



An AEP Company

BOUNDLESS ENERGY™

Legal Department

American Electric Power
1 Riverside Plaza
Columbus, OH 43215-2373
AEP.com

January 24, 2020
Chairman Samuel Randazzo
Public Utilities Commission of Ohio
180 East Broad Street
Columbus, OH 43215-3793

Re: In the Matter of the Application of)
Lakeview Farms, Inc.)
and Ohio Power Company)
for Approval of a Special Arrangement)
Agreement with a Mercantile Customer)

Case No. 20-0029-EL-EEC

Tanner Wolfram
Legal Fellow
Regulatory Services
(614) 716-2914 (T)
twolfram@aep.com

Dear Chairman Randazzo,

Attached please find the Joint Application of Ohio Power Company (AEP Ohio) and the above-referenced mercantile customer for approval of a Special Arrangement of the commitment of energy efficiency/peak demand reduction (EE/PDR) resources toward compliance with the statutory benchmarks for 2020 (hereinafter "Joint Application").

Amended Substitute Senate Bill 221, codified at R.C. 4928.66, sets forth EE/PDR benchmarks that electric distribution utilities are required to meet or exceed. The statute allows utilities to include EE/PDR resources committed by mercantile customers for integration into the utilities' programs to be counted toward compliance with a utility's EE/PDR benchmarks. The statute also enables the Commission to approve special arrangements for mercantile customers that commit EE/PDR resources to be counted toward compliance with EE/PDR benchmarks.

The Commission's Order in Case No. 10-834-EL-EEC established a streamlined process to expedite review of these special arrangements by developing a sample application process for parties to follow for consideration of such programs implemented during the prior three calendar years. The attached Joint Application and affidavit conforms with AEP Ohio's version of the streamlined sample application. As requested by Commission Staff, any confidential information referenced in the Joint Application has been provided confidentially to Commission Staff for filing in Commission Docket 10-1599-EL-EEC and subject to the confidentiality protections of R.C. 4901.16 and OAC 4901-1-24(E). AEP Ohio respectfully requests that the Commission treat the two cases as associated dockets and that any confidential information provided to Staff for filing in connection with the Joint Application be subject to the protective order requested in Docket 10-1599-EL-EEC.

Cordially,

/s/ Tanner Wolfram
Attachment

Case No.: 20-0029-EL-EEC

Mercantile Customer: LAKEVIEW FARMS INC

Electric Utility: Ohio Power

Program Title or Description: AEP Ohio Business Incentives for Energy Efficiency: Self Direct Program

Rule 4901:1-39-05(F), Ohio Administrative Code (O.A.C.), permits a mercantile customer to file, either individually or jointly with an electric utility, an application to commit the customer's existing demand reduction, demand response, and energy efficiency programs for integration with the electric utility's programs. The following application form is to be used by mercantile customers, either individually or jointly with their electric utility, to apply for commitment of such programs in accordance with the Commission's pilot program established in Case No. [10-834-EL-POR](#)

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the electric utility's energy efficiency and demand reduction (EEDR) rider will be automatically approved on the sixty-first calendar day after filing, unless the Commission, or an attorney examiner, suspends or denies the application prior to that time. Completed applications requesting the exemption from the EEDR rider (Option 2) will also qualify for the 60-day automatic approval so long as the exemption period does not exceed 24 months. Rider exemptions for periods of more than 24 months will be reviewed by the Commission Staff and are only approved up the issuance of a Commission order.

Complete a separate application for each customer program. Projects undertaken by a customer as a single program at a single location or at various locations within the same service territory should be submitted together as a single program filing, when possible. Check all boxes that are applicable to your program. For each box checked, be sure to complete all subparts of the question, and provide all requested additional information. Submittal of incomplete applications may result in a suspension of the automatic approval process or denial of the application. Any confidential or trade secret information may be submitted to Staff on disc or via email at ee-pdr@puc.state.oh.us.

Section 1: Company Information

Name: LAKEVIEW FARMS INC

Principal address: 1600 Gressel Drive, Delphos OH 45833

Address of facility for which this energy efficiency program applies: 1700 Gressel Dr, Delphos, OH 45833-9152

Name and telephone number for responses to questions:

Brandon Hoffman, Lakeview Farms Inc, (419) 695-9925

Electricity use by the customer (check the box(es) that apply):

- ☒ The customer uses more than seven hundred thousand kilowatt hours per year at our facility. (Please attach documentation.)

See Confidential and Proprietary Attachment 4 - Calculation of Rider Exemption and UCT which provides the facility consumption for the last three years, benchmark kWh, and the last 12 months usage.

- ☐ The customer is part of a national account involving multiple facilities in one or more states. (Please attach documentation.) When checked, see Attachment 6 - Supporting Documentation for a listing of the customer's name and service addresses of other accounts in the AEP Ohio service territory.

Section 2: Application Information

A) The customer is filing this application (choose which applies):

- ☐ Individually, on our own.
- ☒ Jointly with our electric utility.

B) Our electric utility is: Ohio Power Company

The application to participate in the electric utility energy efficiency program is "Confidential and Proprietary Attachment 3 – Self Direct Program Project Completed Application."

C) The customer is offering to commit (choose which applies):

- ☐ Energy savings from our energy efficiency program. (Complete Sections 3, 5, 6, and 7.)
- ☐ Capacity savings from the customer's demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)
- ☒ Both the energy savings and the demand reduction from the customer's energy efficiency program. (Complete all sections of the Application.)

Section 3: Energy Efficiency Programs

A) The customer's energy efficiency program involves (choose whichever applies):

- ☒ Early replacement of fully functioning equipment with new equipment. (Provide the date on which the customer replaced fully functioning equipment, 12/31/2017 and the date on which the customer would have replaced your equipment if you had not replaced it early. Please include a brief explanation for how the customer determined this future replacement date (or, if not known, please explain why this is not known)).

The remaining life of the equipment varies and is not known with certainty. The future replacement date is unknown and has historically been at the end of equipment life. Replacement was completed early to achieve energy savings and to reduce future maintenance costs.

- ☐ Installation of new equipment to replace equipment that needed to be replaced. The customer installed new equipment on the following date(s):
- ☐ Installation of new equipment for new construction or facility expansion. The customer installed new equipment on the following date(s):
- ☐ Behavioral or operational improvement.

B) Energy savings achieved/to be achieved by your energy efficiency program:

- 1) If you checked the box indicating that your project involves the early replacement of fully functioning equipment replaced with new equipment, then calculate the annual savings [(kWh used by the original equipment) - (kWh used by new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Unit Quantity (watts) = Existing (watts x units) - Installed (watts x units)

kWh Reduction (Annual Savings) = Unit Quantity x (Deemed kWh/Unit)

Annual savings: 74,229 kWh

See Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation for annual energy savings calculations and 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

- 2) If you checked the box indicating that you installed new equipment to replace equipment that needed to be replaced, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by the higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: kWh

Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.

- 3) If you checked the box indicating that your project involves equipment for new construction or facility expansion, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: kWh

Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.

- 4) If you checked the box indicating that the project involves behavioral or operational improvements, provide a description of how the annual savings were determined.

Section 4: Demand Reduction/Demand Response Programs

A) The customer's program involves (check the one that applies):

- ☒ Coincident peak-demand savings from the customer's energy efficiency program.
- ☐ Actual peak-demand reduction. (Attach a description and documentation of the peak-demand reduction.)
- ☐ Potential peak-demand reduction check the one that applies):

➤ Choose one or more of the following that applies:

- ☐ The customer's peak-demand reduction program meets the requirements to be counted as a capacity resource under a tariff of a regional transmission organization (RTO) approved by the Federal Energy Regulatory Commission.
- ☐ The customer's peak-demand reduction program meets the requirements to be counted as a capacity resource under a program that is equivalent to an RTO program, which has been approved by the Public Utilities Commission of Ohio.

B) On what date did the customer initiate its demand reduction program?

The coincident peak-demand savings are permanent installations that reduce demand through energy efficiency and were installed on the date specified in Section 3 A above.

C) What is the peak demand reduction achieved or capable of being achieved (show calculations through which this was determined):

Unit Quantity (watts) = Existing (watts x units) - Installed (watts x units)

KW Demand Reduction = Unit Quantity (watts) x (Deemed KW/Unit (watts))

12.2 kW

See Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation for peak demand reduction calculation, and 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

Section 5: Request for Cash Rebate Reasonable Arrangement (Option 1) or Exemption from Rider (Option 2)

Under this section, check the box that applies and fill in all blanks relating to that choice.

Note: If Option 2 is selected, the application will not qualify for the 60-day automatic approval. All applications, however, will be considered on a timely basis by the Commission.

A) The customer is applying for:

☒ Option 1: A cash rebate reasonable arrangement.

OR

☐ Option 2: An exemption from the cost recovery mechanism implemented by the electric utility.

OR

☐ Commitment payment

B) The value of the option that the customer is seeking is:

Option 1: A cash rebate reasonable arrangement, which is the lesser of (show both amounts):

☐ A cash rebate of \$_____. (Rebate shall not exceed 50% project cost. Attach documentation showing the methodology used to determine the cash rebate value and calculations showing how this payment amount was determined.)

OR

☒ A cash rebate valued at no more than 50% of the total project cost, which is equal to \$ 4,860.00. (Attach documentation and calculations showing how this payment amount was determined.)

See Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation for incentive calculations for this mercantile program.

Option 2: An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider.

- ☐ An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for _____ months (not to exceed 24 months). (Attach calculations showing how this time period was determined.)

OR

- ☐ A commitment payment valued at no more than \$_____. (Attach documentation and calculations showing how this payment amount was determined.)

OR

- ☐ Ongoing exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for an initial period of 24 months because this program is part of an ongoing efficiency program that is practiced by our organization. (Attach documentation that establishes your organization's ongoing efficiency program. In order to continue the exemption beyond the initial 24 month period your organization will need to provide a future application establishing additional energy savings and the continuance of the organization's energy efficiency program.)

Section 6: Cost Effectiveness

The program is cost effective because it has a benefit/cost ratio greater than 1 using the (choose which applies):

- ☐ Total Resource Cost (TRC) Test. The calculated TRC value is: _____
(Continue to Subsection 1, then skip Subsection 2)
- ☒ Utility Cost Test (UCT) . The calculated UCT value is: 4.43 (Skip to Subsection 2.)

Subsection 1: TRC Test Used (please fill in all blanks).

The TRC value of the program is calculated by dividing the value of our avoided supply costs (generation capacity, energy, and any transmission or distribution) by the sum of our program overhead and installation costs and any incremental measure costs paid by either the customer or the electric utility.

The electric utility's avoided supply costs were _____.

Our program costs were _____.

The utility's incremental measure costs were _____.

Subsection 2: UCT Used (please fill in all blanks).

We calculated the UCT value of our program by dividing the value of our avoided supply costs (capacity and energy) by the costs to our electric utility (including administrative costs and incentives paid or rider exemption costs) to obtain our commitment.

Our avoided supply costs were \$ 23,524.22

The utility's program costs were \$ 445.37

The utility's incentive costs/rebate costs were \$ 4,860.00.

Section 7: Additional Information

Please attach the following supporting documentation to this application:

- Narrative description of your program including, but not limited to, make, model, and year of any installed and replaced equipment.

See Attachment 1 - Self Direct Project Overview and Commitment for a description of the project. See Attachment 6 - Supporting Documentation, for the specifications of the replacement equipment 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed. Due to the length of time since the equipment replacement, the make, model and year of the replaced equipment is not available.

- A copy of the formal declaration or agreement that commits your program to the electric utility, including:

- 1) any confidentiality requirements associated with the agreement;

See Attachment 2 - Self Direct Program Project Blank Application including Rules and Requirements. All confidentiality requirements are pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.)

- 2) a description of any consequences of noncompliance with the terms of the commitment;

See Attachment 2 - Self Direct Program Project Blank Application including Rules and Requirements. All consequences of noncompliance are pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.

- 3) a description of coordination requirements between the customer and the electric utility with regard to peak demand reduction;

None required because the resources committed are permanent installations that reduce demand through increased efficiency during the Company's peak summer demand period generally defined as May through September and do not require specific coordination and communication to provide demand reduction capabilities to the Company.

- 4) permission by the customer to the electric utility and Commission staff and consultants to measure and verify energy savings and/or peak-demand reductions resulting from your program; and,

See Attachment 2 – Self Direct Program Blank Application including Rules and Requirements granting such permission pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 – Self Direct Program Project Completed Application.

- 5) a commitment by you to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.

See Attachment 1 - Self Direct Project Overview and Commitment for the commitment to comply with any information and compliance reporting requirements imposed by rule or as part of the approval of this arrangement by the Public Utilities Commission of Ohio.

- A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results. Additionally, identify and explain all deviations from any program measurement and verification guidelines that may be published by the Commission.

The Company applies the same methodologies, protocols, and practices to Self Direct Program retrospective projects that are screened and submitted for approval as it does to prospective projects submitted through its Prescriptive and Custom Programs. The Commission has not published a technical reference manual for use by the Company so deviations can not be identified. The project submitted is a prescriptive project and energy savings are determined as described in Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation, and 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.



Public Utilities Commission

Application to Commit
Energy Efficiency/Peak Demand
Reduction Programs
(Mercantile Customers Only)

Case No.: 20-0029-EL-EEC

State of Ohio :

Raju Pusapati, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

DNV GL Energy Services USA Inc. agent of Ohio Power
2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.

R. S. Raju, Energy Engineer.
Signature of Affiant & Title

Sworn and subscribed before me this 14 day of November, 2019 Month/Year

Linda M. Schmidt
Signature of official administering oath

LINDA M SCHMIDT
Print Name and Title

My commission expires on 7-31-2022



LINDA M. SCHMIDT
Notary Public, State of Ohio
My Commission Expires 7-31-2022



Self Direct Project Overview & Commitment

The Public Utility Commission of Ohio (PUCO) will soon review your application for participation in AEP Ohio's Energy Efficiency/Peak Demand Response program. Based on your submitted project, please select by initialing one of the two options below, sign and fax to 877-607-0740.

Customer Name	LAKEVIEW FARMS INC		
Project Number	AEP-19-26305		
Customer Premise Address	1700 GRESSEL DR, DELPHOS, OH 45833-9152		
Customer Mailing Address	1600 Gressel Drive, DELPHOS, OH 45833		
Date Received	8/22/2019		
Project Installation Date	12/31/2017		
Annual kWh Reduction	74,229		
Total Project Cost	\$21,828.08		
Unadjusted Energy Efficiency Credit (EEC) Calculation	\$4,480.00		
Simple Payback (yrs)	7.1		
Utility Cost Test (UCT) for EEC	4.43		
Utility Cost Test (UCT) for Exemption	0.08		
<i>Please Choose One Option Below and Initial</i>			
Self Direct EEC: 75%	\$4,860.00	<input checked="" type="checkbox"/>	Initial: <i>[Signature]</i>
EE/PDR Rider Exemption	12 Months (with possible extension up to 52 months after PUCO Approval)	<input type="checkbox"/>	Initial: _____

Note: This is a one time selection. By selecting EEC, the customer will receive payment in the amount stated above. Selection of EE/PDR rider exemption, will result in the customer not being eligible to participate in any other energy efficiency programs offered by AEP Ohio during the period of exemption. In addition, the term of EE/PDR rider exemption is subject to ongoing review for compliance and could be changed by the PUCO.

If EEC has been selected, will the Energy Efficiency Funds selected help you move forward with other energy efficiency projects? ☒ YES ☐ NO

Note: Exemptions for periods beyond 24 months are subject to look-back or true-up adjustments every year to ensure that the exemption accurately reflects the EEDR savings. Applicants must file for renewal for any exemption beyond 12 months.

Project Overview:

The Self Direct (Prescriptive) project that the above has completed and applied is as follows.

Non VSD HVAC Fans/Motors with:

- (4) AB 25B-B011N104 PF525 240V 3PH 3HP IP20
- (2) AB 25A-B011N104 PF523 240V 3PH 3HP IP20
- (3) AB 25B-D010N104 PF525 480V 3PH 5HP IP20
- (9) AB 25B-B017N104 PF525 240V 3PH 5HP IP20
- (1) AB 22B-B024N104 AC DRIVE 3PH 7.5HP IP20
- (3) AB 25B-B024N104 PF525 240V 3PH 7.5HP IP20

The documentation that was included with the application proved that the energy measures applied for were purchased and installed.

By signing this document, the Mercantile customer affirms its intention to commit and integrate the above listed energy efficiency resources into the utility's peak demand reduction, demand response, and energy efficiency programs. By signing, the Mercantile customer also agrees to serve as a joint applicant in any filings necessary to secure approval of this arrangement by the Public Utilities Commission of Ohio, and comply with any information and compliance reporting requirements imposed by rule or as part of that approval.

Ohio Power Company

[Signature]
Title: 10/11/2019
Date: Manager

LAKEVIEW FARMS INC

By: *[Signature]*
Title: VP of Engineering
Date: 10/9/19



Application Guidelines

Final Applications must be submitted before November 15, 2019 in order to qualify for incentives identified in this application. Please read and follow all the steps below to ensure your application is accepted and processed in a timely manner.

Step 1. Verify Eligibility

- Customer must have a valid AEP Ohio account.
- Equipment/measure must be installed at facilities served by the AEP Ohio account.
- Project must produce permanent reduction in electrical energy use (kWh).
- All installed equipment must meet or exceed the specifications in the application.
- Please see **Efficient Products for Business, Process Efficiency and New Construction Terms and Conditions** or **Self-Direct Terms and Conditions** for program rules and regulations.

Step 2. Complete Applicant Information

- All fields in customer and project information sections must be completed.
- Contractor information must be completed if project is not self-performed.

Step 3. Complete the Incentive Worksheet(s)

- Find and read specifications related to the project.
- Choose the incentive category on the worksheet based on installed equipment and specifications.
- Complete all fields (fixture description, operating hours, etc.) on the related worksheet.

Step 4. Sign Customer Agreement

- Read the **Terms and Conditions** before signing and submitting the application.
- Sign Pre-Approval Agreement and submit the application to reserve funds.
- Sign Final Application Agreement and submit the application after the project is completed to receive funds.
- Complete Third Party Payment Release Authorization ONLY if incentive payment is to be paid to an entity other than AEP Ohio customer listed on the Applicant Information page.

Step 5. Submit Pre-Approval Application¹

(For Self-Direct applications, skip to Step 6)

- Submitting a Pre-Approval Application to determine qualification and reserve program funds for a project is strongly recommended.
- All process efficiency projects require pre-approval.
- Complete all fields in Pre-Approval Agreement.
- Pre-Approval Application must be submitted with:
 - Proposed scope of work (type and quantity of old and new equipment must be listed)
 - Specification sheets for all proposed equipment
 - W-9 form
- Submit application via email, fax or mail.
- An inspection may be required during application review; applicants requiring inspection will be contacted for scheduling.

Step 6. Submit Final Application

- Complete all fields for Final Application Agreement.
- Update the application if measures/equipment differs from pre-application.
- Final Application must be submitted with:
 - Dated and itemized material invoice
 - External labor invoice (if applicable)
 - If Pre-Approval Application was not submitted, include the documents listed on Step 5
 - If the project has a pre-approval, add the project ID number on the top left field on page 2 as the AEP Application Number
- Submit application via email, fax or mail.
- An inspection may be required during application review; applicants requiring inspection will be contacted for scheduling.
- Self-Direct applications require additional steps. Please see the **Self-Direct Terms and Conditions** for details.

AEP Ohio Business Incentives Program

700 Morrison Road
Gahanna, OH 43230
877-541-3048 | aepohiosolutions@aep.com
Visit our website at AEPohio.com/solutions

¹A Pre-Approval Application is not a guarantee of an incentive; the actual incentive will be based on the energy savings and equipment installed as determined in the Final Application. Funds are reserved for 90 days, unless an applicant is granted an extension. The program team reserves the right to contact the customer before the reservation expiration date to ensure that the project is moving forward. If the project is not underway, the reservation may be cancelled. Reserved funds are not transferable to other projects, facilities and/or customers. A waiting list will be established when funds become fully subscribed.



Applicant Information

AEP Application Number AEP - _ _ - _ _ _ _ _

Application Type (Select One)

CUSTOMER INFORMATION

Business Name _____

Taxpayer ID _____ W-9 Tax Status (Select One) _____

CUSTOMER MAILING ADDRESS

Contact Name _____ Contact Title _____

Mailing Address _____ City _____ State OH Zip _____

Phone _____ Ext. _____ Contact Email _____

How Did You Hear About the Program? _____ AEP OH Energy Advisor _____

PROJECT INFORMATION

Project Name (if applicable) _____

Name as It Appears on Utility Bill _____

AEP Ohio Account Numbers for this Project _____

☐ Check if mailing address and project site address are the same.

Project Site Address _____ City _____ State OH Zip _____

Building Type (Select One) _____ Shift (Select One) _____

Annual Operating Hours _____ Building Area (sq. ft.) _____

Construction Type (Select One) _____ Does the facility have a data center? (Select One) _____



Applicant Information

CONTRACTOR INFORMATION

Company Name _____

Contact Name _____ Title of Contact _____

Mailing Address _____ City _____ State OH Zip _____

Phone _____ Ext. _____ Contact Email _____

PRIMARY CUSTOMER CONTACT INFORMATION

Contact Name _____ Title of Contact _____

Phone _____ Ext. _____ Contact Email _____

Who should we contact with questions about the application? ☐ Customer ☐ Contractor ☐ Energy Advisor

Incentive Summary Table

INCENTIVE CATEGORY	TOTAL INCENTIVES
LIGHTING	
HVAC	
MOTORS & DRIVES	
COMPRESSED AIR	
REFRIGERATION/FOOD SERVICE	
MISCELLANEOUS	
PROCESS EFFICIENCY	
NC LIGHTING (SELF-DIRECT ONLY)	
TOTAL INCENTIVES	

AEP Application Number AEP - _ _ - _ _ _ _ _



Customer Agreement

APPLICATION AGREEMENT

By signing this document, I agree to program requirements outlined in the measure specifications, Terms and Conditions for the applicable program and Final Application Agreement. As an eligible customer, I verify the information is correct and request consideration for participation under this program. Furthermore, I concur that I meet all eligibility criteria in order to receive payment under this program.

[Link to Efficient Products for Business/Process Efficiency Terms and Conditions, and Final Application Agreement](#)

[Link to Self-Direct Terms and Conditions, and Final Application Agreement](#)

☐ Pre-Application ☐ Final-Application

Project Completion Year (Select One) _____

Self-Direct _____

Project Completion Date _____

Total Project Cost _____

Total Requested Incentive¹ _____

Total Self-Direct Requested Incentive² _____

Print Name _____

Date _____

AEP Ohio Customer Signature _____

PRINT APPLICATION

¹Incentives have a threshold of 50% of the project cost and total incentives paid to a threshold of \$25,000 and Bid4Efficiency above that.
²Self-Direct incentives are 75% of Total Requested Incentive, after 50% of the project cost threshold and tiering is applied.



Third Party Payment Release

THIRD PARTY PAYMENT RELEASE AUTHORIZATION (NOT APPLICABLE TO SELF-DIRECT)

Complete this section **ONLY** if incentives check should be made out in any way other than to the AEP Ohio customer exactly as their name appears on the AEP Ohio account.

Make checks payable to: Company/Individual _____

Mailing Address _____ City _____ State OH Zip _____

Phone _____ Ext. _____

Taxpayer ID of 3rd Party _____ W-9 Tax Status _____

By signing this document, I authorize the payment of the incentive to the third party named above and understand that I will not receive the incentive payment from AEP Ohio. I also understand that my release of the payment to a third party does not exempt me from the program requirements outlined in the measure specifications, Terms and Conditions, and Final Application Agreement.

Print Name

Date

AEP Ohio Customer Signature

Technical Data



Allen-Bradley

AB 22B

PowerFlex 4 and 40 AC Drives

Original Instructions



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LISTEN.
THINK.
SOLVE.®



Allen-Bradley • Rockwell Software

**Rockwell
Automation**

Product Overview

Providing users with powerful motor speed control in a compact, space saving design, the Allen-Bradley® PowerFlex® 4 and 40 AC drives are the smallest and most cost-effective members of the PowerFlex® family of drives. Available in power ratings from 0.2 to 11 kW (0.25 to 15 HP) and in voltage classes of 120, 240, 480 and 600 volts, PowerFlex 4 and 40 are designed to meet global OEM and end-user demands for flexibility, space savings, ease of use and are cost-effective alternatives for speed control of applications such as machine tools, fans, pumps and conveyors and material handling systems



Reference Materials

For additional PowerFlex 4 and 40 data and general drive information, refer to the following publications:

Title	Publication	Online
PowerFlex 4 User Manual	22A-UM001	www.rockwellautomation.com/literature
PowerFlex 40 User Manual	22B-UM001	
Wiring and Grounding Guidelines for PWM AC Drives	DRIVES-IN001	
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001	
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1	

For other information, contact Allen-Bradley Drives Technical Support:

Title	Online
Allen-Bradley Drives Technical Support	www.ab.com/support/abdrives

Shaded areas are applicable to PowerFlex 40 only.

Packaging and Mounting

- Installation can be a virtual snap using the **DIN rail mounting** feature on A and B frame drives. Panel mounting is also available, providing added flexibility.
- **Flange mount** drives are available to reduce overall enclosure size.
- **Zero Stacking™** is allowable for ambient temperatures up to 40 °C, saving valuable panel space. 50 °C ambient temperatures are permitted with minimal spacing between drives.
- **Integral filtering** is available on all 230V single phase ratings, providing a cost-effective means of meeting EN55011, Class A and B EMC requirements. External filters provide compliance to Class A and B requirements for all PowerFlex 4 and 40 ratings.
- An optional **IP30, NEMA/UL Type 1 conduit box** is easily adapted to the standard IP20 (NEMA Type Open) product, providing increased environmental ratings.
- **IP66, NEMA/UL Type 4X/12 (Indoor)** for mounting directly in the product environment. Listed by UL to resist dust, dirt, etc. and survive high pressure water spray. Also certified by NSF to ensure conformity with international food equipment standards.



Start Up, Programming and Operation

- An **integral keypad** provides out of the box operation using the local potentiometer and control keys.
- The 10 most common application parameters are contained in the **Basic Program Group**, making programming fast and easy.
- The **programming keys** have the same function as all other PowerFlex drives, so if you can program one PowerFlex drive, you can program them all.
- **4 digit display** with 10 additional LED indicators provides an intuitive display of drive status and information.
- **Integral RS-485 communications** can be used for programming from a PC. It can also be used in a multi-drop network configuration. A serial converter module provides connectivity to any controller with a DF1 port.
- A **NEMA/UL Type 4X remote** and **NEMA/UL Type 1 hand-held LCD keypad** provide additional programming and control flexibility, both featuring the popular CopyCat function.



Optimized Performance

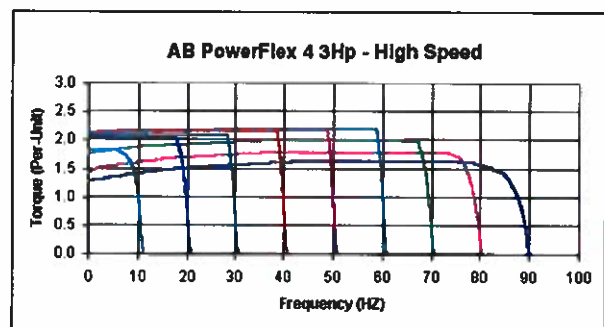
- **Removable MOV** to ground provides trouble-free operation when used on ungrounded distribution systems.
- A **relay pre-charge** limits inrush current.
- **Integral brake transistor**, available on all ratings (except no brake version), provides dynamic braking capability with simple low cost brake resistors.
- DIP switch settable **24V DC sink or source control** for control wiring flexibility.
- 150% overload for 60 seconds or 200% overload for 3 seconds provides **robust overload protection**.
- Adjustable **PWM frequency up to 16 kHz** ensures quiet operation.



Sensorless Vector Performance

PowerFlex 4

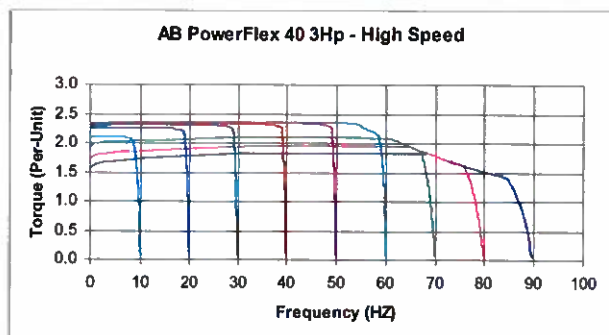
- Drive automatically provides auto boost (IR compensation) and slip compensation.
- Provides excellent speed regulation and high levels of torque across the entire speed range of the drive, and improved speed regulation even as loading increases.



Sensorless Vector Control

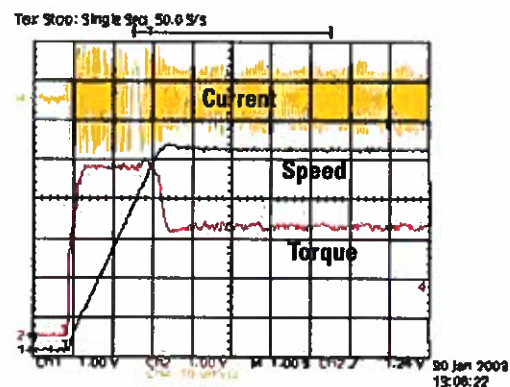
PowerFlex 40

- Sensorless Vector Control provides exceptional speed regulation and very high levels of torque across the entire speed range of the drive.
- The Autotune feature allows the PowerFlex 40 to adapt to individual motor characteristics.



Performance

- This graph depicts the ability of a PowerFlex 40 drive to accelerate into at least 150% load. A PowerFlex 4 will perform similarly, but with a slightly higher acceleration time.
- At 100% motor load, the drive will run the motor at synchronous speed.
- Excellent current regulation.
- Linear acceleration.
- Best in class digital input response time and repeatability.



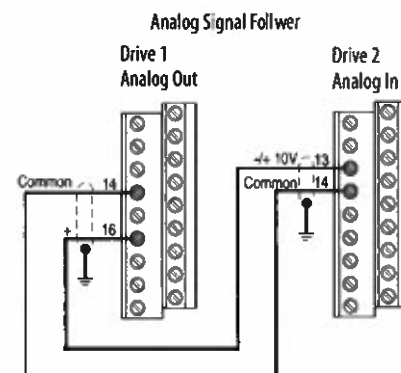
Performance

- **Sensorless Vector Control** develops high torque over a wide speed range and adapts to individual motor characteristics.
- **Variable PWM** allows the drive to output more current at low frequencies.
- **Integral PID** functionality enhances application flexibility.
- **Timer, Counter, Basic Logic and StepLogic™** functions can reduce hardware design costs and simplify control schemes.
 - **Timer function:** Relay or opto outputs controlled by drive performing timer function. Timer is initiated by activating a digital input programmed as “Timer Start.”
 - **Counter function:** Relay or opto outputs controlled by drive performing counter function. Counter function is activated by a digital input programmed as “Counter Input.”
 - **Basic Logic:** Relay or opto outputs controlled by status of digital inputs programmed as “Logic Inputs.” Performs basic Boolean logic.
 - **StepLogic:** Logic-based steps using preset speed settings. Each step can be programmed for a specific speed, direction and accel/decel profile. Drive outputs can be used to indicate which step is being performed.



I/O

- **Two (2) Analog Inputs** (one unipolar and one bipolar) are independently isolated from the rest of the drive I/O. These inputs can be toggled between via a digital input.
- **Three (3) fixed and four (4) fully programmable Digital Inputs** provide application versatility.
- **One (1) Analog Output** is DIP switch selectable for either 0...10V or 0...20mA. This scalable, 10-bit output is suitable for metering or as a speed reference for another drive.
- **Two (2) Opto Outputs** and **one (1) form C relay output** can be used to indicate various drive, motor or logic conditions.



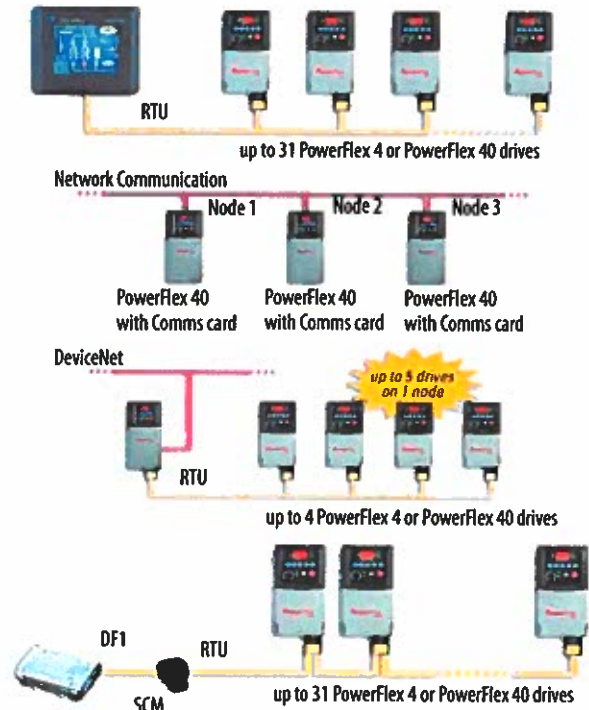
Communications

- Integral communication cards such as DeviceNet™, EtherNet/IP™, PROFIBUS™ DP, LonWorks® and, ControlNet™ can improve machine performance.
- The DSI Wireless Interface Module (WIM) provides a wireless communication interface between a Pocket PC, laptop computer or desktop computer equipped with Bluetooth® wireless technology, and any Allen-Bradley® product supporting the DSI™ protocol.
- Field installed option allows for future addition of stand-alone drives to a network.
- Online EDS file creation with RS NetWorx™ providing ease of set-up on a network.



Versatile Programming and Network Solutions

- PowerFlex 4 and PowerFlex 40 are compatible with any device that acts as a RTU Master and supports standard 03 and 06 RTU commands.
- A network can be configured using PowerFlex 40 drives with optional communication cards for high performance and flexible configuration capabilities.
 - BACnet
 - ControlNet
 - DeviceNet
 - EtherNet/IP
 - LonWorks
 - PROFIBUS DP
- A multi-drive solution can be reached using a single PowerFlex 40 DeviceNet option, with the ability for up to five drives to reside on one node.
- Integral RS485 communications enable the drives to be used in a multi-drop network configuration. A serial converter module (SCM) provides connectivity to any controller with a DF1 port. The SCM can be eliminated if the controller acts as a RTU Master.

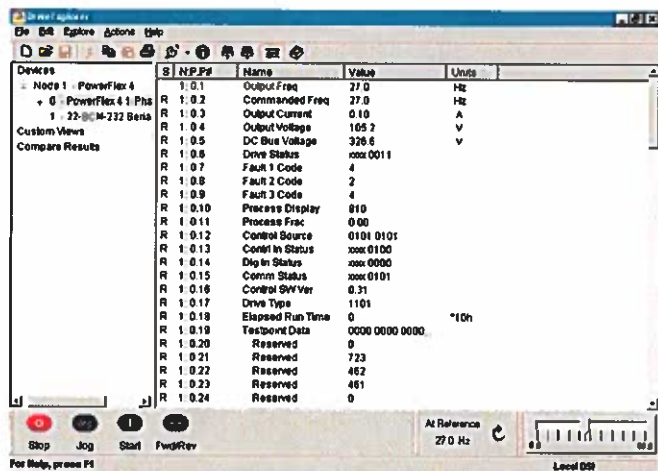


PC Programming Software

Through the use of a Serial Converter Module and DriveExplorer™ or DriveTools™ SP software, programming can be greatly simplified.

DriveExplorer Software

- View and modify drive and adapter parameters in a method similar to the file management capability of Microsoft Windows Explorer.
- Operate the drive via an on-screen Control Bar, which is a tool that allows you to start, stop, and change the speed reference of the drive.
- Save, restore and print parameter information.
- Compare current parameters with factory defaults or previously saved parameter values.
- Edit, upload and download parameters.



DriveTools SP Software

- Online and offline programming capability
- In-grid and dialog-based parameter editing
- Immediate visual indication of drive and communication status when viewing online drive
- Integrated HTML Help architecture

Use the chart below to assist in determining which product is most appropriate for an application.

	PowerFlex[®] 4	PowerFlex[®] 40
Feature		
Catalog Reference	22A	22B
	(1.1) 1.5 HP/115V, 1ø	(1.1) 1.5 HP/115V, 1ø
	(2.2) 3 HP/230V, 1ø	(2.2) 3 HP/230V, 1ø
	(3.7) 5 HP/230V, 3ø	(7.5) 10 HP/230V, 3ø
	(3.7) 5 HP/460V, 3ø	(11.0) 15 HP/460V, 3ø
Maximum (kW)HP Rating/Input Voltage		(11.0) 15 HP/600V, 3ø
Overload Capacity	150% for 60 seconds 200% for 3 seconds	150% for 60 seconds 200% for 3 seconds
IP30, NEMA/UL Type 1 Option	●	●
IP66, NEMA/UL Type 4X/12 (Indoor)		● ⁽²⁾
EMC Filtering	Internal - 1ø, 230V External - All 1ø, 115V and 3ø Ratings	Internal - 1ø, 230V External - All 1ø, 115V and 3ø Ratings
DIN Rail Mounting Standard	●	● (Through 5 HP)
Integral Keypad with Speed Pot	●	●
Keypad - Remote LCD	●	●
Keypad CopyCat Function	●	●
Control Type	V/Hz	Sensorless Vector & V/Hz
Internal DB Transistor	● Not available on no brake models.	●
Preset Speeds	4	8
Carrier Frequency	2...16 kHz	2...16 kHz
Skip Frequency		●
Process Control Loop		● (PID)
StepLogic Functionality		●
Timer/Counter Functions		●
Control Voltage	24V sink/source	24V sink/source
Discrete Inputs	3 fixed for START/STOP/REV 2 fully programmable	3 fixed for START/STOP/REV 4 fully programmable
Analog Input - Unipolar	1 (0...10V or 4...20 mA)	2 (0...10V and 4...20 mA)
Analog Input - Bipolar		1 (+/- 10V) ⁽³⁾
Analog Response	2 Hz (500 ms)	100 Hz (10 ms)
Relay Output	1 - N.O./N.C. dry contact	1 - N.O./N.C. dry contact
Digital/Optocoupler Output		2
Analog Output		● (0...10V or 4...20 mA)
Integral RS485	●	●
RS232 (Requires use of Serial Converter Module)	●	●
BACnet	● ⁽¹⁾	●
ControlNet	● ⁽¹⁾	●
DeviceNet	● ⁽¹⁾	●
EtherNet/IP	● ⁽¹⁾	●
LonWorks	● ⁽¹⁾	●
PROFIBUS DP	● ⁽¹⁾	●

(1) With 22-XCOMM-DC-BASE External mounting kit.

(2) Frame B only.

(3) When using bipolar input, the 0...10V unipolar input cannot be used.

Catalog Number Explanation

1-3	4	5	6-8	9	10	11	12	13-14
22A	-	A	1P5	N	1	1	4	AA
a		b	c	d	e	f	g	h

a	
Drive	
Code	Type
22A	PowerFlex 4
22B	PowerFlex 40

b		
Voltage Rating		
Code	Voltage	Ph.
V	120V ac	1
A	240V ac	1
B	240V ac	3
D	480V ac	3
E	600V ac	3

c1		
Rating		
100-120V Single-Phase Input		
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)

c2		
Rating		
200-240V Single-Phase Input		
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)

c3		
Rating		
200-240V Three-Phase Input		
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)

c4		
Rating		
380-480V Three-Phase Input		
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)

c5		
Rating		
480-600V Three-Phase Input		
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	7.5 (10)
019	19	11 (15)

d	
Enclosure	
Code	Enclosure
C	IP68, NEMA/UL Type 4X *
F	Flange Mount - IP20, NEMA/UL Type Open
H	Replacement Plate Drive - IP20, NEMA/UL Type Open Contact factory for ordering information.
N	Panel Mount - IP20, NEMA/UL Type Open

* Check availability before ordering.

e	
HIM	
Code	Interface Module
1	Fixed Keypad

f	
Emission Class	
Code	Rating
0	Not Filtered
1	Filtered

g	
Brake IGBT	
Code	Description
3	Without Brake
4	With Brake

h	
Optional	
Code	Purpose
AA through ZZ	Reserved for custom firmware

Product Selection

Drive Ratings			PowerFlex 4			IP 20 Flange Mount ⁽²⁾	PowerFlex 40			IP 66, UL Type 4X Panel Mount	IP 20 Flange Mount ⁽²⁾
Input Voltage	kW	HP	Output Current	Catalog Number	Frame Size	Catalog Number	Output Current	Catalog Number	Frame Size	Catalog Number	Catalog Number
120V 50/60 Hz 1-Phase No Filter	0.2	0.25	1.5A	22A-V1P5N104	A	22A-V1P5F104	—	—	—	—	—
	0.4	0.5	2.3A	22A-V2P3N104	A	22A-V2P3F104	2.3A	22B-V2P3N104	B	22B-V2P3C104	22B-V2P3F104
	0.75	1.0	4.5A	22A-V4P5N104	B	22A-V4P5F104	5.0A	22B-V5P0N104	B	22B-V5P0C104	22B-V5P0F104
	1.1	1.5	6.0A	22A-V6P0N104	B	22A-V6P0F104	6.0A	22B-V6P0N104	B	22B-V6P0C104	22B-V6P0F104
240V 50/60 Hz 1-Phase NO BRAKE No Filter	0.2	0.25	1.4A	22A-A1P4N103	A	—	—	—	—	—	—
	0.4	0.5	2.1A	22A-A2P1N103	A	—	—	—	—	—	—
	0.75	1.0	3.6A	22A-A3P6N103	A	—	—	—	—	—	—
	1.5	2.0	6.8A	22A-A6P8N103	B	—	—	—	—	—	—
240V 50/60 Hz 1-Phase NO BRAKE With Integral "S Type" EMC Filter ⁽¹⁾	0.2	0.25	1.4A	22A-A1P4N113	A	—	—	—	—	—	—
	0.4	0.5	2.1A	22A-A2P1N113	A	—	—	—	—	—	—
	0.75	1.0	3.6A	22A-A3P6N113	A	—	—	—	—	—	—
	1.5	2.0	6.8A	22A-A6P8N113	B	—	—	—	—	—	—
240V 50/60 Hz 1-Phase With Integral "S Type" EMC Filter ⁽¹⁾	0.2	0.25	1.5A	22A-A1P5N114	A	—	—	—	—	—	—
	0.4	0.5	2.3A	22A-A2P3N114	A	—	2.3A	22B-A2P3N114	B	—	—
	0.75	1.0	4.5A	22A-A4P5N114	A	—	5.0A	22B-A5P0N114	B	—	—
	1.5	2.0	8.0A	22A-A8P0N114	B	—	8.0A	22B-A8P0N114	B	—	—
240V 50/60 Hz 1-Phase No Filter	0.2	0.25	1.5A	22A-A1P5N104	A	22A-A1P5F104	—	—	—	—	—
	0.4	0.5	2.3A	22A-A2P3N104	A	22A-A2P3F104	2.3A	22B-A2P3N104	B	22B-A2P3C104	22B-A2P3F104
	0.75	1.0	4.5A	22A-A4P5N104	A	22A-A4P5F104	5.0A	22B-A5P0N104	B	22B-A5P0C104	22B-A5P0F104
	1.5	2.0	8.0A	22A-A8P0N104	B	22A-A8P0F104	8.0A	22B-A8P0N104	B	22B-A8P0C104	22B-A8P0F104
240V 50/60 Hz 3-Phase No Filter	0.2	0.25	1.5A	22A-B1P5N104	A	22A-B1P5F104	—	—	—	—	—
	0.4	0.5	2.3A	22A-B2P3N104	A	22A-B2P3F104	2.3A	22B-B2P3N104	B	22B-B2P3C104	22B-B2P3F104
	0.75	1.0	4.5A	22A-B4P5N104	A	22A-B4P5F104	5.0A	22B-B5P0N104	B	22B-B5P0C104	22B-B5P0F104
	1.5	2.0	8.0A	22A-B8P0N104	A	22A-B8P0F104	8.0A	22B-B8P0N104	B	22B-B8P0C104	22B-B8P0F104
480V 50/60 Hz 3-Phase No Filter	0.2	0.25	1.5A	22A-B012N104	B	22A-B012F104	12.0A	22B-B012N104	B	22B-B012C104	22B-B012F104
	0.4	0.5	2.3A	22A-B017N104	B	22A-B017F104	17.5A	22B-B017N104	B	22B-B017C104	22B-B017F104
	0.75	1.0	4.5A	22A-B024N104	C	22A-B024F104	24.0A	22B-B024N104	C	22B-B024C104	22B-B024F104
	1.5	2.0	8.0A	22A-B033N104	C	22A-B033F104	33.0A	22B-B033N104	C	22B-B033C104	22B-B033F104
600V 50/60 Hz 3-Phase No Filter	0.2	0.25	1.5A	22A-D1P4N104	A	22A-D1P4F104	1.4A	22B-D1P4N104	B	22B-D1P4C104	22B-D1P4F104
	0.4	0.5	2.3A	22A-D2P3N104	A	22A-D2P3F104	2.3A	22B-D2P3N104	B	22B-D2P3C104	22B-D2P3F104
	0.75	1.0	4.5A	22A-D4P0N104	A	22A-D4P0F104	4.0A	22B-D4P0N104	B	22B-D4P0C104	22B-D4P0F104
	1.5	2.0	8.0A	22A-D6P0N104	B	22A-D6P0F104	6.0A	22B-D6P0N104	B	22B-D6P0C104	22B-D6P0F104
600V 50/60 Hz 3-Phase No Filter	0.2	0.25	1.5A	22A-D8P7N104	B	22A-D8P7F104	—	—	—	—	—
	0.4	0.5	2.3A	22A-D010N104	B	22A-D010F104	10.5A	22B-D010N104	B	22B-D010C104	22B-D010F104
	0.75	1.0	4.5A	22A-D012N104	C	22A-D012F104	12.0A	22B-D012N104	C	22B-D012C104	22B-D012F104
	1.5	2.0	8.0A	22A-D017N104	C	22A-D017F104	17.0A	22B-D017N104	C	22B-D017C104	22B-D017F104
600V 50/60 Hz 3-Phase No Filter	0.2	0.25	1.5A	22A-D024N104	C	22A-D024F104	24.0A	22B-D024N104	C	22B-D024C104	22B-D024F104 ⁽³⁾
	0.4	0.5	2.3A	22A-E1P7N104	B	22A-E1P7F104	1.7A	22B-E1P7N104	B	22B-E1P7C104	22B-E1P7F104
	0.75	1.0	4.5A	22A-E3P0N104	B	22A-E3P0F104	3.0A	22B-E3P0N104	B	22B-E3P0C104	22B-E3P0F104
	1.5	2.0	8.0A	22A-E4P2N104	B	22A-E4P2F104	4.2A	22B-E4P2N104	B	22B-E4P2C104	22B-E4P2F104
600V 50/60 Hz 3-Phase No Filter	0.2	0.25	1.5A	22A-E6P6N104	B	22A-E6P6F104	6.6A	22B-E6P6N104	B	22B-E6P6C104	22B-E6P6F104
	0.4	0.5	2.3A	22A-E9P9N104	C	22A-E9P9F104	9.9A	22B-E9P9N104	C	22B-E9P9C104	22B-E9P9F104
	0.75	1.0	4.5A	22A-E012N104	C	22A-E012F104	12.0A	22B-E012N104	C	22B-E012C104	22B-E012F104
	1.5	2.0	8.0A	22A-E019N104	C	22A-E019F104	19.0A	22B-E019N104	C	22B-E019C104	22B-E019F104

- (1) This filter is suitable for use with a cable length of at least 10 meters for Class A and 1 meter for Class B environments.
(2) Meets IP40/54/65 (NEMA 1/12/4/4X) when installed in an enclosure of like rating.
(3) Requires use of external DC Bus Inductor or AC Line Reactor.

Shaded areas are applicable to PowerFlex 40 only.

User Installed Options

IP30/NEMA 1/UL Type 1 Conversion Kit

Item	Description	Drive Frame	PowerFlex 4 Catalog Number ⁽¹⁾	PowerFlex 40 Catalog Number ⁽¹⁾
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.	A	22-JBAA	—
		B	22-JBAB	22-JBAB
		C	—	22-JBAC
IP30/NEMA 1/UL Type 1 Kit with 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

(1) For pricing information, refer to the PowerFlex 4 Price List, publication 22A-PL001 and PowerFlex 40 Price List, publication 22B-PL001.

Human Interface Module Option Kits and Accessories

Item	Description	Catalog Number ⁽¹⁾
Remote Human Interface Modules (HIMs)	LCD Display, Remote Panel Mount, Digital Speed Control, CopyCat capable, IP66 (NEMA Type 4X/12) indoor use only. Includes 2.0 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. Can be panel mounted with optional Bezel Kit.	22-HIM-A3
	Remote Handheld, Wireless Interface Module with Bluetooth® technology, IP30 (NEMA Type 1). Panel Mount with optional Bezel Kit.	22-WIM-N1
	Remote Panel Mount, Wireless Interface Module with Bluetooth® technology, IP66 (NEMA Type 4X/12) indoor use only.	22-WIM-N4S
Bezel Kit	Panel Mount for LCD Display, Remote Handheld unit, IP30 (NEMA Type 1). Includes a 22-RJ45CBL-C20 cable.	22-HIM-B1
DSI HIM Cable	DSI HIM Cable (DSI HIM to RJ45 cable)	22-HIM-H10 22-HIM-H30
	• 1.0 Meter (3.3 Feet) • 2.9 Meter (9.51 Feet)	

(1) For pricing information, refer to the PowerFlex 4 Price List, publication 22A-PL001 and PowerFlex 40 Price List, publication 22B-PL001.

Communication Option Kits

Item	Description	Catalog Number ⁽¹⁾
Serial Converter Module (RS485 to RS232)	Provides serial communication via DF1 protocol for use with DriveExplorer™ and DriveExecutive™ software. Smart Self-powered Serial Converter (RS-232) includes: • DSI to RS232 serial converter • DriveExplorer Lite Version 3.01 or later • 1203-SFC and 22-RJ45CBL-C20 Cables	22-SCM-232
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
Universal Serial Bus™ (USB) Converter	Provides a direct, isolated USB connection for use with DriveExplorer and DriveExecutive software. Includes 2.0 meter USB cable, 20-HIM-H10 and 22-HIM-H10 cables.	1203-USB
DSI Cable	2.0 meter RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Splitter Cable	RJ45 one to two port splitter cable.	AK-U0-RJ45-SC1
Terminating Resistors	RJ45 120 Ohm resistor (2 pieces).	AK-U0-RJ45-TR1
Terminal Block	RJ45 Two position terminal block (6 pieces).	AK-U0-RJ45-TB2P
External DSI Communications Kit	External communications kit for 22-COMM Communication Adapters. Multi-Drive capability allows connectivity for up to 5 drives.	22-XCOMM-DC-BASE
External Comms Power Supply	Optional 100...240V AC power supply for external DSI communications kit.	20-XCOMM-AC-PS1
Communication Adapters	Embedded communication option for use with the PowerFlex family of drives. Requires a Communication Adapter Cover (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
Compact I/O Module	Provides 3 channels that can be individually configured for Single, Multi-Drive, and Modbus RTU modes.	1769-SM2
Communication Adapter Covers	Houses the optional communication adapters. These covers add 25 mm (0.98 in.) to the overall depth of the drive. • PowerFlex 40 Drive Frame B • PowerFlex 40 Drive Frame C	22B-CCB 22B-CCC

(1) For pricing information, refer to the PowerFlex 4 Price List, publication 22A-PL001 and PowerFlex 40 Price List, publication 22B-PL001.

Shaded areas are applicable to PowerFlex 40 only.

PC Programming Software

Item	Description	Catalog Number
DriveTools SP Software	"Windows" based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communications adapters online and offline. Compatibility: Windows 98, ME, NT, 4.0 (Service Pack 3 or later), 2000 and XP. ⁽¹⁾	9303-4DTE01ENE
DriveExplorer™ Software	"Windows" based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communications adapters online and offline. Compatibility: Windows 98, ME, NT, 4.0 (Service Pack 3 or later), 2000 and XP. ⁽¹⁾	9306-4EXP01ENE

(1) See www.ab.com/drives/ for support devices.

DC Bus Inductors

Input Voltage	kW	HP	Amps	Inductance (mH)	MTE Catalog Number
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

Shaded areas are applicable to PowerFlex 40 only.

PowerFlex 4 and 40 AC Drives

Dynamic Brake Resistors

Drive Ratings			PowerFlex 4	PowerFlex 40
Input Voltage	kW	HP	Catalog Number ⁽¹⁾	Catalog Number ⁽¹⁾
120V 50/60 Hz 1-Phase	0.2	0.25	AK-R2-091P500	
	0.4	0.5	AK-R2-091P500	
	0.75	1.0	AK-R2-091P500	
	1.1	1.5	AK-R2-091P500	
240V 50/60 Hz 1-Phase	0.2	0.25	AK-R2-091P500	
	0.4	0.5	AK-R2-091P500	
	0.75	1.0	AK-R2-091P500	
	1.5	2.0	AK-R2-091P500	
	2.2	3.0		AK-R2-047P500
240V 50/60 Hz 3-Phase	0.2	0.25	AK-R2-091P500	
	0.4	0.5	AK-R2-091P500	
	0.75	1.0	AK-R2-091P500	
	1.5	2.0	AK-R2-091P500	
	2.2	3.0	AK-R2-047P500	
	3.7	5.0	AK-R2-047P500	
	5.5	7.5		AK-R2-030P1K2
480V 50/60 Hz 3-Phase	7.5	10.0		AK-R2-030P1K2
	0.4	0.5	AK-R2-360P500	
	0.75	1.0	AK-R2-360P500	
	1.5	2.0	AK-R2-360P500	
	2.2	3.0	AK-R2-120P1K2	
	4.0	5.0	AK-R2-120P1K2	
	5.5	7.5		AK-R2-120P1K2
	7.5	10.0		AK-R2-120P1K2
600V 50/60 Hz 3-Phase No Filter	11.0	15.0		AK-R2-120P1K2 ⁽²⁾
	0.75	1.0	AK-R2-360P500	
	1.5	2.0	AK-R2-360P500	
	2.2	3.0	AK-R2-120P1K2	
	4.0	5.0	AK-R2-120P1K2	
	5.5	7.5	AK-R2-120P1K2	
	7.5	10.0	AK-R2-120P1K2	
	11.0	15.0	AK-R2-120P1K2 ⁽²⁾	

(1) Resistors listed in this table are rated for a minimum 5% duty cycle. See publication PFLEX-AT001 for additional information.

(2) Requires two resistors wired in parallel.

3% Line Reactors

Input Voltage	kW	HP	Fundamental Amps	Max Continuous Amps	Inductance mh	Watts Loss	Catalog Number ⁽¹⁾
240V 50/60 Hz 3-Phase	0.2	0.25	2	3	12.0	7.5 W	1321-3R2-A
	0.4	0.5	4	6	12.0	21 W	1321-3R4-D
	0.75	1.0	8	12	3.0	29 W	1321-3R8-B
	1.5	2.0	8	12	1.5	19.5 W	1321-3R8-A
	2.2	3.0	12	18	1.25	26 W	1321-3R12-A
	3.7	5.0	18	27	0.8	36 W	1321-3R18-A
	5.5	7.5	25	37.5	0.5	48 W	1321-3R25-A
	7.5	10.0	35	52.5	0.4	49 W	1321-3R35-A
480V 50/60 Hz 3-Phase	0.4	0.5	2	3	20.0	11.3 W	1321-3R2-B
	0.75	1.0	4	6	9.0	20 W	1321-3R4-C
	1.5	2.0	4	6	6.5	20 W	1321-3R4-B
	2.2	3.0	8	12	5.0	25.3 W	1321-3R8-C
	3.7	5.0	8	12	3.0	29 W	1321-3R8-B
	4.0	5.0	12	18	2.5	31 W	1321-3R12-B
	5.5	7.5	12	18	2.5	31 W	1321-3R12-B
	7.5	10.0	18	27	1.5	43 W	1321-3R18-B
600V 50/60 Hz 3-Phase No Filter	11.0	15.0	25	37.5	1.2	52 W	1321-3R25-B
	0.75	1.0	2	3	20.0	11.3 W	1321-3R2-B
	1.5	2.0	4	6	6.5	20 W	1321-3R4-B
	2.2	3.0	4	6	6.5	20 W	1321-3R4-B
	4.0	5.0	8	12	5.0	25.3 W	1321-3R8-C
	5.5	7.5	12	18	2.5	31 W	1321-3R12-B
	7.5	10.0	12	18	2.5	31 W	1321-3R12-B
	11.0	15.0	18	27	1.5	43 W	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. Refer to publication 1321-TD001.

Shaded areas are applicable to PowerFlex 40 only.

PowerFlex 4 EMC Filters

Drive Ratings			S Type Filter	L Type Filter
Input Voltage	kW	HP	Catalog Number ⁽¹⁾	Catalog Number ⁽³⁾
120V 50/60 Hz 1-Phase	0.2	0.25	—	22-RF010-AL
	0.4	0.5	—	22-RF010-AL
	0.75	1.0	—	22-RF018-BL
240V 50/60 Hz 1-Phase	0.2	0.25	⁽²⁾	22-RF010-AL
	0.4	0.5	⁽²⁾	22-RF010-AL
	0.75	1.0	⁽²⁾	22-RF010-AL
	1.5	2.0	⁽²⁾	22-RF018-BL
240V 50/60 Hz 3-Phase	0.2	0.25	22-RF9P5-AS	22-RF9P5-AL
	0.4	0.5	22-RF9P5-AS	22-RF9P5-AL
	0.75	1.0	22-RF9P5-AS	22-RF9P5-AL
	1.5	2.0	22-RF9P5-AS	22-RF9P5-AL
	2.2	3.0	22-RF021-B5	22-RF021-BL
	3.7	5.0	22-RF021-B5	22-RF021-BL
480V 50/60 Hz 3-Phase	0.4	0.5	22-RF5P7-AS	22-RF5P7-AL
	0.75	1.0	22-RF5P7-AS	22-RF5P7-AL
	1.5	2.0	22-RF5P7-AS	22-RF5P7-AL
	2.2	3.0	22-RF012-B5	22-RF012-BL
	4.0	5.0	22-RF012-B5	22-RF012-BL

PowerFlex 40 EMC Filters

Drive Ratings			S Type Filter	L Type Filter
Input Voltage	kW	HP	Catalog Number ⁽¹⁾	Catalog Number ⁽³⁾
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	⁽²⁾	22-RF018-BL
	0.75	1.0	⁽²⁾	22-RF018-BL
	1.5	2.0	⁽²⁾	22-RF018-BL
	2.2	3.0	⁽²⁾	22-RF025-CL
240V 50/60 Hz 3-Phase	0.4	0.5	22-RF021-B5 ⁽⁴⁾	22-RF021-BL
	0.75	1.0	22-RF021-B5 ⁽⁴⁾	22-RF021-BL
	1.5	2.0	22-RF021-B5 ⁽⁴⁾	22-RF021-BL
	2.2	3.0	22-RF021-B5 ⁽⁴⁾	22-RF021-BL
	3.7	5.0	22-RF021-B5 ⁽⁴⁾	22-RF021-BL
	5.5	7.5	22-RF034-CS	22-RF034-CL
	7.5	10.0	22-RF034-CS	22-RF034-CL
	11.0	15.0	22-RF026-CS	22-RF026-CL
480V 50/60 Hz 3-Phase	0.4	0.5	22-RF012-B5	22-RF012-BL
	0.75	1.0	22-RF012-B5	22-RF012-BL
	1.5	2.0	22-RF012-B5	22-RF012-BL
	2.2	3.0	22-RF012-B5	22-RF012-BL
	4.0	5.0	22-RF012-B5	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
	0.75	1.0	—	22-RF8P0-BL
	1.5	2.0	—	22-RF8P0-BL
600V 50/60 Hz 3-Phase	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 up to 10 meters for Class A and 1 meter for Class B environments.
 (2) Drives are available in these ratings with internal "S Type" filters.
 (3) This filter is suitable for use with a cable length up to 100 meters for Class A and 5 meters for Class B environments.
 (4) Filter must be Series B or later.

PowerFlex 4 & 40 Spare Parts

Description	Catalog Number
PowerFlex 4 Fan Replacement Kit - Frame A	SK-U1-FAN1-A1
PowerFlex 4/40 Fan Replacement Kit - Frame B, 1 Fan	SK-U1-FAN1-B1
PowerFlex 4/40 Fan Replacement Kit - Frame B, 2 Fans	SK-U1-FAN2-B1
PowerFlex 40 Fan Replacement Kit - Frame C, 1 Fan	SK-U1-FAN1-C1
PowerFlex 40 Fan Replacement Kit - Frame C, 1 Fan (15 HP)	SK-U1-FAN1-C2
PowerFlex 4 Frame A Cover with Power Terminal Guard	SK-U1-ACVR1-A1
PowerFlex 4 Frame B Cover with Power Terminal Guard	SK-U1-ACVR1-B1
PowerFlex 40 Frame B Cover with Power Terminal Guard	SK-U1-BCVR1-B1
PowerFlex 40 Frame C Cover with Power Terminal Guard	SK-U1-BCVR1-C1

Shaded areas are applicable to PowerFlex 40 only.

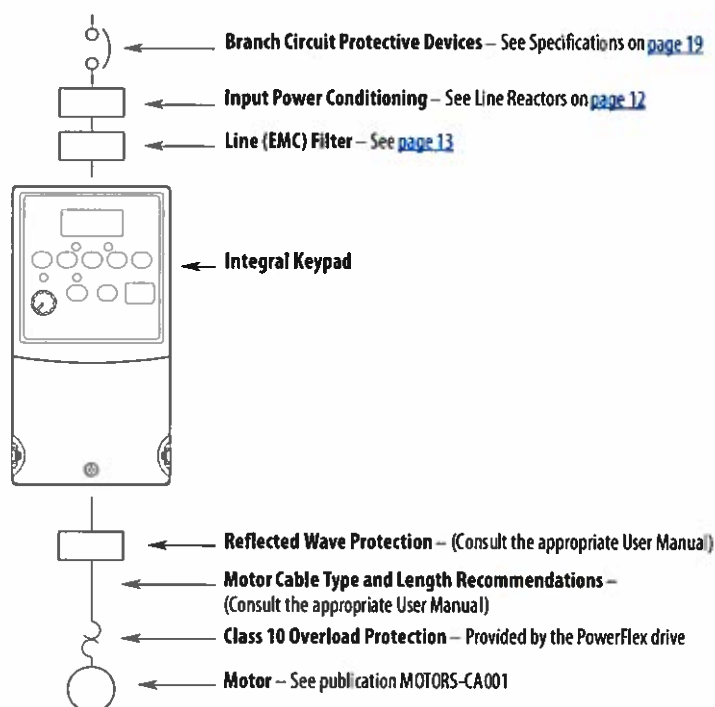
Installation Considerations

PowerFlex 4 and 40 drives have the following built in protective features to help simplify installation.

- Ground fault protection while starting and running ensures reliable operation
- Electronic motor overload protection increases motor life
- Removable MOV to ground ensures compatibility with ungrounded systems
- 6kV transient protection provides increased robustness for 380...480V system voltages

There are many other factors that must be considered for optimal performance in any given application. The block diagram below highlights the primary installation considerations. Consult the PowerFlex 4 or PowerFlex 40 User Manual, Publications 22A-UM001 or 22B-UM001 available online at www.rockwellautomation.com/literature, for detailed recommendations on input power conditioning, CE conformance (EMC filtering), dynamic braking, reflected wave protection, motor cable types and motor cable distances.

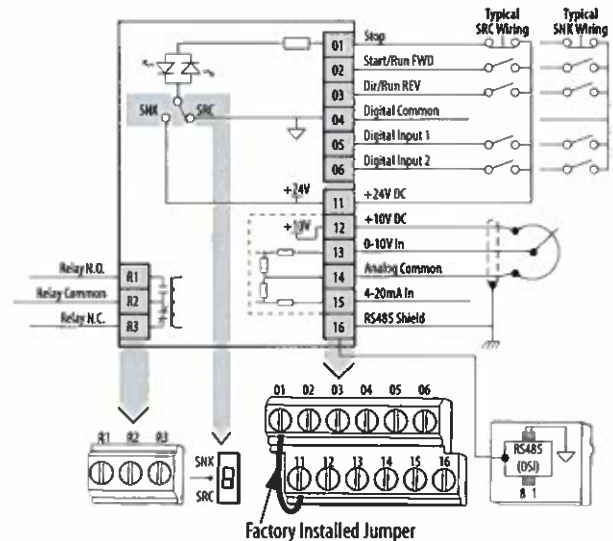
Block Diagram



Control Wiring

PowerFlex 4

- The control logic is 24V DC and can be set for either Sink or Source control via a DIP switch setting.
- Control terminal screws are sized for a conventional blade screw driver.
- I/O Terminals 1, 2 and 3 are dedicated for Stop, Start and Reverse operation respectively. These I/O Terminals can be programmed for 2- or 3-Wire operation to meet application requirements.
- I/O Terminals 4 and 5 are programmable and provide added flexibility. Programmable functions include:
 - Local Control
 - Preset Frequencies
 - Jog
 - RS485 Control
 - Second Accel/Decel
 - Auxiliary Fault
 - Clear Fault
- Speed can be controlled via a 0...10V input or 4...20 mA input. Both are electrically isolated from the drive.
- One form C relay can be programmed to provide the status of a wide variety of drive conditions.
- The drive is shipped with a jumper installed between I/O Terminals 01 and 11 to allow out of box operation from the keypad.



PowerFlex 4 and 40 AC Drives

No.	Signal	Default	Description			
R1	Relay N.O.	Fault	Normally open contact for output relay.			
R2	Relay Common	—	Common for output relay.		30V DC	125V AC
R3	Relay N.C.	Fault	Normally closed contact for output relay.	Resistive	3.0 A	3.0 A
				Inductive	0.5 A	0.5 A
					0.5 A	0.5 A

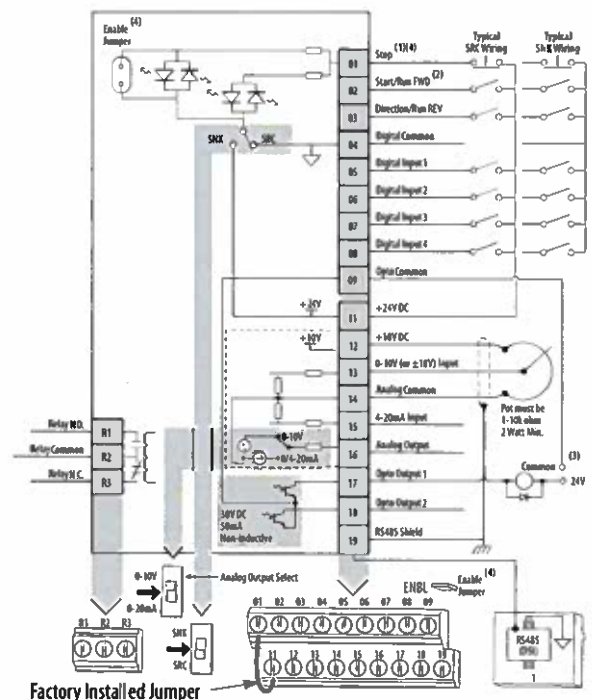
Sink/Source DIP Switch	Source (SRC)	Inputs can be wired as Sink (SNK) or Source (SRC) via DIP Switch setting.
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01	Stop ⁽¹⁾	Coast	The factory installed jumper or a normally closed input must be present for the drive to start.
02	Start/Run FWD	Not Active	Command comes from the integral keypad by default. To disable reverse operation, see A095 [Reverse Disable].
03	Direction/Run REV	Not Active	
04	Digital Common	—	
05	Digital Input 1	Preset Freq	Program with A051 [Digital In1 Sel].
06	Digital Input 2	Preset Freq	Program with A052 [Digital In2 Sel].
11	+24V DC	—	Drive supplied power for digital inputs. Maximum output current is 100 mA.
12	+10V DC	—	Drive supplied power for 0...10V external potentiometer. Maximum output current is 15 mA.
13	0...10V In ⁽¹⁾	Not Active	For external 0...10V input supply (input impedance = 100k ohm) or potentiometer wiper.
14	Analog Common	—	For 0...10V In or 4...20 mA In. Electronically isolated with analog inputs from digital I/O.
15	4...20 mA In ⁽¹⁾	Not Active	For external 4...20 mA input supply (input impedance = 250 ohm).
16	RS485 (DSI) Shield	—	Terminal should be connected to safety ground - PE when using the RS485 (DSI) communications port.

(1) Only one analog frequency source may be connected at a time. If more than one reference is connected at the same time, an undetermined frequency reference will result.

PowerFlex 40

- The control logic is 24V DC and can be set for either Sink or Source control via a DIP switch setting.
- Control terminal screws are sized for a conventional blade screw driver.
- I/O Terminals 1, 2 and 3 are dedicated for Stop, Start and Reverse operation respectively. These I/O Terminals can be programmed for 2- or 3-Wire operation to meet application requirements.
- I/O Terminals 5, 6, 7 and 8 are programmable and provide added flexibility. Programmable functions include Local Control, Jog, Second Accel/Decel, Clear Fault, Preset Frequencies, RS485 Control and Auxiliary Fault.
- Speed can be controlled via a 0...10V input and/or 4...20 mA input. Both inputs are independently isolated from the rest of the drive and can be used for applications such as PID. Voltage input can be programmed for bipolar operation.
- The drive is shipped with a jumper installed between I/O Terminals 01 and 11 to allow out of box operation from the keypad.



PowerFlex 4 and 40 AC Drives

No.	Signal	Default	Description
R1	Relay N.O.	Fault	Normally open contact for output relay.
R2	Relay Common	—	Common for output relay.
R3	Relay N.C.	Fault	Normally closed contact for output relay.
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	Coast	The factory installed jumper or a normally closed input must be present for the drive to start.
02	Start/Run FWD	Not Active	
03	Direction/Run REV	Not Active	
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].
06	Digital Input 2	Preset Freq	Program with A052 [Digital In2 Sel].
07	Digital Input 3	Local	Program with A053 [Digital In3 Sel].
08	Digital Input 4	Jog Forward	Program with A054 [Digital In4 Sel].
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.
13	$\pm 10V$ In ⁽¹⁾	Not Active	For external 0...10V (unipolar) or $\pm 10V$ (bipolar) input supply (input impedance = 100k ohm) or potentiometer wiper.
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 ⁽¹⁾	Not Active	For external 4...20 mA input supply (input impedance = 250 ohm).
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...20mA. Program with A065 [Analog Out Sel]. Max analog value can be scaled with A066 [Analog Out High]. Maximum Load: 4...20 mA = 525 ohm (10.5V) 0...10V = 1k ohm (10 mA)
17	Opto Output 1	MotorRunning	Program with A058 [Opto Out1 Sel]
18	Opto Output 2	At Frequency	Program with A061 [Opto Out2 Sel]
19	RS485 (DSI) Shield	—	Terminal should be connected to safety ground - PE when using the RS485 (DSI) communications port.

(1) 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.

Specifications

Drive Ratings — PowerFlex 4

Catalog Number	Output Ratings		Input Ratings			Branch Circuit Protection				Power Dissipation	
	kW (HP)	Amps	Voltage Range	kVA	Amps	Fuses ⁽²⁾	140M Motor Protectors ⁽³⁾ (4)	Contactors	Min. Enclosure Volume ⁽⁵⁾ (in.³)	Internal	Total
100...120V AC – 1-Phase Input, 0...230V 3-Phase Output											
22A-V1P5N104	0.2 (0.25)	1.5	90...126	0.75	6.0	10	140M-C2E-C10	100-C09	1655	10	25
22A-V2P3N104	0.4 (0.5)	2.3	90...126	1.15	9.0	15	140M-C2E-C16	100-C12	1655	9	30
22A-V4P5N104	0.75 (1.0)	4.5	90...126	2.25	18.0	30	140M-D8E-C20	100-C23	1655	12	50
22A-V6P0N104	1.1 (1.5)	6.0	90...126	3.00	24.0	40	140M-F8E-C32	100-C37	1655	12	70
200...240V AC – 1-Phase Input, 0...230V 3-Phase Output (No Brake) ⁽¹⁾											
22A-A1P4N103	0.2 (0.25)	1.4	180...265	0.7	3.2	6	140M-C2E-B40	100-C09	1655	10	25
22A-A2P1N103	0.4 (0.5)	2.1	180...265	1.05	5.3	10	140M-C2E-B63	100-C09	1655	9	30
22A-A3P6N103	0.75 (1.0)	3.6	180...265	1.8	9.2	15	140M-C2E-C16	100-C12	1655	12	50
22A-A6P8N103	1.5 (2.0)	6.8	180...265	3.4	14.2	25	140M-C2E-C16	100-C16	1655	16	80
22A-A9P6N103	2.2 (3.0)	9.6	180...265	4.8	19.6	30	140M-D8E-C25	100-C23	1655	11	110
200...240V AC – 1-Phase Input, 0...230V 3-Phase Output ⁽¹⁾											
22A-A1P5N104	0.2 (0.25)	1.5	180...265	0.75	5.0	10	140M-C2E-B63	100-C09	1655	10	25
22A-A2P3N104	0.4 (0.5)	2.3	180...265	1.15	6.0	10	140M-C2E-B63	100-C09	1655	9	30
22A-A4P5N104	0.75 (1.0)	4.5	180...265	2.25	10.0	15	140M-C2E-C16	100-C12	1655	12	50
22A-A8P0N104	1.5 (2.0)	8.0	180...265	4.0	18.0	30	140M-D8E-C20	100-C23	1655	16	80
200...240V AC – 3-Phase Input, 0...230V 3-Phase Output											
22A-B1P5N104	0.2 (0.25)	1.5	180...265	0.75	1.8	3	140M-C2E-B25	100-C09	1655	10	25
22A-B2P3N104	0.4 (0.5)	2.3	180...265	1.15	2.5	6	140M-C2E-B40	100-C09	1655	9	30
22A-B4P5N104	0.75 (1.0)	4.5	180...265	2.25	5.2	10	140M-C2E-C10	100-C09	1655	12	50
22A-B8P0N104	1.5 (2.0)	8.0	180...265	4.0	9.5	15	140M-C2E-C16	100-C12	1655	16	80
22A-B012N104	2.2 (3.0)	12.0	180...265	5.5	15.5	25	140M-C2E-C16	100-C16	1655	16	115
22A-B017N104	3.7 (5.0)	17.5	180...265	8.6	21.0	35	140M-F8E-C25	100-C23	1655	16	165
380...480V AC – 3-Phase Input, 0...460V 3-Phase Output											
22A-D1P4N104	0.4 (0.5)	1.4	340...528	1.4	1.8	3	140M-C2E-B25	100-C09	1655	15	30
22A-D2P3N104	0.75 (1.0)	2.3	340...528	2.3	3.2	6	140M-C2E-B40	100-C09	1655	13	40
22A-D4P0N104	1.5 (2.0)	4.0	340...528	4.0	5.7	10	140M-C2E-B63	100-C09	1655	13	60
22A-D6P0N104	2.2 (3.0)	6.0	340...528	5.9	7.5	15	140M-C2E-C10	100-C09	1655	17	90
22A-D8P7N104	3.7 (5.0)	8.7	340...528	8.6	9.0	15	140M-C2E-C16	100-C16	1655	14	145

(1) 200...240V AC - 1-Phase drives are also available with an integral EMC filter. Catalog suffix changes from N104 to N114 or N103 to N113.

(2) Recommended Fuse Type: UL Class J, CC, T or Type BS88, 600V (550V) or equivalent.

(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 4 and 40 AC Drives

Drive Ratings — PowerFlex 40

Catalog Number	Output Ratings		Input Ratings			Branch Circuit Protection				Power Dissipation	
	kW (HP)	Amps	Voltage Range	kVA	Amps	Fuses ⁽²⁾	140M Motor Protectors ^{(3) (4)}	Contactors	Min. Enclosure Volume ⁽⁵⁾ (in. ³)	Internal	Total
100...120V AC – 1-Phase Input, 0...230V 3-Phase Output											
22B-V2P3N104	0.4 (0.5)	2.3	90...132	1.15	9.0	15	140M-C2E-C16	100-C12	1655	9	30
22B-V5P0N104	0.75 (1.0)	5.0	90...132	2.45	20.3	35	140M-D8E-C20	100-C23	1655	12	55
22B-V6P0N104	1.1 (1.5)	6.0	90...132	3.0	24.0	40	140M-F8E-C32	100-C37	1655	12	70
200...240V AC – 1-Phase Input, 0...230V 3-Phase Output ⁽¹⁾											
22B-A2P3N104	0.4 (0.5)	2.3	180...264	1.15	6.0	10	140M-C2E-B63	100-C09	1655	9	30
22B-ASP0N104	0.75 (1.0)	5.0	180...264	2.45	12.0	20	140M-C2E-C16	100-C12	1655	12	55
22B-A8P0N104	1.5 (2.0)	8.0	180...264	4.0	18.0	30	140M-D8E-C20	100-C23	1655	16	80
22B-A012N104	2.2 (3.0)	12.0	180...264	5.5	25.0	40	140M-F8E-C32	100-C37	2069	11	110
200...240V AC – 3-Phase Input, 0...230V 3-Phase Output											
22B-B2P3N104	0.4 (0.5)	2.3	180...264	1.15	2.5	6	140M-C2E-B40	100-C07	1655	9	30
22B-B5P0N104	0.75 (1.0)	5.0	180...264	2.45	5.7	10	140M-C2E-C10	100-C09	1655	12	55
22B-B8P0N104	1.5 (2.0)	8.0	180...264	4.0	9.5	15	140M-C2E-C16	100-C12	1655	16	80
22B-B012N104	2.2 (3.0)	12.0	180...264	5.5	15.5	25	140M-C2E-C16	100-C23	1655	16	115
22B-B017N104	3.7 (5.0)	17.5	180...264	8.6	21.0	35	140M-F8E-C25	100-C23	1655	16	165
22B-B024N104	5.5 (7.5)	24.0	180...264	11.8	26.1	40	140M-F8E-C32	100-C37	2069	28	225
22B-B033N104	7.5 (10.0)	33.0	180...264	16.3	34.6	60	140M-F8E-C45	100-C60	2069	28	290
380...480V AC – 3-Phase Input, 0...460V 3-Phase Output											
22B-D1P4N104	0.4 (0.5)	1.4	342...528	1.4	1.8	3	140M-C2E-B25	100-C07	1655	15	30
22B-D2P3N104	0.75 (1.0)	2.3	342...528	2.3	3.2	6	140M-C2E-B40	100-C07	1655	13	40
22B-D4P0N104	1.5 (2.0)	4.0	342...528	4.0	5.7	10	140M-C2E-B63	100-C09	1655	13	60
22B-D6P0N104	2.2 (3.0)	6.0	342...528	5.9	7.5	15	140M-C2E-C10	100-C09	1655	17	90
22B-D010N104	4.0 (5.0)	10.5	342...528	10.3	13.0	20	140M-C2E-C16	100-C23	1655	14	150
22B-D012N104	5.5 (7.5)	12.0	342...528	11.8	14.2	25	140M-D8E-C20	100-C23	2069	23	160
22B-D017N104	7.5 (10.0)	17.0	342...528	16.8	18.4	30	140M-D8E-C20	100-C23	2069	24	200
22B-D024N104	11.0 (15.0)	24.0	342...528	23.4	26.0	50	140M-F8E-C32	100-C43	2069	25	285
460...600V AC – 3-Phase Input, 0...575V 3-Phase Output											
22B-E1P7N104	0.75 (1.0)	1.7	414...660	2.1	2.3	6	140M-C2E-B25	100-C09	1655	13	40
22B-E3P0N104	1.5 (2.0)	3.0	414...660	3.65	3.8	6	140M-C2E-B40	100-C09	1655	13	60
22B-E4P2N104	2.2 (3.0)	4.2	414...660	5.2	5.3	10	140M-D8E-B63	100-C09	1655	17	90
22B-E6P6N104	4.0 (5.0)	6.6	414...660	8.1	8.3	15	140M-D8E-C10	100-C09	1655	14	150
22B-E9P9N104	5.5 (7.5)	9.9	414...660	12.1	11.2	20	140M-D8E-C16	100-C16	2069	23	160
22B-E012N104	7.5 (10.0)	12.2	414...660	14.9	13.7	25	140M-D8E-C16	100-C23	2069	24	200
22B-E019N104	11.0 (15.0)	19.0	414...660	23.1	24.1	40	140M-F8E-C25	100-C30	2069	25	285

(1) 200...240V AC – 1-Phase drives are also available with an integral EMC filter. Catalog suffix changes from N104 to N114 or N103 to N113.

(2) Recommended Fuse Type: UL Class J, CC, T or Type BS88; 600V (550V) or equivalent.

(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.

Input/Output Ratings	Output Frequency: Efficiency:	PowerFlex 4: 0...240 Hz (Programmable) PowerFlex 40: 0...400 Hz (Programmable) 97.5% (Typical)
Approvals	   	LV Directive 73/23/EEC EN 50178, EN 60204 EMC Directive 89/336/EEC EN 61800-3
Control Inputs	Digital SRC (Source) Mode: SNK (Sink) Mode: Analog 4...20 mA Analog: 0...10V DC Analog: External Pot:	Input Current = 6 mA 18...24V = On, 0...6V = Off 0...6V = On, 18...24V = Off 250 ohm input impedance 100k ohm input impedance 1...10k ohms, 2 Watt minimum
Control Output – Programmable Output (form C relay)	Resistive Rating Opto Outputs (PF 40): Analog Outputs (PF 40): Inductive Rating Opto Outputs (PF 40): Analog Outputs (PF 40):	3.0A at 30V DC, 3.0A at 125V AC, 3.0A at 240V AC 30V DC, 50 mA 10-bit, 0...10V, 1k ohm minimum 0.5A at 30V DC, 0.5A at 125V AC, 0.5A at 240V AC Non-inductive 10 bit, 4...20 mA, 525 ohm maximum
Fuses and Circuit Breakers	Recommended Fuse Type: Recommended Circuit Breakers:	UL Class J, CC, T or Type BS88; 600V (550V) or equivalent. HMCP circuit breaker or equivalent.
Protective Features	Motor Protection: Overcurrent: Control Ride Through: Faultless Power Ride Through: Over Voltage: Under Voltage:	1/2 Overload Protection, 150% for 60 sec., 200% for 3 sec. (provides Class 10 protection) 200% hardware limit, 300% instantaneous fault Minimum Ride Through is 0.5 sec. - typical value is 2 seconds 100 milliseconds 100...120V AC Input – Trip occurs at 405V DC bus voltage (= 150V AC incoming line) 200...240V AC Input – Trip occurs at 405V DC bus voltage (= 290V AC incoming line) 380...480V AC Input – Trip occurs at 810V DC bus voltage (= 575V AC incoming line) 460...600V AC Input (PF 40) – Trip occurs at 1005V DC bus voltage (= 711V AC incoming line) 100...120V AC Input – Trip occurs at 210V DC bus voltage (= 75V AC incoming line) 200...240V AC Input – Trip occurs at 210V DC bus voltage (= 150V AC incoming line) 380...480V AC Input – Trip occurs at 390V DC bus voltage (= 275V AC incoming line) 460...600V AC Input (PF 40) If P042 = 1 "High Voltage" trip occurs at 487V DC bus voltage (344V AC incoming line); If P042 = 0 "Low Voltage" trip occurs at 390V DC bus voltage (275V AC incoming line)
Dynamic Braking	Internal brake IGBT included with all ratings except No Brake drives (Cat. Nos. 22A-AxPxN103 or 22A-AxPxN113). Refer to page 11 for ordering information.	
Environment	Altitude: Ambient Operating Temperature: Cooling Method: Storage Temperature: Atmosphere: Relative Humidity: Shock (operating): Vibration (operating):	1000 m (3300 ft.) maximum without derating IP20, NEMA/UL Type Open: -10 to 50 degrees C (14 to 122 degrees F) IP30, NEMA/UL Type 1: -10 to 40 degrees C (14 to 104 degrees F) IP66, NEMA/UL Type 4X/12 (PF 40): -10 to 40 degrees C (14 to 104 degrees F) Fan, all drive ratings -40 to 85 degrees C (-40 to 185 degrees F) Important: Drive must not 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. 0 to 95% non-condensing 15G peak for 11ms duration (±1.0ms) 1G peak, 5 to 2000 Hz
Control	Carrier Frequency: Frequency Accuracy: Speed Regulation: Stop Modes: Accel/Decel: Intermittent Overload: Electronic Motor Overload Protection:	2...16 kHz. Drive rating based on 4 kHz. Digital Input: Within ±0.05% of set output frequency. Analog Input: Within 0.5% of maximum output frequency. Analog Output (PF 40): ±2% of full scale, 10-bit resolution. Open Loop with Slip Compensation: ±2% of base speed across a 40:1 speed range. (PF 40): 1% of base speed across a 60:1 speed range. Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S Curve. Two independently programmable accel and decel times. Each time may be programmed from 0...600 seconds in 0.1 second increments. 150% overload capability for up to 1 minute, 200% overload capability for up to 3 seconds. 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.
Electrical	Voltage Tolerance: Frequency Tolerance: Displacement Power Factor: Maximum Short Circuit Rating:	120V, 200...240V, 380...480V, 460...600V: ±10% 48...63 Hz 0.98 across entire speed range 100,000 Amps symmetrical

PowerFlex 4 and 40 AC Drives

Parameter Descriptions

Parameter Number	Parameter Name	Description	Factory Default
Display Group			
d001	Output Freq	Output frequency present at T1, T2 & T3 (U, V & W)	Read Only
d002	Commanded Freq	Value of the active frequency command	Read Only
d003	Output Current	Output current present at T1, T2 & T3 (U, V & W)	Read Only
d004	Output Voltage	Output voltage present at T1, T2 & T3 (U, V & W)	Read Only
d005	DC Bus Voltage	Present DC bus voltage level	Read Only
d006	Drive Status	Present operating condition of the drive	Read Only
d007...d009	Fault x Code	A code that represents a drive fault	Read Only
d010	Process Display	The output frequency scaled by parameter A099 (Process Factor)	Read Only
d012	Control Source	Displays the source of the Start Command and Speed Reference	Read Only
d013	Contrl In Status	Status of the control terminal block control inputs	Read Only
d014	Dig In Status	Status of the control terminal block digital inputs	Read Only
d015	Comm Status	Status of the communications ports	Read Only
d016	Control SW Ver	Main Control Board software version	Read Only
d017	Drive Type	Used by Rockwell Automation field service personnel	Read Only
d018	Elapsed Run Time	Accumulated time drive is outputting power	Read Only
d019	Testpoint Data	The present value of the function selected in parameter A102 (Testpoint Sel)	Read Only
d020	Analog In 0-10V	The present value of the voltage at I/O Terminal 13 (100.0% = 10 volts)	Read Only
d021	Analog In 4-20mA	The present value of the current at I/O Terminal 15 (0.0% = 4 mA, 100.0% = 20 mA)	Read Only
d022	Output Power	Output power present at T1, T2 & T3 (U, V & W)	Read Only
d023	Output Power Fctr	The angle in electrical degrees between motor voltage and motor current	Read Only
d024	Drive Temp	Present operating temperature of the drive power section	Read Only
d025	Counter Status	The current value of the counter when counter is enabled	Read Only
d026	Timer Status	The current value of the timer when timer is enabled	Read Only
d028	Stp Logic Status	When P038 (Speed Reference) is set to 6 "Stp Logic", this parameter will display the current step logic profile as defined by parameters A140...A147 (Stp Logic x)	Read Only
d029	Torque Current	Displays the current value of the motor torque current as measured by the drive	Read Only
Basic Program Group			
P031	Motor NP Volts	20 to drive rated volts	Based on Drive Rating
P032	Motor NP Hertz	10 to 240 Hz	60 Hz
		15 to 400 Hz	60 Hz
P033	Motor OL Current	0.0 Amps to (Drive Rated Amps x 2) in units of 0.1 Amps	Based on Drive Rating
P034	Minimum Freq	0.0 to 240.0 Hz	0.0 Hz
		0.0 to 400.0 Hz	0.0 Hz
P035	Maximum Freq	0 to 240 Hz	60 Hz
		0 to 400 Hz	60 Hz
P036	Start Source	6 settings; Keypad, 3-Wire, 2-Wire, 2-Wire Level Sensitive, 2-Wire High Speed, Comm Port	Keypad
		7 settings; Keypad, 3-Wire, 2-Wire, 2-Wire Level Sensitive, 2-Wire High Speed, Comm Port, Momentary FWD/REV	Keypad
P037	Stop Mode	8 settings; Ramp-Clear Fault, Coast-Clear Fault, DC Brake-Clear Fault, DC Brake w/Shutoff-Clear Fault, Ramp, Coast, DC Brake, DC Brake w/Shutoff	Ramp, CF (Clear Fault)
		10 settings; Ramp-Clear Fault, Coast-Clear Fault, DC Brake-Clear Fault, DC Brake w/Shutoff-Clear Fault, Ramp, Coast, DC Brake, DC Brake w/Shutoff, Ramp Stop w/EM Brake Control-Clear Fault, Ramp Stop w/EM Brake Control	Ramp, CF (Clear Fault)
P038	Speed Reference	6 settings; Drive Potentiometer, Internal Freq, 0...10V Input/Remote Potentiometer, 4...20 mA Input, Preset Freq 0-3, Communications Port	Drive Pot
		8 settings; Drive Potentiometer, Internal Freq, 0...10V Input/Remote Potentiometer, 4...20 mA Input, Preset Freq 0-7, Communications Port, Step Logic, Analog In Mult	Drive Pot
P039	Accel Time 1	0.0 to 600.0 seconds	10.0 Secs
P040	Decel Time 1	0.1 to 600.0 seconds	10.0 Secs
P041	Reset To Defaults	Used to reset drive to factory default settings	Ready/Idle
P042	Voltage Class	Sets the voltage class of 600V drives, Low Voltage (460/480V) or High Voltage (575/600V)	High Voltage (575/600V)
P043	Motor OL Ret	Enables/Disables the Motor Overload Retention function.	Disabled
Advanced Program Group			
A051	Digital In1 Sel	16 settings; Not Used, Accel 2 & Decel 2, Jog, Auxiliary Fault, Preset Frequencies, Local, Comm Port, Clear Fault, Ramp Stop Clear Fault, Coast Stop Clear Fault, DC Brake Clear Fault, Jog Forward, Jog Reverse, 10V In Control, 20 mA In Control, Analog Invert	Preset Freq
A052	Digital In2 Sel		
		28 settings; Not Used, Accel 2 & Decel 2, Jog, Auxiliary Fault, Preset Frequencies, Local, Comm Port, Clear Fault, Ramp Stop - Clear Fault, Coast Stop - Clear Fault, DC Brake - Clear Fault, Jog Forward, Jog Reverse, 10V In Control, 20 mA In Control, PID Disable, MOP Up, MOP Down, Timer Start, Counter In, Reset Timer, Reset Counter, Reset Timer and Counter, Logic In1, Logic In2, Current Limit2, Analog Invert, EM Brake Release	
A053	Digital In3 Sel	28 settings; Not Used, Accel 2 & Decel 2, Jog, Auxiliary Fault, Preset Frequencies, Local, Comm Port, Clear Fault, Ramp Stop - Clear Fault, Coast Stop - Clear Fault, DC Brake - Clear Fault, Jog Forward, Jog Reverse, 10V In Control, 20 mA In Control, PID Disable, MOP Up, MOP Down, Timer Start, Counter In, Reset Timer, Reset Counter, Reset Timer and Counter, Logic In1, Logic In2, Current Limit2, Analog Invert, EM Brake Release	Local
A054	Digital In4 Sel		Jog Forward

Shaded areas are applicable to PowerFlex 40 only.

Parameter Number	Parameter Name	Description	Factory Default
A055	Relay Out Sel	13 different settings for a variety of drive status conditions	Ready/Fault
		24 different settings for a variety of drive status conditions	Ready/Fault
A056	Relay Out Level	0.0 to 9999	0.0
A058	Opto Out1 Sel	24 settings; Ready/Fault, At Frequency, Motor Running, Reverse, Motor Overload, Ramp Regulator, Above Frequency, Above Current, Above DC Voltage, Retries Exceeded, Above Analog Voltage, Logic In1, Logic In2, Logic 1 & 2, Logic 1 or 2, Step Logic Out, Timer Out, Counter Out, Above PF Angle, Analog Input Loss, Param Control, Non-Recoverable Fault, EM Brake Control, Above Frequency Command	MotorRunning
A059	Opto Out1 Level	0.0 to 9999	0.0
A061	Opto Out2 Sel	24 settings; Ready/Fault, At Frequency, Motor Running, Reverse, Motor Overload, Ramp Regulator, Above Frequency, Above Current, Above DC Voltage, Retries Exceeded, Above Analog Voltage, Logic In1, Logic In2, Logic 1 & 2, Logic 1 or 2, Step Logic Out, Timer Out, Counter Out, Above PF Angle, Analog Input Loss, Param Control, Non-Recoverable Fault, EM Brake Control, Above Frequency Command	At Frequency
A062	Opto Out2 Level	0.0 to 9999	0.0
A064	Opto Out Logic	Determines the logic (NO or NC) of the opto outputs, 4 settings - NO/NO, NC/NO, NO/NC, NC/NC	NO/NO
A065	Analog Out Sel	Sets the analog output signal mode, various settings	Output Freq 0...10, 0V=0Hz
A066	Analog Out High	0 to 800%	100%
A067	Accel Time 2	0.0 to 600.0 seconds	20.0 Secs
A068	Decel Time 2	0.1 to 600.0 seconds	20.0 Secs
A069	Internal Freq	0.0 to 240.0 Hz	60.0 Hz
		0.0 to 400.0 Hz	60.0 Hz
A070	Preset Freq 0	0.0 to 240.0 Hz	0.0 Hz
		0.0 to 400.0 Hz	0.0 Hz
A071	Preset Freq 1	0.0 to 240.0 Hz	5.0 Hz
		0.0 to 400.0 Hz	5.0 Hz
A072	Preset Freq 2	0.0 to 240.0 Hz	10.0 Hz
		0.0 to 400.0 Hz	10.0 Hz
A073	Preset Freq 3	0.0 to 240.0 Hz	20.0 Hz
		0.0 to 400.0 Hz	20.0 Hz
A074	Preset Freq 4	0.0 to 400.0 Hz	30.0 Hz
A075	Preset Freq 5	0.0 to 400.0 Hz	40.0 Hz
A076	Preset Freq 6	0.0 to 400.0 Hz	50.0 Hz
A077	Preset Freq 7	0.0 to 400.0 Hz	60.0 Hz
A078	Jog Frequency	0.0 to (Value set in P035 (Maximum Freq))	10.0 Hz
A079	Jog Accel/Decel	0.1 to 600.0 seconds	10.0 Secs
A080	DC Brake Time	0.0 to 90.0 seconds	0.0 Secs
		0.0 to 99.9 seconds	0.0 Secs
A081	DC Brake Level	0.0 to (Drive Rated Amps x 1.8)	Drive Rated Amps x 0.05
A082	DB Resistor Sel	Used to set percent duty cycle for external dynamic braking	Disabled
A083	S Curve %	0 to 100%	0% (Disabled)
A084	Boost Select	14 boost settings (in % of P031 (Motor NP Volts)), redefines the Volts per Hertz curve	5.0 (2.5 for 5 HP drives)
		15 boost settings (in % of P031 (Motor NP Volts)), redefines the Volts per Hertz curve	5.0, CT (2.5 CT for 5...15 HP drives)
A085	Start Boost	0.0 to 25.0%	2.5%
A086	Break Voltage	0.0 to 100.0%	25.0%
A087	Break Frequency	0.0 to 400.0 Hz	15.0 Hz
A088	Maximum Voltage	20 to Drive Rated Volts	Drive Rated Volts
A089	Current Limit 1	0.1 to (Drive Rated Amps x 1.8)	Drive Rated Amps x 1.5
A090	Motor OL Select	3 settings; No Derate, Minimum Derate, Maximum Derate	No Derate
A091	PWM Frequency	2.0 to 16.0 kHz	4.0 kHz
A092	Auto Rstrt Tries	0 to 9	0
A093	Auto Rstrt Delay	0.0 to 300.0 seconds	1.0 Secs
A094	Start At PowerUp	2 settings; Disabled, Enabled	Disabled
A095	Reverse Disable	2 settings; Reverse Enabled, Reverse Disabled	Rev Enabled

Shaded areas are applicable to PowerFlex 40 only.

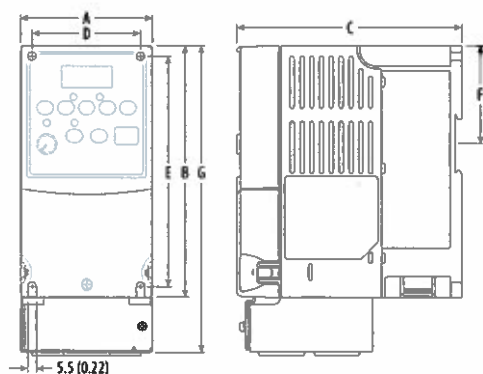
PowerFlex 4 and 40 AC Drives

Parameter Number	Parameter Name	Description	Factory Default
Advanced Program Group, Continued			
A096	Flying Start En	2 settings; Disabled, Enabled	Disabled
A097	Compensation	4 settings; Disabled, Electrical, Mechanical, Both	Electrical
A098	SW Current Trip	Software instantaneous trip, 0.0 to (Drive Rated Amps x 2)	0.0 (Disabled)
A099	Process Factor	0.1 to 999.9	30.0
A100	Fault Clear	Resets a fault and clears the fault queue	Ready/Idle
A101	Program Lock	Protects parameters against change by unauthorized personnel	Unlocked
A102	Testpoint Sel	Used by Rockwell Automation field service personnel	400
A103	Comm Data Rate	6 settings; 1200, 2400, 4800, 9600, 19.2K, 38.4K	9600
A104	Comm Node Addr	1 to 247	100
A105	Comm Loss Action	4 settings; Fault, Coast to Stop, Stop, Continue Last Speed	Fault
A106	Comm Loss Time	0.1 to 60.0 seconds	5.0 Secs
A107	Comm Format	6 settings; RTU 8-N-1, RTU 8-E-1, RTU 8-O-1, RTU 8-N-2, RTU 8-E-2, RTU 8-O-2	RTU 8-N-1
A108	Language	10 settings; English, Francais, Espanol, Italiano, Deutsch, Reserved, Portugues, Reserved, Reserved, Nederlands	English
A109	Anlg Out Sclpt	0.0/100.0%	100.0%
A110	Anlg In 0-10V Lo	0.0 to 100.0%	0.0%
A111	Anlg In 0-10V Hi	0.0 to 100.0%	100.0%
A112	Anlg In4-20mA Lo	0.0 to 100.0%	0.0%
A113	Anlg In4-20mA Hi	0.0 to 100.0%	100.0%
A114	Slip Hertz @ FLA	0.0 to 10.0 Hz	2.0 Hz
A115	Process Time Lo	0.00 to 99.99	0.00
A116	Process Time Hi	0.00 to 99.99	0.00
A117	Bus Reg Mode	0/1	Enabled
A118	Current Limit 2	0.1 to (Drive Rated Amps x 1.8)	Drive Rated Amps x 1.5
A119	Skip Frequency	0 to 400 Hz	0 Hz
A120	Skip Freq Band	0.0 to 30.0 Hz	0.0 Hz
A121	Stall Fault Time	6 settings; 60 Seconds, 120 Seconds, 240 Seconds, 360 Seconds, 480 Seconds, Fit Disabled	60 Seconds
A122	Analog In Loss	7 settings; Disabled, Fault (F29), Stop, Zero Ref, Min Freq Ref, Max Freq Ref, Int Freq Ref	Disabled
A123	10V Bipolar Enbl	2 settings; Uni-Polar In, Bi-Polar In	Uni-Polar In
A124	Var PWM Disable	2 settings; Enabled, Disabled	Enabled
A125	Torque Perf Mode	2 settings; V/Hz, Sensorless Vector	Sensrls Vect
A126	Motor NP FLA	Drive Rated Amps x 0.1/2	Drive Rated Amps
A127	Autotune	3 settings; Ready/Idle, Static Tune, Rotate Tune	Ready/Idle
A128	IR Voltage Drop	0.0 to 230.0 VAC	Based on Drive Rating
A129	Flux Current Ref	0.00 to Motor NP FLA	Based on Drive Rating
A130	PID Trim Hi	0.0 to 400.0	60.0
A131	PID Trim Lo	0.0 to 400.0	0.0
A132	PID Ref Sel	9 settings; PID Disabled, PID Setpoint, 0...10V Input, 4...20 mA Input, Comm Port, Setpoint - Trim, 0...10V - Trim, 4...20 mA - Trim, Comm - Trim	PID Disabled
A133	PID Feedback Sel	3 settings; 0...10V Input, 4...20 mA Input, Comm Port	0...10V Input
A134	PID Prop Gain	0.00 to 99.99	0.01
A135	PID Integ Time	0.0 to 999.9 Seconds	0.1 Secs
A136	PID Diff Rate	0.00 to 99.99 (1/Secs)	0.01 (1/Secs)
A137	PID Setpoint	0.0 to 100.0%	0.0%
A138	PID Deadband	0.0 to 10.0%	0.0%
A139	PID Preload	0.0 to 400.0 Hz	0.0 Hz
A140...A147	Stp Logic 0-7	0001 to bAFF	00F1
A150...157	Stp Logic Time 0-7	0.0 to 999.9 Seconds	30.0 Secs
A160	EM Brk Off Delay	0.01/10.00 Secs	2.00 Secs
A161	EM Brk On Delay	0.01/10.00 Secs	2.00 Secs
A162	MOP Reset Sel	2 settings; Zero MOP Ref, Save MOP Ref	Save MOP Ref
A163	DB Threshold	0.0 to 110.0%	100.0%
A164	Comm Write Mode	2 settings; Save, RAM Only	Save
A165	Anlg Loss Delay	0.0 to 20.0 Secs	0.0 Secs
A166	Analog In Filter	0 to 14	0

Shaded areas are applicable to PowerFlex 40 only.

Product Dimensions

Approximate Dimensions



Dimensions are in millimeters and (inches). Weights are in kilograms and (pounds).

Frame	A	B ⁽¹⁾	C	D	E	F	G ⁽²⁾	Shipping Weight
A	80 (3.15)	152 (5.98)	136 (5.35)	67 (2.64)	140 (5.51)	59.3 (2.33)	185 (7.28)	1.4 (3.1)
B	100 (3.94)	180 (7.09)	136 (5.35)	87 (3.43)	168 (6.61)	87.4 (3.44)	213 (8.39)	2.2 (4.9)
C	130 (5.1)	260 (10.2)	180 (7.1)	116 (4.57)	246 (9.7)	—	320 (12.6)	4.3 (9.5)

(1) Overall height of standard IP 20/Open Type Drive.

(2) Overall height of drive with IP 30/NEMA 1/UL Type 1 option kit installed.

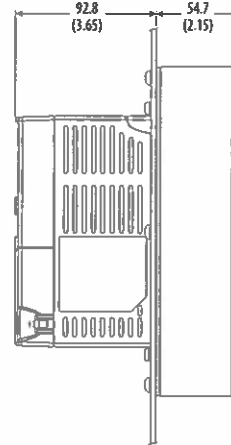
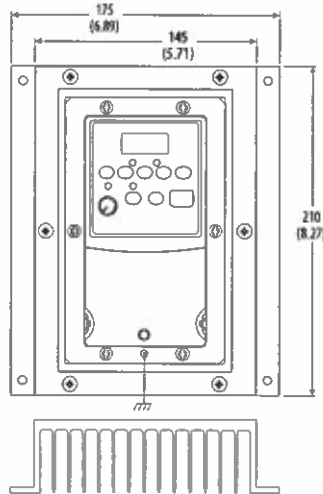
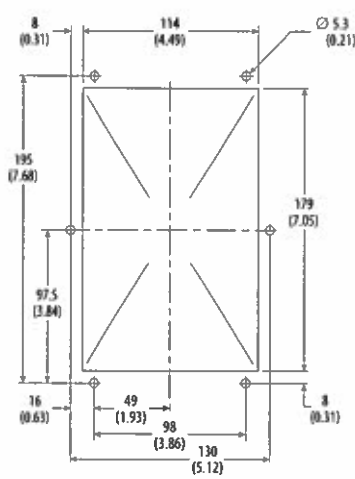
Ratings are in kW and (HP).

PowerFlex 4 — Frame	120V AC — 1-Phase	240V AC — 1-Phase	240V AC — 3-Phase	480V AC — 3-Phase
A	0.2 (0.25) 0.4 (0.5)	0.2 (0.25) 0.4 (0.5) 0.75 (1.0)	0.2 (0.25) 0.4 (0.5) 0.75 (1.0) 1.5 (2.0)	0.4 (0.5) 0.75 (1.0) 1.5 (2.0)
B	0.75 (1.0) 1.1 (1.5)	1.5 (2.0)	2.2 (3.0) 3.7 (5.0)	2.2 (3.0) 3.7 (5.0)

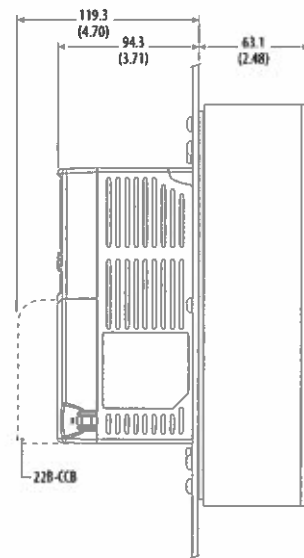
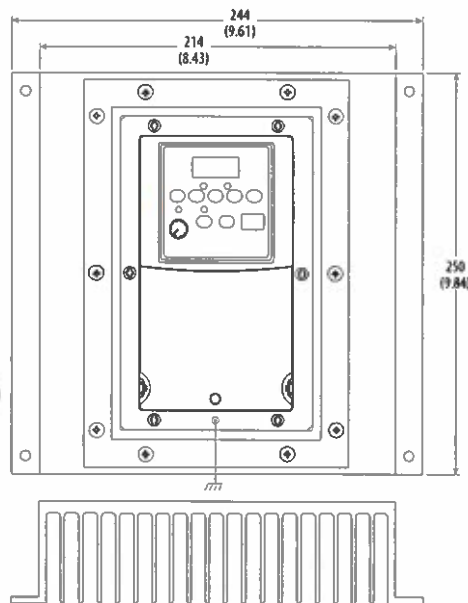
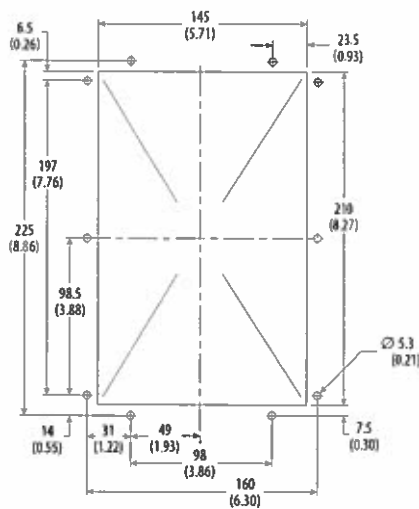
PowerFlex 40 — Frame	120V AC — 1-Phase	240V AC — 1-Phase	240V AC — 3-Phase	480V AC — 3-Phase	600V AC — 3-Phase
B	0.4 (0.5) 0.75 (1.0) 1.1 (1.5)	0.4 (0.5) 0.75 (1.0) 1.5 (2.0)	0.4 (0.5) 0.75 (1.0) 1.5 (2.0) 2.2 (3.0) 3.7 (5.0)	0.4 (0.5) 0.75 (1.0) 1.5 (2.0) 2.2 (3.0) 4.0 (5.0)	0.75 (1.0) 1.5 (2.0) 2.2 (3.0) 4.0 (5.0)
C		2.2 (3.0)	5.5 (7.5) 7.5 (10.0)	5.5 (7.5) 7.5 (10.0) 11.0 (15.0)	5.5 (7.5) 7.5 (10.0) 11.0 (15.0)

Shaded areas are applicable to PowerFlex 40 only.

Flange Mount Drive

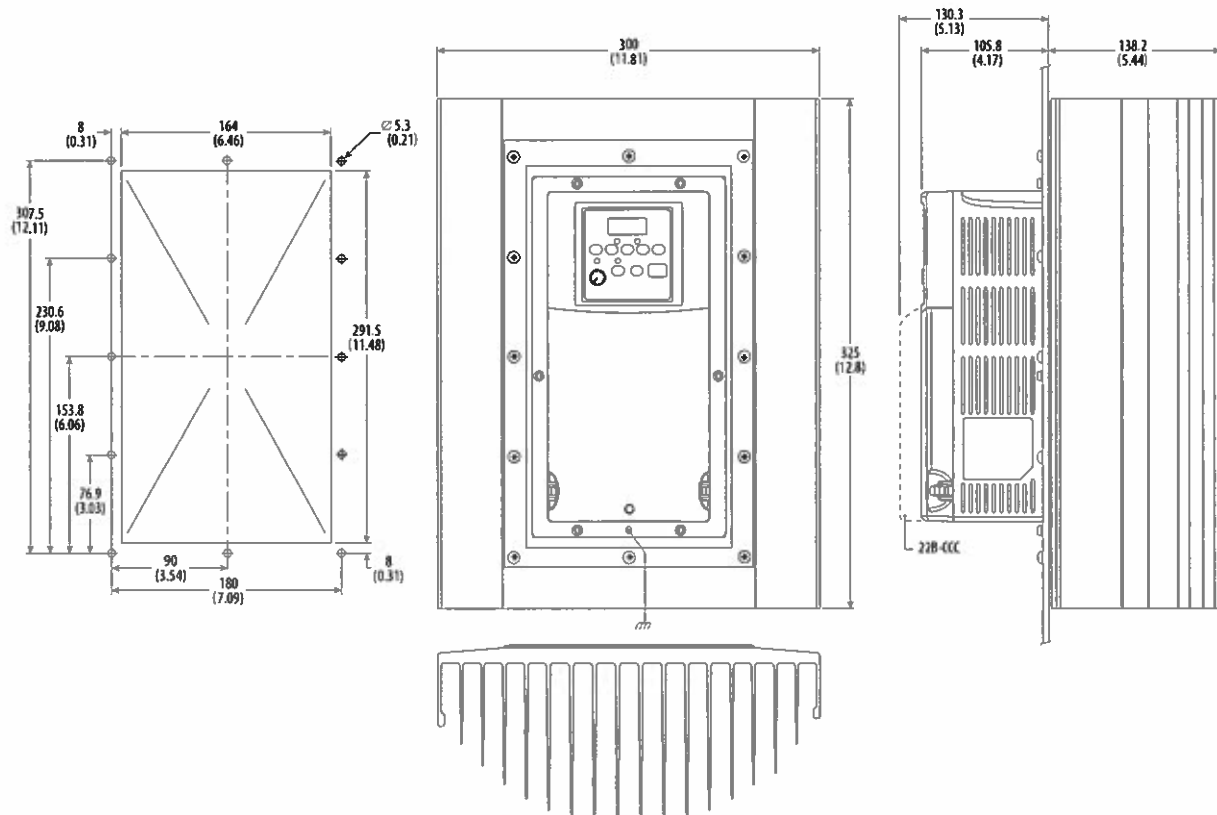


Frame A — PowerFlex 4 only



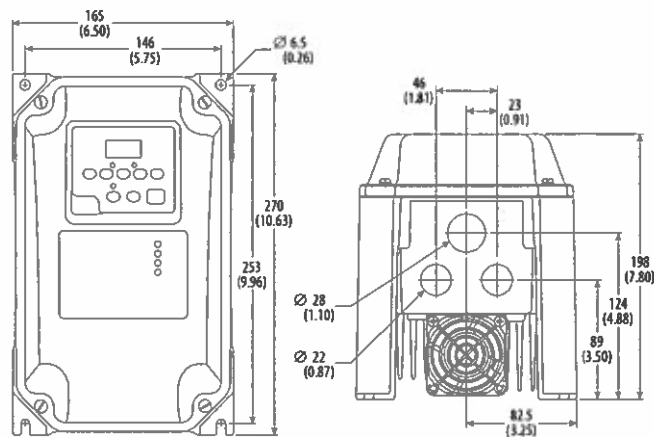
Frame B — PowerFlex 4 and PowerFlex 40

Flange Mount Drive *Continued*



Frame C — PowerFlex 40 only

IP 66, NEMA/UL Type 4X/12

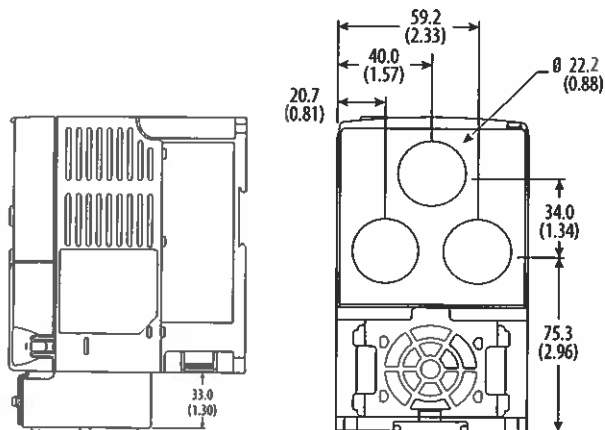


Frame B — PowerFlex 40 only

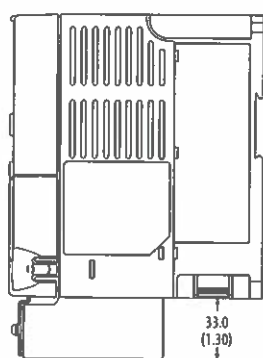
Shaded areas are applicable to PowerFlex 40 only.

IP 30, NEMA/UL Type 1 Option Kit without Communication Options

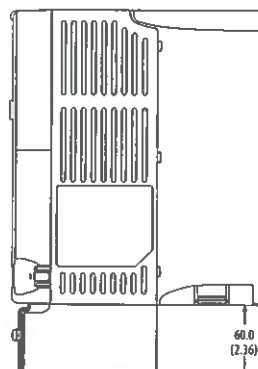
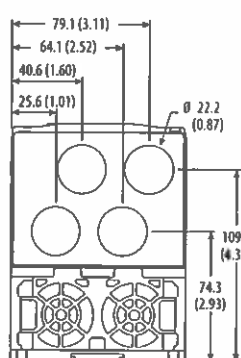
PowerFlex 4 uses Frames A and B. PowerFlex 40 uses Frames B and C.



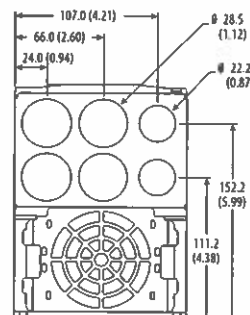
Frame A — 22-JBAA



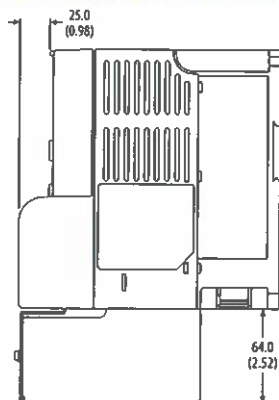
Frame B — 22-JBAB



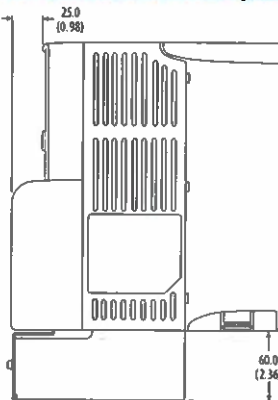
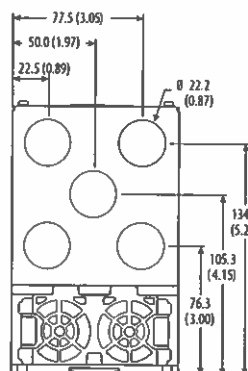
Frame C — 22-JBAC



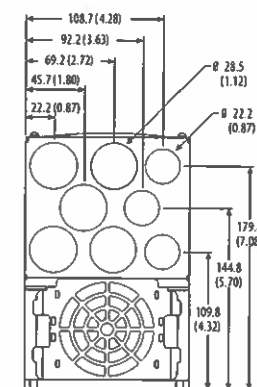
PowerFlex 40 IP 30/NEMA 1/UL Type 1 Option Kit with Communication Option



Frame B — 22-JBCB



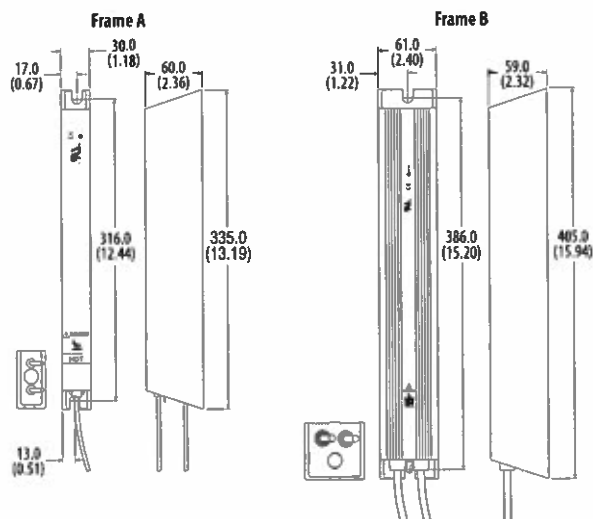
Frame C — 22-JBCC



Shaded areas are applicable to PowerFlex 40 only.

Dynamic Brake Resistors

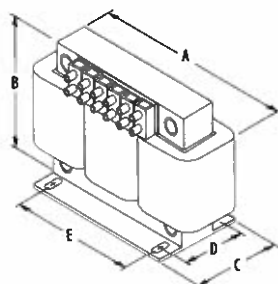
Dimensions are in millimeters and (inches)



Frame	Catalog Number
A	AK-R2-091P500, AK-R2-047P500, AK-R2-360P500
B	AK-R2-030P1K2, AK-R2-120P1K2

Bulletin 1321-3R Series Line Reactors

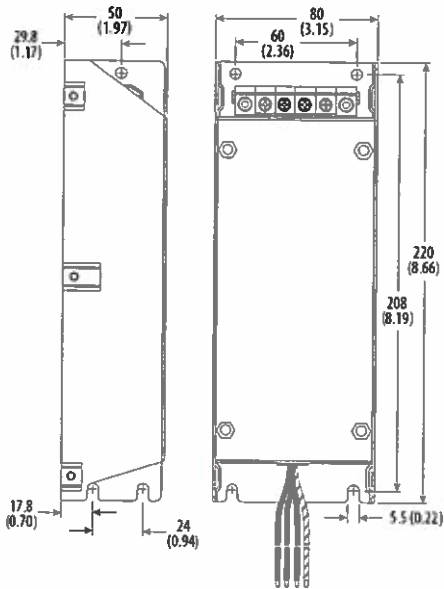
Dimensions are in millimeters and (inches). Weights are in kilograms and (pounds).



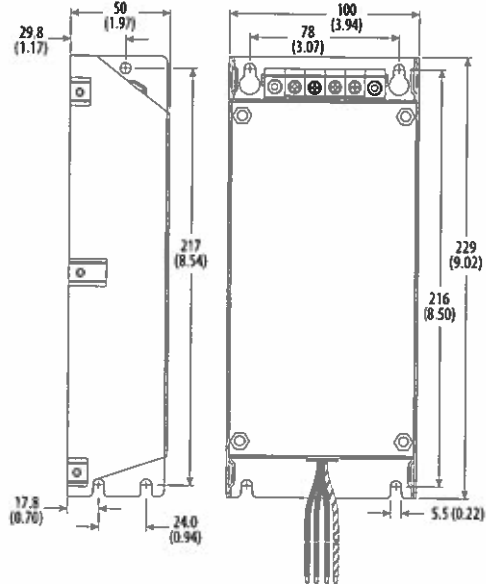
Catalog Number	A	B	C	D	E	Weight
1321-3R2-A	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-B	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-A	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-B	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (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)
1321-3R8-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)

EMC Line Filters

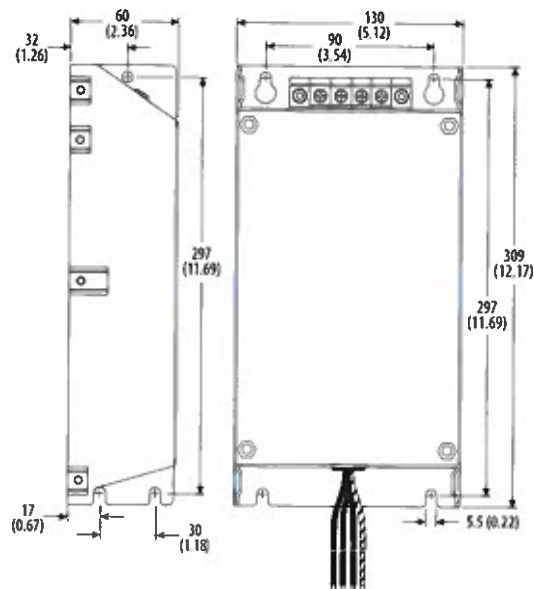
Frame A EMC Line Filters – Dimensions are in millimeters and (inches)
Catalog Numbers: 22-RF5P7-AS, -AL; 22-RF9P5-AS, -AL; 22-RF010-AL



Frame B EMC Line Filters – Dimensions are in millimeters and (inches)
Catalog Numbers: 22-RF8P0-BL, 22-RF012-BL, 22-RF018-BL; 22-RF021-BL, -BL

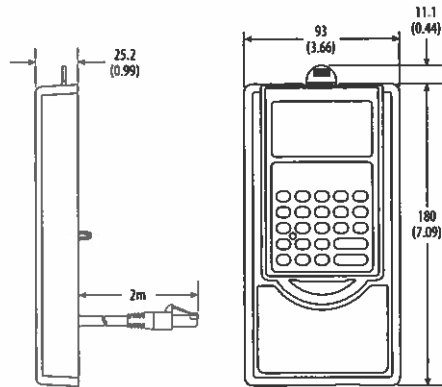


Frame C EMC Line Filters – Dimensions are in millimeters and (inches)
Catalog Numbers: 22-RF015-CL; 22-RF018-CS, -CL; 22-RF024-CL; 22-RF025-CL; 22-RF026-CS, -CL; 22-RF034-CS, -CL

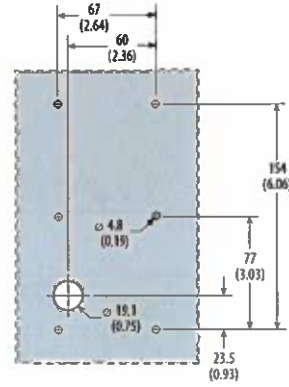
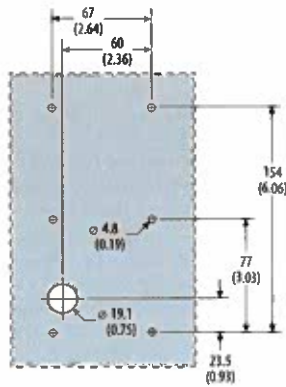
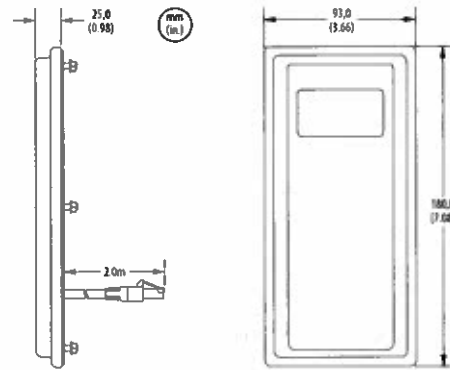


Human Interface Module (HIM) Dimensions

NEMA Type 1 Bezel – Dimensions are in millimeters and (inches)
Catalog Number: 22-HIM-B1



NEMA Type 4X/12 Remote (Panel Mount) HIM
– Dimensions are in millimeters and (inches)
Catalog Number: 22-HIM-C2S



PowerFlex 4 and 40 Configured Drives

The heart of every Configured Drive is an Allen-Bradley standard drive. These world class products help to provide a single solution for virtually all of your motor speed control requirements.

Configured Drive programs provide you with an offering of factory mounted options enhancing the Standard Drive program. The options defined within the programs are pre-engineered for consistency of design. This translates to time and money savings in set-up, integration and maintenance of your automation systems.

Catalog Number Explanation

1-3	4	5	6-8	9	10	11	12	13	14	15	16+
23B	-	D	4P0	D	1	0	4	N	N	-	P6
a		b	c	d	e	f	g	h	i		j

a		
Drive		
Code	Type	
23B	PowerFlex 40	

b		
Voltage Rating		
Code	Voltage	Ph.
D	480V ac	3

c		
Amp Rating		
480V 60Hz Input		
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)

d	
Enclosure	
Code	Enclosure
C	NEMA/UL Type 4X ‡
D	NEMA/UL Type 4 ‡

‡ The design of the PowerFlex 40 Standard Configured Drive supports indoor and outdoor applications that are not in direct sunlight.

e	
HIM	
Code	Interface Module
1	Fixed Keypad on Drive
F ‡	Fixed Keypad on Drive and LCD Display with Digital Speed Control HIM on Enclosure Door (22-HIM-C2S)

‡ This option changes the enclosure rating to indoor only.

f	
Emission Class	
Code	Rating
0	Not Filtered

g	
Version	
Code	Version
4	RS485 (Standard)
C	ControlNet
D	DeviceNet
E	EtherNet/IP
P	PROFIBUS DP

h	
Code	Rating
N	Reserved

i	
Code	Rating
N	Reserved

j	
Options	
Code	Description
-E22	DeviceNet Quick Disconnect (Bottom)
-E23	DeviceNet Quick Disconnect (Left Side)
-P3	Motor Circuit Protector
-P3T	Motor Circuit Protector (Customer wiring into top of device)
-P6	Disconnect Switch - Fused
-P6T	Disconnect Switch - Fused (Customer wiring into top of device)
-R3	DeviceNet I/O (4 In/2 Out) w/Spring Return HOA and Power Disconnect Aux. Contact
-R4	DeviceNet Point I/O w/IB4 (4 Inputs)
-R5	-R3 plus 4 I/O Quick Disconnects and (1) 24V DC Receptacle
-S1	Hand/Off/Auto S.S. (Start/Stop/Speed Ref.)
-S4	Auto/Manual S.S. (Speed Ref.)
-S7	Start and Stop P.B.
-S8	Forward/Reverse S.S.
-S18	Door Mounted Local Speed Pot (1-Turn)
-S20	Local/Remote and Local Control Off/Run Forward Selector Switches
-S21	Local/Off/Remote with 1 N.O. Interposing Relay
-S22	Spring Return Hand/Off Auto S.S. (Start/Stop/Speed Ref.)
-S23	Clear Fault P.B.

Product Description

PowerFlex 40 Configured AC drives are ideal for OEM's and end-users with special installation needs. Designed to meet your customer demand for space savings, applications flexibility and reliability, the PowerFlex 40 Configured AC drive options have been pre-engineered to ensure superior reliability.

Standard Features

- This package integrates the PowerFlex 40 Standard Drive as the base power/control component.
- Enclosure features include...
 - NEMA Type 4/12 and 4X (IP66) indoor and outdoor applications ⁽¹⁾
 - Heat out the back design reduces enclosure size
 - Viewing window-drive display and all indicators are visible.
 - Mounting feet-orientation is adjustable per customer requirements
- The drive can be removed from the front of the enclosure for ease of assembly or repair.
- Low cost, highly configurable I/O inputs and/or 0...10V/4...20 mA outputs that are not used by program standard features and options are available for customer use.

(1) Supports indoor and outdoor applications other than direct sunlight.

Program Options

- Communication Options
 - ControlNet
 - DeviceNet
 - EtherNet/IP
 - LonWorks
 - PROFIBUS DP
- Power Disconnect Options
 - Drive Input Fused Disconnect Switch – 200kA short circuit withstand rating
 - Motor Circuit Protector – 65kA short circuit withstand rating
- Door Mounted Operator Devices
 - Hand/Off/Auto Selector Switch
 - Auto/Manual Selector Switch
 - Start and Stop Pushbuttons
 - Forward/Reverse Selector Switch
 - Local Control Off/Run Forward and Local/Remote – Selector Switches
 - Local/Off/Remote Selector Switch with One – Normally Open Interposing Relay–(Panel)
 - Clear Fault Push button
- Quick Disconnect
 - DeviceNet Quick Disconnect–Bottom or left side mounted
- I/O Options
 - DeviceNet I/O with Hand/Off auto selector switch and power disconnect auxiliary contact. (4 in / 2 out) I/O quick disconnect optional.
 - DeviceNet Point I/O with IB4 (4 in)





For option specific detail, refer to the PowerFlex 40 Adjustable Frequency AC Configured Drives Installation Instructions, publication [23B-IN001](#).

PowerFlex 4 and 40 AC Drives

Drive Ratings — PowerFlex 40 Configured Drives

Catalog Number	kW (HP)	Input Ratings		Output Ratings	
		Voltage	Amps	Voltage	Amps
23B-D1P4	0.4 (0.5)	480	1.8	460	1.4
23B-D2P3	0.75 (1.0)	480	3.2	460	2.3
23B-D4P0	1.5 (2.0)	480	5.7	460	4.0
23B-D6P0	2.2 (3.0)	480	7.5	460	6.0
23B-D010	4.0 (5.0)	480	13.0	460	10.5
23B-D012	5.5 (7.5)	480	14.2	460	12.0
23B-D017	7.5 (10.0)	480	18.4	460	17.0
23B-D024	11.0 (15.0)	480	26.0	460	24.0

Specifications for Configured Drive Products

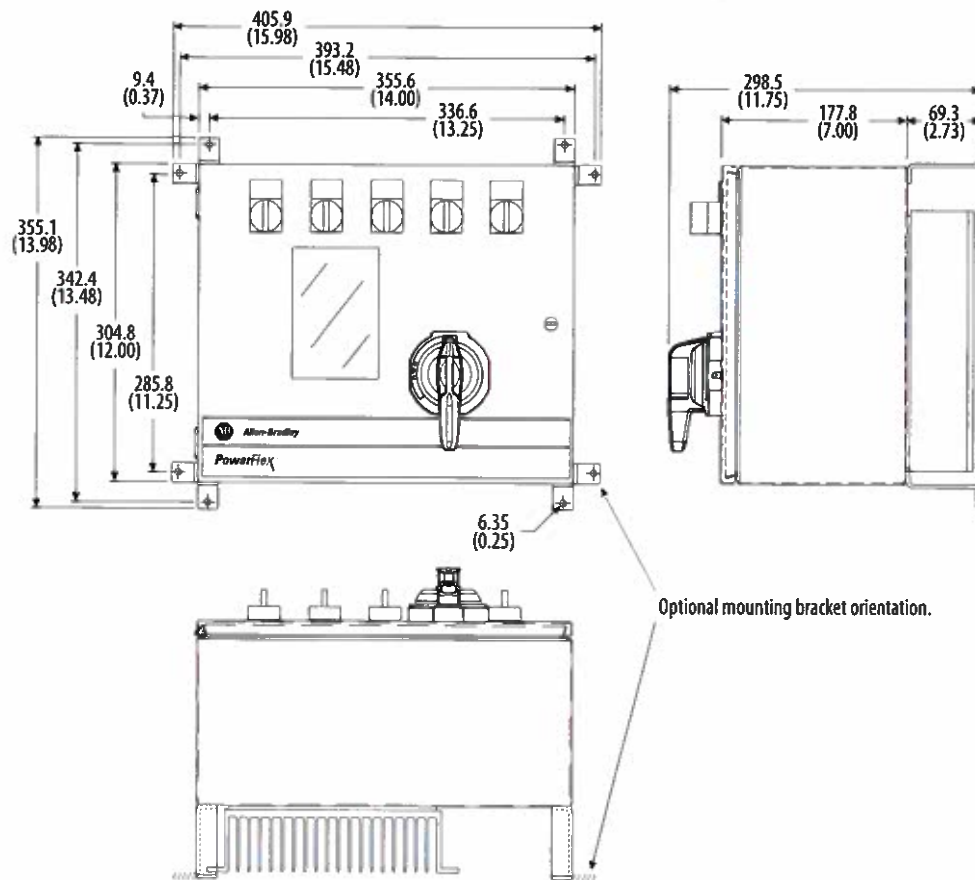
Input/Output Ratings	Output Frequency: Efficiency:	0...400 Hz (Programmable) 97.5% (Typical)
Approvals	    <small>LV Directive 73/23/EEC LV: EN 50178, EN 60204 EMC Directive 89/336/EEC EMC: EN 61000-3</small>	
Fuses and Power Disconnecting Means	140M Motor Circuit Protector: 194R Fused Disconnect:	Provides branch circuit protection, 65 kA short circuit withstand Provides branch circuit protection, 200 kA short circuit withstand, Class J fuses
Protective Features	Over Voltage: Under Voltage:	480V AC Input – Trip occurs at 810V DC bus voltage (equivalent to 575V AC incoming line) 480V AC Input – Trip occurs at 390V DC bus voltage (equivalent to 275V AC incoming line)
Environment	Ambient Operating Temperature: Cooling Method:	NEMA 4/12, 4X (IP66), –10 to 40 degrees C (14 to 104 degrees F) ⁽¹⁾ Fan, all drive ratings
Control	Carrier Frequency:	2...4 kHz. Drive rating and heat calculations are based on 4 kHz.

(1) The design of the PowerFlex 40 Configured Drive supports indoor and outdoor applications that are not in direct sunlight.

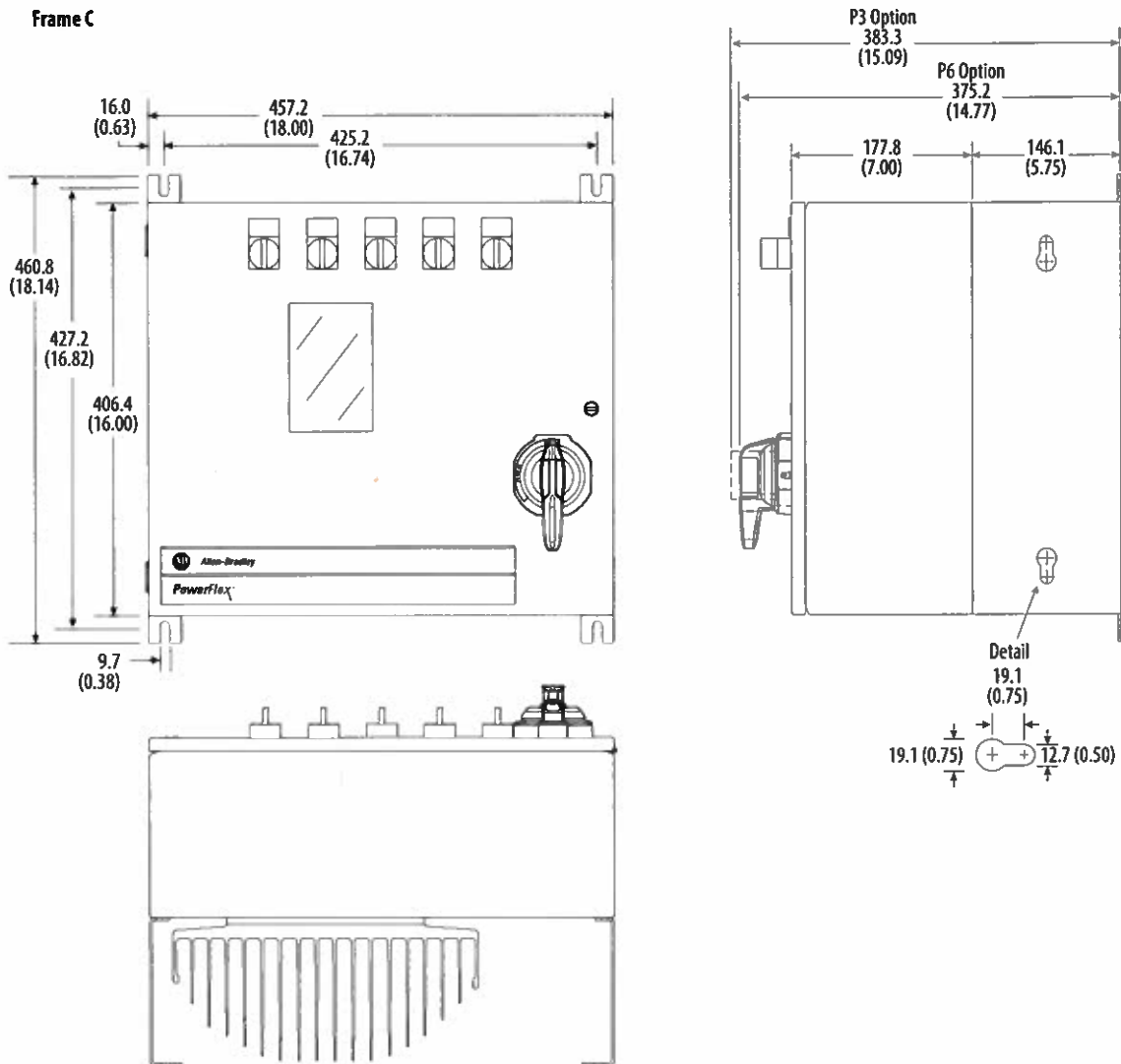
Specifications for Standard PowerFlex 40 Drives

Electrical	Voltage Tolerance: Frequency Tolerance: Displacement Power Factor: Maximum Short Circuit Rating:	120V, 200...240V, 380...480V, 460...600V: $\pm 10\%$ 48...63 Hz 0.98 across entire speed range 100,000 Amps symmetrical
Control Inputs	Digital SRC (Source) Mode: SNK (Sink) Mode: Analog 4...20 mA Analog: 0...10V DC Analog: External Pot:	Input Current = 6 mA 18...24V = On, 0...6V = Off 0...6V = On, 18...24V = Off 250 ohm input impedance 100k ohm input impedance 1...10k ohms, 2 Watt minimum
Control Output – Programmable Outputs (form C relay)	Resistive Rating Opto Outputs: Analog Outputs: Inductive Rating Opto Outputs: Analog Outputs:	3.0A at 30V DC, 3.0A at 125V AC, 3.0A at 240V AC 30V DC, 50 mA 10-bit, 0...10V, 1k ohm minimum 0.5A at 30V DC, 0.5A at 125V AC, 0.5A at 240V AC Non-inductive 10 bit, 4...20 mA, 525 ohm maximum
Fuses and Circuit Breakers	Recommended Fuse Type: Recommended Circuit Breakers:	UL Class J, CC, T or Type BS88; 600V (550V) or equivalent. HMCP circuit breaker or equivalent.
Protective Features	Motor Protection: Overcurrent: Control Ride Through: Faultless Power Ride Through:	1 st Overload Protection, 150% for 60 sec., 200% for 3 sec. (provides Class 10 protection) 200% hardware limit, 300% instantaneous fault Minimum Ride Through is 0.5 sec. - typical value is 2 seconds 100 milliseconds
Dynamic Braking	Internal brake IGBT included with all ratings.	
Environment	Altitude: Storage Temperature: Atmosphere: Relative Humidity: Shock (operating): Vibration (operating):	1000 m (3300 ft.) maximum without derating -40 to 85 degrees C (-40 to 185 degrees F) Important: Drive <u>must not</u> 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. 0 to 95% non-condensing 15G peak for 11ms duration (± 1.0 ms) 1G peak, 5 to 2000 Hz
Control	Frequency Accuracy: Speed Regulation: Stop Modes: Accel/Decel: Intermittent Overload: Electronic Motor Overload Protection:	Digital Input: Within $\pm 0.05\%$ of set output frequency. Analog Input: Within 0.5% of maximum output frequency. Analog Output: $\pm 2\%$ of full scale, 10-bit resolution. Open Loop with Slip Compensation: $\pm 2\%$ of base speed across a 40:1 speed range. 1% of base speed across a 60:1 speed range. Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S Curve. Two independently programmable accel and decel times. Each time may be programmed from 0...600 seconds in 0.1 second increments. 150% overload capability for up to 1 minute, 200% overload capability for up to 3 seconds. 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.

Enclosure Options and Approximate Dimensions



Frame C



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.

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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

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LISTEN.
THINK.
SOLVE.®

PowerFlex® 40P



TECHNICAL DATA

ADJUSTABLE FREQUENCY AC DRIVES

PowerFlex 40P Technical Data

Product Description

As part of the industry leading PowerFlex® family of AC drives, the PowerFlex 40P addresses your needs for closed loop control and category 3 Safe-off in a compact and cost effective design. The PowerFlex 40P AC drive is based on the popular PowerFlex® 40 AC drive platform and shares common options and accessories. Available in power ratings from 0.4 to 11 kW (0.5 to 15 HP) and in voltage classes of 240, 480 and 600 volts, PowerFlex 40P AC drives are designed to meet global OEM and end-user demands for flexibility, space savings and ease of use. PowerFlex 40P AC drives are cost-effective solutions for speed control of applications such as diverters, smart conveyors, packaging machines, palletizers, drafting machines, ring spinning machines and synthetic fiber spinning machines.

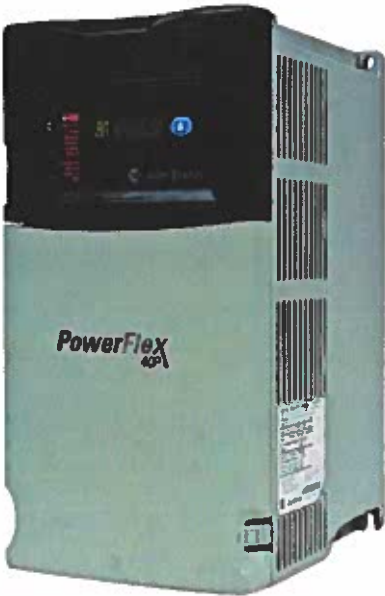


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PowerFlex 40P Technical Data

PowerFlex 40P AC Drive Features

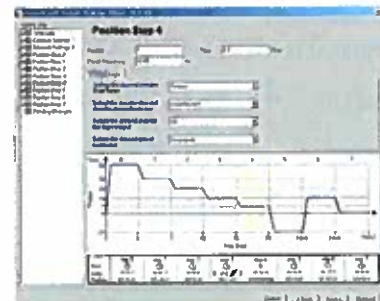
Flexible Packaging and Mounting Options

- Versatile packaging options allow for **panel mount NEMA 1/IP30** as well as **NEMA 4/IP66** (with like enclosure) using the plate/flange drives.
- **Plate drives** also allow for a reduction in overall enclosure size based on a 75% reduction in enclosed Watts.
- Installation can be a virtual snap using the **DIN rail mounting** feature on B frame drives. Panel mounting is also available, providing added flexibility.
- An optional **IP30 (NEMA 1) conduit box** is easily adapted to the standard IP20 (NEMA Type Open) product, providing increased environmental ratings.
- **Zero Stacking™** is allowable for ambient temperatures up to 40°C, saving valuable panel space. 50°C ambient temperatures are permitted with minimal spacing between drives.
- **External filters** are available for all PowerFlex 40P drive ratings to meet EN55011, Class A and B EMC requirements.



Start Up, Programming and Operation

- PowerFlex 40P drive programming is achieved by the use of an **external HIM** or via the resident DSI connection and the **PC programming tool**.
 - DriveTools™ SP
 - DriveExplorer™
 - Pocket DriveExplorer™
- **StepLogic™ wizards** available for DriveTools SP and DriveExplorer (Lite or Full) assist in setup of position or velocity StepLogic programming
- An **integral display and reset button** allows user to change display parameters and reset the drive if a fault occurs.
- **4 digit display** with 10 additional LED indicators provides an intuitive display of drive status and information.
- Integral **RS485 communications** can be used for programming from a PC. It can also be used in a multi-drop network configuration. A serial converter module provides connectivity to any controller with a DF1 port.
- The 10 most common application parameters are contained in the **Basic Program Group**. Common parameters shared with PowerFlex 40 are in the **Advanced Program Group**, and additional position control and fibers parameters located in **Enhanced Program Group**.
- A **NEMA Type 4X remote** and **NEMA Type 1 hand-held LCD keypad** provide additional programming and control flexibility, both featuring the popular CopyCat function.



StepLogic wizards available for ease of position or velocity StepLogic programming using drive software tools.



PowerFlex 40P Technical Data

PowerFlex 40P PC Programming Software

Through the use of a Serial Converter Module and **DriveExplorer™** or **DriveTools™** SP software, programming can be greatly simplified.

DriveExplorer Software

- View and modify drive and adapter parameters in a method similar to the file management capability of Microsoft Windows Explorer.
- Operate the drive via an on-screen Control Bar, which is a tool that allows you to start, stop, and change the speed reference of the drive.
- Save, restore and print parameter information.
- Compare current parameters with factory defaults or previously saved parameter values.
- Edit, upload and download parameters.
- StepLogic setup wizards available for ease of programming.
- DriveTools SP Software
- Online and offline programming capability.
- In-grid and dialog-based parameter editing.
- Immediate visual indication of drive and communication status when viewing online drive.
- Integrated HTML Help architecture.
- StepLogic setup wizards available for ease of programming.



Optimized Performance

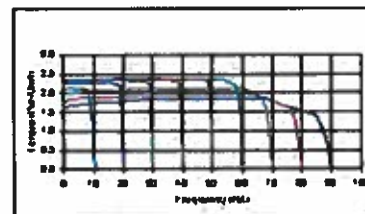
- **Removable MOV** to ground provides trouble-free operation when used on ungrounded distribution systems.
- A **relay pre-charge** limits inrush current.
- **Integral brake transistor**, available on all ratings, provides dynamic braking capability with simple low cost brake resistors.
- DIP switch settable **24V DC sink or source control** for control wiring flexibility.
- 150% overload for 60 seconds or 200% overload for 3 seconds provides **robust overload protection**.
- **Adjustable PWM frequency** up to 16 kHz ensures quiet operation.



PowerFlex 40P Technical Data

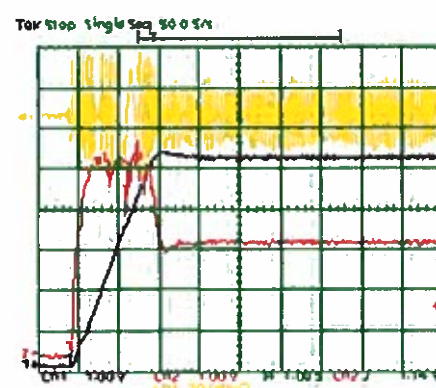
Sensorless Vector Control

- **Sensorless Vector Control** provides exceptional speed regulation and very high levels of torque across the entire speed range of the drive.
- The **Autotune** feature allows the PowerFlex 40P AC drive to adapt to individual motor characteristics.
- **Closed loop** with encoder feedback replaces slip compensation with trim for improved speed range and regulation.



Performance (Open Loop)

- This graph depicts the ability of a PowerFlex 40P drive to accelerate into at least 150% load.
- At 100% motor load, the drive will run the motor at synchronous speed.
- Excellent current regulation.
- Linear acceleration.
- Best in class digital input response time and repeatability.



Control Performance

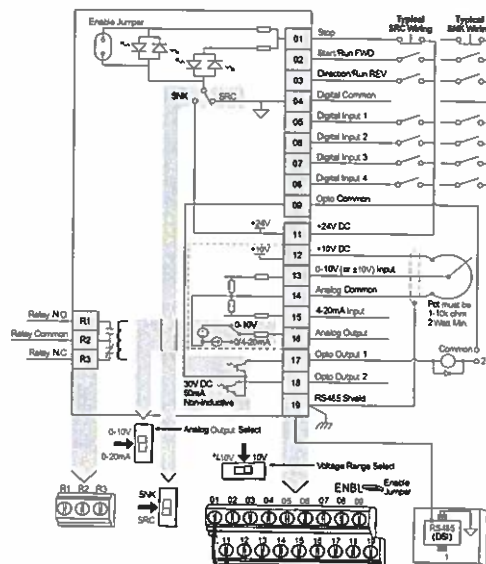
- **V/Hz Motor Control**
- **Sensorless Vector Control** with Autotune feature develops high torque over a wide speed range and adapts to individual motor characteristics.
 - Slip compensation or encoder trim
- Integral **PID** functionality enhances application flexibility.
- **Position control** regulator mode.
- **Timer, Counter, Basic Logic and StepLogic™** functions can reduce hardware design costs and simplify control schemes.
 - **Timer function:** Relay or opto outputs controlled by drive performing timer function. Timer is initiated by activating a digital input programmed as "Timer Start."
 - **Counter function:** Relay or opto outputs controlled by drive performing counter function. Counter function is activated by a digital input programmed as "Counter Input."
 - **Basic Logic:** Relay or opto outputs controlled by status of digital inputs programmed as "Logic Inputs." Performs basic Boolean logic.
 - **Velocity and Position StepLogic™** function available providing repeatable speed or position changes based on StepLogic application profile.



PowerFlex 40P Technical Data

I/O

- Two (2) semi-programmable digital inputs.
 - Dedicated for start and stop
 - Simplifies wiring and troubleshooting
- Five (5) fully programmable digital inputs provide application versatility.
 - Standard 27 different settings, same as PowerFlex 40 AC drive providing application versatility
 - Additional 9 settings for Fibers and basic positioning enhancements
 - Reverse DI is now fully programmable via E202 [Digital Term 3]
- One (1) programmable form C relay output and two (2) opto output can be used to indicate various drive or motor conditions.
- One (1) analog output is DIP Switch selectable for either voltage (0-10V) or current (0-20 mA). This scalable, 10-bit output is suitable for metering or as a speed reference for another drive.
- One (1) analog input is DIP switch selectable for either voltage or current. Input is isolated from the rest of the drive I/O. Bipolar mode offers improved zero-cross performance.



Communications

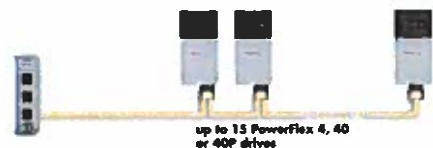
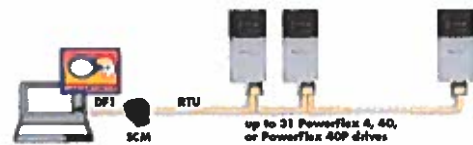
- Integral communication cards such as **DeviceNet™**, **EtherNet/IP™**, **PROFIBUS™ DP**, **LonWorks®** and **ControlNet™** can improve machine performance.
- The **DSI Wireless Interface Module (WIM)** provides a wireless communication interface between a Pocket PC, laptop computer or desktop computer equipped with **Bluetooth®** wireless technology, and any Allen-Bradley® product supporting the DSI™ protocol.
- **Field installed option** allows for future addition of stand-alone drives to a network.
- **Online EDS file creation** with **RSNetWorx™** providing ease of set-up on a network.



PowerFlex 40P Technical Data

Communication Options

- PowerFlex 40P AC drives are compatible with any device that acts as a **RTU Master** and supports standard 03, 06 and 16 RTU commands.
- A network can be configured using PowerFlex 40P AC drives with **optional communication cards** for high performance and flexible configuration capabilities.
 - DeviceNet
 - EtherNet/IP
 - PROFIBUS DP
 - LonWorks
 - ControlNet
- A **multi-drive solution** can be reached using a single PowerFlex 40P AC drive DeviceNet option, with the ability for up to five (5) drives to reside on one (1) node.
- **Integral RS485** communications enable the drives to be used in a multi-drop network configuration. A serial converter module (SCM) provides connectivity to any controller with a DF1 port. The SCM can be eliminated if the controller acts as a RTU Master.



PowerFlex 40P Technical Data

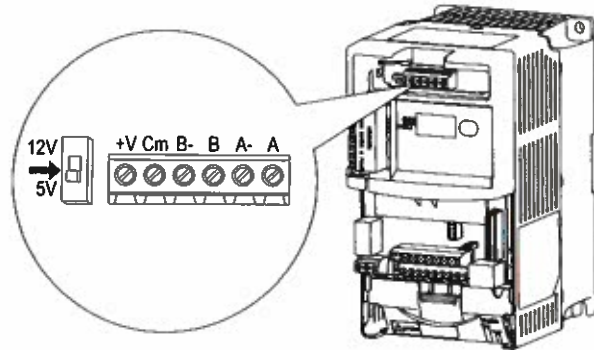
PowerFlex 40P AC Drive Advanced Features

Closed Loop

Encoder/Pulse Train Input Standard

The PowerFlex 40P AC drive allows for configurable closed loop control for either speed or position feedback for **improved speed regulation, basic position control**, or other **pulse inputs** for motor control.

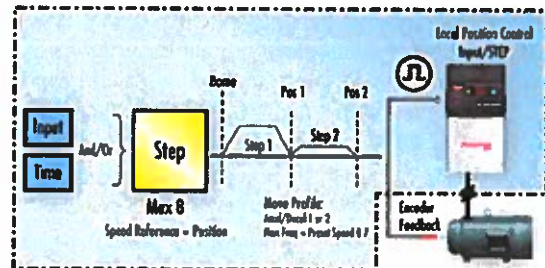
- Improved speed regulation
- Basic position control



Basic Position Control

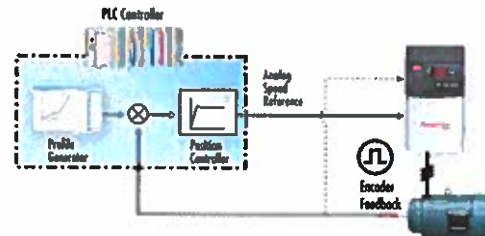
Local Position Control

- **Position regulator with Step Logics**
 - 8 positions (local logic)
 - Infinite if write to single step over multiple field bus networks (external logic)



Outer Position Control Loop

- **Analog input bipolar mode** offers improved zero-cross performance.
- **Simple motion control** applications with more complex position profiles.
- **Speed reference** supplied to Drive via Analog Input or over multiple field bus network options.
- **Speed ratio** available for simple draw applications.



Feedback Details

- Line Driver Type Incremental Encoder Quadrature (dual channel) or Single Channel.
 - 5/12V DC supply, 10mA min per channel
 - Single Ended or Differential (A,B Channel)
 - Duty Cycle of 50%, +10%
- Pulse Train Input.
 - Configurable Input Voltage 5V/12V/24V DC autodetect
 - Frequency controlled PWM
- Allowable Pulse Frequency DC to 250 kHz.

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

PowerFlex 40P Technical Data

Improved Ride Through

Operation Down to 1/2 Line Voltage

The PowerFlex 40P AC 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 40P AC drive also supports **enhanced inertia ride through** for additional low voltage mitigation.

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



Optimized for Common DC Bus Installations

Enhanced Control of Internal Pre-charge

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 40P AC drive has been optimized for use in **Common DC Bus or Shared DC bus** installations.

- Configurable pre-charge control using digital inputs.
- Direct DC Bus connection to power terminal blocks.

Safety Inside using DriveGuard® Safe-off Option

With the **DriveGuard option**, category 3 Safe-off combines safety and productivity with zone control and cost savings through the reduction of components. The PowerFlex 40P AC drive with the Allen-Bradley DriveGuard relay board option is a certified safety solution for AC drive control per EN954-1.



DriveGuard 
Series B, 20-DG01

PowerFlex 40P Technical Data

Application-Specific Features

Beverage and Brewing Industry

- Embedded Encoder in a compact and cost effective design
 - Reduction in dedicated sensors to track product position during production cycle
 - More process reliability and control, allowing for different process control “recipes” to be changed on the fly
 - Local logic capability with position/speed based on StepLogic
- Safety inside (Category 3 Safe-off functionality).
 - Zone control
 - Reduction in components/cost using DriveGuard® Safety Relay Option
- Applications:
 - Smart Conveyors
 - Simple Indexing (Mixers, etc.)
 - Palletizers

Fibers and Textiles Industry

- Fibers Firmware Features
 - Output frequency up to 500Hz
 - Synchronized input ramps
 - Speed ratio over comms
 - Traverse and P-Jump
 - 4 acc./decs.
- ½ DC bus operation and improved ride through.
 - Continuous output under brown out conditions
 - Inherent breaking and ride through with the use of drives/loads in application
- Encoder/Pulse train input.
- Plate drive – 75% reduction in enclosed Watts.
 - Mount to external heat sink
- Applications:
 - Drafting Machines
 - Ring Spinning Machines
 - Roving Machines
 - Carding Machines
 - Draw/Twist Machines
 - Fiber Winder Control
 - Synthetic Fiber Spinning Machines



PowerFlex 40P Technical Data

Automotive Industry

- Embedded Encoder in a compact and cost effective design.
 - Sensorless Vector with encoder feedback provide increased reliability
 - Position Regulator: reduction in sensors required to control process
 - Local logic (StepLogic) for time or digital input based positioning
- Safety inside (Category 3 Safe-off functionality).
 - Zone control
 - Reduced component count to achieve Cat 3 EN 954-1 Solution
- Applications
 - Smart Conveyors
 - Simple Indexing Applications
 - Variable frequency drive applications requiring Category 3 Safe-off per EN 954-1

Material Handling

- Embedded Encoder in a compact and cost effective design.
 - Sensorless Vector with encoder feedback provide increased reliability
 - Position regulator: reduction in sensors required to control process
 - Local logic (StepLogic) for time or digital input based positioning
- Safety inside (Category 3 Safe-off functionality).
 - Zone Control
 - Reduced component count to achieve Cat 3 EN 954-1 solution
- Applications:
 - Palletizers
 - Packaging Equipment
 - Smart Conveyors



PowerFlex 40P Technical Data

Catalog Number Explanation

1-3	4	5	6-8	9	10	11	12	13-14
22D	-	B	2P3	N	1	0	4	AA
a		b	c	d	e	f	g	h

a	
Drive	
Code	Type
22D	PowerFlex 40P

b		
Voltage Rating		
Code	Voltage	Ph.
B	240V ac	3
D	480V ac	3
E	600V ac	3

c1		
Rating		
200-240V Three-Phase Input		
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)

c2		
Rating		
380-480V Three-Phase Input		
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)

c3		
Rating		
460-600V Three-Phase Input		
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	7.5 (10)
019	19	11 (15)

d	
Enclosure	
Code	Enclosure
N	Panel Mount - IP 20 (NEMA Type Open)
F	Flange Mount - IP 20 (NEMA Type Open)
H	Plate Drive - IP 20 (NEMA Type Open)

e	
HIM	
Code	HIM Version
1	Display/Fault Reset Only
2	Display/Fault Reset Only (Plate Drive)

f	
Emission Class	
Code	EMC Filter
0	No Filter

g	
Version	
Code	Version
4	Standard

h	
Optional	
Code	Purpose
AA through ZZ	Reserved for custom firmware

PowerFlex 40P Technical Data

PowerFlex 40P Standard Drives

240V ac, Three-Phase Drives (50/60 Hz, No Filter)

Drive Ratings				Cat. No.		
kW	HP	Output Current (A)	Frame Size	IP20/NEMA Type Open	IP20 Plate Drive	IP20 Flange Mount ❶
0.4	0.5	2.3	B	22D-B2P3N104	22D-B2P3H204	22D-B2P3F104
0.75	1.0	5.0	B	22D-B5P0N104	22D-B5P0H204	22D-B5P0F104
1.5	2.0	9.0	B	22D-B8P0N104	22D-B8P0H204	22D-B8P0F104
2.2	3.0	12	B	22D-B012N104	22D-B012H204	22D-B012F104
3.7	5.0	17.5	B	22D-B017N104	22D-B017H204	22D-B017F104
5.5	7.5	24	C	22D-B024N104	22D-B024H204	22D-B024F104
7.5	10	33	C	22D-B033N104	22D-B033H204	22D-B033F104

480V ac, Three-Phase Drives (50/60 Hz, No Filter)

Drive Ratings				Cat. No.		
kW	HP	Output Current (A)	Frame Size	IP20/NEMA Type Open	IP20 Plate Drive	IP20 Flange Mount ❶
0.4	0.5	1.4	B	22D-D1P4N104	22D-D1P4H204	22D-D1P4F104
0.75	1.0	2.3	B	22D-D2P3N104	22D-D2P3H204	22D-D2P3F104
1.5	2.0	4.0	B	22D-D4P0N104	22D-D4P0H204	22D-D4P0F104
2.2	3.0	6.0	B	22D-D6P0N104	22D-D6P0H204	22D-D6P0F104
4.0	5.0	10.5	B	22D-D010N104	22D-D010H204	22D-D010F104
5.5	7.5	12	C	22D-D012N104	22D-D012H204	22D-D012F104
7.5	10	17	C	22D-D017N104	22D-D017H204	22D-D017F104
11	15	24	C	22D-D024N104	22D-D024H204	22D-D024F104

600V ac, Three-Phase Drives (50/60 Hz, No Filter)

Drive Ratings				Cat. No.		
kW	HP	Output Current (A)	Frame Size	IP20/NEMA Type Open	IP20 Plate Drive	IP20 Flange Mount ❶
0.75	1.0	1.7	B	22D-E1P7N104	22D-E1P7H204	22D-E1P7F104
1.5	2.0	3.0	B	22D-E3P0N104	22D-E3P0H204	22D-E3P0F104
2.2	3.0	4.2	B	22D-E4P2N104	22D-E4P2H204	22D-E4P2F104
4.0	5.0	6.6	B	22D-E6P6N104	22D-E6P6H204	22D-E6P6F104
5.5	7.5	9.9	c	22D-E9P9N104	22D-E9P9H204	22D-E9P9F104
7.5	10	12	C	22D-E012N104	22D-E012H204	22D-E012F104
11	15	19	C	22D-E019N104	22D-E019H204	22D-E019F104

❶ Meets IP 40/54/65 (NEMA 1/12/4/4X) when installed in an enclosure of like rating.

PowerFlex 40P Technical Data

User Installed Options

IP30/NEMA 1/UL Type 1 Conversion Kit

Description	Drive Frame	Catalog Number
IP30/NEMA 1/UL Type 1 Kit <i>Description:</i> 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 with Communication Option <i>Description:</i> 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

Human Interface Module Option Kits and Accessories

Description	Catalog Number
Remote Human Interface Module (HIM) – Panel Mount <i>Description:</i> LCD Display, Remote Panel Mount, Digital Speed Control, CopyCat capable, IP66 (NEMA Type 4X/12) indoor use only. Includes 2.0 meter cable. <i>Note:</i> The 22-HIM-C2S is smaller than the 22-HIM-C2 and cannot be used as a direct replacement.	22-HIM-C2S
Remote Human Interface Module (HIM) – Handheld <i>Description:</i> 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
Remote Human Interface Module (HIM) – Wireless Handheld <i>Description:</i> Remote Handheld, Wireless Interface Module with <i>Bluetooth®</i> technology, IP30 (NEMA Type1), Panel Mount with optional bezel kit.	22-WIM-N1
Remote Human Interface Module (HIM) – Wireless Handheld <i>Description:</i> Remote Handheld, Wireless Interface Module with <i>Bluetooth</i> technology, IP66 (NEMA Type 4X/12) indoor use only.	22-WIM-N4S
Bezel Kit <i>Description:</i> Panel Mount for LCD Display, Remote Handheld unit, IP30 (NEMA Type 1). Includes a 22-RJ45CBL-C20 cable.	22-HIM-B1
DSI HIM Cable <i>Description:</i> DSI HIM to RJ45 cable. 1.0 Meter (3.3 Feet) 2.9 Meter (9.51 Feet)	22-HIM-H10 22-HIM-H30

PC Programming Software

Item	Description	Catalog Number
DriveExecutive	"Windows" based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communications adapters online and offline. Compatibility: Windows 98, ME, NT, 4.0 (Service Pack 3 or later), 2000 and XP. ❶	9303-4DTE01ENE
DriveTools™ SP Suite - includes DriveExecutive, DriveObserver		9303-4DTS01ENE
DriveTools™ SP Suite Upgrade from DriveExecutive - includes DriveExecutive, DriveObserver		9303-4DTE2S01ENE
DriveExplorer™ Software	"Windows" based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communications adapters online and offline. Compatibility: Windows 98, ME, NT, 4.0 (Service Pack 3 or later), 2000 and XP. ❶❷❸	9306-4EXP02ENE
Pocket DriveExplorer™ Software	"Windows" based software package for monitoring and configuring Allen-Bradley drive and communication adapters.	9306-4PXP01ENE

❶ Setup Wizards are available for use with DriveTools SP and DriveExplorer (Lite/Full) only.

❷ See www.ab.com/drive/ for support devices.

❸ DriveExplorer Lite available for free, download at: http://www.ab.com/drives/driveexplorer/free_download.html.

PowerFlex 40P Technical Data

Spare Parts

Description	Catalog Number
Fan Replacement Kits	SK-U1-FAN1-B1 SK-U1-FAN2-B1 SK-U1-FAN1-C1 SK-U1-FAN1-C2
Cover Replacement Kits	SK-U1-DCVR3-B1 SK-U1-DCVR3-C1 SK-U1-DCVR4-EN

Other Options

Description	Catalog Number
DriveGuard® Safe-Off Option (Series B) <i>Description:</i> Field installed kit. Used with suitable safety components to help provide protection against restart.	20A-DG01

Communication Option Kits

Description	Catalog No.
Universal Serial Bus™ (USB) Converter Module <i>Description:</i> Provides serial communication via DF1 protocol for use with DriveExplorer and DriveTools SP software. <i>Includes:</i> 2m USB cable, 20-HIM-H10 cable, and 22-HIM-H10 cable.	1203-USB
Serial Converter Module (RS485 to RS232) <i>Description:</i> Provides serial communication via DF1 protocol for use with DriveExplorer and DriveExecutive™ software. <i>Includes:</i> DSI to RS232 serial converter, 1203-SFC serial cable, 22-RJ45CBL-C20 cable, and DriveExplorer Lite CD.	22-SCM-232
Serial Cable <i>Description:</i> 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 a computer.	1203-SFC
Null Cable Converter <i>Description:</i> For use when connecting the serial converter to DriveExplorer on a handheld PC.	1203-SNM
DSI Cable <i>Description:</i> 2.0 meter RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Splitter Cable <i>Description:</i> RJ45 one to two port splitter cable.	AK-U0-RJ45-SC1
Terminating Resistors <i>Description:</i> 120 Ohm resistor embedded in an RJ45 connector (2 pieces)	AK-U0-RJ45-TR1
Terminal Block <i>Description:</i> RJ45 two position terminal block (5 pieces) with two 120 Ohm terminating resistors (loose).	AK-U0-RJ45-TB2P
ControlNet™ Communication Adapter <i>Note:</i> Requires a Communication Adapter Cover when used with Frame B and C PowerFlex 40P drives (Ordered Separately).	22-COMM-C
DeviceNet™ Communication Adapter <i>Note:</i> Requires a Communication Adapter Cover when used with Frame B and C PowerFlex 40P drives (Ordered Separately).	22-COMM-D
EtherNet/IP™ Communication Adapter <i>Note:</i> Requires a Communication Adapter Cover when used with Frame B and C PowerFlex 40P drives (Ordered Separately).	22-COMM-E
LonWorks™ Communication Adapter <i>Note:</i> Requires a Communication Adapter Cover when used with Frame B and C PowerFlex 40P drives (Ordered Separately).	22-COMM-L
PROFIBUS™ DP Communication Adapter <i>Note:</i> Requires a Communication Adapter Cover when used with Frame B and C PowerFlex 40P drives (Ordered Separately).	22-COMM-P
External DSI Communications Kit <i>Description:</i> External mounting kit for 22-COMM Adapters.	20-XCOMM-DC-BASE
External Comms Power Supply <i>Description:</i> Optional 100-240V ac Power Supply for External DSI Communications Kit	20-XCOMM-AC-PS1
Compact I/O Module (3 Channel)	1769-SM2
Communication Adapter Cover <i>Description:</i> Houses the Communication Adapter for Frame B and C drives. <i>Note:</i> This cover adds 25 mm (0.98 in.) to the overall depth of the drive.	22D-CCB ① 22D-CCC ①

① If NEMA 1/IP30 is required, must also order 22-JBCB (Frame B drives) or 22-JBCC (Frame C drives).

PowerFlex 40P Technical Data

Dynamic Brake Resistors

Drive Ratings			Minimum Resistance	Catalog Number ❶
Input Voltage	kW	Hp	Ohms	
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	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	39	AK-R2-120P1K2
	11	15	24	AK-R2-120P1K2 ❷
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	51	AK-R2-120P1K2
	11	15	51	AK-R2-120P1K2 ❷

❶ Resistors listed in this table are rated 5% duty cycle.

❷ Requires two resistors wired in parallel.

Input Line Reactors

240V, 50/60 Hz, Three-Phase, 3% Impedance

kW	HP	Fundamental Amps	Maximum Continuous Amps	Inductance (mh)	Watts Loss (W)	Catalog Number
0.4	0.5	4.0	6.0	12	21	1321-3R4-B
0.75	1.0	8.0	12	3.0	29	1321-3R4-B
1.5	2.0	8.0	12	1.5	19.5	1321-3R8-B
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	35	52.5	0.4	49	1321-3R35-A

480V, 50/60 Hz, Three-Phase, 3% Impedance

kW	HP	Fundamental Amps	Maximum Continuous Amps	Inductance (mh)	Watts Loss (W)	Catalog Number
0.4	0.5	2.0	3.0	20	11.3	1321-3R2-B
0.75	1.0	4.0	6.0	9.0	20	1321-3R4-C
1.5	2.0	4.0	6.0	6.5	20	1321-3R4-B
2.2	3.0	8.0	12	5.0	25.3	1321-3R8-C
4.0	5.0	12	18	2.5	31	1321-3R8-B
5.5	7.5	12	18	2.5	31	1321-3R12-B
7.5	10	18	27	1.5	43	1321-3R18-B
11	15	25	37.5	1.2	52	1321-3R25-B

600V, 50/60 Hz, Three-Phase, 3% Impedance

kW	HP	Fundamental Amps	Maximum Continuous Amps	Inductance (mh)	Watts Loss (W)	Catalog Number
0.75	1.0	2.0	3.0	20	11.3	1321-3R2-B
1.5	2.0	4.0	6.0	6.5	20	1321-3R4-C
2.2	3.0	4.0	6.0	6.5	20	1321-3R4-B
4.0	5.0	8.0	12	5.0	25.3	1321-3R8-C
5.5	7.5	12	18	2.5	31	1321-3R12-B
7.5	10	12	18	2.5	31	1321-3R12-B
11	15	18	27	1.5	43	1321-3R18-B

PowerFlex 40P Technical Data

EMC Filters

Drive Ratings			Catalog Number	
Input Voltage	kW	HP	S Type Filter ❶	L Type Filter ❷
240V 50/60 Hz 3-Phase	0.4	0.5	22-RF021-BS ❸	22-RF021-BL ❸
	0.75	1.0	22-RF021-BS ❸	22-RF021-BL ❸
	1.5	2.0	22-RF021-BS ❸	22-RF021-BL ❸
	2.2	3.0	22-RF021-BS ❸	22-RF021-BL ❸
	3.7	5.0	22-RF021-BS ❸	22-RF021-BL ❸
	5.5	7.5	22-RF034-CS	22-RF034-CL
	7.5	10	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 ❸	22-RF018-CL
	7.5	10	22-RF018-CS ❸	22-RF018-CL
600V 50/60 Hz 3-Phase	11	15	22-RF026-CS ❸	22-RF026-CL
	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	-	22-RF015-CL
	11	15	-	22-RF024-CL

- ❶ This filter is suitable for use with a cable length of up to 10 meters for Class A and 1 meter for Class B environments.
❷ Filter must be Series C or later.
❸ This filter is suitable for use with a cable length of up to 100 meters for Class A and 5 meters for Class B environments.

PowerFlex 40P Technical Data

Installation Considerations

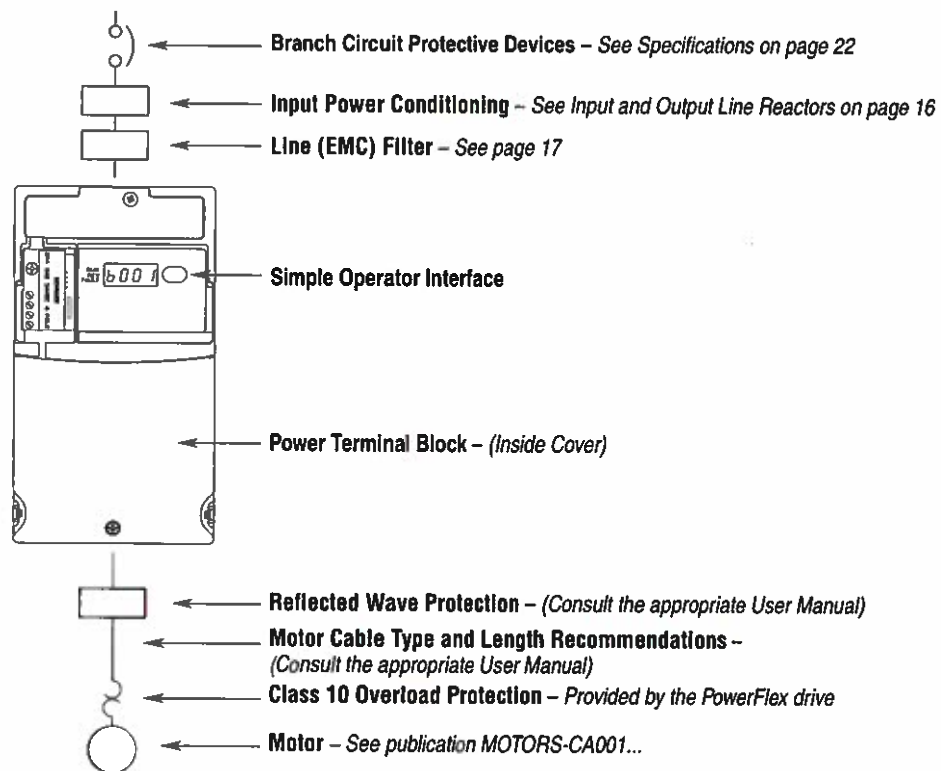
Power Wiring

PowerFlex 40P drives have the following built in protective features to help simplify installation.

- Ground fault protection while starting and running ensures reliable operation
- Electronic motor overload protection increases motor life
- 6kV transient protection provides increased robustness for 380-480V system voltages

There are many other factors that must be considered for optimal performance in any given application. The block diagram below highlights the primary installation considerations. Consult the PowerFlex 40P *User Manual*, Publication 22D-UM001... available online at <http://www.rockwellautomation.com/literature>, for detailed recommendations on input power conditioning, CE conformance (EMC filtering), FCC Compliance, reflected wave protection, motor cable types and motor cable distances.

Block Diagram



PowerFlex 40P Technical Data

Power Terminal Block

Terminal Block Specifications

Name	Frame	Description	Wire Size Range ❶		Recommended Torque
			Maximum	Minimum	
Power Terminal Block	B	All power terminals	5.3 mm² (10 AWG)	1.3 mm² (16 AWG)	1.7-2.2 N-m (16-19 lb.-in.)
	C	All power terminals	8.4 mm² (8 AWG)	1.3 mm² (16 AWG)	2.9-3.7 N-m (26-33 lb.-in.)

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

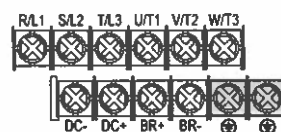
Terminal ❷	Description
R/L1, S/L2	1-Phase Input ❸
R/L1, S/L2, T/L3	3-Phase Input
U/T1	To Motor U/T1
V/T2	To Motor V/T2
W/T3	To Motor W/T3
P2, P1	DC Bus Inductor Connection (C Frame drives only.) The C Frame drive is shipped with a jumper between Terminals P2 and P1. Remove this jumper only when a DC Bus Inductor will be connected. Drive will not power up without a jumper or inductor connected.
DC+, DC-	DC Bus Connection (Frame C Drives)
BR+, BR-	Dynamic Brake Resistor Connection
⊕	Safety Ground - PE



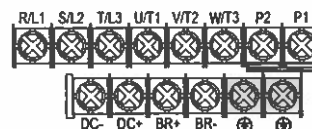
Switch any two motor leads to change forward direction.



B Frame



C Frame



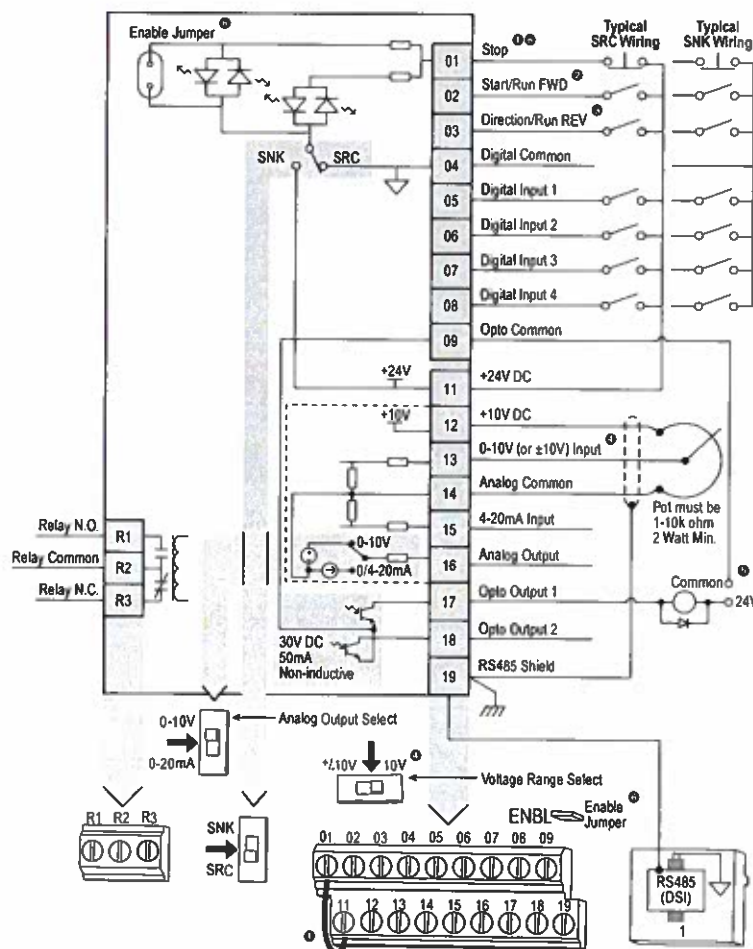
❷ Important: Terminal screws may become loose during shipment. Ensure that all terminal screws are tightened to the recommended torque before applying power to the drive.

❸ Single-phase operation requires a 65% derate of drive rated current.

PowerFlex 40P Technical Data

Control Wiring

- The control logic is 24V DC and can be set for either Sink or Source control via a DIP switch setting.
- Control terminal screws are sized for a conventional blade screw driver.
- I/O Terminals 1 and 2 are semi-programmable and dedicated for Stop, Start and SW Enable inputs. These I/O Terminals can be programmed for 2- or 3-Wire operation to meet application requirements.
- I/O Terminals 5, 6, 7 and 8 are fully programmable and provide added flexibility. Programmable functions include Local Control, Second Accel/Decel, Clear Fault, Preset Frequencies, RS485 Control, Auxiliary Fault, and Purge.
- Speed can be controlled via (2) analog inputs. Both inputs can be configured for either voltage or current and can be used for applications such as PID. Voltage input can be programmed for bipolar operation.
- The drive is shipped with a jumper installed between I/O Terminals 01 and 11. This jumper can be removed when using I/O Terminal 01 as a Stop or Enable input.



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(5)
2-Wire	Per P037	Coast
2-W Lvl Sens	Per P037	Per P037(5)
2-W Hi Speed	Per P037	Coast
RS485 Port	Per P037	Coast
Momt FWD/REV	Per P037	Per P037(5)

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.

- 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.
- The function of I/O Terminal 03 is fully programmable. Program with E202 [Digital Term 3].
- Match the Voltage Range Select DIP switch setting with the control scheme for proper Uni-Polar or Bipolar analog input operation.
- 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.
- 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.

PowerFlex 40P Technical Data

Control I/O Terminal Designations

No.	Signal	Default	Description
R1	Relay N.O.	Fault	Normally open contact for output relay.
R2	Relay Common	–	Common for output relay.
R3	Relay N.C.	Fault	Normally closed contact for output relay.
<hr/>			
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.
<hr/>			
01	Stop ❶	Coast	The factory installed jumper or a normally closed input must be present for the drive to start.
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].
03	Digital Term 3	Not Active	
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].
06	Digital Input 2	Preset Freq	Program with A052 [Digital In2 Sel].
07	Digital Input 3	Local	Program with A053 [Digital In3 Sel].
08	Digital Input 4	Jog Forward	Program with A054 [Digital In4 Sel].
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 100mA.
12	+10V DC	–	Referenced to Analog Common. Drive supplied power for 0-10V external potentiometer. Maximum output current is 15mA.
13	±10V In ❷	Not Active	For external 0-10V (unipolar) or ±10V (bipolar) input supply (input impedance = 100k ohm) or potentiometer wiper.
14	Analog Common	–	For 0-10V In or 4-20mA In. Electronically isolated with analog inputs and outputs from digital I/O and opto outputs.
15	4-20mA In ❸	Not Active	For external 4-20mA input supply (input impedance = 250 ohm).
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 0-20mA. Program with A065 [Analog Out Sel]. Max analog value can be scaled with A066 [Analog Out High]. Maximum Load: 4-20mA = 525 ohm (10.5V) 0-10V = 1k ohm (10mA)
17	Opto Output 1	MotorRunning	Program with A058 [Opto Out1 Sel]
18	Opto Output 2	At Frequency	Program with A061 [Opto Out2 Sel]
19	RS485 (DSI) Shield	–	Terminal should be connected to safety ground - PE when using the RS485 (DSI) communications port.

❶ See Footnotes ❶ and ❷ on page 20.

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

PowerFlex 40P Technical Data

Specifications

Drive Ratings

Catalog Number ^①	Output Ratings		Input Ratings			Branch Circuit Protection				Estimated Power Dissipation
	kW (HP)	Amps	Voltage Range	kVA	Amps	Fuses	140M Motor Protectors ^② ③	Contactors	Min. Enclosure Volume ^④ (in. ³)	IP20 Open Watts
200 - 240V AC – 3-Phase Input, 0 - 230V 3-Phase Output										
22D-B2P3	0.4 (0.5)	2.3	180-264	1.15	2.5	6	140M-C2E-B40	100-C07	1655	40
22D-B5P0	0.75 (1.0)	5.0	180-264	2.45	5.7	10	140M-C2E-C10	100-C09	1655	60
22D-B8P0	1.5 (2.0)	8.0	180-264	4.0	9.5	15	140M-C2E-C16	100-C12	1655	85
22D-B012	2.2 (3.0)	12.0	180-264	5.5	15.5	25	140M-C2E-C16	100-C23	1655	125
22D-B017	3.7 (5.0)	17.5	180-264	8.6	21.0	30	140M-F8E-C25	100-C23	1655	180
22D-B024	5.5 (7.5)	24.0	180-264	11.8	26.1	40	140M-F8E-C32	100-C37	2069	235
22D-B033	7.5 (10)	33.0	180-264	16.3	34.6	60	140M-G8E-C45	100-C60	2069	305
380 - 480V AC – 3-Phase Input, 0 - 460V 3-Phase Output										
22D-D1P4	0.4 (0.5)	1.4	342-528	1.4	1.8	3	140M-C2E-B25	100-C07	1655	35
22D-D2P3	0.75 (1.0)	2.3	342-528	2.3	3.2	6	140M-C2E-B40	100-C07	1655	50
22D-D4P0	1.5 (2.0)	4.0	342-528	4.0	5.7	10	140M-C2E-B63	100-C09	1655	70
22D-D6P0	2.2 (3.0)	6.0	342-528	5.9	7.5	15	140M-C2E-C10	100-C09	1655	100
22D-D010	4.0 (5.0)	10.5	342-528	10.3	13.0	20	140M-C2E-C16	100-C23	1655	160
22D-D012	5.5 (7.5)	12.0	342-528	11.8	14.2	25	140M-D8E-C20	100-C23	2069	175
22D-D017	7.5 (10)	17.0	342-528	16.8	18.4	30	140M-D8E-C20	100-C23	2069	210
22D-D024	11 (15)	24.0	342-528	23.4	26.0	50	140M-F8E-C32	100-C43	2069	300
460 - 600V AC – 3-Phase Input, 0 - 575V 3-Phase Output										
22D-E1P7	0.75 (1.0)	1.7	414-660	2.1	2.3	6	140M-C2E-B25	100-C09	1655	50
22D-E3P0	1.5 (2.0)	3.0	414-660	3.65	3.8	6	140M-C2E-B40	100-C09	1655	70
22D-E4P2	2.2 (3.0)	4.2	414-660	5.2	5.3	10	140M-D8E-B63	100-C09	1655	100
22D-E6P6	4.0 (5.0)	6.6	414-660	8.1	8.3	15	140M-D8E-C10	100-C09	1655	160
22D-E9P9	5.5 (7.5)	9.9	414-660	12.1	11.2	20	140M-D8E-C16	100-C16	2069	175
22D-E012	7.5 (10)	12.2	414-660	14.9	13.7	25	140M-D8E-C16	100-C23	2069	210
22D-E019	11 (15)	19.0	414-660	23.1	24.1	40	140M-F8E-C25	100-C30	2069	300










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 40P Technical Data

Category	Specification
Agency Certification	 Listed to UL508C and CAN/CSA-22.2
	 Certified to AS/NZS, 1997 Group 1, Class A
	 Marked for all applicable European Directives EMC Directive (89/336) EN 61800-3, EN 50081-1, EN 50082-2 Low Voltage Directive (73/23/EEC) EN 50178, EN 60204
	      Certified to EN 954-1, Category 3. Meets Functional Safety (FS) when used with the DriveGuard Safe-Off Option (Series B).
The drive is also designed to meet the appropriate portions of the following specifications: NFPA 70 - US National Electrical Code NEMA ICS 3.1 - Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems. IEC 146 - International Electrical Code.	
Protection	Bus Overvoltage Trip 200-240V AC Input: 405V DC bus (equivalent to 290V AC incoming line) 380-460V AC Input: 810V DC bus (equivalent to 575V AC incoming line) 460-600V AC Input: 1005V DC bus (equivalent to 711V AC incoming line)
	Bus Undervoltage Trip 200-240V AC Input: 210V DC bus (equivalent to 150V AC incoming line) 380-480V AC Input: 390V DC bus (equivalent to 275V AC incoming line) 460-600V AC Input: 487V DC bus (equivalent to 344V AC incoming line) P042 = 3 "High Voltage": 390V DC bus (equivalent to 275V AC incoming line) P042 = 2 "Low Voltage": 390V DC bus (equivalent to 275V AC incoming line)
	Power Ride-Thru: 100 milliseconds
	Logic Control Ride-Thru: 0.5 seconds minimum, 2 seconds 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
Environment	Altitude: 1000 m (3300 ft) max. without derating. Above 1000 m (3300 ft) derate 3% for every 305 m (1000 ft).
	Maximum Surrounding Air Temperature without derating: IP20, Open Type: -10 to 50° C (14 to 122° F) IP30, NEMA Type 1, UL Type 1: -10 to 40° C (14 to 104° F) Flange and Plate Mount: Heatsink: -10 to 40° C (14 to 104° F) Drive: -10 to 50° C (14 to 122° F)
	Cooling Method Convection: 0.4 kW (0.5 HP) drives and all Flange and Plate drives Fan: All other drive ratings
	Storage Temperature: -40 to 85 degrees C (-40 to 185 degrees F)
	Atmosphere: Important: Drive must not 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.
	Relative Humidity: 0 to 95% non-condensing
	Shock (operating): 15G peak for 11ms duration (±1.0 ms)
	Vibration (operating): 1G peak, 5 to 2000 Hz
Electrical	Voltage Tolerance: 200-240V ±10% 380-480V ±10% 460-600V ±10%
	Frequency Tolerance: 48-63 Hz
	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 (IGBT)

PowerFlex 40P Technical Data

Category	Specification		
Control	Method:		Sinusoidal PWM, Volts/Hertz, and Sensorless Vector
	Carrier Frequency		2-16 kHz, Drive rating based on 4 kHz.
	Frequency Accuracy		Within ±0.05% of set output frequency
	Digital Input:		Within 0.5% of maximum output frequency, 10-Bit resolution
	Analog Input:		±2% of full scale, 10-Bit resolution
	Analog Output:		
	Speed Regulation		
	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
	Output Frequency:		0-500 Hz (programmable)
Efficiency:		97.5% (typical)	
Stop Modes:		Multiple programmable stop modes including - Ramp, Coast, DC-Brake, and Ramp-to-Stop	
Accel/Decel:		Four independently programmable accel and decel times. Each time may be programmed from 0 - 600 seconds in 0.1 second increments.	
Intermittent Overload:		150% Overload capability for up to 1 minute 200% Overload capability for up to 3 seconds	
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.	
Control Inputs	Digital:	Bandwidth:	10 Rad/Secs for open and closed loop
		Quantity:	(2) Dedicated for start and stop (5) Programmable for functions such as preset speeds, jog, etc.
		Current:	6 mA
		Type	
	Analog:	Source Mode (SRC):	18-24V = ON, 0-6V = OFF
		Sink Mode (SNK):	0-6V = ON, 18-24V = OFF
		Quantity:	(2) Isolated, -10 to 10V and 4-20mA
		Specification	
Resolution:		10-bit	
0 to 10V DC Analog:		100k ohm input impedance	
4-20mA Analog:		250 ohm input impedance	
External Pot:		1-10k ohm, 2 Watt minimum	
Encoder	Type:		Incremental, dual channel
	Supply:		12V, 250 mA. 12V, 10 mA minimum inputs isolated with differential transmitter, 250 kHz maximum.
	Quadrature:		90°, ±27 degrees at 25 degrees C.
	Duty Cycle:		50%, +10%
	Requirements:		Encoders must be line driver type, quadrature (dual channel) or pulse (single channel), 3.5 - 26V DC output, single-ended or differential and capable of supplying a minimum of 10 mA per channel. Maximum input frequency is 250 kHz. The encoder I/O automatically scales to allow 5V, 12V and 24V DC nominal voltages.
Control Outputs	Relay:	Quantity:	(1) Programmable Form C
		Specification	
	Resistive Rating:	3.0A at 30V DC, 3.0A at 125V, 3.0A at 240V AC	
		Inductive Rating:	0.5A at 30V DC, 0.5A at 125V, 0.5A at 240V AC
	Opto:	Quantity:	(2) Programmable
		Specification:	30V DC, 50mA Non-inductive
	Analog:	Quantity:	(1) Non-Isolated 0-10V or 4-20mA
		Specification	
Resolution:		10-bit	
0 to 10V DC Analog:		1k ohm minimum	
4-20mA Analog:		525 ohm maximum	

PowerFlex 40P Technical Data

Parameter List

Parameter Number	Parameter Name	Description	Factory Default
Basic Display Group			
b001	Output Freq	Output frequency present at T1, T2 & T3 (U, V & W).	Read Only
b002	Commanded Freq	Value of the active frequency command.	Read Only
b003	Output Current	Output current present at T1, T2 & T3 (U, V & W).	Read Only
b004	Output Voltage	Output voltage present at T1, T2 & T3 (U, V & W).	Read Only
b005	DC Bus Voltage	Present DC bus voltage level.	Read Only
b006	Drive Status	Present operating condition of the drive.	Read Only
b007	Fault 1 Code	A code that represents a drive fault.	Read Only
b008	Fault 2 Code		
b009	Fault 3 Code		
b010	Process Display	Output frequency scaled by A099 [Process Factor].	Read Only
b012	Control Source	Displays the active source of the Start Command and Speed Command.	Read Only
b013	Ctrl In Status	Status of the control terminal block control inputs.	Read Only
b014	Dig In Status	Status of the control terminal block digital inputs.	Read Only
b015	Comm Status	Status of the communication ports.	Read Only
b016	Control SW Ver	Main Control Board software version.	Read Only
b017	Drive Type	Used by Rockwell Automation field service personnel.	Read Only
b018	Elapsed Run Time	Accumulated time drive is outputting power.	Read Only
b019	Testpoint Data	Present value of the function selected in A102 [Testpoint Sel].	Read Only
b020	Analog In 0-10V	Present value of the voltage at I/O Terminal 13.	Read Only
b021	Analog In 4-20mA	Present value of the current at I/O Terminal 15.	Read Only
b022	Output Power	Output power present at T1, T2 & T3 (U, V & W).	Read Only
b023	Output Powr Fctr	The angle in electrical degrees between motor voltage and motor current.	Read Only
b024	Drive Temp	Present operating temperature of the drive power section.	Read Only
b025	Counter Status	The current value of the counter when counter is enabled.	Read Only
b026	Timer Status	The current value of the timer when timer is enabled.	Read Only
b028	Stp Logic Status	The current step of the StepLogic profile.	Read Only
b029	Torque Current	The current value of the motor torque current.	Read Only
Basic Program Group			
P031	Motor NP Volts	20 to Drive Rated Volts	Based on Drive Rating
P032	Motor NP Hertz	15 to 500 Hz	60 Hz
P033	Motor OL Current	0.0 to (Drive Rated Amps x 2)	Based on Drive Rating
P034	Minimum Freq	0.00 to 500.0 Hz	0.00 Hz
P035	Maximum Freq	0.00 to 500.0 Hz	60.00 Hz
P036	Start Source	6 settings; 3-Wire, 2-Wire, 2-W Lvl Sens, 2-W Hi Speed, Comm Port, Momt FWD/REV	Comm Port
P037	Stop Mode	10 settings: Ramp, CF; Coast, CF; DC Brake, CF; DCBrkAuto,CF; Ramp; Coast; DC Brake; DC BrakeAuto; Ramp+EM B,CF; Ramp+EM Brk	Ramp, CF (Clear Fault)
P038	Speed Reference	9 settings; InternalFreq, 0-10V Input, 4-20mA Input, Preset Freq, Comm Port, Stp Logic, Anlg In Mult, Encoder, Positioning	Comm Port
P039	Accel Time 1	0.0 to 600.0 seconds	10.0 Secs
P040	Decel Time 1	0.0 to 600.0 seconds	10.0 Secs
P041	Reset To Defaults	Used to reset drive to factory default settings.	Ready/Idle
P042	Voltage Class	Sets the voltage class of 600V drives.	High Voltage
P043	Motor OL Ret	Enables/disables the Motor Overload Retention function.	Disabled
Advanced Program Group			
A051	Digital In1 Sel	36 settings: Not Used; Acc/Dec Sel1; Jog; Aux Fault; Preset Freq; Comm Port; Clear Fault; RampStop,CF; CoastStop,CF; DCInjStop,CF; Jog Forward; Jog Reverse; 10V In Ctr; 20mA In Ctr; PID Disable; MOP Up; MOP Down; Timer Start; Counter In; Reset Timer; Reset Counter; Rset Tim&Cnt; Logic In1; Logic In2; Current Lmt2; Anlg Invert; EM Brk Rlse; Acc/Dec Sel2; Precharge En; Inertia Dcel; Sync Enable; Traverse Dis; Home Limit; Find Home; Hold Step; Pos Redefine	Preset Freq
A052	Digital In2 Sel		Preset Freq
A053	Digital In3 Sel		Local
A054	Digital In4 Sel		Jog Forward
A055	Relay Out Sel	26 settings; Ready/Fault, At Frequency, MotorRunning, Reverse, Motor Overld, Ramp Reg, Above Freq, Above Cur, Above DCVolt, Retries Exst, Above Anlg V, Logic In 1, Logic In 2, Logic 1 & 2, Logic 1 or 2, StpLogic Out, Timer Out, Counter Out, Above PF Ang, Anlg In Loss, ParamControl, NonRec Fault, EM Brk Cntrl, At Position, At Home, Safe-Off	Ready/Fault
A056	Relay Out Level	0.0 to 9999	0.0
A058	Opto Out1 Sel	26 settings; Ready/Fault, At Frequency, MotorRunning, Reverse, Motor Overld, Ramp Reg, Above Freq, Above Cur, Above DCVolt, Retries Exst, Above Anlg V, Logic In 1, Logic In 2, Logic 1 & 2, Logic 1 or 2, StpLogic Out, Timer Out, Counter Out, Above PF Ang, Anlg In Loss, ParamControl, NonRec Fault, EM Brk Cntrl, At Position, At Home, Safe-Off	MotorRunning
A059	Opto Out1 Level	0.0 to 9999	0.0
A061	Opto Out2 Sel	26 settings; Ready/Fault, At Frequency, MotorRunning, Reverse, Motor Overld, Ramp Reg, Above Freq, Above Cur, Above DCVolt, Retries Exst, Above Anlg V, Logic In 1, Logic In 2, Logic 1 & 2, Logic 1 or 2, StpLogic Out, Timer Out, Counter Out, Above PF Ang, Anlg In Loss, ParamControl, NonRec Fault, EM Brk Cntrl, At Position, At Home, Safe-Off	At Frequency

PowerFlex 40P Technical Data

Parameter Number	Parameter Name	Description	Factory Default
A062	Opto Out2 Level	0.0 to 9999	0.0
A064	Opto Out Logic	0 to 3	0
A065	Analog Out Sel	21 settings; OutFreq 0-10, OutCurr 0-10, OutVolt 0-10, OutPowr 0-10, TstData 0-10, OutFreq 0-20, OutCurr 0-20, OutVolt 0-20, OutPowr 0-20, TstData 0-20, OutFreq 4-20, OutCurr 4-20, OutVolt 4-20, OutPowr 4-20, TstData 4-20, OutTorq 0-10, OutTorq 0-20, OutTorq 4-20, Setpnt 0-10, Setpnt 0-20, Setpnt 4-20	OutFreq 0-10
A066	Analog Out High	0 to 800%	100%
A067	Accel Time 2	0.0 to 600.0 Secs	20.0 Secs
A068	Decel Time 2	0.0 to 600.0 Secs	20.0 Secs
A069	Internal Freq	0.00 to 600.0 Hz	60.00 Hz
A070	Preset Freq 0	0.00 to 500.0 Hz	0.00 Hz
A071	Preset Freq 1		5.00 Hz
A072	Preset Freq 2		10.00 Hz
A073	Preset Freq 3		20.00 Hz
A074	Preset Freq 4		30.00 Hz
A075	Preset Freq 5		40.00 Hz
A076	Preset Freq 6		50.00 Hz
A077	Preset Freq 7		60.00 Hz
A078	Jog Frequency	0.00 to [Maximum Freq]	10.00 Hz
A079	Jog Accel/Decel	0.1 to 600.0 Secs	10.0 Secs
A080	DC Brake Time	0.0 to 99.9 Secs	0.0 Secs
A081	DC Brake Level	0.0 to (Drive Rated Amps x 1.8)	Drive Rated Amps x 0.05
A082	DB Resistor Sel	0 to 99	0
A083	S Curve %	0 to 100%	0%
A084	Boost Select	15 settings: Custom V/Hz; 30.0, VT (Variable Torque); 35.0, VT; 40.0, VT; 45.0, VT; 0.0 no IR; 0.0; 2.5, CT (Constant Torque); 5.0, CT; 7.5, CT; 10.0, CT; 12.5, CT; 15.0, CT; 17.5, CT; 20.0, CT	5.0, CT 2.5, CT; 5, 7.5, 10 & 15 Hp
A085	Start Boost	0.0 to 25.0%	2.5%
A086	Break Voltage	0.0 to 100.0%	25.0%
A087	Break Frequency	0.0 to 500.0 Hz	15.0 Hz
A088	Maximum Voltage	20 to Drive Rated Volts	Drive Rated Volts
A089	Current Limit 1	0.1 to (Drive Rated Amps x 1.8)	Drive Rated Amps x 1.5
A090	Motor OL Select	3 settings; No Derate, Min Derate, Max Derate	No Derate
A091	PWM Frequency	2.0 to 16.0 kHz	4.0 kHz
A092	Auto Rstrt Tries	0 to 9	0
A093	Auto Rstrt Delay	0.0 to 120.0 Secs	1.0 Secs
A094	Start At PowerUp	2 settings; Disabled, Enabled	Disabled
A095	Reverse Disable	2 settings; Rev Enabled, Rev Disabled	Rev Enabled
A096	Flying Start En	2 settings; Disabled, Enabled	Disabled
A097	Compensation	4 settings; Disabled, Electrical, Mechanical, Both	Electrical
A098	SW Current Trip	0.0 to (Drive Rated Amps x 2)	0.0 (Disabled)
A099	Process Factor	0.1 to 999.9	30.0
A100	Fault Clear	3 settings; Ready/Idle, Reset Fault, Clear Buffer	Ready/Idle
A101	Program Lock	2 settings; Unlocked, Locked	Unlocked
A102	Testpoint Sel	400 to FFFF Hex	400
A103	Comm Data Rate	6 settings; 1200, 2400, 4800, 9600, 19.2K, 38.4K	9600
A104	Comm Node Addr	1 to 247	100
A105	Comm Loss Action	4 settings; Fault, Coast Stop, Stop, Continu Last	Fault
A106	Comm Loss Time	0.1 to 60.0 Secs	5.0 Secs
A107	Comm Format	6 settings; RTU 8-N-1, RTU 8-E-1, RTU 8-O-1, RTU 8-N-2, RTU 8-E-2, RTU 8-O-2	RTU 8-N-1
A108	Language	7 settings; English, Francais, Espanol, Italiano, Deutsch, Portugues, Nederlands	English
A109	Anlg Out Setpt	0.0 to 100.0%	0.0%
A110	Anlg In 0-10V Lo	0.0 to 100.0%	0.0%
A111	Anlg In 0-10V Hi	0.0 to 100.0%	100.0%
A112	Anlg In4-20mA Lo	0.0 to 100.0%	0.0%
A113	Anlg In4-20mA Hi	0.0 to 100.0%	100.0%
A114	Slip Hertz @ FLA	0.0 to 10.0 Hz	2.0 Hz
A115	Process Time Lo	0.00 to 99.99	0.00
A116	Process Time Hi	0.00 to 99.99	0.00
A117	Bus Reg Mode	2 settings; Disabled, Enabled	Enabled
A118	Current Limit 2	0.1 to (Drive Rated Amps x 1.8)	Drive Rated Amps x 1.5
A119	Skip Frequency	0 to 500 Hz	0 Hz
A120	Skip Freq Band	0.0 to 30.0 Hz	0.0 Hz
A121	Stall Fault Time	6 settings; 60 Seconds, 120 Seconds, 240 Seconds, 360 Seconds, 480 Seconds, Fit Disabled	60 Seconds
A122	Analog In Loss	7 settings; Disabled, Fault, Stop, Zero Ref, Min Freq Ref, Max Freq Ref, Int Freq Ref	Disabled

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Parameter Number	Parameter Name	Description	Factory Default
A123	10V Bipolar Enbl	2 settings; Uni-Polar In, Bi-Polar In	Uni-Polar In
A124	Var PWM Disable	2 settings; Enable, Disable	Enable
A125	Torque Perf Mode	2 settings; V/Hz, Sensrls Vect	Sensrls Vect
A126	Motor NP FLA	0.1 to (Drive Rated Amps x 2)	Drive Rated Amps
A127	Autotune	3 settings; Ready/Idle, Static Tune, Rotate Tune	Ready/Idle
A128	IR Voltage Drop	0.0 to 230.0 VAC	Based on Drive Rating
A129	Flux Current Ref	0.00 to (Motor NP FLA)	Based on Drive Rating
A130	PID Trim Hi	0.0 to 500.0 Hz	60.0 Hz
A131	PID Trim Lo	0.0 to 500.0 Hz	0.0 Hz
A132	PID Ref Sel	11 settings: PID Disabled; PID Setpoint; 0-10V Input; 4-20mA Input; Comm Port; Encoder; Setpnt, Trim; 0-10V, Trim; 4-20mA, Trim; Comm, Trim; Encoder, Trim	PID Disabled
A133	PID Feedback Sel	4 settings; 0-10V Input, 4-20mA Input, Comm Port, Encoder	0-10V Input
A134	PID Prop Gain	0.00 to 99.99	0.01
A135	PID Integ Time	0.0 to 999.9 Secs	2.0 Secs
A136	PID Diff Rate	0.00 to 99.99 (1/Secs)	0.01 (1/Secs)
A137	PID Setpoint	0.0 to 100.0%	0.0%
A138	PID Deadband	0.0 to 10.0%	0.0%
A139	PID Preload	0.0 to 500.0 Hz	0.0 Hz
A140	Stp Logic 0	0001 to FAFF	00F1
A141	Stp Logic 1		
A142	Stp Logic 2		
A143	Stp Logic 3		
A144	Stp Logic 4		
A145	Stp Logic 5		
A146	Stp Logic 6		
A147	Stp Logic 7		
A150	Stp Logic Time 0	0.0 to 999.9 Secs	30.0 Secs
A151	Stp Logic Time 1		
A152	Stp Logic Time 2		
A153	Stp Logic Time 3		
A154	Stp Logic Time 4		
A155	Stp Logic Time 5		
A156	Stp Logic Time 6		
A157	Stp Logic Time 7		
A160	EM Brk Off Delay	0.01 to 10.00 Secs	2.00 Secs
A161	EM Brk On Delay	0.01 to 10.00 Secs	2.00 Secs
A162	MOP Reset Sel	2 settings; Zero MOP Ref, Save MOP Ref	Save MOP Ref
A163	DB Threshold	0.0 to 110.0%	100.0%
Enhanced Program Group			
E201	LED Display Opt	0 to 3	2
E202	Digital Term 3	36 settings: Start Source; Acc/Dec Sel1; Jog; Aux Fault; Preset Freq; Comm Port; Clear Fault; RampStop,CF; CoastStop,CF; DCInjStop,CF; Jog Forward; Jog Reverse; 10V In Ctrl; 20mA In Ctrl; PID Disable; MOP Up; MOP Down; Timer Start; Counter In; Reset Timer; Reset Count; Rset Tim&Cnt; Logic In1; Logic In2; Current Lmt2; Anlg Invert; EM Brk Rlse; Acc/Dec Sel2; Precharge En; Inertia Dcel; Sync Enable; Traverse Dis; Home Limit; Find Home; Hold Step; Pos Redefine	Term Block
E203	Accel Time 3	0.0 to 600.0 Secs	5.0 Secs
E204	Decel Time 3	0.0 to 600.0 Secs	5.0 Secs
E205	Accel Time 4	0.0 to 600.0 Secs	30.0 Secs
E206	Decel Time 4	0.0 to 600.0 Secs	30.0 Secs
E207	Comm Write Mode	2 settings; EEPROM, RAM only	EEPROM
E208	Power Loss Mode	2 settings; Coast, Decel	Coast
E209	Half Bus Enable	2 settings; Disabled, Enabled	Disabled
E210	Max Traverse	0.00 to 300.0 Hz	0.00 Hz (Disabled)
E211	Traverse Inc	0.00 to 30.00 Secs	0.00 Secs
E212	Traverse Dec	0.00 to 30.00 Secs	0.00 Secs
E213	P Jump	0.00 to 300.0 Hz	0.00 Hz
E214	Sync Time	0.0 to 3200.0 Secs	0.0 Secs (Disabled)
E215	Speed Ratio	0.01 to 99.99	1.00
E216	Motor Fdbk Type	6 settings; None, Pulse Train, Single Chan, Single Check, Quadrature, Quad Check	None
E217	Motor NP Poles	2 to 40	4
E218	Encoder PPR	1 to 20000	1024
E219	Pulse In Scale	1 to 20000	64
E220	Ki Speed Loop	0.0 to 400.0	2.0
E221	Kp Speed Loop	0.0 to 200.0	0.5

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Parameter Number	Parameter Name	Description	Factory Default
E222	Positioning Mode	0 to 4	0
E223	Find Home Freq	0.1 to 500.0 Hz	10.0 Hz
E224	Find Home Dir	2 settings; Forward, Reverse	Forward
E225	Encoder Pos Tol	1 to 50000	100
E226	Counts Per Unit	1 to 32000	4096
E230	Step Units 0	0 to 64000	0
E232	Step Units 1		
E234	Step Units 2		
E236	Step Units 3		
E238	Step Units 4		
E240	Step Units 5		
E242	Step Units 6		
E244	Step Units 7		
E231	Step Units F 0	0.00 to 0.99	0.00
E233	Step Units F 1		
E235	Step Units F 2		
E237	Step Units F 3		
E239	Step Units F 4		
E241	Step Units F 5		
E243	Step Units F 6		
E245	Step Units F 7		
E246	Pos Reg Filter	0 to 15	8
E247	Pos Reg Gain	0.0 to 200.0	3.0
E248	Enh Control Word	0 to 1	0
E249	Cmd Stat Select	0 to 1	0
<i>Advanced Display Group</i>			
d301	Drive Status 2	0 to 1	Read Only
d302	Fibers Status	0 to 1	Read Only
d303	Slip Hz Meter	0.0 to 25.0 Hz	Read Only
d304	Speed Feedback	0 to 64000 RPM	Read Only
d305	Speed Feedback F	0.0 to 0.9	Read Only
d306	Encoder Speed	0 to 64000	Read Only
d307	Encoder Speed F	0.0 to 0.9	Read Only
d308	Units Traveled H	0 to 64000	Read Only
d309	Units Traveled L	0.00 to 0.99	Read Only

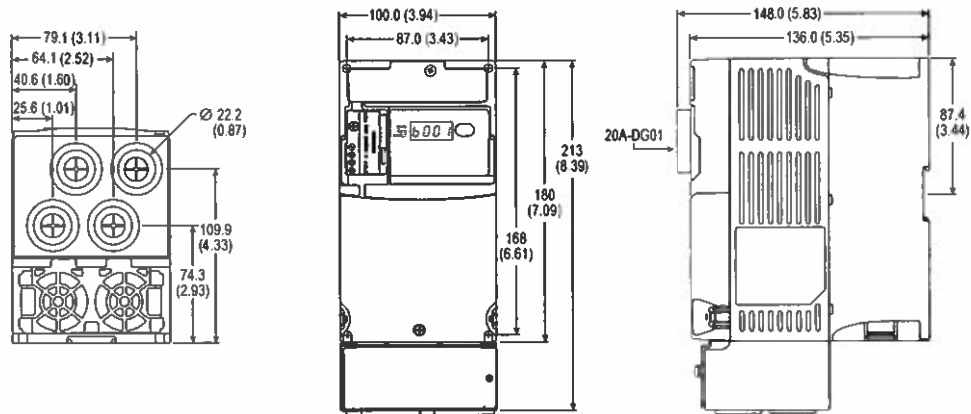
PowerFlex 40P Technical Data

Approximate Dimensions

Ratings are in kW and (HP).

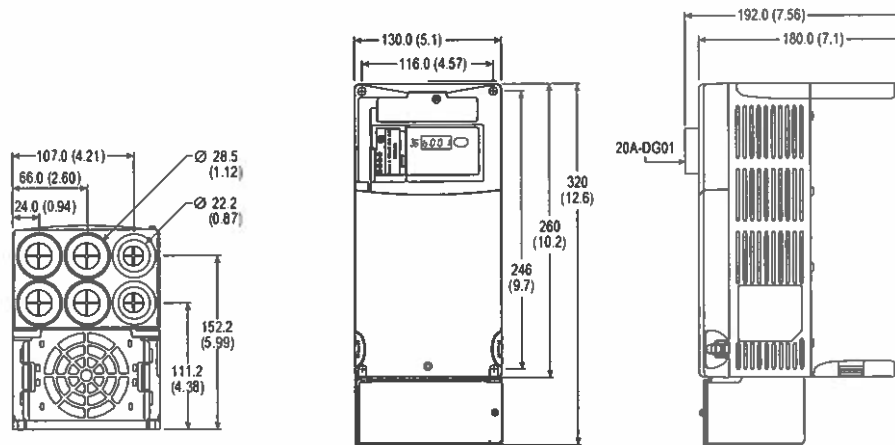
Frame	240V AC – 3-Phase		480V AC – 3-Phase		600V AC – 3-Phase	
B	0.4 (0.5)	2.2 (3.0)	0.4 (0.5)	2.2 (3.0)	0.75 (1.0)	2.2 (3.0)
	0.75 (1.0)	3.7 (5.0)	0.75 (1.0)	4.0 (5.0)	1.5 (2.0)	4.0 (5.0)
	1.5 (2.0)		1.5 (2.0)			
C	11.0 (15.0)	18.5 (25.0)	5.5 (7.5)	11.0 (15.0)	5.5 (7.5)	11.0 (15.0)
	15.0 (20.0)	22.0 (30.0)	7.5 (10.0)		7.5 (10.0)	

IP 30/NEMA 1/ UL Type 1 Option Kit without Communication Option



Frame B

(Shown with IP30/NEMA 1/UL Type 1 conversion kit.)

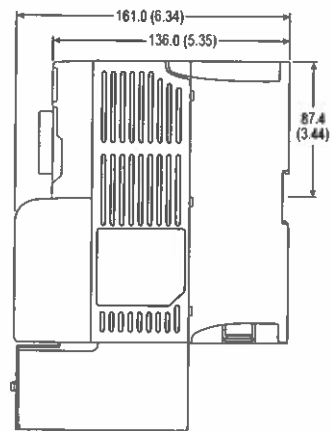
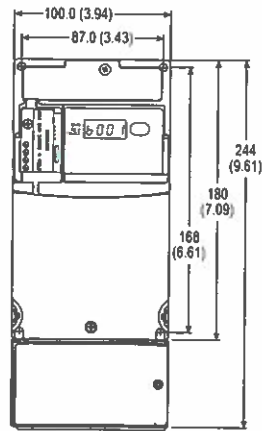
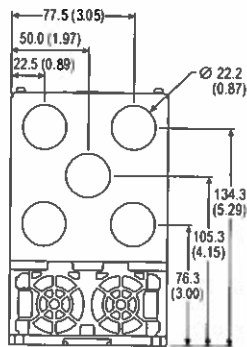


Frame C

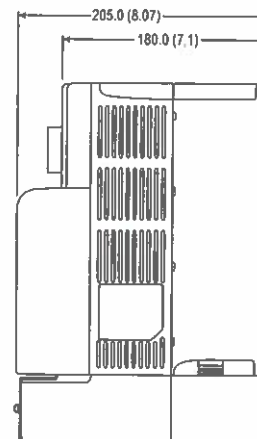
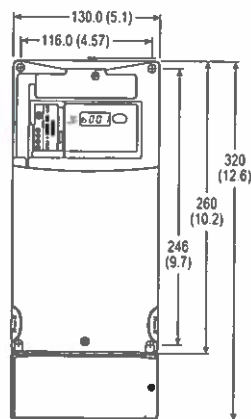
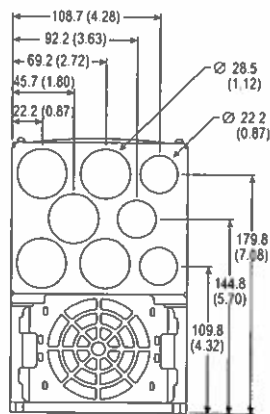
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PowerFlex 40P Technical Data

IP 30/NEMA 1/UL Type 1 Option Kit with Communication Option



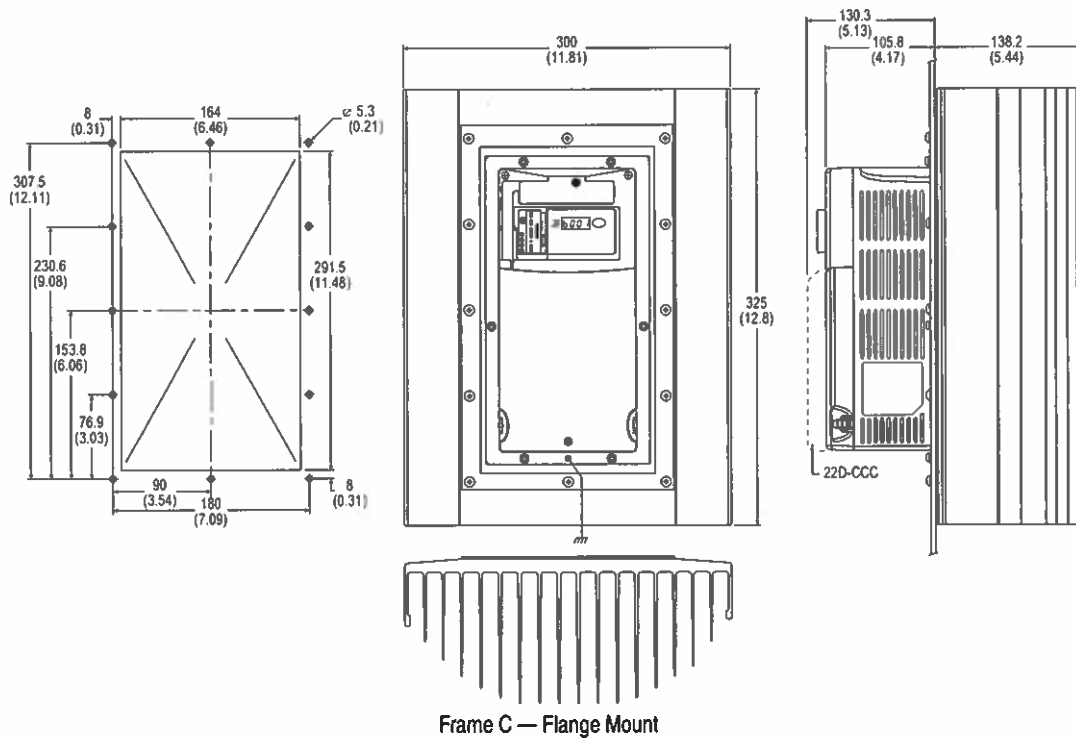
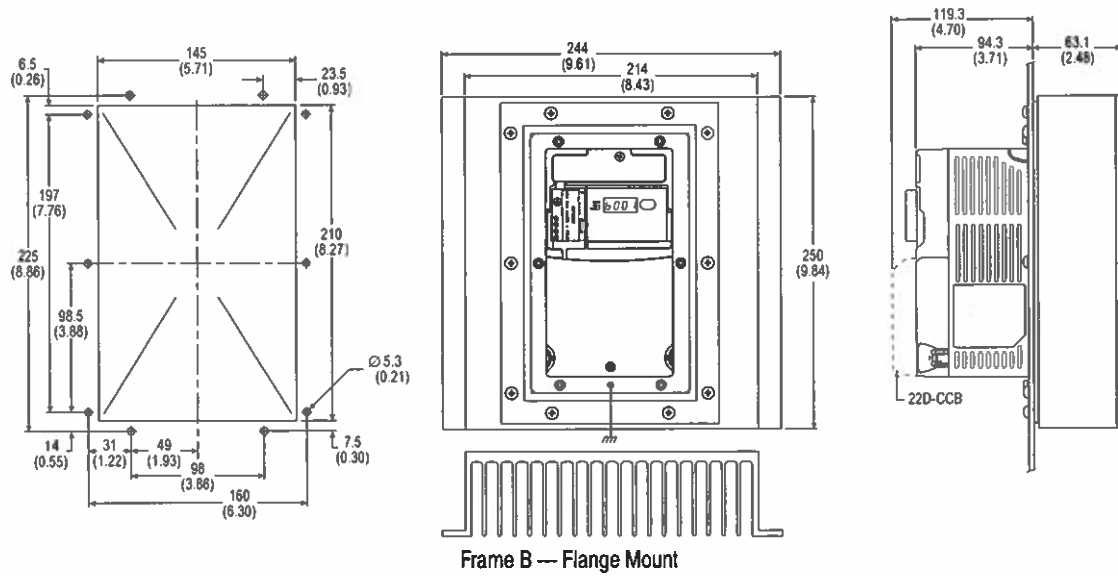
Frame B - 22-JBCB



Frame C - 22-JBCC

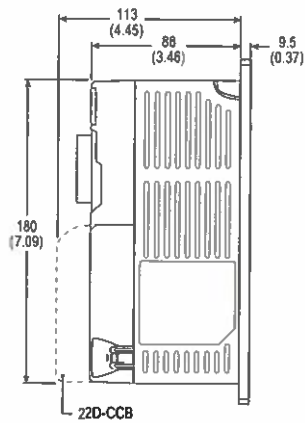
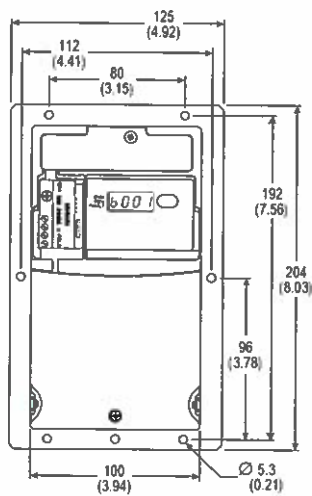
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Flange Mount Drive

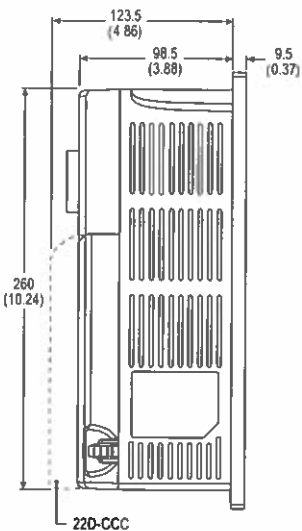
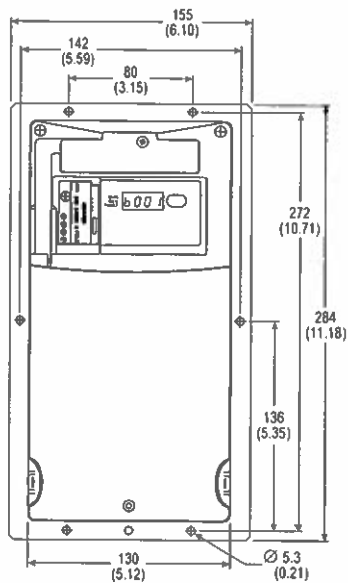


PowerFlex 40P Technical Data

Plate Drive



Frame B — Plate Drive

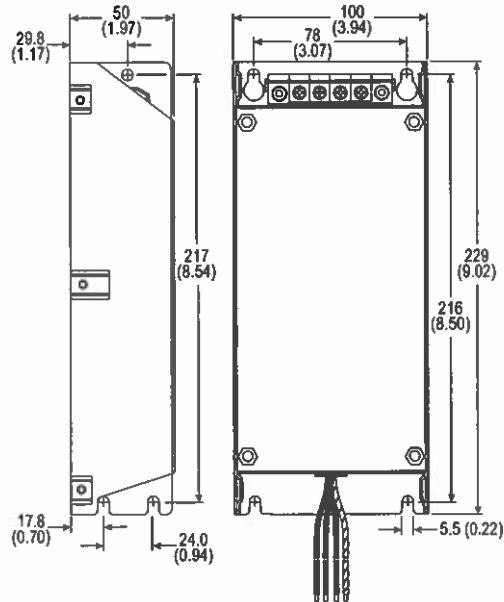


Frame C — Plate Drive

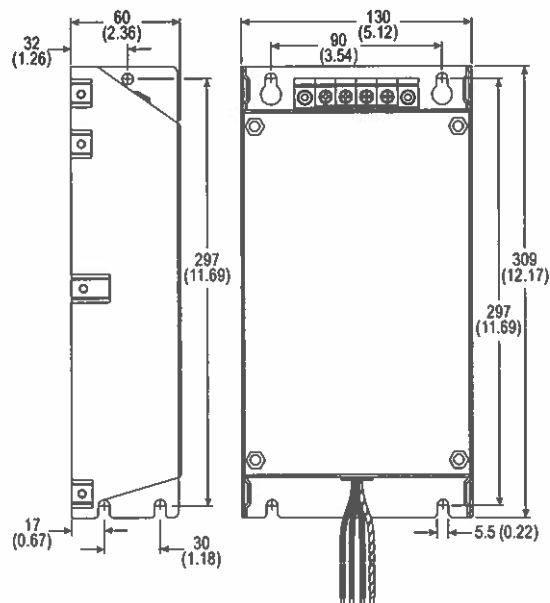
PowerFlex 40P Technical Data

EMC Line Filters

Dimensions are in millimeters and (inches)
Catalog Numbers: 22-RF0P8-BL; 22-RF012-BS, -BL (Series B); 22-RF021-BS, -BL



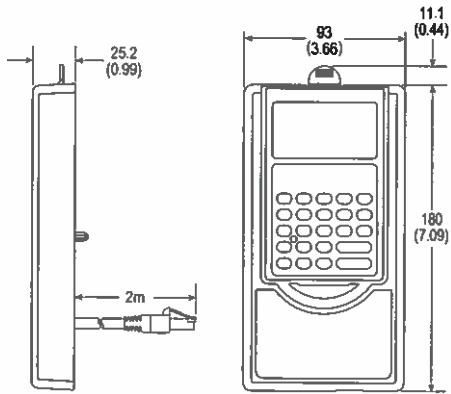
Catalog Numbers: 22-RF018-CS, -CL; 22-RF025-CL; 22-RF026-CS, -CL; 22-RF034-CS, -CL



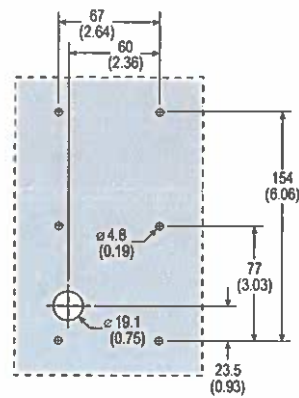
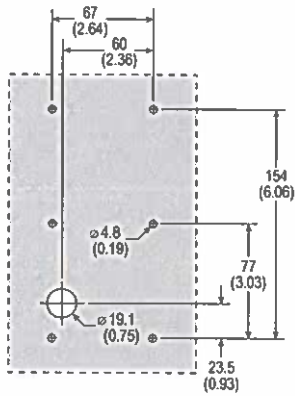
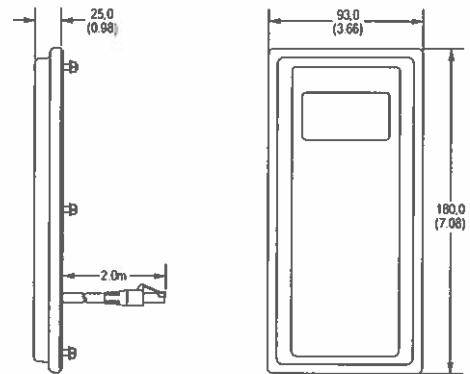
PowerFlex 40P Technical Data

Human Interface Module (HIM) Dimensions

NEMA Type 1 Bezel – Dimensions are in millimeters and (inches)
Catalog Number: 22-HIM-B1



NEMA Type 4X/12 Remote (Panel Mount) Small HIM
– Dimensions are in millimeters and (inches)
Catalog Number: 22-HIM-C2S



PowerFlex 40P Technical Data

Notes

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Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382 2000, Fax: (1) 414 382 4444

Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

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

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Technical Data



Allen-Bradley

PowerFlex 520-Series AC Drive Specifications

Original Instructions



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Drive Features: AppView™, CustomView™, QuickView™, and MainsFree™ configuration and programming tools.



Allen-Bradley • Rockwell Software

**Rockwell
Automation**

Product Overview

The PowerFlex® 520-Series AC drive delivers an innovative design that is remarkably versatile and can accommodate systems ranging from standalone machines to simple system integration. The PowerFlex 523 drive provides general purpose control for applications ranging up to 30 HP and 22 kW. The PowerFlex 525 drive provides maximum flexibility and performance ranging up to 30 HP and 22 kW.

By combining a variety of motor control options, communications, energy savings and standard safety features in a cost-effective drive, the PowerFlex 520-Series drive is suitable for a wide array of applications.

Maximize your system performance and productivity by taking advantage of the following key features offered in a PowerFlex 520-Series drive.

PowerFlex 520-Series AC Drives Feature

Modular Design

- Detachable control module and power module allow **simultaneous configuration and installation**.
- Each drive has a **standard control module** used across the entire power range.
- **MainsFree™ configuration** allows you to simply connect your control module to a PC with a standard USB cable and quickly upload, download, and flash the drive with new settings.
- **Support for accessory cards** without affecting footprint.
(PowerFlex 523 drives support one, PowerFlex 525 drives support two)

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 16 kHz** ensures quiet operation.

PowerFlex 520-Series AC Drive Advanced Features

Control Performance

- **Variety of motor control options, including:**
 - Volts per hertz (V/Hz)
 - Sensorless Vector Control (SVC)
 - Closed loop velocity vector control (PowerFlex 525 drives only)
 - Permanent Magnet motor control (PowerFlex 525 drives only)
- **Variety of Positioning Control, including:**
 - PointStop™ stops motor load in a consistent position without encoder feedback
 - Closed loop feedback with an optional encoder card (PowerFlex 525 drives only)
 - Point-to-point positioning mode (PowerFlex 525 drives only)
- **Integral PID functionality enhances application flexibility**
(PowerFlex 523 drives have one PID loop, PowerFlex 525 drives have two PID loops)

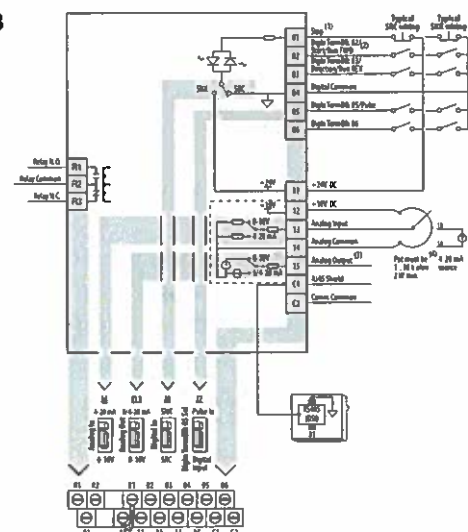
I/O Wiring

PowerFlex 523

- **One (1) Analog Input** (unipolar voltage or current) independently isolated from the rest of the drive I/O.
- **Five (5) Digital Inputs** (four programmable) provide application versatility.
- **One (1) Analog Output⁽¹⁾** which 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 to another device.
- **One (1) Relay Output** (form C) can be used to indicate various drive, motor or logic conditions.

(1) Analog output (terminal 15) is only available on PowerFlex 523 series B drive and requires firmware 3.001 and later to configure the analog output parameters.

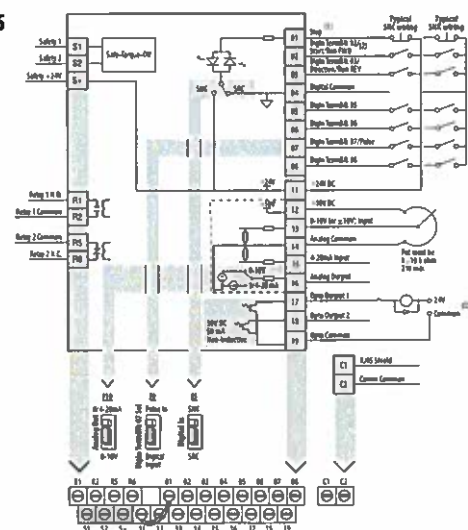
**PowerFlex 523
Series B
Control I/O
Wiring Block
Diagram**



PowerFlex 525

- **Two (2) Analog Inputs** (one unipolar and one bipolar) are independently isolated from the rest of the drive I/O. These inputs can be toggled via a digital input.
- **Seven (7) Digital Inputs** (six programmable) provide application versatility.
- **One (1) Analog Output** which 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 to 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.

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



Communications

- **Embedded EtherNet/IP™ port** allows easy configuration, control, and collection of drive data over the network. (PowerFlex 525 drives only)
- **Dual port EtherNet/IP option card** supports Device Level Ring (DLR) topologies, providing **fault-tolerant connectivity** for optimum drive availability.
- **Integral RS485/DSI communications** enable the drives to be used in a multi-drop network configuration.
- Optional communication cards such as **DeviceNet™**, and **PROFIBUS DP™** can improve machine performance.
- **Online EDS file creation** with RSNetWorx™ providing ease of set-up on a network.

Optimized for Common DC Bus Installations

Enhanced Control of Internal Pre-charge

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 520-Series drive has been optimized for use in **Common DC Bus** or **Shared DC Bus** installations.

- Configurable pre-charge control using digital inputs.
- Direct DC Bus connection to power terminal blocks.

Improved Ride Through

Operation Down to 1/2 Line Voltage

The PowerFlex 520-Series 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 520-Series drive also supports **enhanced inertia ride through** for additional low voltage mitigation.

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

Additional Features of PowerFlex 525 Drives

Closed Loop Feedback

Encoder/Pulse Train Input

The PowerFlex 525 drive allows for configurable closed loop control with an optional encoder card for either speed or position feedback for improved speed regulation, basic position control, or other pulse inputs for motor control.

- Improved speed regulation
- Basic position control

Basic Position Control

Local Position Control

- Position regulator with StepLogic™
- 8 positions (local logic)

Outer Position Control Loop

- **Analog input bipolar mode** offers improved zero-cross performance.
- **Simple motion control** applications with more complex position profiles.
- **Speed reference** supplied to drive via Analog Input or multiple field bus network options.
- **Speed ratio** available for simple draw applications.

Feedback Details

Line Driver Type Incremental Encoder Option Card

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

Pulse Train Input

- Configurable Input Voltage 5V/12V/24V DC autodetect
- Input Frequency up to 100 kHz

Encoder Wiring Examples

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

Safety Inside using Safe-Torque-Off Function

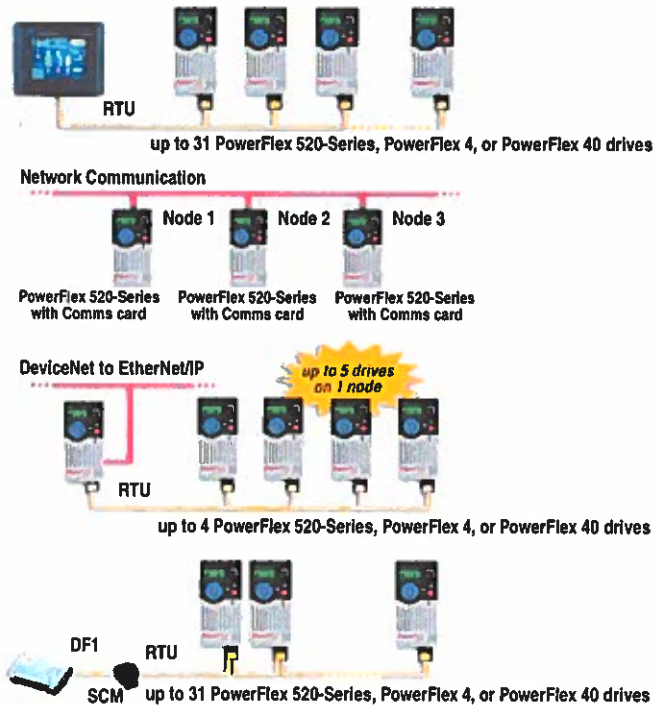
Safe Torque-Off is a standard safety feature of the PowerFlex 525 drive to help protect personnel and equipment. Safe Torque-off allows you to restart your application faster after a safety-related situation.

- Safe Torque-Off functionality **removes rotational power without powering down the drive.**
- Embedded safety **reduces wiring and saves on installation space.**
- Meets ISO 13849-1 standards and provides safety ratings up to and including **SIL 2/PLd.**

Communications and Software

Versatile Programming and Network Solutions

- PowerFlex 520-Series drives are compatible with any device that acts as a **RTU Master** and supports standard 03 and 06 RTU commands.
- A network can be configured using PowerFlex 520-Series drives for **high performance and flexible configuration** capabilities.
 - Embedded port for EtherNet/IP (PowerFlex 525 drives only)
 - EtherNet/IP dual-port option card
 - DeviceNet option card
 - PROFIBUS DP option card
- A **multi-drive solution** can be reached using a single PowerFlex 520-Series drive, with the ability for up to five (5) drives to reside on one (1) node.
- **Integral RS485** communications enable the drives to be used in a multi-drop network configuration. A serial converter module (SCM) provides connectivity to any controller with a DF1 port. The SCM can be eliminated if the controller acts as a RTU Master.



PC Programming Software

Connected Components Workbench™

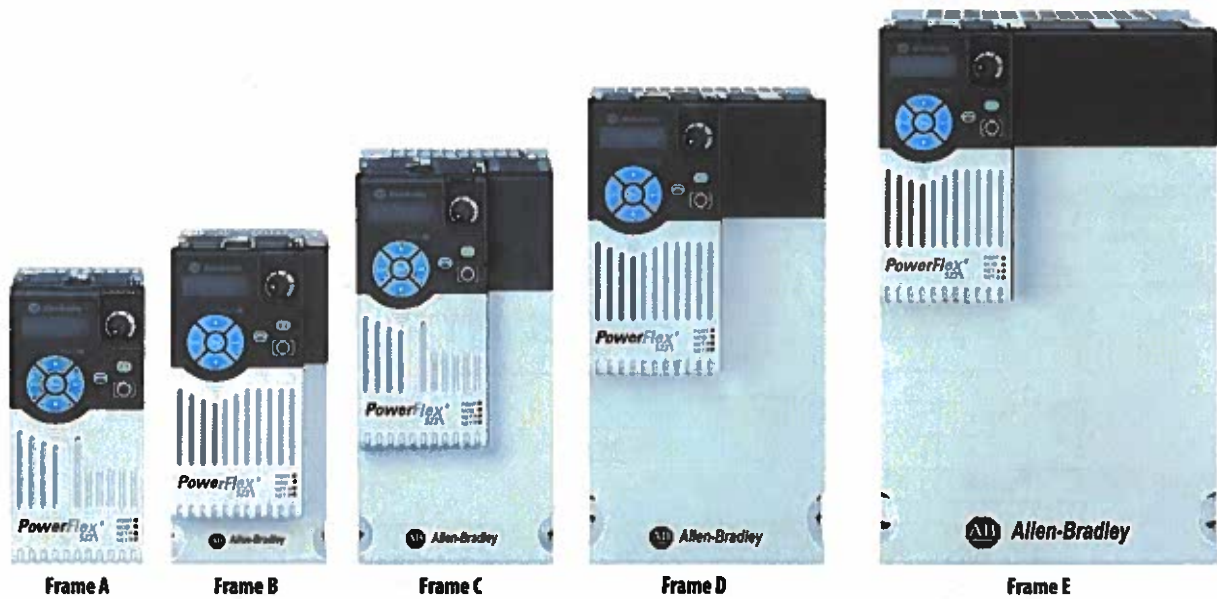
- Supports plug-and-play connectivity through a standard USB connection.
- AppView™ tool provides parameter groups for several of the most common applications.
- Create and save custom parameter groups using the CustomView™ tool.
- Supports PowerFlex drives, Micro800™ controllers and PanelView™ component graphic terminals.

Studio 5000™ Logix Designer

- Add-on profiles (AOPs) for PowerFlex 520-series AC drives provide seamless integration into the Logix environment.
- Configuration files from Studio 5000 Logix Designer⁽¹⁾ can be transferred directly to the PowerFlex 520-Series drive over EtherNet/IP.
- Automatic Device Configuration (ADC) uploads configuration parameters to a replaced drive, minimizing the need for a manual reconfiguration.

⁽¹⁾ The Logix Designer application is the rebranding of RSLogix 5000 software. You can also use RSLogix 5000 version 17 or greater.

PowerFlex 523 Drive Family



PowerFlex 525 Drive Family



PowerFlex 520-Series AC Drive Specifications

Catalog Number Explanation

1-3	4	5	6-8	9	10	11	12	13	14
25B	–	B	2P3	N	1	1	4	–	–
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	Interface Module
1	Standard

Code	Enclosure
N	IP20 NEMA / Open

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
1P6 ⁽¹⁾	1.6	A	0.25	0.2	0.25	0.2
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
1P6 ⁽¹⁾	1.6	A	0.25	0.2	0.25	0.2
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
1P6 ⁽¹⁾	1.6	A	0.25	0.2	0.25	0.2
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 ⁽²⁾	48.3	E	15.0	11.0	10.0	7.5
062 ⁽²⁾	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 ⁽²⁾	30.0	D	20.0	15.0	15.0	11.0
037 ⁽²⁾	37.0	E	25.0	18.5	20.0	15.0
043 ⁽²⁾	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 ⁽²⁾	22.0	D	20.0	15.0	15.0	11.0
027 ⁽²⁾	27.0	E	25.0	18.5	20.0	15.0
032 ⁽²⁾	32.0	E	30.0	22.0	25.0	18.5

(1) This rating is only available for PowerFlex 523 drives.

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

Technical Specifications

Protection

Specifications	PowerFlex 523	PowerFlex 525
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		
P038 = 3 "600V":	487V DC bus (equivalent to 344V AC incoming line)	
P038 = 2 "480V":	390V DC bus (equivalent to 275V 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 523	PowerFlex 525
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 523	PowerFlex 525
Method	Sinusoidal PWM, Volts/Hertz, Sensorless Vector Control, Economizer SVC motor control, Closed Loop Velocity Vector Control, Surface Mount and Interior Permanent Magnet Motor (without encoder), Interior Permanent Magnet Motor (with encoder) (Closed Loop Velocity Vector Control and PM motor control are not applicable to PowerFlex 523 drives)	
Carrier Frequency	2...16 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	

PowerFlex 520-Series AC Drive Specifications

Specifications	PowerFlex 523	PowerFlex 525
Performance V/Hz (Volts per Hertz): SVC (Sensorless Vector): SVC Economizer: VVC (Velocity Vector Control): PM Motor ⁽¹⁾ :	$\pm 1\%$ of base speed across a 60:1 speed range $\pm 0.5\%$ of base speed across a 100:1 speed range $\pm 0.5\%$ of base speed across a 100:1 speed range (Applicable to PowerFlex 525 drives only) $\pm 0.5\%$ of base speed across a 60:1 speed range $\pm 0.5\%$ of base speed, up to a 20:1 speed range	
Performance with Encoder SVC (Sensorless Vector): SVC Economizer: VVC (Velocity Vector Control): PM Motor (iPM motor, 10 HP rating and below) ⁽¹⁾ :	(Applicable to PowerFlex 525 drives only) $\pm 0.1\%$ of base speed across a 100:1 speed range ⁽²⁾ $\pm 0.1\%$ of base speed across a 100:1 speed range ⁽²⁾ $\pm 0.1\%$ of base speed across a 1000:1 speed range ⁽²⁾ $\pm 0.1\%$ of base speed, up to a 60:1 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 – Ramp, Coast, DC-Brake, and Ramp-to-Stop	
Accel/Decel:	Four independently programmable accel and decel times. Each time may be programmed from 0...600 s in 0.01 s increments.	
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)	

(1) For details on specific motor performance, see Knowledge Base article "PowerFlex 525 PM Motor Performance Testing Summary".

(2) For more information, see the PowerFlex 520-Series Adjustable Frequency AC Drive User Manual, publication [520-UM001](#).

Control Inputs

Specifications	PowerFlex 523	PowerFlex 525
Digital	Bandwidth:	10 Rad/s for open and closed loop
	Quantity:	(1) Dedicated for stop (4) Programmable
	Current:	6 mA
	Type Source Mode (SRC): Sink Mode (SNK):	18...24V = ON, 0...6V = OFF 0...6V = ON, 18...24V = OFF
	Pulse Train Quantity: Input Signal: Input Frequency: Current Consumption:	(1) Shared with one of the programmable digital input terminals. Transistor contact (open collector) 0...100 kHz 7 mA @ 24V DC maximum
	Quantity:	(1) Isolated, 0-10V and 4-20 mA
Analog	Specification Resolution: 0-10V DC Analog: 4-20 mA Analog: External Pot:	(2) Isolated, -10-10V and 4-20 mA 10-bit 100k ohm input impedance 250 ohm input impedance 1...10k ohm, 2 W minimum

Control Outputs

Specifications		PowerFlex 523	PowerFlex 525
Relay	Quantity:	(1) Programmable Form C	(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 ⁽¹⁾	
	Specification Resolution: 0-10V DC Analog: 4-20 mA Analog:	10-bit 1 k ohm minimum 525 ohm maximum	

(1) Feature is not applicable to PowerFlex 523 series A drives.

Encoder







Specifications	PowerFlex 523	PowerFlex 525
Type:	—	Incremental, dual channel
Supply:		12V, 250 mA
Quadrature:		90°, ±27° @ 25 °C
Duty Cycle:		50%, +10%
Requirements:		Encoders must be line driver type, quadrature (dual channel) or pulse (single 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.

PowerFlex 520-Series AC Drive Specifications

Environmental Specifications

Specifications	PowerFlex 523	PowerFlex 525																																		
Altitude	See Current Derating Curves on page 18 for derating guidelines. 1000 m (3300 ft) max. 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 Current Derating Curves on page 18 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:	IMPORTANT Drive must not 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.																																			
Relative Humidity:	0...95% noncondensing																																			
Shock:	Complies with IEC 60068-2-27																																			
Vibration:	Complies with IEC 60068-2-6:1995																																			
	<table><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><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></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	
Frame Size	Operating and Nonoperating		Nonoperating (Transportation)																																	
	Force (Shock/Vibration)	Mounting Type	Force (Shock/Vibration)	Mounting Type																																
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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																																
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 523	PowerFlex 525
c-UL-us 	Listed to UL508C and CAN/CSA-C22.2 No. 14-05.	
RCM 	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	
CE 	In conformity with the following European Directives: 2014/35/EU Low Voltage Directive (LVD) 2014/30/EU EMC Directive (EMC) 2014/34/EU ATEX Directive (ATEX) 2006/42/EC Machinery Directive (MD) Standards applied: EN 61800-3 EN 61800-5-1	
TUV 	(Applicable to PowerFlex 525 drives only) TÜV Rheinland Standards applied: EN ISO 13849-1 EN 61800-5-2 EN 61508 PARTS 1-7 EN 62061 EN 60204-1 Certified to ISO 13849-1 SIL2/PLd with embedded Safe-Torque-Off function Meets Functional Safety (FS) when used with embedded Safe-Torque-Off function	
ATEX  II (2) G D TUV 12 ATEX 7199 X	(Applicable to PowerFlex 525 drives only) Certified to ATEX directive 2014/34/EU Group II Category (2) GD Applications with ATEX Approved Motors	
KCC	Korean Registration of Broadcasting and Communications Equipment Compliant with the following standards: Article 58-2 of Radio Waves Act, Clause 3	
EAC	Standards applied: Low Voltage TP TC 004/2011 EMC TP TC 020/2011	
AC 156	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	
SEMI F47 	Electric Power Research Institute Certified compliant with the following standards: SEMI F47 IEC 61000-4-11 IEC 61000-4-34	
Lloyds Register	(Applicable to PowerFlex 525 drives only) Lloyd's Register Type Approval Certificate 12/10068(E1)	
RoHS	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

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

PowerFlex 520-Series Drive Ratings

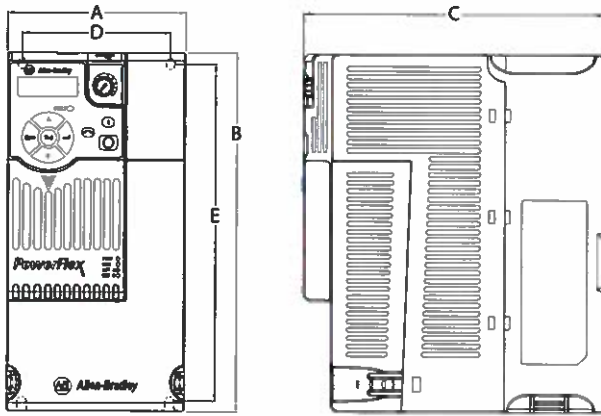
PowerFlex 523 Catalog No.	PowerFlex 525 Catalog No.	Output Ratings				Output Current (A)	Input Voltage Range	Total Watts Loss	Frame Size
		Normal Duty		Heavy Duty					
		HP	kW	HP	kW				
100...120V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output									
25A-V1P6N104	—	0.25	0.2	0.25	0.2	1.6	85...132	20.0	A
25A-V2P5N104	25B-V2P5N104	0.5	0.4	0.5	0.4	2.5	85...132	27.0	A
25A-V4P8N104	25B-V4P8N104	1.0	0.75	1.0	0.75	4.8	85...132	53.0	B
25A-V6P0N104	25B-V6P0N104	1.5	1.1	1.5	1.1	6.0	85...132	67.0	B
200...240V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output									
25A-A1P6N104	—	0.25	0.2	0.25	0.2	1.6	85...132	20.0	A
25A-A2P5N104	25B-A2P5N104	0.5	0.4	0.5	0.4	2.5	170...264	29.0	A
25A-A4P8N104	25B-A4P8N104	1.0	0.75	1.0	0.75	4.8	170...264	50.0	A
25A-A8P0N104	25B-A8P0N104	2.0	1.5	2.0	1.5	8.0	170...264	81.0	B
25A-A011N104	25B-A011N104	3.0	2.2	3.0	2.2	11.0	170...264	111.0	B
200...240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0...230V 3-Phase Output									
25A-A1P6N114	—	0.25	0.2	0.25	0.2	1.6	85...132	20.0	A
25A-A2P5N114	25B-A2P5N114	0.5	0.4	0.5	0.4	2.5	170...264	29.0	A
25A-A4P8N114	25B-A4P8N114	1.0	0.75	1.0	0.75	4.8	170...264	53.0	A
25A-A8P0N114	25B-A8P0N114	2.0	1.5	2.0	1.5	8.0	170...264	84.0	B
25A-A011N114	25B-A011N114	3.0	2.2	3.0	2.2	11.0	170...264	116.0	B
200...240V AC (-15%, +10%) – 3-Phase Input, 0...230V 3-Phase Output									
25A-B1P6N104	—	0.25	0.2	0.25	0.2	1.6	85...132	20.0	A
25A-B2P5N104	25B-B2P5N104	0.5	0.4	0.5	0.4	2.5	170...264	29.0	A
25A-B5P0N104	25B-B5P0N104	1.0	0.75	1.0	0.75	5.0	170...264	50.0	A
25A-B8P0N104	25B-B8P0N104	2.0	1.5	2.0	1.5	8.0	170...264	79.0	A
25A-B011N104	25B-B011N104	3.0	2.2	3.0	2.2	11.0	170...264	107.0	A
25A-B017N104	25B-B017N104	5.0	4.0	5.0	4.0	17.5	170...264	148.0	B
25A-B024N104	25B-B024N104	7.5	5.5	7.5	5.5	24.0	170...264	259.0	C
25A-B032N104	25B-B032N104	10.0	7.5	10.0	7.5	32.2	170...264	323.0	D
25A-B048N104	25B-B048N104	15.0	11.0	10.0	7.5	48.3	170...264	584.0	E
25A-B062N104	25B-B062N104	20.0	15.0	15.0	11.0	62.1	170...264	708.0	E
380...480V AC (-15%, +10%) – 3-Phase Input, 0...460V 3-Phase Output ⁽¹⁾									
25A-D1P4N104	25B-D1P4N104	0.5	0.4	0.5	0.4	1.4	323...528	27.0	A
25A-D2P3N104	25B-D2P3N104	1.0	0.75	1.0	0.75	2.3	323...528	37.0	A
25A-D4P0N104	25B-D4P0N104	2.0	1.5	2.0	1.5	4.0	323...528	62.0	A
25A-D6P0N104	25B-D6P0N104	3.0	2.2	3.0	2.2	6.0	323...528	86.0	A
25A-D010N104	25B-D010N104	5.0	4.0	5.0	4.0	10.5	323...528	129.0	B
25A-D013N104	25B-D013N104	7.5	5.5	7.5	5.5	13.0	323...528	170.0	C
25A-D017N104	25B-D017N104	10.0	7.5	10.0	7.5	17.0	323...528	221.0	C
25A-D024N104	25B-D024N104	15.0	11.0	15.0	11.0	24.0	323...528	303.0	D
25A-D030N104	25B-D030N104	20.0	15.0	15.0	11.0	30.0	323...528	387.0	D

PowerFlex 523	PowerFlex 525	Output Ratings				Output Current (A)	Input Voltage Range	Total Watts Loss	Frame Size
		Normal Duty		Heavy Duty					
Catalog No.	Catalog No.	HP	kW	HP	kW				
380...480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0...460V 3-Phase Output									
25A-D1P4N114	25B-D1P4N114	0.5	0.4	0.5	0.4	1.4	323...528	27.0	A
25A-D2P3N114	25B-D2P3N114	1.0	0.75	1.0	0.75	2.3	323...528	37.0	A
25A-D4P0N114	25B-D4P0N114	2.0	1.5	2.0	1.5	4.0	323...528	63.0	A
25A-D6P0N114	25B-D6P0N114	3.0	2.2	3.0	2.2	6.0	323...528	88.0	A
25A-D010N114	25B-D010N114	5.0	4.0	5.0	4.0	10.5	323...528	133.0	B
25A-D013N114	25B-D013N114	7.5	5.5	7.5	5.5	13.0	323...528	175.0	C
25A-D017N114	25B-D017N114	10.0	7.5	10.0	7.5	17.0	323...528	230.0	C
25A-D024N114	25B-D024N114	15.0	11.0	15.0	11.0	24.0	323...528	313.0	D
25A-D030N114	25B-D030N114	20.0	15.0	15.0	11.0	30.0	323...528	402.0	D
25A-D037N114	25B-D037N114	25.0	18.5	20.0	15.0	37.0	323...528	602.0	E
25A-D043N114	25B-D043N114	30.0	22.0	25.0	18.5	43.0	323...528	697.0	E
525...600V AC (-15%, +10%) – 3-Phase Input, 0...575V 3-Phase Output									
25A-E0P9N104	25B-E0P9N104	0.5	0.4	0.5	0.4	0.9	446...660	22.0	A
25A-E1P7N104	25B-E1P7N104	1.0	0.75	1.0	0.75	1.7	446...660	32.0	A
25A-E3P0N104	25B-E3P0N104	2.0	1.5	2.0	1.5	3.0	446...660	50.0	A
25A-E4P2N104	25B-E4P2N104	3.0	2.2	3.0	2.2	4.2	446...660	65.0	A
25A-E6P6N104	25B-E6P6N104	5.0	4.0	5.0	4.0	6.6	446...660	95.0	B
25A-E9P9N104	25B-E9P9N104	7.5	5.5	7.5	5.5	9.9	446...660	138.0	C
25A-E012N104	25B-E012N104	10.0	7.5	10.0	7.5	12.0	446...660	164.0	C
25A-E019N104	25B-E019N104	15.0	11.0	15.0	11.0	19.0	446...660	290.0	D
25A-E022N104	25B-E022N104	20.0	15.0	15.0	11.0	22.0	446...660	336.0	D
25A-E027N104	25B-E027N104	25.0	18.5	20.0	15.0	27.0	446...660	466.0	E
25A-E032N104	25B-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.

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

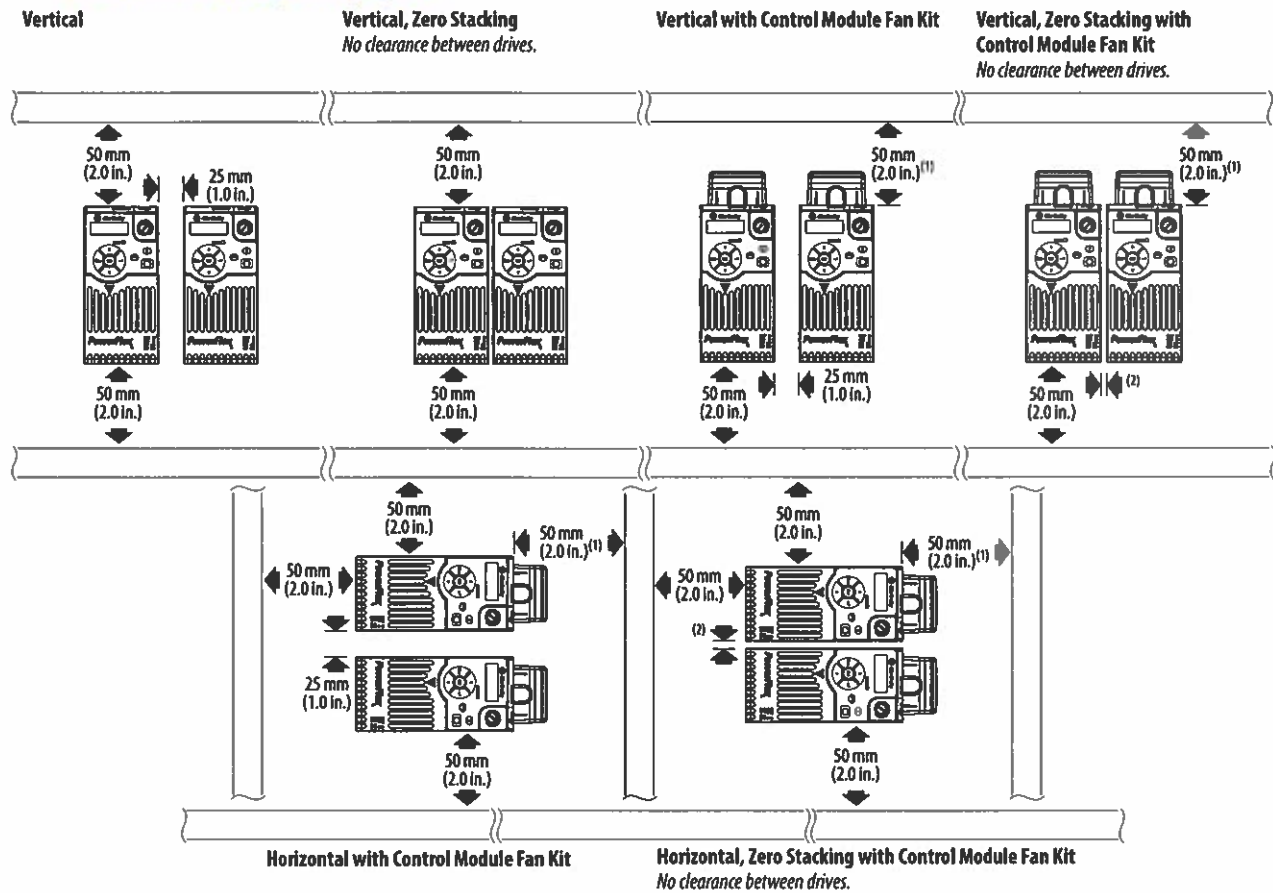
- Mount the drive upright on a flat, vertical and level surface.

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 14](#) 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

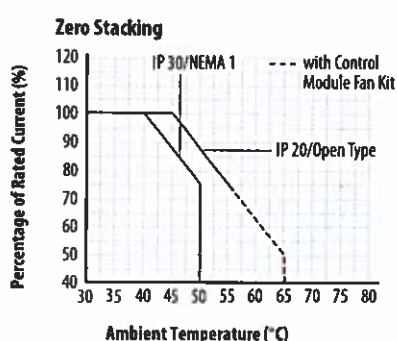
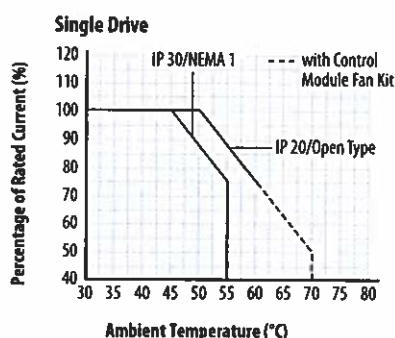
See [Accessories and Dimensions on page 32](#) for option kits.

Mounting	Enclosure Rating ⁽¹⁾	Ambient Temperature			
		Minimum	Maximum (No Derate)	Maximum (Derate) ⁽²⁾	Maximum with Control Module Fan Kit (Derate) ⁽³⁾⁽⁵⁾
Vertical	IP 20/Open Type	-20 °C (-4 °F)	50 °C (122 °F)	60 °C (140 °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)	55 °C (131 °F)	65 °C (149 °F)
	IP 30/NEMA 1/UL Type 1		40 °C (104 °F)	50 °C (122 °F)	—
Horizontal with Control Module Fan Kit ⁽⁴⁾⁽⁵⁾	IP 20/Open Type		50 °C (122 °F)	—	70 °C (158 °F)
Horizontal, Zero Stacking with Control Module Fan Kit ⁽⁴⁾⁽⁵⁾	IP 20/Open Type		45 °C (113 °F)	—	65 °C (149 °F)

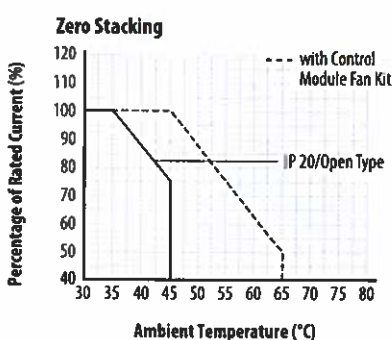
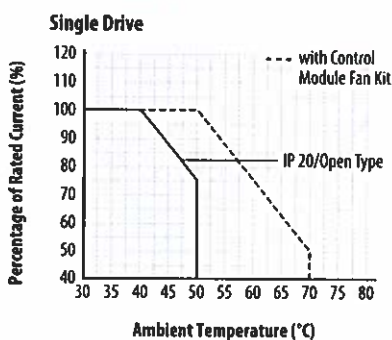
- (1) IP 30/NEMA 1/UL Type 1 rating requires installation of the PowerFlex 520-Series IP 30/NEMA 1/UL Type 1 option kit, catalog number 25-JBAX.
(2) For catalogs 25x-D1P4N104 and 25x-E0P9N104, the temperature listed under the Max. (Derate) column is reduced by 5 °C (9 °F) for all mounting methods.
(3) For catalogs 25x-D1P4N104 and 25x-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 25x-D1P4N104 and 25x-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).

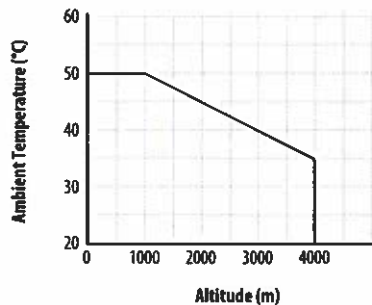
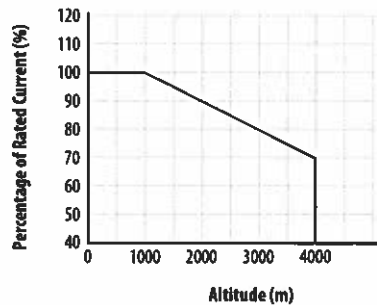
If the drive is used above 1000 m (3300 ft):

- Derate the maximum ambient temperature by 5 °C (9 °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 °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.

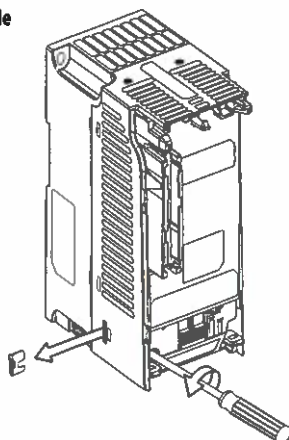
Disconnecting MOVs

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.

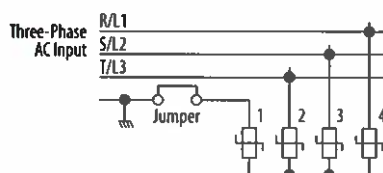
Jumper Location (Typical)

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 20](#)). 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

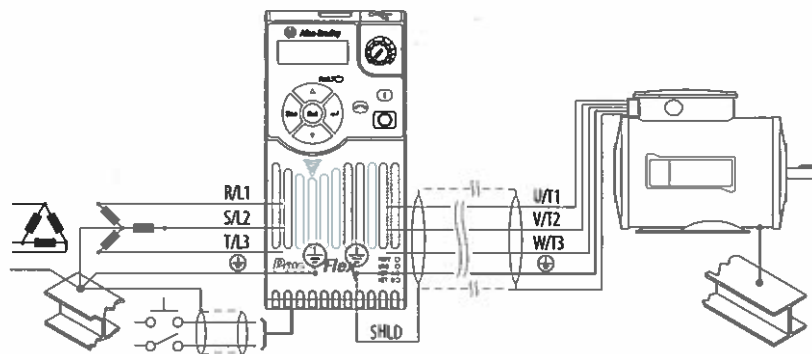
Input Power Condition	Corrective Action
Low Line Impedance (less than 1% line reactance)	<ul style="list-style-type: none"> • Install Line Reactor⁽²⁾ • or Isolation Transformer
Greater than 120 kVA supply transformer	
Line has power factor correction capacitors	<ul style="list-style-type: none"> • Install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

- (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 37 for specific line reactor part numbers.
- (2) See [Accessories and Dimensions](#) on page 32 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 - (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.

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"> Four tinned copper conductors with XLPE insulation. Copper braid/aluminum foil combination shield and tinned copper drain wire. PVC jacket.
Standard (Option 2)	Tray rated 600V, 90 °C (194 °F) RHH/RHW-2 Anixter OLF-7xxxx or equivalent	<ul style="list-style-type: none"> Three tinned copper conductors with XLPE insulation. 5 mil single helical copper tape (25% overlap min.) with three bare copper grounds in contact with shield. PVC jacket.
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"> Three bare copper conductors with XLPE insulation and impervious corrugated continuously welded aluminum armor. Black sunlight resistant PVC jacket overall. Three copper grounds on #10 AWG and smaller.

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...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 Wire Specifications

Frame	Maximum Wire Size ⁽¹⁾	Minimum Wire Size ⁽¹⁾	Torque
A	5.3 mm ² (10 AWG)	0.8 mm ² (18 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
B	8.4 mm ² (8 AWG)	2.1 mm ² (14 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
C	8.4 mm ² (8 AWG)	2.1 mm ² (14 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
D	13.3 mm ² (6 AWG)	5.3 mm ² (10 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
E	26.7 mm ² (3 AWG)	8.4 mm ² (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.

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.

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) ⁽¹⁾	Description	Min. Insulation Rating
Analog I/O & PTC	8760/9460	0.750 mm ² (18 AWG), twisted pair, 100% shield with drain ⁽²⁾	300V, 60 °C (140 °F)
Remote Pot	8770	0.750 mm ² (18 AWG), 3 conductor, shielded	
Encoder/Pulse I/O	9728/9730	0.196 mm ² (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 ² (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 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.

Control I/O Terminal Block Wire Specifications

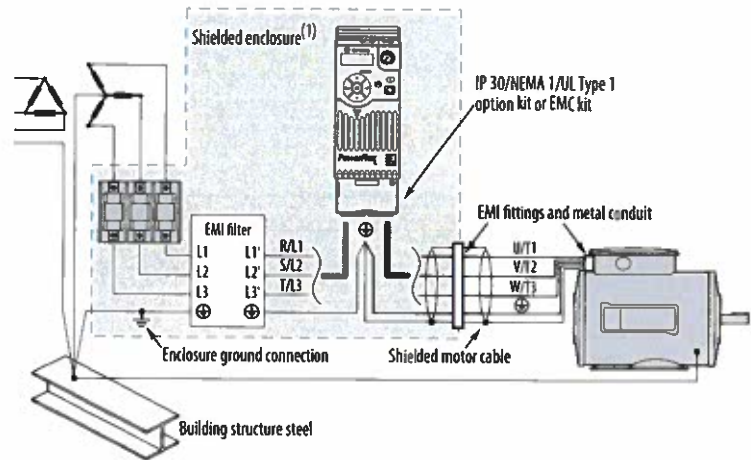
Frame	Maximum Wire Size ⁽¹⁾	Minimum Wire Size ⁽¹⁾	Torque
A...E	1.3 mm ² (16 AWG)	0.13 mm ² (26 AWG)	0.71...0.86 Nm (6.2...7.6 lb-in.)

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

Machinery Directive (2006/42/EC)

- EN ISO 13849-1 – Safety of machinery – Safety related parts of control systems -Part 1: General principles for design.
- EN 62061 – Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- EN 60204-1 – Safety of machinery – Electrical equipment of machines - Part 1: General requirements.
- EN 61800-5-2 – 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 520-Series 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 ⁽¹⁾	30 m (16 ft)	100 m (328 ft)	100 m (328 ft)

(1) See [Accessory Dimensions on page 39](#) for more information on optional external filters.

Fuses and Circuit Breaker Ratings

The PowerFlex 520-Series 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 [28...31](#) 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 [28...31](#). 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⁽¹⁾, 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 [28...31](#) 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 selfprotected 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.

Fuses and Circuit Breakers for PowerFlex 520-Series Drives

100...120V 1-Phase Input Protection Devices – Frames A...B

Catalog No.	Output Ratings						Input Ratings		Frame Size	Catalog No.	IEC Applications (Non-UL)			UL Applications			Min. Enclosure Vol. (in. ³)	
	PF 523	ND	HP		kW		Amps	kVA			Max Amps ⁽¹⁾	Fuses (Rating)	Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers		
			HP	kW	HP	kW							Min.	Max.		140U/140G		140M
25A-V1P6N104	—	0.25	0.2	0.25	0.2	1.6	0.8	6.4	A	100-C09	10	16	140U-D602-B80	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D602-B80	140M-CZE-B63	—
25A-V2P5N104	25B-V2P5N104	0.5	0.4	0.5	0.4	2.5	1.3	9.6	A	100-C12	16	20	140U-D602-C12	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D602-C12	140M-CZE-C10	—
25A-V4P8N104	25B-V4P8N104	1.0	0.75	1.0	0.75	4.8	2.5	19.2	B	100-C23	25	40	140U-D602-C25	140M-D8E-C20	CLASS RK5, CC, J, or T / DLS-R-40	140U-D602-C25	140M-D8E-C20	—
25A-V6P0N104	25B-V6P0N104	1.5	1.1	1.5	1.1	6.0	3.2	24.0	B	100-C23	32	50	140U-D602-C30	140M-F8E-C25	CLASS RK5, CC, J, or T / DLS-R-50	140U-D602-C30	140M-F8E-C25	—

200...240V 1-Phase Input Protection Devices – Frames A...B

Catalog No.	Output Ratings						Input Ratings		Frame Size	Fuses (Rating) Catalog No.	IEC Applications (Non-UL)			UL Applications			
	ND		HP		kW	Amps	kVA	Max Amps ⁽¹⁾			Circuit Breakers		Fuses (Max. Rating) Class / Catalog No.	Circuit Breakers		Min. Enclosure Vol. (in. ³)	
	PF 525		HP								Min.	Max.		140U/140G	140M		140U/140G
PF 523	PF 525		HP	kW	HP	kW	Amps	kVA	Max Amps ⁽¹⁾								
25A-A1P6N104 25A-A1P6N114 25A-A2P5N104 25A-A2P5N114 25A-A4P8N104 25A-A4P8N114 25A-A8P0N104 25A-A8P0N114 25A-A0T1N104 25A-A0T1N114	—	0.25	0.2	0.25	0.2	1.6	1.4	5.3	A	100-C09	6	10	140U-D602-C10	140M-C2E-B63	140U-D602-C10	140M-C2E-B63	—
	—	0.25	0.2	0.25	0.2	1.6	1.4	5.3	A	100-C09	6	10	140U-D602-C10	140M-C2E-B63	140U-D602-C10	140M-C2E-B63	—
		0.5	0.4	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	16	140U-D602-C10	140M-C2E-C10	140U-D602-C10	140M-C2E-C10	—
		0.5	0.4	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	16	140U-D602-C10	140M-C2E-C10	140U-D602-C10	140M-C2E-C10	—
		1.0	0.75	1.0	0.75	4.8	2.8	10.7	A	100-C12	16	25	140U-D602-C15	140M-C2E-C16	140U-D602-C15	140M-C2E-C16	—
		1.0	0.75	1.0	0.75	4.8	2.8	10.7	A	100-C12	16	25	140U-D602-C15	140M-C2E-C16	140U-D602-C15	140M-C2E-C16	—
		2.0	1.5	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D602-C25	140M-F8E-C25	140U-D602-C25	140M-F8E-C25	—
		2.0	1.5	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D602-C25	140M-F8E-C25	140U-D602-C25	140M-F8E-C25	—
		3.0	2.2	3.0	2.2	11.0	6.0	22.9	B	100-C37	32	50	140G-G6C3-C35	140M-F8E-C25	⁽⁵⁾	140M-F8E-C25	—
		3.0	2.2	3.0	2.2	11.0	6.0	22.9	B	100-C37	32	50	140G-G6C3-C35	140M-F8E-C25	⁽⁵⁾	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 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.
- (5) Circuit breaker selection is not available for this drive rating.

Fuses and Circuit Breakers for PowerFlex 520-Series Drives (continued)

200...240V 3-Phase Input Protection Devices – Frames A...E

Catalog No. ⁽¹⁾	Output Ratings						Input Ratings		Frame Size	Fuses (Rating) Catalog No.	IEC Applications (Non-UL)			UL Applications			Min. Enclosure Vol. (in. ³)			
	PF 523	PF 525	ND		HD		Amps	KVA			Max Amps ⁽²⁾	Fuses (Rating)		Circuit Breakers		Fuses (Max. Rating)		Circuit Breakers		
			HP	kW	HP	kW						Min.	Max.	140U/7140G	140M	Class / Catalog No.		140U/7140G	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-15
			0.25	0.2	0.25	0.2	1.6	0.9	1.9	A	100-C09	3	6	140U-D603-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-15	140U-D603-B30	140M-CZE-B25	—	
			0.5	0.4	0.5	0.4	2.5	1.2	2.7	A	100-C09	6	6	140U-D603-B40	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-6	140U-D603-B40	140M-CZE-B40	—	
			1.0	0.75	1.0	0.75	5.0	2.7	5.8	A	100-C09	10	16	140U-D603-B80	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D603-B80	140M-CZE-B63	—	
			2.0	1.5	2.0	1.5	8.0	4.3	9.5	A	100-C12	16	20	140U-D603-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D603-C10	140M-CZE-C10	—	
			3.0	2.2	3.0	2.2	11.0	6.3	13.8	A	100-C23	20	32	140U-D603-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U-D603-C15	140M-CZE-C16	—	
			5.0	4.0	5.0	4.0	17.5	9.6	21.1	B	100-C23	32	45	140U-D603-C25	140M-F8E-C25	CLASS CC, J, or T / 45	140U-D603-C25	140M-F8E-C25	—	
			7.5	5.5	7.5	5.5	24.0	12.2	26.6	C	100-C37	35	63	140G-G6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 60	— ⁽⁷⁾	140M-F8E-C32	—	
			10.0	7.5	10.0	7.5	32.2	15.9	34.8	D	100-C43	45	70	140G-G6C3-C60	140M-F8E-C45	CLASS RK5, CC, J, or T / DLS-R-70	— ⁽⁷⁾	140M-F8E-C45	—	
			15.0	11.0	10.0	7.5	48.3	20.1	44.0	E	100-C60	63	90	140G-G6C3-C70	140M-F8E-C45	CLASS CC, J, or T / 90	— ⁽⁷⁾	140M-F8E-C45	1416.0 ⁽⁶⁾	
			20.0	15.0	15.0	11.0	62.1	25.6	56.0	E	100-C72	70	125	140G-G6C3-C90	— ⁽⁷⁾	CLASS CC, J, or T / 125	— ⁽⁷⁾	—	—	

(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 AC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protector 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 using a Manual Self-Protected (Type E) Combination Motor Controller with this drive power rating, 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.

(7) Circuit breaker selection is not available for this drive rating.

Fuses and Circuit Breakers for PowerFlex 520-Series Drives (continued)


380...480V 3-Phase Input Protection Devices – Frames A...E

Catalog No. ⁽¹⁾		Output Ratings				Input Ratings		Frame Size	IEC Applications (Non-UL)	UL Applications								
		PF 525	ND	HP	kW	HP	kW			Amps	kVA	Max Amps ⁽²⁾	Contactor No.	Fuses (Rating)	Circuit Breakers	Fuses (Max. Rating)	Circuit Breakers	Min. Enclosure Vol. (in. ³)
PF 523																		
PF 523	25A-D1P4N104	25B-D1P4N104	0.5	0.4	0.5	0.4	1.4	1.7	1.9	A	100-C09	3	6	140U-D603-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140M-CZE-B25	-
	25A-D1P4N114	25B-D1P4N114	0.5	0.4	0.5	0.4	1.4	1.7	1.9	A	100-C09	3	6	140U-D603-B30	140M-CZE-B25	CLASS RK5, CC, J, or T / DLS-R-6	140M-CZE-B25	-
	25A-D2P3N104	25B-D2P3N104	1.0	0.75	1.0	0.75	2.3	2.9	3.2	A	100-C09	6	10	140U-D603-B60	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	140M-CZE-B40	-
	25A-D2P3N114	25B-D2P3N114	1.0	0.75	1.0	0.75	2.3	2.9	3.2	A	100-C09	6	10	140U-D603-B60	140M-CZE-B40	CLASS RK5, CC, J, or T / DLS-R-10	140M-CZE-B40	-
	25A-D4P0N104	25B-D4P0N104	2.0	1.5	2.0	1.5	4.0	5.2	5.7	A	100-C09	10	16	140U-D603-B60	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140M-CZE-B63	-
	25A-D4P0N114	25B-D4P0N114	2.0	1.5	2.0	1.5	4.0	5.2	5.7	A	100-C09	10	16	140U-D603-B60	140M-CZE-B63	CLASS RK5, CC, J, or T / DLS-R-15	140M-CZE-B63	-
	25A-D6P0N104	25B-D6P0N104	3.0	2.2	3.0	2.2	6.0	6.9	7.5	A	100-C09	10	16	140U-D603-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	140M-CZE-C10	-
	25A-D6P0N114	25B-D6P0N114	3.0	2.2	3.0	2.2	6.0	6.9	7.5	A	100-C09	10	16	140U-D603-C10	140M-CZE-C10	CLASS RK5, CC, J, or T / DLS-R-15	140M-CZE-C10	-
	25A-D010N104	25B-D010N104	5.0	4.0	5.0	4.0	10.5	12.6	13.8	B	100-C23	20	32	140U-D603-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140M-CZE-C16	-
	25A-D010N114	25B-D010N114	5.0	4.0	5.0	4.0	10.5	12.6	13.8	B	100-C23	20	32	140U-D603-C15	140M-CZE-C16	CLASS RK5, CC, J, or T / DLS-R-30	140M-CZE-C16	-
	25A-D013N104	25B-D013N104	7.5	5.5	7.5	5.5	13.0	14.1	15.4	C	100-C23	20	35	140U-D603-C25	140M-D8E-C20	CLASS CC, J, or T / 35	140M-D8E-C20	-
	25A-D013N114	25B-D013N114	7.5	5.5	7.5	5.5	13.0	14.1	15.4	C	100-C23	20	35	140U-D603-C25	140M-D8E-C20	CLASS CC, J, or T / 35	140M-D8E-C20	-
	25A-D017N104	25B-D017N104	10.0	7.5	10.0	7.5	17.0	16.8	18.4	C	100-C23	25	40	140U-D603-C25	140M-D8E-C20	CLASS CC, J, or T / 40	140M-D8E-C20	-
	25A-D017N114	25B-D017N114	10.0	7.5	10.0	7.5	17.0	16.8	18.4	C	100-C23	25	40	140U-D603-C25	140M-D8E-C20	CLASS CC, J, or T / 40	140M-D8E-C20	-
	25A-D024N104	25B-D024N104	15.0	11.0	15.0	11.0	24.0	24.1	26.4	D	100-C37	35	63	140G-G6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	140M-F8E-C32	656.7 ⁽⁶⁾
	25A-D024N114	25B-D024N114	15.0	11.0	15.0	11.0	24.0	24.1	26.4	D	100-C37	35	63	140G-G6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	140M-F8E-C32	656.7 ⁽⁶⁾
	25A-D030N104	25B-D030N104	20.0	15.0	15.0	11.0	30.0	30.2	33.0	D	100-C43	45	70	140G-G6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	140M-F8E-C45	656.7 ⁽⁶⁾
	25A-D030N114	25B-D030N114	20.0	15.0	15.0	11.0	30.0	30.2	33.0	D	100-C43	45	70	140G-G6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	140M-F8E-C45	656.7 ⁽⁶⁾
	25A-D037N114	25B-D037N114	25.0	18.5	20.0	15.0	37.0	30.8	33.7	E	100-C43	45	70	140G-G6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	140M-F8E-C45	-
	25A-D043N114	25B-D043N114	30.0	22.0	25.0	18.5	43.0	35.6	38.9	E	100-C60	50	80	140G-G6C3-C60	140M-F8E-C45	CLASS CC, J, or T / 80	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 use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.
- (6) When using a Manual Self-Protected (Type E) Combination Motor Controller with this drive power rating, 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.
- (7) Circuit breaker selection is not available for this drive rating.

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

Catalog No. ⁽¹⁾	Output Ratings				Input Ratings		Frame Size	IEC Applications (Non-UL)				UL Applications																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	PF 523		PF 525		ND	HP		kW	HP	kW	Amps	KVA	Max Amps ⁽²⁾	Contactor No.	Fuses (Rating)		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers		Min. Enclosure Vol. (in. ³)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
	HP	kW	HP	kW		Min.									Max.	1400/140G	140M	Class / Catalog No.		1400/140G	140M-D8E-B63		140M-D8E-C16																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
PF 523	PF 525	ND	HP	kW	HP	kW	HP	kW	Amps	Max Amps ⁽²⁾	Contactor No.	Min.	Max.	1400/140G	140M	Class / Catalog No.	1400/140G	140M-D8E-B63	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140M-D8E-C16	140

- (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 use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.
- (6) When used with the 140M circuit breaker, the 25A-EP95104 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.).
- (7) When using a Manual Self-Protected (Type E) Combination Motor Controller with this drive power rating, 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.
- (8) Circuit breaker selection is not available for this drive rating.

Accessories and Dimensions

Dynamic Brake Resistors

Drive Ratings	HP	kW	Minimum Resistance $\Omega \pm 10\%$	Resistance $\Omega \pm 5\%$	Catalog No. ⁽¹⁾⁽²⁾
100...120V 50/60 Hz 1-Phase	0.25	0.2	56	91	AK-R2-091P500
	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	0.25	0.2	56	91	AK-R2-091P500
	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	0.25	0.2	56	91	AK-R2-091P500
	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 ⁽³⁾
	20.0	15.0	10	15	AK-R2-030P1K2 ⁽³⁾
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 ⁽³⁾
	20.0	15.0	43	60	AK-R2-120P1K2 ⁽³⁾
	25.0	18.5	27	40	AK-R2-120P1K2 ⁽⁴⁾
	30.0	22.0	27	40	AK-R2-120P1K2 ⁽⁴⁾
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 ⁽³⁾
	20.0	15.0	59	60	AK-R2-120P1K2 ⁽³⁾
	25.0	18.5	53	60	AK-R2-120P1K2 ⁽³⁾
	30.0	22.0	34	40	AK-R2-120P1K2 ⁽⁴⁾

(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 [PELEX-AL001](#).

(3) Requires two resistors wired in parallel.

(4) Requires three resistors wired in parallel.

EMC Line Filters

Short Circuit Current Rating = 100 kA					
Drive Ratings				Frame Size	Catalog No.
Input Voltage	HP	kW	Current (A)		
100...120V 50/60 Hz 1-Phase	0.25	0.2	1.6	A	25-RF011-AL
	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	0.25	0.2	1.6	A	25-RF011-AL
	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	0.25	0.2	1.6	A	25-RF014-AL
	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 ⁽¹⁾
	0.5	0.4	0.9	A	25-RF8P0-BL ⁽²⁾
	1.0	0.75	1.7	A	25-RF8P0-BL ⁽²⁾
	2.0	1.5	3.0	A	25-RF8P0-BL ⁽²⁾
525...600V 50/60 Hz 3-Phase	3.0	2.2	4.2	A	25-RF8P0-BL ⁽²⁾
	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 ⁽¹⁾

- (1) EMC Line Filter size is based on the input current of the drive. See the tables on [page 30](#) and [page 31](#) for more information.
(2) This 600V drive rating needs to be matched with a frame B EMC Line Filter.

PowerFlex 520-Series AC Drive Specifications

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

Human Interface Modules (HIM) Option Kits and Accessories

Item	Description	Catalog No.
LCD Display, Remote Panel Mount	Digital speed control CopyCat capable IP 66 (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 m 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

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	Incremental encoder input option board.	25-ENC-1



WARNING: Only the 25-ENC-1 Encoder will work properly in the PowerFlex 525 drive. Installing an incorrect encoder card, such as the PowerFlex 527 25-ENC-2 will cause damage to the PowerFlex 525 drive.

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 520-Series Power Module

Item	Description
PowerFlex 520-Series Power Module	Replacement power module for use with PowerFlex 520-Series drives. Includes: <ul style="list-style-type: none"> • Power Module • Power Module Front Cover • Power Terminal Guard • Heatsink Fan

Output Ratings					Input Voltage Range	Frame Size	Catalog No.
Normal Duty		Heavy Duty		Output Current (A)			
HP	kW	HP	kW				
100...120V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	85...132	A	25-PM1-V1P6
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
200...240V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	170...264	A	25-PM1-A1P6
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
200...240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0...230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	170...264	A	25-PM2-A1P6
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
200...240V AC (-15%, +10%) – 3-Phase Input, 0...230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	170...264	A	25-PM1-B1P6
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
380...480V AC (-15%, +10%) – 3-Phase Input, 0...460V 3-Phase Output							
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

PowerFlex 520-Series AC Drive Specifications

Output Ratings					Input Voltage Range	Frame Size	Catalog No.
Normal Duty		Heavy Duty		Output Current (A)			
HP	kW	HP	kW				
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
380...480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0...460V 3-Phase Output							
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
525...600V AC (-15%, +10%) – 3-Phase Input, 0...575V 3-Phase Output							
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

PowerFlex 520-Series Control Module

Item	Description	Frame Size	Catalog No.
PowerFlex 523 Control Module	Replacement control module for use with PowerFlex 520-Series drives. Includes: • Control Module • Control Module Front Cover	A...E	25A-CTM1
PowerFlex 525 Control Module			25B-CTM1

Other Parts

Item	Description	Frame Size	Catalog No.
PowerFlex 523 Control Module Front Cover	Replacement cover for the control module I/O terminals, EtherNet/IP and DSI ports.	A...E	25A-CTMFC1
PowerFlex 525 Control Module Front Cover			25B-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

Other Parts

Item	Description	Frame Size	Catalog No.
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 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

Communication Option Kits and Accessories

Item	Description	Catalog No.
Communication Adapters	Embedded communication options for use with the PowerFlex 520-Series drives: <ul style="list-style-type: none"> • DeviceNet • Dual Port EtherNet/IP • PROFIBUS DP-V1 	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 via DF1 protocol for use with Connected Components Workbench software. Includes: <ul style="list-style-type: none"> • 2m 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 Connected Components Workbench software. Includes: <ul style="list-style-type: none"> • DSI to RS232 serial converter (1) • 1203-SFC serial cable (1) • 22-RJ45CBL-C20 cable (1) 	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
Terminating Resistors	RJ45 120 Ohm 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	http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software

Bulletin 1321-3R Series Line Reactors

Output Ratings ⁽¹⁾				Input Line Reactor ⁽³⁾⁽⁴⁾		Output Line Reactor ⁽³⁾⁽⁴⁾	
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.
200...240V 50/60 Hz 1-Phase⁽²⁾							
0.25	0.2	0.25	0.2	1321-3R4-A	1321-3RA4-A	1321-3R2-D	1321-3RA2-D
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
200...240V 50/60 Hz 3-Phase							

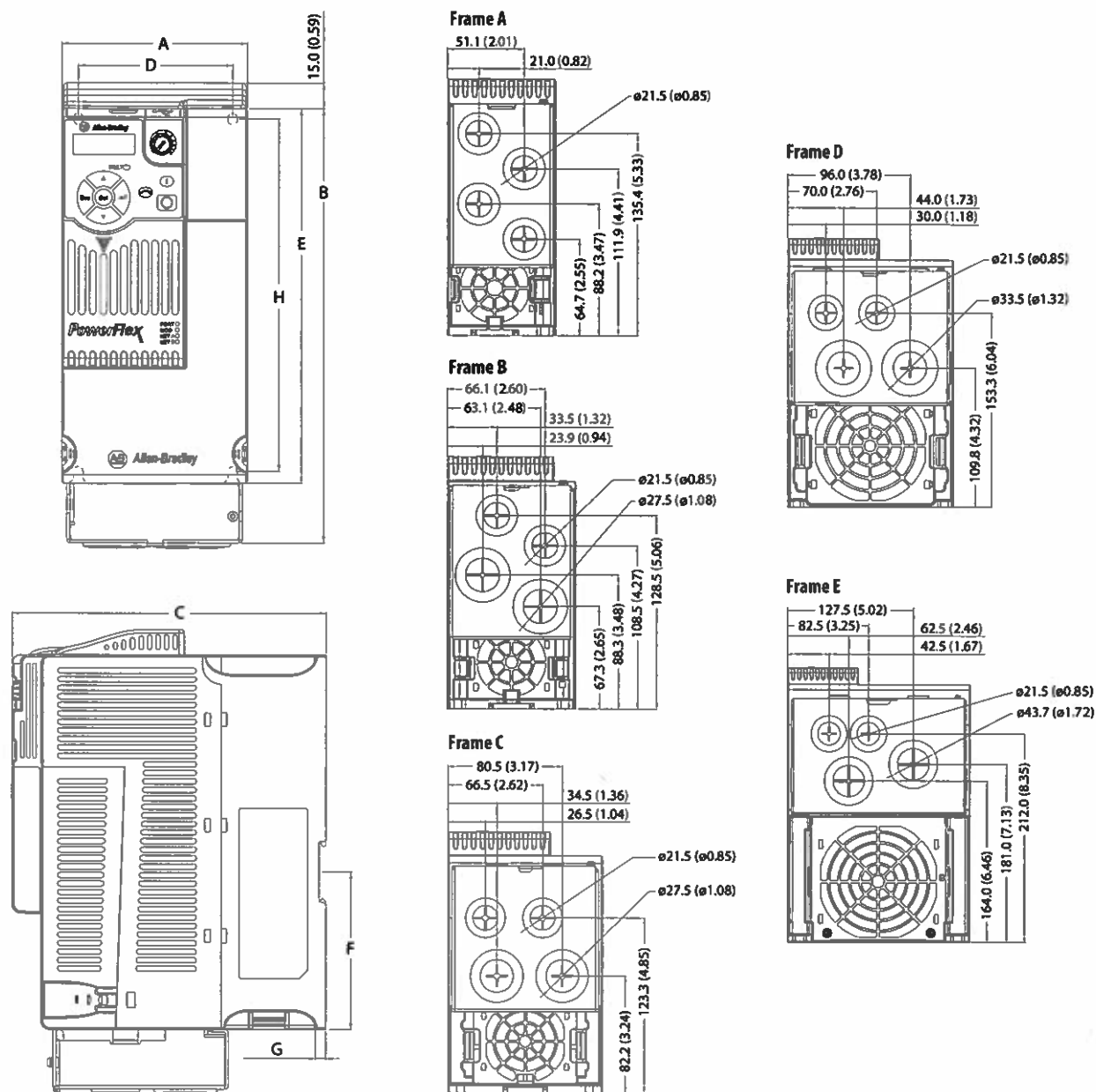
PowerFlex 520-Series AC Drive Specifications

Bulletin 1321-3R Series Line Reactors

Output Ratings ⁽¹⁾				Input Line Reactor ⁽³⁾⁽⁴⁾		Output Line Reactor ⁽³⁾⁽⁴⁾	
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.
0.25	0.2	0.25	0.2	1321-3R2-D	1321-3RA2-D	1321-3R2-D	1321-3RA2-D
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) 1321-3RA5-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)
380...480V 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	1321-3R4-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)
525...600V 50/60 Hz 3-Phase							
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. 5% impedance reactor types are also available. See 1321 Power Conditioning Products Technical Data, 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.

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

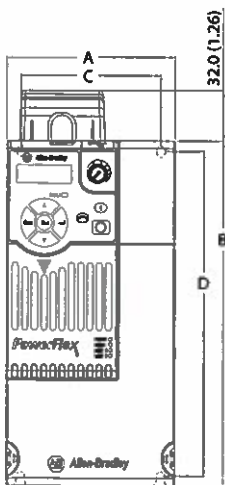


Frame Size	A	B	C	D	E	F	G	H
A	72.0 (2.83)	219.0 (8.62)	172.0 (6.77)	57.5 (2.26)	152.0 (5.98)	92.7 (3.65)	6.0 (0.24)	140.0 (5.51)
B	87.0 (3.43)	218.0 (8.58)	172.0 (6.77)	72.5 (2.85)	180.0 (7.09)	92.7 (3.65)	6.0 (0.24)	168.0 (6.61)
C	109.0 (4.29)	255.0 (10.04)	184.0 (7.24)	90.5 (3.56)	222.0 (8.66)	92.7 (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)

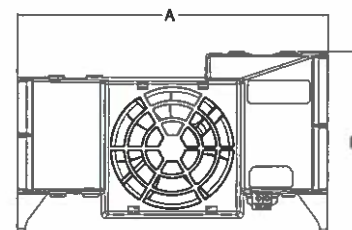
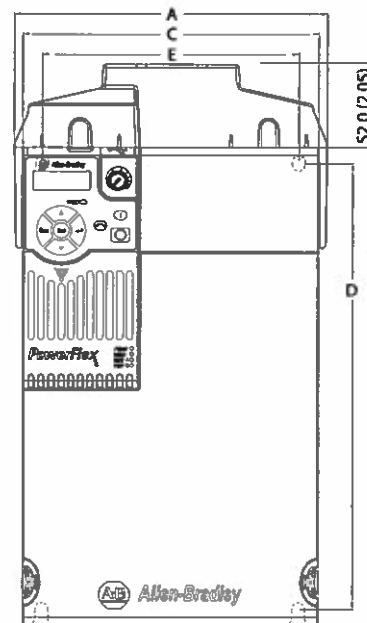
PowerFlex 520-Series AC Drive Specifications

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

Frame A...D



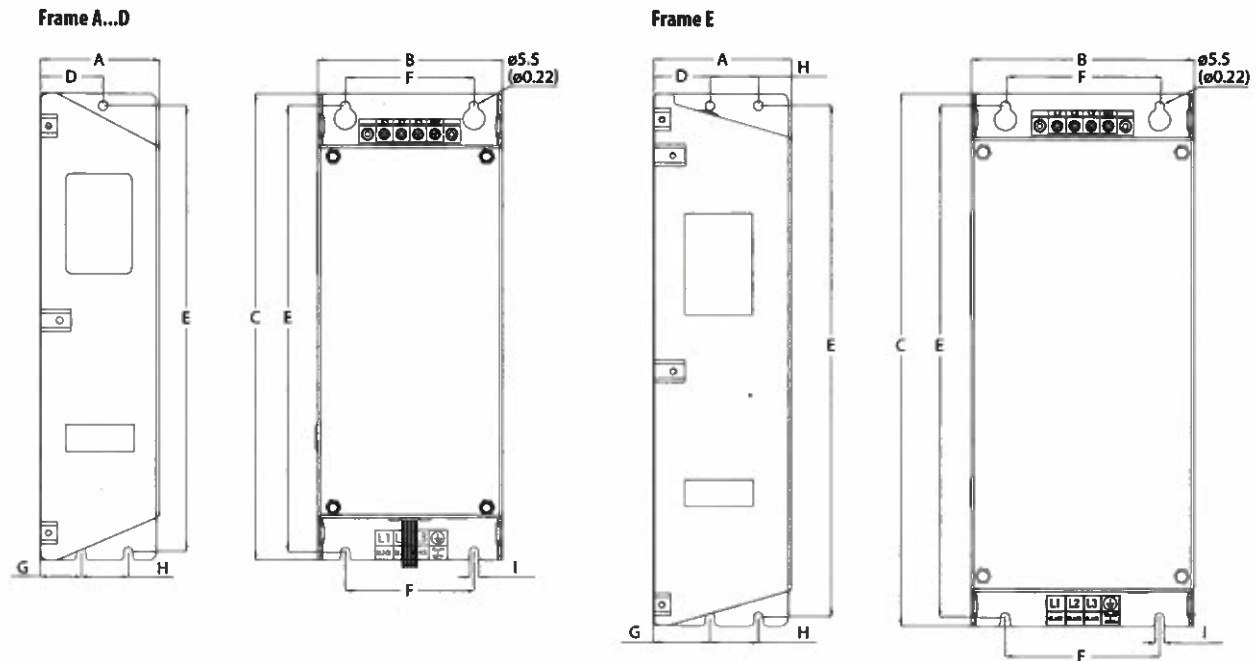
Frame E



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 ³ /min	1.574 m ³ /min
Maximum Air Pressure (At zero air flow)	7.70 mmH ₂ O	9.598 mmH ₂ 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 ² (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 525 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 525 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 525 Safe-Torque-Off Overview

The PowerFlex 525 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 (d) according to EN ISO 13849-1 and SIL CL2 according to EN 62061, IEC 61508, and EN 61800-5-2.

IMPORTANT The function is suitable for performing mechanical work on the drive system or affected area of a machine only. It does not provide electrical safety.

EC Type Examination Certification

TÜV Rheinland has certified the PowerFlex 525 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 Safety of machinery – Safety related parts of control systems – Part 1: General principles for design. (PowerFlex 525 STO achieves Category 3 / PL(d))
- EN 61800-5-2 Adjustable speed electrical power drive systems – Part 5-2 Safety requirements – Functional. (PowerFlex 525 STO achieves SIL CL 2)
- EN 62061 Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- IEC 61508 Part 1-7 Functional safety of electrical/electronic/programmable electronic safety-related systems – Parts 1-7.

TÜV also certifies that the PowerFlex 525 STO may be used in applications up to Category 3/ PL(d) according to EN ISO 13849-1 and SIL 2 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 525 Safe-Torque-Off function is suitable for use in safety applications up to and including Category 3 / PL(d) according to EN ISO 13849-1 and SIL 2 according to EN 62061 / EN 61800-5-2 / IEC 61508.

In addition, the PowerFlex 525 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. This is illustrated in Example 3 on [page 46](#).

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

The PowerFlex 525 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.

PFD and PFH Data

PFD and PFH calculations are based on the equations from Part 6 of EN 61508.

This table provides data for a 20-year proof test interval and demonstrates the worst-case effect of various configuration changes on the data.

PFD and PFH for 20-year Proof Test Interval

Attribute	Value
PFD	6.62E-05 (MTTF = 3593 years)
PFH _D	8.13E-10
SFF	83%
DC	62.5%
CAT	3
HFT	1 (1002)
PTI	20 YEARS
Hardware Type	Type A

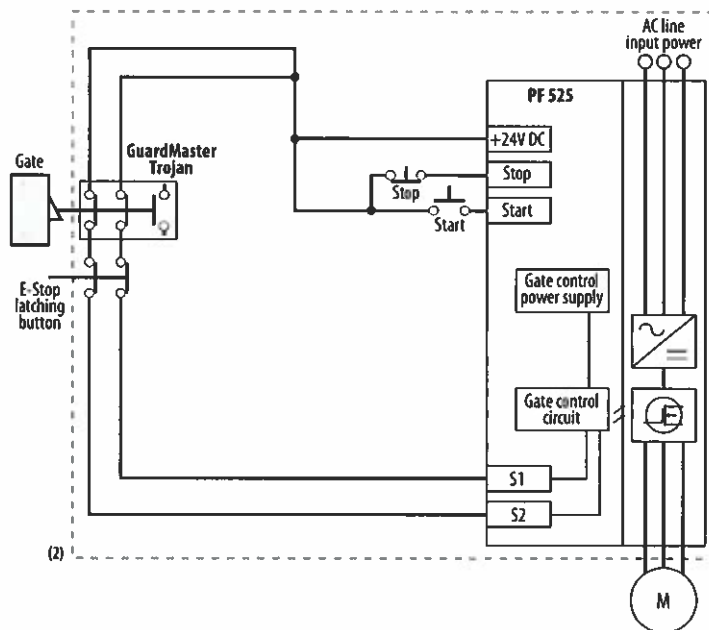
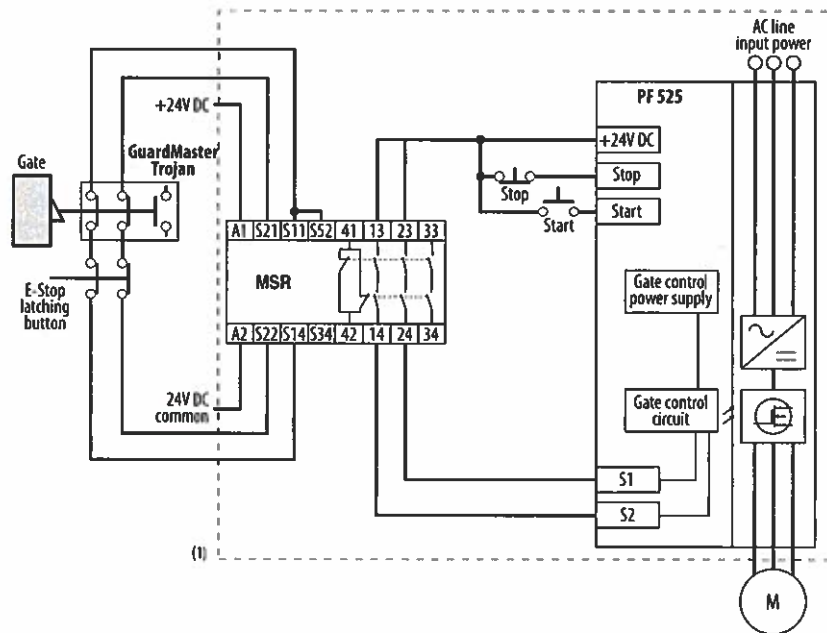
Safety Reaction Time

The safety reaction time from an input signal condition that triggers a safe stop, to the initiation of the configured Stop Type, is 100 ms (maximum).

Connection Examples

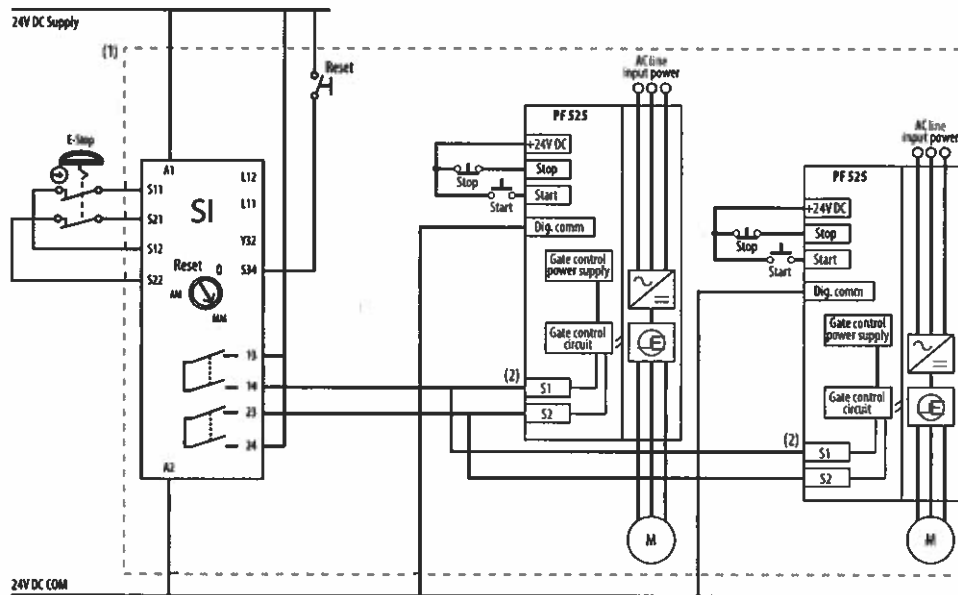
Example 1 – Safe-Torque-Off Connection with Coast-to-Stop Action, SIL 2/PL d

Stop Category 0 – Coast



- (1) Enclosure Recommended. Note: External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.
(2) In some situations, a safety relay is not required if both the switch and PowerFlex 525 are installed in the same enclosure.

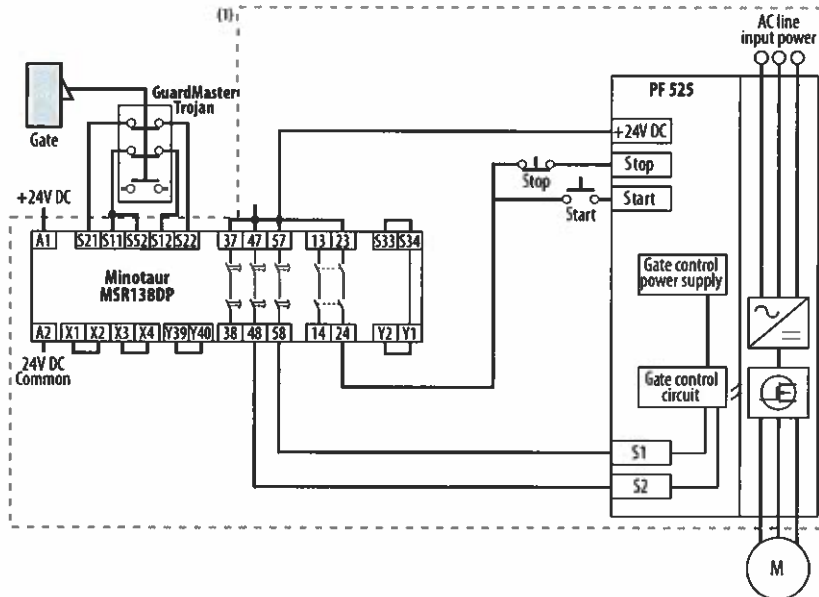
Stop Category 0 – Coast with Two PowerFlex 525 Drives



- (1) Enclosure Recommended. Note: External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.
- (2) Each safety input draws 6 mA from the supply.

Example 2 – Safe-Torque-Off Connection with Controlled Stop Action, SIL 2/PL d

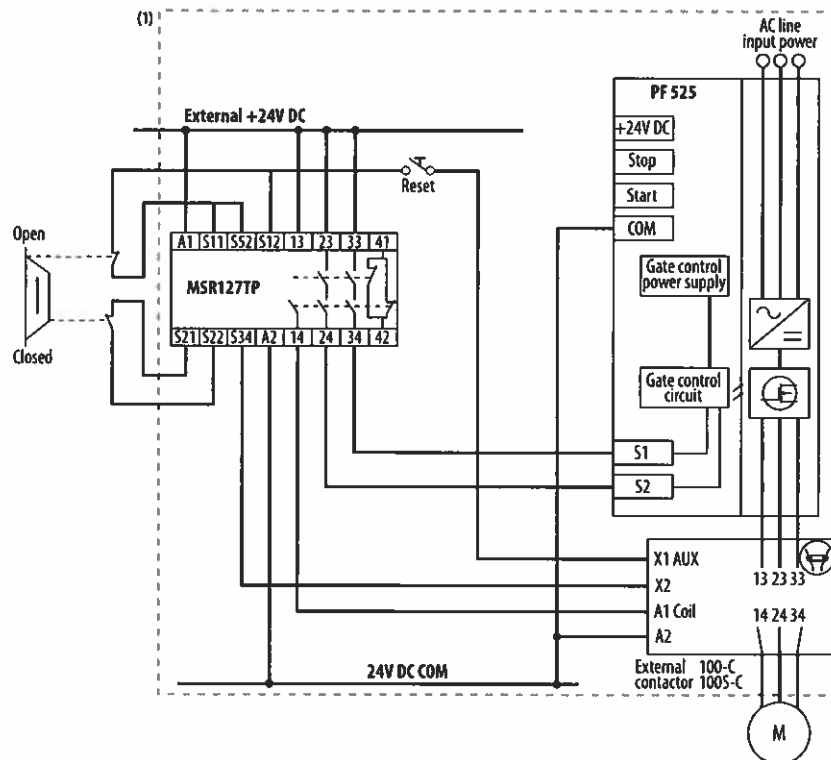
Stop Category 1– Controlled



- (1) Enclosure Recommended. Note: External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.

Example 3 – Safe-Torque-Off Connection with Coast-to-Stop Action Using External +24V supply, SIL 3/PL e

Stop Category 0 – Coast



(1) Enclosure Recommended. Note: External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.

Additional Resources

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

Title	Publication
PowerFlex 520-Series Adjustable Frequency AC Drive User Manual	520-UM001
PowerFlex 4-Class Human Interface Module (HIM) DSI Quick Reference	22HIM-QR001
PowerFlex 525 Embedded EtherNet/IP Adapter User Manual	520COM-UM001
PowerFlex 25-COMM-D DeviceNet Adapter User Manual	520COM-UM002
PowerFlex 25-COMM-E2P EtherNet/IP Adapter User Manual	520COM-UM003
PowerFlex 25-COMM-P PROFIBUS DP Adapter User Manual	520COM-UM004
Dynamic Braking Resistor Calculator	PELEX-AT001
Wiring and Grounding Guidelines for PWM AC Drives	DRIVES-IN001
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1

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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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

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PowerFlex® 520-Series AC Drives



The Next Generation of Powerful Performance. Flexible Control.



LISTEN.
THINK.
SOLVE.

Allen-Bradley • Rockwell Software

**Rockwell
Automation**

PowerFlex 520-Series AC Drives

The Next Generation of Powerful Performance. Flexible Control.

The Allen-Bradley® PowerFlex 520-Series of AC drives is the next generation of compact drives offering a variety of features and time-saving benefits to help meet a wide range of global applications. PowerFlex® 523 AC drives are ideal for standalone machines and provide motor control for applications up to 11 kW/15 Hp. PowerFlex® 525 AC drives are ideal for networked machines and simple system integration, offering standard features including embedded EtherNet/IP™, safety and performance up to 22 kW/30 Hp.

By combining an innovative design, several motor control options, installation flexibility, communications, energy savings and ease of programming, PowerFlex 520-Series AC drives can help you increase your system performance and reduce your time to design and deliver better machines.





Designed for ease of use and flexible installation, PowerFlex 520-Series AC drives can help you maximize your productivity.

- Power ratings
 - PowerFlex 523 AC drives: **0.2...11 kW / 0.25...15 Hp** in global voltage classes from 100-600V
 - PowerFlex 525 AC drives: **0.4...22 kW / 0.5...30 Hp** in global voltage classes from 100-600V
- The **modular design** features an innovative removable control module that allows installation and configuration at the same time to help increase productivity
- An **embedded port** for EtherNet/IP for the PowerFlex 525 AC drive supports seamless integration into the Logix environment and EtherNet/IP networks
- An optional **dual port EtherNet/IP** card supports ring topologies and device level ring (DLR) functionality, which can help provide network resiliency
- PowerFlex 525 AC drives can help protect personnel with **embedded Safe Torque-Off**
- **Software** and **tools** help simplify programming
- An integral human interface module (HIM) supports **multiple languages** and features descriptive **QuickView™** scrolling text to help explain parameters and codes, easing configuration
- **AppView™** application parameter groups help speed configuration for many common applications
- **CustomView™** configuration helps speed machine commissioning with your own defined group of parameters
- Economizer control mode and energy monitoring features can help **reduce energy costs**
- Drives operate in **ambient temperatures** from -20°C (-4°F) to 50°C (122°F). With current derating and a control module fan kit, up to 70°C (158°F)
- A **range of motor control options** support a variety of applications
- A **compact footprint** provides flexible installation options and helps save space inside of a panel



Innovative, Modular Design

Versatile Installation

PowerFlex 520-Series AC drives are made up of two modules that can be detached for simultaneous and independent wiring installation and software configuration. This innovative design allows you to begin mounting the power modules while configuration of the control modules is performed elsewhere, helping speed up installation.

You can download drive configuration files to the control module while the power module is installed using MainsFree configuration. Simply connect a PowerFlex 523 or 525 AC drive to your PC with a standard USB cable and upload or download configuration files using the onboard transfer application.

Flexible mounting options, a compact size and a high temperature tolerance can allow PowerFlex 520-Series AC drives to help meet your needs for flexibility and space savings.

Adding accessory cards does not affect the footprint of the drives. Additional panel space can be saved when installing these drives with the 50mm (1.96 in) clearance requirement at the top and bottom of drive. For further flexibility, these drives can be installed vertically or horizontally as well as side by side in either orientation. A control module fan kit is required for horizontal mounting.

Generous venting allows PowerFlex 520-Series AC drives to operate in high ambient temperatures of up to 50°C (122°F) without current derating and 60°C (140°F) with current derating. These drives can run in temperatures up to 70°C (158°F) with current derating using a control module fan kit.

Conformal coating to IEC 60721 3C2 standards over the circuitry also helps improve the drive's robustness.



A control module fan kit allows PowerFlex 520-Series AC drives to run in temperatures up to 70°C (158°F) with current derating.



Control module fan kits allow you to mount PowerFlex 520-Series AC drives side by side and horizontally, saving panel space.

Ease of Programming

Tools Help Make It Simple

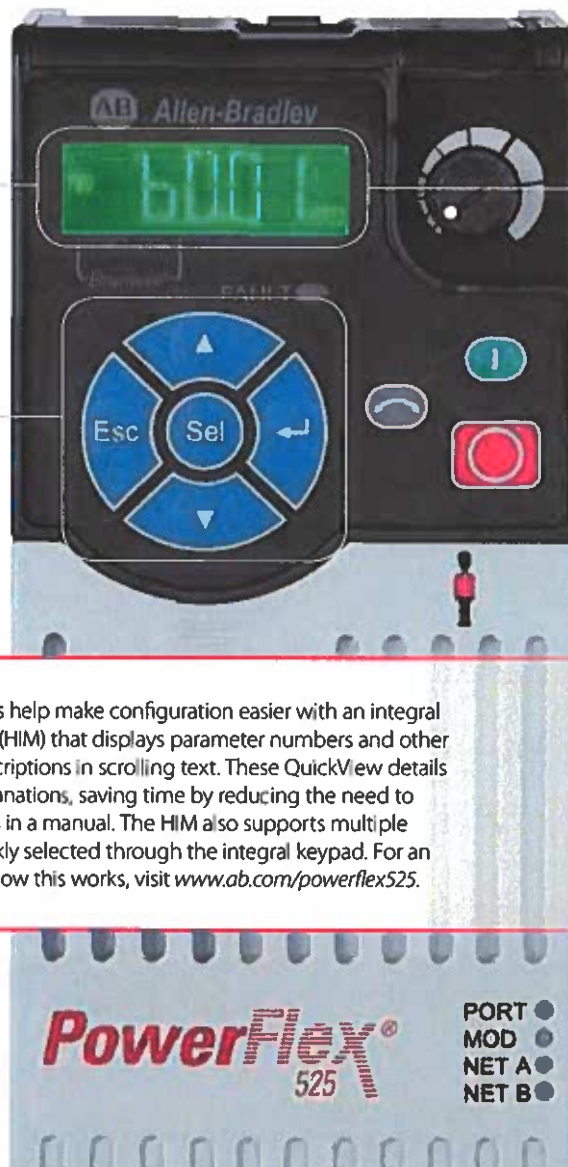
There are several ways to quickly and easily configure PowerFlex 520-Series AC drives. From the integral human interface module (HIM), to Connected Components Workbench™ software or the Studio 5000 Logix Designer™ application, we can provide you with powerful, intuitive tools to help enhance your user experience and reduce your development time so you can deliver faster and more efficiently.

Five digit, 16 segment liquid crystal display (LCD) HIM with scrolling descriptive text.

Quickly navigate menus and speed configuration with the integral keypad.

Support for multiple languages.

PowerFlex 520-Series AC drives help make configuration easier with an integral LCD human interface module (HIM) that displays parameter numbers and other codes followed by simple descriptions in scrolling text. These QuickView details help provide meaningful explanations, saving time by reducing the need to look up parameters and codes in a manual. The HIM also supports multiple languages, which can be quickly selected through the integral keypad. For an interactive demonstration of how this works, visit www.ab.com/powerflex525.

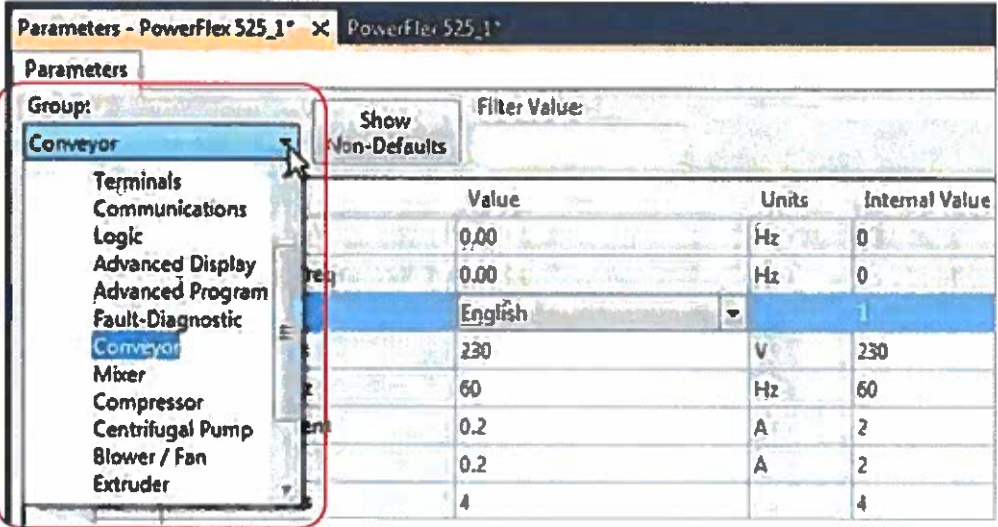


Speed Configuration

PowerFlex 520-Series AC drives can help you configure drives faster with intuitive and convenient AppView and CustomView application-specific parameter tools.

AppView configuration, which is available through the integral HIM, Connected Components Workbench software and the Studio 5000 Logix Designer application, provides parameter groups for several of the most common applications, including conveyors, mixers, compressors, pumps and blowers. With the settings to run these applications already in place, you can get your machine up and running faster, increasing your productivity.

Customize your machine and further reduce future design and development time by quickly defining your own group of parameters using the CustomView tool. This configuration option, which is also available through all the same drive configuration tools, allows you to customize your configuration by adding or removing parameters from an AppView group or save your own custom group of parameters.



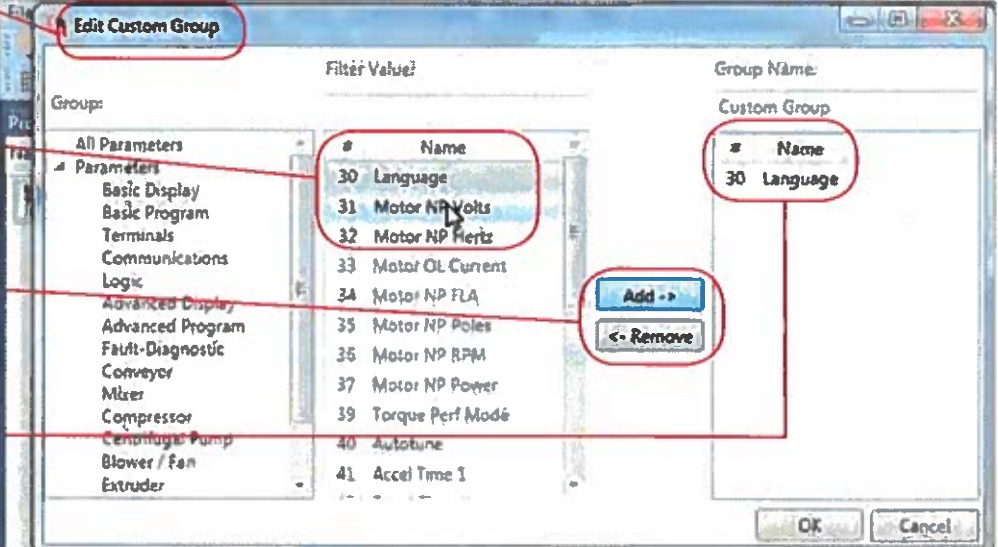
Parameters - PowerFlex 525_1

Group: **Conveyor**

Show Non-Defaults

Parameter	Value	Units	Internal Value
Frequency	0.00	Hz	0
Language	English		1
Voltage	230	V	230
Frequency	60	Hz	60
Current	0.2	A	2
Current	0.2	A	2
Acceleration	4		4

AppView group configuration provides parameters for common applications. With a few clicks, save time by seeing only the parameters most relevant to an application.



Edit Custom Group

Filter Value:

Group Name: Custom Group

Groups:

- All Parameters
- Parameters
 - Basic Display
 - Basic Program
 - Terminals
 - Communications
 - Logic
 - Advanced Display
 - Advanced Program
 - Fault-Diagnostic
 - Conveyor
 - Mixer
 - Compressor
 - Centrifugal Pump
 - Blower / Fan
 - Extruder

Parameters:

- 30 Language
- 31 Motor NP Volts
- 32 Motor NP Hertz
- 33 Motor OL Current
- 34 Motor NP FLA
- 35 Motor NP Poles
- 36 Motor NP RPM
- 37 Motor NP Power
- 39 Torque Perf Mode
- 40 Autotune
- 41 Accel Time 1

Custom Group:

- 30 Language

Buttons: Add ->, <- Remove

Buttons: OK, Cancel

Create and save a user defined group of parameters.

Select parameters from the parameter list.

Move parameters by clicking the "add" or "remove" button.

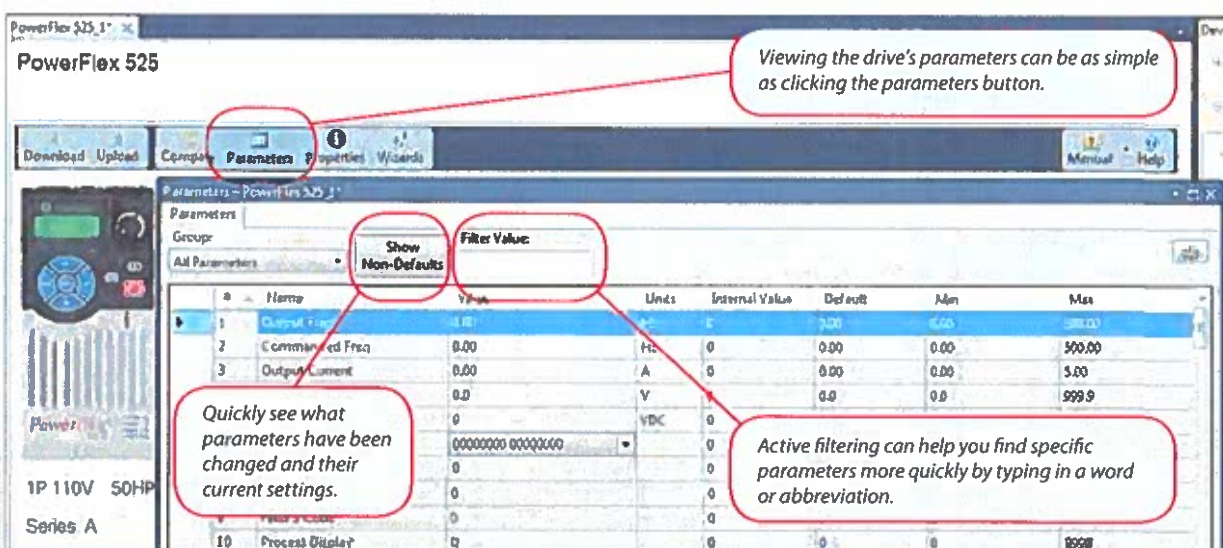
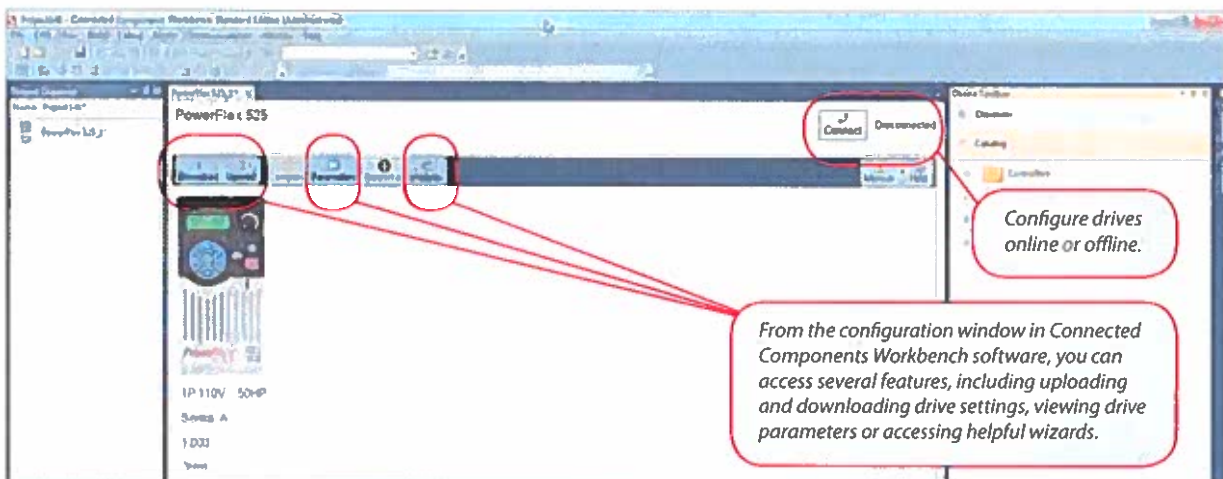
Parameters appear in the CustomView window.

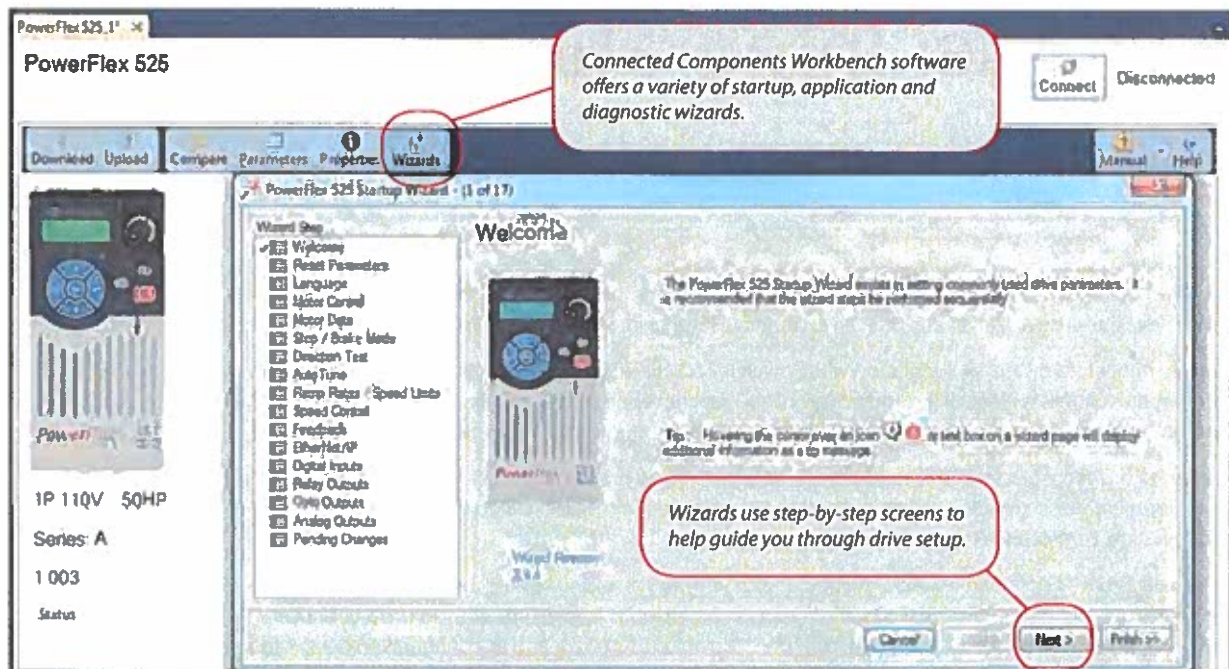
Drive Configuration

Connected Components Workbench Software

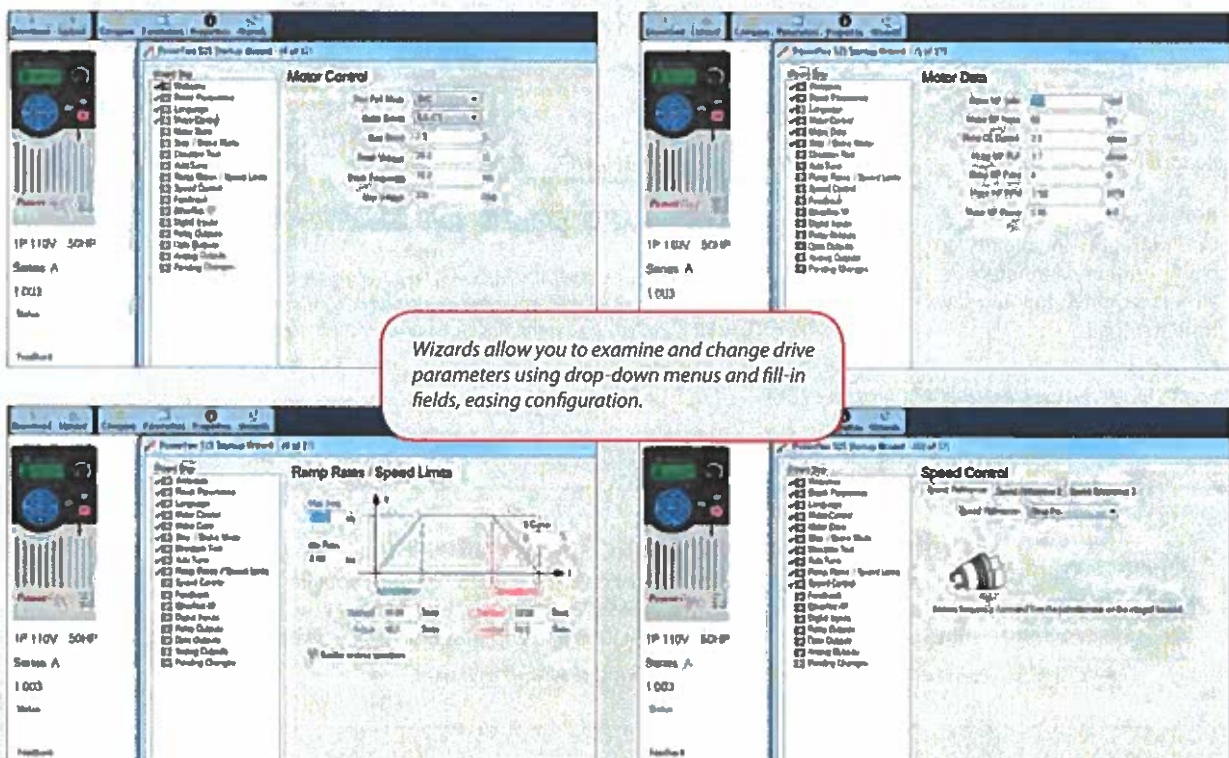
Connected Components Workbench software can help you get your drives up and running with an intuitive interface and startup wizards. This free software uses Rockwell Automation and Microsoft® Visual Studio® technologies for fast and easy drive configuration.

- Start up wizards to help speed up configuration
- Configuration and control of drives over communication networks





Connected Components Workbench software can help minimize your machine design and development time and is ideal for standalone applications. You can upload and download configurations over a USB connection and configure drives over EtherNet/IP, DeviceNet® or other open industrial networks. Connected Components Workbench software supports PowerFlex drives as well as Micro800™ programmable controllers and PanelView™ component graphic terminals.



Premier Integration

Streamline Development, Use and Maintenance

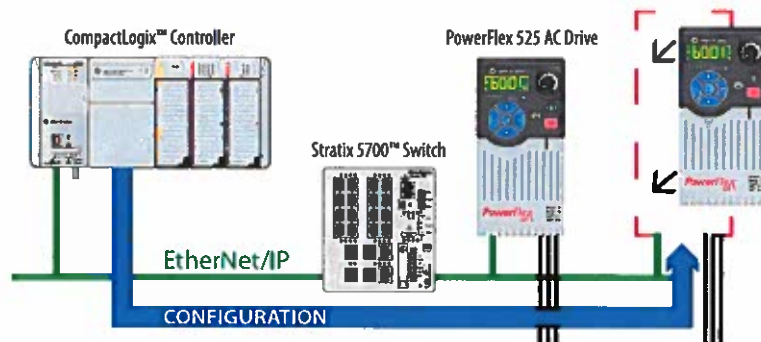
The power of Rockwell Automation Integrated Architecture™ combined with the communication capabilities of PowerFlex 520-Series AC drives can offer an exceptional level of integration that can reduce development costs and time.

You can benefit from Premier Integration with PowerFlex 520-Series AC drives and Allen-Bradley programmable automation controllers (PACs). The Studio 5000 Logix Designer application can help reduce programming time by automatically populating drive parameters in the controller memory as controller tags.

PowerFlex drives are placed in the controller I/O tree, minimizing mismatch errors and further reducing configuration time. Using Premier Integration can help you reduce engineering time and related costs while improving the configuration, control and collection of data.

Automatic Device Configuration (ADC) is another productivity enhancing feature available with the Studio 5000 Logix Designer application and PowerFlex 525 AC drives with EtherNet/IP. This feature allows a Logix controller to automatically detect a replaced PowerFlex 520-Series AC drive* and download firmware and all configuration parameters using an Allen-Bradley Stratix™ 5700, 6000 or 8000 switch, which automatically assigns the drive's IP address. This time-saving feature can help minimize the need for manual reconfiguration.

- A single software environment to configure your entire system can help save time and money by allowing you to work more productively
- Seamless integration into the Logix environment, reducing programming time
- Automatic Device Configuration downloads configuration parameters to a replaced drive, helping save time to repair



Automatic Device Configuration (ADC) allows a Logix controller to automatically detect a replaced PowerFlex 525 or 523* AC drive and download all configuration parameters. A Stratix 5700, 6000 or 8000 switch can automatically assign the drive's IP address.

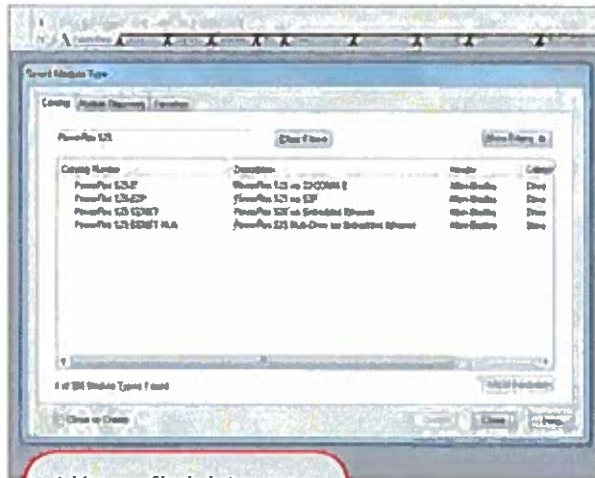
*PowerFlex 523 AC drives require a dual port EtherNet/IP communication card for ADC.



Studio 5000 Logix Designer Application

The Studio 5000 Logix Designer application allows you to configure your PowerFlex drives similarly to previous versions of RSLogix 5000™ software. Use a single software tool to help reduce your programming time, ease startup and commissioning and streamline diagnostics.

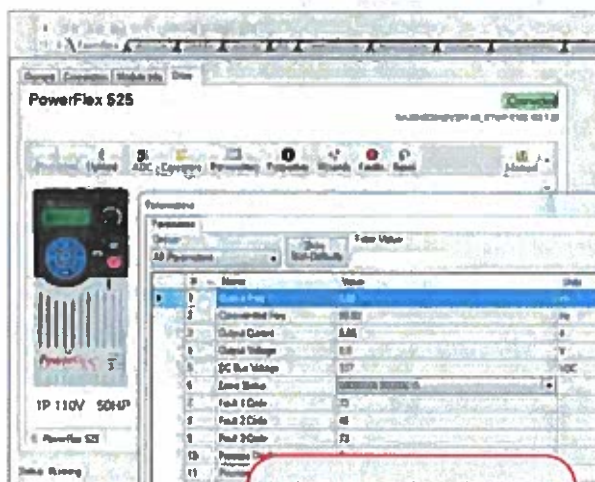
PowerFlex 520-Series AC drives are compatible with RSLogix 5000 (v17 and higher)



Add-on profiles help integrate PowerFlex 525 AC drives into the Logix environment.



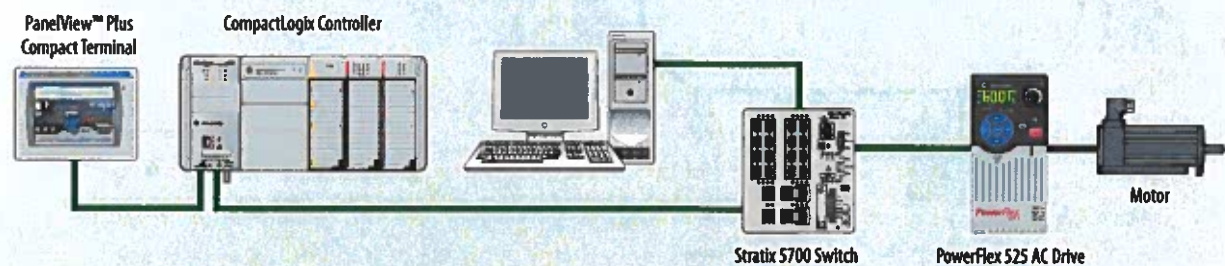
Premier Integration with PowerFlex 525 AC drives helps save development time and makes systems easier to maintain.



The Logix interface allows the dynamic selection of drive parameters transmitted over the network.



A wizard in the Studio 5000 Logix Designer application can help you configure your PowerFlex 525 AC drives EtherNet/IP settings.



PowerFlex 525 AC drives and the Integrated Architecture system offer you the flexibility to find the ideal solution for your application.

Communications

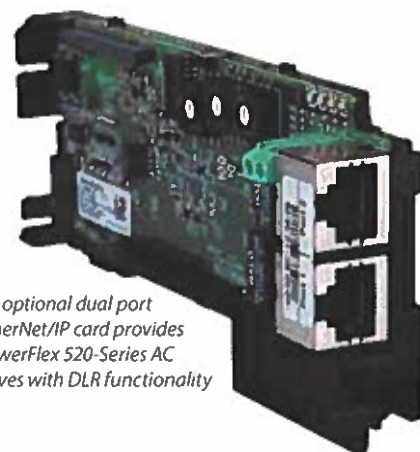
A Wide Variety of Options

The seamless exchange of information between drives and operators helps save time and increase efficiency, and PowerFlex 523 and 525 AC drives offer features that can help you easily manage data throughout your operations.

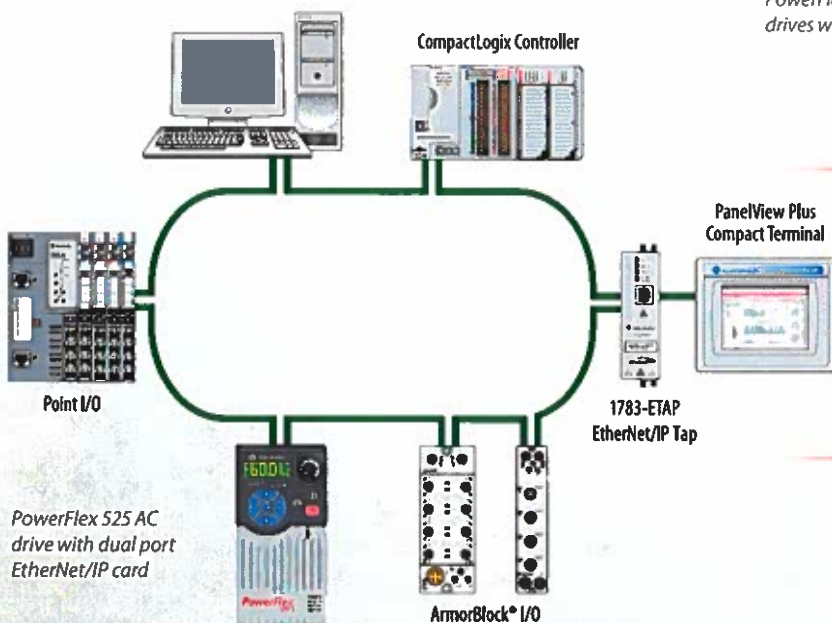
For networked applications, PowerFlex 525 AC drives have an embedded port for EtherNet/IP that allows you to easily configure, control and collect data over the network. An optional dual port EtherNet/IP card for PowerFlex 520-Series AC drives supports linear and ring network topologies.

The dual port communication adapter offers device level ring (DLR) functionality, which can help increase system resiliency in the case of the loss of one network connection. DLR technology, which is an ODVA standard, helps reduce configuration time and costs by minimizing the number of managed switches and reducing cabling needs while allowing users to create a single network ring that connects all components at the device level.

- Embedded DSI port standard
- PowerFlex 525 AC drives include an embedded port for EtherNet/IP
- Dual port EtherNet/IP option card
- DeviceNet communications option card



An optional dual port EtherNet/IP card provides PowerFlex 520-Series AC drives with DLR functionality



DLR is an ODVA standard and requires no additional hardware to implement. This provides network resiliency.

Flexible Control

Suitable for Many Applications

PowerFlex 520-Series AC drives provide a range of motor control options for a vast array of applications, including volts per hertz, sensorless vector control and Economizer mode in sensorless vector control. PowerFlex 525 AC drives can also provide closed-loop velocity vector control and permanent magnet motor control* in addition to closed-loop feedback for positioning capability with an optional encoder card.

For applications requiring stops at designated positions regardless of the speed or load, and without the help of an encoder, PowerFlex 520-Series AC drives utilize PointStop™ positioning control. This set of parameters directs the drive to adjust its deceleration rate based on its speed when a command is initiated, allowing a motor to stop in a consistent position.

And for position control applications such as diverters, smart conveyors and packaging machines, PowerFlex 525 AC drives provide point-to-point positioning in a cost effective and flexible package to help meet your needs.

- Volts per hertz
- Sensorless vector control
- Economizer mode in sensorless vector control
- Closed loop velocity vector control for PowerFlex 525 AC drives
- Permanent magnet motor control for PowerFlex 525 AC drives

* Permanent magnet motor control is scheduled for a future firmware release



Energy Savings

Improved motor control performance boosts efficiency, and PowerFlex 520-Series AC drives can provide a measurable impact on energy use.

In addition to the inherent energy savings associated with using a variable frequency drive, PowerFlex 520-Series AC drives offer additional savings in Economizer mode when using sensorless vector control. Economizer measures power consumption and optimizes current output to meet the demands of the application.

PowerFlex 520-Series AC drives can also monitor and report energy usage data and provide that information in a standard format to help you develop and manage an energy strategy for your operations.

- Adjust energy use and help reduce costs with Economizer mode
- Monitors and reports energy usage to help make data-driven decisions



PowerFlex 523 AC Drive

PowerFlex 523 AC drives are designed to help reduce installation and configuration time while offering the control you need for your application. These drives offer convenient programming features and installation flexibility in a cost-effective solution.



Product shown is actual size, PowerFlex 523 AC drive Frame A

Power ratings of 0.2...11 kW / 0.25...15 Hp in global voltage classes of 120, 240, 480 and 600 volts. Available in four frame sizes (A, B, C and D).

Volts per hertz, sensorless vector control and Economizer mode in sensorless vector control to meet a wide range of applications.

An embedded DSI port comes standard. With a communication adapter card, PowerFlex 523 AC drives support multi-drive networking, connecting up to five PowerFlex AC drives on one node.

- 5 digital inputs (24V DC, 4 programmable)
- 1 analog input (unipolar voltage or current)
- 1 relay (form C)



PowerFlex 525 AC Drive

PowerFlex 525 AC drives are ideal for networked applications requiring more motor control options, embedded EtherNet/IP, energy savings and standard safety features. When you combine PowerFlex 525 AC drives with EtherNet/IP, you can seamlessly integrate into your system architecture and standardize on a single software tool.



Power ratings of 0.4...22 kW / 0.5...30 Hp in global voltage classes of 120, 240, 480 and 600 volts. Available in five frame sizes (A, B, C, D and E).

Volts per hertz, sensorless vector control, closed loop velocity vector control and permanent magnet motor control to meet a wide range of applications.*

An embedded port for EtherNet/IP supports seamless integration into the Logix environment and EtherNet/IP networks.

An embedded DSI port supports multi-drive networking, connecting up to five PowerFlex AC drives on one node.

- 7 digital inputs (24V DC, 6 programmable)
- 2 analog inputs (1 bipolar voltage, 1 current)
- 2 digital outputs
- 1 analog output (1 unipolar voltage or current)
- 2 relays (1 form A relay & 1 form B relay; 24V DC, 120V AC, 240V AC)

Embedded Safe Torque-Off can help to protect personnel.

Product shown is actual size,
PowerFlex 525 AC drive Frame A



PowerFlex 520-Series AC Drives Maximize System Performance

Control

- Volts per hertz
- Sensorless vector control (SVC)
- Closed loop velocity vector control for PowerFlex 525 AC drives
- Permanent magnet motor control* for PowerFlex 525 AC drives
- Multiple preset speeds with programmable control through digital inputs or communications

Positioning Control

- PointStop positioning control stops motor load in a consistent position without encoder feedback
- Closed loop feedback with an optional encoder card for PowerFlex 525 AC drives
- Point-to-point positioning mode for PowerFlex 525 AC drives

Communications

- Built-in port for EtherNet/IP for PowerFlex 525 AC drives
- Embedded DSI port
- Dual port EtherNet/IP option card
- DeviceNet and PROFIBUS* option cards

Energy Savings

- Economizer mode in SVC adjusts current output to help reduce energy costs
- Energy data monitoring and reporting capability
- Permanent magnet motor control* for PowerFlex 525 AC drives

Hardware

- Modular design with removable control modules
- Same control module for the entire power range
- Built-in USB port uses standard USB cable
- Vertical, side-by-side mounting to reduce panel space
- Flexible, time-saving installation using DIN rail mounting with A, B and C frame drives
- Horizontal mounting with a control module fan kit
- Ambient operating temperatures from -20°C (-4°F) up to 70°C (158°F) with current derating and a control module fan kit
- IP20 NEMA/Open, IP30 NEMA/UL Type 1 (with conduit kit)
- EMC filtering embedded at 200V and 400V; optional EMC filtering available for all voltages
- Standard conformal coating IEC 60721 3C2 (chemical and gases only)

Programming and Commissioning

- Integral HIM supports multiple languages and features QuickView scrolling text
- Application specific parameter groups and customized application settings using AppView and CustomView tools
- Simplified configuration and MainsFree programming using standard USB cables
- Connected Components Workbench software for fast and easy drive configuration
- Premier Integration with the Logix control platform with the Studio 5000 Logix Designer application

* Permanent magnet motor control is scheduled for a future firmware release

Help Protect Personnel with Embedded Safety

Safe Torque-Off is a standard safety feature of the PowerFlex 525 AC drive to help protect personnel and equipment. Integrated Safe Torque-Off suits several safety situations that require removing rotational power from the motor without powering down the drive.

Safe Torque-Off allows you to restart your application faster after a safety-related situation. The system, which meets ISO 13849-1 standards, provides safety ratings up to and including SIL2/PLd Cat 3.

Embedded safety can help lower your total system costs, boost machine availability and reduce downtime.

- Safe Torque-Off functionality removes rotational power without powering down the drive, helping to reduce downtime
- Embedded safety reduces wiring and saves on installation space
- Rated SIL 2/PLd Cat 3 to meet many applications

Technical Specifications

	PowerFlex® 523 AC Drives								PowerFlex® 525 AC Drives							
Power Ratings	100 - 120V: 0.2...1.1 kW / 0.25...1.5 Hp 380 - 480V: 0.4...11 kW / 0.5...15 Hp				200 - 240V: 0.2...7.5 kW / 0.25...10 Hp 525 - 600V: 0.4...11 kW / 0.5...15 Hp				100 - 120V: 0.4...1.1 kW / 0.5...1.5 Hp 380 - 480V: 0.4...22 kW / 0.5...30 Hp				200 - 240V: 0.4...15 kW / 0.5...20 Hp 525 - 600V: 0.4...22 kW / 0.5...30 Hp			
Motor Control	Volts per hertz Sensorless vector control				Sensorless vector control with Econolizer				Volts per hertz Sensorless vector control Closed loop velocity vector control				Sensorless vector control with Econolizer Permanent magnet motor control*			
Application	Open loop speed regulation								Open loop speed regulation Closed loop speed regulation							
Overload Capability	Heavy duty application: 150% for 60 seconds, 180% for 3 sec (200% programmable)								Normal duty application: 110% for 60 seconds, 150% for 3 sec Heavy duty application: 150% for 60 seconds, 180% for 3 sec (200% programmable)							
Input Specifications	1 phase voltage: 100 ... 120V/200 ... 240V Voltage: adjustable 0V to rated motor voltage; -15% / +10% voltage tolerance 3 phase voltage: 200 ... 240V/380 ... 480V/525 ... 600V frequency: 50 to 60 Hz Logic control ride through: >0.5 seconds, 2 seconds typical 1/2 DC bus operation (selectable) Maximum short circuit rating: 100,000 amps symmetrical								1 phase voltage: 100 ... 120V/200 ... 240V Voltage: adjustable 0V to rated motor voltage; -15% / +10% voltage tolerance 3 phase voltage: 200 ... 240V/380 ... 480V/525 ... 600V frequency: 50 to 60 Hz Logic control ride through: >0.5 seconds, 2 seconds typical 1/2 DC bus operation (selectable) Maximum short circuit rating: 100,000 amps symmetrical							
Output Voltage Range	Adjustable 0V to rated motor voltage				Intermittent current: 150% for 60 seconds				Adjustable 0V to rated motor voltage				Intermittent current: 150% for 60 seconds			
Frequency Range	Max output frequency 500 Hz				Input frequency variation 47 to 63 Hz				Max output frequency 500 Hz				Input frequency variation 47 to 63 Hz			
Ambient Operating Temperatures*	-20 °C to 50 °C (-4 °F to 122 °F) -20 °C to 60 °C (-4 °F to 140 °F) with current derating -20 °C to 70 °C (-4 °F to 158 °F) with current derating (with optional control module fan kit)								-20 °C to 50 °C (-4 °F to 122 °F) -20 °C to 60 °C (-4 °F to 140 °F) with current derating -20 °C to 70 °C (-4 °F to 158 °F) with current derating (with optional control module fan kit)							
Altitude	1000 m (3,280 ft) with derating guideline for up to max 4000 m (13,123 ft), with the exception of 600V at max 2000 m (6,561 ft)								1000 m (3,280 ft) with derating guideline for up to max 4000 m (13,123 ft), with the exception of 600V at max 2000 m (6,561ft)							
Enclosures	IP20 NEMA/Open				IP30 NEMA/UL Type 1 (with conduit kit)				IP20 NEMA/Open				IP30 NEMA/UL Type 1 (with conduit kit)			
Mounting	DIN rail (frames A,B and C) Zero Stacking				50 mm (1.96 in) air-flow gap at the top and bottom				DIN rail (frames A,B and C) Zero Stacking				50mm (1.96 in) air-flow gap at the top and bottom***			
Configuration	Integral HIM, LCD, 5 digits, 16 segments, multi-language Connected Components Workbench software Studio 5000™ Logix Designer application								Integral HIM, LCD, 5 digits, 16 segments, multi-language Connected Components Workbench software Studio 5000™ Logix Designer application							
Human Interface Module (HIM) Languages	English, French, Spanish, Italian, German, Portuguese, Polish, Turkish, Czech								English, French, Spanish, Italian, German, Portuguese, Polish, Turkish, Czech							
Control I/O	5 digital inputs (24V DC, 4 programmable) 1 analog input (unipolar voltage or current) 1 relay (form C)								7 digital inputs (24V DC, 6 programmable) 2 analog inputs (1 bipolar voltage, 1 current) 2 digital outputs 1 analog output (1 unipolar voltage or current) 2 relays (1 form A relay & 1 form B relay; 24V DC, 120V AC, 240V AC)							
Dynamic Braking	7th IGBT braking, DC braking								7th IGBT braking, DC braking							
Carrier Frequency	2 to 16 kHz, 4 kHz default								2 to 16 kHz, 4 kHz default							
EMC Filtering	Embedded 1 ph 240V and 3 ph 480V. Available as an external option for all voltages								Embedded 1 ph 240V and 3 ph 480V. Available as an external option for all voltages							
Safety	None								Embedded ISO 13849-1 SIL2/PLD Cat 3 Safe Torque-Off							
Communications	Integral RS485 with Modbus RTU/DSI Dual port EtherNet/IP option card DeviceNet option card PROFIBUS DP option card								Integral RS485 with Modbus RTU/DSI Embedded EtherNet/IP port Dual port EtherNet/IP option card DeviceNet option card PROFIBUS DP option card							
Feedback Types	None								Line driver type encoder quadrature (dual channel) or single channel -Single ended or differential (A, B channel); Duty cycle of 50%, +10% Pulse-train input (1 to 100kHz) -Configurable input voltage: 5VDC (±10%); 10-12VDC (±10%), or 24V DC (±15%) Allowance pulse frequency -DC to 250 kHz Frequency controlled PWM allowable pulse frequency							
Protection	Fault history log, password-lock security								Fault history log, password-lock security							
Standards	UL	C-Tick	RoHS	ACS 156	CE	cUL	GOST-R	KCC	UL	TUV	C-Tick	Semi F47	ATEX	CE Marine (Lloyds)		
									RoHS	ACS 156	CE	cUL	GOST-R	KCC		
Control Features	Flying start V/F ratio Bus regulator Process PID Common DC bus Fiber application specific features				PTC Input compatible 1/2 DC bus operation 8 datalinks (4 In and 4 out, requires communication option card) Multi-drive connectivity (requires communication option card) 8 preset speeds				Flying start V/F ratio Bus regulator Process PID Common DC bus StepLogic™ functions (relays and timers) Fiber application specific features PTC Input compatible				Position control Regulation with encoder feedback or analog input 1/2 DC bus operation 8 datalinks (4 In and 4 out) Multi-drive connectivity 16 preset speeds			
Accessories	70 °C (158 °F) control module fan kit (requires external power) EMC plates NEMA/UL Type 1 kits				EMC line filters Line reactors Dynamic brake resistors				70 °C (158 °F) control module fan kit (may require external power) Incremental encoder EMC plates NEMA/UL Type 1 kits				EMC line filters Line reactors Dynamic brake resistors			
Dimensions mm (in)	Frame A: 152 (5.98) H x 72 (2.83) W x 172 (6.77) D Frame B: 180 (7.08) H x 87 (3.42) W x 172 (6.77) D Frame C: 220 (8.66) H x 109 (4.29) W x 184 (7.24) D Frame D: 260 (10.23) H x 130 (5.11) W x 212 (8.34) D								Frame A: 152 (5.98) H x 72 (2.83) W x 172 (6.77) D Frame B: 180 (7.08) H x 87 (3.42) W x 172 (6.77) D Frame C: 220 (8.66) H x 109 (4.29) W x 184 (7.24) D Frame D: 260 (10.23) H x 130 (5.11) W x 212 (8.34) D Frame E: 300 (11.81) H x 185 (7.28) W x 279 (10.98) D							

* Permanent magnet motor control is scheduled for a future firmware release

** These temperatures are for typical vertical drive mounting. For other mounting options and temperatures, please refer to the user manual (520-UM001)

*** Frame E at 60 °C to 70 °C requires 95mm (3.74 in) airflow gap at the top of the drive and a control module fan kit

PowerFlex 523 AC Drives					
50/60Hz	Heavy Duty (HD)		Output Current	Catalog No.	Frame Size
	Hp	kW			
100-120V, 1Ø No Filter	0.25	0.2	1.6A	25A-V1P6N104	A
	0.5	0.4	2.5A	25A-V2P5N104	A
	1	0.75	4.8A	25A-V4P8N104	B
	1.5	1.1	6.0A	25A-V6P0N104	B
200-240V, 1Ø No Filter	0.25	0.2	1.6A	25A-A1P6N104	A
	0.5	0.4	2.5A	25A-A2P5N104	A
	1	0.75	4.8A	25A-A4P8N104	A
	2	1.5	8.0A	25A-A8P0N104	B
	3	2.2	11.0A	25A-A011N104	B
200-240V, 1Ø EMC Filter	0.25	0.2	1.6A	25A-A1P6N114	A
	0.5	0.4	2.5A	25A-A2P5N114	A
	1	0.75	4.8A	25A-A4P8N114	A
	2	1.5	8.0A	25A-A8P0N114	B
	3	2.2	11.0A	25A-A011N114	B
200-240V, 3Ø No Filter	0.25	0.2	1.6A	25A-B1P6N104	A
	0.5	0.4	2.5A	25A-B2P5N104	A
	1	0.75	5.0A	25A-B5P0N104	A
	2	1.5	8.0A	25A-B8P0N104	A
	3	2.2	11.0A	25A-B011N104	A
	5	4	17.5A	25A-B017N104	B
	7.5	5.5	24.0A	25A-B024N104	C
	10	7.5	32.2A	25A-B032N104	D
380-480V, 3Ø No Filter	0.5	0.4	1.4A	25A-D1P4N104	A
	1	0.75	2.3A	25A-D2P3N104	A
	2	1.5	4.0A	25A-D4P0N104	A
	3	2.2	6.0A	25A-D6P0N104	A
	5	4	10.5A	25A-D010N104	B
	7.5	5.5	13.0A	25A-D013N104	C
	10	7.5	17.0A	25A-D017N104	C
	15	11	24A	25A-D024N104	D
380-480V, 3Ø EMC Filter	0.5	0.4	1.4A	25A-D1P4N114	A
	1	0.75	2.3A	25A-D2P3N114	A
	2	1.5	4.0A	25A-D4P0N114	A
	3	2.2	6.0A	25A-D6P0N114	A
	5	4	10.5A	25A-D010N114	B
	7.5	5.5	13.0A	25A-D013N114	C
	10	7.5	17.0A	25A-D017N114	C
	15	11	24A	25A-D024N114	D
525-600V, 3Ø No Filter	0.5	0.4	0.9A	25A-E0P9N104	A
	1	0.75	1.7A	25A-E1P7N104	A
	2	1.5	3.0A	25A-E3P0N104	A
	3	2.2	4.2A	25A-E4P2N104	A
	5	4	6.6A	25A-E6P6N104	B
	7.5	5.5	9.9A	25A-E9P9N104	C
	10	7.5	12.0A	25A-E012N104	C
	15	11	19.0A	25A-E019N104	D

PowerFlex 525 AC Drives							
50/60Hz 100-120V, 1Ø No Filter	Normal Duty (ND)		Heavy Duty (HD)		Output Current	Catalog No.	Frame Size
	Hp	kW	Hp	kW			
	0.5	0.4	0.5	0.4			
	1	0.75	1	0.75			
	1.5	1.1	1.5	1.1	6.0A	25B-V6P0N104	B
200-240V, 1Ø No Filter	0.5	0.4	0.5	0.4	2.5A	25B-A2P5N104	A
	1	0.75	1	0.75	4.8A	25B-A4P8N104	A
	2	1.5	2	1.5	8.0A	25B-A8P0N104	B
	3	2.2	3	2.2	11.0A	25B-A011N104	B
200-240V, 1Ø EMC Filter	0.5	0.4	0.5	0.4	2.5A	25B-A2P5N114	A
	1	0.75	1	0.75	4.8A	25B-A4P8N114	A
	2	1.5	2	1.5	8.0A	25B-A8P0N114	B
	3	2.2	3	2.2	11.0A	25B-A011N114	B
200-240V, 3Ø No Filter	0.5	0.4	0.5	0.4	2.5A	25B-B2P5N104	A
	1	0.75	1	0.75	5.0A	25B-B5P0N104	A
	2	1.5	2	1.5	8.0A	25B-B8P0N104	A
	3	2.2	3	2.2	11.0A	25B-B011N104	A
	5	4	5	4	17.5A	25B-B017N104	B
	7.5	5.5	7.5	5.5	24.0A	25B-B024N104	C
	10	7.5	10	7.5	32.2A	25B-B032N104	D
	15	11	15	11	48.3A	25B-B048N104	E
	20	15	15	11	62.1A	25B-B062N104	E
380-480V, 3Ø No Filter	0.5	0.4	0.5	0.4	1.4A	25B-D1P4N104	A
	1	0.75	1	0.75	2.3A	25B-D2P3N104	A
	2	1.5	2	1.5	4.0A	25B-D4P0N104	A
	3	2.2	3	2.2	6.0A	25B-D6P0N104	A
	5	4	5	4	10.5A	25B-D010N104	B
	7.5	5.5	7.5	5.5	13.0A	25B-D013N104	C
	10	7.5	10	7.5	17.0A	25B-D017N104	C
	15	11	15	11	24A	25B-D024N104	D
	20	15	15	11	30A	25B-D030N104	D
	25	18.5	20	15	37A	25B-D037N114*	E
	30	22	25	18.5	43A	25B-D043N114*	E
380-480V, 3Ø EMC Filter	0.5	0.4	0.5	0.4	1.4A	25B-D1P4N114	A
	1	0.75	1	0.75	2.3A	25B-D2P3N114	A
	2	1.5	2	1.5	4.0A	25B-D4P0N114	A
	3	2.2	3	2.2	6.0A	25B-D6P0N114	A
	5	4	5	4	10.5A	25B-D010N114	B
	7.5	5.5	7.5	5.5	13.0A	25B-D013N114	C
	10	7.5	10	7.5	17.0A	25B-D017N114	C
	15	11	15	11	24A	25B-D024N114	D
	20	15	15	11	30A	25B-D030N114	D
	25	18.5	20	15	37A	25B-D037N114	E
	30	22	25	18.5	43A	25B-D043N114	E
525-600V, 3Ø No Filter	0.5	0.4	0.5	0.4	0.9A	25B-E0P9N104	A
	1	0.75	1	0.75	1.7A	25B-E1P7N104	A
	2	1.5	2	1.5	3.0A	25B-E3P0N104	A
	3	2.2	3	2.2	4.2A	25B-E4P2N104	A
	5	4	5	4	6.6A	25B-E6P6N104	B
	7.5	5.5	7.5	5.5	9.9A	25B-E9P9N104	C
	10	7.5	10	7.5	12.0A	25B-E012N104	C
	15	11	15	11	19.0A	25B-E019N104	D
	20	15	15	11	22.0A	25B-E022N104	D
	25	18.5	20	15	27.0A	25B-E027N104	E
	30	22	25	18.5	32.0A	25B-E032N104	E

*With EMC filter



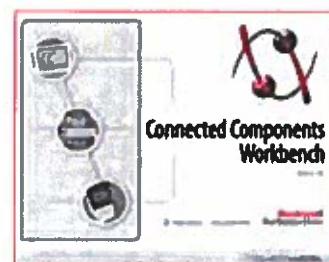
Energy Savings Calculators

See how installing a PowerFlex drive for your fan or pump can help reduce energy costs when compared with traditional flow control methods. Download the tools at:

<http://www.rockwellenergycalc.com/>



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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

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Case No(s). 20-0029-EL-EEC

Summary: Application - Lakeview Farms, Inc. and Ohio Power Company for approval of a special arrangement agreement with a mercantile customer electronically filed by Tanner Wolfram on behalf of Ohio Power Company