

# PowerFlex 527 AC Drive Specifications

Original Instructions



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## Product Overview

PowerFlex® 527 AC drives are designed to be used with an Allen-Bradley® Logix Programmable Automation Controller (PAC). Ideal for machines that can benefit from the same drive configuration experience for both servo and AC drives, the PowerFlex 527 drive features a built-in dual port for EtherNet/IP™ and safety over the network. The PowerFlex 527 drive provides maximum flexibility and performance ranging up to 30 HP and 22 kW.

Designed to connect and operate only with the ControlLogix® 1756-L7x, GuardLogix® 1756-L7xS, and CompactLogix™ 5370 controllers and Studio 5000 Logix Designer™ application. The PowerFlex 527 is programmed with the embedded motion instructions within Studio 5000, these are the same instructions that are used for Allen-Bradley Kinetix® servo drives. This streamlined approach provides a common user experience and just one software package to learn and use. The commonality and use of consolidated integration tools helps save valuable engineering time.

Maximize your system performance and productivity by taking advantage of the following key features offered in a PowerFlex 527 drive.

## PowerFlex 527 AC Drives Feature

### Design

- Designed to be used exclusively with Allen-Bradley Logix controllers.
- Designed for machine applications – such as pumps, fans, and in-feed and out-feed conveyors – that need speed control for induction motors.
- Logix integration helps deliver a high level of motor coordination.
- Built-in dual-port EtherNet/IP supports multiple network topologies and Device Level Ring functionality.
- Built-in hardwired Safe Torque-off. SIL 3 / PLe Cat 3.
- Integrated Safety – controller-based safety delivered via EtherNet/IP. SIL 3 / PLe Cat 3.
- Reduce your spare parts with a standard control module that can be used across the entire power range.
- Support for an incremental encoder accessory card without affecting footprint.

### Packaging and Mounting

- Installation can be quick and easy using the DIN rail mounting feature on A, B, and C frame drives. Panel mounting is also available, providing added flexibility.
- Zero Stacking™ is allowed for ambient temperatures up to 45 °C, saving valuable panel space.
- Integral filtering is available on all 200V and 400V ratings, providing a cost-effective means of meeting EN61800-3 Category C2 and C3 EMC requirements. External filters provide compliance to EN61800-3 Category C1, C2, and C3 EMC requirements for all PowerFlex 520-Series ratings.
- An optional IP 30, NEMA/UL Type 1 conduit box is easily adapted to the standard IP 20 (NEMA Type Open) product, providing increased environmental ratings.

### Optimized Performance

- Removable MOV to ground provides trouble-free operation when used on ungrounded distribution systems.
- A relay pre-charge limits inrush current.
- Integral brake transistor, available on all ratings, provides dynamic braking capability with simple low cost brake resistors.

- A jumper to switch between 24V DC sink or source control for control wiring flexibility.
- Dual Overload Rating available for drives above 15 HP/11 kW. Normal duty: 110% overload for 60 seconds or 150% for 3 seconds. Heavy duty: 150% overload for 60 seconds or 180% overload (200% programmable) for 3 seconds provides robust overload protection.
- Adjustable PWM frequency up to 8 kHz ensures quiet operation.

## PowerFlex 527 AC Drive Advanced Features

### Control Performance

- **Frequency Control with the following options:**
  - Volts per Hertz (V/Hz)
  - Sensorless Vector Control (SVC)
  - Sensorless Vector Control (SVC) Economizer
- **Position Loop, including:**
  - Closed Loop Position Vector Control (with optional encoder card)
- **Velocity Loop, including:**
  - Closed Loop Velocity Vector Control (with optional encoder card)

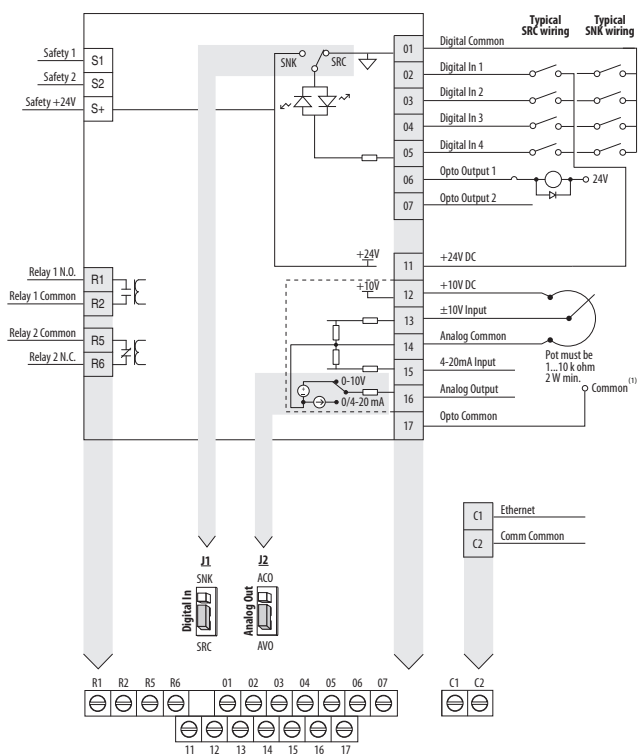
### I/O Wiring

- Two (2) Analog Inputs (one current and one voltage) are independently isolated from the rest of the drive I/O.
- Four (4) Digital Inputs provide application versatility.
- One (1) Analog Output is jumper selectable between either 0-10V or 0-20 mA. This scalable, 10-bit output is suitable for metering or as a speed reference for another drive.
- Two (2) Opto Outputs and two (2) Relay Outputs (one form A and one form B) can be used to indicate various drive, motor or logic conditions.

### Communications

- Built-in dual port for EtherNet/IP allows easy configuration, control, and collection of drive data over the network. It also supports Device Level Ring (DLR) topologies, providing fault-tolerant connectivity for optimum drive availability.
- Online EDS file creation with RSNetWorx™ providing ease of set-up on a network.

PowerFlex 527 Control I/O Wiring Block Diagram



## Common DC Bus Installations

Common DC Bus offers additional inherent breaking capabilities by utilizing all the drives/loads on the bus for energy absorption offering higher efficiency and cost savings. The PowerFlex 527 drive has been optimized for use in Common DC Bus or Shared DC Bus installations.

- Direct DC Bus connection to power terminal blocks.

## Improved Ride Through

### Operation Down to 1/2 Line Voltage

The PowerFlex 527 drive allows for the selection of 1/2 DC Bus operation, for use in critical applications where continued drive output is desired even in the event of brown out or low voltage conditions. The PowerFlex 527 drive also supports enhanced inertia ride through for additional low voltage mitigation.

- Selectable 1/2 line voltage operation.
- Increased power loss ride through.

## Basic Position Control

Closed loop position control using Logix motion instructions such as MAM (Motion Axis Move). For more information on Logix motion instructions, see the Logix5000 Motion Controllers Instructions Reference Manual, publication [MOTION-RM002](#).

## Closed Loop Feedback

### Encoder Option Card

The PowerFlex 527 drive allows for configurable closed loop control with an optional encoder card for either speed or position feedback for improved speed regulation or basic position control.

- Improved speed regulation
- Basic position control

## Feedback Details

### Line Driver Type Incremental Encoder Option Card

- Quadrature (dual channel)
- 5V/12V DC supply, 10 mA min per channel
- Single Ended or Differential (A, B, and Z Channel)
- Duty Cycle of 50%, +10%
- Input Frequency up to 250 kHz

### Encoder Wiring Examples

I/O	Connection Example	I/O	Connection Example
<b>Encoder Power – Internal Drive Power</b> Internal (drive) 12V DC, 250 mA		<b>Encoder Power – External Power Source</b>	
<b>Encoder Signal – Single-Ended, Dual Channel</b>		<b>Encoder Signal – Differential, Dual Channel</b>	

## Safety Inside using Safe Torque-Off Function

Safe Torque-off is a standard feature that can be applied through either hardwired safety or Integrated Safety via an EtherNet/IP network. Safe Torque-Off allows you to restart your application faster after a safety-related situation.

- Safe Torque-Off functionality removes rotational power without powering down the drive.
- Built-in safety reduces wiring and saves on installation space.
- Meets ISO 13849-1 standards and provides safety ratings up to and including SIL 3/PLc.

## Communications and Software

### Versatile Programming and Network Solutions

- A network can be configured using PowerFlex 527 drives for flexible configuration capabilities.
- Built-in dual port for EtherNet/IP

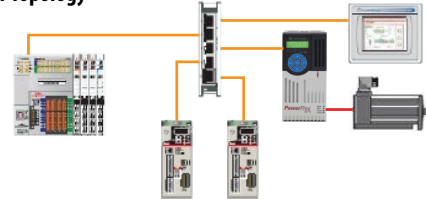
EtherNet/IP is an established, broadly adopted network that helps simplify and enhance machine design and operation. Dual-port EtherNet/IP connectivity supports linear and ring topologies as well as device level ring (DLR) functionality.

The application of the CIP Safety protocol enables the simultaneous transmission of safety and standard control data and diagnostics information through EtherNet/IP.

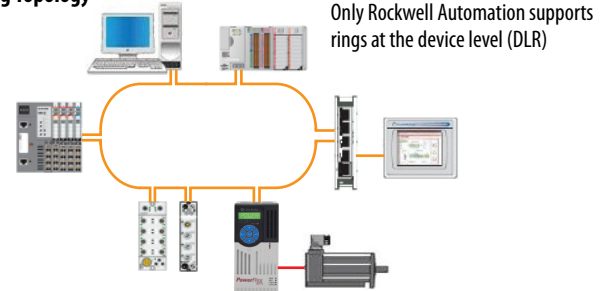
Linear Topology



Star Topology



Ring Topology



## PC Programming Software

### Studio 5000 Logix Designer

- PowerFlex 527 drives are designed to be used exclusively with Allen Bradley Logix controllers.
- Drives are programmed using the motion instructions in Studio 5000 Logix Designer<sup>(1)</sup>.
- PowerFlex 527 drives feature drive configuration that is stored in the Logix controller, supporting fast, automatic device replacement.

(1) Studio 5000 Logix Designer (formerly RSLogix 5000) version 24 or greater is required.

## PowerFlex 527 Drive Family



## Catalog Number Explanation

1-3	4	5	6-8	9	10	11	12	13	14
<b>25C</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
25C	PowerFlex 527

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

Code	Enclosure
N	IP20 NEMA / Open

Code	Interface Module
1	Standard

Code	EMC Filter
0	No Filter
1	Filter

Code	Braking
4	Standard

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 @ 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	15.0	11.0
062 <sup>(1)</sup>	62.1	E	20.0	15.0	15.0	11.0

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 @ 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 drives above 15 HP / 11 kW.

## Technical Specifications

### Protection

Specifications	PowerFlex 527
Bus Overvoltage Trip	
100...120V AC Input:	405V DC bus (equivalent to 150V AC incoming line)
200...240V AC Input:	405V DC bus (equivalent to 290V AC incoming line)
380...480V AC Input:	810V DC bus (equivalent to 575V AC incoming line)
525...600V AC Input:	1005V DC bus (equivalent to 711V AC incoming line)
Bus Undervoltage Trip	
100...120V AC Input:	190V DC bus (equivalent to 75V AC incoming line)
200...240V AC Input:	190V DC bus (equivalent to 150V AC incoming line)
380...480V AC Input:	390V DC bus (equivalent to 275V AC incoming line)
525...600V AC Input:	487V DC bus (equivalent to 344V AC incoming line)
Power Ride-Thru:	100 ms
Logic Control Ride-Thru:	0.5 s minimum, 2 s typical
Electronic Motor Overload Protection:	Provides class 10 motor overload protection according to NEC article 430 and motor over-temperature protection according to NEC article 430.126 (A) (2). UL 508C File 29572.
Overcurrent:	200% hardware limit, 300% instantaneous fault
Ground Fault Trip:	Phase-to-ground on drive output
Short Circuit Trip:	Phase-to-phase on drive output

### Electrical

Specifications	PowerFlex 527
Voltage Tolerance:	-15% / +10%
Frequency Tolerance:	47...63 Hz
Input Phases:	Three-phase input provides full rating. Single-phase input provides 35% rating on three-phase drives.
Displacement Power Factor:	0.98 across entire speed range
Maximum Short Circuit Rating:	100,000 Amps Symmetrical
Actual Short Circuit Rating:	Determined by AIC Rating of installed fuse/circuit breaker
Transistor Type:	Isolated Gate Bipolar Transistor (IGBT)
Internal DC Bus Choke	Only for Frame E drive ratings
200...240V AC Input:	11 kW (15 HP)
380...480V AC Input:	15...18.5 kW (20...25 HP) – Heavy Duty
525...600V AC Input:	15...18.5 kW (20...25 HP) – Heavy Duty



## Control

Specifications	PowerFlex 527
Method	<ul style="list-style-type: none"> <li>• Frequency Control:               <ul style="list-style-type: none"> <li>– Volts per Hertz (V/Hz)</li> <li>– Sensorless Vector Control (SVC)</li> <li>– Sensorless Vector Control (SVC) Economizer</li> </ul> </li> <li>• Position Loop:               <ul style="list-style-type: none"> <li>– Closed Loop Position Vector Control (with optional encoder card)</li> </ul> </li> <li>• Velocity Loop:               <ul style="list-style-type: none"> <li>– Closed Loop Velocity Vector Control (with optional encoder card)</li> </ul> </li> </ul>
Carrier Frequency	2...8 kHz, Drive rating based on 4 kHz
Frequency Accuracy	
Digital Input:	Within $\pm 0.05\%$ of set output frequency
Analog Input:	Within 0.5% of maximum output frequency, 10-Bit resolution
Analog Output:	$\pm 2\%$ of full scale, 10-Bit resolution
Performance	
V/Hz (Volts per Hertz):	$\pm 1\%$ of base speed across a 60:1 speed range
SVC (Sensorless Vector):	$\pm 0.5\%$ of base speed across a 100:1 speed range
SVC Economizer:	$\pm 0.5\%$ of base speed across a 100:1 speed range
Performance with Encoder	
Closed Loop Velocity Vector Control:	$\pm 0.1\%$ of base speed across a 100:1 speed range
Output Voltage Range:	0V to rated motor voltage
Output Frequency Range:	0...500 Hz (programmable)
Efficiency:	97.5% (typical)
Stop Modes:	Multiple programmable stop modes including – Disable & Coast, Current Decel & Disable, and Ramp Decel & Hold
Accel/Decel:	<p>“REAL” tag programmable with Studio 5000 motion instructions.</p> <p>For more information see the Logix5000 Motion Controllers Instructions Reference Manual, publication <a href="#">MOTION-RM002</a>.</p>
Intermittent Overload	
Normal Duty:	110% Overload capability for up to 60 s, 150% for up to 3 s
	Applies for power rating above 15 kW (20 HP) only. Based on 480V drive rating.
Heavy Duty:	150% Overload capability for up to 60 s, 180% for up to 3 s (200% programmable)

## Control Inputs

Specifications	PowerFlex 527	
Digital	Bandwidth:	10 Rad/s for open and closed loop
	Quantity:	(4) Programmable
	Current:	6 mA
	Type	
	Source Mode (SRC):	18...24V = ON, 0...6V = OFF
	Sink Mode (SNK):	0...6V = ON, 18...24V = OFF
Analog	Quantity:	(2) Isolated, $\pm 10V$ and 4-20 mA
	Specification	
	Resolution:	10-bit
	$\pm 10V$ DC Analog:	100k ohm input impedance
	4-20 mA Analog:	250 ohm input impedance
	External Pot:	1...10k ohm, 2 W minimum

Specifications		PowerFlex 527
Safety (per channel)	Input Current:	<10 mA
	Input ON Voltage, max:	18...26.4V DC
	Input OFF Voltage, max:	5V DC
	Input ON Current:	10 mA
	Input OFF Current:	500 $\mu$ A
	Pulse Rejection Width:	700 $\mu$ s
	External Power Supply:	SELV/PELV
	Input Type:	Optically isolated and reverse voltage protected

### Control Outputs

Specifications		PowerFlex 527
Relay	Quantity:	(2) 1 Programmable Form A and 1 Programmable Form B
	Specification	
	Resistive Rating: Inductive Rating:	3.0 A @ 30V DC, 3.0 A @ 125V, 3.0 A @ 240V AC 0.5 A @ 30V DC, 0.5 A @ 125V, 0.5 A @ 240V AC
Opto	Quantity:	(2) Programmable
	Specification:	30V DC, 50 mA Non-inductive
Analog	Quantity:	(1) Non-Isolated 0-10V or 4-20 mA
	Specification	
	Resolution: 0-10V DC Analog: 4-20 mA Analog:	10-bit 1 k ohm minimum 525 ohm maximum








### Encoder

Specifications	PowerFlex 527
Type:	Incremental, dual channel
Supply:	5V, 12V, 250 mA
Quadrature:	90°, $\pm$ 27° @ 25 °C
Duty Cycle:	50%, +10%
Requirements:	Encoders must be line driver type, quadrature (dual channel), 3.5...26V DC output, single-ended or differential and capable of supplying a minimum of 10 mA per channel. Allowable input is DC up to a maximum frequency of 250 kHz. The encoder I/O automatically scales to allow 5V, 12V and 24V DC nominal voltages.

## Environmental Specifications

Specifications	PowerFlex 527																																		
Altitude	See <a href="#">Current Derating Curves on page 17</a> for derating guidelines.																																		
Without derating:	1000 m (3300 ft) max.																																		
With derating:	Up to 4000 m (13,200 ft) max., with the exception of 600V drives at 2000 m (6600 ft) max.																																		
Surrounding Air Temperature, max.	See <a href="#">Current Derating Curves on page 17</a> for derating guidelines.																																		
Without derating:	-20...50 °C (-4...122 °F)																																		
With derating:	-20...60 °C (-4...140 °F) or -20...70 °C (-4...158 °F) with optional Control Module Fan kit.																																		
Storage Temperature																																			
Frame A...D:	-40...85 °C (-40...185 °F)																																		
Frame E:	-40...70 °C (-40...158 °F)																																		
Atmosphere:	<p><b>IMPORTANT</b> Drive <b>must not</b> be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.</p>																																		
Relative Humidity:	0...95% noncondensing																																		
Shock:	Complies with IEC 60068-2-27																																		
Vibration:	Complies with IEC 60068-2-6:2007																																		
	<table border="1"> <thead> <tr> <th rowspan="2">Frame Size</th> <th colspan="2">Operating and Nonoperating</th> <th colspan="2">Nonoperating (Transportation)</th> </tr> <tr> <th>Force (Shock/Vibration)</th> <th>Mounting Type</th> <th>Force (Shock/Vibration)</th> <th>Mounting Type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>15 g / 2 g</td> <td>DIN rail or screw</td> <td>30 g / 2.5 g</td> <td>Screw only</td> </tr> <tr> <td>B</td> <td>15 g / 2 g</td> <td>DIN rail or screw</td> <td>30 g / 2.5 g</td> <td>Screw only</td> </tr> <tr> <td>C</td> <td>15 g / 2 g</td> <td>DIN rail or screw</td> <td>30 g / 2.5 g</td> <td>Screw only</td> </tr> <tr> <td>D</td> <td>15 g / 2 g</td> <td>Screw only</td> <td>30 g / 2.5 g</td> <td>Screw only</td> </tr> <tr> <td>E</td> <td>15 g / 1.5 g</td> <td>Screw only</td> <td>30 g / 2.5 g</td> <td>Screw only</td> </tr> </tbody> </table>	Frame Size	Operating and Nonoperating		Nonoperating (Transportation)		Force (Shock/Vibration)	Mounting Type	Force (Shock/Vibration)	Mounting Type	A	15 g / 2 g	DIN rail or screw	30 g / 2.5 g	Screw only	B	15 g / 2 g	DIN rail or screw	30 g / 2.5 g	Screw only	C	15 g / 2 g	DIN rail or screw	30 g / 2.5 g	Screw only	D	15 g / 2 g	Screw only	30 g / 2.5 g	Screw only	E	15 g / 1.5 g	Screw only	30 g / 2.5 g	Screw only
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D	15 g / 2 g	Screw only	30 g / 2.5 g	Screw only																															
E	15 g / 1.5 g	Screw only	30 g / 2.5 g	Screw only																															
Conformal Coating:	Complies with: IEC 60721-3-3 to level 3C2 (chemical and gases only)																																		
Surrounding Environment Pollution Degree																																			
Pollution Degree 1 & 2:	All enclosures acceptable.																																		
Sound Pressure Level (A-weighted)	Measurements are taken 1 m from the drive.																																		
Frame A & B:	Maximum 53 dBA																																		
Frame C:	Maximum 57 dBA																																		
Frame D:	Maximum 64 dBA																																		
Frame E:	Maximum 68 dBA																																		

## Certifications

Certification	PowerFlex 527
<b>c-UL-us</b> 	Listed to UL508C and CAN/CSA-C22.2 No. 14-05.
<b>RCM</b> 	Australian Communications and Media Authority In conformity with the following: Radiocommunications Act: 1992 Radiocommunications Standard: 2008 Radiocommunications Labelling Notice: 2008 Standards applied: EN 61800-3:2004+A1:2012
<b>CE</b> 	In conformity with the following European Directives: Low Voltage Directive 2006/95/EC: 61800-5-1 EMC Directive 2004/108/EC: EN 61800-3 Machine Directive 2006/42/EC: EN 60261
<b>TUV</b> 	TÜV Rheinland Standards applied: EN ISO 13849-1:2008+AC:2009 EN 61800-5-2:2007 EN 62061:2005+A1:2013 EN 60204-1:2006+A1:2009 IEC 61508 Part 1-7:2010 Certified to ISO 13849-1 SIL3/PLe with embedded Safe Torque-Off function Certified to ISO 61800-5-2 and EN 62061 SIL3/PLe with Network Torque-Off function Meets Functional Safety (FS) when used with embedded Safe Torque-Off function
<b>KCC</b>	Korean Registration of Broadcasting and Communications Equipment Compliant with the following standards: Article 58-2 of Radio Waves Act, Clause 3
<b>EAC</b> 	Customs Union: Low Voltage TR CU 004/2011 EMC TR CU 020/2011
<b>AC 156</b>	Tested by Trentec to be compliant with AC156 Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components and 2003 International Building Code for worst-case seismic level for USA excluding site class F
<b>EPRI</b> 	Electric Power Research Institute Certified compliant with the following standards: SEMI F47 IEC 61000-4-34
<b>ODVA</b> 	ODVA conformance tested to EtherNet/IP specifications
<b>Lloyd's Register</b>	Lloyd's Register Type Approval Certificate 15/80016(E1)
<b>IEEE P1668</b>	Product meets the requirements of IEEE P1668
<b>RoHS</b>	Compliant with the European "Restriction of Hazardous Substances" Directive

The drive is also designed to meet the appropriate portions of the following specifications:

NFPA 70 - US National Electrical Code

NEMA ICS 7.1 - Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.

## Dimensions and Weights

### Frame/Rating Cross-Reference

#### Catalog Number Description

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

#### PowerFlex 527 Drive Ratings

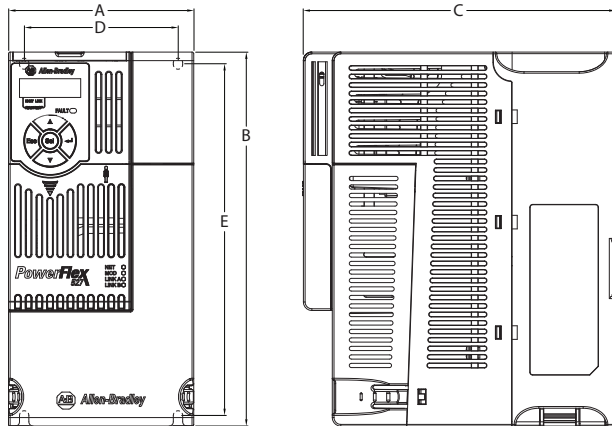
Catalog No.	Output Ratings				Output Current (A)	Input Voltage Range	Total Watts Loss	Frame Size
	Normal Duty		Heavy Duty					
	HP	kW	HP	kW				
<b>100...120V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output</b>								
25C-V2P5N104	0.5	0.4	0.5	0.4	2.5	85...132	27.0	A
25C-V4P8N104	1.0	0.75	1.0	0.75	4.8	85...132	53.0	B
25C-V6PON104	1.5	1.1	1.5	1.1	6.0	85...132	67.0	B
<b>200...240V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output</b>								
25C-A2P5N104	0.5	0.4	0.5	0.4	2.5	170...264	29.0	A
25C-A4P8N104	1.0	0.75	1.0	0.75	4.8	170...264	50.0	A
25C-A8PON104	2.0	1.5	2.0	1.5	8.0	170...264	81.0	B
25C-A011N104	3.0	2.2	3.0	2.2	11.0	170...264	111.0	B
<b>200...240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0...230V 3-Phase Output</b>								
25C-A2P5N114	0.5	0.4	0.5	0.4	2.5	170...264	29.0	A
25C-A4P8N114	1.0	0.75	1.0	0.75	4.8	170...264	53.0	A
25C-A8PON114	2.0	1.5	2.0	1.5	8.0	170...264	84.0	B
25C-A011N114	3.0	2.2	3.0	2.2	11.0	170...264	116.0	B
<b>200...240V AC (-15%, +10%) – 3-Phase Input, 0...230V 3-Phase Output</b>								
25C-B2P5N104	0.5	0.4	0.5	0.4	2.5	170...264	29.0	A
25C-B5PON104	1.0	0.75	1.0	0.75	5.0	170...264	50.0	A
25C-B8PON104	2.0	1.5	2.0	1.5	8.0	170...264	79.0	A
25C-B011N104	3.0	2.2	3.0	2.2	11.0	170...264	107.0	A
25C-B017N104	5.0	4.0	5.0	4.0	17.5	170...264	148.0	B
25C-B024N104	7.5	5.5	7.5	5.5	24.0	170...264	259.0	C
25C-B032N104	10.0	7.5	10.0	7.5	32.2	170...264	323.0	D
25C-B048N104	15.0	11.0	10.0	7.5	48.3	170...264	584.0	E
25C-B062N104	20.0	15.0	15.0	11.0	62.1	170...264	708.0	E
<b>380...480V AC (-15%, +10%) – 3-Phase Input, 0...460V 3-Phase Output<sup>(1)</sup></b>								
25C-D1P4N104	0.5	0.4	0.5	0.4	1.4	323...528	27.0	A
25C-D2P3N104	1.0	0.75	1.0	0.75	2.3	323...528	37.0	A
25C-D4PON104	2.0	1.5	2.0	1.5	4.0	323...528	80.0	A
25C-D6PON104	3.0	2.2	3.0	2.2	6.0	323...528	86.0	A
25C-D010N104	5.0	4.0	5.0	4.0	10.5	323...528	129.0	B
25C-D013N104	7.5	5.5	7.5	5.5	13.0	323...528	170.0	C
25C-D017N104	10.0	7.5	10.0	7.5	17.0	323...528	221.0	C
25C-D024N104	15.0	11.0	15.0	11.0	24.0	323...528	303.0	D
25C-D030N104	20.0	15.0	15.0	11.0	30.0	323...528	387.0	D
25C-D037N114 <sup>(2)</sup>	25.0	18.5	20.0	15.0	37.0	323...528	602.0	E
25C-D043N114 <sup>(2)</sup>	30.0	22.0	25.0	18.5	43.0	323...528	697.0	E

Catalog No.	Output Ratings				Output Current (A)	Input Voltage Range	Total Watts Loss	Frame Size
	Normal Duty		Heavy Duty					
	HP	kW	HP	kW				
<b>380...480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0...460V 3-Phase Output</b>								
25C-D1P4N114	0.5	0.4	0.5	0.4	1.4	323...528	27.0	A
25C-D2P3N114	1.0	0.75	1.0	0.75	2.3	323...528	37.0	A
25C-D4P0N114	2.0	1.5	2.0	1.5	4.0	323...528	81.0	A
25C-D6P0N114	3.0	2.2	3.0	2.2	6.0	323...528	88.0	A
25C-D010N114	5.0	4.0	5.0	4.0	10.5	323...528	133.0	B
25C-D013N114	7.5	5.5	7.5	5.5	13.0	323...528	175.0	C
25C-D017N114	10.0	7.5	10.0	7.5	17.0	323...528	230.0	C
25C-D024N114	15.0	11.0	15.0	11.0	24.0	323...528	313.0	D
25C-D030N114	20.0	15.0	15.0	11.0	30.0	323...528	402.0	D
25C-D037N114	25.0	18.5	20.0	15.0	37.0	323...528	602.0	E
25C-D043N114	30.0	22.0	25.0	18.5	43.0	323...528	697.0	E
<b>525...600V AC (-15%, +10%) – 3-Phase Input, 0...575V 3-Phase Output</b>								
25C-E0P9N104	0.5	0.4	0.5	0.4	0.9	446...660	22.0	A
25C-E1P7N104	1.0	0.75	1.0	0.75	1.7	446...660	32.0	A
25C-E3P0N104	2.0	1.5	2.0	1.5	3.0	446...660	50.0	A
25C-E4P2N104	3.0	2.2	3.0	2.2	4.2	446...660	65.0	A
25C-E6P6N104	5.0	4.0	5.0	4.0	6.6	446...660	95.0	B
25C-E9P9N104	7.5	5.5	7.5	5.5	9.9	446...660	138.0	C
25C-E012N104	10.0	7.5	10.0	7.5	12.0	446...660	164.0	C
25C-E019N104	15.0	11.0	15.0	11.0	19.0	446...660	290.0	D
25C-E022N104	20.0	15.0	15.0	11.0	22.0	446...660	336.0	D
25C-E027N104	25.0	18.5	20.0	15.0	27.0	446...660	466.0	E
25C-E032N104	30.0	22.0	25.0	18.5	32.0	446...660	562.0	E

- (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.
- (2) Catalogs 25C-037N114 and 25C-043N114 come with an EMC filter.

## Drive Dimensions and Weight

Dimensions are in mm and (in.). Weights are in kg and (lb).



Frame Size	A	B	C	D	E	Weight
A	72.0 (2.83)	152.0 (5.98)	172.0 (6.77)	57.5 (2.26)	140.0 (5.51)	1.1 (2.4)
B	87.0 (3.43)	180.0 (7.09)	172.0 (6.77)	72.5 (2.85)	168.0 (6.61)	1.6 (3.5)
C	109.0 (4.29)	220.0 (8.66)	184.0 (7.24)	90.5 (3.56)	207.0 (8.15)	2.3 (5.0)
D	130.0 (5.12)	260.0 (10.24)	212.0 (8.35)	116.0 (4.57)	247.0 (9.72)	3.9 (8.6)
E	185.0 (7.28)	300.0 (11.81)	279.0 (10.98)	160.0 (6.30)	280.0 (11.02)	12.9 (28.4)

## Design Considerations

### Mounting Considerations

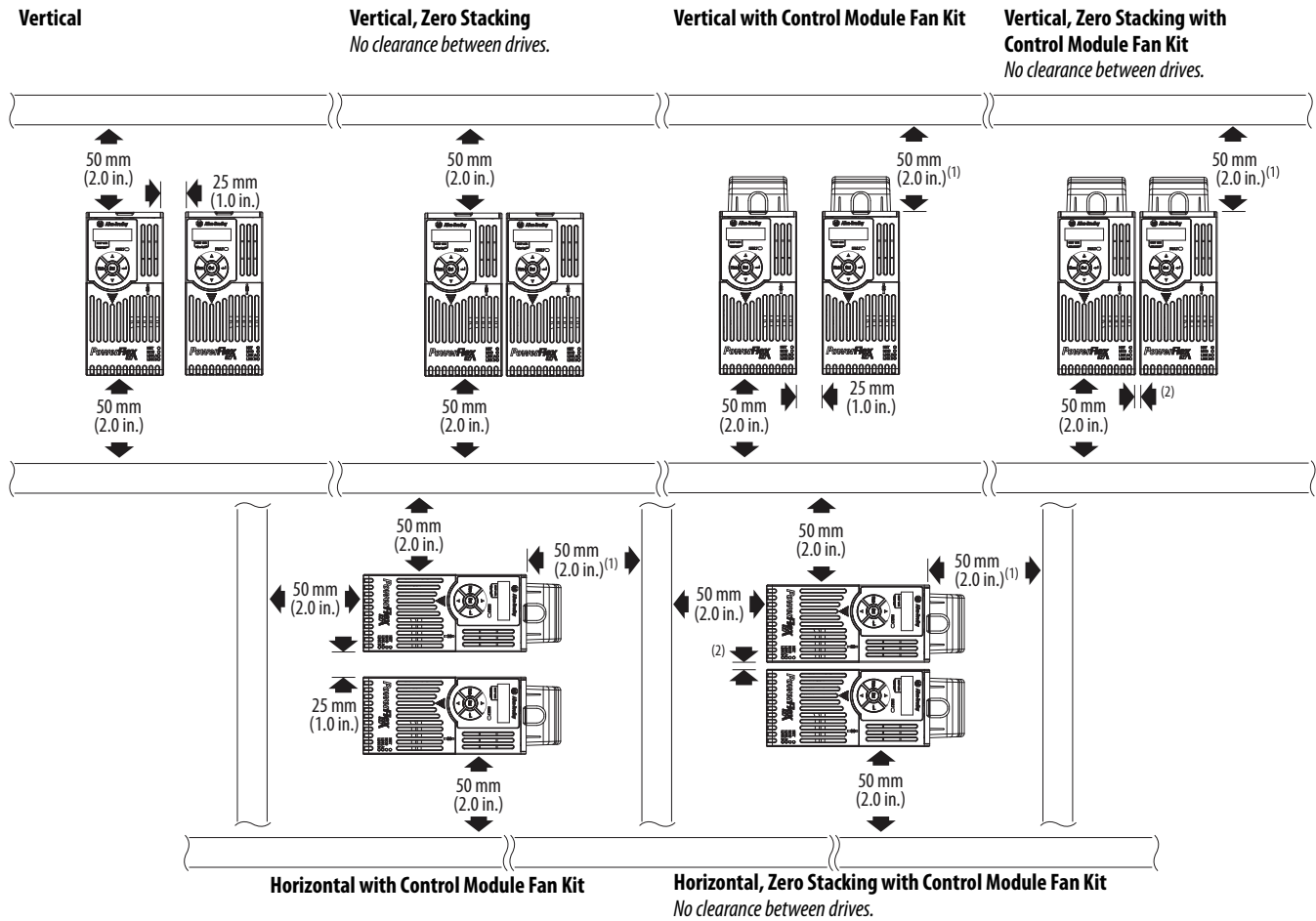
- Mount the drive upright on a flat, vertical and level surface.

Frame	Screw Size	Screw Torque
A	M5 (#10...24)	1.56...1.96 Nm (14...17 lb-in.)
B	M5 (#10...24)	1.56...1.96 Nm (14...17 lb-in.)
C	M5 (#10...24)	1.56...1.96 Nm (14...17 lb-in.)
D	M5 (#10...24)	2.45...2.94 Nm (22...26 lb-in.)
E	M8 (5/16 in.)	6.0...7.4 Nm (53...65 lb-in.)

- Protect the cooling fan by avoiding dust or metallic particles.
- Do not expose to a corrosive atmosphere.
- Protect from moisture and direct sunlight.

### Minimum Mounting Clearances

See [Dimensions and Weights on page 13](#) for mounting dimensions.



- (1) For Frame E with Control Module Fan Kit only, clearance of 95 mm (3.7 in.) is required.
- (2) For Frame E with Control Module Fan Kit only, clearance of 12 mm (0.5 in.) is required.

### Ambient Operating Temperatures

See [Accessories and Dimensions on page 31](#) for option kits.

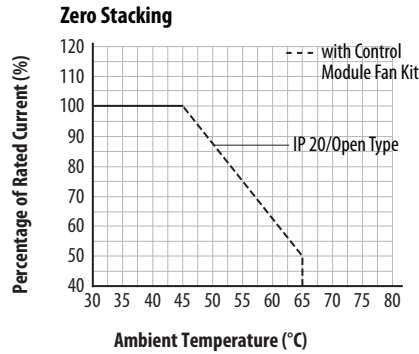
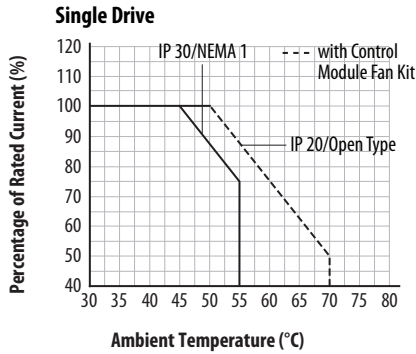
Mounting	Enclosure Rating <sup>(1)</sup>	Ambient Temperature			
		Minimum	Maximum (No Derate)	Maximum (Derate) <sup>(2)</sup>	Maximum with Control Module Fan Kit (Derate) <sup>(3)(5)</sup>
Vertical	IP 20/Open Type	-20 °C (-4 °F)	50 °C (122 °F)	–	70 °C (158 °F)
	IP 30/NEMA 1/UL Type 1		45 °C (113 °F)	55 °C (131 °F)	–
Vertical, Zero Stacking	IP 20/Open Type		45 °C (113 °F)	–	65 °C (149 °F)
Horizontal with Control Module Fan Kit <sup>(4)(5)</sup>	IP 20/Open Type		50 °C (122 °F)	–	70 °C (158 °F)
			45 °C (113 °F)	–	65 °C (149 °F)

- (1) IP 30/NEMA 1/UL Type 1 rating requires installation of the PowerFlex 520-Series IP 30/NEMA 1/UL Type 1 option kit, catalog number 25-JBAX.
- (2) For catalogs 25C-D1P4N104 and 25C-E0P9N104, the temperature listed under the Max. (Derate) column is reduced by 5 °C (9 °F) for all mounting methods.
- (3) For catalogs 25C-D1P4N104 and 25C-E0P9N104, the temperature listed under the Max. with Control Module Fan Kit (Derate) column is reduced by 10 °C (18 °F) for vertical and vertical with zero stacking mounting methods only.
- (4) Catalogs 25C-D1P4N104 and 25C-E0P9N104 cannot be mounted using either of the horizontal mounting methods.
- (5) Requires installation of the PowerFlex 520-Series Control Module Fan Kit, catalog number 25-FANx-70C.

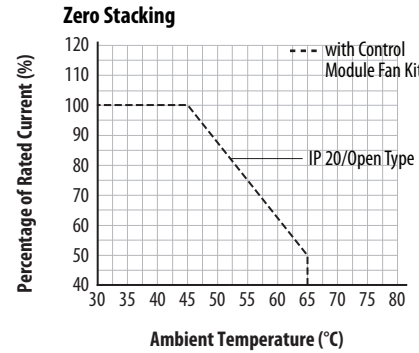
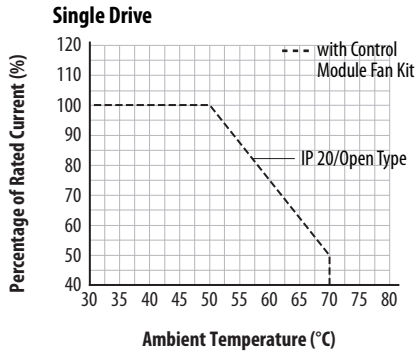


## Current Derating Curves

### Vertical Mounting



### Horizontal Mounting/Floor



### Derating Guidelines for High Altitude

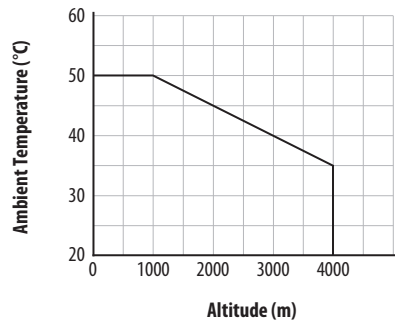
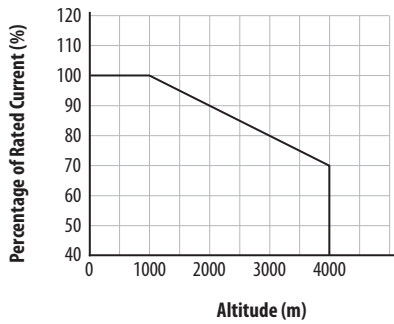
The drive can be used without derating at a maximum altitude of 1000 m (3300 ft).  
 If the drive is used above 1000 m (3300 ft):

- Derate the maximum ambient temperature by 5 °C (41 °F) for every additional 1000 m (3300 ft), subject to limits listed in the Altitude Limit (Based on Voltage) table below.
- Or
- Derate the output current by 10% for every additional 1000 m (3300 ft), subject to limits listed in the Altitude Limit (Based on Voltage) table below.

#### Altitude Limit (Based on Voltage)

Drive Rating	Center Ground (Wye Neutral)	Corner Ground, Impedance Ground, or Ungrounded
100...120V 1-Phase	6000 m	6000 m
200...240V 1-Phase	2000 m	2000 m
200...240V 3-Phase	6000 m	2000 m
380...480V 3-Phase	4000 m	2000 m
525...600V 3-Phase	2000 m	2000 m

## High Altitude



## Debris Protection

Take precautions to prevent debris from falling through the vents of the drive housing during installation.

## Storage

- Store within an ambient temperature range of  $-40...85\text{ }^{\circ}\text{C}^{(1)}$ .
- Store within a relative humidity range of 0...95%, noncondensing.
- Do not expose to a corrosive atmosphere.

(1) The maximum ambient temperature for storing a Frame E drive is 70 °C.

## AC Supply Source Considerations

### *Ungrounded Distribution Systems*



**ATTENTION:** PowerFlex 520-Series drives contain protective MOVs that are referenced to ground. These devices must be disconnected if the drive is installed on an ungrounded or resistive grounded distribution system.

**ATTENTION:** Removing MOVs in drives with an embedded filter will also disconnect the filter capacitor from earth ground.

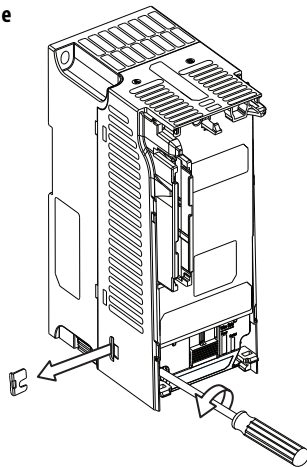
### *Disconnecting MOVs*

To prevent drive damage, the MOVs connected to ground shall be disconnected if the drive is installed on an ungrounded distribution system (IT mains) where the line-to-ground voltages on any phase could exceed 125% of the nominal line-to-line voltage. To disconnect these devices, remove the jumper shown in the diagrams below.

1. Turn the screw counterclockwise to loosen.
2. Pull the jumper completely out of the drive chassis.
3. Tighten the screw to keep it in place.

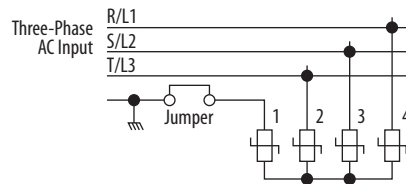
**Jumper Location (Typical)**

**Power Module**



**IMPORTANT** Tighten screw after jumper removal.

**Phase to Ground MOV Removal**



**Input Power Conditioning**

The drive is suitable for direct connection to input power within the rated voltage of the drive (see [Input Power Conditions on page 19](#)). Listed in the Input Power Conditions table below are certain input power conditions which may cause component damage or reduction in product life. If any of these conditions exist, install one of the devices listed under the heading Corrective Action on the line side of the drive.

**IMPORTANT** Only one device per branch circuit is required. It should be mounted closest to the branch and sized to handle the total current of the branch circuit.

**Input Power Conditions**

Input Power Condition	Corrective Action
Low Line Impedance (less than 1% line reactance)	<ul style="list-style-type: none"> <li>• Install Line Reactor<sup>(2)</sup></li> <li>• or Isolation Transformer</li> </ul>
Greater than 120 kVA supply transformer	
Line has power factor correction capacitors	<ul style="list-style-type: none"> <li>• Install Line Reactor<sup>(2)</sup></li> <li>• or Isolation Transformer</li> </ul>
Line has frequent power interruptions	
Line has intermittent noise spikes in excess of 6000V (lightning)	<ul style="list-style-type: none"> <li>• Remove MOV jumper to ground.</li> <li>• or Install Isolation Transformer with grounded secondary if necessary.</li> </ul>
Phase to ground voltage exceeds 125% of normal line to line voltage	
Ungrounded distribution system	<ul style="list-style-type: none"> <li>• Install Line Reactor<sup>(2)</sup></li> </ul>
240V open delta configuration (stinger leg) <sup>(1)</sup>	

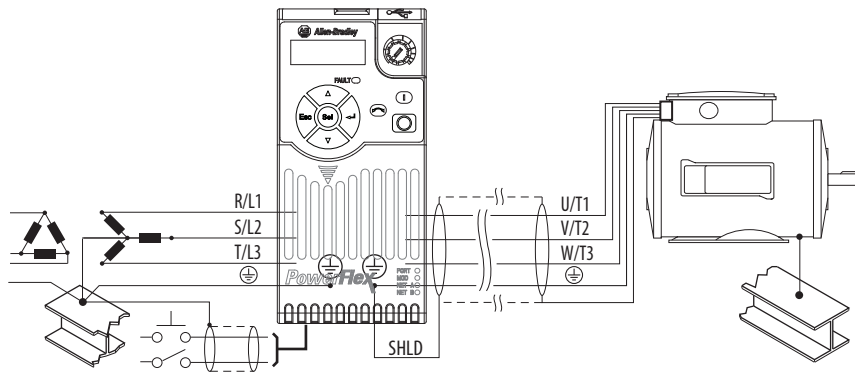
(1) For drives applied on an open delta with a middle phase grounded neutral system, the phase opposite the phase that is tapped in the middle to the neutral or earth is referred to as the “stinger leg,” “high leg,” “red leg,” etc. This leg should be identified throughout the system with red or orange tape on the wire at each connection point. The stinger leg should be connected to the center Phase B on the reactor. See [Bulletin 1321-3R Series Line Reactors on page 35](#) for specific line reactor part numbers.

(2) See [Accessories and Dimensions on page 31](#) for accessory ordering information.

## General Grounding Requirements

The drive Safety Ground - (PE) must be connected to system ground. Ground impedance must conform to the requirements of national and local industrial safety regulations and/or electrical codes. The integrity of all ground connections should be periodically checked.

### Typical Grounding



### Ground Fault Monitoring

If a system ground fault monitor (RCD) is to be used, only Type B (adjustable) devices should be used to avoid nuisance tripping.

### Safety Ground - $\ominus$ (PE)

This is the safety ground for the drive that is required by code. One of these points must be connected to adjacent building steel (girder, joist), a floor ground rod or bus bar. Grounding points must comply with national and local industrial safety regulations and/or electrical codes.

### Motor Ground

The motor ground must be connected to one of the ground terminals on the drive.

### Shield Termination - SHLD

Either of the safety ground terminals located on the power terminal block provides a grounding point for the motor cable shield. The **motor cable** shield connected to one of these terminals (drive end) should also be connected to the motor frame (motor end). Use a shield terminating or EMI clamp to connect the shield to the safety ground terminal. The earthing plate or conduit box option may be used with a cable clamp for a grounding point for the cable shield.

When shielded cable is used for **control and signal wiring**, the shield should be grounded at the source end only, not at the drive end.

## RFI Filter Grounding

Using a drive with filter may result in relatively high ground leakage currents. Therefore, the **filter must only be used in installations with grounded AC supply systems and be permanently installed and solidly grounded** (bonded) to the building power distribution ground. Ensure that the incoming supply neutral is solidly connected (bonded) to the same building power distribution ground. Grounding must not rely on flexible cables and should not include any form of plug or socket that would permit inadvertent disconnection. Some local codes may require redundant ground connections. The integrity of all connections should be periodically checked.

## Power Wiring



**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.



**ATTENTION:** The distance between the drive and motor must not exceed the maximum cable length stated in the Motor Cable Length Restrictions Tables in “Wiring and Grounding Guide, (PWM) AC Drives,” publication [DRIVES-IN001](#).

## 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 “Wiring and Grounding Guide, (PWM) AC Drives,” publication [DRIVES-IN001](#).

The reflected wave data applies to all carrier frequencies 2...8 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, use Logix Designer to disable the drive (Aux Fault or Coast to Stop).

### 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 Nm (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 Nm (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 Nm (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 Nm (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 Nm (27.3...33.4 lb-in.)

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

## Common Bus/Precharge Notes

If drives are used with a disconnect switch to the common DC bus, then an auxiliary contact on the disconnect must be connected to a digital input of the drive.

## I/O Wiring

### 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.

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.

## Signal and Control Wire Types

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.

### Recommended Signal Wire

Signal Type/Where Used	Belden Wire Type(s)(or equivalent) <sup>(1)</sup>	Description	Min. Insulation Rating
Analog I/O	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	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.

### 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.	

## Maximum Control Wire Recommendation

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 Common may be connected to ground terminal/protective earth. When using the embedded Ethernet ports, the I/O terminal C1 or C2 should be connected to a clean ground.

### 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 Nm (6.2...7.6 lb-in.)

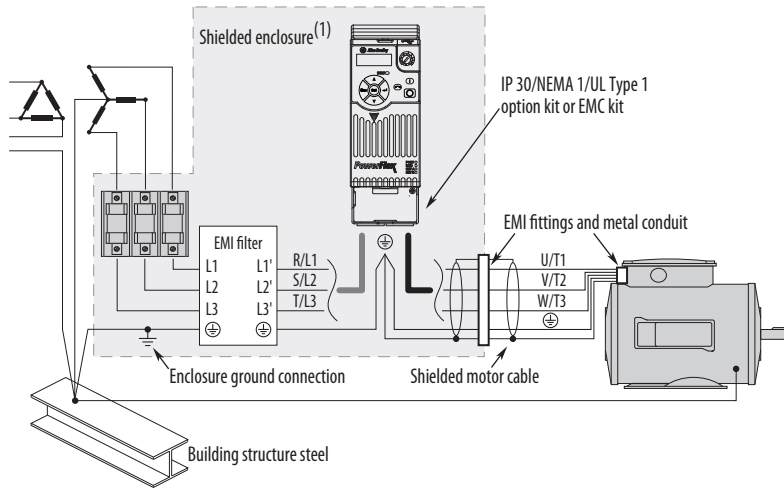
(1) Maximum/minimum sizes that the terminal block will accept – these are not recommendations.

## Machinery Directive (2006/42/EC)

- EN ISO 13849-1:2008+AC:2009 – Safety of machinery – Safety related parts of control systems -Part 1: General principles for design.
- EN 62061:2005+A1:2013 – Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- EN 60204-1:2006+A1:2009 – Safety of machinery – Electrical equipment of machines - Part 1: General requirements.
- EN 61800-5-2:2007 – Adjustable speed electrical power drive systems - Part 5-2: Safety requirement – Functional.



## Connections and Grounding



(1) Some installations require a shielded enclosure. Keep wire length as short as possible between the enclosure entry point and the EMI filter.

### PowerFlex 527 RF Emission Compliance and Installation Requirements

Filter Type	Standard/Limits		
	EN61800-3 Category C1 EN61000-6-3 CISPR11 Group 1 Class B	EN61800-3 Category C2 EN61000-6-4 CISPR11 Group 1 Class A (Input power ≤ 20 kVA)	EN61800-3 Category C3 (I ≤ 100 A) CISPR11 Group 1 Class A (Input power > 20 kVA)
Internal	–	10 m (33 ft)	20 m (66 ft)
External <sup>(1)</sup>	30 m (16 ft)	100 m (328 ft)	100 m (328 ft)

(1) See [Accessory Dimensions on page 37](#) for more information on optional external filters.

## Fuses and Circuit Breaker Ratings

The PowerFlex 527 drive does not provide branch short circuit protection. This product should 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 on pages [27...30](#) provide drive ratings and recommended AC line input fuse and circuit breaker information. Both types of short circuit protection are acceptable 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 [27...30](#). 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.

(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.

### *Circuit Breakers*

The “non-fuse” listings in the tables found on pages [27...30](#) 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.

If the DC Bus terminals or the Dynamic Brake terminals are used, the drive must be installed in an enclosure and fuses must be used for input protection (for CE applications only). The ventilated enclosure needs to be IP 20 rating or higher and at least 1.5x size larger than the drive.

## Fuses and Circuit Breakers for PowerFlex 527

### 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		Max Amps <sup>(1)</sup>	kVA	Fuses	Circuit Breakers	Fuses (Max. Rating)	Circuit Breakers	Fuses (Max. Rating)	Circuit Breakers	
	HP	kW	HP	kW									Min. Rating
25C-V2P5N104	0.5	0.4	0.5	0.4	2.5	1.3	15	140U-D6D2-C12	140M	140U-D6D2-C12	CLASS RK5, CC, J, or T / DLS-R-20	140U	140M <sup>(2)(3)(4)</sup>
25C-V4P8N104	1.0	0.75	1.0	0.75	4.8	2.5	25	140U-D6D2-C25	140M-F8E-C20	140U-D6D2-C25	CLASS RK5, CC, J, or T / DLS-R-40	140U-D6D2-C25	140M-F8E-C20
25C-V6P0N104	1.5	1.1	1.5	1.1	6.0	3.2	30	140U-D6D2-C30	140M-F8E-C25	140U-D6D2-C30	CLASS RK5, CC, J, or T / DLS-R-50	140U-D6D2-C30	140M-F8E-C25

### 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		Max Amps <sup>(1)</sup>	kVA	Fuses	Circuit Breakers	Fuses (Max. Rating)	Circuit Breakers	Fuses (Max. Rating)	Circuit Breakers	
	HP	kW	HP	kW									Min. Rating
25C-A2P5N104	0.5	0.4	0.5	0.4	2.5	1.7	10	140U-D6D2-C10	140M	140U-D6D2-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M <sup>(2)(3)(4)</sup>
25C-A2P5N114	0.5	0.4	0.5	0.4	2.5	1.7	10	140U-D6D2-C10	140M	140U-D6D2-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-CZE-C10
25C-A4P8N104	1.0	0.75	1.0	0.75	4.8	2.8	15	140U-D6D2-C15	140M-CZE-C16	140U-D6D2-C15	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-CZE-C16
25C-A4P8N114	1.0	0.75	1.0	0.75	4.8	2.8	15	140U-D6D2-C15	140M-CZE-C16	140U-D6D2-C15	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-CZE-C16
25C-A8P0N104	2.0	1.5	2.0	1.5	8.0	4.8	25	140U-D6D2-C25	140M-F8E-C25	140U-D6D2-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25
25C-A8P0N114	2.0	1.5	2.0	1.5	8.0	4.8	25	140U-D6D2-C25	140M-F8E-C25	140U-D6D2-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25
25C-A0T1N104	3.0	2.2	3.0	2.2	11.0	6.0	30	140U-H6C2-C35	140M-F8E-C25	140U-H6C2-C35	CLASS CC, J, or T / 50	140U-H6C2-C35	140M-F8E-C25
25C-A0T1N114	3.0	2.2	3.0	2.2	11.0	6.0	30	140U-H6C2-C35	140M-F8E-C25	140U-H6C2-C35	CLASS CC, J, or T / 50	140U-H6C2-C35	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 use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

## Fuses and Circuit Breakers for PowerFlex 527 (continued)

### 200...240V 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	140M (3)(4)(5)
25C-B2P5N104	0.5	0.4	0.5	0.4	2.5	1.2	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	
25C-B5P0N104	1.0	0.75	1.0	0.75	5.0	2.7	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	
25C-B8P0N104	2.0	1.5	2.0	1.5	8.0	4.3	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	
25C-B011N104	3.0	2.2	3.0	2.2	11.0	6.3	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	
25C-B017N104	5.0	4.0	5.0	4.0	17.5	9.6	B	100-C23	30	45	140U-D6D3-C25	140M-F8E-C25	CLASS CC, J, or T / 45	140U-D6D3-C25	140M-F8E-C25	
25C-B024N104	7.5	5.5	7.5	5.5	24.0	12.2	C	100-C37	35	60	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 60	140U-H6C3-C35	140M-F8E-C32	
25C-B032N104	10.0	7.5	10.0	7.5	32.2	15.9	D	100-C43	45	70	140U-H6C3-C60	140M-F8E-C45	CLASS RK5, CC, J, or T / DLS-R-70	—	140M-F8E-C45	
25C-B048N104	15.0	11.0	15.0	11.0	48.3	20.1	E	100-C60	60	90	140U-H6C3-C70	140M-F8E-C45	CLASS CC, J, or T / 90	—	140M-F8E-C45	
25C-B062N104	20.0	15.0	15.0	11.0	62.1	25.6	E	100-C72	70	125	140U-H6C3-C90	140M-H8P-C70	CLASS CC, J, or T / 125	—	140M-H8P-C70	

(1) Normal and Heavy duty ratings are available for drives above 15 HP / 11 kW.

(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 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

## Fuses and Circuit Breakers for PowerFlex 527 (continued)

### 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				kVA	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M (3)(4)(5)
25C-D1P4N104	0.5	0.4	0.5	0.4	1.4	1.7	100-C07	3	6	140U-D6D3-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-CZE-B25	
25C-D1P4N114	0.5	0.4	0.5	0.4	1.4	1.7	100-C07	3	6	140U-D6D3-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-CZE-B25	
25C-D2P3N104	1.0	0.75	1.0	0.75	2.3	2.9	100-C07	6	10	140U-D6D3-B60	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-CZE-B40	
25C-D2P3N114	1.0	0.75	1.0	0.75	2.3	2.9	100-C07	6	10	140U-D6D3-B60	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-CZE-B40	
25C-D4P0N104	2.0	1.5	2.0	1.5	4.0	5.2	100-C09	10	15	140U-D6D3-B60	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-CZE-B63	
25C-D4P0N114	2.0	1.5	2.0	1.5	4.0	5.2	100-C09	10	15	140U-D6D3-B60	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-CZE-B63	
25C-D6P0N104	3.0	2.2	3.0	2.2	6.0	6.9	100-C09	10	15	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-CZE-C10	
25C-D6P0N114	3.0	2.2	3.0	2.2	6.0	6.9	100-C09	10	15	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-CZE-C10	
25C-D0T0N104	5.0	4.0	5.0	4.0	10.5	12.6	100-C23	20	30	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-CZE-C16	
25C-D0T0N114	5.0	4.0	5.0	4.0	10.5	12.6	100-C23	20	30	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-CZE-C16	
25C-D0T3N104	7.5	5.5	7.5	5.5	13.0	14.1	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	–	140M-D8E-C20	
25C-D0T3N114	7.5	5.5	7.5	5.5	13.0	14.1	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	–	140M-D8E-C20	
25C-D0T7N104	10.0	7.5	10.0	7.5	17.0	16.8	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	–	140M-D8E-C20	
25C-D0T7N114	10.0	7.5	10.0	7.5	17.0	16.8	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	–	140M-D8E-C20	
25C-D0Z4N104	15.0	11.0	15.0	11.0	24.0	24.1	100-C37	35	60	140U-H6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	–	140M-F8E-C32	
25C-D0Z4N114	15.0	11.0	15.0	11.0	24.0	24.1	100-C37	35	60	140U-H6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	–	140M-F8E-C32	
25C-D0Z0N104	20.0	15.0	20.0	15.0	30.0	30.2	100-C43	45	70	140U-H6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	–	140M-F8E-C45	
25C-D0Z0N114	20.0	15.0	20.0	15.0	30.0	30.2	100-C43	45	70	140U-H6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	–	140M-F8E-C45	
25C-D0Z3N114	25.0	18.5	20.0	15.0	37.0	30.8	100-C43	45	70	140U-H6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	–	140M-F8E-C45	
25C-D0Z3N114	30.0	22.0	25.0	18.5	43.0	35.6	100-C60	50	80	140U-H6C3-C60	140M-F8E-C45	CLASS CC, J, or T / 80	–	140M-F8E-C45	

(1) ■ Normal and Heavy duty ratings are available for drives above 15 HP / 11 kW.

(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 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

## Fuses and Circuit Breakers for PowerFlex 527 (continued)

### 525...600V 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
25C-E0P9N104	0.5	0.4	0.5	0.4	0.9	1.4	1.2	3	6	140U-D6D3-B20	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140U	140M-CZE-B25	
25C-E1P7N104	1.0	0.75	1.0	0.75	1.7	2.6	2.3	3	6	140U-D6D3-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140U	140M-CZE-B25	
25C-E3P0N104	2.0	1.5	2.0	1.5	3.0	4.3	3.8	6	10	140U-D6D3-B50	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	140U	140M-CZE-B40	
25C-E4P2N104	3.0	2.2	3.0	2.2	4.2	6.1	5.3	10	15	140U-D6D3-B80	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U	140M-D8E-B63	
25C-E6P6N104	5.0	4.0	5.0	4.0	6.6	9.1	8.0	10	20	140U-D6D3-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U	140M-D8E-C10	
25C-E9P9N104	7.5	5.5	7.5	5.5	9.9	12.8	11.2	15	25	140U-D6D3-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U	140M-D8E-C16 (6)	
25C-E0T2N104	10.0	7.5	10.0	7.5	12.0	15.4	13.5	20	30	140U-D6D3-C20	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U	140M-D8E-C16	
25C-E0T9N104	15.0	11.0	15.0	11.0	19.0	27.4	24.0	30	50	140U-H6C3-C30	140M-F8E-C25	CLASS CC, J, or T / 50	140U	140M-F8E-C25	
25C-E0Z2N104	20.0	15.0	20.0	15.0	22.0	31.2	27.3	35	60	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 60	140U	140M-F8E-C32	
25C-E0Z7N104	25.0	18.5	25.0	18.5	27.0	36.2	31.7	35	50	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 50	140U	140M-F8E-C32	
25C-E032N104	30.0	22.0	30.0	22.0	32.0	43.4	39.2	40	60	140U-H6C3-C50	140M-F8E-C32	CLASS CC, J, or T / 60	140U	140M-F8E-C32	

- (1) ■ Normal and Heavy duty ratings are available for drives above 15 HP / 11 kW.
- (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 25C-E9P9N104 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.).

## Accessories and Dimensions

### Dynamic Brake Resistors

Drive Ratings Input Voltage	HP	kW	Minimum Resistance	Resistance	Catalog 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
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
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.

**EMC Line Filters**

Drive Ratings				Frame Size	Catalog No.
Input Voltage	HP	kW	Current (A)		
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
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
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 [page 29](#) and [page 30](#) for more information.

(2) This 600V drive rating needs to be matched with a frame B EMC Line Filter.



**EMC Plates**

Item	Description	Frame Size	Catalog 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

**IP 30/NEMA 1/UL Type 1 Kit**

Item	Description	Frame Size	Catalog 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

**Control Module Fan Kit**

Item	Description	Frame Size	Catalog 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

**Incremental Encoder Input Option**

Item	Description	Catalog No.
Incremental Encoder Board	Interface to an external incremental encoder.	25-ENC-2

**Bulletin 160 to PowerFlex 520-Series Mounting Adapter Plate**

Item	Description	B160 Frame Size	Catalog No.
Mounting Adapter Plate	For use with drive when replacing Bulletin 160 drives in existing installations to a PowerFlex 520-Series drive. Select the catalog number based on the frame size of your Bulletin 160 drive.	A	25-MAP-FA
		B	25-MAP-FB

**Replacement Parts****PowerFlex 527 Power Module**

Item	Description
PowerFlex 527 Power Module	Replacement power module for use with PowerFlex 527 drives. 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					Output Current (A)	Input Voltage Range	Frame Size	Catalog No.
Normal Duty		Heavy Duty						
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	15.0	11.0	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	
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	

Output Ratings				Output Current (A)	Input Voltage Range	Frame Size	Catalog No.
Normal Duty		Heavy Duty					
HP	kW	HP	kW				
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

### PowerFlex 527 Control Module

Item	Description	Frame Size	Catalog No.
PowerFlex 527 Control Module	Replacement control module for use with PowerFlex 527 drives. Includes: <ul style="list-style-type: none"> <li>Control Module</li> <li>Control Module Front Cover</li> </ul>	A...E	25C-CTM1

### Other Parts

Item	Description	Frame Size	Catalog No.
PowerFlex 527 Control Module Front Cover	Replacement cover for the control module I/O terminals and EtherNet/IP ports.	A...E	25C-CTMFC1
PowerFlex 520-Series 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
PowerFlex 520-Series 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
PowerFlex 527 Removable Terminal Blocks Kit	Replacement terminal blocks for control wiring.	A...E	25C-RCTB
PowerFlex 527 Control Module Internal Fan Kit	Replacement internal fan for the control module.	A...E	25C-FAN2-INT
PowerFlex 520-Series 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

### Bulletin 1321-3R Series Line Reactors

Output Ratings <sup>(1)</sup>				Input Line Reactor <sup>(2)(3)</sup>		Output Line Reactor <sup>(2)(3)</sup>	
Normal Duty		Heavy Duty		IP 00 (Open Style)	IP 11 (NEMA/UL Type 1)	IP 00 (Open Style)	IP 11 (NEMA/UL Type 1)
HP	kW	HP	kW	Catalog No.	Catalog No.	Catalog No.	Catalog No.
<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

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

Output Ratings <sup>(1)</sup>				Input Line Reactor <sup>(2)(3)</sup>		Output Line Reactor <sup>(2)(3)</sup>	
Normal Duty		Heavy Duty		IP 00 (Open Style)	IP 11 (NEMA/UL Type 1)	IP 00 (Open Style)	IP 11 (NEMA/UL Type 1)
HP	kW	HP	kW	Catalog No.	Catalog No.	Catalog No.	Catalog No.
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	15.0	11.0	1321-3R45-A	1321-3RA45-A	1321-3R45-A	1321-3RA45-A
20.0	15.0	15.0	11.0	1321-3R55-A (ND) 1321-3R45-A (HD)	1321-3RA55-A (ND) 1321-3RA45-A (HD)	1321-3R55-A	1321-3RA55-A

**380...480V 50/60 Hz 3-Phase**

0.5	0.4	0.5	0.4	1321-3R1-C	1321-3RA1-C	1321-3R2-B	1321-3RA2-B
1.0	0.75	1.0	0.75	1321-3R2-A	1321-3RA2-A	1321-3R2-A	1321-3RA2-A
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	1321-3R8-B	1321-3RA8-B	1321-3R8-B	1321-3RA8-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)	1321-3R25-B	1321-3RA25-B
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	1321-3RA45-B

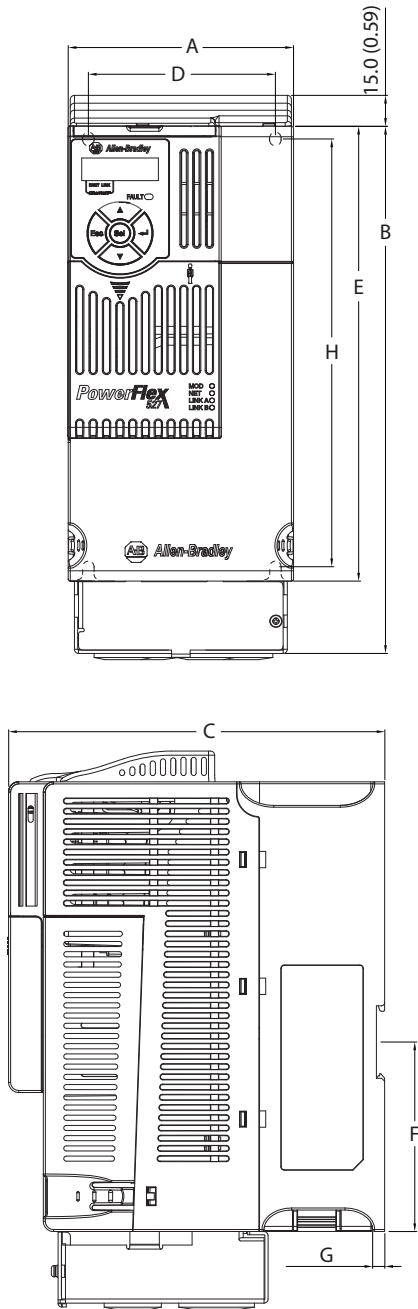
**525...600V 50/60 Hz 3-Phase**

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	1321-3R2-B	1321-3RA2-B	1321-3R2-B	1321-3RA2-B
2.0	1.5	2.0	1.5	1321-3R4-D	1321-3RA4-D	1321-3R4-D	1321-3RA4-D
3.0	2.2	3.0	2.2	1321-3R4-C	1321-3RA4-C	1321-3R4-C	1321-3RA4-C
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-C	1321-3RA12-C	1321-3R12-C	1321-3RA12-C
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	1321-3RA25-B
25.0	18.5	20.0	15.0	1321-3R35-C (ND) 1321-3R25-B (HD)	1321-3RA35-C (ND) 1321-3RA25-B (HD)	1321-3R35-C	1321-3RA35-C
30.0	22.0	25.0	18.5	1321-3R35-B (ND) 1321-3R35-C (HD)	1321-3RA35-B (ND) 1321-3RA35-C (HD)	1321-3R35-B	1321-3RA35-B

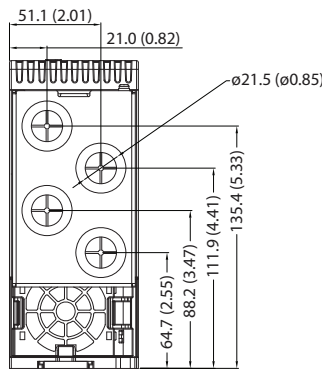
- (1) Normal Duty and Heavy Duty ratings for 15 HP / 11 kW and below are identical.
- (2) Catalog numbers listed are for 3% impedance at 60 Hz. 5% impedance reactor types are also available. See publication [1321-TD001](#).
- (3) Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

### Accessory Dimensions

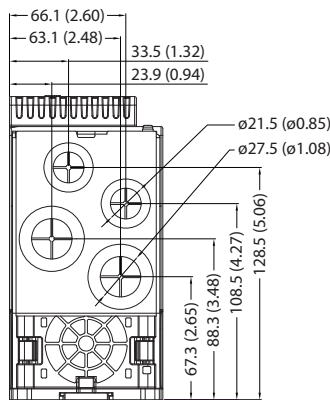
IP 30/NEMA 1/UL Type 1 Kit – Dimensions are in mm and (in.).



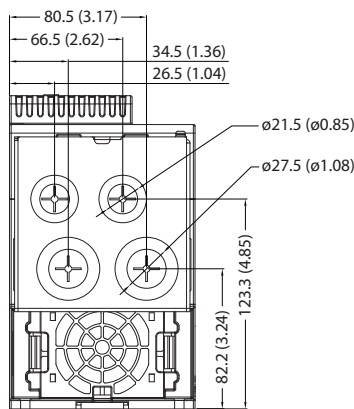
**Frame A**



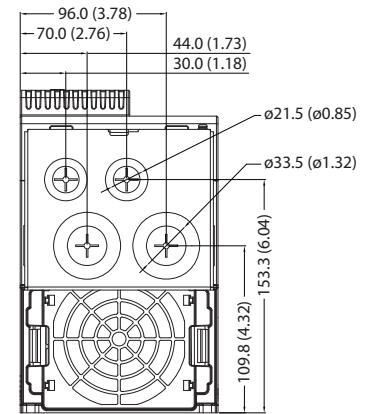
**Frame B**



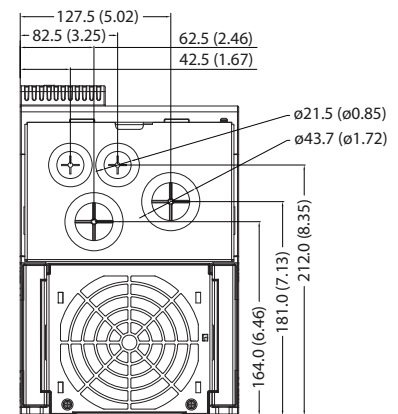
**Frame C**



**Frame D**



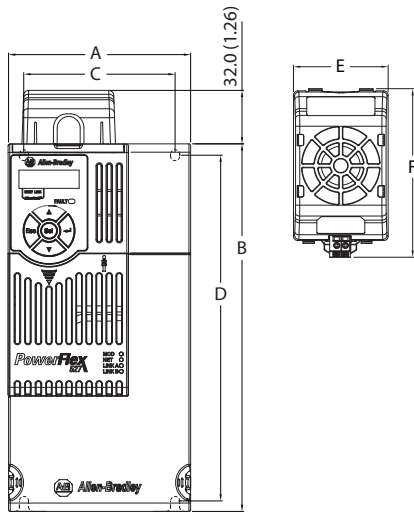
**Frame E**



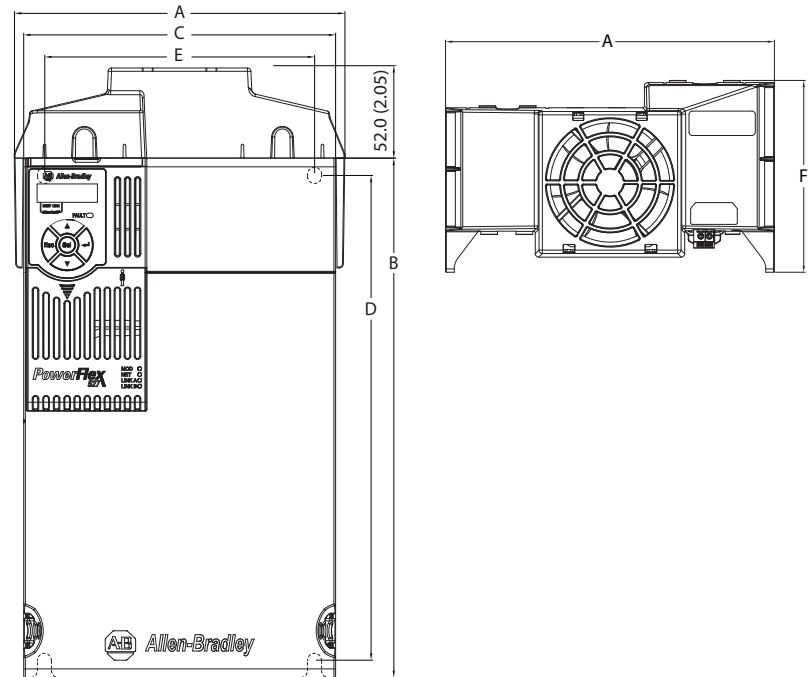
Frame Size	A	B	C	D	E	F	G	H
A	72.0 (2.83)	219.0 (8.62)	172.0 (6.77)	57.5 (2.26)	152.0 (5.98)	92.7 (3.65)	6.0 (0.24)	140.0 (5.51)
B	87.0 (3.43)	218.0 (8.58)	172.0 (6.77)	72.5 (2.85)	180.0 (7.09)	92.7 (3.65)	6.0 (0.24)	168.0 (6.61)
C	109.0 (4.29)	255.0 (10.04)	184.0 (7.24)	90.5 (3.56)	222.0 (8.66)	92.7 (3.65)	6.0 (0.24)	207.0 (8.15)
D	130.0 (5.12)	295.0 (11.61)	212.0 (8.35)	116.0 (4.57)	260.0 (10.24)	–	6.0 (0.24)	247.0 (9.74)
E	185.0 (7.28)	350.0 (13.78)	279.0 (10.98)	160.0 (6.30)	300.0 (11.81)	–	7.6 (0.30)	280.0 (11.02)

**Control Module Fan Kit – Dimensions are in mm and (in.).**

**Frame A...D**



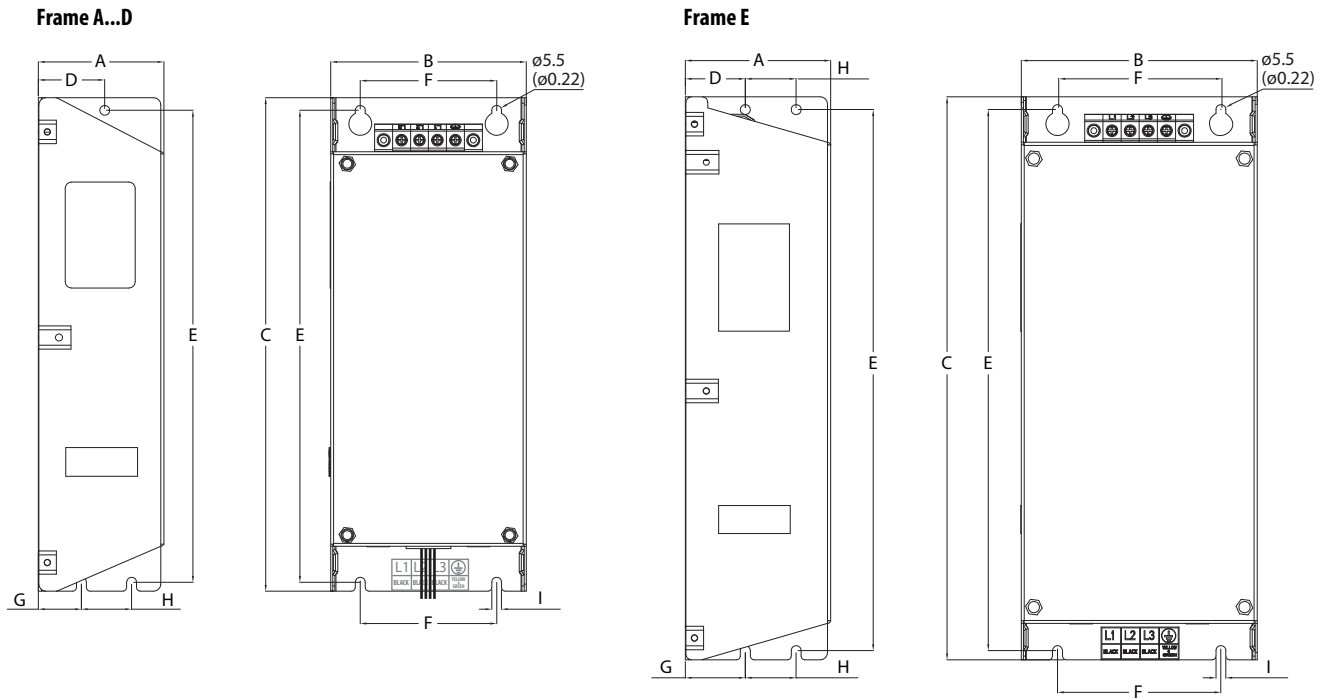
**Frame E**



Frame Size	A	B	C	D	E	F
A	72.0 (2.83)	152.0 (5.98)	57.5 (2.26)	140.0 (5.51)	56.0 (2.20)	99.8 (3.93)
B	87.0 (3.43)	180.0 (7.09)	72.5 (2.85)	168.0 (6.61)	56.0 (2.20)	99.8 (3.93)
C	109.0 (4.29)	220.0 (8.66)	90.5 (3.56)	207.0 (8.15)	56.0 (2.20)	99.8 (3.93)
D	130.0 (5.12)	260.0 (10.24)	116.0 (4.57)	247.0 (9.72)	56.0 (2.20)	99.8 (3.93)
E	196.0 (7.72)	300.0 (11.81)	185.0 (7.28)	280.0 (11.02)	196.0 (7.72)	114.3 (4.50)

Specifications	25-FAN1-70C	25-FAN2-70C
Rated Voltage	24V DC	
Operation Voltage	14...27.6V DC	
Input Current	0.1 A	0.15 A
Speed (Reference)	7000 rpm	4500 ± 10% rpm
Maximum Air Flow (At zero static pressure)	0.575 m <sup>3</sup> /min	1.574 m <sup>3</sup> /min
Maximum Air Pressure (At zero air flow)	7.70 mmH <sub>2</sub> O	9.598 mmH <sub>2</sub> O
Acoustical Noise	40.5 dB-A	46.0 dB-A
Insulation Type	UL Class A	
Frame Size	Frame A...D	Frame E
Wire Size	0.32 mm <sup>2</sup> (22 AWG)	
Torque	0.29...0.39 Nm (2.6...3.47 lb-in.)	

**EMC Line Filter – Dimensions are in mm and (in.).**



Frame Size	A	B	C	D	E	F	G	H	I
A	55.0 (2.17)	72.0 (2.83)	234.0 (9.21)	30.0 (1.18)	223.0 (8.78)	54.0 (2.13)	20.0 (0.79)	23.0 (0.91)	5.5 (0.22)
B	70.0 (2.76)	87.0 (3.43)	270.0 (10.63)	35.0 (1.38)	258.0 (10.16)	58.0 (2.28)	25.0 (0.98)	24.0 (0.94)	5.5 (0.22)
C	70.0 (2.76)	109.0 (4.29)	275.0 (10.83)	37.0 (1.46)	263.0 (10.35)	76.0 (2.99)	25.0 (0.98)	28.0 (1.10)	5.5 (0.22)
D	80.0 (3.15)	130.0 (5.12)	310.0 (12.20)	33.0 (1.30)	298.0 (11.73)	90.0 (3.54)	33.0 (1.30)	28.0 (1.10)	5.5 (0.22)
E	80.0 (3.15)	155.0 (6.10)	390.0 (15.35)	33.0 (1.30)	375.0 (14.76)	110.0 (4.33)	33.0 (1.30)	28.0 (1.10)	5.5 (0.22)

## Safe Torque-Off Function

The PowerFlex 527 Safe Torque-Off function, when used with other safety components, helps provide protection according to EN ISO 13849 and EN62061 for safe-off and protection against restart. The PowerFlex 527 Safe Torque-Off function 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 operator safeguarding.

### PowerFlex 527 Safe Torque-Off Overview

The PowerFlex 527 Safe Torque-Off function:

- Provides the Safe Torque-Off (STO) function defined in EN IEC 61800-5-2.
- Blocks gate-firing signals from reaching the Insulated Gate Bipolar Transistor (IGBT) output devices of the drive. This prevents the IGBTs from switching in the sequence necessary to generate torque in the motor.
- Can be used in combination with other safety devices to fulfill the requirements of a system “safe torque off” function which satisfies Category 3 / PL (e) according to EN ISO 13849-1 and SIL CL3 according to EN/IEC 62061, IEC 61508, and EN/IEC 61800-5-2.

### EC Type Examination Certification

TÜV Rheinland has certified the PowerFlex 527 Safe Torque-Off function compliant with the requirements for machines defined in Annex I of the EC Directive 2006/42/EC, and that it complies with the requirements of the relevant standards listed below:

- EN ISO 13849-1:2008+AC:2009 Safety of machinery – Safety related parts of control systems – Part 1: General principles for design. (PowerFlex 527 STO achieves Category 3 / PL(e))
- EN 61800-5-2:2007 Adjustable speed electrical power drive systems – Part 5-2 Safety requirements – Functional. (PowerFlex 527 STO achieves SIL CL 3)
- EN 62061:2005+A1:2013 Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- EN 60204-1:2006+A1:2009 – Safety of machinery – Electrical equipment of machines - Part 1: General requirements
- IEC 61508 Part 1-7:2010 Functional safety of electrical/electronic/programmable electronic safety-related systems – Parts 1-7.

TÜV also certifies that the PowerFlex 527 STO may be used in applications up to Category 3/ PL(e) according to EN ISO 13849-1 and SIL 3 according to EN 62061 / EN 61800-5-2 / IEC 61508.

The TÜV Rheinland certificate may be found at <http://www.rockwellautomation.com/products/certification/>.

### Safety Concept

The PowerFlex 527 Safe Torque-Off function is suitable for use in safety applications up to and including Category 3 / PL(e) according to EN ISO 13849-1 and SIL 3 according to EN 62061 / EN 61800-5-2 / IEC 61508.

In addition, the PowerFlex 527 STO function may be used together with other components in a safety application to achieve an overall Category 3 / PL(e) according to EN ISO 13849-1 and SIL 3 according to EN 62061 and IEC 61508.

Safety requirements are based on the standards current at the time of certification.



The PowerFlex 527 STO function is intended for use in safety-related applications where the de-energized state is considered to be the safe state. All of the examples shown here are based on achieving de-energization as the safe state for typical Machine Safety and Emergency Shutdown (ESD) systems.

### *Probability of Dangerous Failure Per Hour (PFH) Data*

These PFH calculation is based on the equations from EN 61508 and show worst-case values.

Determination of safety parameters is based on the assumption that the system operates in High demand mode and that the safety function is requested at least once a year.

This table provides data for a 10-year proof test interval and demonstrates the worst-case effect of various configuration changes on the data.

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**IMPORTANT** Determination of safety parameters is based on the assumption that the system operates in High demand mode and that the safety function is requested at least once every three months.

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#### **PFH for 10-year Proof Test Interval**

Attribute	Value
PFH (1e-9)	2.10
Proof test (years)	10

### *Safety Reaction Time*

The safety reaction time from an input signal condition that triggers a safe stop, to the initiation of the configured Stop Type, is less than 12 ms.

## **Additional Resources**

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

Title	Publication
PowerFlex 527 Adjustable Frequency AC Drive User Manual	<a href="#">520-UM002</a>
GuardLogix 5570 Controllers User Manual	<a href="#">1756-UM022</a>
GuardLogix 5570 Controller Systems Safety Reference Manual	<a href="#">1756-RM099</a>
CompactLogix 5370 Controllers User Manual	<a href="#">1769-UM021</a>
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives	<a href="#">DRIVES-IN001</a>
Preventive Maintenance of Industrial Control and Drive System Equipment	<a href="#">DRIVES-TD001</a>
Integrated Motion on the EtherNet/IP Network Configuration and Startup User Manual	<a href="#">MOTION-UM003</a>
Integrated Motion on the EtherNet/IP Network	<a href="#">MOTION-RM003</a>
PowerFlex DB (Dynamic Braking) Resistor Calculator	<a href="#">PFLEX-AT001</a>
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	<a href="#">SGI-1.1</a>
Guarding Against Electrostatic Damage	<a href="#">8000-4.5.2</a>

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.

## Important Information

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

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

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

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