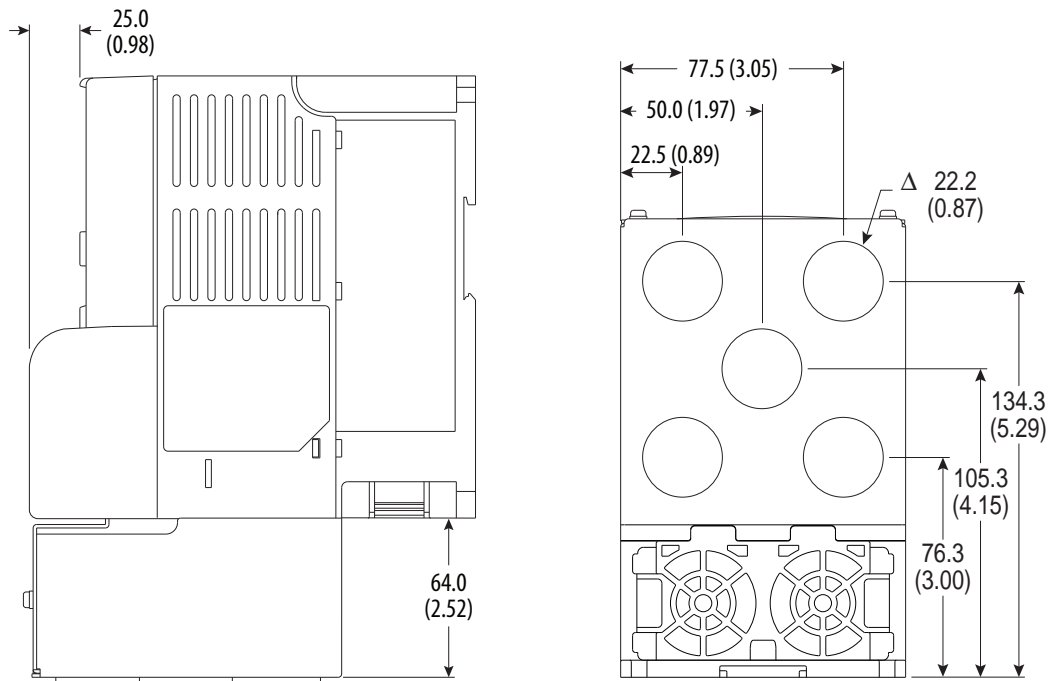
**Frame B - 22-JBAB**



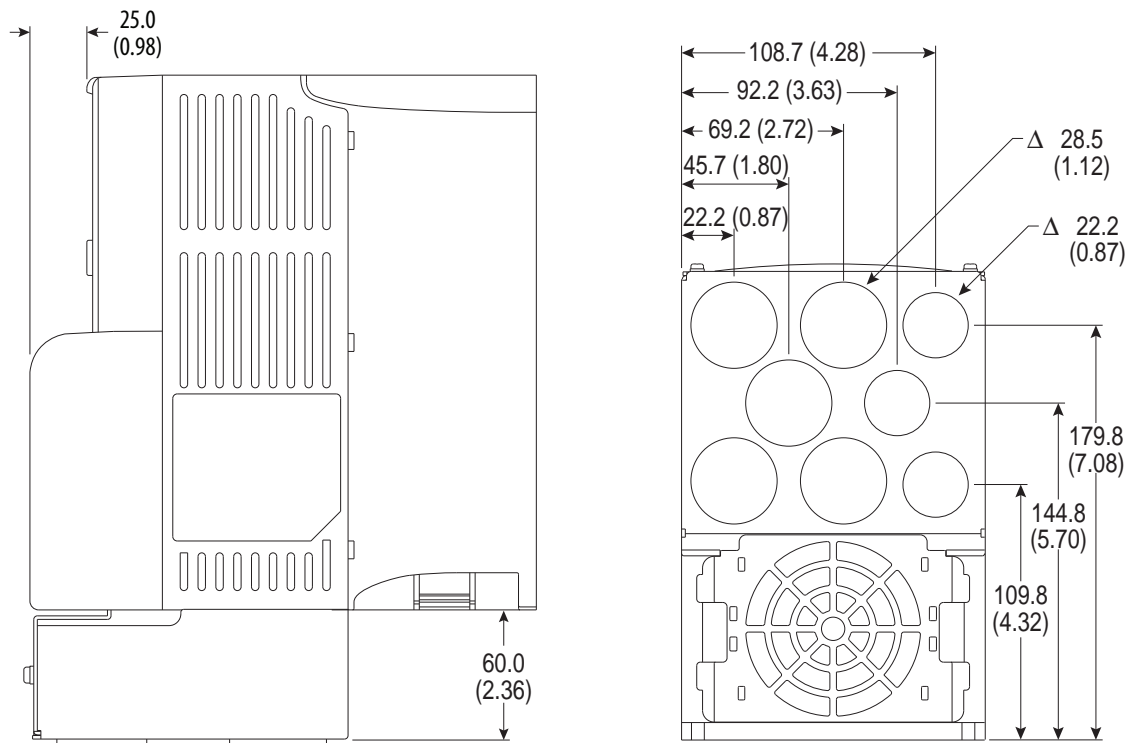
**Frame C - 22-JBAC**

**Figure 9 - IP30, NEMA/UL Type 1 Option Kit with Communication Option**

All dimensions are in millimeters (inches)



**Frame B - 22-JBCB**

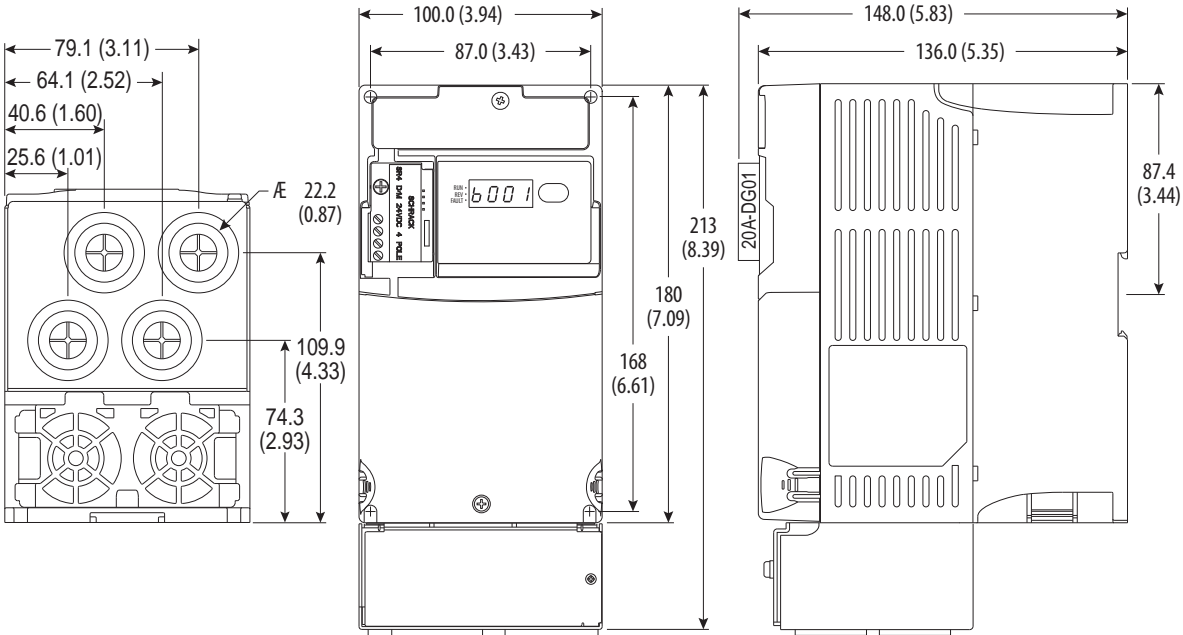


**Frame C - 22-JBCC**

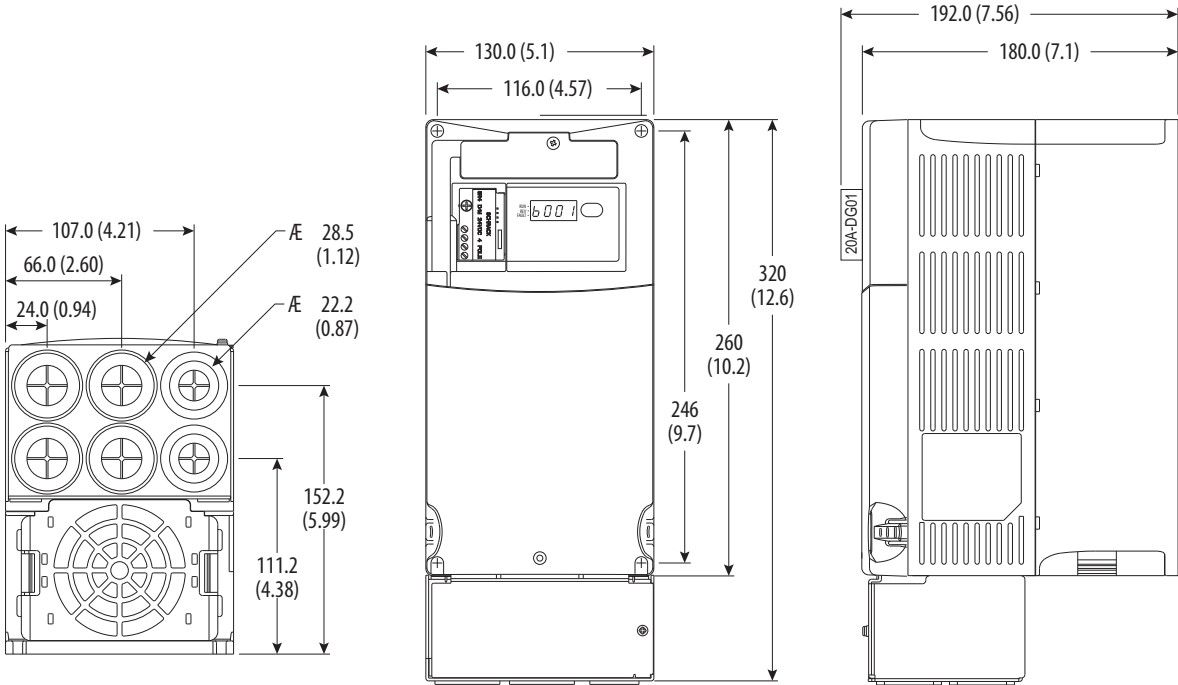
PowerFlex 40P Drive

Figure 10 - IP 30/NEMA 1/UL Type 1 Option Kit without Communication Option

All dimensions are in millimeters (inches)



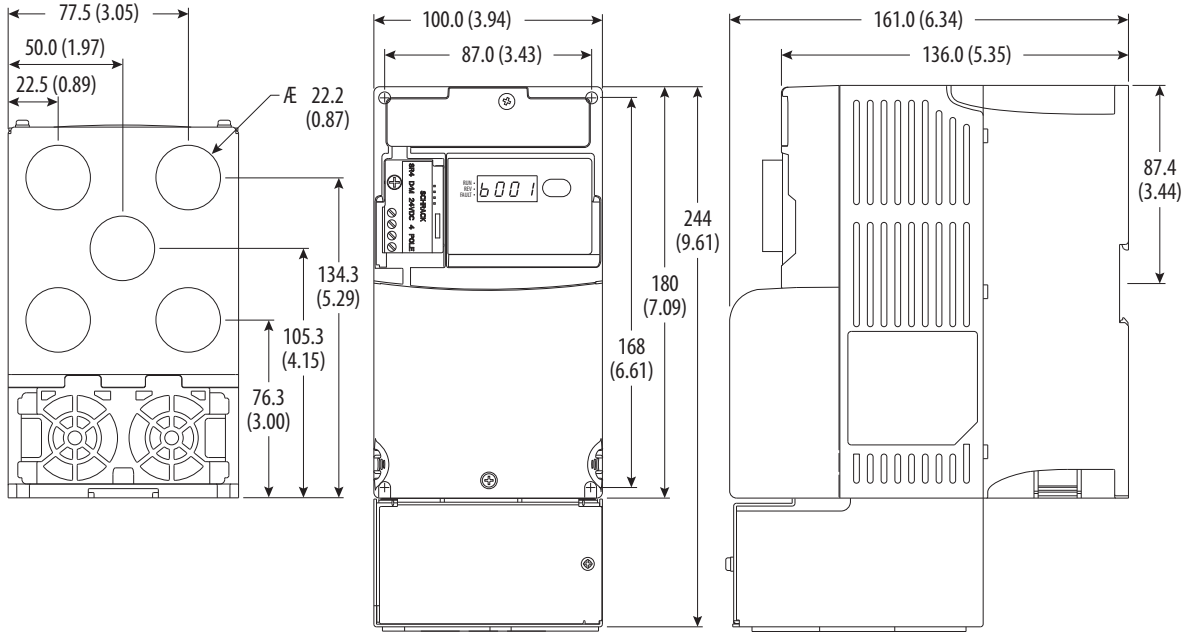
Frame B - 22-JBAB



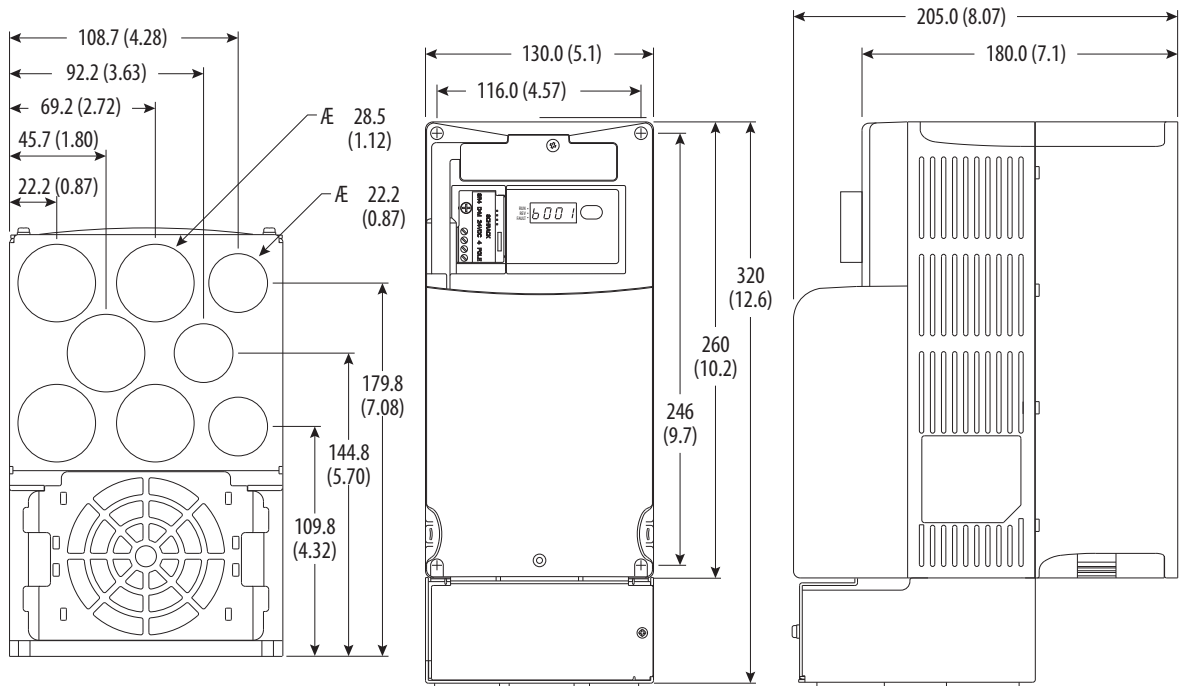
Frame C - 22-JBAC

**Figure 11 - IP 30/NEMA 1/UL Type 1 Option Kit with Communication Option**

All dimensions are in millimeters (inches)



**Frame B - 22-JBCB**



**Frame C - 22-JBCC**



PowerFlex 525

Table 6 - Drive Weights

Frame Size	Weight (kg/lb)
A	1.1 / 2.4
B	1.6 / 3.5
C	2.3 / 5.0
D	3.9 / 8.6
E	12.9 / 28.4

Figure 12 - IP 20/Open Type – Frame A

Dimensions are in millimeters and (inches)

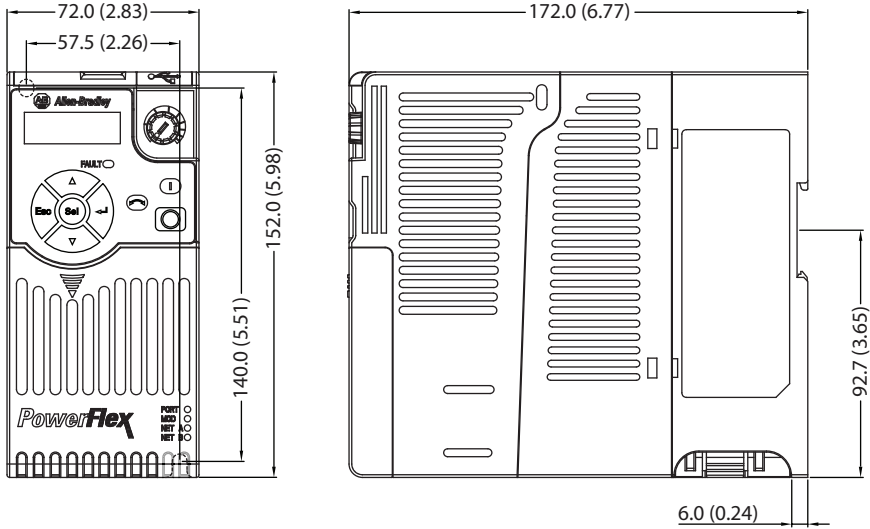
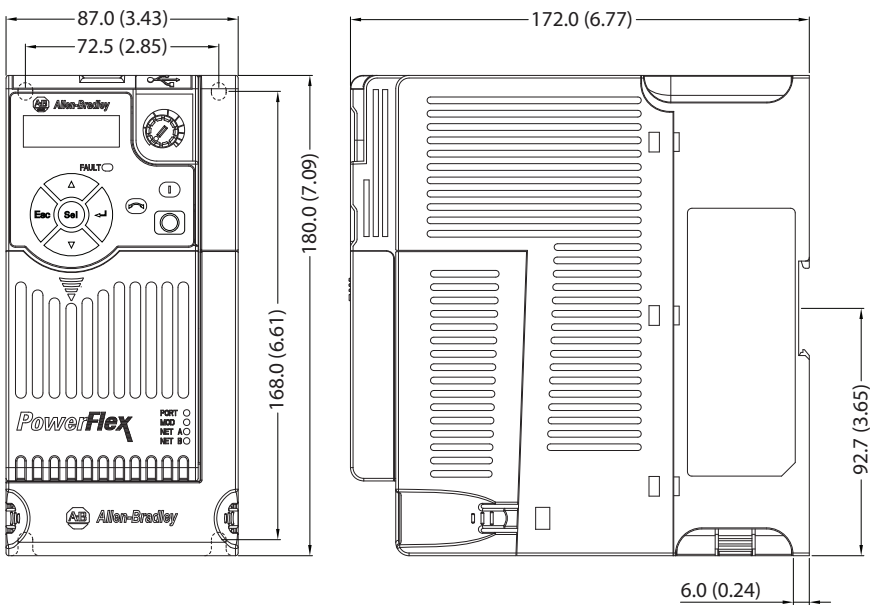


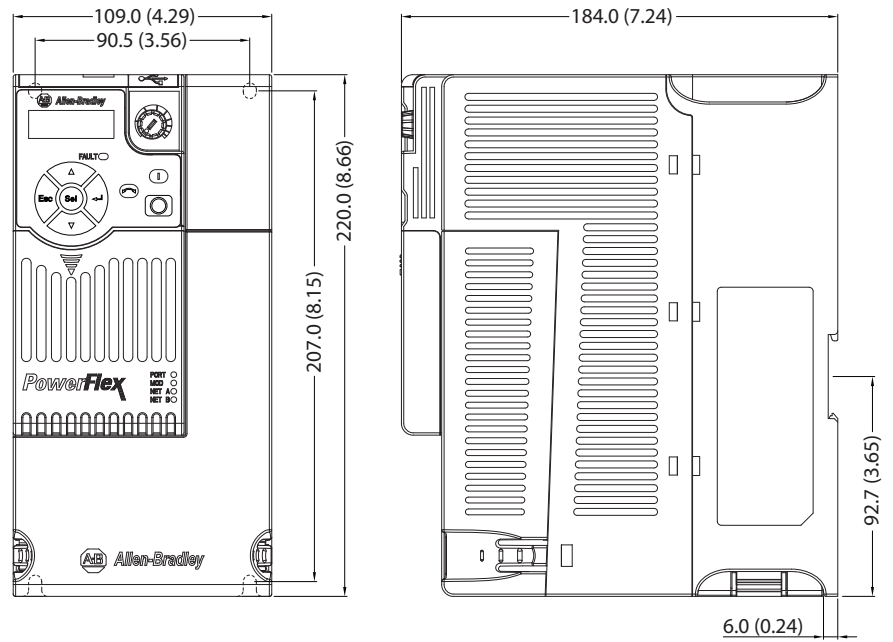
Figure 13 - IP 20/Open Type – Frame B

Dimensions are in millimeters and (inches)



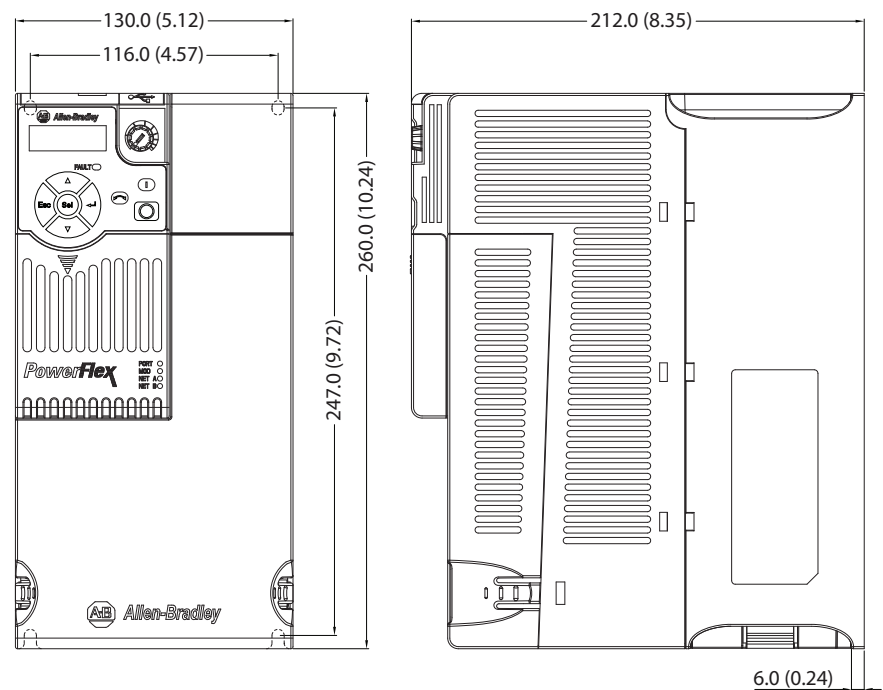
**Figure 14 - IP 20/Open Type – Frame C**

Dimensions are in millimeters and (inches)



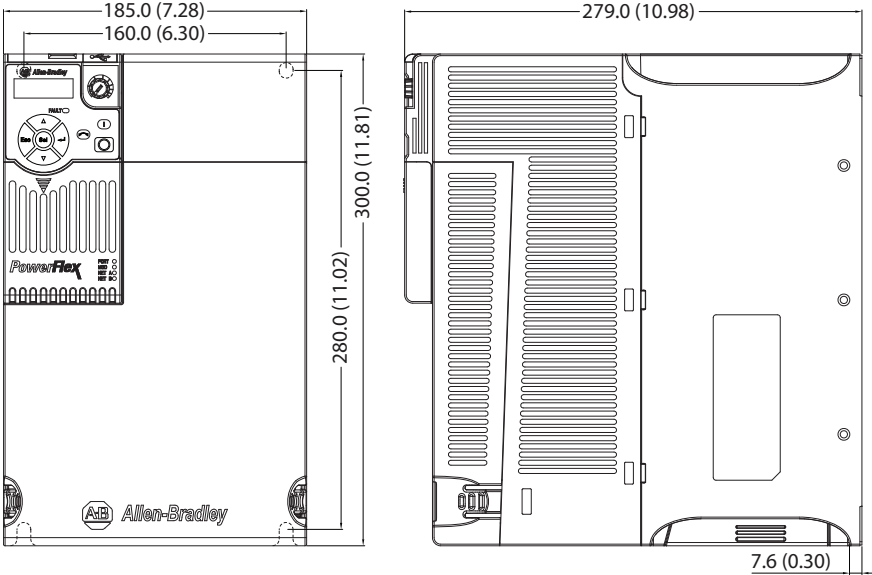
**Figure 15 - IP 20/Open Type – Frame D**

Dimensions are in millimeters and (inches)



**Figure 16 - IP 20/Open Type – Frame E**

Dimensions are in millimeters and (inches)



**Figure 17 - IP 20/Open Type with Control Module Fan Kit – Frame A...C**

Dimensions are in millimeters and (inches)

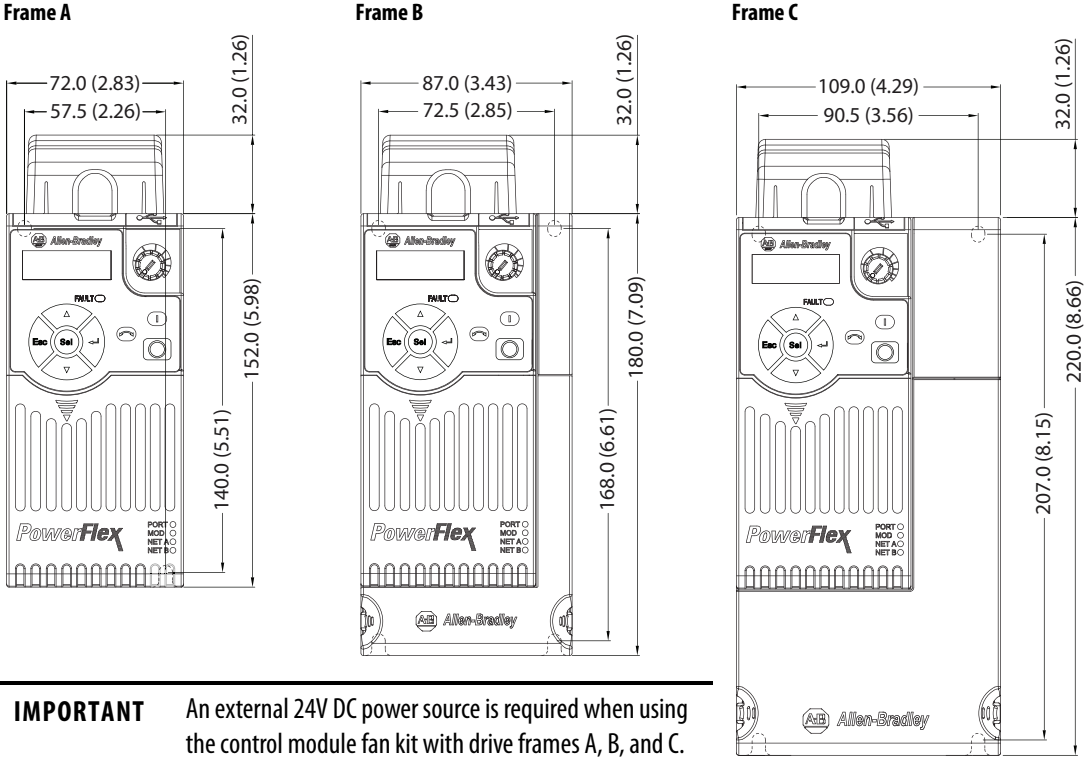
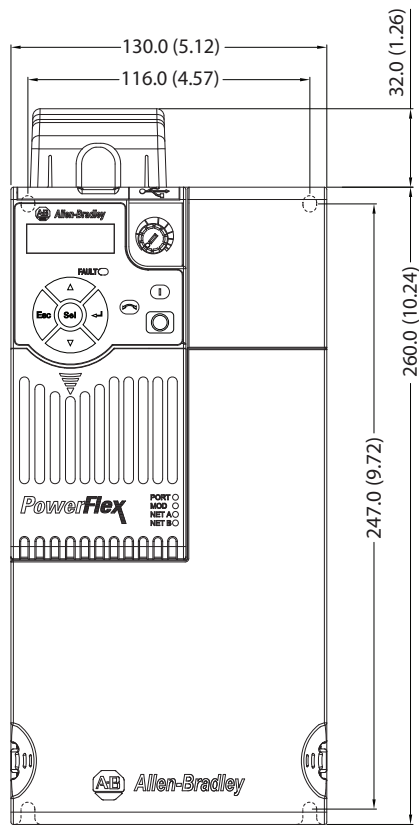


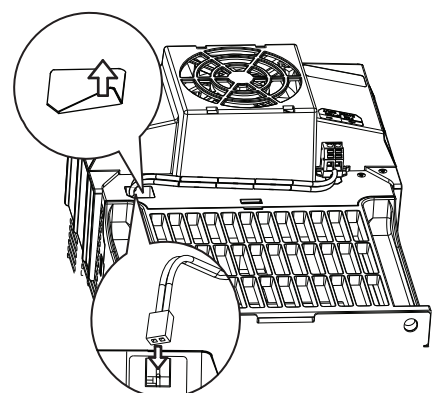
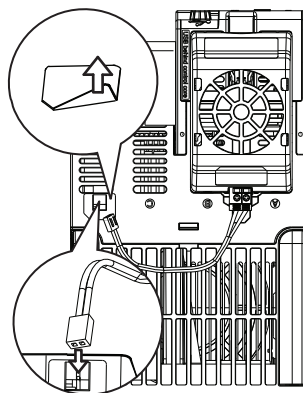
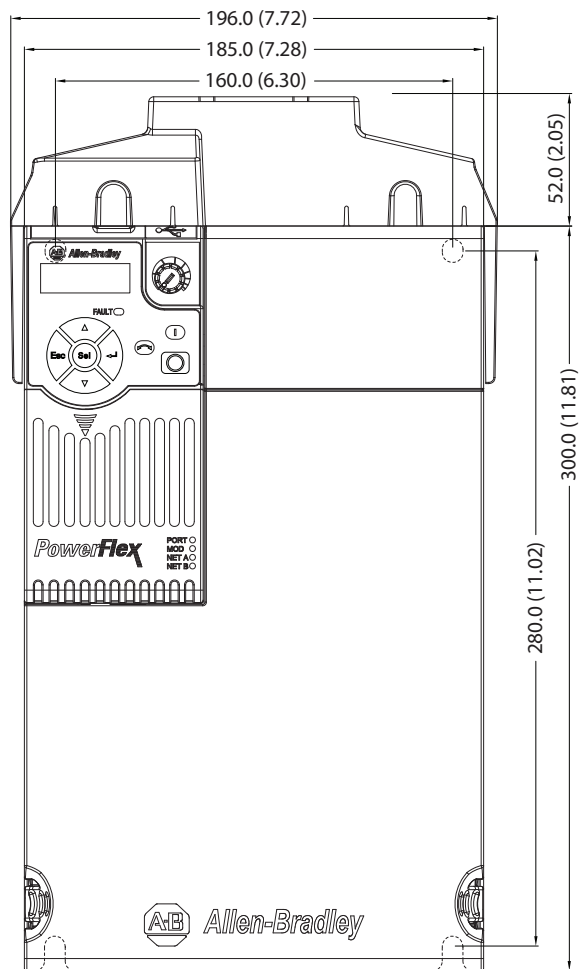
Figure 18 - IP 20/Open Type with Control Module Fan Kit – Frame D...E

Dimensions are in millimeters and (inches)

**Frame D**



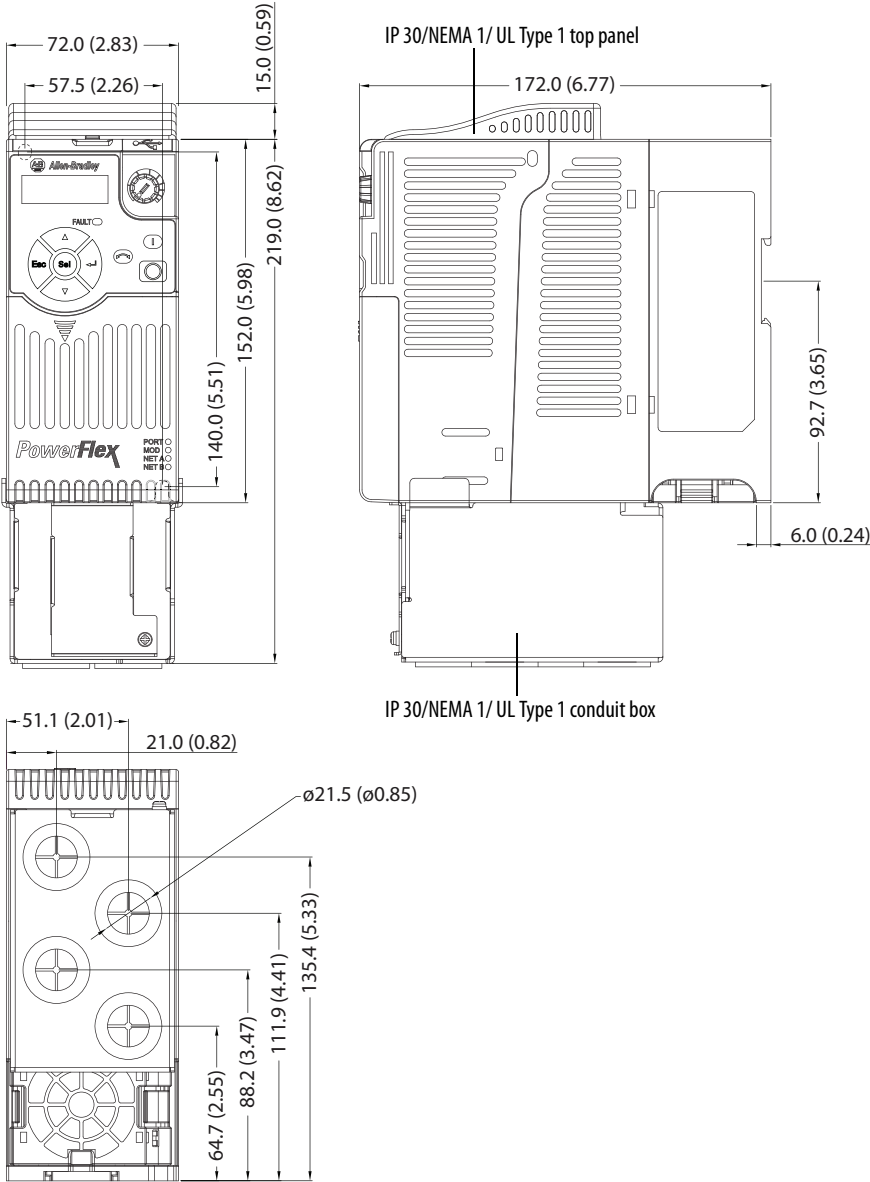
**Frame E**



**IMPORTANT** Remove the label to access the built-in 24V supply on drive frames D and E for use with the control module fan kit.

Figure 19 - IP 30/NEMA 1/UL Type 1 – Frame A

Dimensions are in millimeters and (inches)



**Figure 20 - IP 30/NEMA 1/UL Type 1 – Frame B**

Dimensions are in millimeters and (inches)

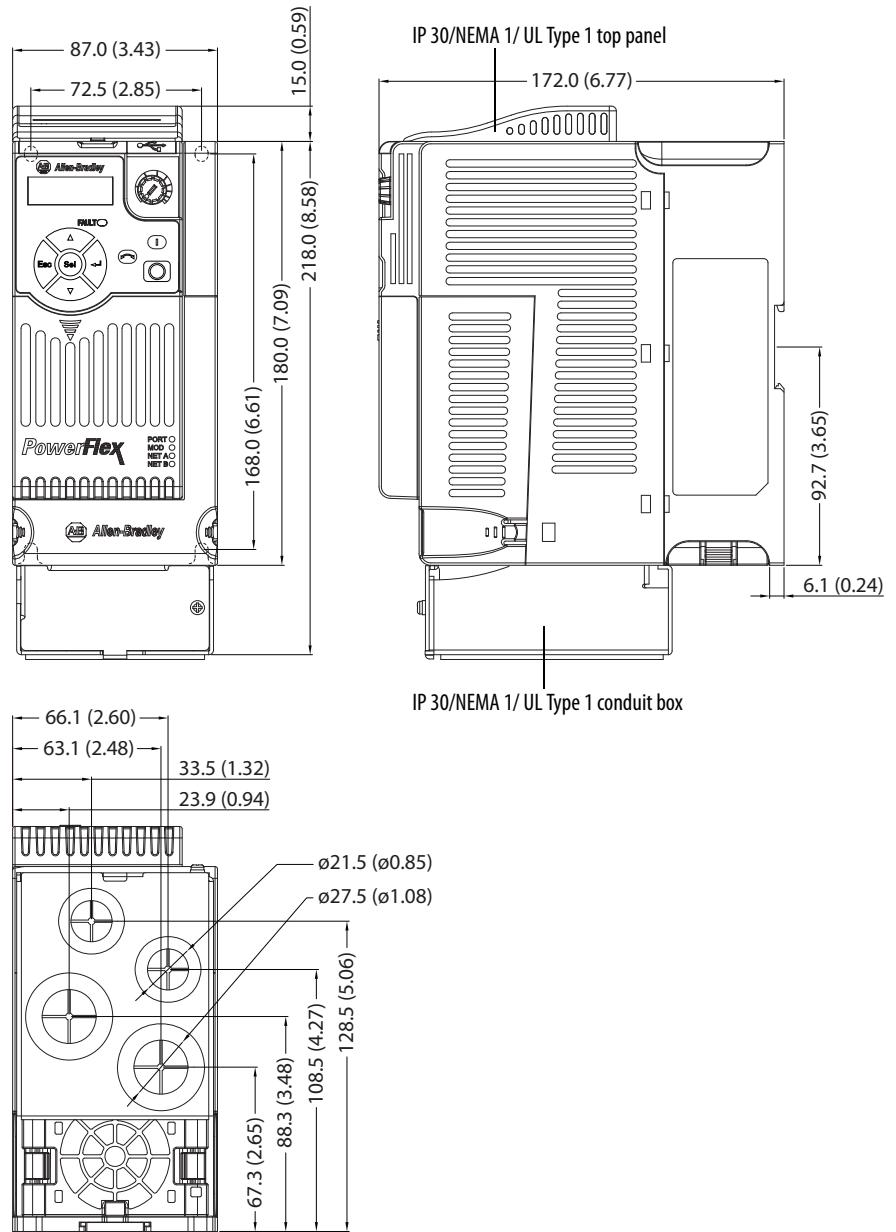
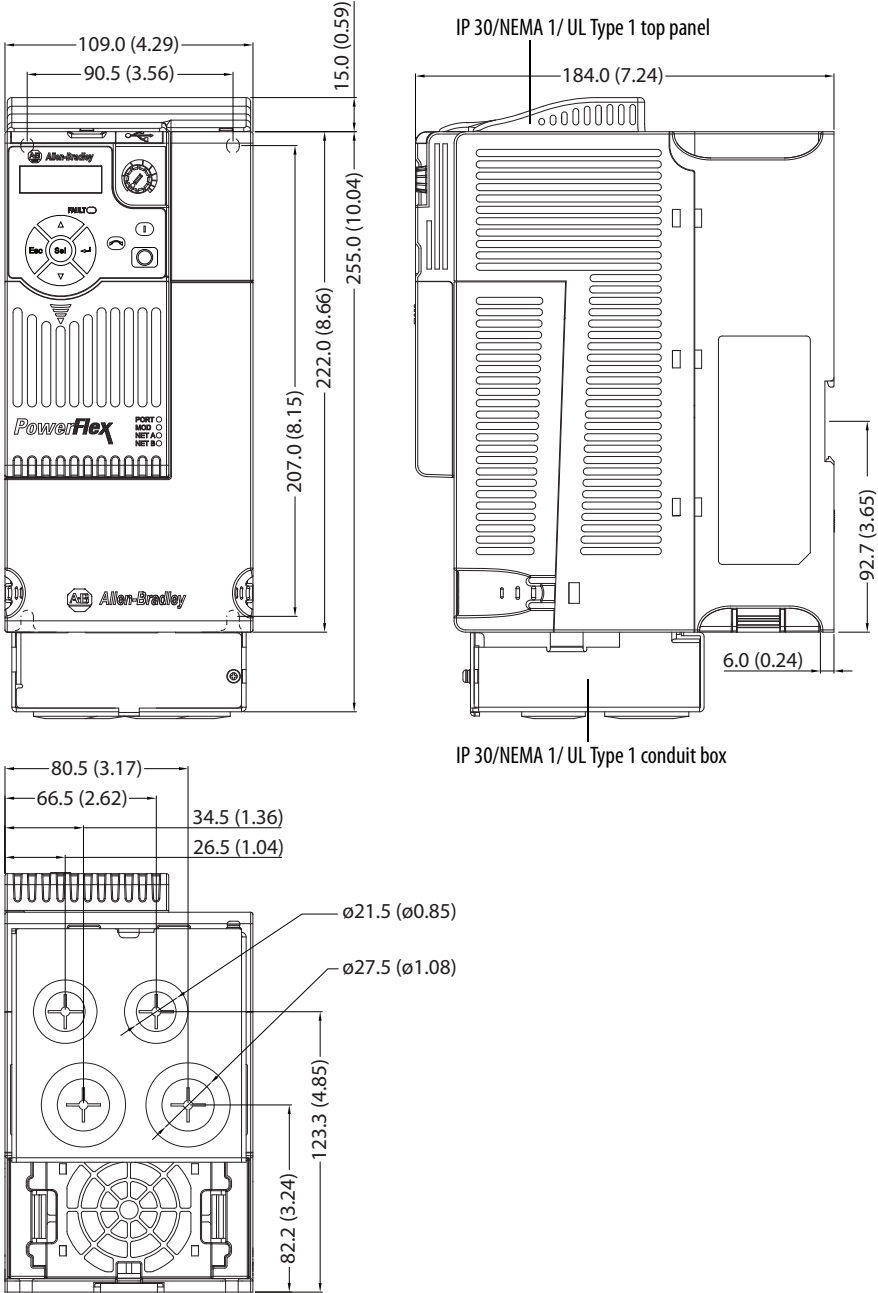


Figure 21 - IP 30/NEMA 1/UL Type 1 – Frame C

Dimensions are in millimeters and (inches)



**Figure 22 - IP 30/NEMA 1/UL Type 1 – Frame D**

Dimensions are in millimeters and (inches)

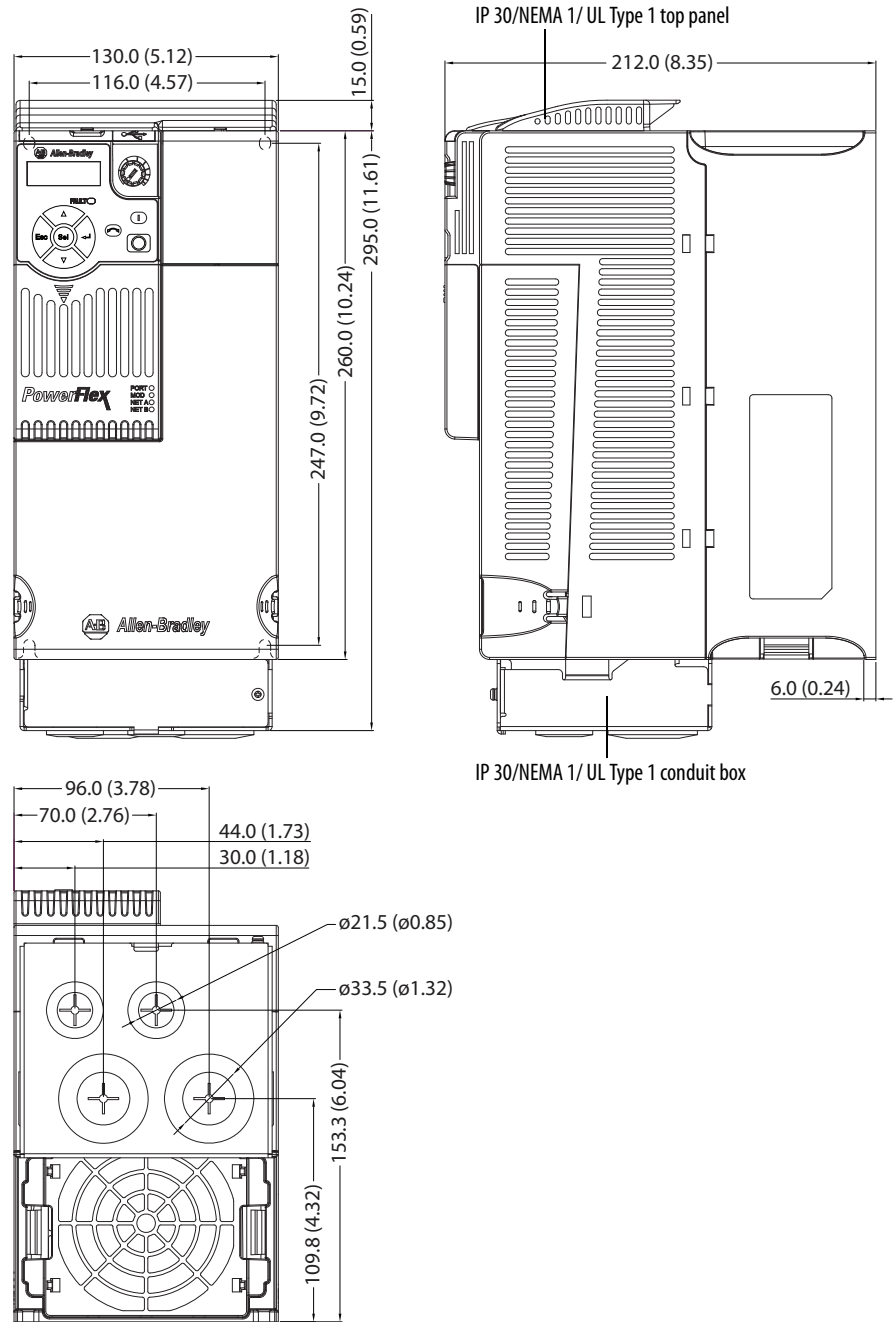
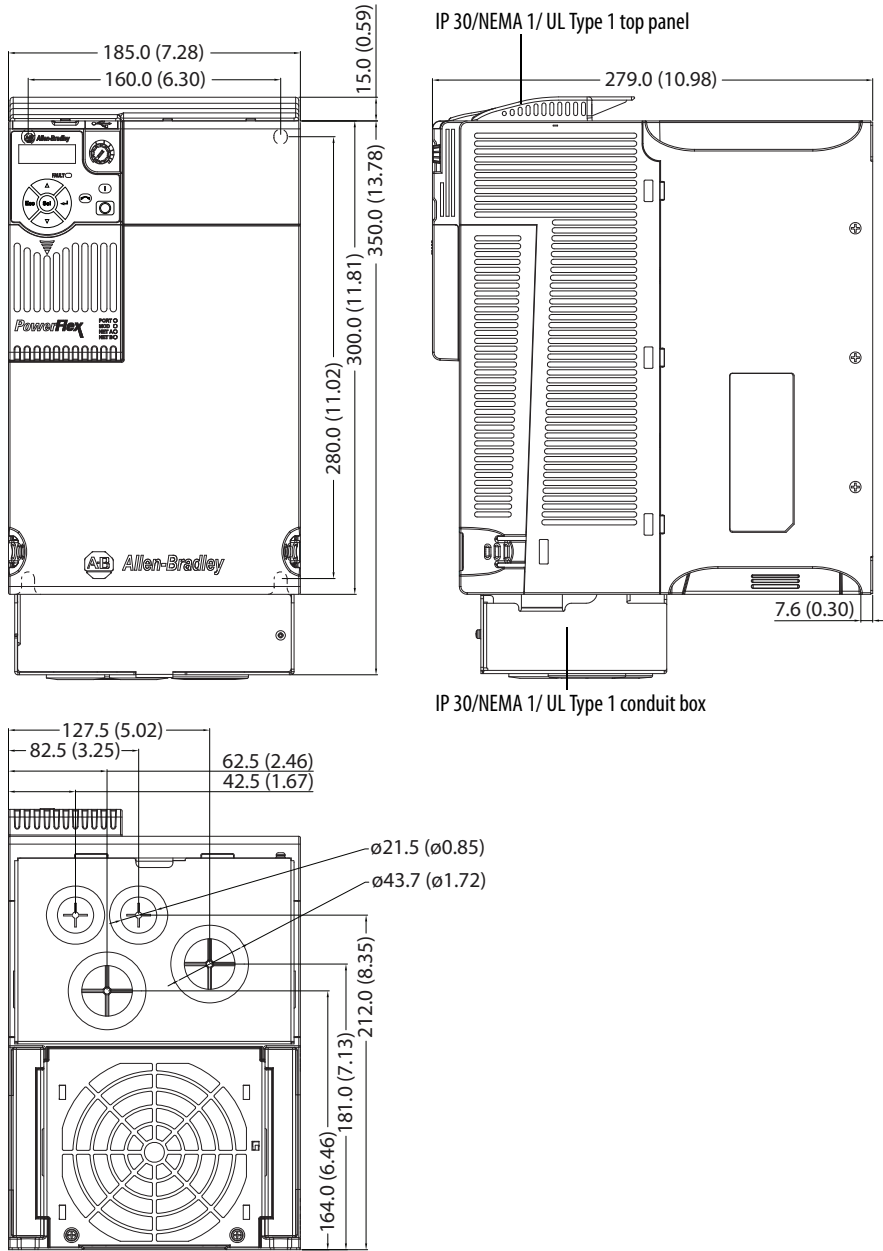




Figure 23 - IP 30/NEMA 1/UL Type 1 – Frame E

Dimensions are in millimeters and (inches)



## Fuse and Circuit Breaker Ratings

### PowerFlex 40 and PowerFlex 40P Drives

The PowerFlex 40 and 40P drives do not provide branch short circuit protection. These drives must be installed with either input fuses or an input circuit breaker.

The tables on the following pages provide recommended AC line input fuse and circuit breaker information. See Fusing and Circuit Breakers below for UL and IEC requirements. Sizes listed are the recommended sizes based on 40 °C (104 °F) and the U.S. N.E.C. Other country, state or local codes can require different ratings.

#### *Fusing*

The recommended fuse types are listed below. If available current ratings do not match those listed in the tables provided, choose the next higher fuse rating.

- IEC – BS88 (British Standard) Parts 1 & 2<sup>(1)</sup>, EN60269-1, Parts 1 & 2, type gG or equivalent should be used.
- UL – UL Class CC, T or J must be used.<sup>(2)</sup>

#### *Circuit Breakers*

The “non-fuse” listings in the following tables include inverse time circuit breakers, instantaneous trip circuit breakers (motor circuit protectors) and 140M self-protected combination motor controllers. If one of these is chosen as the desired protection method, the following requirements apply:

- IEC – Both types of circuit breakers and 140M self-protected combination motor controllers are acceptable for IEC installations.
- UL – Only inverse time circuit breakers and the specified 140M self-protected combination motor controllers are acceptable for UL installations.

(1) Typical designations include, but may not be limited to the following; Parts 1 & 2: AC, AD, BC, BD, CD, DD, ED, EFS, EF, FF, FG, GF, GG, GH.

(2) Typical designations include; Type CC - KTK-R, FNQ-R  
Type J - JKS, LPJ  
Type T - JJS, JJN

PowerFlex 40 Drives Fuses and Circuit Breakers

Catalog Number <sup>(1)</sup>	Output Ratings		Input Ratings			Branch Circuit Protection			
	kW (Hp)	Amps	Voltage Range	kVA	Amps	Fuses	140M Motor Protectors <sup>(3)(4)</sup>	Contactors	Min. Enclosure Volume <sup>(5)</sup> (in. <sup>3</sup> )
<b>100...120V AC (±10%) – 1-Phase Input, 0...230V 3-Phase Output</b>									
22B-V2P3x104	0.4 (0.5)	2.3	90...132	1.15	9.0	15	140M-C2E-C16	100-C12	1655
22B-V5P0x104	0.75 (1.0)	5.0	90...132	2.45	20.3	35	140M-D8E-C20	100-C23	1655
22B-V6P0x104	1.1 (1.5)	6.0	90...132	3.0	24.0	40	140M-F8E-C32	100-C37	1655
<b>200...240V AC (±10%) – 1-Phase<sup>(2)</sup> Input, 0...230V 3-Phase Output</b>									
22B-A2P3x104	0.4 (0.5)	2.3	180...264	1.15	6.0	10	140M-C2E-B63	100-C09	1655
22B-A5P0x104	0.75 (1.0)	5.0	180...264	2.45	12.0	20	140M-C2E-C16	100-C12	1655
22B-A8P0x104	1.5 (2.0)	8.0	180...264	4.0	18.0	30	140M-D8E-C20	100-C23	1655
22B-A012x104	2.2 (3.0)	12.0	180...264	5.5	25.0	40	140M-F8E-C32	100-C37	2069
<b>200...240V AC (±10%) – 3-Phase Input, 0...230V 3-Phase Output</b>									
22B-B2P3x104	0.4 (0.5)	2.3	180...264	1.15	2.5	6	140M-C2E-B40	100-C07	1655
22B-B5P0x104	0.75 (1.0)	5.0	180...264	2.45	5.7	10	140M-C2E-C10	100-C09	1655
22B-B8P0x104	1.5 (2.0)	8.0	180...264	4.0	9.5	15	140M-C2E-C16	100-C12	1655
22B-B012x104	2.2 (3.0)	12.0	180...264	5.5	15.5	25	140M-C2E-C16	100-C23	1655
22B-B017x104	3.7 (5.0)	17.5	180...264	8.6	21.0	30	140M-F8E-C25	100-C23	1655
22B-B024x104	5.5 (7.5)	24.0	180...264	11.8	26.1	40	140M-F8E-C32	100-C37	2069
22B-B033x104	7.5 (10.0)	33.0	180...264	16.3	34.6	60	140M-G8E-C45	100-C60	2069
<b>380...480V AC (±10%) – 3-Phase Input, 0...460V 3-Phase Output</b>									
22B-D1P4x104	0.4 (0.5)	1.4	342...528	1.4	1.8	3	140M-C2E-B25	100-C07	1655
22B-D2P3x104	0.75 (1.0)	2.3	342...528	2.3	3.2	6	140M-C2E-B40	100-C07	1655
22B-D4P0x104	1.5 (2.0)	4.0	342...528	4.0	5.7	10	140M-C2E-B63	100-C09	1655
22B-D6P0x104	2.2 (3.0)	6.0	342...528	5.9	7.5	15	140M-C2E-C10	100-C09	1655
22B-D010x104	4.0 (5.0)	10.5	342...528	10.3	13.0	20	140M-C2E-C16	100-C23	1655
22B-D012x104	5.5 (7.5)	12.0	342...528	11.8	14.2	25	140M-D8E-C20	100-C23	2069
22B-D017x104	7.5 (10.0)	17.0	342...528	16.8	18.4	30	140M-D8E-C20	100-C23	2069
22B-D024x104	11.0 (15.0)	24.0	342...528	23.4	26.0	50	140M-F8E-C32	100-C43	2069
<b>460...600V AC (±10%) – 3-Phase Input, 0...575V 3-Phase Output</b>									
22B-E1P7x104	0.75 (1.0)	1.7	414...660	2.1	2.3	6	140M-C2E-B25	100-C09	1655
22B-E3P0x104	1.5 (2.0)	3.0	414...660	3.65	3.8	6	140M-C2E-B40	100-C09	1655
22B-E4P2x104	2.2 (3.0)	4.2	414...660	5.2	5.3	10	140M-D8E-B63	100-C09	1655
22B-E6P6x104	4.0 (5.0)	6.6	414...660	8.1	8.3	15	140M-D8E-C10	100-C09	1655
22B-E9P9x104	5.5 (7.5)	9.9	414...660	12.1	11.2	20	140M-D8E-C16	100-C16	2069
22B-E012x104	7.5 (10.0)	12.2	414...660	14.9	13.7	25	140M-D8E-C16	100-C23	2069
22B-E019x104	11.0 (15.0)	19.0	414...660	23.1	24.1	40	140M-F8E-C25	100-C30	2069

- (1) In the Catalog Numbers listed “x” represents enclosure type. Specifications are valid for all enclosure types. IP66, NEMA/UL Type 4X drive ratings are only available as Frame B drives. Refer to Table B.B in the PowerFlex 40 AC Drive User Manual, publication 20B-UM001, for more information.
- (2) 200...240V AC: 1-Phase drives are also available with an integral EMC filter. Catalog suffix changes from N104 to N114. Filter option is not available for IP66, NEMA/UL Type 4X rated drives.
- (3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).
- (4) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 208 Wye or Delta, 240 Wye or Delta, 480Y/277 or 600Y/347. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.
- (5) When using a Manual Self-Protected (Type E) Combination Motor Controller, the drive must be installed in a ventilated or non-ventilated enclosure with the minimum volume specified in this column. Application specific thermal considerations may require a larger enclosure.

PowerFlex 40P Drive Fuses and Circuit Breakers

Catalog Number <sup>(1)</sup>	Output Ratings		Input Ratings			Branch Circuit Protection			
	kW (Hp)	Amps	Voltage Range	kVA	Amps	Fuses	140M Motor Protectors <sup>(2)(3)</sup>	Contactors	Min. Enclosure Volume <sup>(4)</sup> (in. <sup>3</sup> )
<b>200...240V AC (±10%) – 3-Phase Input, 0...230V 3-Phase Output</b>									
22D-B2P3	0.4 (0.5)	2.3	180...264	1.15	2.5	6	140M-C2E-B40	100-C07	1655
22D-B5P0	0.75 (1.0)	5.0	180...264	2.45	5.7	10	140M-C2E-C10	100-C09	1655
22D-B8P0	1.5 (2.0)	8.0	180...264	4.0	9.5	15	140M-C2E-C16	100-C12	1655
22D-B012	2.2 (3.0)	12.0	180...264	5.5	15.5	25	140M-C2E-C16	100-C23	1655
22D-B017	3.7 (5.0)	17.5	180...264	8.6	21.0	30	140M-F8E-C25	100-C23	1655
22D-B024	5.5 (7.5)	24.0	180...264	11.8	26.1	40	140M-F8E-C32	100-C37	2069
22D-B033	7.5 (10.0)	33.0	180...264	16.3	34.6	60	140M-G8E-C45	100-C60	2069
<b>380...480V AC (±10%) – 3-Phase Input, 0...460V 3-Phase Output</b>									
22D-D1P4	0.4 (0.5)	1.4	342...528	1.4	1.8	3	140M-C2E-B25	100-C07	1655
22D-D2P3	0.75 (1.0)	2.3	342...528	2.3	3.2	6	140M-C2E-B40	100-C07	1655
22D-D4P0	1.5 (2.0)	4.0	342...528	4.0	5.7	10	140M-C2E-B63	100-C09	1655
22D-D6P0	2.2 (3.0)	6.0	342...528	5.9	7.5	15	140M-C2E-C10	100-C09	1655
22D-D010	4.0 (5.0)	10.5	342...528	10.3	13.0	20	140M-C2E-C16	100-C23	1655
22D-D012	5.5 (7.5)	12.0	342...528	11.8	14.2	25	140M-D8E-C20	100-C23	2069
22D-D017	7.5 (10.0)	17.0	342...528	16.8	18.4	30	140M-D8E-C20	100-C23	2069
22D-D024	11.0 (15.0)	24.0	342...528	23.4	26.0	50	140M-F8E-C32	100-C43	2069
<b>460...600V AC (±10%) – 3-Phase Input, 0...575V 3-Phase Output</b>									
22D-E1P7	0.75 (1.0)	1.7	414...660	2.1	2.3	6	140M-C2E-B25	100-C09	1655
22D-E3P0	1.5 (2.0)	3.0	414...660	3.65	3.8	6	140M-C2E-B40	100-C09	1655
22D-E4P2	2.2 (3.0)	4.2	414...660	5.2	5.3	10	140M-D8E-B63	100-C09	1655
22D-E6P6	4.0 (5.0)	6.6	414...660	8.1	8.3	15	140M-D8E-C10	100-C09	1655
22D-E9P9	5.5 (7.5)	9.9	414...660	12.1	11.2	20	140M-D8E-C16	100-C16	2069
22D-E012	7.5 (10.0)	12.2	414...660	14.9	13.7	25	140M-D8E-C16	100-C23	2069
22D-E019	11.0 (15.0)	19.0	414...660	23.1	24.1	40	140M-F8E-C25	100-C30	2069

(1) Ratings apply to all drive types; Panel Mount (N104), Flange Mount (F104), and Plate Drive (H204).

(2) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).

(3) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 208 Wye or Delta, 240 Wye or Delta, 480Y/277 or 600Y/347. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

(4) When using a Manual Self-Protected (Type E) Combination Motor Controller, the drive must be installed in a ventilated or non-ventilated enclosure with the minimum volume specified in this column. Application specific thermal considerations may require a larger enclosure.

## PowerFlex 525 Drive

The PowerFlex 520-series drive does not provide branch short circuit protection. This product must be installed with either input fuses or an input circuit breaker. National and local industrial safety regulations and/or electrical codes may determine additional requirements for these installations.

The tables found on pages [46...49](#) provide recommended AC line input fuse and circuit breaker information. See Fusing and Circuit Breakers below for UL and IEC requirements. Sizes listed are the recommended sizes based on 40 °C (104 °F) and the U.S. N.E.C. Other country, state or local codes may require different ratings.

## Fusing

The recommended fuse types are listed in the tables found on pages [46...49](#). If available current ratings do not match those listed in the tables provided, choose the next higher fuse rating.

- IEC – BS88 (British Standard) Parts 1 & 2<sup>(1)</sup>, EN60269-1, Parts 1 & 2, type GG or equivalent should be used.
- UL – UL Class CC, T, RK1, or J should be used.

## Circuit Breakers

The “non-fuse” listings in the tables found on pages [46...49](#) include inverse time circuit breakers, instantaneous trip circuit breakers (motor circuit protectors) and 140M self-protected combination motor controllers. If one of these is chosen as the desired protection method, the following requirements apply:

- IEC – Both types of circuit breakers and 140M self-protected combination motor controllers are acceptable for IEC installations.
- UL – Only inverse time circuit breakers and the specified 140M self-protected combination motor controllers are acceptable for UL installations.

### *Bulletin 140M (Self-Protected Combination Controller)/UL489 Circuit Breakers*

When using Bulletin 140M or UL489 rated circuit breakers, the guidelines listed below must be followed in order to meet the NEC requirements for branch circuit protection.

- Bulletin 140M can be used in single motor applications.
- Bulletin 140M can be used up stream from the drive **without** the need for fuses.

(1) Typical designations include, but may not be limited to the following:  
Parts 1 & 2: AC, AD, BC, BD, CD, DD, ED, EFS, EF, FF, FG, GF, GG, GH.

PowerFlex 525 Drives, 100...120V 1-Phase Input Protection Devices – Frames A...B

Catalog No.	Output Ratings				Input Ratings			IEC (Non-UL Applications)				UL Applications					
	Normal Duty		Heavy Duty		Amps	kVA	Max Amps <sup>(1)</sup>	Frame Size	Contactor Catalog No.	Fuses		Circuit Breakers		Fuses (Max. Rating)		Circuit Breakers	
	Hp	kW	Hp	kW						Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M <sup>(2)(3)(4)</sup>	
25B-V2P5N104	0.5	0.4	0.5	0.4	2.5	1.3	9.6	A	100-C12	15	20	140U-D6D2-C12	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D6D2-C12	140M-CZE-C10	
25B-V4P8N104	1.0	0.75	1.0	0.75	4.8	2.5	19.2	B	100-C23	25	40	140U-D6D2-C25	140M-D8E-C20	CLASS RK5, CC, J, or T / DLS-R-40	140U-D6D2-C25	140M-D8E-C20	
25B-V6P0N104	1.5	1.1	1.5	1.1	6.0	3.2	24.0	B	100-C23	30	50	140U-D6D2-C30	140M-F8E-C25	CLASS RK5, CC, J, or T / DLS-R-50	140U-D6D2-C30	140M-F8E-C25	

PowerFlex 525 Drives, 200...240V 1-Phase Input Protection Devices – Frames A...B

Catalog No.	Output Ratings				Input Ratings			IEC (Non-UL Applications)				UL Applications					
	Normal Duty		Heavy Duty		Amps	kVA	Max Amps <sup>(1)</sup>	Frame Size	Contactor Catalog No.	Fuses		Circuit Breakers		Fuses (Max. Rating)		Circuit Breakers	
	Hp	kW	Hp	kW						Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M <sup>(2)(3)(4)</sup>	
25B-A2P5N104	0.5	0.4	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	15	140U-D6D2-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-CZE-C10	
25B-A2P5N114	0.5	0.4	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	15	140U-D6D2-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-CZE-C10	
25B-A4P8N104	1.0	0.75	1.0	0.75	4.8	2.8	10.7	A	100-C12	15	25	140U-D6D2-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-CZE-C16	
25B-A4P8N114	1.0	0.75	1.0	0.75	4.8	2.8	10.7	A	100-C12	15	25	140U-D6D2-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-CZE-C16	
25B-A8P0N104	2.0	1.5	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D6D2-C25	140M-F8E-C25	CLASS RK5, CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25	
25B-A8P0N114	2.0	1.5	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D6D2-C25	140M-F8E-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25	
25B-A011N104	3.0	2.2	3.0	2.2	11.0	6.0	22.9	B	100-C37	30	50	–	–	CLASS CC, J, or T / 50	–	140M-F8E-C25	
25B-A011N114	3.0	2.2	3.0	2.2	11.0	6.0	22.9	B	100-C37	30	50	–	–	CLASS CC, J, or T / 50	–	140M-F8E-C25	

- (1) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive input current rating.
- (2) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).
- (3) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.
- (4) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480V/277 and 600V/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

PowerFlex 525 Drives, 200...240V 3-Phase Input Protection Devices – Frames A...E

Catalog No. <sup>(1)</sup>	Output Ratings				Input Ratings			IEC (Non-UL Applications)			UL Applications					
	Normal Duty		Heavy Duty		Max Amps <sup>(2)</sup>	Frame Size	Contactor Catalog No.	Fuses		Circuit Breakers		Fuses (Max. Rating)		Circuit Breakers		
	Hp	kW	Hp	kW				Amps	kVA	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M <sup>(3)(4)(5)</sup>
25B-B2P5N1T04	0.5	0.4	0.5	0.4	2.5	1.2	2.7	A	100-C07	6	6	140U-D6D3-B40	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-6	140U-D6D3-B40	140M-CZE-B40
25B-B5P0N1T04	1.0	0.75	1.0	0.75	5.0	2.7	5.8	A	100-C09	10	15	140U-D6D3-B80	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D3-B80	140M-CZE-B63
25B-B8P0N1T04	2.0	1.5	2.0	1.5	8.0	4.3	9.5	A	100-C12	15	20	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D6D3-C10	140M-CZE-C10
25B-B011N1T04	3.0	2.2	3.0	2.2	11.0	6.3	13.8	A	100-C23	20	30	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U-D6D3-C15	140M-CZE-C16
25B-B017N1T04	5.0	4.0	5.0	4.0	17.5	9.6	21.1	B	100-C23	30	45	140U-D6D3-C25	140M-F8E-C25	CLASS CC, J, or T / 45	140U-D6D3-C25	140M-F8E-C25
25B-B024N1T04	7.5	5.5	7.5	5.5	24.0	12.2	26.6	C	100-C37	35	60	—	140M-F8E-C32	CLASS CC, J, or T / 60	—	140M-F8E-C32
25B-B032N1T04	10.0	7.5	10.0	7.5	32.2	15.9	34.8	D	100-C43	45	70	—	140M-F8E-C45	CLASS RK5, CC, J, or T / DLS-R-70	—	140M-F8E-C45
25B-B048N1T04	15.0	11.0	10.0	7.5	48.3	20.1	44.0	E	100-C60	60	90	—	140M-F8E-C45	CLASS CC, J, or T / 90	—	—
25B-B062N1T04	20.0	15.0	15.0	11.0	62.1	25.6	56.0	E	100-C72	70	125	—	140M-H8P-C70	CLASS CC, J, or T / 125	—	—

- (1) Normal and Heavy duty ratings are available for this drive.
- (2) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive input current rating.
- (3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).
- (4) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.
- (5) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480V/277 and 600V/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

PowerFlex 525 Drives, 380...480V 3-Phase Input Protection Devices – Frames A...E

Catalog No. (1)	Output Ratings				Input Ratings			IEC (Non-UL Applications)				UL Applications			
	Normal Duty		Heavy Duty		Max Amps (2)	Frame Size	Contactor Catalog No.	Fuses		Circuit Breakers		Fuses (Max. Rating)		Circuit Breakers	
	Hp	kW	Hp	kW				Amps	kVA	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U
258-D1P4N104	0.5	0.4	0.5	0.4	1.4	1.7	A	100-C07	3	6	140U-D6D3-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140U	140M-CZE-B25
258-D1P4N114	0.5	0.4	0.5	0.4	1.4	1.7	A	100-C07	3	6	140U-D6D3-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140U	140M-CZE-B25
258-D2P3N104	1.0	0.75	1.0	0.75	2.3	2.9	A	100-C07	6	10	140U-D6D3-B60	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	140U	140M-CZE-B40
258-D2P3N114	1.0	0.75	1.0	0.75	2.3	2.9	A	100-C07	6	10	140U-D6D3-B60	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	140U	140M-CZE-B40
258-D4P0N104	2.0	1.5	2.0	1.5	4.0	5.2	A	100-C09	10	15	140U-D6D3-B60	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M-CZE-B63
258-D4P0N114	2.0	1.5	2.0	1.5	4.0	5.2	A	100-C09	10	15	140U-D6D3-B60	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M-CZE-B63
258-D6P0N104	3.0	2.2	3.0	2.2	6.0	6.9	A	100-C09	10	15	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M-CZE-C10
258-D6P0N114	3.0	2.2	3.0	2.2	6.0	6.9	A	100-C09	10	15	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M-CZE-C10
258-D0T0N104	5.0	4.0	5.0	4.0	10.5	12.6	B	100-C23	20	30	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U	140M-CZE-C16
258-D0T0N114	5.0	4.0	5.0	4.0	10.5	12.6	B	100-C23	20	30	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U	140M-CZE-C16
258-D0T3N104	7.5	5.5	7.5	5.5	13.0	14.1	C	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	140U	140M-D8E-C20
258-D0T3N114	7.5	5.5	7.5	5.5	13.0	14.1	C	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	140U	140M-D8E-C20
258-D0T7N104	10.0	7.5	10.0	7.5	17.0	16.8	C	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	140U	140M-D8E-C20
258-D0T7N114	10.0	7.5	10.0	7.5	17.0	16.8	C	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	140U	140M-D8E-C20
258-D024N104	15.0	11.0	15.0	11.0	24.0	24.1	D	100-C37	35	60	140M-F8E-C32	140M-F8E-C32	CLASS CC, J, or T / 60	140U	140M-F8E-C32
258-D024N114	15.0	11.0	15.0	11.0	24.0	24.1	D	100-C37	35	60	140M-F8E-C32	140M-F8E-C32	CLASS CC, J, or T / 60	140U	140M-F8E-C32
258-D030N104	20.0	15.0	20.0	15.0	30.0	30.2	D	100-C43	45	70	140M-F8E-C45	140M-F8E-C45	CLASS CC, J, or T / 70	140U	140M-F8E-C45
258-D030N114	20.0	15.0	20.0	15.0	30.0	30.2	D	100-C43	45	70	140M-F8E-C45	140M-F8E-C45	CLASS CC, J, or T / 70	140U	140M-F8E-C45
258-D037N114	25.0	18.5	25.0	18.5	37.0	30.8	E	100-C43	45	70	140M-F8E-C45	140M-F8E-C45	CLASS CC, J, or T / 70	140U	140M-F8E-C45
258-D043N114	30.0	22.0	25.0	18.5	43.0	35.6	E	100-C60	50	80	140M-F8E-C45	140M-F8E-C45	CLASS CC, J, or T / 80	140U	140M-F8E-C45

(1) Normal and Heavy duty ratings are available for this drive.  
 (2) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive input current rating.  
 (3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).  
 (4) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.  
 (5) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480V/277 and 600V/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta/Delta, corner ground, or high-resistance ground systems.



PowerFlex 525 Drives, 525...600V 3-Phase Input Protection Devices – Frames A...E

Catalog No. <sup>(1)</sup>	Output Ratings						Input Ratings			IEC (Non-UL Applications)				UL Applications			
	Normal Duty		Heavy Duty		Amps	kVA	Max Amps <sup>(2)</sup>	Frame Size	Contactor Catalog No.	Fuses		Circuit Breakers		Fuses (Max. Rating)		Circuit Breakers	
	HP	kW	HP	kW						Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M	Class / Catalog No.
25B-E0P9N104	0.5	0.4	0.5	0.4	0.9	1.4	1.2	A	100-C09	3	6	140U-D6D3-B20	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140U	140M <sup>(3)(4)(5)</sup>	
25B-E1P7N104	1.0	0.75	1.0	0.75	1.7	2.6	2.3	A	100-C09	3	6	140U-D6D3-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140U	140M-CZE-B25	
25B-E3P0N104	2.0	1.5	2.0	1.5	3.0	4.3	3.8	A	100-C09	6	10	140U-D6D3-B50	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	140U	140M-CZE-B40	
25B-E4P2N104	3.0	2.2	3.0	2.2	4.2	6.1	5.3	A	100-C09	10	15	140U-D6D3-B80	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M-D8E-B63	
25B-E6P6N104	5.0	4.0	5.0	4.0	6.6	9.1	8.0	B	100-C09	10	20	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U	140M-D8E-C10	
25B-E9P9N104	7.5	5.5	7.5	5.5	9.9	12.8	11.2	C	100-C16	15	25	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U	140M-D8E-C16 <sup>(6)</sup>	
25B-E0T2N104	10.0	7.5	10.0	7.5	12.0	15.4	13.5	C	100-C23	20	30	140U-D6D3-C20	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U	140M-D8E-C16	
25B-E0T9N104	15.0	11.0	15.0	11.0	19.0	27.4	24.0	D	100-C30	30	50	140M-F8E-C25	140M-F8E-C25	CLASS CC, J, or T / 50	140U	140M-D8E-C16	
25B-E0Z2N104	20.0	15.0	20.0	15.0	22.0	31.2	27.3	D	100-C30	35	60	140M-F8E-C32	140M-F8E-C32	CLASS CC, J, or T / 60	140U	140M-D8E-C16	
25B-E0Z7N104	25.0	18.5	25.0	18.5	27.0	28.2	24.7	E	100-C30	35	50	140M-F8E-C32	140M-F8E-C32	CLASS CC, J, or T / 50	140U	140M-D8E-C16	
25B-E032N104	30.0	22.0	25.0	18.5	32.0	33.4	29.2	E	100-C37	40	60	140M-F8E-C32	140M-F8E-C32	CLASS CC, J, or T / 60	140U	140M-D8E-C16	

- (1) Normal and Heavy duty ratings are available for this drive.
- (2) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive input current rating.
- (3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).
- (4) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.
- (5) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480V/277 and 600V/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.
- (6) When used with the 140M circuit breaker, the 25B-E9P9104 must be installed in a ventilated or non-ventilated enclosure with the minimum size of 457.2 x 457.2 x 269.8 mm (18 x 18 x 10.62 in.).

## Power Terminal Comparisons

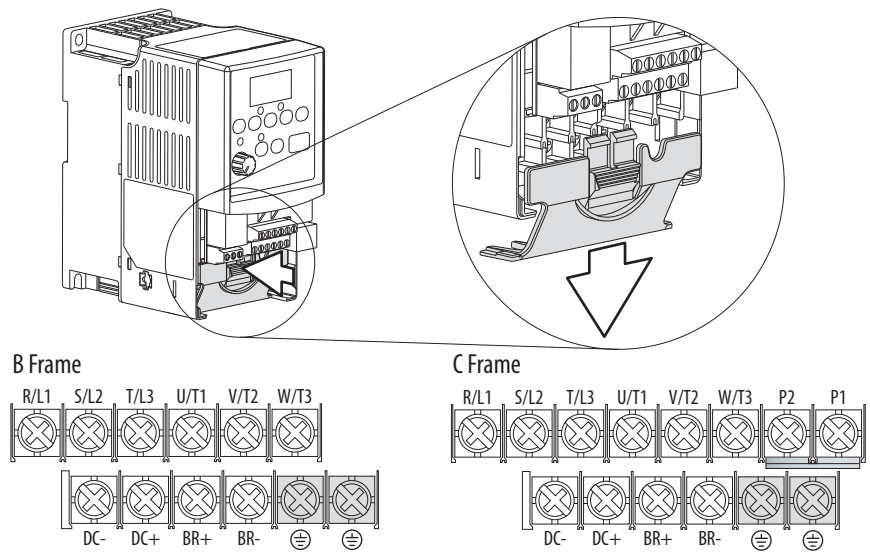
The following section provides a comparison of the power terminals for the PowerFlex 40 and 40P drives and the PowerFlex 525 drive.

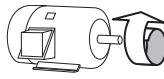

### PowerFlex 40 and 40P Drive Power Terminal Block

The power terminal block is covered by a finger guard. Complete the following steps to remove the finger guard.

1. Press in and hold the locking tab.
2. Slide the finger guard down and out of the drive.
3. Replace the finger guard when wiring is complete.

Figure 24 - PowerFlex 40 and 40P Power Terminal Block (Typical)



Terminal <sup>(1)</sup>	Description
R/L1, S/L2	1-Phase Input
R/L1, S/L2, T/L3	3-Phase Input
U/T1	To Motor U/T1 =  Switch any two motor leads to change forward direction.
V/T2	To Motor V/T2
W/T3	To Motor W/T3
P2, P1	DC Bus Inductor Connection (C Frame drives only.) The C Frame drive is shipped with a jumper between Terminals P2 and P1. Remove this jumper only when a DC Bus Inductor will be connected. Drive will not power up without a jumper or inductor connected. 
DC+, DC-	DC Bus Connection
BR+, BR-	Dynamic Brake Resistor Connection
Ⓧ	Safety Ground - PE

<sup>(1)</sup> **Important:** Terminal screws may become loose during shipment. Ensure that all terminal screws are tightened to the recommended torque before applying power to the drive.

**Table 7 - PowerFlex 40 and 40P Power Terminal Block Specifications**

Frame	Maximum Wire Size <sup>(1)</sup>	Minimum Wire Size <sup>(1)</sup>	Torque
B	5.3 mm <sup>2</sup> (10 AWG)	1.3 mm <sup>2</sup> (16 AWG)	1.7...2.2 N•m (16...19 lb-in)
C	8.4 mm <sup>2</sup> (8 AWG)	1.3 mm <sup>2</sup> (16 AWG)	2.9...3.7 N•m (26...33 lb-in)

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

## PowerFlex 525 Drive Power Terminal Block



**ATTENTION:** National Codes and standards (NEC, VDE, BSI, etc.) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, branch circuit protection and disconnect devices. Failure to do so may result in personal injury and/or equipment damage.



**ATTENTION:** To avoid a possible shock hazard caused by induced voltages, unused wires in the conduit must be grounded at both ends. For the same reason, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled. This will help minimize the possible shock hazard from “cross coupled” power leads.

### *Motor Cable Types Acceptable for 100...600 Volt Installations*

A variety of cable types are acceptable for drive installations. For many installations, unshielded cable is adequate, provided it can be separated from sensitive circuits. As an approximate guide, allow a spacing of 0.3 m (1 ft) for every 10 m (32.8 ft) of length. In all cases, long parallel runs must be avoided. Do not use cable with an insulation thickness less than 15 mils (0.4 mm/0.015 in.). Do not route more than three sets of motor leads in a single conduit to minimize “cross talk”. If more than three drive/motor connections per conduit are required, shielded cable must be used.

UL installations above 50 °C ambient must use 600V, 90 °C wire.

UL installations in 50 °C ambient must use 600V, 75 °C or 90 °C wire.

UL installations in 40 °C ambient should use 600V, 75 °C or 90 °C wire.

Use copper wire only. Wire gauge requirements and recommendations are based on 75 °C. Do not reduce wire gauge when using higher temperature wire.

### **Unshielded**

THHN, THWN or similar wire is acceptable for drive installation in dry environments provided adequate free air space and/or conduit fill rates limits are provided. Any wire chosen must have a minimum insulation thickness of 15 mils and should not have large variations in insulation concentricity.



**ATTENTION:** Do not use THHN or similarly coated wire in wet areas.

### Shielded/Armored Cable

Shielded cable contains all of the general benefits of multi-conductor cable with the added benefit of a copper braided shield that can contain much of the noise generated by a typical AC Drive. Strong consideration for shielded cable should be given in installations with sensitive equipment such as weigh scales, capacitive proximity switches and other devices that may be affected by electrical noise in the distribution system. Applications with large numbers of drives in a similar location, imposed EMC regulations or a high degree of communications / networking are also good candidates for shielded cable.

Shielded cable may also help reduce shaft voltage and induced bearing currents for some applications. In addition, the increased impedance of shielded cable may help extend the distance that the motor can be located from the drive without the addition of motor protective devices such as terminator networks. Refer to Reflected Wave in “Wiring and Grounding Guide, (PWM) AC Drives,” publication [DRIVES-IN001](#).

Consideration should be given to all of the general specifications dictated by the environment of the installation, including temperature, flexibility, moisture characteristics and chemical resistance. In addition, a braided shield should be included and be specified by the cable manufacturer as having coverage of at least 75%. An additional foil shield can greatly improve noise containment.

A good example of recommended cable is Belden® 295xx (xx determines gauge). This cable has four (4) XLPE insulated conductors with a 100% coverage foil and an 85% coverage copper braided shield (with drain wire) surrounded by a PVC jacket.

Other types of shielded cable are available, but the selection of these types may limit the allowable cable length. Particularly, some of the newer cables twist 4 conductors of THHN wire and wrap them tightly with a foil shield. This construction can greatly increase the cable charging current required and reduce the overall drive performance. Unless specified in the individual distance tables as tested with the drive, these cables are not recommended and their performance against the lead length limits supplied is not known.

#### Recommended Shielded Wire

Location	Rating/Type	Description
Standard (Option 1)	600V, 90 °C (194 °F) XHHW2/RHW-2 Anixter B209500-B209507, Belden 29501-29507, or equivalent	<ul style="list-style-type: none"> <li>• Four tinned copper conductors with XLPE insulation.</li> <li>• Copper braid/aluminum foil combination shield and tinned copper drain wire.</li> <li>• PVC jacket.</li> </ul>
Standard (Option 2)	Tray rated 600V, 90 °C (194 °F) RHH/RHW-2 Anixter OLF-7xxxxx or equivalent	<ul style="list-style-type: none"> <li>• Three tinned copper conductors with XLPE insulation.</li> <li>• 5 mil single helical copper tape (25% overlap min.) with three bare copper grounds in contact with shield.</li> <li>• PVC jacket.</li> </ul>
Class I & II; Division I & II	Tray rated 600V, 90 °C (194 °F) RHH/RHW-2 Anixter 7V-7xxxx-3G or equivalent	<ul style="list-style-type: none"> <li>• Three bare copper conductors with XLPE insulation and impervious corrugated continuously welded aluminum armor.</li> <li>• Black sunlight resistant PVC jacket overall.</li> <li>• Three copper grounds on #10 AWG and smaller.</li> </ul>

### Reflected Wave Protection

The drive should be installed as close to the motor as possible. Installations with long motor cables may require the addition of external devices to limit voltage reflections at the motor (reflected wave phenomena). Refer to “Reflected Wave” in the Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives Installation Instructions, publication [DRIVES-IN001](#).

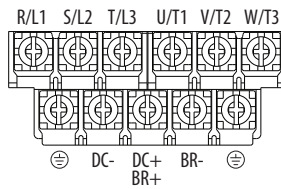
The reflected wave data applies to all carrier frequencies 2...16 kHz. For 240V ratings and lower, reflected wave effects do not need to be considered.

### Output Disconnect

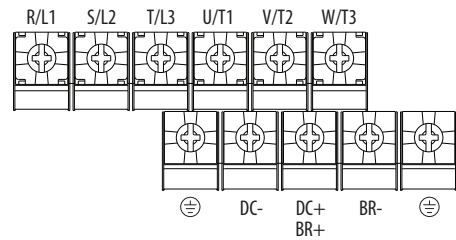
The drive is intended to be commanded by control input signals that will start and stop the motor. A device that routinely disconnects then reapplies output power to the motor for the purpose of starting and stopping the motor should not be used. If it is necessary to disconnect power to the motor with the drive outputting power, an auxiliary contact should be used to simultaneously disable drive (Aux Fault or Coast to Stop).

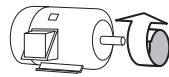

## Power Terminal Block

Frame A, B, C & D



Frame E



Terminal	Description
R/L1, S/L2	1-Phase Input Line Voltage Connection
R/L1, S/L2, T/L3	3-Phase Input Line Voltage Connection
U/T1, V/T2, W/T3	Motor Phase Connection =  Switch any two motor leads to change forward direction.
DC+, DC-	DC Bus Connection
BR+, BR-	Dynamic Brake Resistor Connection
	Safety Ground - PE

**IMPORTANT** Terminal screws may become loose during shipment. Ensure that all terminal screws are tightened to the recommended torque before applying power to the drive.

**PowerFlex 525 Power Terminal Block Wire Specifications**

Frame	Maximum Wire Size <sup>(1)</sup>	Minimum Wire Size <sup>(1)</sup>	Torque
A	5.3 mm <sup>2</sup> (10 AWG)	0.8 mm <sup>2</sup> (18 AWG)	1.76...2.16 N•m (15.6...19.1 lb•in)
B	8.4 mm <sup>2</sup> (8 AWG)	2.1 mm <sup>2</sup> (14 AWG)	1.76...2.16 N•m (15.6...19.1 lb•in)
C	8.4 mm <sup>2</sup> (8 AWG)	2.1 mm <sup>2</sup> (14 AWG)	1.76...2.16 N•m (15.6...19.1 lb•in)
D	13.3 mm <sup>2</sup> (6 AWG)	5.3 mm <sup>2</sup> (10 AWG)	1.76...2.16 N•m (15.6...19.1 lb•in)
E	26.7 mm <sup>2</sup> (3 AWG)	8.4 mm <sup>2</sup> (8 AWG)	3.09...3.77 N•m (27.3...33.4 lb•in)

(1) Maximum/minimum sizes that the terminal block will accept – these are not recommendations.

## Control Terminal Comparisons

The following section provides a comparison of the control terminals for PowerFlex 40 and 40P and the PowerFlex 525 drives.

### Motor Start/Stop Precautions



**ATTENTION:** A contactor or other device that routinely disconnects and reapplies the AC line to the drive to start and stop the motor can cause drive hardware damage. The drive is designed to use control input signals that will start and stop the motor. If used, the input device must not exceed one operation per minute or drive damage can occur.



**ATTENTION:** The drive start/stop control circuitry includes solid-state components. If hazards due to accidental contact with moving machinery or unintentional flow of liquid, gas or solids exist, an additional hardwired stop circuit may be required to remove the AC line to the drive. When the AC line is removed, there will be a loss of any inherent regenerative braking effect that might be present - the motor will coast to a stop. An auxiliary braking method may be required. Alternatively, use the drive's safety input function.

Important points to remember about I/O wiring:

- Always use copper wire.
- Wire with an insulation rating of 600V or greater is recommended.
- Control and signal wires should be separated from power wires by at least 0.3 m (1 ft).

**IMPORTANT** I/O terminals labeled “Common” are not referenced to the safety ground (PE) terminal and are designed to greatly reduce common mode interference.



**ATTENTION:** Driving the 4...20 mA analog input from a voltage source could cause component damage. Verify proper configuration prior to applying input signals.

## PowerFlex 40 Control Wiring and Terminals

**Table 8 - Recommended Control and Signal Wire** <sup>(1)</sup>

Wire Type(s) <sup>(2)</sup>	Description	Minimum Insulation Rating
Belden 8760/9460 (or equiv.)	0.8 mm <sup>2</sup> (18 AWG), twisted pair, 100% shield with drain.	300V, 60 °C (140 °F)
Belden 8770 (or equiv.)	0.8 mm <sup>2</sup> (18 AWG), 3 conductor, shielded for remote pot only.	

(1) If the wires are short and contained within a cabinet which has no sensitive circuits, the use of shielded wire may not be necessary, but is always recommended.

(2) Stranded or solid wire.

**Table 9 - I/O Terminal Block Specifications**

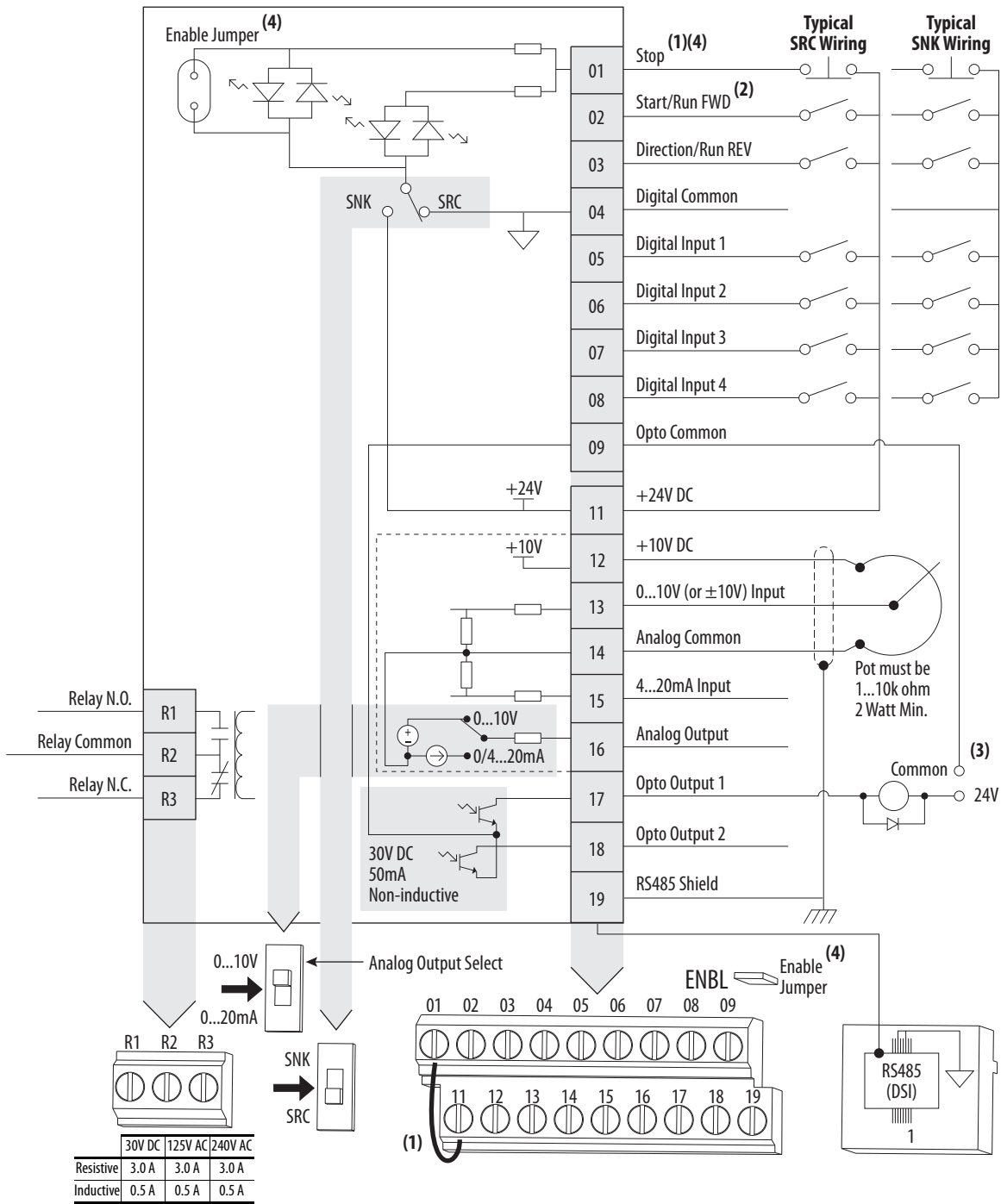
Frame	Maximum Wire Size <sup>(1)</sup>	Minimum Wire Size <sup>(1)</sup>	Torque
B & C	1.3 mm <sup>2</sup> (16 AWG)	0.2 mm <sup>2</sup> (24 AWG)	0.5 . . . 0.8 N•m (4.4 . . . 7 lb•in)

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

### *Maximum Control Wire Recommendations*

Do not exceed control wiring length of 30 meters (100 feet). Control signal cable length is highly dependent on electrical environment and installation practices. To improve noise immunity, the I/O terminal block Common must be connected to ground terminal/protective earth. If using the RS485 (DSI) port, I/O Terminal 16 should also be connected to ground terminal/protective earth.

Figure 25 - PowerFlex 40 Control Wiring Block Diagram



- (1) **Important:** I/O Terminal 01 is always a coast to stop input except when P036 [Start Source] is set to “3-Wire” or “Momt FWD/REV” control. In three wire control, I/O Terminal 01 is controlled by P037 [Stop Mode]. All other stop sources are controlled by P037 [Stop Mode].  
**Important:** The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input.
- (2) Two wire control shown. For three wire control use a momentary input  $\circ$  on I/O Terminal 02 to command a start. Use a maintained input  $\circ$  for I/O Terminal 03 to change direction.
- (3) When using an opto output with an inductive load such as a relay, install a recovery diode parallel to the relay as shown, to prevent damage to the output.
- (4) When the ENBL enable jumper is removed, I/O Terminal 01 will always act as a hardware enable, causing a coast to stop without software interpretation.



**Table 10 - PowerFlex 40 Control I/O Terminal Designations**

No.	Signal	Default	Description	Param.
R1	Relay N.O.	Fault	Normally open contact for output relay.	A055
R2	Relay Common	–	Common for output relay.	
R3	Relay N.C.	Fault	Normally closed contact for output relay.	A055
Analog Output Select DIP Switch		0-10V	Sets analog output to either voltage or current. Setting must match A065 [Analog Out Sel].	
Sink/Source DIP Switch		Source (SRC)	Inputs can be wired as Sink (SNK) or Source (SRC) via DIP Switch setting.	
01	Stop <sup>(1)</sup>	Coast	The factory installed jumper or a normally closed input must be present for the drive to start.	P036 <sup>(1)</sup>
02	Start/Run FWD	Not Active	Command comes from the integral keypad by default. To disable reverse operation, see A095 [Reverse Disable].	P036, P037
03	Direction/Run REV	Not Active		P036, P037, A095
04	Digital Common	–	For digital inputs. Electronically isolated with digital inputs from analog I/O and opto outputs.	
05	Digital Input 1	Preset Freq	Program with A051 [Digital In1 Sel].	A051
06	Digital Input 2	Preset Freq	Program with A052 [Digital In2 Sel].	A052
07	Digital Input 3	Local	Program with A053 [Digital In3 Sel].	A053
08	Digital Input 4	Jog Forward	Program with A054 [Digital In4 Sel].	A054
09	Opto Common	–	For opto-coupled outputs. Electronically isolated with opto outputs from analog I/O and digital inputs.	
11	+24V DC	–	Referenced to Digital Common. Drive supplied power for digital inputs. Maximum output current is 100 mA.	
12	+10V DC	–	Referenced to Analog Common. Drive supplied power for 0...10V external potentiometer. Maximum output current is 15 mA.	P038
13	±10V In <sup>(2)</sup>	Not Active	For external 0...10V (unipolar) or ±10V (bipolar) input supply (input impedance = 100 k $\Omega$ ) or potentiometer wiper.	P038, A051...A054, A123, A132
14	Analog Common	–	For 0...10V In or 4...20 mA In. Electronically isolated with analog inputs and outputs from digital I/O and opto outputs.	
15	4...20 mA In <sup>(2)</sup>	Not Active	For external 4...20 mA input supply (input impedance = 250 $\Omega$ ).	P038, A051...A054, A132
16	Analog Output	OutFreq 0...10	The default analog output is 0...10V. To convert to a current value, change the Analog Output Select DIP Switch to 0...20 mA. Program with A065 [Analog Out Sel]. Max analog value can be scaled with A066 [Analog Out High]. Maximum Load: 4...20 mA = 525 $\Omega$ (10.5V) 0...10V = 1 k $\Omega$ (10 mA)	A065, A066
17	Opto Output 1	MotorRunning	Program with A058 [Opto Out1 Sel]	A058, A059, A064
18	Opto Output 2	At Frequency	Program with A061 [Opto Out2 Sel]	A058, A059, A064
19	RS485 (DSI) Shield	–	Terminal should be connected to safety ground - PE when using the RS485 (DSI) communications port.	

(1) See footnotes (1) and (4) on page 56.

(2) 0...10V In and 4...20 mA In are distinct input channels and may be connected simultaneously. Inputs may be used independently for speed control or jointly when operating in PID mode.

## PowerFlex 40P Control Wiring and Terminals

**Table 11 - Recommended Signal Wire**

Signal Type/ Where Used	Belden Wire Type(s) <sup>(1)</sup> (or equivalent)	Description	Min. Insulation Rating
Analog I/O & PTC	8760/9460	0.750 mm <sup>2</sup> (18 AWG), twisted pair, 100% shield with drain <sup>(3)</sup>	300V, 75...90 °C (167...194 °F)
Remote Pot	8770	0.750 mm <sup>2</sup> (18 AWG), 3 cond., shielded	
Encoder/Pulse I/O	89730 <sup>(2)</sup>	0.196 mm <sup>2</sup> (24 AWG), individually shielded pairs	

(1) Stranded or solid wire.

(2) 9728 or 9730 are equivalent and may be used but may not fit in the drive wire channel.

(3) If the wires are short and contained within a cabinet which has no sensitive circuits, the use of shielded wire may not be necessary, but is always recommended.

**Table 12 - Recommended Control Wire for Digital I/O**

Type	Wire Type(s)	Description	Minimum Insulation Rating
Unshielded	Per US NEC or applicable national or local code	—	300V, 60 °C (140 °F)
Shielded	Multi-conductor shielded cable such as Belden 8770 (or equiv.)	0.750 mm <sup>2</sup> (18 AWG), 3 conductor, shielded.	

**Table 13 - I/O Terminal Block Specifications**

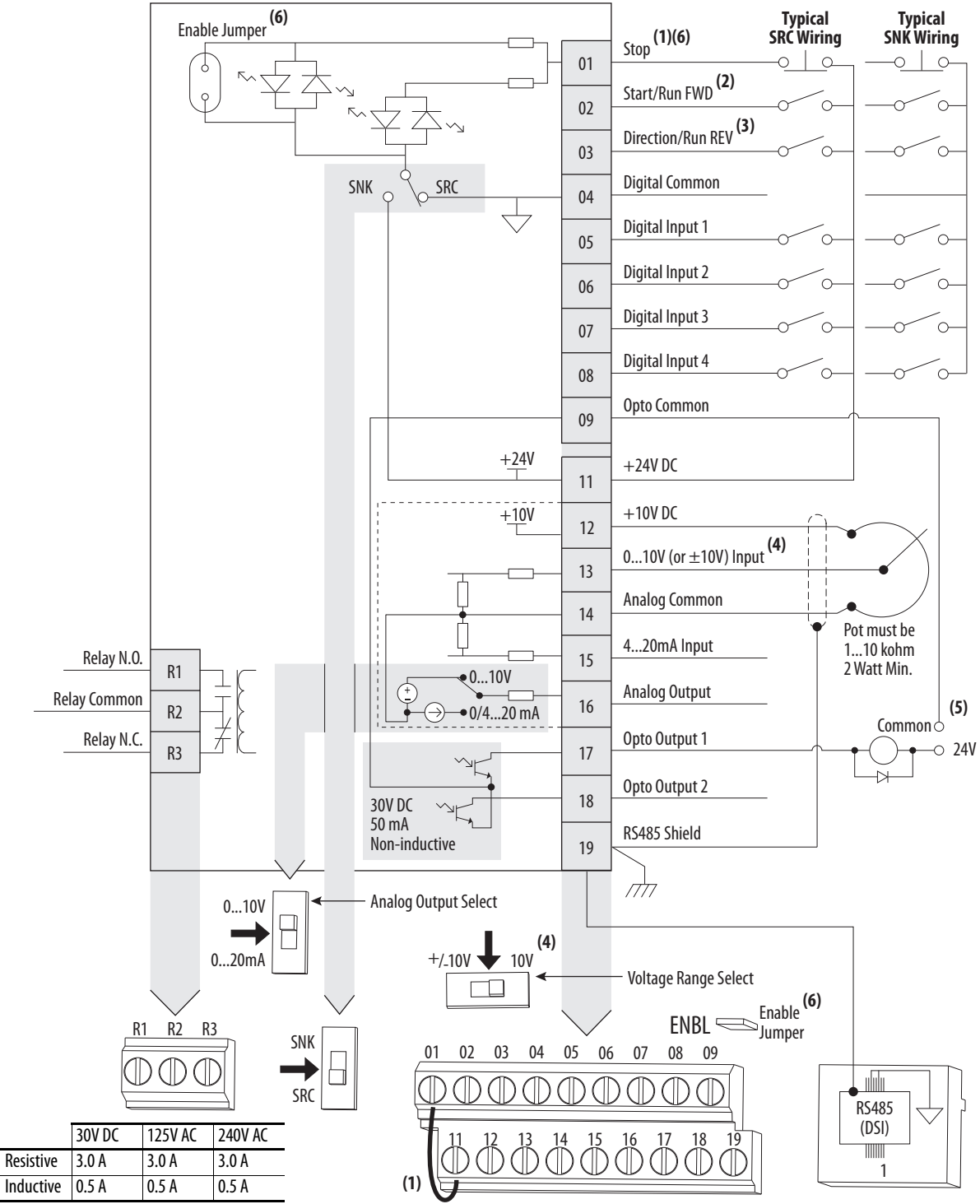
Frame	Maximum Wire Size <sup>(1)</sup>	Minimum Wire Size <sup>(1)</sup>	Torque
B & C	1.3 mm <sup>2</sup> (16 AWG)	0.2 mm <sup>2</sup> (24 AWG)	0.5...0.8 N·m (4.4...7 lb·in)

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

### Maximum Control Wire Recommendations

Do not exceed control wiring length of 30 meters (100 feet). Control signal cable length is highly dependent on electrical environment and installation practices. To improve noise immunity, the I/O terminal block Common may be connected to ground terminal/protective earth. If using the RS485 (DSI) port, I/O Terminal 19 should also be connected to ground terminal/protective earth.

Figure 26 - PowerFlex 40P Control Wiring Block Diagram





See PowerFlex 40P Control Wiring Block Diagram Notes on page 60.

### PowerFlex 40P Control Wiring Block Diagram Notes

- (1) **Important:** I/O Terminal 01 is always a coast to stop input except when P036 [Start Source] is set to “3-Wire”, “2-W Lvl Sens” or “Momt FWD/REV” control. In three wire control, I/O Terminal 01 is controlled by P037 [Stop Mode]. All other stop sources are controlled by P037 [Stop Mode].

P036 [Start Source]	Stop	I/O Terminal 01 Stop
3-Wire	Per P037	Per P037 <sup>(6)</sup>
2-Wire	Per P037	Coast
2-W Lvl Sens	Per P037	Per P037 <sup>(6)</sup>
2-W Hi Speed	Per P037	Coast
RS485 Port	Per P037	Coast
Momt FWD/REV	Per P037	Per P037 <sup>(6)</sup>

**Important:** The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input.

- (2) Two wire control shown. For three wire control use a momentary input  on I/O Terminal 02 to command a start. Use a maintained input  for I/O Terminal 03 to change direction.
- (3) The function of I/O Terminal 03 is fully programmable. Program with E202 [Digital Term 3].
- (4) Match the Voltage Range Select DIP Switch setting with the control scheme for proper Uni-Polar or Bipolar analog input operation.
- (5) When using an opto output with an inductive load such as a relay, install a recovery diode parallel to the relay as shown, to prevent damage to the output.
- (6) When the ENBL enable jumper is removed, I/O Terminal 01 will always act as a hardware enable, causing a coast to stop without software interpretation.

**Table 14 - PowerFlex 40P Control I/O Terminal Designations**

No.	Signal	Default	Description	Param.
R1	Relay N.O.	Fault	Normally open contact for output relay.	A055
R2	Relay Common	–	Common for output relay.	
R3	Relay N.C.	Fault	Normally closed contact for output relay.	A055
Analog Output Select DIP Switch		0...10V	Sets analog output to either voltage or current. Setting must match A065 [Analog Out Sel].	
Sink/Source DIP Switch		Source (SRC)	Inputs can be wired as Sink (SNK) or Source (SRC) via DIP Switch setting.	
01	Stop <sup>(1)</sup>	Coast	The factory installed jumper or a normally closed input must be present for the drive to start.	P036 <sup>(1)</sup>
02	Start/Run FWD	Not Active	I/O Terminal 03 is fully programmable. Program with E202 [Digital Term 3]. To disable reverse operation, see A095 [Reverse Disable].	P036, P037
03	Digital Term 3	Not Active		P036, P037, A095, E202
04	Digital Common	–	For digital inputs. Electronically isolated with digital inputs from analog I/O and opto outputs.	
05	Digital Input 1	Preset Freq	Program with A051 [Digital In1 Sel].	A051
06	Digital Input 2	Preset Freq	Program with A052 [Digital In2 Sel].	A052
07	Digital Input 3	Local	Program with A053 [Digital In3 Sel].	A053
08	Digital Input 4	Jog Forward	Program with A054 [Digital In4 Sel].	A054
09	Opto Common	–	For opto-coupled outputs. Electronically isolated with opto outputs from analog I/O and digital inputs.	
11	+24V DC	–	Referenced to Digital Common. Drive supplied power for digital inputs. Maximum output current is 100 mA.	
12	+10V DC	–	Referenced to Analog Common. Drive supplied power for 0...10V external potentiometer. Maximum output current is 15 mA.	P038

No.	Signal	Default	Description	Param.
13	$\pm 10V$ In <sup>(2)</sup>	Not Active	For external 0...10V (unipolar) or $\pm 10V$ (bipolar) input supply (input impedance = 100 k $\Omega$ ) or potentiometer wiper.	P038, A051...A054, A123, A132
14	Analog Common	–	For 0...10V In or 4...20 mA In. Electronically isolated with analog inputs and outputs from digital I/O and opto outputs.	
15	4...20 mA In <sup>(2)</sup>	Not Active	For external 4...20 mA input supply (input impedance = 250 $\Omega$ ).	P038, A051...A054, A132
16	Analog Output	OutFreq 0...10	The default analog output is 0...10V. To covert to a current value, change the Analog Output Select DIP Switch to 0...20 mA. Program with A065 [Analog Out Sel]. Max analog value can be scaled with A066 [Analog Out High]. Maximum Load: 4...20 mA = 525 $\Omega$ (10.5V) 0...10V = 1 k $\Omega$ (10 mA)	A065, A066
17	Opto Output 1	MotorRunning	Program with A058 [Opto Out1 Sel]	A058, A059, A064
18	Opto Output 2	At Frequency	Program with A061 [Opto Out2 Sel]	A061, A062, A064
19	RS485 (DSI) Shield	–	Terminal should be connected to safety ground - PE when using the RS485 (DSI) communications port.	

(1) See footnotes (1) and (6) in the PowerFlex 40P Control Wiring Block Diagram Notes on page 60.

(2) 0...10V In and 4...20 mA In are distinct input channels and may be connected simultaneously. Inputs may be used independently for speed control or jointly when operating in PID mode.

## PowerFlex 525 Control Wiring and Terminals

Recommendations are for 50 °C ambient temperature.  
75 °C wire must be used for 60 °C ambient temperature.  
90 °C wire must be used for 70 °C ambient temperature.

**Table 15 - Recommended Signal Wire**

Signal Type/ Where Used	Belden Wire Type(s) <sup>(1)</sup> (or equivalent)	Description	Min. Insulation Rating
Analog I/O & PTC	8760/9460	0.750 mm <sup>2</sup> (18 AWG), twisted pair, 100% shield with drain <sup>(2)</sup>	300V, 60 °C (140 °F)
Remote Pot	8770	0.750 mm <sup>2</sup> (18 AWG), 3 conductor, shielded	
Encoder/Pulse I/O	9728/9730	0.196 mm <sup>2</sup> (24 AWG), individually shielded pairs	

(1) Stranded or solid wire.

(2) If the wires are short and contained within a cabinet which has no sensitive circuits, the use of shielded wire may not be necessary, but is always recommended.

**Table 16 - Recommended Control Wire for Digital I/O**

Type	Wire Type(s)	Description	Min. Insulation Rating
Unshielded	Per US NEC or applicable national or local code	–	300V, 60 °C (140 °F)
Shielded	Multi-conductor shielded cable such as Belden 8770 (or equivalent)	0.750 mm <sup>2</sup> (18 AWG), 3 conductor, shielded.	

**Table 17 - Control I/O Terminal Block Wire Specifications**

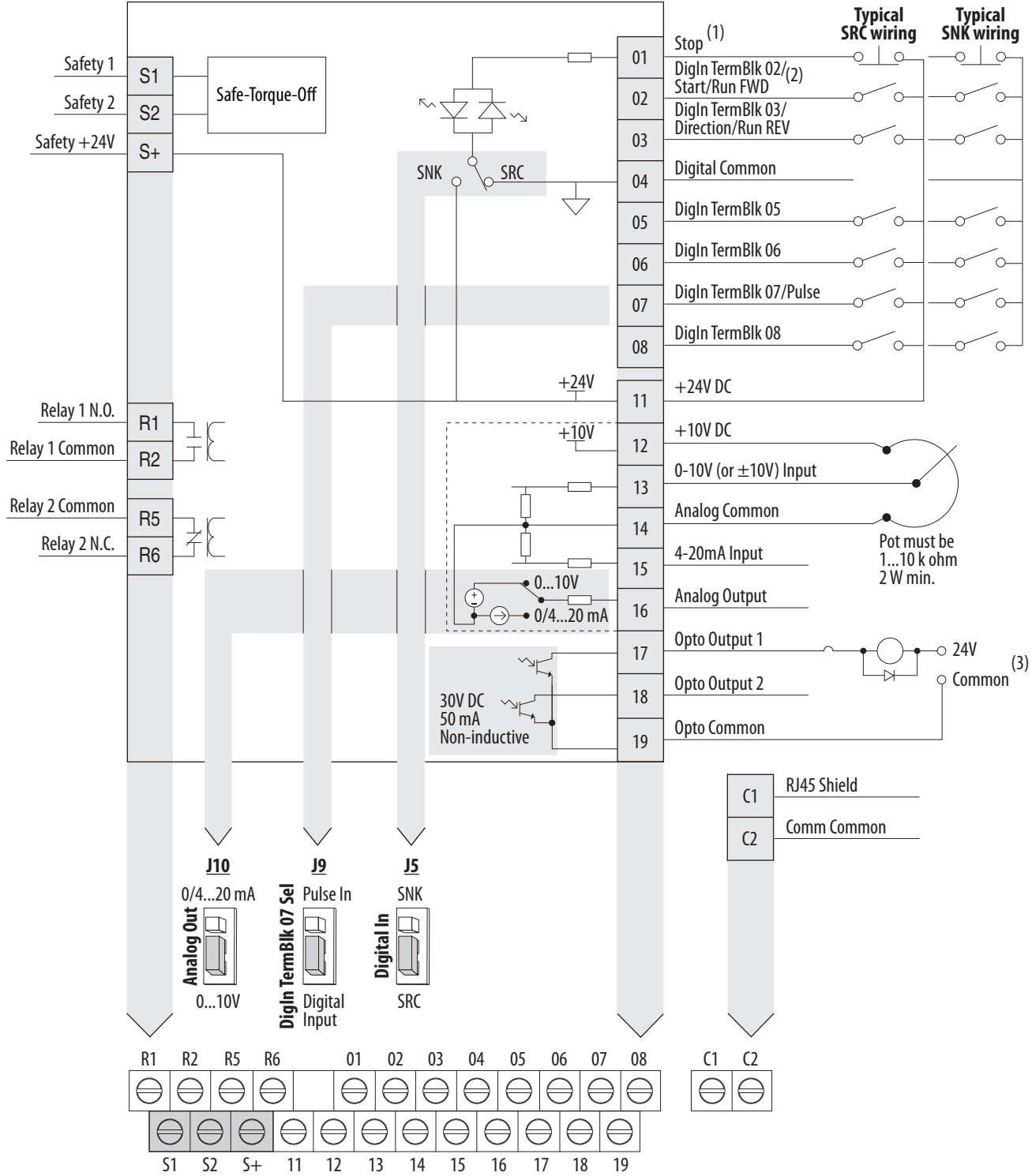
Frame	Maximum Wire Size <sup>(1)</sup>	Minimum Wire Size <sup>(1)</sup>	Torque
A...E	1.3 mm <sup>2</sup> (16 AWG)	0.13 mm <sup>2</sup> (26 AWG)	0.71...0.86 N·m (6.2...7.6 lb·in)

(1) Maximum/minimum sizes that the terminal block will accept – these are not recommendations.

### Maximum Control Wire Recommendations

Do not exceed control wiring length of 30 m (100 ft). Control signal cable length is highly dependent on electrical environment and installation practices. To improve noise immunity, the I/O terminal block Common may be connected to ground terminal/protective earth. If using the RS485 (DSI) port, I/O Terminal C1 should also be connected to ground terminal/protective earth. Additionally, communication noise immunity can also be improved by connecting I/O Terminal C2 to ground terminal/protective earth.

PowerFlex 525 Control I/O Wiring Block Diagram



See PowerFlex 525 Control I/O Wiring Block Diagram Notes on page 64.

*PowerFlex 525 Control I/O Wiring Block Diagram Notes*

- (1) See Digital Input Selection for Start Source in the PowerFlex 520-Series AC Drives User Manual, publication [520-UM001](#), for more information on configuring the digital inputs.

**IMPORTANT** I/O Terminal 01 is always a stop input. The stopping mode is determined by the drive setting. See the tables below for more information.

P046, P048, P050 [Start Source x]	Normal Stop	I/O Terminal 01 Stop
1 "Keypad"	Per P045 [Stop Mode]	Coast
2 "DigIn TrmBlk"		See t062, t063 [DigIn TermBlk xx] below
3 "Serial/DSI"		Coast
4 "Network Opt"		Per P045 [Stop Mode]
5 "EtherNet/IP"		Per P045 [Stop Mode]

t062, t063 [DigIn TermBlk xx]	Normal Stop	I/O Terminal 01 Stop
48 "2-Wire FWD"	Per P045 [Stop Mode]	See t064 [2-Wire Mode] below
49 "3-Wire Start"		Per P045 [Stop Mode]
50 "2-Wire REV"		See t064 [2-Wire Mode] below
51 "3-Wire Dir"		Per P045 [Stop Mode]

t064 [2-Wire Mode]	Normal Stop	I/O Terminal 01 Stop
0 "Edge Trigger"	Per P045 [Stop Mode]	Coast
1 "Level Sense"		Coast
2 "Hi-Spd Edge"		Coast
3 "Momentary"		Per P045 [Stop Mode]

**IMPORTANT** The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input.



- (2) Two wire control shown. For three wire control use a momentary input  on I/O Terminal 02 to command a start. Use a maintained input  for I/O Terminal 03 to change direction.
- (3) When using an opto output with an inductive load such as a relay, install a recovery diode parallel to the relay as shown, to prevent damage to the output.



Table 18 - PowerFlex 525 Control I/O Terminal Designations

No.	Signal	Default	Description	Param.
R1	Relay 1 N.O.	Fault	Normally open contact for output relay.	t076
R2	Relay 1 Common	Fault	Common for output relay.	
R5	Relay 2 Common	Motor Running	Common for output relay.	t081
R6	Relay 2 N.C.	Motor Running	Normally closed contact for output relay.	
01	Stop	Coast	Three wire stop. However, it functions as a stop under all input modes and cannot be disabled.	P045 <sup>(1)</sup>
02	DigIn TermBlk 02/ Start/Run FWD	Run FWD	Used to initiate motion and also can be used as a programmable digital input. It can be programmed with t062 [DigIn TermBlk 02] as three wire (Start/Dir with Stop) or two wire (Run FWD/Run REV) control. Current consumption is 6 mA.	P045, P046, 048, P050, 544, t062
03	DigIn TermBlk 03/ Dir/Run REV	Run REV	Used to initiate motion and also can be used as a programmable digital input. It can be programmed with t063 [DigIn TermBlk 03] as three wire (Start/Dir with Stop) or two wire (Run FWD/Run REV) control. Current consumption is 6 mA.	t063
04	Digital Common	–	Return for digital I/O. Electrically isolated (along with the digital I/O) from the rest of the drive.	–
05	DigIn TermBlk 05	Preset Freq	Program with t065 [DigIn TermBlk 05]. Current consumption is 6 mA.	t065
06	DigIn TermBlk 06	Preset Freq	Program with t066 [DigIn TermBlk 06]. Current consumption is 6 mA.	t066
07	DigIn TermBlk 07/ Pulse In	Start Source 2 + Speed Reference2	Program with t067 [DigIn TermBlk 07]. Also functions as a Pulse Train input for reference or speed feedback. The maximum frequency is 100 kHz. Current consumption is 6 mA.	t067
08	DigIn TermBlk 08	Jog Forward	Program with t068 [DigIn TermBlk 08]. Current consumption is 6 mA.	t068
C1	C1	–	This terminal is tied to the RJ-45 port shield. Tie this terminal to a clean ground in order to improve noise immunity when using external communication peripherals.	–
C2	C2	–	This is the signal common for the communication signals.	–
S1	Safety 1	–	Safety input 1. Current consumption is 6 mA.	–
S2	Safety 2	–	Safety input 2. Current consumption is 6 mA.	–
S+	Safety +24V	–	+24V supply for safety circuit. Internally tied to the +24V DC source (Pin 11).	–
11	+24V DC	–	Referenced to Digital Common. Drive supplied power for digital inputs. Maximum output current is 100 mA.	–
12	+10V DC	–	Referenced to Analog Common. Drive supplied power for 0...10V external potentiometer. Maximum output current is 15 mA.	P047, P049
13	±10V In	Not Active	For external 0...10V (unipolar) or ±10V (bipolar) input supply or potentiometer wiper. Input impedance: Voltage source = 100 k $\Omega$ Allowable potentiometer resistance range = 1...10 k $\Omega$	P047, P049, t062, t063, t065, t066, t093, A459, A471
14	Analog Common	–	Return for the analog I/O. Electrically isolated (along with the analog I/O) from the rest of the drive.	–
15	4...20 mA In	Not Active	For external 4...20 mA input supply. Input impedance = 250 $\Omega$	P047, P049, t062, t063, t065, t066, t093, A459, A471

No.	Signal	Default	Description	Param.
16	Analog Output	OutFreq 0...10	The default analog output is 0...10V. To convert a current value, change the Analog Output jumper to 0...20 mA. Program with t088 [Analog Out Sel]. Maximum analog value can be scaled with t089 [Analog Out High]. Maximum Load: 4...20 mA = 525 $\Omega$ (10.5V) 0...10V = 1 k $\Omega$ (10 mA)	t 088, t089
17	Opto Output 1	Motor Running	Program with t069 [Opto Out1 Sel]. Each Opto-Output is rated 30V DC 50 mA (Non-inductive).	t069, t070, t075
18	Opto Output 2	At Frequency	Program with t072 [Opto Out1 Sel]. Each Opto-Output is rated 30V DC 50 mA (Non-inductive).	t072, t073, t075
19	Opto Common	—	The emitters of the Optocoupler Outputs (1 and 2) are tied together at Optocoupler Common. Electrically isolated from the rest of the drive.	—

(1) See footnote (1) on page 64.

## Terminal Comparison Summary

Description	PowerFlex 40	PowerFlex 40P	PowerFlex 525
1-Phase input	R/L1,S/L2	-	R/L1,S/L2
3-Phase input	R/L1,S/L2,T/L3	R/L1,S/L2,T/L3	R/L1,S/L2,T/L3
Motor – U/T1	U/T1	U/T1	U/T1
Motor – V/T2	V/T2	V/T2	V/T2
Motor – W/T3	W/T3	W/T3	W/T3
Brake resistor	BR+	BR+	BR+
Brake resistor	BR-	BR-	BR-
Bus inductor	P1 (C frame only)	P1 (C frame only)	-
Bus inductor	P2 (C frame only)	P2 (C frame only)	-
DC Bus connection (-)	DC-	DC-	DC-
DC Bus connection (+)	DC+	DC+	DC+
Motor ground	PE	PE	PE
Drive ground	PE	PE	PE
Analog shield	PE	PE	PE
Analog input 1 common	14	14	14
Analog input 1	13 - (0 to +/-10V)	13 - (0 to +/- 10V)	13- (0 to +/- 10V)
Analog input 2 common	-	-	14
Analog input 2	15 - (4...20 mA)	15 - (4...20 mA)	15 - (4...20 mA)
Analog output 1 (-)	-	-	-
Analog output 1 (+)	16	16	16
Analog output common	14	14	14
Reference +10V	12	12	13
Reference common	14	14	14
Relay 1 N.O.	R1	R1	R1
Relay 1 common	R2	R2	R2
Relay 1 N.C.	R3	R3	-
Relay 2 N.O.	-	-	-
Relay 2 common	-	-	R5
Relay 2 N.C.	-	-	R6
Opto output 1	17	17	17
Opto output 2	18	18	18
Opto common	9	9	19
Start/Run forward	2	2	2
Direction/Run reverse	3	3	3
Digital common	4	4	4
Digital input 1	5	5	5
Digital input 2	6	6	6
Digital input 3	7	7	7
Digital input 4	8	8	8

Description	PowerFlex 40	PowerFlex 40P	PowerFlex 525
Source +24V DC	11	11	11
Source +10 V DC	12	12	10
Encoder A	-	A	A
Encoder A (Not)	-	A-	A-
Encoder B	-	B	B
Encoder B (Not)	-	B-	B-
Encoder Reference +	-	+V	+V
Encoder Reference -	-	Cm	Cm
Encoder shield	-	PE	PE
RS485 (DSI) shield	19	19	C1
Communication common	-	-	C2

Note: Safe Torque-Off is only available on the PowerFlex 40P and PowerFlex 525 drives. Please see the respective user manuals for more details.

## Accessories and Dimensions **PowerFlex 40**

**Table 19 - Catalog Number Description**

<b>22B</b>	-	<b>A</b>	<b>1P5</b>	<b>N</b>	<b>1</b>	<b>1</b>	<b>4</b>
Drive		Voltage Rating	Rating	Enclosure	HIM	Emission Class	Type

**Table 20 - PowerFlex 40 Drives Ratings**

Drive Ratings				IP20, NEMA/UL Type Open		IP20 Flange Mount <sup>(1)</sup>	IP66, NEMA/UL Type 4X
Input Voltage	kW	Hp	Output Current <i>Amps</i>	Cat. No.	Frame Size	Cat. No.	Cat. No.
120V 50/60 Hz 1-phase no filter	0.4	0.5	2.3	22B-V2P3N104	B	22B-V2P3F104	22B-V2P3C104
	0.75	1.0	5.0	22B-V5P0N104	B	22B-V5P0F104	22B-V5P0C104
	1.1	1.5	6.0	22B-V6P0N104	B	22B-V6P0F104	22B-V6P0C104
240V 50/60 Hz 1-phase with integral "S type" EMC filter	0.4	0.5	2.3	22B-A2P3N114	B	-	-
	0.75	1.0	5.0	22B-A5P0N114	B	-	-
	1.5	2.0	8.0	22B-A8P0N114	B	-	-
	2.2	3.0	12.0	22B-A012N114	C	-	-
240V 50/60 Hz 1-phase no filter	0.4	0.5	2.3	22B-A2P3N104	B	22B-A2P3F104	22B-A2P3C104
	0.75	1.0	5.0	22B-A5P0N104	B	22B-A5P0F104	22B-A5P0C104
	1.5	2.0	8.0	22B-A8P0N104	B	22B-A8P0F104	22B-A8P0C104
	2.2	3.0	12.0	22B-A012N104	C	22B-A012F104	-

Drive Ratings				IP20, NEMA/UL Type Open		IP20 Flange Mount <sup>(1)</sup>	IP66, NEMA/UL Type 4X
Input Voltage	kW	Hp	Output Current <i>Amps</i>	Cat. No.	Frame Size	Cat. No.	Cat. No.
240V 50/60 Hz 3-phase no filter	0.4	0.5	2.3	22B-B2P3N104	B	22B-B2P3F104	22B-B2P3C104
	0.75	1.0	5.0	22B-B5P0N104	B	22B-B5P0F104	22B-B5P0C104
	1.5	2.0	8.0	22B-B8P0N104	B	22B-B8P0F104	22B-B8P0C104
	2.2	3.0	12.0	22B-B012N104	B	22B-B012F104	22B-B012C104
	3.7	5.0	17.5	22B-B017N104	B	22B-B017F104	22B-B017C104
	5.5	7.5	24.0	22B-B024N104	C	22B-B024F104	–
	7.5	10.0	33.0	22B-B033N104	C	22B-B033F104	–
480V 50/60 Hz 3-phase no filter	0.4	0.5	1.4	22B-D1P4N104	B	22B-D1P4F104	22B-D1P4C104
	0.75	1.0	2.3A	22B-D2P3N104	B	22B-D2P3F104	22B-D2P3C104
	1.5	2.0	4.0	22B-D4P0N104	B	22B-D4P0F104	22B-D4P0C104
	2.2	3.0	6.0	22B-D6P0N104	B	22B-D6P0F104	22B-D6P0C104
	4.0	5.0	10.5	22B-D010N104	B	22B-D010F104	22B-D010C104
	5.5	7.5	12.0	22B-D012N104	C	22B-D012F104	–
	7.5	10.0	17.0	22B-D017N104	C	22B-D017F104	–
	11.0	15.0	24.0	22B-D024N104	C	22B-D024F104 <sup>(2)</sup>	–
600V 50/60 Hz 3-phase no filter	0.75	1.0	1.7	22B-E1P7N104	B	22B-E1P7F104	22B-E1P7C104
	1.5	2.0	3.0	22B-E3P0N104	B	22B-E3P0F104	22B-E3P0C104
	2.2	3.0	4.2	22B-E4P2N104	B	22B-E4P2F104	22B-E4P2C104
	4.0	5.0	6.6	22B-E6P6N104	B	22B-E6P6F104	22B-E6P6C104
	5.5	7.5	9.9	22B-E9P9N104	C	22B-E9P9F104	–
	7.5	10.0	12.0	22B-E012N104	C	22B-E012F104	–
	11.0	15.0	19.0	22B-E019N104	C	22B-E019F104	–

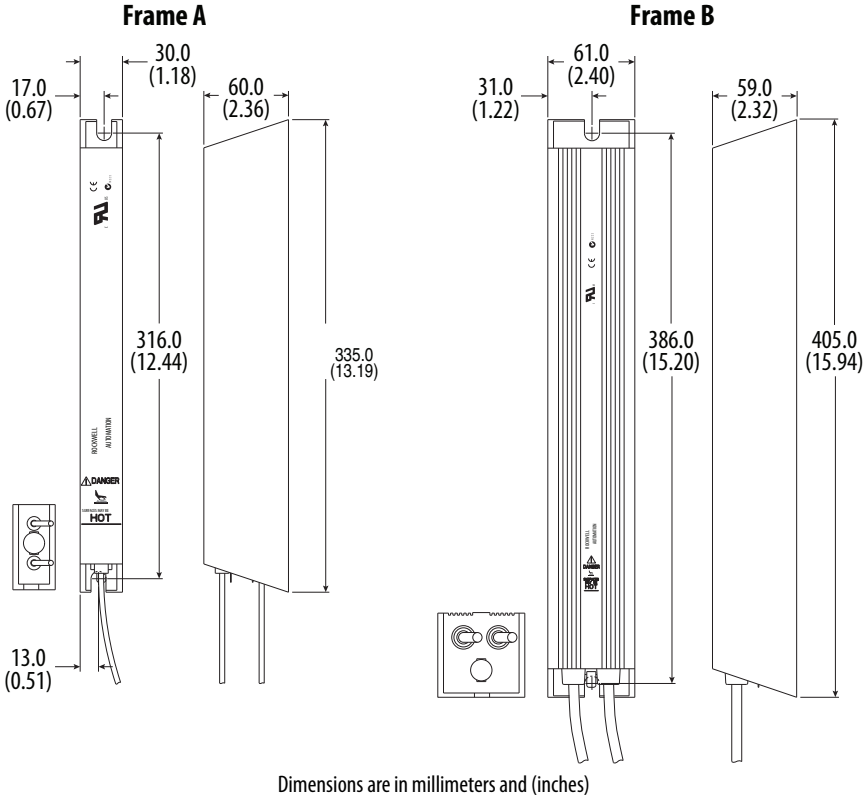
(1) Meets IP40/54/65 (NEMA 1/12/4/4X) when installed in an enclosure of like rating.  
 (2) Requires use of external DC Bus Inductor or AC Line Reactor. See [Table 23](#) for details.

**Table 21 - Dynamic Brake Modules**

Drive Ratings				Cat. No. <sup>(1) (2)</sup>
Input Voltage	kW	Hp	Min Resistance $\Omega$	
120V 50/60 Hz 1-phase	0.4	0.5	48	AK-R2-091P500
	0.75	1.0	48	AK-R2-091P500
	1.1	1.5	48	AK-R2-091P500
240V 50/60 Hz 1-phase	0.4	0.5	48	AK-R2-091P500
	0.75	1.0	48	AK-R2-091P500
	1.5	2.0	48	AK-R2-091P500
	2.2	3.0	32	AK-R2-047P500
240V 50/60 Hz 3-phase	0.4	0.5	48	AK-R2-091P500
	0.75	1.0	48	AK-R2-091P500
	1.5	2.0	48	AK-R2-091P500
	2.2	3.0	32	AK-R2-047P500
	3.7	5.0	19	AK-R2-047P500
	5.5	7.5	13	AK-R2-030P1K2
	7.5	10.0	10	AK-R2-030P1K2
480V 50/60 Hz 3-phase	0.4	0.5	97	AK-R2-360P500
	0.75	1.0	97	AK-R2-360P500
	1.5	2.0	97	AK-R2-360P500
	2.2	3.0	97	AK-R2-120P1K2
	4.0	5.0	77	AK-R2-120P1K2
	5.5	7.5	55	AK-R2-120P1K2
	7.5	10.0	39	AK-R2-120P1K2
	11.0	15.0	24	AK-R2-120P1K2 <sup>(3)</sup>
600V 50/60 Hz 3-phase	0.75	1.0	120	AK-R2-360P500
	1.5	2.0	120	AK-R2-360P500
	2.2	3.0	82	AK-R2-120P1K2
	4.0	5.0	82	AK-R2-120P1K2
	5.5	7.5	51	AK-R2-120P1K2
	7.5	10.0	51	AK-R2-120P1K2
	11.0	15.0	51	AK-R2-120P1K2 <sup>(3)</sup>

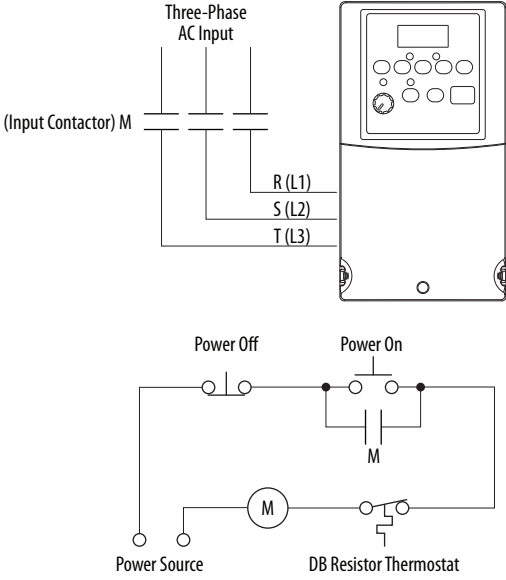
- (1) The resistors listed in this tables are rated for 5% duty cycle.
- (2) Use of Rockwell resistors is always recommended. The resistors listed have been carefully selected for optimizing performance in a variety of applications. Alternative resistors may be used, however care must be taken when making a selection. Refer to the PowerFlex Dynamic Braking Resistor Calculator, publication [PFLEX-AT001](#).
- (3) Requires two resistors wired in parallel.

Figure 27 - Dynamic Brake Modules



Frame	Cat. No.	Weight kg (lb)
A	AK-R2-091P500, AK-R2-047P500, AK-R2-360P500	1.1 (2.5)
B	AK-R2-030P1K2, AK-R2-120P1K2	2.7 (6)

Figure 28 - Recommended External Brake Resistor Circuitry

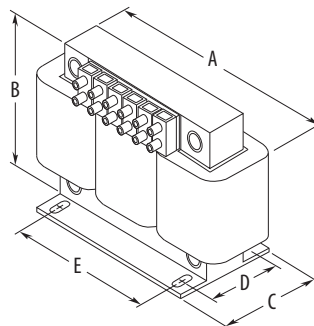


**Table 22 - Bulletin 1321-3R Series Line Reactors**

Input Voltage	kW	Hp	Fundamental Amps	Max Continuous Amps	Inductance <i>mh</i>	Watts Loss <i>W</i>	Cat. No. <sup>(1)</sup>
240V 50/60 Hz 3-phase	0.4	0.5	4	6	12.0	21	1321-3R4-D
	0.75	1.0	8	12	3.0	29	1321-3R8-B
	1.5	2.0	8	12	1.5	19.5	1321-3R8-A
	2.2	3.0	12	18	1.25	26	1321-3R12-A
	3.7	5.0	18	27	0.8	36	1321-3R18-A
	5.5	7.5	25	37.5	0.5	48	1321-3R25-A
	7.5	10.0	35	52.5	0.4	49	1321-3R35-A
480V 50/60 Hz 3-phase	0.4	0.5	2	3	20.0	11.3	1321-3R2-B
	0.75	1.0	4	6	9.0	20	1321-3R4-C
	1.5	2.0	4	6	6.5	20	1321-3R4-B
	2.2	3.0	8	12	5.0	25.3	1321-3R8-C
	4.0	5.0	12	18	2.5	31	1321-3R12-B
	5.5	7.5	12	18	2.5	31	1321-3R12-B
	7.5	10.0	18	27	1.5	43	1321-3R18-B
	11.0	15.0	25	37.5	1.2	52	1321-3R25-B
600V 50/60 Hz 3-phase	0.75	1.0	2	3	20.0	11.3	1321-3R2-B
	1.5	2.0	4	6	6.5	20	1321-3R4-B
	2.2	3.0	4	6	6.5	20	1321-3R4-B
	4.0	5.0	8	12	5.0	25.3	1321-3R8-C
	5.5	7.5	12	18	2.5	31	1321-3R12-B
	7.5	10.0	12	18	2.5	31	1321-3R12-B
	11.0	15.0	18	27	1.5	43	1321-3R18-B

(1) Catalog numbers listed are for 3% impedance open style units. NEMA Type 1 and 5% impedance reactor types are also available. See the 1321 Power Conditioning Products Technical Data, publication [1321-TD001](#).

**Figure 29 - Bulletin 1321-3R Series Line Reactors**



Cat. No.	A <i>mm (in.)</i>	B <i>mm (in.)</i>	C <i>mm (in.)</i>	D <i>mm (in.)</i>	E <i>mm (in.)</i>	Weight <i>kg (lb)</i>
1321-3R2-A	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-B	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-A	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (1.44)	1.8 (4)



<b>Cat. No.</b>	<b>A</b> <i>mm (in.)</i>	<b>B</b> <i>mm (in.)</i>	<b>C</b> <i>mm (in.)</i>	<b>D</b> <i>mm (in.)</i>	<b>E</b> <i>mm (in.)</i>	<b>Weight</b> <i>kg (lb)</i>
1321-3R4-B	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-C	112 (4.40)	104 (4.10)	86 (3.38)	60 (2.35)	37 (1.44)	2.3 (5)
1321-3R4-D	112 (4.40)	104 (4.10)	92 (3.62)	66 (2.60)	37 (1.44)	2.7 (6)
1321-3R8-A	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	3.1 (7)
1321-3R8-B	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	3.6 (8)
1321-3R8-C	152 (6.00)	127 (5.00)	85 (3.35)	63 (2.48)	51 (2.00)	4.9 (11)
1321-3R12-A	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	4.1 (9)
1321-3R12-B	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	4.5 (10)
1321-3R18-A	152 (6.00)	133 (5.25)	79 (3.10)	54 (2.13)	51 (2.00)	4.1 (9)
1321-3R18-B	152 (6.00)	133 (5.25)	86 (3.40)	63 (2.48)	51 (2.00)	5.4 (12)
1321-3R25-A	183 (7.20)	146 (5.76)	85 (3.35)	60 (2.35)	76 (3.00)	4.9 (11)
1321-3R35-A	193 (7.60)	146 (5.76)	91 (3.60)	66 (2.60)	76 (3.00)	6.3 (14)

**Table 23 - DC Bus Inductors**

<b>Input Voltage</b>	<b>kW</b>	<b>Hp</b>	<b>Amps</b>	<b>Inductance</b> <i>mh</i>	<b>MTE Cat. No.</b> <sup>(1)</sup>
240V 50/60 Hz 3-phase	5.5	7.5	32	0.85	32RB001
	7.5	10.0	40	0.5	40RB001
480V 50/60 Hz 3-phase	5.5	7.5	18	3.75	18RB004
	7.5	10.0	25	4.0	25RB005
	11.0	15.0	32	2.68	32RB003
600V 50/60 Hz 3-phase	5.5	7.5	12	6.0	12RB004
	7.5	10.0	18	6.0	18RB005
	11.0	15.0	25	4.0	25RB005

(1) Use MTE RB Series or equivalent inductors.

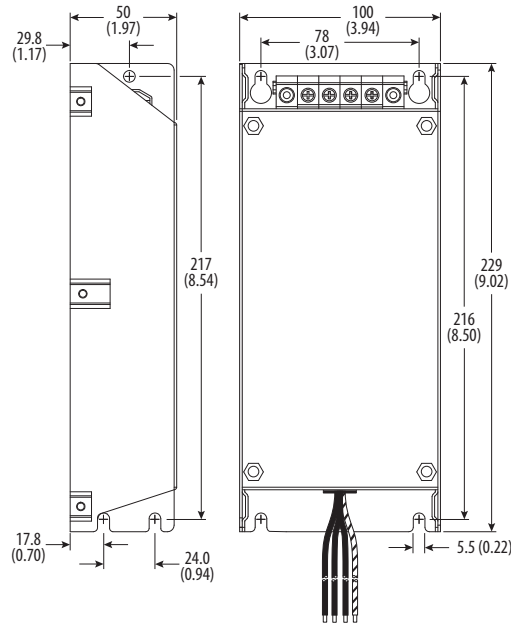
**Table 24 - EMC Line Filters**

Drive Ratings			S Type Filter Cat. No. <sup>(1)</sup>	L Type Filter Cat. No. <sup>(4)</sup>
Input Voltage	kW	Hp		
120V 50/60 Hz 1-phase	0.4	0.5	–	22-RF018-BL
	0.75	1.0	–	22-RF018-BL
	1.1	1.5	–	22-RF018-BL
240V 50/60 Hz 1-phase	0.4	0.5	<sup>(2)</sup>	22-RF018-BL
	0.75	1.0	<sup>(2)</sup>	22-RF018-BL
	1.5	2.0	<sup>(2)</sup>	22-RF018-BL
	2.2	3.0	<sup>(2)</sup>	22-RF025-CL
240V 50/60 Hz 3-phase	0.4	0.5	22-RF021-BS <sup>(3)</sup>	22-RF021-BL
	0.75	1.0	22-RF021-BS <sup>(3)</sup>	22-RF021-BL
	1.5	2.0	22-RF021-BS <sup>(3)</sup>	22-RF021-BL
	2.2	3.0	22-RF021-BS <sup>(3)</sup>	22-RF021-BL
	3.7	5.0	22-RF021-BS <sup>(3)</sup>	22-RF021-BL
	5.5	7.5	22-RF034-CS	22-RF034-CL
480V 50/60 Hz 3-phase	0.4	0.5	22-RF012-BS	22-RF012-BL
	0.75	1.0	22-RF012-BS	22-RF012-BL
	1.5	2.0	22-RF012-BS	22-RF012-BL
	2.2	3.0	22-RF012-BS	22-RF012-BL
	4.0	5.0	22-RF012-BS	22-RF012-BL
	5.5	7.5	22-RF018-CS	22-RF018-CL
	7.5	10.0	22-RF018-CS	22-RF018-CL
	11.0	15.0	22-RF026-CS	22-RF026-CL
600V 50/60 Hz 3-phase	0.75	1.0	–	22-RF8P0-BL
	1.5	2.0	–	22-RF8P0-BL
	2.2	3.0	–	22-RF8P0-BL
	4.0	5.0	–	22-RF8P0-BL
	5.5	7.5	–	22-RF015-CL
	7.5	10.0	–	22-RF015-CL
	11.0	15.0	–	22-RF024-CL

- (1) This filter is suitable for use with a cable length of at least 10 meters (33 feet) for Class A and 1 meter for Class B environments.
- (2) These ratings can be ordered with internal "S Type" filters. Refer to the Catalog Number Explanation for the PowerFlex 40 Drive on page 21 and Table 20 on page 68 for details.
- (3) Filter must be Series B or later.
- (4) This filter is suitable for use with a cable length of at least 100 meters for Class A and 5 meters for Class B environments.

**Figure 30 - Frame B EMC Line Filters**

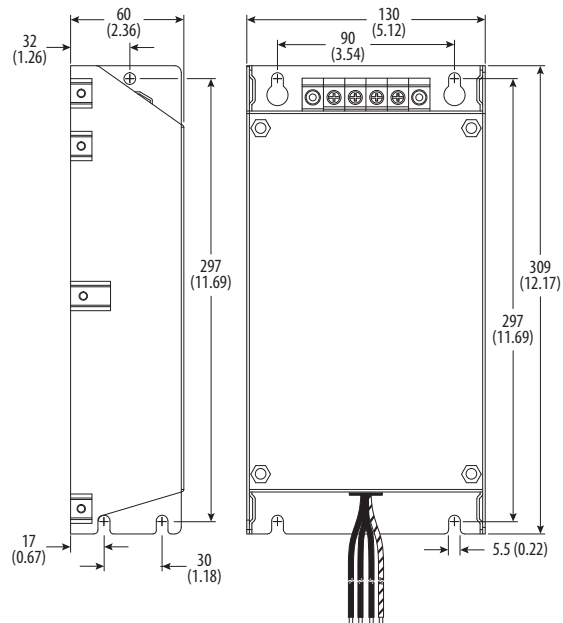
Cat. Nos.: 22-RF8P0-BL, 22-RF012-BS, -BL (Series B); 22-RF018-BS; 22-RF021-BS, -BL



Dimensions are in millimeters and (inches)

**Figure 31 - Frame C EMC Line Filters**

Cat. Nos.: 22-RF018-CS, -CL; 22-RF025-CL; 22-RF026-CS, -CL; 22-RF034-CS, -CL



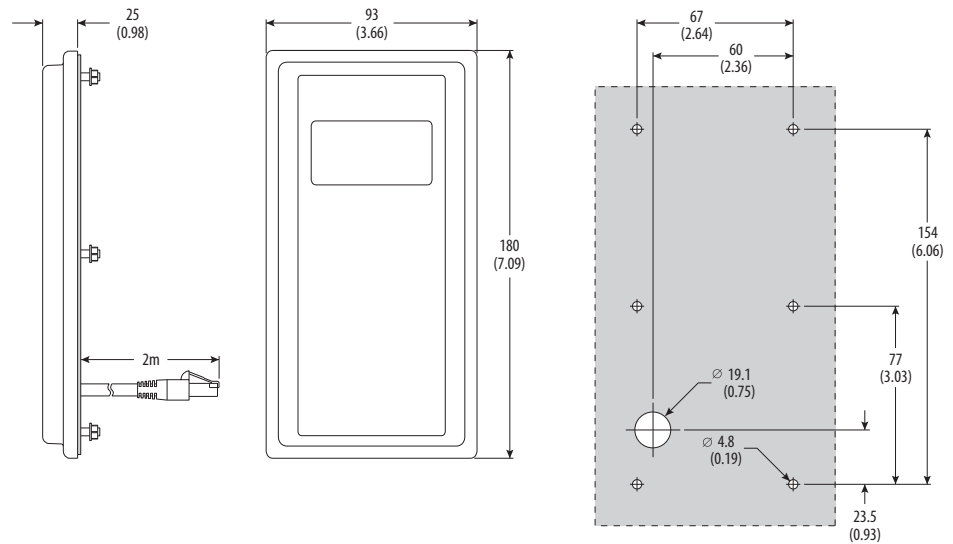
Dimensions are in millimeters and (inches)

**Table 25 - Human Interface Module (HIM) Option Kits and Accessories**

Item	Description	Cat. No.
LCD display, remote panel mount	Digital speed control CopyCat capable IP66 (NEMA Type 4X/12) indoor use only Includes 2.9 meter cable	22-HIM-C2S
LCD display, remote panel mount	Digital speed control CopyCat capable IP66 (NEMA Type 4X/12) indoor use only Includes 2.9 meter cable	22-HIM-C2
LCD display, remote handheld	Digital speed control Full numeric keypad CopyCat capable IP30 (NEMA Type 1) Includes 1.0 meter cable Panel mount with optional Bezel kit	22-HIM-A3
Bezel kit	Panel mount for LCD display, remote handheld unit, IP30 (NEMA Type 1)	22-HIM-B1
DSI HIM cable (DSI HIM to RJ45 cable)	1.0 m (3.3 ft) 2.9 m (9.51 ft)	22-HIM-H10 22-HIM-H30

**Figure 32 - Remote (Panel Mount) HIM**

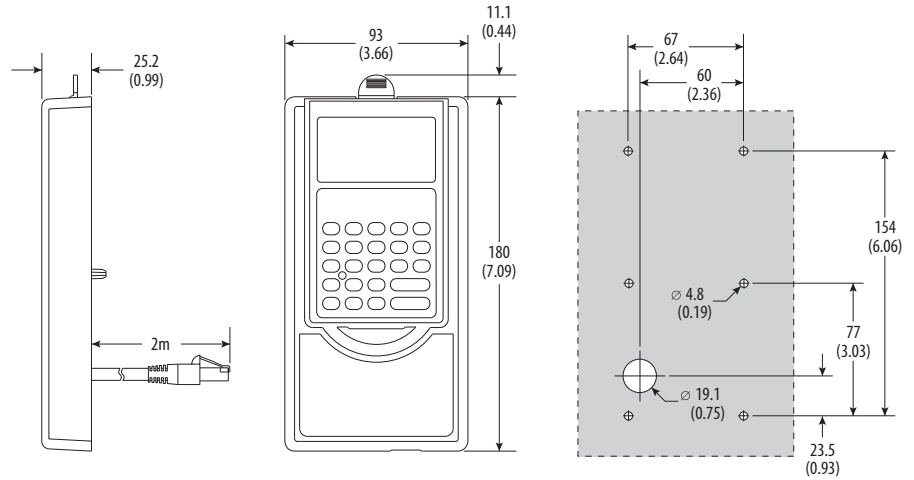
Cat. No.: 22-HIM-C2S



Dimensions are in millimeters and (inches)

**Figure 33 - NEMA Type 1 Bezel**

Cat. No.: 22-HIM-B1



Dimensions are in millimeters and (inches)

**Table 26 - IP30/NEMA 1/UL Type 1 Kit**

Item	Description	Drive Frame	Cat. No.
IP30/NEMA 1/UL Type 1 kit	Field installed kit. Converts drive to IP30/NEMA 1/UL Type 1 enclosure. Includes conduit box with mounting screws and plastic top panel.	B	22-JBAB
		C	22-JBAC
IP30/NEMA 1/UL Type 1 kit for communication option	Field installed kit. Converts drive to IP30/NEMA 1/UL Type 1 enclosure. Includes communication option conduit box with mounting screws and plastic top panel.	B	22-JBCB
		C	22-JBCC

**Table 27 - Communication Option Kits and Accessories**

Item	Description	Cat. No.
Communication adapters	Communication options for use with the PowerFlex 4-Class drives. Requires a communication adapter cover (IP20, NEMA/UL Type 1 only. Ordered separately.) BACnet® ControlNet™ DeviceNet™ EtherNet/IP™ LonWorks® PROFIBUS™ DP	22-COMM-B 22-COMM-C 22-COMM-D 22-COMM-E 22-COMM-L 22-COMM-P
External DSI communication kit	External mounting kit for 22-COMM communication options.	22-XCOMM-DC-BASE
External communication power supply	Optional 100...240V AC power supply for external DSI communication kit.	20-XCOMM-AC-PS1
Compact I/O module	Three channel.	1769-SM2
Communication adapter cover	Cover that houses the DeviceNet communication adapter (IP20, NEMA/UL Type 1 only). B frame drive C frame drive	22B-CCB 22B-CCC

Item	Description	Cat. No.
Serial converter module (RS485 to RS232)	Provides serial communication via DF1 protocol for use with DriveExplorer and DriveExecutive software. Includes: DSI to RS232 serial converter (1). 1203-SFC serial cable (1) 22-RJ45CBL-C20 cable (1) DriveExplorer Lite CD (1)	22-SCM-232
DSI cable	2.0 meter RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Serial cable	2.0 meter serial cable with a locking low profile connector to connect to the serial converter and a 9-pin sub-miniature D female connector to connect to a computer.	1203-SFC
Null cable converter	For use when connecting the serial converter to DriveExplorer on a handheld PC.	1203-SNM
Splitter cable	RJ45 one to two port splitter cable	AK-U0-RJ45-SC1
Terminating resistors	RJ45 120 Ω resistors (2 pieces)	AK-U0-RJ45-TR1
Terminal block	RJ45 Two position terminal block (5 pieces)	AK-U0-RJ45-TB2P
DriveExplorer software (CD-ROM) version 3.01 or later	Windows based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communication adapters online. Compatibility: Windows 95, 98, ME, NT 4.0 (Service Pack 3 or later), 2000, XP and CE	9306-4EXP01ENE
DriveExecutive software (CD-ROM) version 1.01 or later	Windows based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communication adapters online and offline. Compatibility: Windows 98, ME, NT 4.0 (Service Pack 3 or later), 2000 and XP	9303-4DTE01ENE

## PowerFlex 40P

**Table 28 - Catalog Number Description**

<b>22D</b>	<b>-</b>	<b>B</b>	<b>2P3</b>	<b>N</b>	<b>1</b>	<b>0</b>	<b>4</b>
Drive		Voltage Rating	Rating	Enclosure	HIM	Emission Class	Version

**Table 29 - PowerFlex 40P Drives Ratings**

Drive Ratings				IP20/NEMA Type Open		IP20 Flange Mount <sup>(1)</sup>	Plate Drive
Input Voltage	kW	Hp	Output Current Amps	Cat. No.	Frame Size	Cat. No.	Cat. No.
240V 50/60 Hz 3-phase no filter	0.4	0.5	2.3	22D-B2P3N104	B	22D-B2P3F104	22D-B2P3H204
	0.75	1.0	5.0	22D-B5P0N104	B	22D-B5P0F104	22D-B5P0H204
	1.5	2.0	8.0	22D-B8P0N104	B	22D-B8P0F104	22D-B8P0H204
	2.2	3.0	12.0	22D-B012N104	B	22D-B012F104	22D-B012H204
	3.7	5.0	17.5	22D-B017N104	B	22D-B017F104	22D-B017H204
	5.5	7.5	24.0	22D-B024N104	C	22D-B024F104	22D-B024H204
	7.5	10.0	33.0	22D-B033N104	C	22D-B033F104	22D-B033H204
480V 50/60 Hz 3-phase no filter	0.4	0.5	1.4	22D-D1P4N104	B	22D-D1P4F104	22D-D1P4H204
	0.75	1.0	2.3	22D-D2P3N104	B	22D-D2P3F104	22D-D2P3H204
	1.5	2.0	4.0	22D-D4P0N104	B	22D-D4P0F104	22D-D4P0H204
	2.2	3.0	6.0	22D-D6P0N104	B	22D-D6P0F104	22D-D6P0H204
	4.0	5.0	10.5	22D-D010N104	B	22D-D010F104	22D-D010H204
	5.5	7.5	12.0	22D-D012N104	C	22D-D012F104	22D-D012H204
	7.5	10.0	17.0	22D-D017N104	C	22D-D017F104	22D-D017H204
	11.0	15.0	24.0	22D-D024N104	C	22D-D024F104 <sup>(2)</sup>	22D-D024H204 <sup>(2)</sup>
600V 50/60 Hz 3-phase no filter	0.75	1.0	1.7	22D-E1P7N104	B	22D-E1P7F104	22D-E1P7H204
	1.5	2.0	3.0	22D-E3P0N104	B	22D-E3P0F104	22D-E3P0H204
	2.2	3.0	4.2	22D-E4P2N104	B	22D-E4P2F104	22D-E4P2H204
	4.0	5.0	6.6	22D-E6P6N104	B	22D-E6P6F104	22D-E6P6H204
	5.5	7.5	9.9	22D-E9P9N104	C	22D-E9P9F104	22D-E9P9H204
	7.5	10.0	12.0	22D-E012N104	C	22D-E012F104	22D-E012H204
	11.0	15.0	19.0	22D-E019N104	C	22D-E019F104	22D-E019H204

(1) Meets IP40/54/65 (NEMA 1/12/4/4X) when installed in an enclosure of like rating.

(2) Requires use of external DC bus inductor or AC line reactor. See [Table 33](#) on page [83](#) for details.

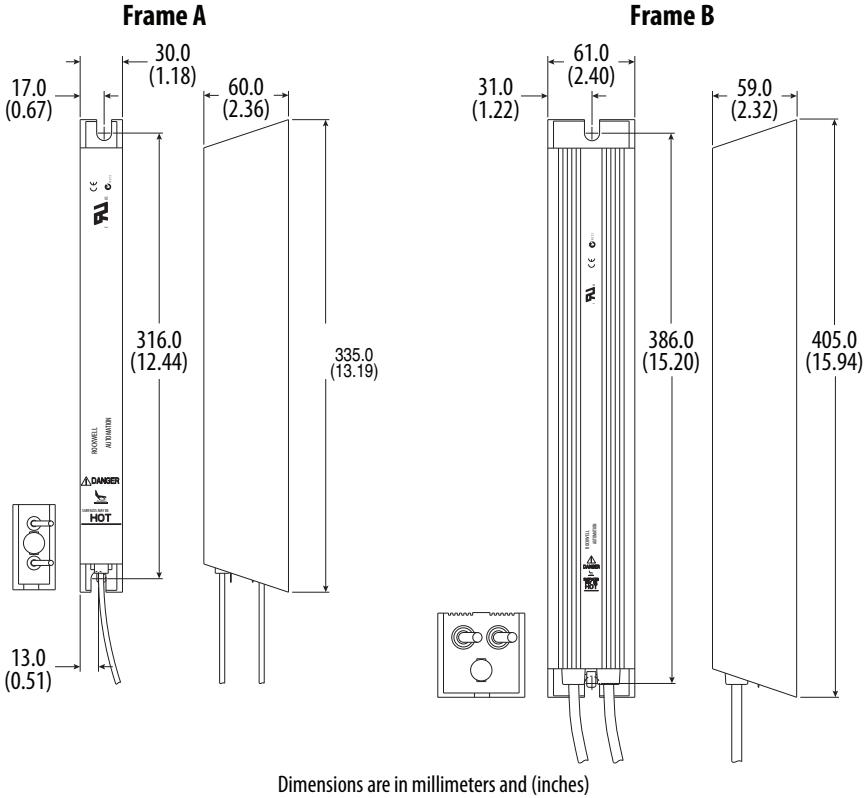
**Table 30 - Dynamic Brake Modules**

Drive Ratings				Cat. No. <sup>(1)</sup> <sup>(2)</sup>
Input Voltage	kW	Hp	Min Resistance $\Omega$	
240V 50/60 Hz 3-phase	0.4	0.5	48	AK-R2-091P500
	0.75	1.0	48	AK-R2-091P500
	1.5	2.0	48	AK-R2-091P500
	2.2	3.0	32	AK-R2-047P500
	3.7	5.0	19	AK-R2-047P500
	5.5	7.5	13	AK-R2-030P1K2
	7.5	10.0	10	AK-R2-030P1K2
480V 50/60 Hz 3-phase	0.4	0.5	97	AK-R2-360P500
	0.75	1.0	97	AK-R2-360P500
	1.5	2.0	97	AK-R2-360P500
	2.2	3.0	97	AK-R2-120P1K2
	4.0	5.0	77	AK-R2-120P1K2
	5.5	7.5	55	AK-R2-120P1K2
	7.5	10.0	39	AK-R2-120P1K2
	11.0	15.0	24	AK-R2-120P1K2 <sup>(3)</sup>
600V 50/60 Hz 3-phase	0.75	1.0	120	AK-R2-360P500
	1.5	2.0	120	AK-R2-360P500
	2.2	3.0	82	AK-R2-120P1K2
	4.0	5.0	82	AK-R2-120P1K2
	5.5	7.5	51	AK-R2-120P1K2
	7.5	10.0	51	AK-R2-120P1K2
	11.0	15.0	51	AK-R2-120P1K2 <sup>(3)</sup>

- (1) The resistors listed in this tables are rated for 5% duty cycle.
- (2) Use of Rockwell resistors is always recommended. The resistors listed have been carefully selected for optimizing performance in a variety of applications. Alternative resistors may be used, however care must be taken when making a selection. Refer to the PowerFlex Dynamic Braking Resistor Calculator, publication [PFLEX-AT001](#).
- (3) Requires two resistors wired in parallel.

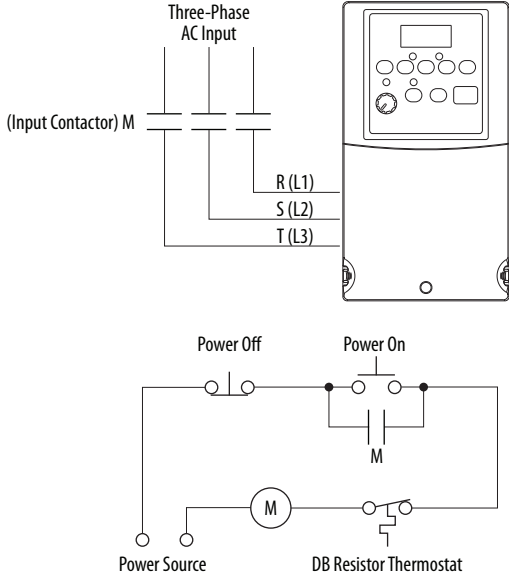


Figure 34 - Dynamic Brake Modules



Frame	Cat. No.	Weight kg (lb)
A	AK-R2-091P500, AK-R2-047P500, AK-R2-360P500	1.1 (2.5)
B	AK-R2-030P1K2, AK-R2-120P1K2	2.7 (6)

Figure 35 - Recommended External Brake Resistor Circuitry

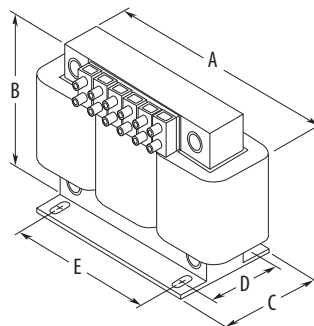


**Table 31 - Bulletin 1321-3R Series Line Reactors**

Input Voltage	kW	Hp	Fundamental Amps	Maximum Continuous Amps	Inductance <i>mh</i>	Watts Loss	Cat. No. <sup>(1)</sup>
240V 50/60 Hz 3-phase	0.4	0.5	4	6	12.0	21	1321-3R4-D
	0.75	1.0	8	12	3.0	29	1321-3R8-B
	1.5	2.0	8	12	1.5	19.5	1321-3R8-A
	2.2	3.0	12	18	1.25	26	1321-3R12-A
	3.7	5.0	18	27	0.8	36	1321-3R18-A
	5.5	7.5	25	37.5	0.5	48	1321-3R25-A
	7.5	10.0	35	52.5	0.4	49	1321-3R35-A
480V 50/60 Hz 3-phase	0.4	0.5	2	3	20.0	11.3	1321-3R2-B
	0.75	1.0	4	6	9.0	20	1321-3R4-C
	1.5	2.0	4	6	6.5	20	1321-3R4-B
	2.2	3.0	8	12	5.0	25.3	1321-3R8-C
	4.0	5.0	12	18	2.5	31	1321-3R12-B
	5.5	7.5	12	18	2.5	31	1321-3R12-B
	7.5	10.0	18	27	1.5	43	1321-3R18-B
	11.0	15.0	25	37.5	1.2	52	1321-3R25-B
600V 50/60 Hz 3-phase	0.75	1.0	2	3	20.0	11.3	1321-3R2-B
	1.5	2.0	4	6	6.5	20	1321-3R4-B
	2.2	3.0	4	6	6.5	20	1321-3R4-B
	4.0	5.0	8	12	5.0	25.3	1321-3R8-C
	5.5	7.5	12	18	2.5	31	1321-3R12-B
	7.5	10.0	12	18	2.5	31	1321-3R12-B
	11.0	15.0	18	27	1.5	43	1321-3R18-B

(1) Catalog numbers listed are for 3% impedance open style units. NEMA Type 1 and 5% impedance reactor types are also available. See the 1321 Power Conditioning Products Technical Data, publication [1321-TD001](#).

**Figure 36 - Bulletin 1321-3R Series Line Reactors**



Cat. No.	A <i>mm (in.)</i>	B <i>mm (in.)</i>	C <i>mm (in.)</i>	D <i>mm (in.)</i>	E <i>mm (in.)</i>	Weight <i>kg (lb)</i>
1321-3R2-A	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-B	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-A	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (1.44)	1.8 (4)

<b>Cat. No.</b>	<b>A</b> <i>mm (in.)</i>	<b>B</b> <i>mm (in.)</i>	<b>C</b> <i>mm (in.)</i>	<b>D</b> <i>mm (in.)</i>	<b>E</b> <i>mm (in.)</i>	<b>Weight</b> <i>kg (lb)</i>
1321-3R4-B	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-C	112 (4.40)	104 (4.10)	86 (3.38)	60 (2.35)	37 (1.44)	2.3 (5)
1321-3R4-D	112 (4.40)	104 (4.10)	92 (3.62)	66 (2.60)	37 (1.44)	2.7 (6)
1321-3R8-A	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	3.1 (7)
1321-3R8-B	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	3.6 (8)
1321-3R8-C	152 (6.00)	127 (5.00)	85 (3.35)	63 (2.48)	51 (2.00)	4.9 (11)
1321-3R12-A	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	4.1 (9)
1321-3R12-B	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	4.5 (10)
1321-3R18-A	152 (6.00)	133 (5.25)	79 (3.10)	54 (2.13)	51 (2.00)	4.1 (9)
1321-3R18-B	152 (6.00)	133 (5.25)	86 (3.40)	63 (2.48)	51 (2.00)	5.4 (12)
1321-3R25-A	183 (7.20)	146 (5.76)	85 (3.35)	60 (2.35)	76 (3.00)	4.9 (11)
1321-3R35-A	193 (7.60)	146 (5.76)	91 (3.60)	66 (2.60)	76 (3.00)	6.3 (14)

**Table 32 - DC Bus Inductors**

<b>Input Voltage</b>	<b>kW</b>	<b>Hp</b>	<b>Amps</b>	<b>Inductance</b> <i>mh</i>	<b>Cat. No.</b>
240V 50/60 Hz 3-phase	5.5	7.5	32	0.85	1321-DC32-1
	7.5	10.0	40	0.5	1321-DC40-2
480V 50/60 Hz 3-phase	5.5	7.5	18	3.75	1321-DC18-4
	7.5	10.0	25	4.0	1321-DC25-4
	11.0	15.0	32	2.68	1321-DC32-3
600V 50/60 Hz 3-phase	5.5	7.5	12	6.0	1321-DC12-2
	7.5	10.0	18	6.0	1321-DC18-4
	11.0	15.0	25	4.0	1321-DC25-4

**Table 33 - EMC Line Filters**

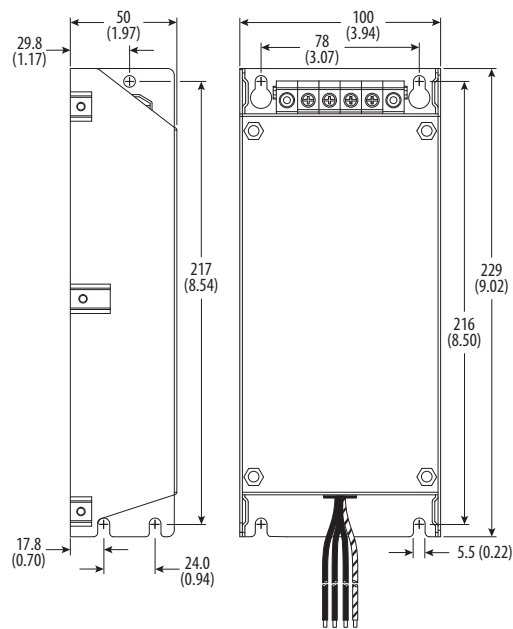
<b>Drive Ratings</b>			<b>S Type Filter</b> <b>Cat. No.</b> <sup>(1)</sup>	<b>L Type Filter</b> <b>Cat. No.</b> <sup>(2)</sup>
<b>Input Voltage</b>	<b>kW</b>	<b>Hp</b>		
240V 50/60 Hz 3-phase	0.4	0.5	22-RF021-BS	22-RF021-BL <sup>(3)</sup>
	0.75	1.0	22-RF021-BS	22-RF021-BL <sup>(3)</sup>
	1.5	2.0	22-RF021-BS	22-RF021-BL <sup>(3)</sup>
	2.2	3.0	22-RF021-BS	22-RF021-BL <sup>(3)</sup>
	3.7	5.0	22-RF021-BS	22-RF021-BL <sup>(3)</sup>
	5.5	7.5	22-RF034-CS	22-RF034-CL
	7.5	10.0	22-RF034-CS	22-RF034-CL

Drive Ratings			S Type Filter Cat. No. <sup>(1)</sup>	L Type Filter Cat. No. <sup>(2)</sup>
Input Voltage	kW	Hp		
480V 50/60 Hz 3-phase	0.4	0.5	22-RF012-BS	22-RF012-BL
	0.75	1.0	22-RF012-BS	22-RF012-BL
	1.5	2.0	22-RF012-BS	22-RF012-BL
	2.2	3.0	22-RF012-BS	22-RF012-BL
	4.0	5.0	22-RF012-BS	22-RF012-BL
	5.5	7.5	22-RF018-CS <sup>(3)</sup>	22-RF018-CL
	7.5	10.0	22-RF018-CS <sup>(3)</sup>	22-RF018-CL
	11.0	15.0	22-RF026-CS <sup>(3)</sup>	22-RF026-CL
600V 50/60 Hz 3-phase	0.75	1.0	—	22-RF8P0-BL
	1.5	2.0	—	22-RF8P0-BL
	2.2	3.0	—	22-RF8P0-BL
	4.0	5.0	—	22-RF8P0-BL
	5.5	7.5	—	22-RF015-CL
	7.5	10.0	—	22-RF015-CL
	11.0	15.0	—	22-RF024-CL

- (1) This filter is suitable for use with a cable length of at least 10 meters (33 feet) for Class A and 1 meter for Class B environments.
- (2) This filter is suitable for use with a cable length of at least 100 meters for Class A and 5 meters for Class B environments.
- (3) Filter must be Series C or later.

**Figure 37 - Frame B EMC Line Filters**

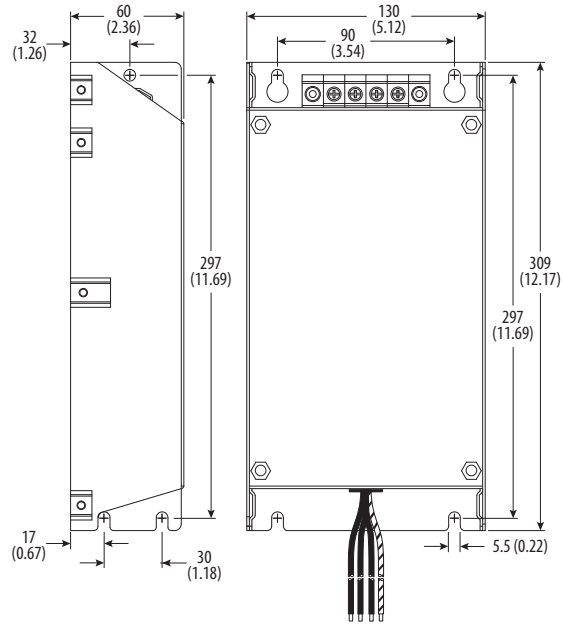
Cat. Nos.: 22-RF8P0-BL, 22-RF012-BS, -BL (Series B); 22-RF018-BS; 22-RF021-BS, -BL



Dimensions are in millimeters and (inches)

**Figure 38 - Frame C EMC Line Filters**

Cat. Nos.: 22-RF018-CS, -CL; 22-RF025-CL; 22-RF026-CS, -CL; 22-RF034-CS, -CL



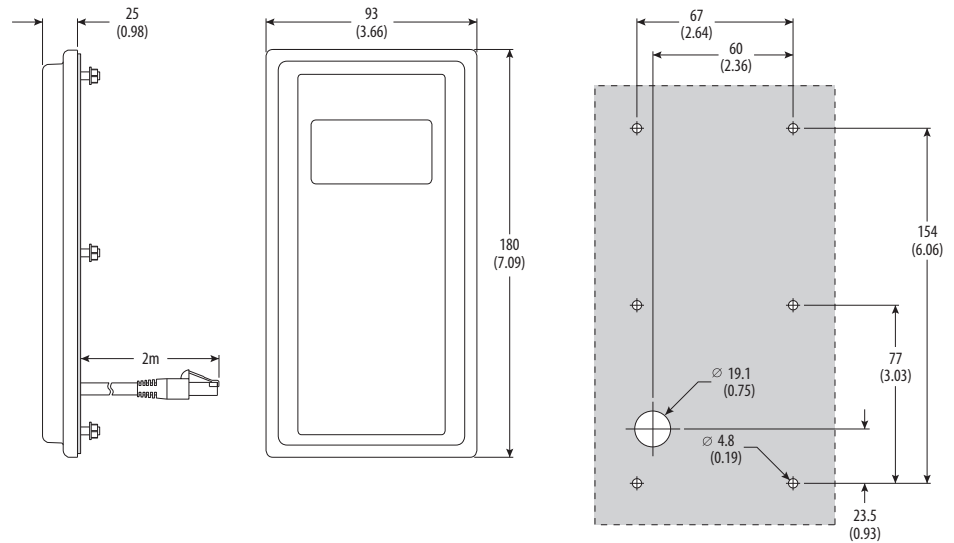
Dimensions are in millimeters and (inches)

**Table 34 - Human Interface Module (HIM) Option Kits and Accessories**

Item	Description	Cat. No.
LCD display, remote panel mount	Digital speed control CopyCat capable IP66 (NEMA Type 4X/12) indoor use only Includes 2.9 meter cable	22-HIM-C2S
LCD display, remote handheld	Digital speed control Full numeric keypad CopyCat capable IP30 (NEMA Type 1) Includes 1.0 meter cable Panel mount with optional Bezel Kit	22-HIM-A3
Bezel kit	Panel mount for LCD display, remote handheld unit, IP30 (NEMA Type 1)	22-HIM-B1
DSI HIM cable (DSI HIM to RJ45 cable)	1.0 m (3.3 ft) 2.9 m (9.51 ft)	22-HIM-H10 22-HIM-H30

**Figure 39 - Remote (Panel Mount) HIM**

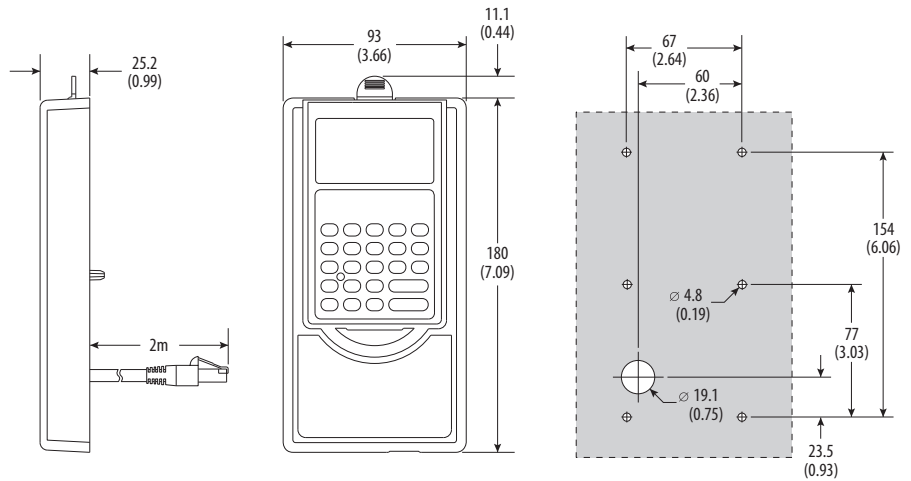
Cat. No.: 22-HIM-C2S



Dimensions are in millimeters and (inches)

**Figure 40 - NEMA Type 1 Bezel**

Cat. No.: 22-HIM-B1



Dimensions are in millimeters and (inches)

**Table 35 - IP30/NEMA 1/UL Type 1 Kit**

Item	Description	Drive Frame	Cat. No.
IP30/NEMA 1/UL Type 1 kit	Field installed kit. Converts drive to IP30/NEMA 1/UL Type 1 enclosure. Includes conduit box with mounting screws and plastic top panel.	B	22-JBAB
		C	22-JBAC
IP30/NEMA 1/UL Type 1 kit for communication option	Field installed kit. Converts drive to IP30/NEMA 1/UL Type 1 enclosure. Includes communication option conduit box with mounting screws and plastic top panel.	B	22-JBCB
		C	22-JBCC

**Table 36 - Other Options**

Item	Description	Cat. No.
DriveGuard® Safe Torque-Off option board	When used with suitable safety components, provides protection according to EN 954-1, Category 3 for safe off and protection against restart.	20A-DG01

**Table 37 - Communication Option Kits and Accessories**

Item	Description	Cat. No.
Communication adapters	Communication options for use with the PowerFlex 4-Class drives. Requires a communication adapter cover (ordered separately). ControlNet™ DeviceNet™ EtherNet/IP™ LonWorks™ PROFIBUS™ DP	22-COMM-C 22-COMM-D 22-COMM-E 22-COMM-L 22-COMM-P
External DSI™ communication kit	External mounting kit for 22-COMM cards.	22-XCOMM-DC-BASE
External communication kit power supply	Optional 100...240V AC power supply for external DSI communications kit.	20-XCOMM-AC-PS1
Compact I/O module	Three channel.	1769-SM2
Communication adapter cover	Cover that houses the communication adapter. B Frame Drive C Frame Drive	22D-CCB 22D-CCC
Universal Serial Bus™ (USB) converter module	Provides serial communication via DF1 protocol for use with DriveExplorer and DriveTools SP software. Includes: 2 meter USB cable (1) 20-HIM-H10 cable (1) 22-HIM-H10 cable (1)	1203-USB
Serial converter module (RS485 to RS232)	Provides serial communication via DF1 protocol for use with DriveExplorer and DriveTools SP software. Includes: DSI to RS232 serial converter (1) 1203-SFC serial cable (1) 22-RJ45CBL-C20 cable (1) DriveExplorer Lite CD (1)	22-SCM-232
Remote handheld HIM	Wireless interface module with <i>Bluetooth</i> ® technology, IP30 (NEMA Type 1), panel mount with optional bezel kit.	22-WIM-N1
Remote panel mount HIM	Wireless interface module with <i>Bluetooth</i> ® technology, IP66 (NEMA Type 4X/12) indoor use only.	22-WIM-N4S
DSI cable	2 meter RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Serial cable	2 meter serial cable with a locking low profile connector to connect to the serial converter and a 9-pin sub-miniature D female connector to connect to a computer.	1203-SFC
Null cable converter	For use when connecting the serial converter to DriveExplorer on a handheld PC.	1203-SNM
Splitter cable	RJ45 one to two port splitter cable	AK-U0-RJ45-SC1
Terminating resistors	RJ45 120 Ω resistors (2 pieces)	AK-U0-RJ45-TR1
Terminal block	RJ45 two position terminal block (5 pieces)	AK-U0-RJ45-TB2P

Item	Description	Cat. No.
DriveTools SP software	Windows based software packages that provide an intuitive means for monitoring or configuring Allen-Bradley drives and communication adapters online. Compatibility: Windows 95, 98, ME, NT 4.0 (Service Pack 3 or later), 2000, XP and CE <sup>(1)</sup>	9303-4DTS01ENE
DriveExplorer Software (CD-ROM) version 3.01 or later		9306-4EXP01ENE
DriveExecutive software (CD-ROM) version 1.01 or later		9303-4DTE01ENE

(1) See [www.ab.com/drives/driveexplorer.htm](http://www.ab.com/drives/driveexplorer.htm) for supported devices.

## PowerFlex 525

Table 38 - Catalog Number Description

25B	-	V	2P5	N	1	0	4
Drive		Voltage Rating	Rating	Enclosure	HIM	Emission Class	Version

Table 39 - PowerFlex 525 Drive Ratings

Output Ratings					Input Voltage Range	Frame Size	Cat. No.
Normal Duty		Heavy Duty		Output Current <i>Amps</i>			
Hp	kW	Hp	kW				
<b>100...120V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	85...132	A	25B-V2P5N104
1.0	0.75	1.0	0.75	4.8	85...132	B	25B-V4P8N104
1.5	1.1	1.5	1.1	6.0	85...132	B	25B-V6P0N104
<b>200...240V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	170...264	A	25B-A2P5N104
1.0	0.75	1.0	0.75	4.8	170...264	A	25B-A4P8N104
2.0	1.5	2.0	1.5	8.0	170...264	B	25B-A8P0N104
3.0	2.2	3.0	2.2	11.0	170...264	B	25B-A011N104
<b>200...240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	170...264	A	25B-A2P5N114
1.0	0.75	1.0	0.75	4.8	170...264	A	25B-A4P8N114
2.0	1.5	2.0	1.5	8.0	170...264	B	25B-A8P0N114
3.0	2.2	3.0	2.2	11.0	170...264	B	25B-A011N114
<b>200...240V AC (-15%, +10%) – 3-Phase Input, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	170...264	A	25B-B2P5N104
1.0	0.75	1.0	0.75	5.0	170...264	A	25B-B5P0N104
2.0	1.5	2.0	1.5	8.0	170...264	A	25B-B8P0N104
3.0	2.2	3.0	2.2	11.0	170...264	A	25B-B011N104
5.0	4.0	5.0	4.0	17.5	170...264	B	25B-B017N104
7.5	5.5	7.5	5.5	24.0	170...264	C	25B-B024N104
10.0	7.5	10.0	7.5	32.2	170...264	D	25B-B032N104
15.0	11.0	10.0	7.5	48.3	170...264	E	25B-B048N104
20.0	15.0	15.0	11.0	62.1	170...264	E	25B-B062N104
<b>380...480V AC (-15%, +10%) – 3-Phase Input, 0...460V 3-Phase Output <sup>(1)</sup></b>							
0.5	0.4	0.5	0.4	1.4	323...528	A	25B-D1P4N104
1.0	0.75	1.0	0.75	2.3	323...528	A	25B-D2P3N104
2.0	1.5	2.0	1.5	4.0	323...528	A	25B-D4P0N104
3.0	2.2	3.0	2.2	6.0	323...528	A	25B-D6P0N104
5.0	4.0	5.0	4.0	10.5	323...528	B	25B-D010N104



Output Ratings					Input Voltage Range	Frame Size	Cat. No.
Normal Duty		Heavy Duty		Output Current Amps			
Hp	kW	Hp	kW				
7.5	5.5	7.5	5.5	13.0	323...528	C	25B-D013N104
10.0	7.5	10.0	7.5	17.0	323...528	C	25B-D017N104
15.0	11.0	15.0	11.0	24.0	323...528	D	25B-D024N104
20.0	15.0	15.0	11.0	30.0	323...528	D	25B-D030N104
<b>380...480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0...460V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	1.4	323...528	A	25B-D1P4N114
1.0	0.75	1.0	0.75	2.3	323...528	A	25B-D2P3N114
2.0	1.5	2.0	1.5	4.0	323...528	A	25B-D4P0N114
3.0	2.2	3.0	2.2	6.0	323...528	A	25B-D6P0N114
5.0	4.0	5.0	4.0	10.5	323...528	B	25B-D010N114
7.5	5.5	7.5	5.5	13.0	323...528	C	25B-D013N114
10.0	7.5	10.0	7.5	17.0	323...528	C	25B-D017N114
15.0	11.0	15.0	11.0	24.0	323...528	D	25B-D024N114
20.0	15.0	15.0	11.0	30.0	323...528	D	25B-D030N114
25.0	18.5	20.0	15.0	37.0	323...528	E	25B-D037N114
30.0	22.0	25.0	18.5	43.0	323...528	E	25B-D043N114
<b>525...600V AC (-15%, +10%) – 3-Phase Input, 0...575V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	0.9	446...660	A	25B-E0P9N104
1.0	0.75	1.0	0.75	1.7	446...660	A	25B-E1P7N104
2.0	1.5	2.0	1.5	3.0	446...660	A	25B-E3P0N104
3.0	2.2	3.0	2.2	4.2	446...660	A	25B-E4P2N104
5.0	4.0	5.0	4.0	6.6	446...660	B	25B-E6P6N104
7.5	5.5	7.5	5.5	9.9	446...660	C	25B-E9P9N104
10.0	7.5	10.0	7.5	12.0	446...660	C	25B-E012N104
15.0	11.0	15.0	11.0	19.0	446...660	D	25B-E019N104
20.0	15.0	15.0	11.0	22.0	446...660	D	25B-E022N104
25.0	18.5	20.0	15.0	27.0	446...660	E	25B-E027N104
30.0	22.0	25.0	18.5	32.0	446...660	E	25B-E032N104

(1) A non-filtered drive is not available for 380...480V AC 25 Hp (18.5 kW) and 30 Hp (22.0 kW) ratings. Filtered drives are available, however you must verify that the application will support a filtered drive.

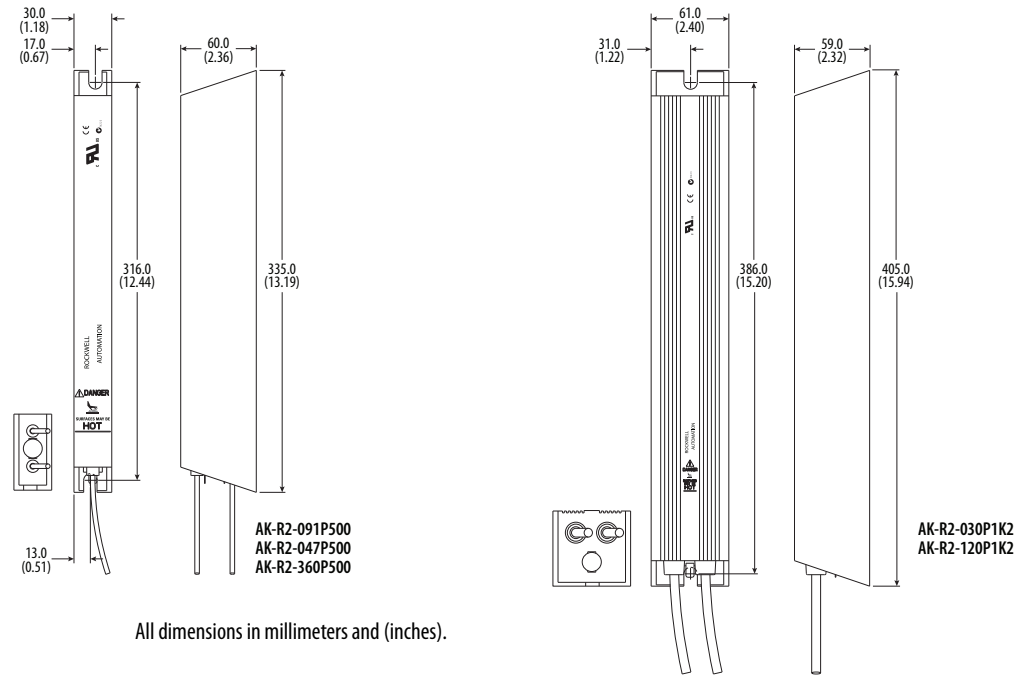
**Table 40 - Dynamic Brake Resistors**

Drive Ratings Input Voltage	Hp	kW	Min Resistance	Resistance	Cat. No. <sup>(1)(2)</sup>
			$\Omega \pm 10\%$	$\Omega \pm 5\%$	
100...120V 50/60 Hz 1-phase	0.5	0.4	56	91	AK-R2-091P500
	1.0	0.75	56	91	AK-R2-091P500
	1.5	1.1	41	91	AK-R2-091P500
200...240V 50/60 Hz 1-phase	0.5	0.4	56	91	AK-R2-091P500
	1.0	0.75	56	91	AK-R2-091P500
	2.0	1.5	41	91	AK-R2-091P500
	3.0	2.2	32	47	AK-R2-047P500

Drive Ratings			Min Resistance	Resistance	Cat. No. <sup>(1)(2)</sup>
Input Voltage	Hp	kW	$\Omega \pm 10\%$	$\Omega \pm 5\%$	
200...240V 50/60 Hz 3-phase	0.5	0.4	56	91	AK-R2-091P500
	1.0	0.75	56	91	AK-R2-091P500
	2.0	1.5	41	91	AK-R2-091P500
	3.0	2.2	32	47	AK-R2-047P500
	5.0	4.0	18	47	AK-R2-047P500
	7.5	5.5	16	30	AK-R2-030P1K2
	10.0	7.5	14	30	AK-R2-030P1K2
	15.0	11.0	14	15	AK-R2-030P1K2 <sup>(3)</sup>
	20.0	15.0	10	15	AK-R2-030P1K2 <sup>(3)</sup>
380...480V 50/60 Hz 3-phase	0.5	0.4	89	360	AK-R2-360P500
	1.0	0.75	89	360	AK-R2-360P500
	2.0	1.5	89	360	AK-R2-360P500
	3.0	2.2	89	120	AK-R2-120P1K2
	5.0	4.0	47	120	AK-R2-120P1K2
	7.5	5.5	47	120	AK-R2-120P1K2
	10.0	7.5	47	120	AK-R2-120P1K2
	15.0	11.0	43	60	AK-R2-120P1K2 <sup>(3)</sup>
	20.0	15.0	43	60	AK-R2-120P1K2 <sup>(3)</sup>
	25.0	18.5	27	40	AK-R2-120P1K2 <sup>(4)</sup>
	30.0	22.0	27	40	AK-R2-120P1K2 <sup>(4)</sup>
525...600V 50/60 Hz 3-phase	0.5	0.4	112	360	AK-R2-360P500
	1.0	0.75	112	360	AK-R2-360P500
	2.0	1.5	112	360	AK-R2-360P500
	3.0	2.2	112	120	AK-R2-120P1K2
	5.0	4.0	86	120	AK-R2-120P1K2
	7.5	5.5	59	120	AK-R2-120P1K2
	10.0	7.5	59	120	AK-R2-120P1K2
	15.0	11.0	59	60	AK-R2-120P1K2 <sup>(3)</sup>
	20.0	15.0	59	60	AK-R2-120P1K2 <sup>(3)</sup>
	25.0	18.5	53	60	AK-R2-120P1K2 <sup>(3)</sup>
	30.0	22.0	34	40	AK-R2-120P1K2 <sup>(4)</sup>

- (1) The resistors listed in this tables are rated for 5% duty cycle.
- (2) Use of Rockwell Automation resistors is always recommended. The resistors listed have been carefully selected for optimizing performance in a variety of applications. Alternative resistors may be used, however, care must be taken when making a selection. See the PowerFlex Dynamic Braking Resistor Calculator, publication [PFLEX-AT001](#).
- (3) Requires two resistors wired in parallel.
- (4) Requires three resistors wired in parallel.

**Figure 41 - PowerFlex 525 External Dynamic Brake Resistor Kit Dimensions**



All dimensions in millimeters and (inches).

**Table 41 - EMC Line Filters**

Drive Ratings				Frame Size	Cat. No.
Input Voltage	Hp	kW	Current <i>Amps</i>		
100...120V 50/60 Hz 1-phase	0.5	0.4	2.5	A	25-RF011-AL
	1.0	0.75	4.8	B	25-RF023-BL
	1.5	1.1	6.0	B	25-RF023-BL
200...240V 50/60 Hz 1-phase	0.5	0.4	2.5	A	25-RF011-AL
	1.0	0.75	4.8	A	25-RF011-AL
	2.0	1.5	8.0	B	25-RF023-BL
	3.0	2.2	11.0	B	25-RF023-BL
200...240V 50/60 Hz 3-phase	0.5	0.4	2.5	A	25-RF014-AL
	1.0	0.75	5.0	A	25-RF014-AL
	2.0	1.5	8.0	A	25-RF014-AL
	3.0	2.2	11.0	A	25-RF014-AL
	5.0	4.0	17.5	B	25-RF021-BL
	7.5	5.5	24.0	C	25-RF027-CL
	10.0	7.5	32.2	D	25-RF035-DL
	15.0	11.0	48.3	E	25-RF056-EL
20.0	15.0	62.1	E	25-RF056-EL	

Drive Ratings				Frame Size	Cat. No.
Input Voltage	Hp	kW	Current <i>Amps</i>		
380...480V 50/60 Hz 3-Phase	0.5	0.4	1.4	A	25-RF7P5-AL
	1.0	0.75	2.3	A	25-RF7P5-AL
	2.0	1.5	4.0	A	25-RF7P5-AL
	3.0	2.2	6.0	A	25-RF7P5-AL
	5.0	4.0	10.5	B	25-RF014-BL
	7.5	5.5	13.0	C	25-RF018-CL
	10.0	7.5	17.0	C	25-RF018-CL
	15.0	11.0	24.0	D	25-RF033-DL
	20.0	15.0	30.0	D	25-RF033-DL
	25.0	18.5	37.0	E	25-RF039-EL
30.0	22.0	43.0	E	25-RF039-EL <sup>(1)</sup>	
525...600V 50/60 Hz 3-Phase	0.5	0.4	0.9	A	25-RF8P0-BL <sup>(2)</sup>
	1.0	0.75	1.7	A	25-RF8P0-BL <sup>(2)</sup>
	2.0	1.5	3.0	A	25-RF8P0-BL <sup>(2)</sup>
	3.0	2.2	4.2	A	25-RF8P0-BL <sup>(2)</sup>
	5.0	4.0	6.6	B	25-RF8P0-BL
	7.5	5.5	9.9	C	25-RF014-CL
	10.0	7.5	12.0	C	25-RF014-CL
	15.0	11.0	19.0	D	25-RF027-DL
	20.0	15.0	22.0	D	25-RF027-DL
	25.0	18.5	27.0	E	25-RF029-EL
30.0	22.0	32.0	E	25-RF029-EL <sup>(1)</sup>	

- (1) EMC Line Filter size is based on the input current of the drive. See the tables on pages 46...49 for more information.
- (2) This 600V drive rating needs to be matched with a frame B EMC Line Filter.

Figure 42 - EMC Line Filter Dimensions – Frame A

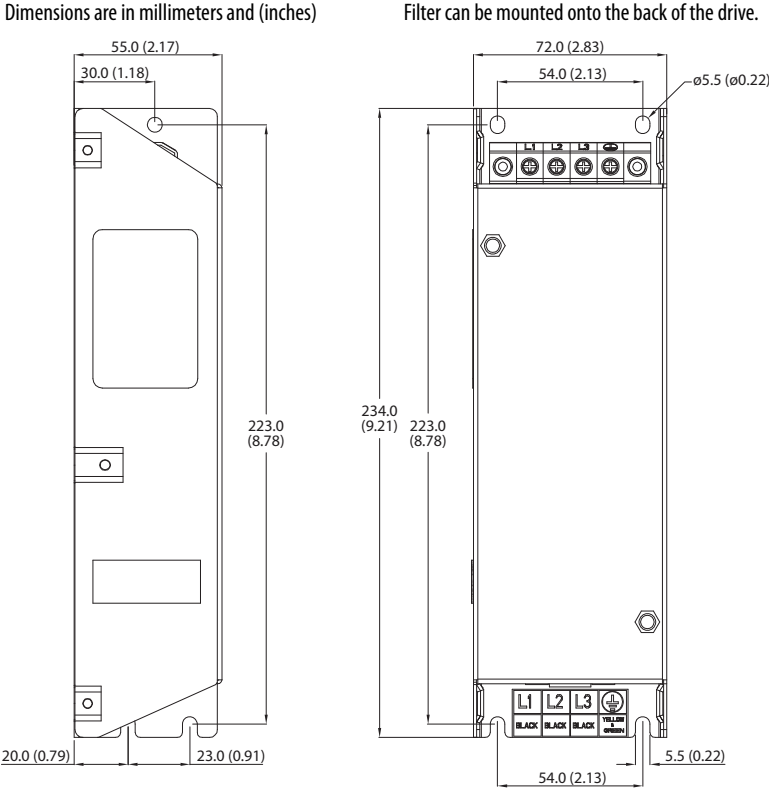
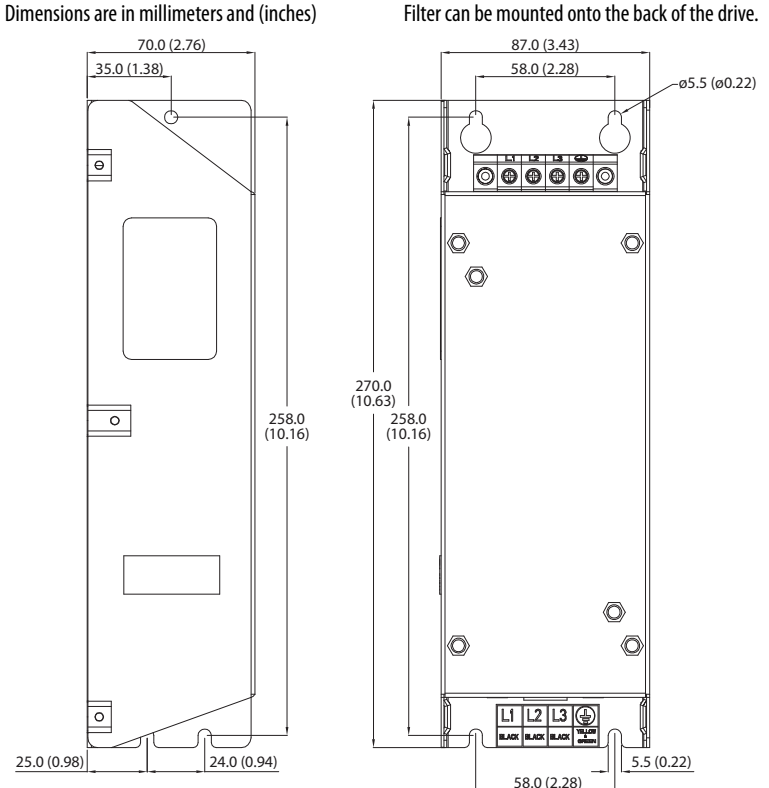
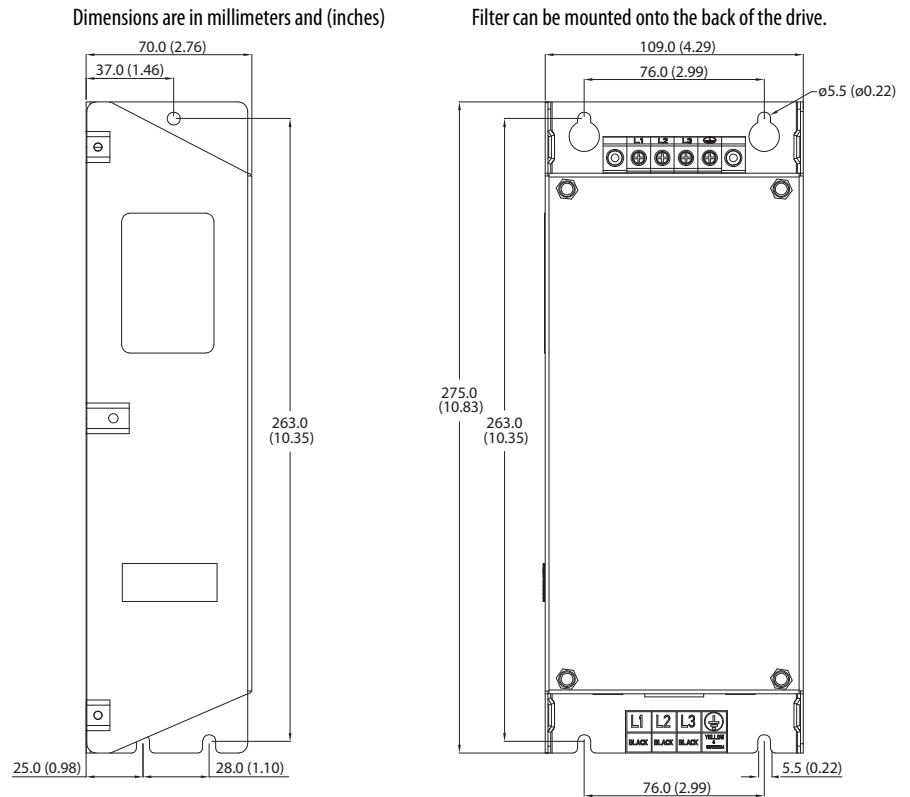


Figure 43 - EMC Line Filter Dimensions – Frame B



**Figure 44 - EMC Line Filter Dimensions – Frame C**



**Figure 45 - EMC Line Filter Dimensions – Frame D**

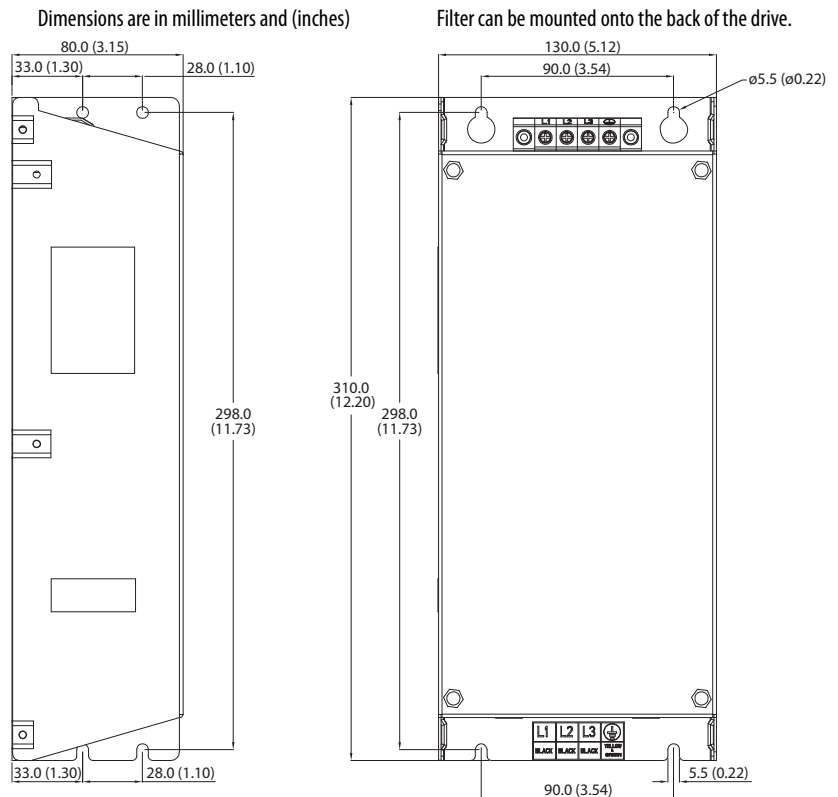
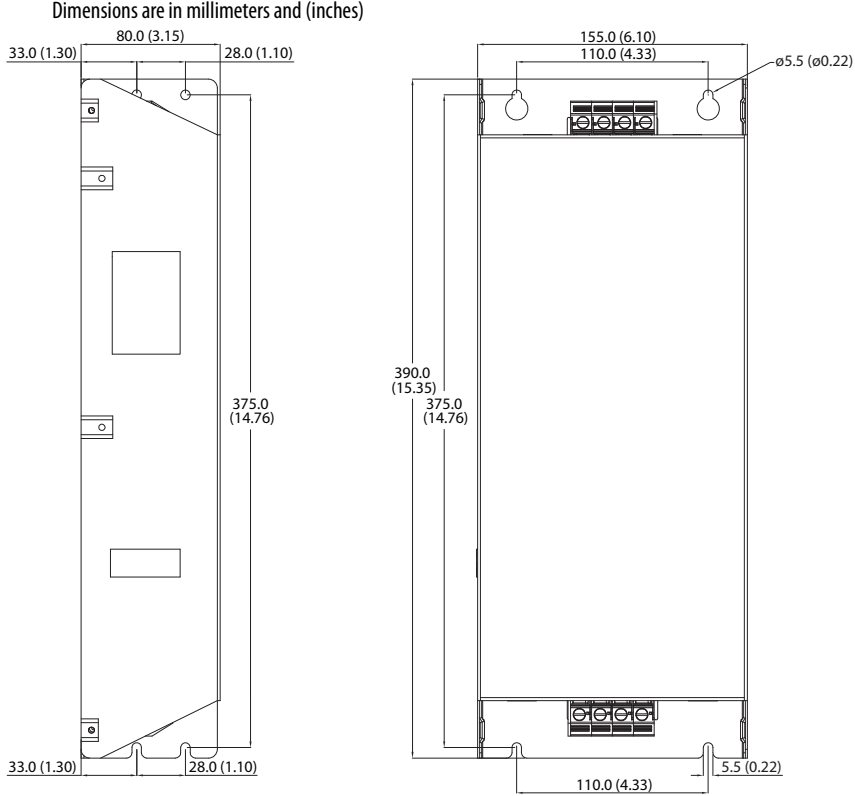


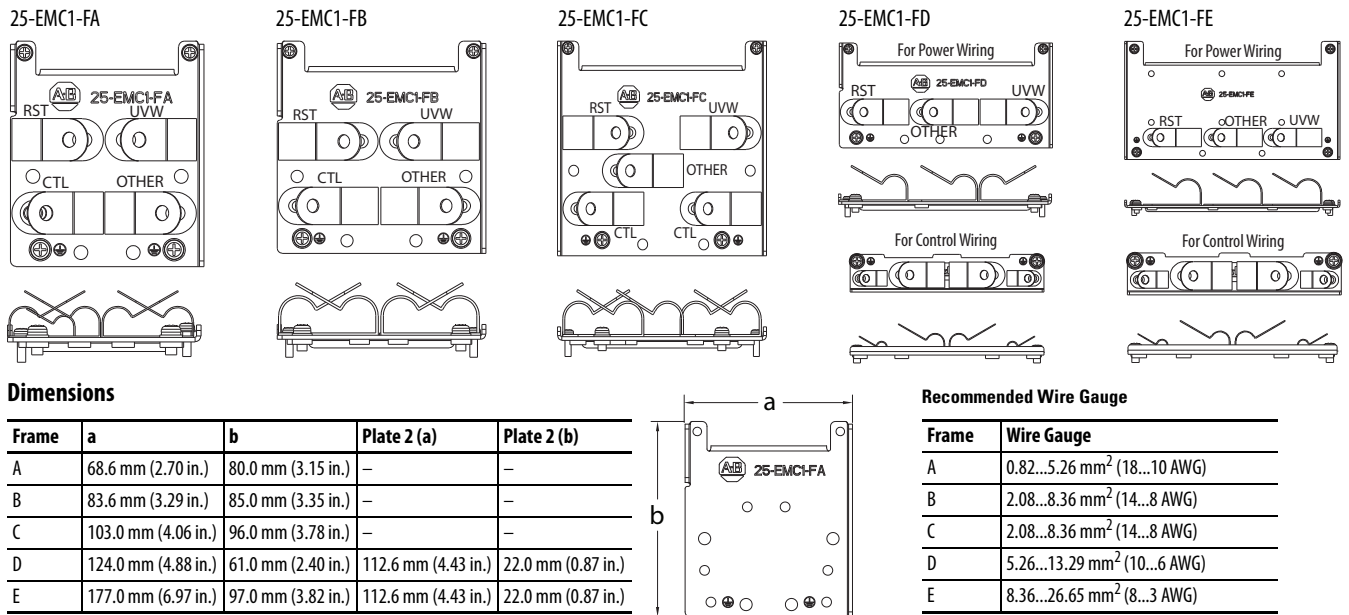
Figure 46 - EMC Line Filter Dimensions – Frame E



**Table 42 - EMC Plates**

Item	Description	Frame Size	Cat. No.
EMC plate	Optional grounding plate for shielded cables.	A	25-EMC1-FA
		B	25-EMC1-FB
		C	25-EMC1-FC
		D	25-EMC1-FD
		E	25-EMC1-FE

**Figure 47 - PowerFlex 525 EMC Plate Dimensions**



**Table 43 - Human Interface Module (HIM) Option Kits and Accessories**

Item	Description	Cat. No.
LCD display, remote panel mount	Digital speed control CopyCat capable IP66 (NEMA Type 4X/12) indoor use only Includes 2.9 meter cable	22-HIM-C2S
LCD display, remote handheld	Digital speed control Full numeric keyboard CopyCat capable IP 30 (NEMA Type 1) Includes 1.0 meter cable Panel mount with optional bezel kit	22-HIM-A3
Bezel kit	Panel mount for LCD display, remote handheld unit, IP 30 (NEMA Type 1) Includes 2.0 m DSI cable	22-HIM-B1
DSI HIM cable (DSI HIM to RJ45 cable)	1.0 m (3.3 ft)	22-HIM-H10
	2.9 m (9.51 ft)	22-HIM-H30



**Table 44 - IP 30/NEMA 1/UL Type 1 Kit**

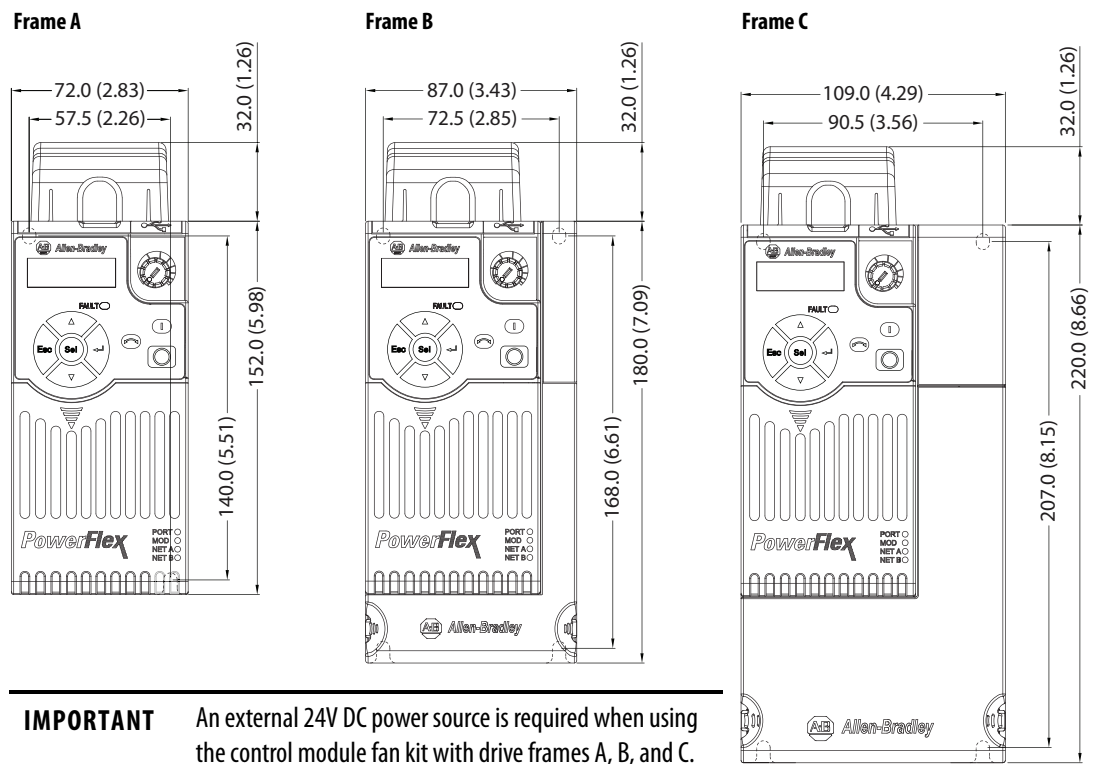
Item	Description	Frame Size	Cat. No.
IP 30/NEMA 1/UL Type 1 kit	Field installed kit. Converts drive to IP 30/NEMA 1/UL Type 1 enclosure. Includes conduit box with mounting screws and plastic top panel.	A	25-JBAA
		B	25-JBAB
		C	25-JBAC
		D	25-JBAD
		E	25-JBAE

**Table 45 - Control Module Fan Kit**

Item	Description	Frame Size	Cat. No.
Control module fan kit	For use with drive in environments with ambient temperatures up to 70 °C or horizontal mounting.	A...D	25-FAN1-70C
		E	25-FAN2-70C

**Figure 48 - IP 20/Open Type with Control Module Fan Kit – Frame A...C**

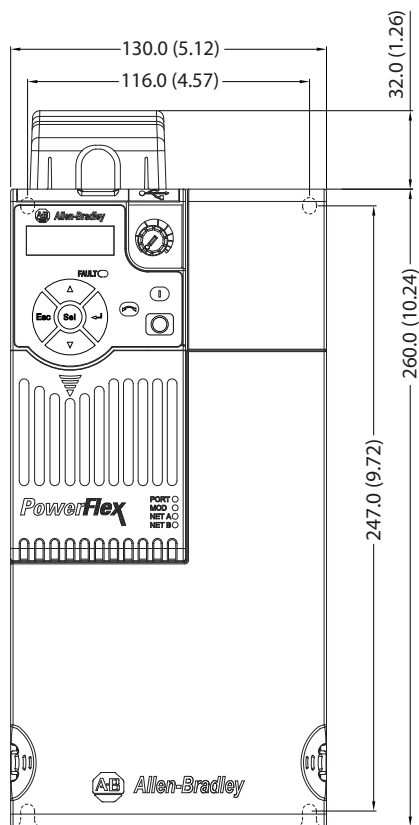
Dimensions are in millimeters and (inches)



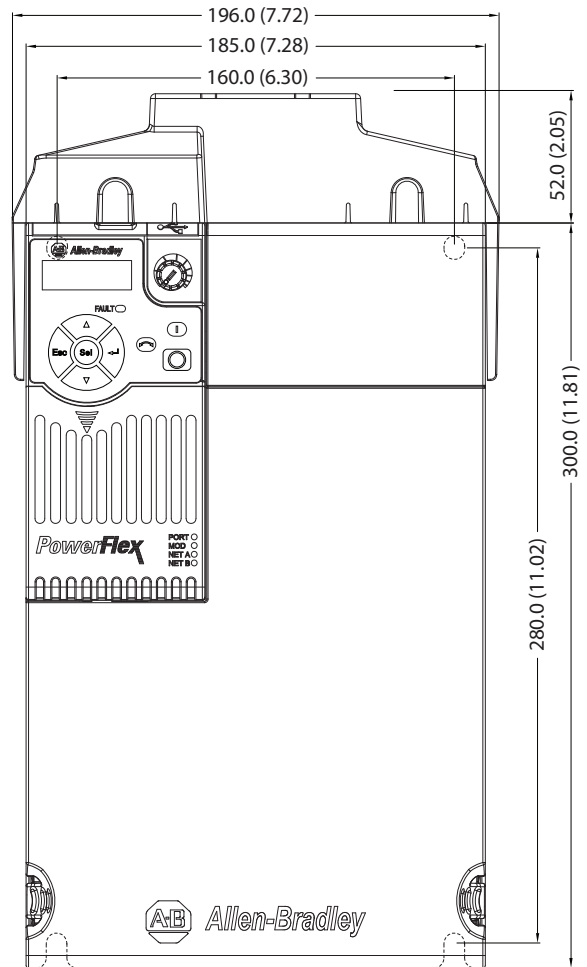
**Table 46 - IP 20/Open Type with Control Module Fan Kit – Frame D...Incremental Encoder Input**

Dimensions are in millimeters and (inches)

**Frame D**



**Frame E**



**IMPORTANT** Remove the label to access the built-in 24V supply on drive frames D and E for use with the control module fan kit.

**Option**

Item	Description	Cat. No.
Incremental encoder	Incremental encoder input option board.	25-ENC-1

*PowerFlex 525 Replacement Parts*

**Table 47 - PowerFlex 520-Series Power Module**

Item		Description					
Power module		Replacement power module. Includes: <ul style="list-style-type: none"> <li>• Power module</li> <li>• Power module front cover</li> <li>• Power terminal guard</li> <li>• Heatsink fan</li> </ul>					
Output Ratings					Input Voltage Range	Frame Size	Cat. No.
Normal Duty		Heavy Duty		Output Current <i>Amps</i>			
Hp	kW	Hp	kW				
<b>100...120V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	85...132	A	25-PM1-V2P5
1.0	0.75	1.0	0.75	4.8	85...132	B	25-PM1-V4P8
1.5	1.1	1.5	1.1	6.0	85...132	B	25-PM1-V6P0
<b>200...240V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	170...264	A	25-PM1-A2P5
1.0	0.75	1.0	0.75	4.8	170...264	A	25-PM1-A4P8
2.0	1.5	2.0	1.5	8.0	170...264	B	25-PM1-A8P0
3.0	2.2	3.0	2.2	11.0	170...264	B	25-PM1-A011
<b>200...240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	170...264	A	25-PM2-A2P5
1.0	0.75	1.0	0.75	4.8	170...264	A	25-PM2-A4P8
2.0	1.5	2.0	1.5	8.0	170...264	B	25-PM2-A8P0
3.0	2.2	3.0	2.2	11.0	170...264	B	25-PM2-A011
<b>200...240V AC (-15%, +10%) – 3-Phase Input, 0...230V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	2.5	170...264	A	25-PM1-B2P5
1.0	0.75	1.0	0.75	5.0	170...264	A	25-PM1-B5P0
2.0	1.5	2.0	1.5	8.0	170...264	A	25-PM1-B8P0
3.0	2.2	3.0	2.2	11.0	170...264	A	25-PM1-B011
5.0	4.0	5.0	4.0	17.5	170...264	B	25-PM1-B017
7.5	5.5	7.5	5.5	24.0	170...264	C	25-PM1-B024
10.0	7.5	10.0	7.5	32.2	170...264	D	25-PM1-B032
15.0	11.0	10.0	7.5	48.3	170...264	E	25-PM1-B048
20.0	15.0	15.0	11.0	62.1	170...264	E	25-PM1-B062
<b>380...480V AC (-15%, +10%) – 3-Phase Input, 0...460V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	1.4	323...528	A	25-PM1-D1P4
1.0	0.75	1.0	0.75	2.3	323...528	A	25-PM1-D2P3
2.0	1.5	2.0	1.5	4.0	323...528	A	25-PM1-D4P0
3.0	2.2	3.0	2.2	6.0	323...528	A	25-PM1-D6P0
5.0	4.0	5.0	4.0	10.5	323...528	B	25-PM1-D010
7.5	5.5	7.5	5.5	13.0	323...528	C	25-PM1-D013

Output Ratings					Input Voltage Range	Frame Size	Cat. No.
Normal Duty		Heavy Duty		Output Current <i>Amps</i>			
Hp	kW	Hp	kW				
10.0	7.5	10.0	7.5	17.0	323...528	C	25-PM1-D017
15.0	11.0	15.0	11.0	24.0	323...528	D	25-PM1-D024
20.0	15.0	15.0	11.0	30.0	323...528	D	25-PM1-D030
<b>380...480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0...460V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	1.4	323...528	A	25-PM2-D1P4
1.0	0.75	1.0	0.75	2.3	323...528	A	25-PM2-D2P3
2.0	1.5	2.0	1.5	4.0	323...528	A	25-PM2-D4P0
3.0	2.2	3.0	2.2	6.0	323...528	A	25-PM2-D6P0
5.0	4.0	5.0	4.0	10.5	323...528	B	25-PM2-D010
7.5	5.5	7.5	5.5	13.0	323...528	C	25-PM2-D013
10.0	7.5	10.0	7.5	17.0	323...528	C	25-PM2-D017
15.0	11.0	15.0	11.0	24.0	323...528	D	25-PM2-D024
20.0	15.0	15.0	11.0	30.0	323...528	D	25-PM2-D030
25.0	18.5	20.0	15.0	37.0	323...528	E	25-PM2-D037
30.0	22.0	25.0	18.5	43.0	323...528	E	25-PM2-D043
<b>525...600V AC (-15%, +10%) – 3-Phase Input, 0...575V 3-Phase Output</b>							
0.5	0.4	0.5	0.4	0.9	446...660	A	25-PM1-E0P9
1.0	0.75	1.0	0.75	1.7	446...660	A	25-PM1-E1P7
2.0	1.5	2.0	1.5	3.0	446...660	A	25-PM1-E3P0
3.0	2.2	3.0	2.2	4.2	446...660	A	25-PM1-E4P2
5.0	4.0	5.0	4.0	6.6	446...660	B	25-PM1-E6P6
7.5	5.5	7.5	5.5	9.9	446...660	C	25-PM1-E9P9
10.0	7.5	10.0	7.5	12.0	446...660	C	25-PM1-E012
15.0	11.0	15.0	11.0	19.0	446...660	D	25-PM1-E019
20.0	15.0	15.0	11.0	22.0	446...660	D	25-PM1-E022
25.0	18.5	20.0	15.0	27.0	446...660	E	25-PM1-E027
30.0	22.0	25.0	18.5	32.0	446...660	E	25-PM1-E032

**Table 48 - PowerFlex 520-Series Control Module**

Item	Description	Frame Size	Cat. No.
Control module	Replacement control module. Includes: <ul style="list-style-type: none"> <li>• Control module</li> <li>• Control module front cover</li> </ul>	A...E	25B-CTM1

**Table 49 - Other Parts**

Item	Description	Frame Size	Cat. No.
Control module front cover	Replacement cover for the control module I/O terminals, EtherNet/IP and DSI ports.	A...E	25B-CTMFC1
Power module front cover	Replacement cover for the PowerFlex 520-Series power module.	B	25-PMFC-FB
		C	25-PMFC-FC
		D	25-PMFC-FD
		E	25-PMFC-FE
Power terminal guard	Replacement finger guard for power terminals.	A	25-PTG1-FA
		B	25-PTG1-FB
		C	25-PTG1-FC
		D	25-PTG1-FD
		E	25-PTG1-FE
Heatsink fan kit	Replacement fan for drive power module.	A	25-FAN1-FA
		B	25-FAN1-FB
		C	25-FAN1-FC
		D	25-FAN1-FD
		E	25-FAN1-FE

**Table 50 - Communication Option Kits and Accessories**

Item	Description	Cat. No.
Communication adapters	Communication options for use with PowerFlex 520-Series drives: <ul style="list-style-type: none"> <li>• DeviceNet™</li> <li>• Dual Port EtherNet/IP™</li> <li>• PROFIBUS™ DP-V1</li> </ul>	25-COMM-D 25-COMM-E2P 25-COMM-P
Compact I/O module	Three channel	1769-SM2
Universal Serial Bus™ (USB) converter module	Provides serial communication with DF1 protocol for use with Connected Components Workbench software. Includes: <ul style="list-style-type: none"> <li>• 2 m USB cable (1)</li> <li>• 20-HIM-H10 cable (1)</li> <li>• 22-HIM-H10 cable (1)</li> </ul>	1203-USB
Serial converter module (RS485 to RS232)	Provides serial communication with DF1 protocol for use with Connected Components Workbench software. Includes: <ul style="list-style-type: none"> <li>• DSI to RS232 serial converter (1)</li> <li>• 1203-SFC serial cable (1)</li> <li>• 22-RJ45CBL-C20 cable (1)</li> </ul>	22-SCM-232
DSI cable	2.0 m RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Serial cable	2.0 m serial cable with a locking low profile connector to connect to the serial converter and a 9-pin sub-miniature D female connector to connect to a computer.	1203-SFC
Splitter cable	RJ45 one to two port splitter cable (Modbus only)	AK-U0-RJ45-SC1

Item	Description	Cat. No.
Terminating resistors	RJ45 120 Ω resistors (2 pieces)	AK-U0-RJ45-TR1
Terminal block	RJ45 two position terminal block (5 pieces)	AK-U0-RJ45-TB2P
Connected Components Workbench Software (download or DVD-ROM)	Windows-based software packages for programming and configuring Allen-Bradley drives and other Rockwell Automation products. Compatibility: Windows XP, Windows Vista and Windows 7	<a href="http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software">http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software</a>

**Table 51 - Bulletin 1321-3R Series Line Reactors**

Output Ratings <sup>(1)</sup>				Input Line Reactor <sup>(3)(4)</sup>		Output Line Reactor <sup>(3)(4)</sup>	
Normal Duty		Heavy Duty		IP00 (Open Style)	IP11 (NEMA/UL Type 1)	IP00 (Open Style)	IP11 (NEMA/UL Type 1)
Hp	kW	Hp	kW	Cat. No.	Cat. No.	Cat. No.	Cat. No.
<b>200...240V 50/60 Hz 1-Phase<sup>(2)</sup></b>							
0.5	0.4	0.5	0.4	1321-3R8-A	1321-3RA8-A	1321-3R2-D	1321-3RA2-D
1.0	0.75	1.0	0.75	1321-3R8-A	1321-3RA8-A	1321-3R4-A	1321-3RA4-A
2.0	1.5	2.0	1.5	1321-3R18-A	1321-3RA18-A	1321-3R8-A	1321-3RA8-A
3.0	2.2	3.0	2.2	1321-3R18-A	1321-3RA18-A	1321-3R12-A	1321-3RA12-A
<b>200...240V 50/60 Hz 3-Phase</b>							
0.5	0.4	0.5	0.4	1321-3R2-D	1321-3RA2-D	1321-3R2-D	1321-3RA2-D
1.0	0.75	1.0	0.75	1321-3R4-A	1321-3RA4-A	1321-3R4-A	1321-3RA4-A
2.0	1.5	2.0	1.5	1321-3R8-A	1321-3RA8-A	1321-3R8-A	1321-3RA8-A
3.0	2.2	3.0	2.2	1321-3R12-A	1321-3RA12-A	1321-3R12-A	1321-3RA12-A
5.0	4.0	5.0	4.0	1321-3R18-A	1321-3RA18-A	1321-3R18-A	1321-3RA18-A
7.5	5.5	7.5	5.5	1321-3R25-A	1321-3RA25-A	1321-3R25-A	1321-3RA25-A
10.0	7.5	10.0	7.5	1321-3R35-A	1321-3RA35-A	1321-3R35-A	1321-3RA35-A
15.0	11.0	10.0	7.5	1321-3R45-A	1321-3RA45-A	1321-3R45-A	1321-3RA45-A
20.0	15.0	15.0	11.0	1321-3R55-A (ND) 1321-3RA45-A (HD)	1321-3RA55-A (ND) 1321-3RA45-A (HD)	1321-3R55-A (ND) 1321-3R45-A (HD)	1321-3RA55-A (ND) 1321-3RA45-A (HD)
<b>380...480V 50/60 Hz 3-Phase</b>							
0.5	0.4	0.5	0.4	1321-3R2-B	1321-3RA2-B	1321-3R2-B	1321-3RA2-B
1.0	0.75	1.0	0.75	1321-3R4-C	1321-3RA4-C	1321-3R4-C	1321-3RA4-C
2.0	1.5	2.0	1.5	1321-3R4-B	1321-3RA4-B	1321-3R4-B	1321-3RA4-B
3.0	2.2	3.0	2.2	1321-3R8-C	1321-3RA8-C	1321-3R8-C	1321-3RA8-C
5.0	4.0	5.0	4.0	1321-3R12-B	1321-3RA12-B	1321-3R12-B	1321-3RA12-B
7.5	5.5	7.5	5.5	1321-3R12-B	1321-3RA12-B	1321-3R12-B	1321-3RA12-B
10.0	7.5	10.0	7.5	1321-3R18-B	1321-3RA18-B	1321-3R18-B	1321-3RA18-B
15.0	11.0	15.0	11.0	1321-3R25-B	1321-3RA25-B	1321-3R25-B	1321-3RA25-B
20.0	15.0	15.0	11.0	1321-3R35-B (ND) 1321-3R25-B (HD)	1321-3RA35-B (ND) 1321-3RA25-B (HD)	1321-3R35-B (ND) 1321-3R25-B (HD)	1321-3RA35-B (ND) 1321-3RA25-B (HD)
25.0	18.5	20.0	15.0	1321-3R35-B	1321-3RA35-B	1321-3R35-B	1321-3RA35-B
30.0	22.0	25.0	18.5	1321-3R45-B (ND) 1321-3R35-B (HD)	1321-3RA45-B (ND) 1321-3RA35-B (HD)	1321-3R45-B (ND) 1321-3R35-B (HD)	1321-3RA45-B (ND) 1321-3RA35-B (HD)

Output Ratings <sup>(1)</sup>				Input Line Reactor <sup>(3)(4)</sup>		Output Line Reactor <sup>(3)(4)</sup>	
Normal Duty		Heavy Duty		IP00 (Open Style)	IP11 (NEMA/UL Type 1)	IP00 (Open Style)	IP11 (NEMA/UL Type 1)
Hp	kW	Hp	kW	Cat. No.	Cat. No.	Cat. No.	Cat. No.
<b>525...600V 50/60 Hz 3-Phase</b>							
0.5	0.4	0.5	0.4	1321-3R1-C	1321-3RA1-C	1321-3R1-C	1321-3RA1-C
1.0	0.75	1.0	0.75	1321-3R2-B	1321-3RA2-B	1321-3R2-B	1321-3RA2-B
2.0	1.5	2.0	1.5	1321-3R4-C	1321-3RA4-C	1321-3R4-C	1321-3RA4-C
3.0	2.2	3.0	2.2	1321-3R4-B	1321-3RA4-B	1321-3R4-B	1321-3RA4-B
5.0	4.0	5.0	4.0	1321-3R8-C	1321-3RA8-C	1321-3R8-C	1321-3RA8-C
7.5	5.5	7.5	5.5	1321-3R12-B	1321-3RA12-B	1321-3R12-B	1321-3RA12-B
10.0	7.5	10.0	7.5	1321-3R12-B	1321-3RA12-B	1321-3R12-B	1321-3RA12-B
15.0	11.0	15.0	11.0	1321-3R18-B	1321-3RA18-B	1321-3R18-B	1321-3RA18-B
20.0	15.0	15.0	11.0	1321-3R25-B (ND) 1321-3R18-B (HD)	1321-3RA25-B (ND) 1321-3RA18-B (HD)	1321-3R25-B (ND) 1321-3R18-B (HD)	1321-3RA25-B (ND) 1321-3RA18-B (HD)
25.0	18.5	20.0	15.0	1321-3R35-C (ND) 1321-3R25-C (HD)	1321-3RA35-C (ND) 1321-3RA25-C (HD)	1321-3R35-C (ND) 1321-3R25-C (HD)	1321-3RA35-C (ND) 1321-3RA25-C (HD)
30.0	22.0	25.0	18.5	1321-3R35-C (ND) 1321-3R25-B (HD)	1321-3RA35-C (ND) 1321-3RA25-B (HD)	1321-3R35-C (ND) 1321-3R25-B (HD)	1321-3RA35-C (ND) 1321-3RA25-B (HD)

- (1) Normal Duty and Heavy Duty ratings for 15 Hp (11 kW) and below are identical except for 200...240V 3-Phase 15 Hp (11 kW) drive.
- (2) Standard 3-phase reactors can be used for 1-phase applications by routing each of the two supply conductors through an outside coil and leaving the center open.
- (3) Catalog numbers listed are for 3% impedance at 60Hz. 5% impedance reactor types are also available. See publication [1321-TD001](#).
- (4) Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

Note: See the 1321 Power Conditioning Products Technical Data, publication [1321-TD001](#), for Bulletin 1321-3R Series Line Reactors dimensions.

**Notes:**



## Drive Configuration

This section contains information on wiring and terminal configurations for the PowerFlex 40, PowerFlex 40P, and PowerFlex 525. Wiring and terminal comparisons include power, motor, I/O, and feedback configurations.

Examples of 2-wire and 3-wire control schemes are provided in this section. For information on PowerFlex 40, PowerFlex 40P, and PowerFlex 525 drives controlled on a network, see Chapter 3 Network Communication, beginning on page [119](#).

### General Notes

#### Sink (SNK)/Source (SRC) Mode

PowerFlex 40, 40P and 525 drives can operate in sink (SNK) or source (SRC) mode.

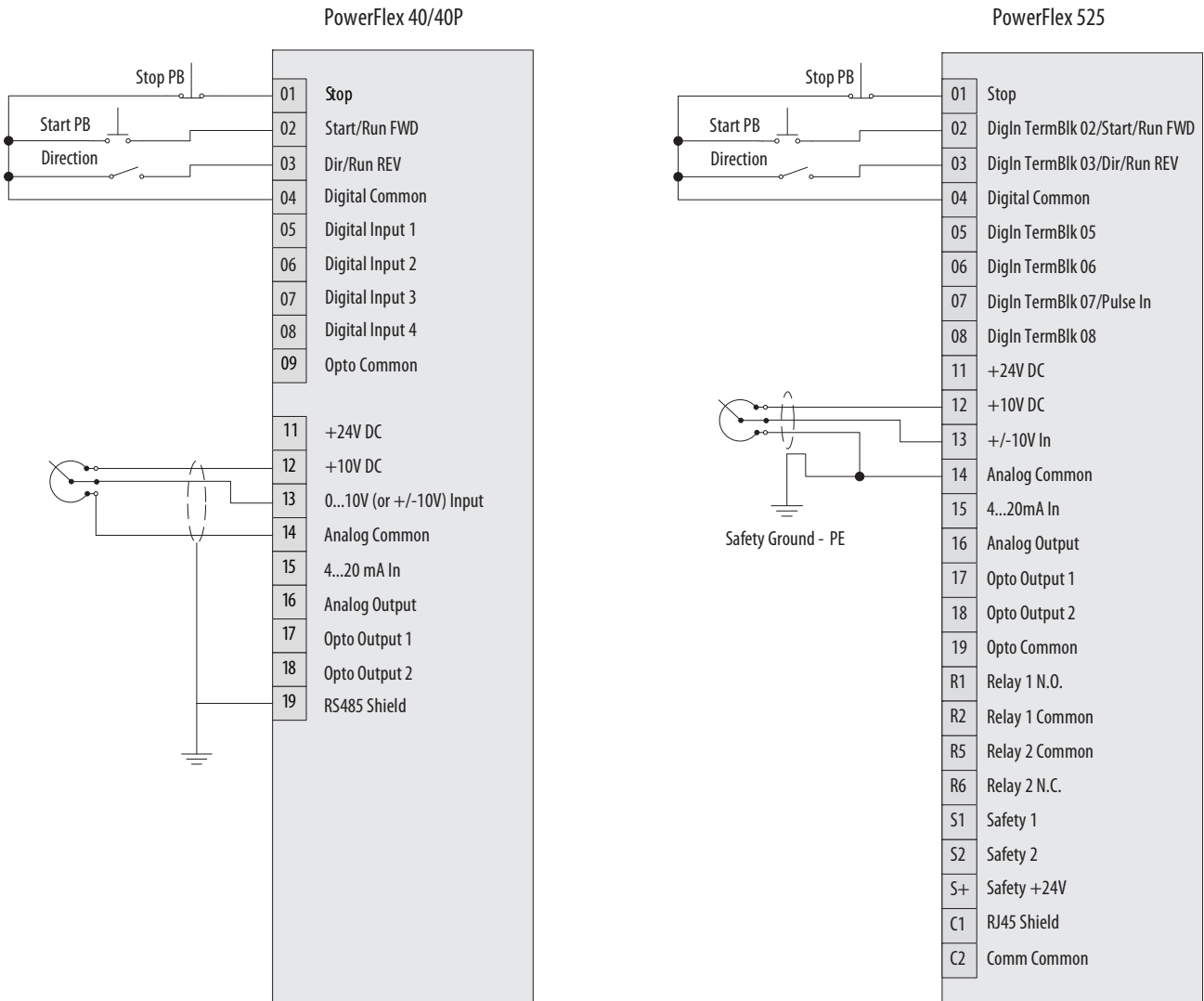
- In SNK mode, inputs are active if pulled to DIG COM (internal)
- In SRC mode inputs are active if pulled to +24V DC (internal or external)

The default control scheme is SRC, with the Stop terminal jumpered to terminal 11 (I/O terminals 1 and 11) to allow starting from the keypad. If this control scheme is changed to SNK, the jumper must be removed from terminals 1 and 11 and installed between I/O terminals 1 and 4.

### 3-Wire Control, Pot Speed Reference

The control method is 3-wire Start/Stop/Direction (factory default). The speed reference comes from a 10 kΩ, 2 W potentiometer wired to the drive's +10V DC power supply.

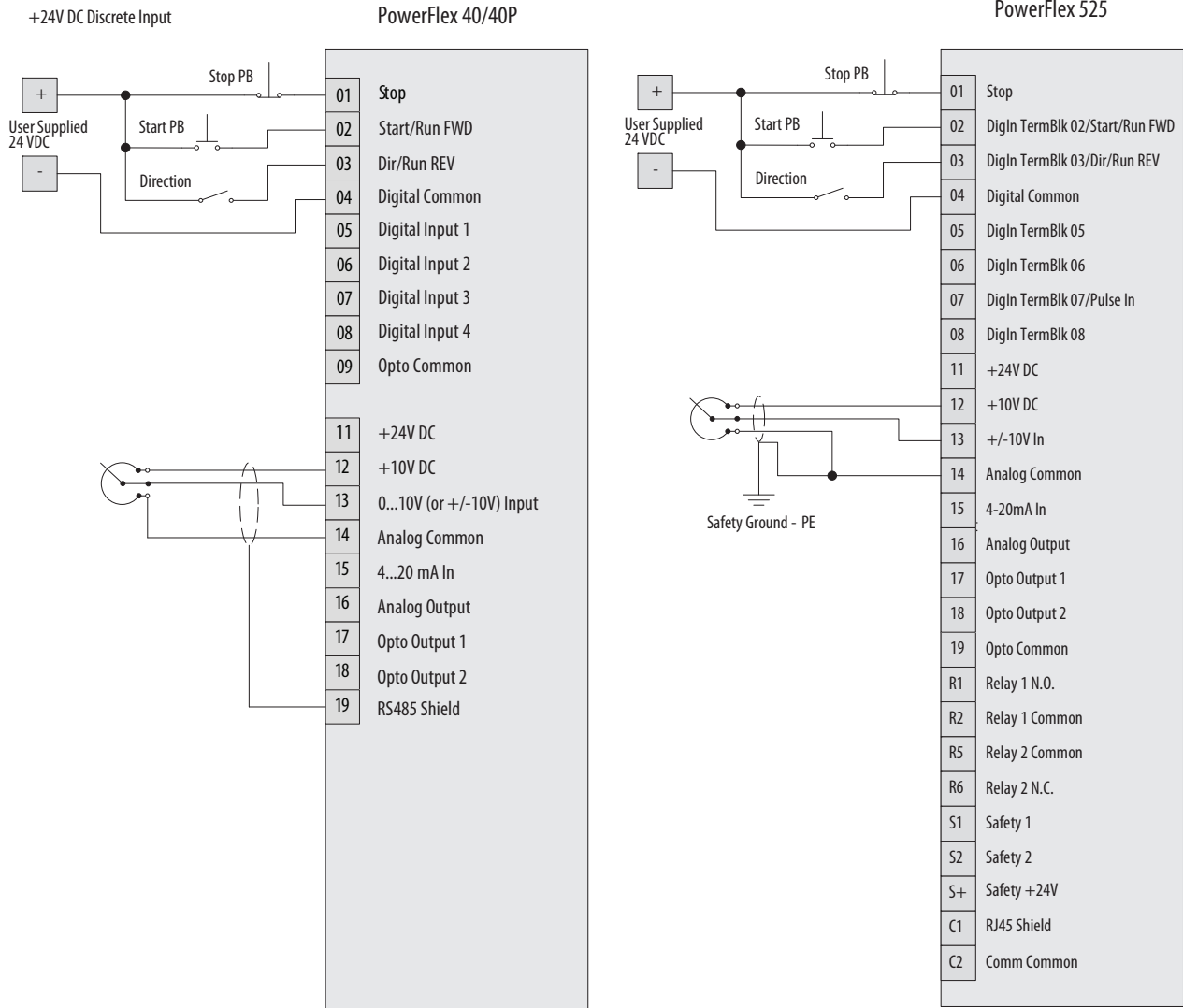
Figure 49 - 3-Wire Control (SNK), Pot Speed Reference Wiring Example



- PowerFlex 40/40P Notes:
1. See the PowerFlex 40 User Manual (22B-UM001) or PowerFlex 40P User Manual (22D-UM001) and review I/O Wiring in Chapter 1 for more details.
  2. Be sure the Sink/Source DIP switch is set to the SNK (up) position.
  3. The shield is tied to terminal 19.
  4. Remove the factory installed jumper from 11 to 1 or 4 to 1.

- PowerFlex 525 Notes:
1. Refer to the I/O Wiring section in Chapter 1 of the PowerFlex 525 User Manual (520-UM001), for more details.
  2. Make sure Digital In (J5) jumper is set to the SNK (top) jumper position.
  3. Shield is tied to Safety Ground – PE.
  4. Remove factory installed jumper from 11 to 1 or 4 to 1.

Figure 50 - 3-Wire Control (SRC), Pot Speed Reference Wiring Example



- PowerFlex 40/40P Notes:
1. See the PowerFlex 40 User Manual (22B-UM001) or PowerFlex 40P User Manual (22D-UM001) and review I/O Wiring in Chapter 1 for more details.
  2. Be sure the Sink/Source DIP switch is set to the SRC (bottom) position.
  3. The shield is tied to terminal 19.
  4. Remove the factory installed jumper from 11 to 1 or 4 to 1.

- PowerFlex 525 Notes:
1. See the the I/O Wiring section in Chapter 1 of the PowerFlex 525 User Manual (520-UM001), for more details.
  2. Make sure Digital In (J5) jumper is set to the SRC (bottom) jumper position.
  3. Shield is tied to Safety Ground – PE.
  4. Remove factory installed jumper from 11 to 1 or 4 to 1.

## Parameter Comparison

The parameters in [Table 52](#) are the minimum required to configure a PowerFlex 525 for the motor attributes and to control it with a 3-wire Start/Stop/Direction method. The table provides a cross reference to the equivalent PowerFlex 40 and 40P parameters.

**Note:** This example uses a 5 Hp, 460V AC, 6.0 FLA, 60 Hz motor. PowerFlex 525 parameters 31...37, 39, and 40 are dependent on your motor. PowerFlex 525 Parameters 41...47, 62, 63, and 93 are dependent on your application, Start/Stop modes and Accel/Decel rates, etc.

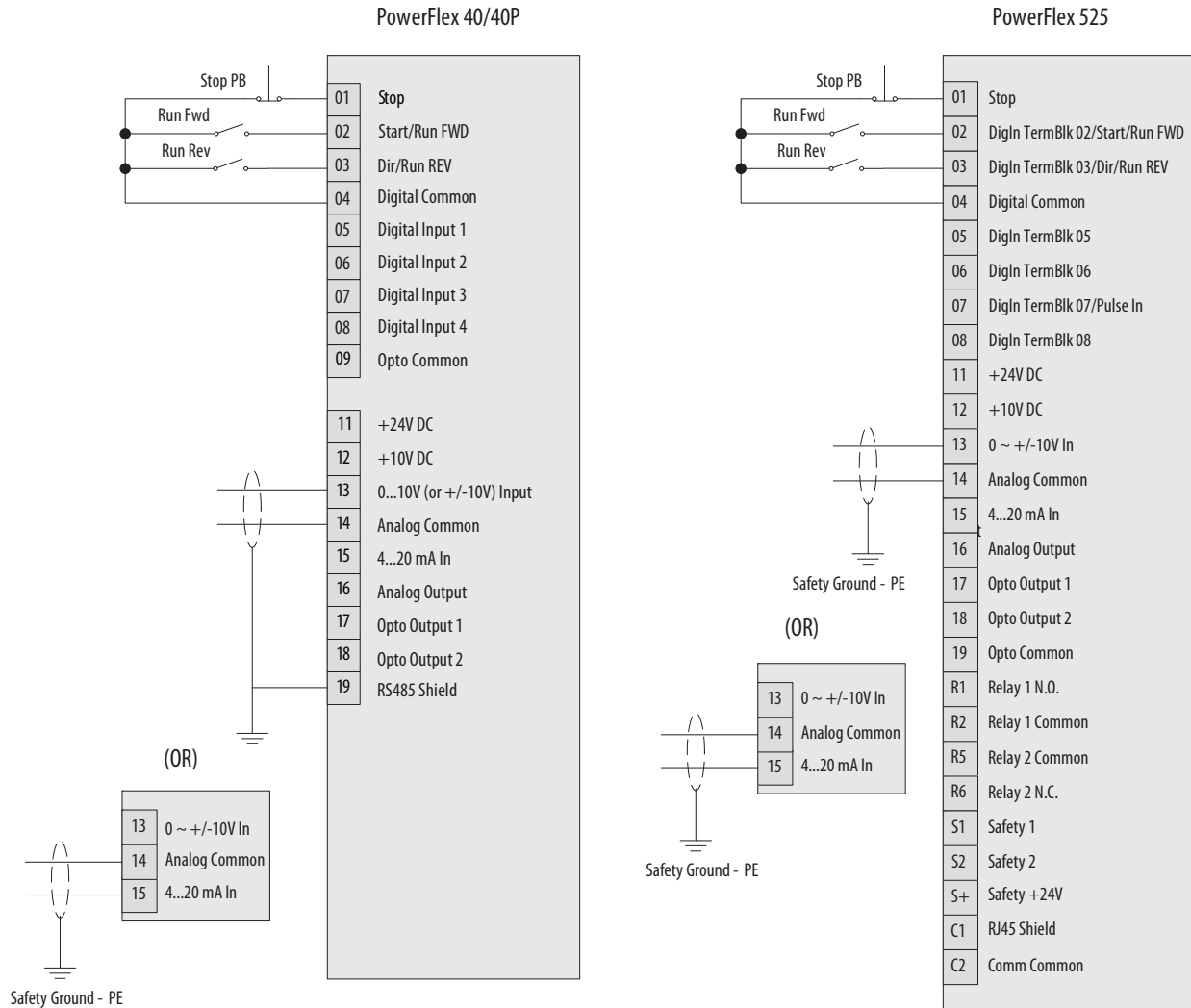
**Table 52 - 3 Wire Control - Pot Speed Reference Parameter Comparison**

PowerFlex 40 / 40P			PowerFlex 525		
No.	Parameter	Value	No.	Parameter	Value
31	Motor NP Volts	460V	31	Motor NP Volts	460V
32	Motor NP Hertz	60 Hz	32	Motor NP Hertz	60 Hz
33	Motor OL Current	6.0 A	33	Motor OL Current	6.0 A
126	Motor FLA	6.0 A	34	Motor FLA	6.0 A
			35	Motor Poles	4
			36	Motor NP RPM	1750
			37	Motor NP Power	3.72 kW
			39	Torque Perf Mode	1 "SVC"
			40	Autotune	"Rotate Tune" (preferred)
39	Accel Time 1	10.0 s	41	Accel Time 1	10.0 s
40	Decel Time 1	10.0 s	42	Decel Time 1	10.0 s
34	Minimum Frequency	0 Hz	43	Minimum Freq	0 Hz
35	Maximum Frequency	60 Hz	44	Maximum Freq	60 Hz
37	Stop Mode	4 "Ramp"	45	Stop Mode	0 "Ramp CF"
36	Start Source	1 "3-Wire"	46	Start Source	2 "DigIn TrmBlk"
38	Speed Reference	2 "0-10V Input"	47	Speed Reference1	5 "0-10V Input"
			62	DigIn TermBlk 02	49 "3-Wire Start"
			63	DigIn TermBlk 03	51 "3-Wire Dir"
123	10V Bipolar Enbl	0 "Uni-Polar In"	93	10V Bipolar Enbl	0 "Uni-Polar In"

## 2-Wire Control, Analog Input Speed Reference

The control method is 2-wire Run Forward/Run Reverse. The speed Reference comes from a 4...20 mA, 0...10V DC or a ±10V DC input. The Stop push button shown in the examples is not required. The drives run while a Run Fwd or Run Rev input is on. If you eliminate the Stop push button you must have the external +24V DC applied to terminal 01 or internally jumper from terminal 11 to 01 on the PowerFlex 525.

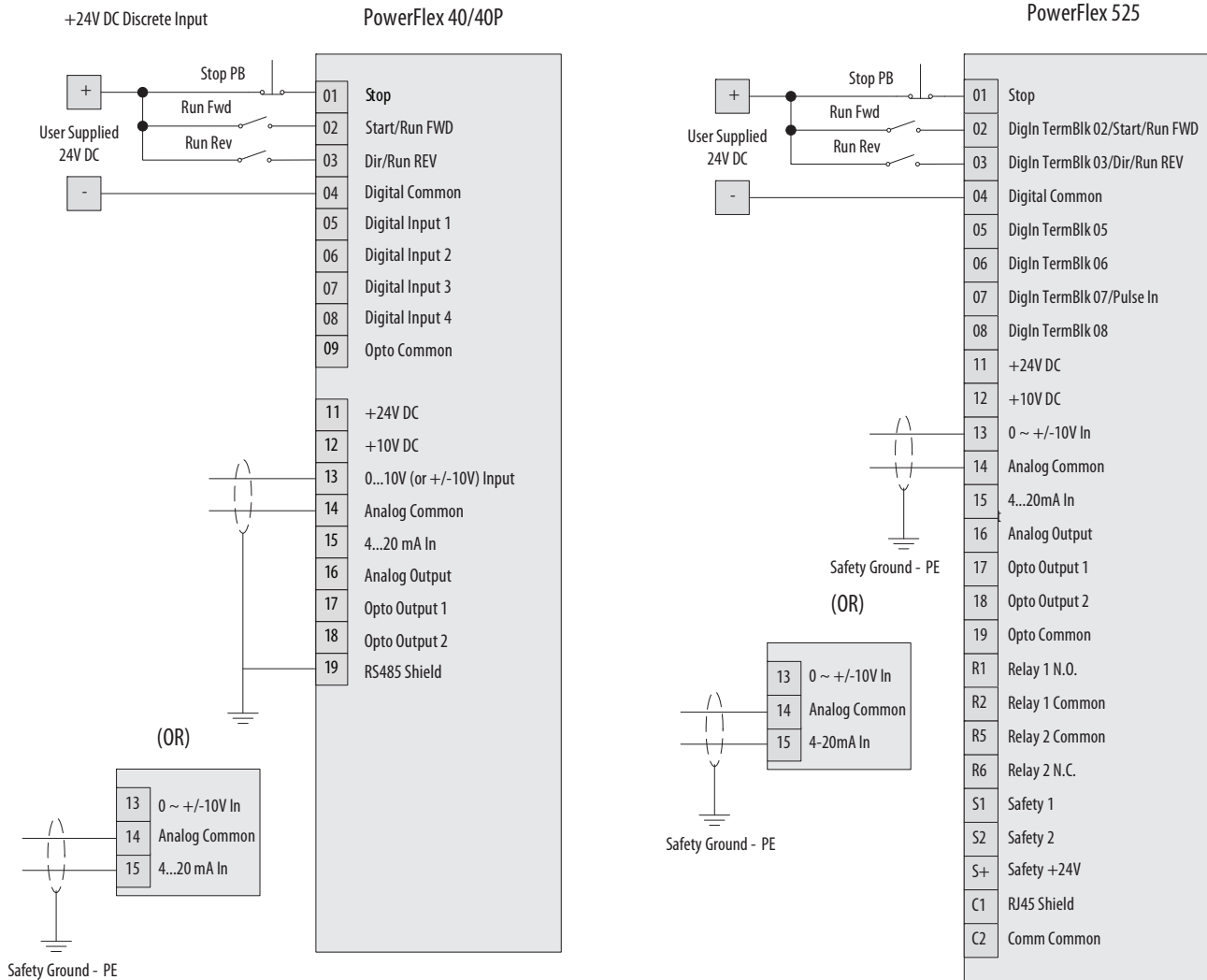
**Figure 51 - 2 Wire Control (SNK), Analog Input Reference Wiring Example**



- PowerFlex 40/40P Notes:**
1. See the PowerFlex 40 User Manual (22B-UM001) or PowerFlex 40P User Manual (22D-UM001) and review I/O Wiring in Chapter 1 for more details.
  2. Be sure the Sink/Source DIP switch is set to the SNK (up) position.
  3. The shield is tied to terminal 19.
  4. Remove the factory installed jumper from 11 to 1 or 4 to 1.

- PowerFlex 525 Notes:**
1. See the I/O Wiring section in Chapter 1 of the PowerFlex 525 User Manual (520-UM001), for more details.
  2. Make sure Digital In (J5) jumper is set to the SNK (top) jumper position.
  3. Shield is tied to Safety Ground – PE.
  4. Remove factory installed jumper from 11 to 1 or 4 to 1.

Figure 52 - 2 Wire Control (SRC), Analog Input Reference Wiring Example



PowerFlex 40/40P Notes:

1. Refer to the respective PowerFlex 40 or 40P User Manual and review I/O Wiring in Chapter 1 for more details.
2. Be sure the Sink/Source DIP switch is set to the SRC (bottom) position.
3. The shield is tied to terminal 19.
4. Remove the factory installed jumper from 11 to 1 or 4 to 1.

PowerFlex 525 Notes:

1. Refer to the the I/O Wiring section in Chapter 1 of the PowerFlex 525 User Manual (520-UM001), for more details.
2. Make sure Digital In (J5) jumper is set to the SRC (bottom) jumper position.
3. Shield is tied to Safety Ground – PE.
4. Remove factory installed jumper from 11 to 1 or 4 to 1.

## Parameter Comparison

The parameters in [Table 53](#) are the minimum required to configure the PowerFlex 525 for the motor attributes and to control it with a 2-wire Run Fwd/Run Rev method. The table provides a cross reference to the equivalent PowerFlex 40 and 40P parameters.

**Note:** This example uses a 5 Hp, 460V AC, 6.0 FLA, 60 Hz motor. PowerFlex 525 parameters 31...37, 39, and 40 are dependent on your motor. PowerFlex 525 parameters 41...47, 62, 63, and 93 are dependent on your application, Start/Stop modes and Accel/Decel rates, etc.

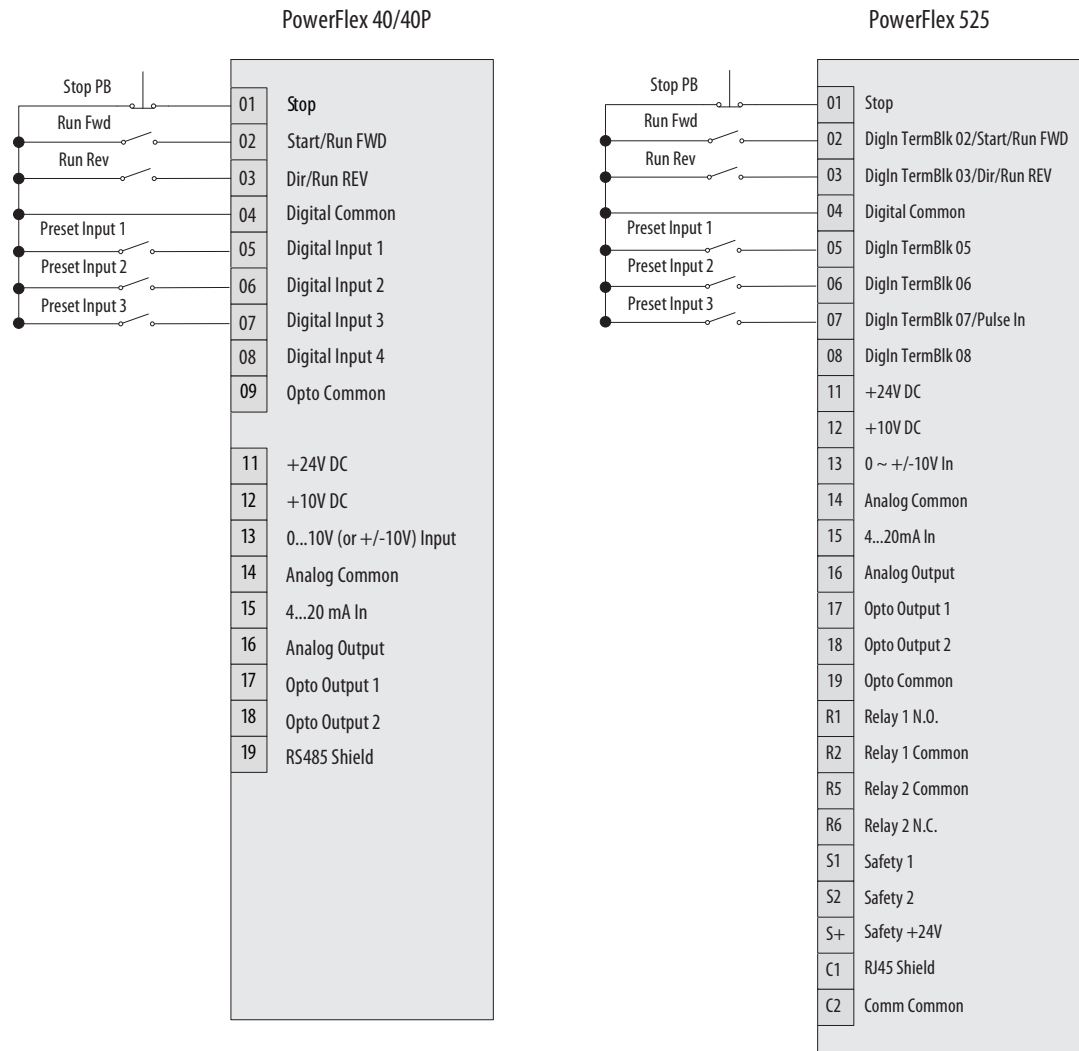
**Table 53 - 2-Wire Control - Analog Input Reference Parameter Comparison**

PowerFlex 40 / 40P			PowerFlex 525		
No.	Parameter	Value	No.	Parameter	Value
31	Motor NP Volts	460V	31	Motor NP Volts	460V
32	Motor NP Hertz	60 Hz	32	Motor NP Hertz	60 Hz
33	Motor OL Current	6.0 A	33	Motor OL Current	6.0 A
126	Motor FLA	6.0 A	34	Motor FLA	6.0 A
			35	Motor Poles	4
			36	Motor NP RPM	1750
			37	Motor NP Power	3.72 kW
			39	Torque Perf Mode	1 "SVC"
			40	Autotune	"Rotate Tune" (preferred)
39	Accel Time 1	10.0 s	41	Accel Time 1	10.0 s
40	Decel Time 1	10.0 s	42	Decel Time 1	10.0 s
34	Minimum Frequency	0 Hz	43	Minimum Freq	0 Hz
35	Maximum Frequency	60 Hz	44	Maximum Freq	60 Hz
37	Stop Mode	4 "Ramp"	45	Stop Mode	0 "Ramp CF"
36	Start Source	1 "2-Wire"	46	Start Source	2 "DigIn TrmBlk"
38	Speed Reference	2 "0-10V Input" or 3 "4-20mA Input"	47	Speed Reference1	5 "0-10V Input" or 6 "4-20mA input"
			62	DigIn TermBlk 02	48 "2-Wire FWD"
			63	DigIn TermBlk 03	50 "2-Wire REV"
123	10V Bipolar Enbl	0 "Uni-Polar In"	93	10V Bipolar Enbl	0 "Uni-Polar In"

## Preset Speeds

The control method is 2-wire Run Fwd/Run Rev. The speed reference for the PowerFlex 40 and 40P Preset Speed model is selected with three digital inputs. The PowerFlex 40 and 40P are capable of eight preset speeds and the PowerFlex 525 is capable of 16 preset speeds.

**Figure 53 - 2 Wire Control (SNK), Preset Speeds Wiring Example**

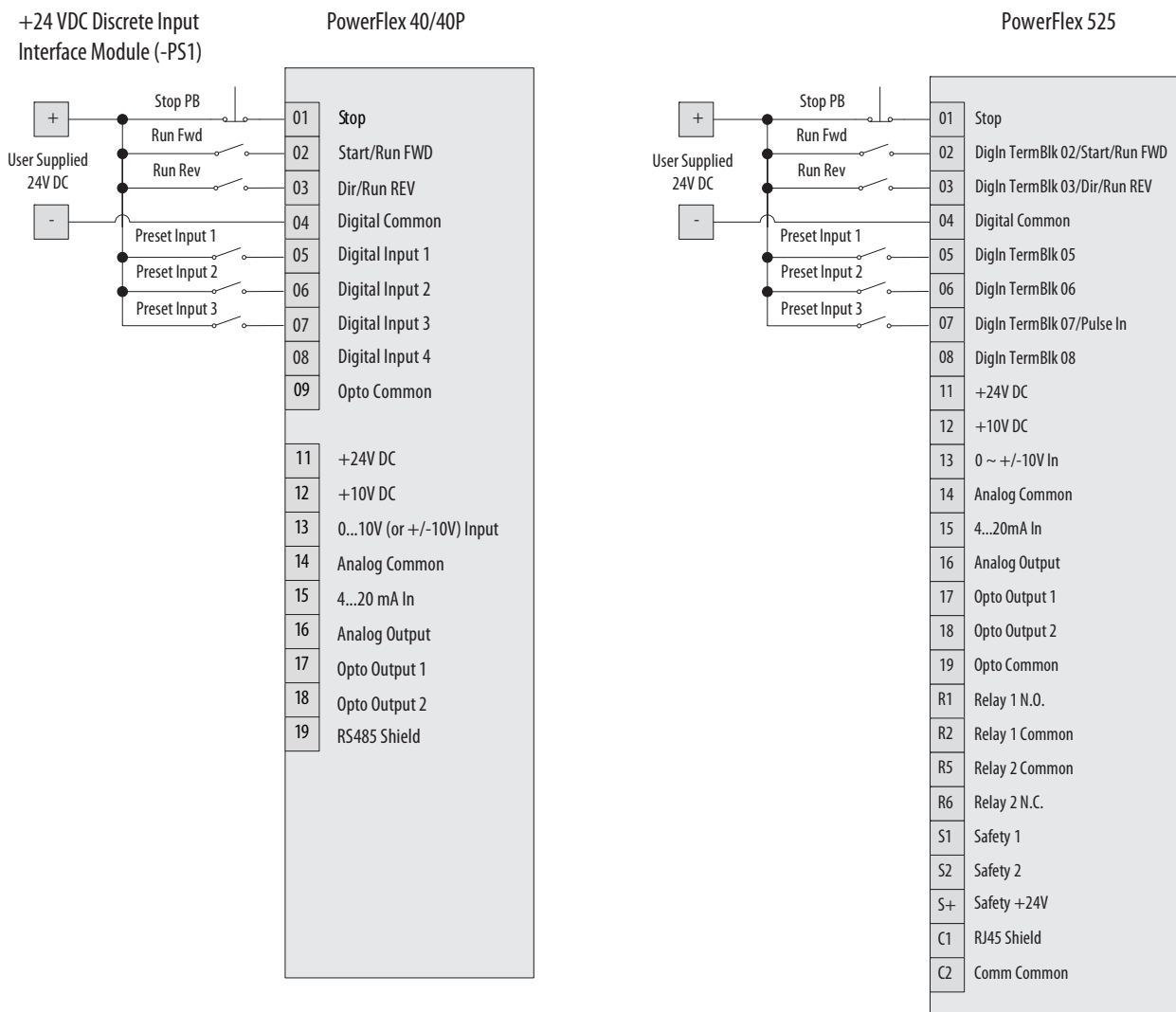


- PowerFlex 40/40P Notes:
1. See the PowerFlex 40 User Manual (22B-UM001) or PowerFlex 40P User Manual (22D-UM001) and review I/O Wiring in Chapter 1 for more details.
  2. See Page 3-23 of the PowerFlex 40 User Manual or page 3-25 of the PowerFlex 40P User Manual for details on the Preset Frequency logic table.

- PowerFlex 525 Notes:
1. See the I/O Wiring section in Chapter 1 of the PowerFlex 525 User Manual (520-UM001), for more details.
  2. See page 102 in the PowerFlex 525 User Manual for details on the Preset Settings logic table.
  3. Make sure Digital In (J5) jumper is set to the SNK (top) jumper position.
  4. Remove factory installed jumper from 11 to 1 or 4 to 1.



**Figure 54 - 2 Wire Control (SRC), Preset Speeds Wiring Example**



- PowerFlex 40/40P Notes:**
1. See the PowerFlex 40 User Manual (22B-UM001) or PowerFlex 40P User Manual (22D-UM001) and review I/O Wiring in Chapter 1 for more details.
  2. See Page 3-23 of the PowerFlex 40 User Manual or page 3-25 of the PowerFlex 40P User Manual for details on the Preset Frequency logic table.

- PowerFlex 525 Notes:**
1. Refer to the I/O Wiring section in Chapter 1 of the PowerFlex 525 User Manual (520-UM001), for more details.
  2. Refer to page 102 in the PowerFlex 525 User Manual (520-UM001) for details on the Preset Settings logic table.
  3. Make sure Digital In (J5) jumper is set to the SRC (bottom) jumper position.
  4. Remove factory installed jumper from 11 to 1 or 4 to 1.

### Parameter Comparison

The parameters in [Table 54](#) on page [114](#) are the minimum required to configure a PowerFlex 525 for the motor attributes and to control it with a 2-wire Run Fwd/Run Rev method. The table provides a cross reference to the equivalent PowerFlex 40 and 40P parameters.

**Note:** This example uses a 5 Hp, 460V AC, 6.0 FLA, 60 Hz motor. PowerFlex 525 parameters 31...37, 39, and 40 are dependent on your motor. PowerFlex 525 parameters 41...47, 62, 63, 65...67, 410...417, 442, and 443 are dependent on your application, Start/Stop modes and Accel/Decel rates, etc.

[Table 55](#) on page [115](#) provides the parameter settings for the PowerFlex 40 and 40P preset speeds.

[Table 56](#) on page [116](#) provides the parameter settings for the PowerFlex 525 preset speeds.

**Table 54 - 2 Wire Control - Preset Speed Parameter Comparison**

PowerFlex 40/40P			PowerFlex 525		
No.	Parameter	Value	No.	Parameter	Value
31	Motor NP Volts	460V	31	Motor NP Volts	460V
32	Motor NP Hertz	60 Hz	32	Motor NP Hertz	60 Hz
33	Motor OL Current	6.0 A	33	Motor OL Current	6.0 A
126	Motor FLA	6.0 A	34	Motor FLA	6.0 A
			35	Motor Poles	4
			36	Motor NP RPM	1750
			37	Motor NP Power	3.72 kW
			39	Torque Perf Mode	1 "SVC"
			40	Autotune	"Rotate Tune" (preferred)
39	Accel Time 1	10.0 s	41	Accel Time 1	10.0 s
40	Decel Time 1	10.0 s	42	Decel Time 1	10.0 s
34	Minimum Frequency	0 Hz	43	Minimum Freq	0 Hz
35	Maximum Frequency	60 Hz	44	Maximum Freq	60 Hz
37	Stop Mode	0 "Ramp,CF"	45	Stop Mode	0 "Ramp,CF"
36	Start Source	2 "2-Wire"	46	Start Source	2 "DigIn TrmBlk"
38	Speed Reference	4 "Preset Freq"	47	Speed Reference1	7 "Preset Freq"
			62	DigIn TermBlk 02	48 "2-Wire FWD"
			63	DigIn TermBlk 03	50 "2-Wire REV"
51	DigIn TermBlk 05	4 "Preset Freq"	65	DigIn TermBlk 05	7 "Preset Freq"
52	DigIn TermBlk 06	4 "Preset Freq"	66	DigIn TermBlk 06	7 "Preset Freq"
53	DigIn TermBlk 07	4 "Preset Freq"	67	DigIn TermBlk 07	7 "Preset Freq"
70	Preset Freq 0	0 Hz	410	Preset Freq 0	0 Hz
71	Preset Freq 1	5.0 Hz	411	Preset Freq 1	5.0 Hz
72	Preset Freq 2	10.0 Hz	412	Preset Freq 2	10.0 Hz
73	Preset Freq 3	20.0 Hz	413	Preset Freq 3	20.0 Hz
74	Preset Freq 4	30.0 Hz	414	Preset Freq 4	30.0 Hz
75	Preset Freq 5	40.0 Hz	415	Preset Freq 5	40.0 Hz
76	Preset Freq 6	50.0 Hz	416	Preset Freq 6	50.0 Hz
77	Preset Freq 7	60.0 Hz	417	Preset Freq 7	60.0 Hz
67	Accel Time 2	10.0 s	442	Accel Time 2	10.0 s
68	Decel Time 2	10.0 s	443	Decel Time 2	10.0 s

**Table 55 - PowerFlex 40 and 40P Preset Speed Logic**

Parameter	Default Value	Min/Max/Display
<b>A070 [Preset Freq 0]</b> <sup>(1)</sup>	0.00 Hz	0.00/500.0 Hz/0.01 Hz
<b>A071 [Preset Freq 1]</b>	5.00 Hz	
<b>A072 [Preset Freq 2]</b>	10.00 Hz	
<b>A073 [Preset Freq 3]</b>	20.00 Hz	
<b>A074 [Preset Freq 4]</b>	30.00 Hz	
<b>A075 [Preset Freq 5]</b>	40.00 Hz	
<b>A076 [Preset Freq 6]</b>	50.00 Hz	
<b>A077 [Preset Freq 7]</b>	60.00 Hz	

Provides a fixed frequency command value when A051...A053 [Digital Inx Sel] is set to 4 "Preset Freq". An active preset input will override speed command as shown in the Start and Speed Reference Control flowchart in Chapter 1 of the PowerFlex 40 User Manual (22B-UM001) and PowerFlex 40P User Manual (22D-UM001).

<sup>(1)</sup> To activate A070...A077 in Velocity mode, set P038 [Speed Reference] to option 4 "Preset Freq". In Positioning mode, set P038 [Speed Reference] to option 9 "Positioning" and E222 [Positioning Mode] to option 1 "Preset Input".

Input State of Digital In 1 (I/O Terminal 05 when A051 = 4)	Input State of Digital In 2 (I/O Terminal 06 when A052 = 4)	Input State of Digital In 3 (I/O Terminal 07 when A053 = 4)	Freq Source	Position Source (when P038 = 9)	Accel / Decel Parameter Used <sup>(2)</sup>
0	0	0	A070	E230	[Accel Time 1] / [Decel Time 1]
1	0	0	A071	E232	[Accel Time 1] / [Decel Time 1]
0	1	0	A072	E234	[Accel Time 2] / [Decel Time 2]
1	1	0	A073	E236	[Accel Time 2] / [Decel Time 2]
0	0	1	A074	E238	[Accel Time 1] / [Decel Time 1]
1	0	1	A075	E240	[Accel Time 1] / [Decel Time 1]
0	1	1	A076	E242	[Accel Time 2] / [Decel Time 2]
1	1	1	A077	E244	[Accel Time 2] / [Decel Time 2]

<sup>(2)</sup> When a Digital Input is set to "Accel 2 & Decel 2", and the input is active, that input overrides the settings in this table.

**Table 56 - PowerFlex 525 Preset Speed Logic**

A410 [Preset Freq 0]      A411 [Preset Freq 1]  
 A412 [Preset Freq 2]      A413 [Preset Freq 3]  
 A414 [Preset Freq 4]      A415 [Preset Freq 5]  
 A416 [Preset Freq 6]      A417 [Preset Freq 7]  
  
 A418 [Preset Freq 8]      A419 [Preset Freq 9]  
 A420 [Preset Freq 10]      A421 [Preset Freq 11]  
 A422 [Preset Freq 12]      A423 [Preset Freq 13]  
 A424 [Preset Freq 14]      A425 [Preset Freq 15]

Sets the frequency of the drive outputs to the programmed value when selected.

For PowerFlex 525					
	Default Accel/Decel Used	Preset Input 1 (DigIn TermBlk 05)	Preset Input 2 (DigIn TermBlk 06)	Preset Input 3 (DigIn TermBlk 07)	Preset Input 4 (DigIn TermBlk 08)
Preset Setting 0 <sup>(1)</sup>	1	0	0	0	0
Preset Setting 1	1	1	0	0	0
Preset Setting 2	2	0	1	0	0
Preset Setting 3	2	1	1	0	0
Preset Setting 4	1	0	0	1	0
Preset Setting 5	1	1	0	1	0
Preset Setting 6	2	0	1	1	0
Preset Setting 7	2	1	1	1	0
Preset Setting 8	1	0	0	0	1
Preset Setting 9	1	1	0	0	1
Preset Setting 10	2	0	1	0	1
Preset Setting 11	2	1	1	0	1
Preset Setting 12	1	0	0	1	1
Preset Setting 13	1	1	0	1	1
Preset Setting 14	2	0	1	1	1
Preset Setting 15	2	1	1	1	1

(1) Preset Setting 0 is only available if P047, P049 or P051 [Speed Reference] is set to 7 "Preset Freq".

Values	Defaults:
	Preset Freq 0: 0.00 Hz
	Preset Freq 1: 5.00 Hz
	Preset Freq 2: 10.00 HZ
	Preset Freq 3: 20.00 Hz
	Preset Freq 4: 30.00 Hz
	Preset Freq 5: 40.00 Hz
	Preset Freq 6: 50.00 Hz
	Preset Freq 7...15: 60.00 Hz
	Min/Max: 0.00/500.00 Hz
	Display: 0.01 Hz

## Step Logic Velocity Profile

Step logic is only active when the speed reference is set to “Step Logic”. These parameters can be used to create a custom profile of frequency commands. Each “step” can be based on time, status of logic input, or a combination of time and the status of a logic input. A digital input must be programmed for each “step” according to the desired profile. A logic input is established by setting a digital input to “Logic In 1” or “Logic In 2”.

A time interval between steps can be programmed using parameters A150...A157 [Stp Logic Time *x*]. See [Table 57](#) for related parameters.

The speed for any step is programmed using parameters A070...A077 [Preset Freq *x*].

It is highly recommended that either DriveExecutive™ or Connected Components Workbench™ software be used to program the velocity or position step logic.

**Table 57 - PowerFlex 40/40P Velocity Step Logic Parameters**

Step	StepLogic Parameter	Related Preset Frequency Parameter (Can be activated independent of StepLogic Parameters)	Related StepLogic Time Parameter (Active when A140-A147 Digit 0 or 1 are set to 1, b, C, d or E)
0	A140 [Stp Logic 0]	A070 [Preset Freq 0]	A150 [Stp Logic Time 0]
1	A141 [Stp Logic 1]	A071 [Preset Freq 1]	A151 [Stp Logic Time 1]
2	A142 [Stp Logic 2]	A072 [Preset Freq 2]	A152 [Stp Logic Time 2]
3	A143 [Stp Logic 3]	A073 [Preset Freq 3]	A153 [Stp Logic Time 3]
4	A144 [Stp Logic 4]	A074 [Preset Freq 4]	A154 [Stp Logic Time 4]
5	A145 [Stp Logic 5]	A075 [Preset Freq 5]	A155 [Stp Logic Time 5]
6	A146 [Stp Logic 6]	A076 [Preset Freq 6]	A156 [Stp Logic Time 6]
7	A147 [Stp Logic 7]	A077 [Preset Freq 7]	A157 [Stp Logic Time 7]

**Table 58 - PowerFlex 525 Step Logic Parameters**

Step	Step Logic Parameter	Related Preset Frequency Parameter (can be activated independent of Step Logic parameters)	Related StepLogic Time Parameter (active when L180...L187 Digit 1 or 2 are set to 1, b, C, d, or E)
0	L180 [Stp Logic 0]	A410 [Preset Freq 0]	L190 [Stp Logic Time 0]
1	L181 [Stp Logic 1]	A411 [Preset Freq 1]	L191 [Stp Logic Time 1]
2	L182 [Stp Logic 2]	A412 [Preset Freq 2]	L192 [Stp Logic Time 2]
3	L183 [Stp Logic 3]	A413 [Preset Freq 3]	L193 [Stp Logic Time 3]
4	L184 [Stp Logic 4]	A414 [Preset Freq 4]	L194 [Stp Logic Time 4]
5	L185 [Stp Logic 5]	A415 [Preset Freq 5]	L195 [Stp Logic Time 5]
6	L186 [Stp Logic 6]	A416 [Preset Freq 6]	L196 [Stp Logic Time 6]
7	L187 [Stp Logic 7]	A417 [Preset Freq 7]	L197 [Stp Logic Time 7]

## Step Logic Position Profile

The PowerFlex 40P and the PowerFlex 525 can be programmed to use encoder feedback to define the step position. The step position can be an incremental or an absolute move when using the appropriate encoder. Below are the additional parameters that are added to the velocity step logic routine to include the step position.

### *PowerFlex 40P*

The PowerFlex 40P has the ability to program a position for any step by including parameters [Step Units  $x$ ] and [Step Unit F  $x$ ] with the step logic parameters.

**Table 59 - PowerFlex 40P Step Logic Position Profile Parameters**

Step	Parameters
0	E230 [Step Units 0] and E231 [Step Units F 0]
1	E232 [Step Units 1] and E233 [Step Units F 1]
2	E234 [Step Units 2] and E235 [Step Units F 2]
3	E236 [Step Units 3] and E237 [Step Units F 3]
4	E238 [Step Units 4] and E239 [Step Units F 4]
5	E240 [Step Units 5] and E241 [Step Units F 5]
6	E242 [Step Units 6] and E243 [Step Units F 6]
7	E244 [Step Units 7] and E245 [Step Units F 7]

### *PowerFlex 525*

The PowerFlex 525 has the ability to program a position for any step by including parameters [Step Units  $x$ ] and [Step Units F  $x$ ] with the step logic parameters.

**Table 60 - PowerFlex 525 Step Logic Position Profile Parameters**

Step	Parameters
0	L200 [Step Units 0] and L201 [Step Units F 0]
1	L202 [Step Units 1] and L203 [Step Units F 1]
2	L204 [Step Units 2] and L205 [Step Units F 2]
3	L206 [Step Units 3] and L207 [Step Units F 3]
4	L208 [Step Units 4] and L209 [Step Units F 4]
5	L210 [Step Units 5] and L211 [Step Units F 5]
6	L212 [Step Units 6] and L213 [Step Units F 6]
7	L214 [Step Units 7] and L215 [Step Units F 7]

**Note:** Refer to the appropriate drive programming manual for more information on applying step logic or position step logic.

---

## Network Communication

### Overview

A PowerFlex 40 and 40P drive with a communication adapter can be replaced with a PowerFlex 525 drive. The process to migrate can vary significantly depending upon the communication adapter in the PowerFlex 40 or 40P drive and the controller type communicating to the drive.

This section explains which PowerFlex 40 and 40P network options can be migrated to the PowerFlex 525 drive. Due to the wide variety of networks, processors, and drive options to consider, only guidelines for migration will be provided, rather than step-by-step procedures.

---

**IMPORTANT** Please refer to the respective drive's and communication adapter's user manual. The manuals provide important configuration, installation, wiring, and programming processes required for proper operation.

---

### Communication Adapters

#### *25-COMM Adapters*

The following communication adapters are supported by the PowerFlex 525 drive:

- 25-COMM-D: DeviceNet communication adapter
- 25-COMM-E2P: EtherNet/IP communication adapter - dual port
- 25-COMM-P: Profibus communication adapter

Note: The PowerFlex 525 drive includes an embedded EtherNet/IP adapter on the main control circuit board. See PowerFlex 525 Embedded Ethernet/IP Adapter on page [121](#) for more information.

#### *22-COMM Carrier Adapters*

The following component-class (DSI) communication adapters are supported by the PowerFlex 525 drive:

- 22-COMM-D: DeviceNet™ communication adapter
- 22-COMM-E: EtherNet/IP™ communication adapter
- 22-COMM-P: Profibus™ communication adapter

One of the following component-class communication modules are required for the modules listed above to function with the PowerFlex 525 drive:

- 20-XCOMM-AC-PS1: Optional 100...240V AC power supply for external DSI communication kit
- 22-XCOMM-DC-BASE: External mounting kit for 22-COMM communication adapters

The following component-class communication adapters are not supported by the PowerFlex 525 drive:

- 22-COMM-B: BACnet™ MS/TP RS485 adapter
- 22-COMM-C: ControlNet™ adapter
- 22-COMM-L: LonWorks® adapter

The following component-class peripheral devices are supported by the PowerFlex 525 drive:

- 1203-USB: Universal Serial Bus™ (USB) to DSI converter
- 1769-SM2: Compact I/O to DSI module
- 22-SCM-232: Serial converter module (RS485 to RS232)
- 22-HIM-A3: Remote handheld, LCD display, full numeric keypad HIM
- 22-HIM-C25: Remote (panel mount) LCD display, digital speed control HIM
- 22-WIM-Nx: Wireless interface module



### PowerFlex 525 Embedded Ethernet/IP Adapter

This section contains only basic information to setup an EtherNet/IP connection with your PowerFlex 525 drive. For comprehensive information about EtherNet/IP (single and dual port) and how to use it, see the PowerFlex 525 Embedded EtherNet/IP Adapter User Manual, publication [520COM-UM001](#).

#### Establishing a Connection with Ethernet/IP

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 using 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 the control network using a gateway. The IP address, subnet mask, and gateway addresses are set in the adapter parameters.

---

**IMPORTANT** If you are setting your network addresses manually using 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.

---

#### Software Versions

Some features in the PowerFlex 525 drive are not supported by older configuration software tools. It is strongly recommended that customers using such tools migrate to RSLogix™ 5000 software (version 17.0 or later) or Logix Designer application (version 21.0 or later) with an Add-On-Profile (AOP), or Connected Components Workbench™ software (version 5.0 or later) for full-featured configuration capabilities.

Description	Catalog Number/Release Version
Connected Components Workbench <sup>(1)</sup>	Version 5.0 or later
Logix Designer	Version 21.0 or later
RSLogix 5000	Version 17.0 or later
Built-in USB software tool	–
Serial Converter Module <sup>(2)</sup>	22-SCM-232
USB Converter Module <sup>(2)</sup>	1203-USB
Remote Panel Mount, LCD Display <sup>(2)</sup>	22-HIM-C25
Remote Handheld, LCD Display <sup>(2)</sup>	22-HIM-A3

(1) Available as a free download at <http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software>.

(2) Does not support the new dynamic parameter groups (AppView, CustomView), and CopyCat functionality is limited to the linear parameter list.

*RS485 (DSI)/Modbus*

PowerFlex 40 and 40P drives support RS485 (DSI) protocol to allow efficient operation with Rockwell Automation peripherals. In addition, some Modbus functions are supported to provide simple networking.

In order to control a PowerFlex 40 and 40P drive on a Modbus network, the drive must be setup for network control. You can enter all of the parameter values into the drive by using the integral keypad or DriveExecutive or Connected Components Workbench software.

For programming a PowerFlex 525 drive to operate on a DSI network, the keypad, RSLogix™ 5000 or Connected Components Workbench software are recommended.

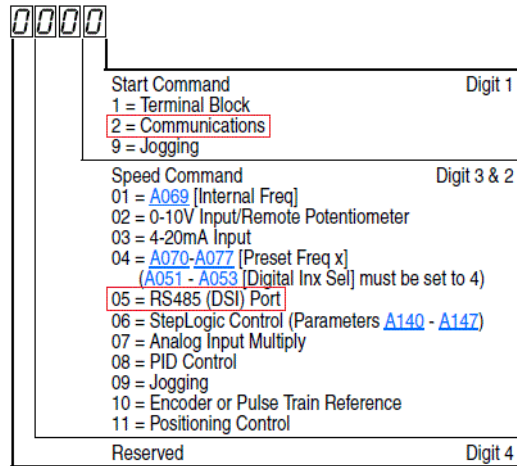
[Table 61](#) lists the parameters that require programming for the drive to communicate on a Modbus network.

**Table 61 - Parameters Programmed for Communication on a Modbus Network**

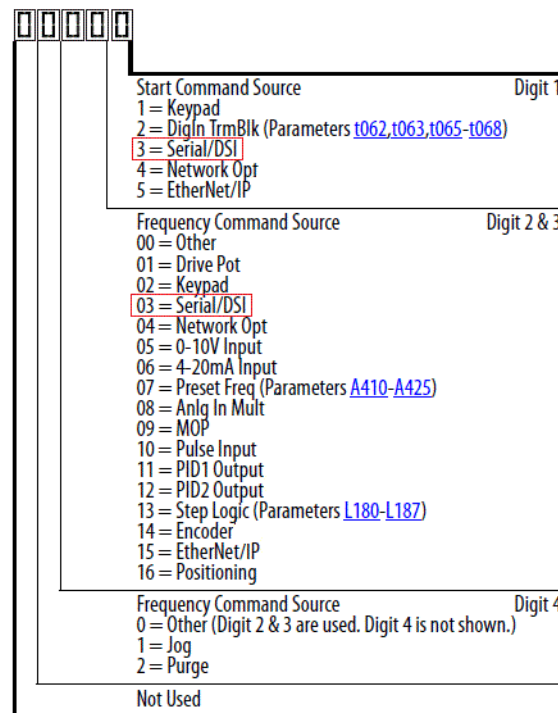
Requirement	PowerFlex 40 / 40P		PowerFlex 525	
	Parameter Number	Value	Parameter Number	Value
Control scheme for logic	P036 [Start Source]	5 "Comm Port"	P046 [Start Source 1]	3 "Serial/DSI"
Source of Speed Reference	P038 [Speed Reference]	5 "Comm Port"	P047 [Speed Reference1]	3 "Serial/DSI"
Modbus RTU Comm Speed	A103 [Comm Data Rate]	4 "19.2K"	C123 [RS485 Data Rate]	4 "19,200"
Modbus RTU Address	A104 [Comm Node Addr]	100	C124 [RS485 Node Addr]	100
Modbus RTU Comm Format	A107 [Comm Format]	0 "RTU 8-N-1"	C127 [RS485 Format]	0 "RTU 8-N-1"

The communication node address and format should be programmed to meet the requirements of your application. Note that each drive requires a unique Modbus RTU address. Also, the drive's node address and Modbus RTU settings are only updated by cycling power to the drive.

Once the drive is connected and power is applied, verify that parameter b012 [Control Source] in the PowerFlex 40 or 40P displays “52” (RS485 Port/communication), indicating that the start and speed reference are controlled by the RS485 port.



In the PowerFlex 525, parameter b012 [Control Source] displays “33” (serial/DSI), indicating that the start and speed reference are from the RS485 port.



Appendix C of the respective drive's user manual provides additional information on installing, wiring and which Modbus functions are supported.

### *Using the Adapter I/O*

The terms input and output are defined from the controller's point of view. Therefore, output I/O is data that is produced by the controller and consumed by the adapter. Input I/O is status data that is produced by the adapter and consumed as input by the controller. The I/O image can vary greatly depending on the communication adaptor and thus, the user should consult the "Using the I/O" section of the respective communication adaptor user manual.

### *Velocity Reference/Feedback*

The PowerFlex 40, 40P, and 525 velocity reference and feedback 16-bit integer values represent drive speed. The scaling for the velocity reference and feedback is 0.01 Hz. For example, a 16-bit integer reference value of "3000" equals a reference of 30.00 Hz. Note that the commanded maximum speed can never exceed the value of parameter P035 [Maximum Freq] for PowerFlex 40/40P and parameter 044 [Maximum Freq] for PowerFlex 525.

---

**IMPORTANT** Attempting to write a negative value to the Speed Reference results in the drive ramping to maximum speed due to overflow. The direction of the drive can only be controlled programmatically with the appropriate bits (4 and 5) in the Command Word.

---

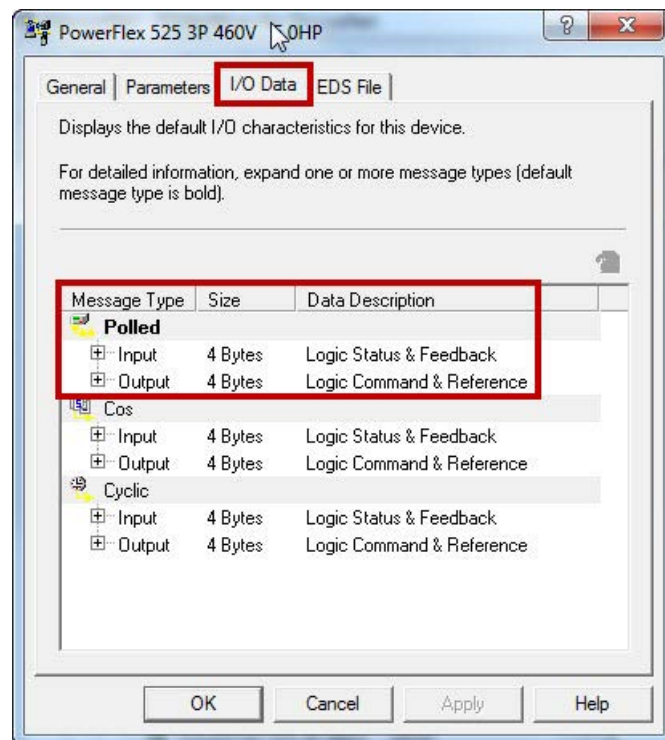
## DeviceNet

The example below is based on the 1747-SDN SLC DeviceNet scanner module and provides some key points in regard to the DeviceNet communication differences between PowerFlex 40 and 40P drives and PowerFlex 525 drives.

### Communication size

Note: The communication size between the PowerFlex 40/40P and PowerFlex 525 drives is identical, as long as no datalinks are added to the PowerFlex 525 drive.

**Figure 55 - PowerFlex 525 I/O Data Size**

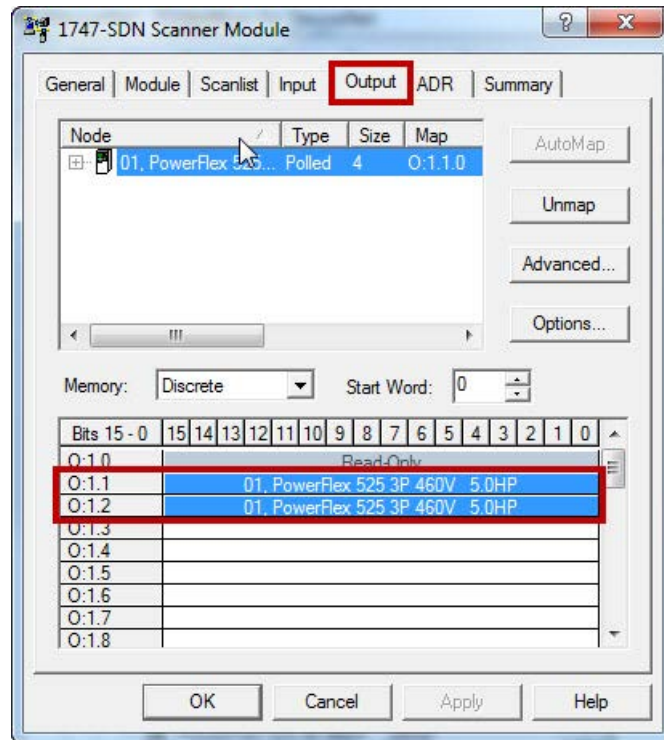


- 4 bytes (2 words) status & feedback
  - 1 word: drive status
  - 1 word: speed feedback
- 4 bytes (2 words) command & reference
  - 1 word: drive command
  - 1 word: speed reference

### DeviceNet Scanner Output Mapping

Note: The DeviceNet scanner output mapping between the PowerFlex 40/40P drives and PowerFlex 525 drives is identical as long as no datalinks are added to the PowerFlex 525 drive.

Figure 56 - PowerFlex 525 DeviceNet Output Mapping Data

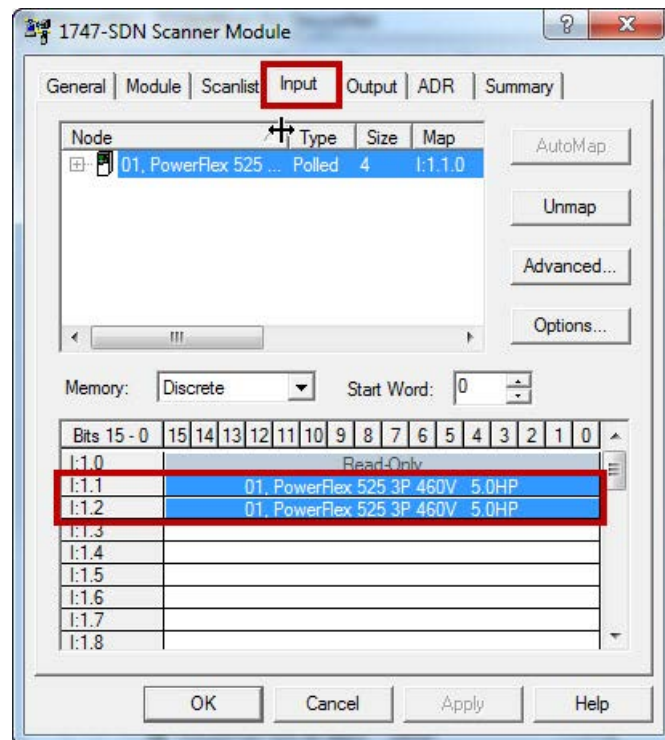


- Node 1 - PowerFlex 525
  - O:1.1 Command word
  - O:1.2 Speed reference

## DeviceNet Scanner Input Mapping

Note: The DeviceNet scanner input mapping between the PowerFlex 40/40P drives and PowerFlex 525 drives is identical as long as no datalinks are added to the PowerFlex 525 drive.

**Figure 57 - PowerFlex 52 DeviceNet Input Mapping Data**



- Node 1 - PowerFlex 525
  - I:1.1 Status word
  - I:1.2 Speed feedback

Command Word Format

Table 62, Table 63, Table 64, Table 65, and Table 66 show the difference between the PowerFlex 40/40P and PowerFlex 525. Note that bit 6 for the PowerFlex 525 is used to force keypad control which is not available in the PowerFlex 40/40P.

Table 62 - PowerFlex 40 Logic Command Word

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	See Note <sup>(1)</sup>	Ref Sel	Ref Sel	Ref Sel	Decel Rate	Decel Rate	Accel Rate	Accel Rate	See Note <sup>(2)</sup>	See Note <sup>(3)</sup>	Direction	Direction	Clear Faults	Jog	Start	Stop

- (1) Not used in firmware version 3.03 and earlier. In firmware version 4.01 and later, activates C-Form Relay. Note: This bit controls the output when the value of parameter A055 is set to 20.
- (2) Not used in firmware version 3.03 and earlier. In firmware version 4.01 and later, activates Opto Output 2. Note: This bit controls the output when the value of parameter A061 is set to 20.
- (3) Not used in firmware version 3.03 and earlier. In firmware version 4.01 and later, activates Opto Output 1. Note: This bit controls the output when the value of parameter A058 is set to 20.

Table 63 - PowerFlex 40P - E249 = 0 "Velocity" Logic Command Word

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Not Used	Ref Sel	Ref Sel	Ref Sel	Decel Rate	Decel Rate	Accel Rate	Accel Rate	Logic In 2	Logic In 1	Direction	Direction	Clear Faults	Jog	Start	Stop

Table 64 - PowerFlex 525 - C122 = 0 "Velocity" Logic Command Word

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	MOP Dec	Ref Select 3	Ref Select 2	Ref Select 1	Decel Time	Decel Time	Accel Time	Accel Time	MOP Inc	Keypad	Direction	Direction	Clear Faults	Jog	Start	Stop

Table 65 - PowerFlex 40P - E249 = 1 "Position" Logic Command Word

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Traverse Disable	Sync Enable	Pos Redefine	Hold Step	Find Home	Frequency and Position Source			Logic In 2	Logic In 1	Direction	Direction	Clear Faults	Jog	Start	Stop

Table 66 - PowerFlex 525 - C122 = 1 "Position" Logic Command Word

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Disable Travel	Enable Sync	Redefine Position	Hold Step	Find Home	Frequency and Position Steps			Logic Input 2	Logic Input 1	Direction	Direction	Clear Faults	Jog	Start	Stop

The reference select bits (12...14) have the same location, but have slightly different functions as identified in this table:

Bit 14	Bit 13	Bit 12	PowerFlex 40/40P - "Velocity"	PowerFlex 525 - Velocity Mode
0	0	0	No Command	No Command
0	0	1	Freq Source = Select	Freq Source = P047 [Speed Reference1]
0	1	0	Freq Source = Int Freq	Freq Source = P049 [Speed Reference2]
0	1	1	Freq Source = Comm	Freq Source = P051 [Speed Reference3]
1	0	0	A070 [Preset Freq 0]	A410 [Preset Freq 0]
1	0	1	A071 [Preset Freq 1]	A411 [Preset Freq 1]
1	1	0	A072 [Preset Freq 2]	A412 [Preset Freq 2]
1	1	1	A073 [Preset Freq 3]	A413 [Preset Freq 3]



The frequency and position sources for the PowerFlex 40P and PowerFlex 525 drives are identical. The details are shown in this table.

Bit 10	Bit 09	Bit 08	PowerFlex 40P - "Position"	PowerFlex 525 - Position Mode
0	0	0	A070 Freq. Source, E230 Position Source	Frequency and Position Step 0
0	0	1	A071 Freq. Source, E232 Position Source	Frequency and Position Step 1
0	1	0	A072 Freq. Source, E234 Position Source	Frequency and Position Step 2
0	1	1	A073 Freq. Source, E236 Position Source	Frequency and Position Step 3
1	0	0	A074 Freq. Source, E238 Position Source	Frequency and Position Step 4
1	0	1	A075 Freq. Source, E240 Position Source	Frequency and Position Step 5
1	1	0	A076 Freq. Source, E242 Position Source	Frequency and Position Step 6
1	1	1	A077 Freq. Source, E244 Position Source	Frequency and Position Step 7

*Speed Reference Format*

The speed reference value is sent (controller to drive) as a 16-bit integer value. This 16-bit value represents the drive speed in 0.01Hz. For example, if the value sent to the drive = 1235, then the output frequency = 12.35Hz.

*Status Word Format*

[Table 67](#), [Table 68](#), [Table 69](#), [Table 70](#), and [Table 71](#) show the difference in bit designations of the status word. Note that the difference is bit 6.

**Table 67 - PowerFlex 40 Logic Status Word**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Digital Input 4 Status <sup>(1)</sup>	Digital Input 3 Status <sup>(1)</sup>	Digital Input 2 Status	Digital Input 1 Status	Parameters	Operation Command	Main Freq	At Speed	Fault	Alarm	Decel	Accel	Actual Direction	Command Direction	Active	Ready

(1) This status is available only with firmware revision 2.xx and higher.

**Table 68 - PowerFlex 40P - E249 = 0 "Velocity"**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Digital Input 4 Status	Digital Input 3 Status	Digital Input 2 Status	Digital Input 1 Status	Parameters	Operation Command	Main Freq	At Speed	Fault	Not Used	Decel	Accel	Actual Direction	Command Direction	Active	Ready

**Table 69 - PowerFlex 525 - C122 = 0 "Velocity"**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Digital Input 4 Status	Digital Input 3 Status	Digital Input 2 Status	Digital Input 1 Status	Parameters	Operation Command	Main Freq	At Speed	Fault	Reserved	Decel	Accel	Actual Direction	Command Direction	Active	Run Ready

**Table 70 - PowerFlex 40P - E249 = 1 "Position"**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Traverse Decel	Traverse	Sync Ramp	Sync Hold	Drive Homed	At Home	At Position	At Speed	Fault	Travel Position	Decel	Accel	Actual Direction	Command Direction	Active	Run Ready

**Table 71 - PowerFlex 525 - C122 = 1 "Position"**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Traverse Decel	Traverse	Sync Ramp	Sync Hold	Commanded Home	Drive Home	At Position	At Speed	Fault	Travel Position	Decel	Accel	Actual Direction	Command Direction	Active	Run Ready

*Speed Feedback Format*

The speed feedback value is received (drive to controller) as a 16-bit integer value. The speed reference is a 16-bit integer value which represents drive speed in 0.01 Hz. For example, if the value received from the drive = 1235, then the output frequency = 12.35Hz.



## 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 and application notes, sample code, and links to software service packs. You can also visit our Support Center at <https://rockwellautomation.custhelp.com/> for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://www.rockwellautomation.com/services/online-phone>.

## 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 <a href="#">Worldwide Locator</a> at <a href="http://www.rockwellautomation.com/rockwellautomation/support/overview.page">http://www.rockwellautomation.com/rockwellautomation/support/overview.page</a> , or contact your local Rockwell Automation representative.

## New Product Satisfaction Return

Rockwell Automation tests all of its products to help 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.

## Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication [RA-DU002](#), available at <http://www.rockwellautomation.com/literature/>.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication PFLEX-AP011B-EN-P - March 2014

Supersedes Publication - PFLEX-AP011A-EN-P February 2014

Copyright © 2014 Rockwell Automation, Inc. All rights reserved. Printed in the U.S.A.