

LISTEN.
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SOLVE.®

PowerFlex® 70



TECHNICAL DATA

ADJUSTABLE FREQUENCY AC DRIVES

Product Overview

PowerFlex® 70 drives are designed to worldwide standards providing out-of-the-box performance around the globe. Available ratings include: 0.5 to 25 Hp output at 240V ac input, 0.5 to 50 Hp output at 480V ac input, 0.5 to 50 Hp output at 600V ac input.

The PowerFlex 70 drive can be used with a full featured LCD Human Interface Module, which provides multilingual text for startup, metering, programming and troubleshooting.

The PowerFlex 70 can be programmed for either Volts per Hertz, Sensorless Vector or Vector Control with FORCE™ Technology to cover a wide range of applications from fans to extruders.

Optional internal communication modules provide fast and efficient control and/or data exchange with host controllers over popular interfaces. These interfaces include: DeviceNet™, EtherNet, ControlNet™, Remote I/O, Serial Communications and other open control and communication networks. PC tools such as DriveExplorer™ and DriveTools™ SP assist with programming, monitoring, and troubleshooting the PowerFlex 70.



Table of Contents

| Description | Page |
|---|------|
| Standard Drives Program | 3 |
| Catalog Number Explanation | 5 |
| Factory Installed Options | 7 |
| User Installed Options | 8 |
| Installation Considerations | 16 |
| Cable Recommendations | 22 |
| Single-Phase Input Power | 23 |
| Power Ratings and Branch Circuit Protection | 23 |
| Maximum Motor Cable Lengths | 25 |
| Mounting | 29 |
| PowerFlex 70 Frames | 29 |
| Approximate Dimensions | 30 |
| PowerFlex 70 Configured Drives | 35 |
| Standard Drive Specifications | 37 |
| Derating Guidelines | 42 |

Reference Materials

For additional PowerFlex 70 data and general drive information, refer to the following publications:

| Title | Publication | Available Online at . . . |
|--|-----------------|--|
| PowerFlex 70 User Manual | 20A-UM001... | www.rockwellautomation.com/literature |
| PowerFlex Reference Manual | PFLEX-RM001... | |
| 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 at . . . |
|--|--|
| Allen-Bradley Drives Technical Support | www.ab.com/support/abdrives |

Standard Drives Program

Flexible Packaging and Mounting

IP20, NEMA/UL Type 1 – For conventional mounting inside or outside a control cabinet. Conduit plate is vertically removable for easy installation and replacement without disturbing conduit.

IP66, NEMA/UL Type 4X/12 (Indoor Use) – For mounting directly in the production environment. Listed by UL to resist dust, dirt, etc. and to survive high pressure water spray. Also certified by NSF International to assure conformity with international food equipment standards.

Flange Type – For mounting heatsink through back of an enclosure, thus removing a large portion of the heat inside a cabinet. The backside is rated IP66, NEMA/UL Type 4X/12 for both indoor and outdoor use.

Zero Stacking™ - Drives can be mounted directly next to one another with no reduction of ambient temperature rating (50° C for IP20, NEMA/UL Type 1 and Flange Mount; 40° C for IP66, NEMA/UL Type 4X/12).

Space Saving Hardware Features

Integral EMC Filtering provides a compact, all-in-one package solution for meeting EMC requirements, including CE in Europe.

Integral Dynamic Brake Transistor delivers a cost-effective means of switching regenerative energy without costly external chopper circuits.

Internal Dynamic Brake Resistor requires no extra panel space, and supplies a large amount of braking torque for short periods.

Easy to Use Human Interface Tools

- PowerFlex 7-Class LCD Human Interface Modules provide:
 - Large and easy to read 7 line x 21 character backlit display
 - Variety of languages (English, French, German, Italian, Spanish, Portuguese, Dutch)
 - Alternate function keys for shortcuts to common tasks
 - “Calculator-like” number pad for fast and easy data entry (Full Numeric version only)
 - Control keys for local start, stop, speed, and direction
 - Remote versions for panel mount applications
- PC-based Configuration tools include:
 - **DriveExplorer™ and DriveExplorer Lite:** A simple and flexible “On-line” tool for monitoring and configuration while connected to a drive.
 - **DriveTools™ SP:** A suite of software tools which provide an intuitive means for programming, troubleshooting and maintaining Allen-Bradley AC and DC drives.
- For simplified AC drive start-up and reduced development time, we’ve integrated Allen-Bradley PowerFlex drive configuration with RSLogix™ 5000 software. This single-software approach simplifies parameter and tag programming while still allowing stand-alone drive software tool use on the factory floor.

Outstanding Control and Performance

Vector Control with FORCE™ Technology ❶ provides outstanding torque and speed regulation, with or without encoder feedback.

Sensorless Vector Control develops high torque over a wide speed range, and adapts to individual motor characteristics.

Drives Features

Fast acting **Current Limit** and **Bus Voltage Regulation** result in maximum acceleration and deceleration without tripping.

Flying Start delivers smooth connection into rotating loads, regardless of commanded direction, without the need for any speed feedback device.

PI Control can eliminate the need for a separate process loop controller.

Inertia Ride-Through offers tripless operation during a prolonged power outage by using the rotating energy stored in high inertia, low friction loads.

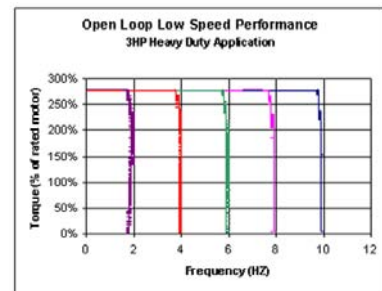
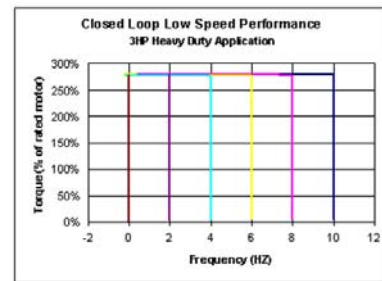
User Sets, allowing up to three complete sets of parameter data, can be individually loaded for different batch processes.

Slip compensation delivers minimum of 0.5% open loop speed regulation across a wide speed range, eliminating the need for speed feedback devices in some applications.

Safe Off Option ❶, the first offering available within the DriveGuard™ series of safety solutions, prevents a drive from delivering rotational energy to motors by integrating a safety circuit with the drive's power switching signals. This solution meets EN 954-1, Category 3.

Droop Control ❶ for load sharing applications.

Sleep/Wake Control ❶ for analog control of start and stop.



❶ Feature available for Enhanced Control only.

Unsurpassed Capability in Network Communications

PowerFlex drives are fully compatible with the wide variety of Allen-Bradley DPI™ communication adapters, offering the following benefits:

| BACnet® | DeviceNet™ | ControlNet™ | EtherNet/IP | Remote I/O | RS-485 DF1 | Profibus DP | Interbus | LonWorks | Modbus RTU | Modbus TCP | Metasys N2 | Siemens PI FLN | Bluetooth® | Description |
|---------|------------|-------------|-------------|------------|------------|-------------|----------|----------|------------|------------|------------|----------------|------------|---|
| ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | Unconnected Messaging permits other network devices (e.g. PanelView) to communicate directly to a drive without routing the communication through the network scanner. |
| ✓ | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | | | | ✓ | Adapter Routing – Plug PC into one drive and talk to other Allen-Bradley drives on same network, without being routed through the network scanner. |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Access to 100% of all parameters over the network. |
| ✓ | ✓ | | ✓ | | | ✓ | | | | | | | | AutoBaud capability makes initial connections less problematic. |
| | ✓ | | | | | | | | | | | | | Change Of State significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Very flexible configuration for each node (Example: "reference must change by more than 5%"). |
| | ✓ | | ✓ | | | | | | | | | | | Peer Control provides master slave type control between drives, where one or more slave drives (consumers) can run based on the status of a master drive (producer), which can also significantly reduce network traffic. |
| | ✓ | | | | | | | | | | | | | Automatic Device Replacement (ADR) saves significant time and effort when replacing a drive, by allowing the scanner to be configured to automatically detect a new drive and download the required parameter settings. |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Flexible Fault Configuration – Adapters can be programmed to take fault based actions such as ramp to stop, coast to stop, and hold last state, as well as send user configurable logic control and speed reference values. In addition, different actions can be taken based on whether the network experienced a serious problem (broken cable etc.) versus a network idle condition (PLC set to "Program"). |

Catalog Number Explanation

| 1-3 | | | | 4 | | | | 5-7 | | | | 8 | | | | 9 | | | | 10 | | | | 11 | | | | 12 | | | | 13 | | | | 14 | | | | 15 | | | | 16 | | | |
|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|----------|--|--|--|
| 20A | | | | B | | | | 2P2 | | | | A | | | | 3 | | | | A | | | | Y | | | | Y | | | | N | | | | N | | | | C | | | | 0 | | | |
| <i>a</i> | | | | <i>b</i> | | | | <i>c</i> | | | | <i>d</i> | | | | <i>e</i> | | | | <i>f</i> | | | | <i>g</i> | | | | <i>h</i> | | | | <i>i</i> | | | | <i>j</i> | | | | <i>k</i> | | | | <i>l</i> | | | |

| Drive | |
|-------|--------------|
| Code | Type |
| 20A | PowerFlex 70 |

| Voltage Rating | | |
|----------------|---------|-----|
| Code | Voltage | Ph. |
| B | 240V ac | 3 |
| C | 400V ac | 3 |
| D | 480V ac | 3 |
| E | 600V ac | 3 |

| ND Rating | | |
|-------------------|------|------------|
| 208V, 60 Hz Input | | |
| Code | Amps | kW (Hp) |
| 2P2 | 2.5 | 0.37 (0.5) |
| 4P2 | 4.8 | 0.75 (1.0) |
| 6P8 | 7.8 | 1.5 (2.0) |
| 9P6 | 11 | 2.2 (3.0) |
| 015 | 17.5 | 4.0 (5.0) |
| 022 | 25.3 | 5.5 (7.5) |
| 028 | 32.2 | 7.5 (10) |
| 042 | 43 | 11 (15) |
| 054 | 62.1 | 15 (20) |
| 070 | 78.2 | 18.5 (25) |

| ND Rating | | |
|-------------------|------|------------|
| 240V, 60 Hz Input | | |
| Code | Amps | kW (Hp) |
| 2P2 | 2.2 | 0.37 (0.5) |
| 4P2 | 4.2 | 0.75 (1.0) |
| 6P8 | 6.8 | 1.5 (2.0) |
| 9P6 | 9.6 | 2.2 (3.0) |
| 015 | 15.3 | 4.0 (5.0) |
| 022 | 22 | 5.5 (7.5) |
| 028 | 28 | 7.5 (10) |
| 042 | 42 | 11 (15) |
| 054 | 54 | 15 (20) |
| 070 | 70 | 18.5 (25) |

| ND Rating | | |
|-------------------|------|------------|
| 400V, 50 Hz Input | | |
| Code | Amps | kW (Hp) |
| 1P3 | 1.3 | 0.37 (0.5) |
| 2P1 | 2.1 | 0.75 (1.0) |
| 3P5 | 3.5 | 1.5 (2.0) |
| 5P0 | 5.0 | 2.2 (3.0) |
| 8P7 | 8.7 | 4.0 (5.0) |
| 011 | 11.5 | 5.5 (7.5) |
| 015 | 15.4 | 7.5 (10) |
| 022 | 22 | 11 (15) |
| 030 | 30 | 15 (20) |
| 037 | 37 | 18.5 (25) |
| 043 | 43 | 22 (30) |
| 060 | 60 | 30 (40) |
| 072 | 72 | 37 (50) |

| ND Rating | | |
|-------------------|------|------------|
| 480V, 60 Hz Input | | |
| Code | Amps | kW (Hp) |
| 1P1 | 1.1 | 0.37 (0.5) |
| 2P1 | 2.1 | 0.75 (1.0) |
| 3P4 | 3.4 | 1.5 (2.0) |
| 5P0 | 5.0 | 2.2 (3.0) |
| 8P0 | 8.0 | 3.7 (5.0) |
| 011 | 11 | 5.5 (7.5) |
| 014 | 14 | 7.5 (10) |
| 022 | 22 | 11 (15) |
| 027 | 27 | 15 (20) |
| 034 | 34 | 18.5 (25) |
| 040 | 40 | 22 (30) |
| 052 | 52 | 30 (40) |
| 065 | 65 | 37 (50) |

| ND Rating | | |
|---------------------|------|------------|
| 600V, 60 Hz Input * | | |
| Code | Amps | kW (Hp) |
| 0P9 | 0.9 | 0.37 (0.5) |
| 1P7 | 1.7 | 0.75 (1.0) |
| 2P7 | 2.7 | 1.5 (2.0) |
| 3P9 | 3.9 | 2.2 (3.0) |
| 6P1 | 6.1 | 4.0 (5.0) |
| 9P0 | 9.0 | 5.5 (7.5) |
| 011 | 11 | 7.5 (10) |
| 017 | 17 | 11 (15) |
| 022 | 22 | 15 (20) |
| 027 | 27 | 18.5 (25) |
| 032 | 32 | 22 (30) |
| 041 | 41 | 30 (40) |
| 052 | 52 | 37 (50) |

* CE certification testing has not been performed on 600V class drives.

| Enclosure | |
|-----------|---|
| Code | Enclosure |
| A | Panel Mount - IP 20, NEMA/UL Type 1 |
| C | Wall/Machine Mount = IP66, NEMA/UL Type 4X/12 for indoor use only |
| F | Flange Mount - Front Chassis = IP 20, NEMA/UL Type 1; Rear Heatsink = IP66, NEMA/UL Type 4X/12 for indoor/outdoor use |
| G | Wall/Machine Mount - IP54, NEMA/UL Type 12 |
| L | Flange Mount with Conformal Coat |
| M | Panel Mount with Conformal Coat |

| HIM | |
|------|---|
| Code | Interface Module |
| 0 | Blank Cover |
| 3 | Full Numeric LCD |
| 5 | Prog. Only LCD |
| 8 | Wireless Interface Module - IP66, NEMA/UL Type 4X/12 Only |

| 1-3 | | | | 4 | | | | 5-7 | | | | 8 | | | | 9 | | | | 10 | | | | 11 | | | | 12 | | | | 13 | | | | 14 | | | | 15 | | | | 16 | | | |
|---------------|--|--|--|--|--|--|--|-----|--|--|--|---|--|--|--|----------------|--|--|--|--|--|--|--|----|--|--|--|----|--|--|--|---------------|--|--|--|-----------------------------------|--|--|--|----------|--|--|--|----|--|--|--|
| 20A | | | | B | | | | 2P2 | | | | A | | | | 3 | | | | A | | | | Y | | | | Y | | | | N | | | | N | | | | C | | | | 0 | | | |
| a | | | | b | | | | c | | | | d | | | | e | | | | f | | | | g | | | | h | | | | i | | | | j | | | | k | | | | l | | | |
| f | | | | | | | | | | | | | | | | i | | | | | | | | | | | | | | | | k | | | | | | | | | | | | | | | |
| Documentation | | | | | | | | | | | | | | | | Emission Class | | | | | | | | | | | | | | | | Control & I/O | | | | | | | | | | | | | | | |
| Code | | | | Type | | | | | | | | | | | | Code | | | | Rating | | | | | | | | | | | | Code | | | | Control | | | | Safe-Off | | | | | | | |
| A | | | | English User Manual and Multi-Language Quick Start | | | | | | | | | | | | A | | | | Filtered* A* & B Frames (Optional) C, D, & E Frames (Standard) | | | | | | | | | | | | N | | | | Standard | | | | N/A | | | | | | | |
| N | | | | No Manual | | | | | | | | | | | | N | | | | Not Filtered* A & B Frames (Optional) C, D, & E Frames | | | | | | | | | | | | G* | | | | Enhanced | | | | No | | | | | | | |
| C | | | | Chinese Documentation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Enhanced | | | | Yes | | | | | | | |
| g | | | | | | | | | | | | | | | | j | | | | | | | | | | | | | | | | l | | | | | | | | | | | | | | | |
| Brake IGBT | | | | | | | | | | | | | | | | Comm Slot | | | | | | | | | | | | | | | | Feedback | | | | | | | | | | | | | | | |
| Code | | | | w/Brake IGBT | | | | | | | | | | | | Code | | | | Version | | | | | | | | | | | | Code | | | | Feedback | | | | | | | | | | | |
| Y | | | | Yes | | | | | | | | | | | | B | | | | BACnet | | | | | | | | | | | | N | | | | NA - Standard Control | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | C | | | | ControlNet (Coax) | | | | | | | | | | | | 0 | | | | No Feedback - Enhanced Control | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | D | | | | DeviceNet | | | | | | | | | | | | 1 | | | | 5V/12V Encoder w/Enhanced Control | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | E | | | | Ethernet/IP | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | R | | | | RIO | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | S | | | | RS485 DF1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | N | | | | None | | | | | | | | | | | | | | | | | | | | | | | | | | | |

* 600V Frames A through D available only without filter (Cat. Code N). 600V Frame E available only with filter (Cat. Code A).

※ Increases size to Frame B.

* Not available as factory installed option for 600V ratings.

Factory Installed Options

Conformal Coat

Printed circuit boards are coated with HumiSeal 1B73 acrylic coating to provide improved resistance to dust and moisture. Consult factory for additional details.

| Description | | A |
|--|---|---|
| Flange Mount Front: IP20, NEMA/UL Type 1 Back/Heatsink: IP66, NEMA/UL Type 4X/12 with Conformal Coat | L | B |
| | | C |
| | | D |
| | | E |
| | | A |
| Panel Mount IP20, NEMA/UL Type 1 with Conformal Coat | M | B |
| | | C |
| | | D |
| | | E |
| | | A |

Human Interface and Wireless Interface Modules (Pos. e) IP20, NEMA/UL Type 1 and Flange Type Drives



Cat. Code: 0
No HIM (Blank Plate)



Cat. Code: 3
LCD Display, Full
Numeric Keypad



Cat. Code: 5
LCD Display,
Programmer Only

IP66, NEMA/UL Type 4X/12 Drives (Position e)



Cat. Code: 0
No HIM (Blank)



Cat. Code: 3
LCD Display, Full Numeric Keypad



Cat. Code: 5
LCD Display, Programmer Only



Cat. Code: 8
Wireless Interface Module

Documentation

| Description | Cat. Code (Position f) |
|---|---------------------------|
| English User Manual, Multi-Language Quick Start | A |
| No User Manual | N |

Internal Dynamic Brake Resistors

| Drive Input Voltage | Brake Resistance Ω | Frame | Cat. Code (Position h) |
|---------------------|------------------------------|-------|---------------------------|
| 200...240V ac | 62 | A | Y |
| | | B | Y |
| | | C | Y |
| | 22 | D | Y |
| | | E | Not Available |
| 380...480V ac | 115 | A | Y |
| | | B | Y |
| | | C | Y |
| | 62 | D | Y |
| | | E | Not Available |
| 600V ac | 115 | A | Y |
| | | B | Y |
| | | C | Y |
| | | D & E | Not Available |

These resistors have a limited duty cycle. Refer to the PowerFlex Dynamic Braking Selection Guide to determine if an internal resistor will be sufficient. An external resistor may be required.

Internal EMC Filter

| Drive Input Voltage | CE Filter | Frame* | Cat. Code (Position i) |
|---------------------|-----------|--------|---------------------------|
| 200...240V ac | Optional | B | A |
| | Standard | C | |
| | Standard | D | |
| 380...480V ac | Optional | B | A |
| | Standard | C | |
| | Standard | D | |
| | Standard | E | |

* Internal CE filters are not available for PowerFlex 70 A Frame drives. If an A Frame rating is ordered with an internal filter option, it will be supplied in a B Frame.

Internal Communication Adapters

| Description | Cat. Code (Position j) |
|---|---------------------------|
| BACnet® MS/TP RS485 Communication Adapter | B |
| ControlNet™ Communication Adapter (Coax) | C |
| DeviceNet™ Communication Adapter | D |
| EtherNet/IP™ Communication Adapter | E |
| Remote I/O Communication Adapter | R |
| RS485 DF1 Communication Adapter | S |

Control Options

| Description | Cat. Code (Position <i>k</i>) |
|-------------------------------------|-----------------------------------|
| Enhanced Control without DriveGuard | C |
| Enhanced Control with DriveGuard | G |
| Standard Control | N |

Feedback Options

| Description | Cat. Code (Position <i>l</i>) |
|-----------------------------------|-----------------------------------|
| None (Standard Control) | N |
| None (Enhanced Control) | 0 |
| 5V/12V Encoder (Enhanced Control) | 1 |

User Installed Options

Human Interface and Wireless Interface Modules



No HIM (Blank Plate)
20-HIM-A0



LCD Display, Full
Numeric Keypad
20-HIM-A3



LCD Display,
Programmer Only
20-HIM-A5



Wireless Interface
Module
20-WIM-N1



Remote (Panel Mount)
LCD Display, Full
Numeric Keypad
20-HIM-C3S



Remote (Panel Mount)
LCD Display,
Programmer Only
20-HIM-C5S



Remote (Panel Mount)
Wireless Interface
Module
20-WIM-N4S

| Description | Handheld/Local (Drive Mount) Cat. No. | Remote (Panel Mount) IP66, NEMA/UL Type 4x/12 * Cat. No. |
|----------------------------------|---|--|
| No HIM (Blank Plate) | 20-HIM-A0 | – |
| LCD Display, Full Numeric Keypad | 20-HIM-A3 | 20-HIM-C3S ‡ |
| LCD Display, Programmer Only | 20-HIM-A5 | 20-HIM-C5S ‡ |
| Wireless Interface Module | 20-WIM-N1 | 20-WIM-N4S |

* For indoor use only.

‡ Includes a 1202-C30 interface cable (3 meters) for connection to drive.

Human Interface Module Accessories

| Description | Cat. No. |
|--|-------------------|
| Bezel Kit for LCD HIMs, NEMA/UL Type 1 ‡ | 20-HIM-B1 |
| PowerFlex HIM Interface Cable, 1 m (39 in) ? | 20-HIM-H10 |
| Cable Kit (Male-Female) ➤ | |
| 0.33 Meters (1.1 Feet) | 1202-H03 |
| 1 Meter (3.3 Feet) | 1202-H10 |
| 3 Meter (9.8 Feet) | 1202-H30 |
| 9 Meter (29.5 Feet) | 1202-H90 |
| Comm Option Cable Kit | |
| 0.33 Meters (1.1 Feet) | 1202-C03 |
| 1 Meter (3.3 Feet) | 1202-C10 |
| 3 Meter (9.8 Feet) | 1202-C30 |
| 9 Meter (29.5 Feet) | 1202-C90 |
| DPI Cable Kit with Connectors, Tools and 100 m (328 ft.) Cable | 1202-CBL-KIT-100M |
| DPI Cable Connector Kit | 1202-TB-KIT-SET |
| DPI/SCANport™ One to Two Port Splitter Cable | 1203-S03 |

‡ Includes a 1202-C30 interface cable (3 meters) for connection to drive.

? Required only when HIM is used as handheld or remote.

➤ Required in addition to 20-HIM-H10 for distances up to a total maximum of 10 Meters (32.8 Feet).

Dynamic Brake Resistors

Small Duty Internal Dynamic Brake Resistors

Limited duty resistors mount directly to the back surface of the drive and require no extra panel space. Internal resistors are non-destructive and do not require a resistor overheat external safety circuit.

| PowerFlex 70 AC Drive | | | Small Duty Internal DB Resistor | | | | | | | | |
|--------------------------------|---------------------------|-------------------------------|---------------------------------|-----------------------------|---------------------------|---------------------|--|---------------------------------------|------------|---------------------------------------|------------|
| Normal Duty* kW (Hp) | Heavy Duty* kW (Hp) | Min DB Res Ohms ±10% | Part Number | Resistance ⊗ Ohms ±5% | Continuous Power kW | Max Energy kJ | Max Braking Torque % of ND Motor | Application Type 1 | | Application Type 2 | |
| | | | | | | | | Braking Torque % of ND Motor | Duty Cycle | Braking Torque % of ND Motor | Duty Cycle |
| 200...240 Volt ac Input Drives | | | | | | | | | | | |
| 0.37 (0.5) | 0.25 (0.33) | 33 | 20AB-DB1-A | 62 | 0.048 | 8.3 | 307% | 100% | 25.9% | 150% | 17.3% |
| 0.75 (1.0) | 0.55 (0.75) | 33 | 20AB-DB1-A | 62 | 0.048 | 7.3 | 300% | 100% | 12.8% | 150% | 8.5% |
| 1.5 (2.0) | 1.1 (1.5) | 33 | 20AB-DB1-B | 62 | 0.028 | 0.8 | 160% | 100% | 3.7% | 150% | 2.5% |
| 2.2 (3.0) | 1.5 (2.0) | 33 | 20AB-DB1-B | 62 | 0.028 | 0.8 | 109% | 100% | 2.5% | 109% | 2.3% |
| 4.0 (5.0) | 3.0 (3.0) | 30 | 20AB-DB1-C | 62 | 0.040 | 0.8 | 60% | 60% | 3.3% | N/A | N/A |
| 5.5 (7.5) | 4.0 (5.0) | 21 | 20AB-DB1-D | 22 | 0.036 | 0.9 | 117% | 100% | 1.3% | 117% | 1.1% |
| 7.5 (10) | 5.5 (7.5) | 21 | 20AB-DB1-D | 22 | 0.036 | 0.9 | 86% | 86% | 1.1% | N/A | N/A |
| 400...480 Volt ac Input Drives | | | | | | | | | | | |
| 0.37 (0.5) | 0.25 (0.33) | 68 | 20AD-DB1-A | 115 | 0.048 | 8.3 | 320% | 100% | 25.9% | 150% | 17.3% |
| 0.75 (1.0) | 0.55 (0.75) | 68 | 20AD-DB1-A | 115 | 0.048 | 9.0 | 259% | 100% | 12.8% | 150% | 8.5% |
| 1.5 (2.0) | 1.1 (1.5) | 68 | 20AD-DB1-A | 115 | 0.048 | 2.4 | 243% | 100% | 6.4% | 150% | 4.3% |
| 2.2 (3.0) | 1.5 (2.0) | 68 | 20AD-DB1-B | 115 | 0.028 | 0.9 | 206% | 100% | 2.5% | 150% | 1.7% |
| 4.0 (5.0) | 3.0 (3.0) | 68 | 20AD-DB1-B | 115 | 0.028 | 0.9 | 129% | 100% | 1.4% | 129% | 1.1% |
| 5.5 (7.5) | 4.0 (5.0) | 74 | 20AD-DB1-C | 115 | 0.04 | 0.9 | 94% | 94% | 1.5% | N/A | N/A |
| 7.5 (10) | 5.5 (7.5) | 74 | 20AD-DB1-C | 115 | 0.04 | 0.9 | 69% | 69% | 1.5% | N/A | N/A |
| 11 (15) | 7.5 (10) | 44 | 20AD-DB1-D | 62 | 0.036 | 0.8 | 87% | 87% | 0.8% | N/A | N/A |
| 15 (20) | 11 (15) | 31 | 20AD-DB1-D | 62 | 0.036 | 0.8 | 64% | 64% | 0.8% | N/A | N/A |
| 500...600 Volt ac Input Drives | | | | | | | | | | | |
| 0.37 (0.5) | 0.25 (0.33) | 117 | 20AD-DB1-A | 115 | 0.048 | 8.3 | 287% | 100% | 25.9% | 150% | 17.3% |
| 0.75 (1.0) | 0.55 (0.75) | 117 | 20AD-DB1-A | 115 | 0.048 | 9.0 | 263% | 100% | 12.8% | 150% | 8.5% |
| 1.5 (2.0) | 1.1 (1.5) | 117 | 20AD-DB1-A | 115 | 0.048 | 2.4 | 243% | 100% | 6.4% | 150% | 4.3% |
| 2.2 (3.0) | 1.5 (2.0) | 117 | 20AD-DB1-B | 115 | 0.028 | 0.9 | 202% | 100% | 2.5% | 150% | 1.7% |
| 4.0 (5.0) | 3.0 (3.0) | 80 | 20AD-DB1-B | 115 | 0.028 | 0.9 | 193% | 100% | 1.4% | 150% | 0.9% |
| 5.5 (7.5) | 4.0 (5.0) | 80 | 20AD-DB1-C | 115 | 0.04 | 0.9 | 147% | 100% | 1.5% | 147% | 1.0% |
| 7.5 (10) | 5.5 (7.5) | 80 | 20AD-DB1-C | 115 | 0.04 | 0.9 | 108% | 100% | 1.1% | 108% | 1.0% |
| 11 (15) | 7.5 (10) | 48 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 (20) | 11 (15) | 48 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

* Duty cycle listed is based on full speed to zero speed deceleration. For constant regen at full speed, duty cycle capability is half of what is listed. Application Type 1 represents maximum capability up to 100% braking torque where possible. Application Type 2 represents more than 100% braking torque where possible, up to a maximum of 150%.

* Always check resistor ohms against minimum resistance for drive being used.

Internal Dynamic Brake Resistor Kits

| Drive Input Voltage | Brake Resistance | Frame | Cat. No. |
|------------------------|------------------|-------|---------------|
| | Ω | | |
| 200...240V ac | 62 | A | 20AB-DB1-A |
| | | B | 20AB-DB1-B |
| | | C | 20AB-DB1-C |
| | 22 | D | 20AB-DB1-D |
| | | E | Not Available |
| 380...480V ac | 115 | A | 20AD-DB1-A |
| | | B | 20AD-DB1-B |
| | | C | 20AD-DB1-C |
| | 62 | D | 20AD-DB1-D |
| | | E | Not Available |
| 600V ac | 115 | A | 20AD-DB1-A |
| | | B | 20AD-DB1-B |
| | | C | 20AD-DB1-C |
| | | D & E | Not Available |

These resistors have a limited duty cycle. Refer to the PowerFlex Dynamic Braking Selection Guide to determine if an internal resistor will be sufficient. An external resistor may be required.

Medium Duty External Dynamic Brake Resistors

These resistors provide a larger duty cycle capability than the internal type. Includes an internal thermal switch for use in external safety circuit.

| PowerFlex 70 AC Drive | | | Medium Duty External DB Resistor | | | | | | | | |
|--------------------------------|---------------------------|-------------------------------|----------------------------------|--------------------------------|---------------------------|---------------------|--|---------------------------------|---------------|---------------------------------|---------------|
| Normal Duty* kW (Hp) | Heavy Duty* kW (Hp) | Min DB Res Ohms ±10% | Part Number | Resistance * Ohms ±5% | Continuous Power kW | Max Energy kJ | Max Braking Torque % of ND Motor | Application Type 1 | | Application Type 2 | |
| | | | | | | | | Braking Torque % of ND Motor | Duty Cycle | Braking Torque % of ND Motor | Duty Cycle |
| 200...240 Volt ac Input Drives | | | | | | | | | | | |
| 0.37 (0.5) | 0.25 (0.33) | 33 | AK-R2-091P500 | 91 | 0.086 | 17 | 293% | 100% | 46% | 150% | 31% |
| 0.75 (1.0) | 0.55 (0.75) | 33 | AK-R2-091P500 | 91 | 0.086 | 17 | 218% | 100% | 23% | 150% | 15% |
| 1.5 (2.0) | 1.1 (1.5) | 33 | AK-R2-091P500 | 91 | 0.086 | 17 | 109% | 100% | 11% | 109% | 11% |
| 2.2 (3.0) | 1.5 (2.0) | 33 | AK-R2-047P500 | 47 | 0.166 | 33 | 144% | 100% | 15% | 144% | 11% |
| 4.0 (5.0) | 3.0 (3.0) | 30 | AK-R2-047P500 | 47 | 0.166 | 33 | 79% | 79% | 11% | N/A | N/A |
| 5.5 (7.5) | 4.0 (5.0) | 23 | AK-R2-030P1K2 | 30 | 0.26 | 52 | 90% | 90% | 10% | N/A | N/A |
| 7.5 (10) | 5.5 (7.5) | 23 | AK-R2-030P1K2 | 30 | 0.26 | 52 | 66% | 66% | 10% | N/A | N/A |
| 400...480 Volt ac Input Drives | | | | | | | | | | | |
| 0.37 (0.5) | 0.25 (0.33) | 68 | AK-R2-360P500 | 360 | 0.086 | 17 | 305% | 100% | 47% | 150% | 31% |
| 0.75 (1.0) | 0.55 (0.75) | 68 | AK-R2-360P500 | 360 | 0.086 | 17 | 220% | 100% | 23% | 150% | 15% |
| 1.5 (2.0) | 1.1 (1.5) | 68 | AK-R2-360P500 | 360 | 0.086 | 17 | 110% | 100% | 12% | 110% | 11% |
| 2.2 (3.0) | 1.5 (2.0) | 68 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 197% | 100% | 24% | 150% | 16% |
| 4.0 (5.0) | 3.0 (3.0) | 68 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 124% | 100% | 13% | 124% | 10% |
| 5.5 (7.5) | 4.0 (5.0) | 74 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 90% | 90% | 10% | N/A | N/A |
| 7.5 (10) | 5.5 (7.5) | 74 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 66% | 66% | 10% | N/A | N/A |
| 11 (15) ‡ | 7.5 (10) ‡ | 44 | ‡ | 60 | 0.52 | 104 | 90% | 90% | 10% | N/A | N/A |
| 15 (20) ‡ | 11 (15) ‡ | 31 | ‡ | 60 | 0.52 | 104 | 66% | 66% | 10% | N/A | N/A |
| 500...600 Volt ac Input Drives | | | | | | | | | | | |
| 0.37 (0.5) | 0.25 (0.33) | 117 | AK-R2-360P500 | 360 | 0.086 | 17 | 274% | 100% | 46% | 150% | 31% |
| 0.75 (1.0) | 0.55 (0.75) | 117 | AK-R2-360P500 | 360 | 0.086 | 17 | 251% | 100% | 23% | 150% | 15% |
| 1.5 (2.0) | 1.1 (1.5) | 117 | AK-R2-360P500 | 360 | 0.086 | 17 | 172% | 100% | 11% | 150% | 8% |
| 2.2 (3.0) | 1.5 (2.0) | 117 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 193% | 100% | 24% | 150% | 16% |
| 4.0 (5.0) | 3.0 (3.0) | 80 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 185% | 100% | 13% | 150% | 9% |
| 5.5 (7.5) | 4.0 (5.0) | 80 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 141% | 100% | 9% | 141% | 7% |
| 7.5 (10) | 5.5 (7.5) | 80 | AK-R2-120P1K2 | 120 | 0.26 | 52 | 103% | 100% | 7% | 103% | 7% |
| 11 (15) ‡ | 7.5 (10) ‡ | 48 | ‡ | 60 | 0.52 | 104 | 141% | 100% | 9% | 141% | 7% |
| 15 (20) ‡ | 11 (15) ‡ | 48 | ‡ | 60 | 0.52 | 104 | 103% | 100% | 7% | 103% | 7% |

* Duty cycle listed is based on full speed to zero speed deceleration. For constant regen at full speed, duty cycle capability is half of what is listed. Application Type 1 represents maximum capability up to 100% braking torque where possible. Application Type 2 represents more than 100% braking torque where possible, up to a maximum of 150%.

‡ Always check resistor ohms against minimum resistance for drive being used.

‡ For 11 and 15 kW (15 and 20 Hp) applications, use two 7.5 kW (10 Hp) size resistors wired in parallel.

External Dynamic Brake Resistor Kits

| Drive Input Voltage | Brake Resistance | Continuous Power | Cat. No. |
|---------------------|------------------|------------------|---------------|
| | Ω | W | |
| 200...240V ac | 30 | 260 | AK-R2-030P1K2 |
| | 47 | 166 | AK-R2-047P500 |
| | 91 | 86 | AK-R2-091P500 |
| 480...600V ac | 120 | 260 | AK-R2-120P1K2 |
| | 360 | 86 | AK-R2-360P500 |

Communication Option Kits

| Description | Cat. No. |
|---|------------------|
| BACnet® MS/TP RS485 Communication Adapter | 20-COMM-B |
| ControlNet™ Communication Adapter (Coax) | 20-COMM-C |
| ControlNet™ Communication Adapter (Coax) Conformal Coat | 20-COMM-C-MX3 |
| DeviceNet™ Communication Adapter | 20-COMM-D |
| DeviceNet™ Communication Adapter Conformal Coat | 20-COMM-D-MX3 |
| EtherNet/IP™ Communication Adapter | 20-COMM-E |
| EtherNet/IP™ Communication Adapter Conformal Coat | 20-COMM-E-MX3 |
| HVAC Communication Adapter | 20-COMM-H |
| Interbus™ Communication Adapter | 20-COMM-I |
| CANopen® Communication Adapter | 20-COMM-K |
| LonWorks® Communication Adapter | 20-COMM-L |
| Modbus/TCP Communication Adapter | 20-COMM-M |
| PROFIBUS™ DP Communication Adapter | 20-COMM-P |
| ControlNet™ Communication Adapter (Fiber) | 20-COMM-Q |
| Remote I/O Communication Adapter | 20-COMM-R |
| Remote I/O Communication Adapter Conformal Coat | 20-COMM-R-MX3 |
| RS485 DF1 Communication Adapter | 20-COMM-S |
| RS485 DF1 Communication Adapter Conformal Coat | 20-COMM-S-MX3 |
| External Communications Kit Power Supply | 20-XCOMM-AC-PS1 |
| DPI External Communications Kit | 20-XCOMM-DC-BASE |
| External DPI I/O Option Board † | 20-XCOMM-IO-OPT1 |
| Compact I/O Module (3 Channel) | 1769-SM1 |
| Serial Null Modem Adapter | 1203-SNM |
| Smart Self-powered Serial Converter (RS232) includes 1203-SFC and 1202-C10 Cables | 1203-SSS |
| Universal Serial Bus™ (USB) Converter includes 2m USB, 20-HIM-H10 & 22-HIM-H10 Cables | 1203-USB |

† For use only with DPI External Communications Kits 20-XCOMM-DC-BASE.

Other Options

| Description | Cat. No. |
|------------------------------|------------------|
| DriveGuard® Safe-Off Board § | 20A-DG01 |
| 5V/12V Encoder § | 20A-ENC-1 |
| 115V ac Interface | AK-M9-115VAC-1 |
| Frame E Flange Gasket | AK-M9-GASKET1-E4 |
| Service Connection Board ‡ | SK-M9-SCB1 |

§ Works only with PowerFlex 70 Enhanced Control.

‡ Provides temporary DPI/HIM connection for NEMA/UL Type 1 and Flange drives with cover removed.

Terminators

| Description † | Cat. No. |
|---|-----------|
| for use with 3.7 kW (5 Hp) & below drives | 1204-TFA1 |
| for use with 1.5 kW (2 Hp) & up drives | 1204-TFB2 |

† Refer to Appendix A of publication *DRIVES-IN001* for selection information.

Reflected Wave Reduction Modules

| Description † | Cat. No. |
|-------------------------------|----------------|
| 17A with Common Mode Choke | 1204-RWC-17-A |
| 9A without Choke, Book Mount | 1204-RWR2-09-B |
| 9A without Choke, Stack Mount | 1204-RWR2-09-C |

† Refer to Appendix A of publication *DRIVES-IN001* for selection information.

PC Programming Software

| Description | |
|---|--|
| DriveTools™ SP Software † | See publication PFLEX-SG002 for further information. |
| DriveExplorer™ Software (Lite/Full) † ‡ | |
| Pocket DriveExplorer™ Software | |

† Set-up wizards are available for use with DriveTools SP and DriveExplorer (Lite/Full) only.

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

Reflective Wave Reduction Devices

1321-RWR devices are used at the output of the drive to reduce dv/dt and motor terminal peak voltages

| 480V, 60 Hz, Three-Phase | | |
|--------------------------|------------|---------------------|
| Drive Cat. No. | KW (Hp) | RWR Filter Cat. No. |
| 20AD1P1-ND | 0.37 (0.5) | — |
| 20AD2P1-ND | 0.75 (1.0) | — |
| 20AD3P4-ND | 1.5 (2.0) | — |
| 20AD5P0-ND | 2.2 (3.0) | — |
| 20AD8P0-ND | 4.0 (5.0) | 1321-RWR8-DP |
| 20AD011-ND | 5.5 (7.5) | 1321-RWR12-DP |
| 20AD014-ND | 7.5 (10) | 1321-RWR18-DP |
| 20AD022-ND | 11 (15) | 1321-RWR25-DP |
| 20AD027-ND | 15 (20) | 1321-RWR35-DP |
| 20AD034-ND | 18.5 (25) | 1321-RWR35-DP |
| 20AD040-ND | 22 (30) | 1321-RWR45-DP |
| 20AD052-ND | 30 (40) | 1321-RWR55-DP |
| 20AD065-ND | 37 (50) | 1321-RWR80-DP |

| 600V, 60 Hz, Three-Phase | | |
|--------------------------|------------|---------------------|
| Drive Cat. No. | KW (Hp) | RWR Filter Cat. No. |
| 20AE0P9-ND | 0.37 (0.5) | — |
| 20AE1P7-ND | 0.75 (1.0) | — |
| 20AE2P7-ND | 1.5 (2.0) | — |
| 20AE3P9-ND | 2.2 (3.0) | — |
| 20AE6P1-ND | 4.0 (5.0) | 1321-RWR8-EP |
| 20AE9P0-ND | 5.5 (7.5) | 1321-RWR12-EP |
| 20AE011-ND | 7.5 (10) | 1321-RWR18-EP |
| 20AE017-ND | 11 (15) | 1321-RWR25-EP |
| 20AE022-ND | 15 (20) | 1321-RWR35-EP |
| 20AE027-ND | 18.5 (25) | 1321-RWR45-EP |
| 20AE032-ND | 22 (30) | 1321-RWR55-EP |
| 20AE041-ND | 30 (40) | 1321-RWR80-EP |
| 20AE052-ND | 37 (50) | 1321-RWR100-EP |

Isolation Transformers

For installations that have specific types of AC supply configurations or require drive protection due to AC line disturbances, isolation transformers are available.

| Motor Rating kW (Hp) | 240V, 60 Hz, Three-Phase, 240V Primary & 240V Secondary | 460V, 60 Hz, Three-Phase, 460V Primary & 460V Secondary | 575V, 60 Hz, Three-Phase 575V Primary & 575V Secondary |
|-------------------------|--|--|---|
| | IP32 (NEMA/UL Type 3R) | IP32 (NEMA/UL Type 3R) | IP32 (NEMA/UL Type 3R) |
| | Cat. No. | Cat. No. | Cat. No. |
| 0.25 (0.33) | 1321-3TW005-AA | 1321-3TW005-BB | – |
| 0.37 (0.5) | 1321-3TW005-AA | 1321-3TW005-BB | – |
| 0.55 (0.75) | 1321-3TW005-AA | 1321-3TW005-BB | – |
| 0.75 (1.0) | 1321-3TW005-AA | 1321-3TW005-BB | 1321-3TW005-CC |
| 1.1 (1.5) | 1321-3TW005-AA | 1321-3TW005-BB | – |
| 1.5 (2.0) | 1321-3TW005-AA | 1321-3TW005-BB | 1321-3TW005-CC |
| 2.2 (3.0) | 1321-3TW005-AA | 1321-3TW005-BB | 1321-3TW005-CC |
| 4.0 (5.0) | 1321-3TW007-AA | 1321-3TW007-BB | 1321-3TW007-CC |
| 5.5 (7.5) | 1321-3TW011-AA | 1321-3TW011-BB | 1321-3TW011-CC |
| 7.5 (10) | 1321-3TW014-AA | 1321-3TW014-BB | 1321-3TW014-CC |
| 11 (15) | 1321-3TW020-AA | 1321-3TW020-BB | 1321-3TW020-CC |
| 15 (20) | 1321-3TW027-AA | 1321-3TW027-BB | 1321-3TW027-CC |
| 18.5 (25) | 1321-3TW034-AA | 1321-3TW034-BB | 1321-3TW034-CC |
| 22 (30) | – | 1321-3TW040-BB | 1321-3TW040-CC |
| 30 (40) | – | 1321-3TW051-BB | 1321-3TW051-CC |
| 37 (50) | – | 1321-3TH063-BB | 1321-3TH063-CC |

EMC Filters

These external filters are only for Frame A drives. Other drive frames are available with internal filters. See Factory Installed Options.

| Description | Frame | Cat. No. |
|--|-------|--------------|
| External 1-Phase 200...240V, 8A Filter | A | 20A-RF-08-A1 |
| External 3-Phase 200...480V, 5A Filter | A | 20A-RF-05-A3 |

Input/Output Line Reactors

For impedance matching, protection from AC line disturbances or motor protection, reactors are available for both the input and output sides of the drive.

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

| Drive Cat. No. | Duty | Hp | Input Line Reactor ⁽¹⁾ | | Output Line Reactor ⁽¹⁾ | |
|----------------|-------------|------|-----------------------------------|-----------------------|------------------------------------|-----------------------|
| | | | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) |
| | | | Cat. No. | Cat. No. | Cat. No. | Cat. No. |
| 20AB2P2 | Heavy Duty | 0.33 | 1321-3R2-D | 1321-3RA2-D | 1321-3R2-D | 1321-3RA2-D |
| 20AB2P2 | Normal Duty | 0.5 | 1321-3R2-D | 1321-3RA2-D | 1321-3R2-D | 1321-3RA2-D |
| 20AB4P2 | Heavy Duty | 0.75 | 1321-3R4-A | 1321-3RA4-A | 1321-3R4-A | 1321-3RA4-A |
| 20AB4P2 | Normal Duty | 1 | 1321-3R4-A | 1321-3RA4-A | 1321-3R4-A | 1321-3RA4-A |
| 20AB6P8 | Heavy Duty | 1.5 | 1321-3R8-B | 1321-3RA8-B | 1321-3R8-A | 1321-3RA8-A |
| 20AB6P8 | Normal Duty | 2 | 1321-3R8-A | 1321-3RA8-A | 1321-3R8-A | 1321-3RA8-A |
| 20AB9P6 | Heavy Duty | 2 | 1321-3R8-A | 1321-3RA8-A | 1321-3R12-A | 1321-3RA12-A |
| 20AB9P6 | Normal Duty | 3 | 1321-3R12-A | 1321-3RA12-A | 1321-3R12-A | 1321-3RA12-A |
| 20AB015 | Heavy Duty | 3 | 1321-3R12-A | 1321-3RA12-A | 1321-3R18-A | 1321-3RA18-A |
| 20AB015 | Normal Duty | 5 | 1321-3R18-A | 1321-3RA18-A | 1321-3R18-A | 1321-3RA18-A |
| 20AB022 | Heavy Duty | 5 | 1321-3R18-A | 1321-3RA18-A | 1321-3R25-A | 1321-3RA25-A |
| 20AB022 | Normal Duty | 7.5 | 1321-3R25-A | 1321-3RA25-A | 1321-3R25-A | 1321-3RA25-A |
| 20AB028 | Heavy Duty | 7.5 | 1321-3R25-A | 1321-3RA25-A | 1321-3R35-A | 1321-3RA35-A |
| 20AB028 | Normal Duty | 10 | 1321-3R35-A | 1321-3RA35-A | 1321-3R35-A | 1321-3RA35-A |
| 20AB042 | Heavy Duty | 10 | 1321-3R35-A | 1321-3RA35-A | 1321-3R45-A | 1321-3RA45-A |
| 20AB042 | Normal Duty | 15 | 1321-3R45-A | 1321-3RA45-A | 1321-3R45-A | 1321-3RA45-A |
| 20AB054 | Heavy Duty | 15 | 1321-3R45-A | 1321-3RA45-A | 1321-3R55-A | 1321-3RA55-A |
| 20AB054 | Normal Duty | 20 | 1321-3R55-A | 1321-3RA55-A | 1321-3R55-A | 1321-3RA55-A |
| 20AB070 | Heavy Duty | 20 | 1321-3R55-A | 1321-3RA55-A | 1321-3R80-A | 1321-3RA80-A |
| 20AB070 | Normal Duty | 25 | 1321-3R80-A | 1321-3RA80-A | 1321-3R80-A | 1321-3RA80-A |

⁽¹⁾ Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

240V, 60 Hz, Three-Phase, 5% Impedance

| Drive Cat. No. | Duty | Hp | Input Line Reactor ⁽¹⁾ | | Output Line Reactor ⁽¹⁾ | |
|----------------|-------------|------|-----------------------------------|-----------------------|------------------------------------|-----------------------|
| | | | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) |
| | | | Cat. No. | Cat. No. | Cat. No. | Cat. No. |
| 20AB2P2 | Heavy Duty | 0.33 | 1321-3R2-A | 1321-3RA2-A | 1321-3R2-A | 1321-3RA2-A |
| 20AB2P2 | Normal Duty | 0.5 | 1321-3R2-A | 1321-3RA2-A | 1321-3R2-A | 1321-3RA2-A |
| 20AB4P2 | Heavy Duty | 0.75 | 1321-3R4-B | 1321-3RA4-B | 1321-3R4-B | 1321-3RA4-B |
| 20AB4P2 | Normal Duty | 1 | 1321-3R4-B | 1321-3RA4-B | 1321-3R4-B | 1321-3RA4-B |
| 20AB6P8 | Heavy Duty | 1.5 | 1321-3R8-B | 1321-3RA8-B | 1321-3R8-B | 1321-3RA8-B |
| 20AB6P8 | Normal Duty | 2 | 1321-3R8-B | 1321-3RA8-B | 1321-3R8-B | 1321-3RA8-B |
| 20AB9P6 | Heavy Duty | 2 | 1321-3R8-B | 1321-3RA8-B | 1321-3R12-B | 1321-3RA12-B |
| 20AB9P6 | Normal Duty | 3 | 1321-3R12-B | 1321-3RA12-B | 1321-3R12-B | 1321-3RA12-B |
| 20AB015 | Heavy Duty | 3 | 1321-3R12-B | 1321-3RA12-B | 1321-3R18-B | 1321-3RA18-B |
| 20AB015 | Normal Duty | 5 | 1321-3R18-B | 1321-3RA18-B | 1321-3R18-B | 1321-3RA18-B |
| 20AB022 | Heavy Duty | 5 | 1321-3R18-B | 1321-3RA18-B | 1321-3R25-B | 1321-3RA25-B |
| 20AB022 | Normal Duty | 7.5 | 1321-3R25-B | 1321-3RA25-B | 1321-3R25-B | 1321-3RA25-B |
| 20AB028 | Heavy Duty | 7.5 | 1321-3R25-B | 1321-3RA25-B | 1321-3R35-B | 1321-3RA35-B |
| 20AB028 | Normal Duty | 10 | 1321-3R35-B | 1321-3RA35-B | 1321-3R35-B | 1321-3RA35-B |
| 20AB042 | Heavy Duty | 10 | 1321-3R35-B | 1321-3RA35-B | 1321-3R45-B | 1321-3RA45-B |
| 20AB042 | Normal Duty | 15 | 1321-3R45-B | 1321-3RA45-B | 1321-3R45-B | 1321-3RA45-B |
| 20AB054 | Heavy Duty | 15 | 1321-3R45-B | 1321-3RA45-B | 1321-3R55-B | 1321-3RA55-B |
| 20AB054 | Normal Duty | 20 | 1321-3R55-B | 1321-3RA55-B | 1321-3R55-B | 1321-3RA55-B |
| 20AB070 | Heavy Duty | 20 | 1321-3R55-B | 1321-3RA55-B | 1321-3R80-B | 1321-3RA80-B |
| 20AB070 | Normal Duty | 25 | 1321-3R80-B | 1321-3RA80-B | 1321-3R80-B | 1321-3RA80-B |

⁽¹⁾ Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

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

| Drive Cat. No. | Duty | Hp | Input Line Reactor ⁽¹⁾ | | Output Line Reactor ⁽¹⁾ | |
|----------------|-------------|------|-----------------------------------|-----------------------|------------------------------------|-----------------------|
| | | | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) |
| | | | Cat. No. | Cat. No. | Cat. No. | Cat. No. |
| 20AD1P1 | Heavy Duty | 0.33 | 1321-3R1-C | 1321-3RA1-C | 1321-3R2-B | 1321-3RA2-B |
| 20AD1P1 | Normal Duty | 0.5 | 1321-3R1-C | 1321-3RA1-C | 1321-3R2-B | 1321-3RA2-B |
| 20AD2P1 | Heavy Duty | 0.75 | 1321-3R2-A | 1321-3RA2-A | 1321-3R2-A | 1321-3RA2-A |
| 20AD2P1 | Normal Duty | 1 | 1321-3R2-A | 1321-3RA2-A | 1321-3R2-A | 1321-3RA2-A |
| 20AD3P4 | Heavy Duty | 1.5 | 1321-3R4-C | 1321-3RA4-C | 1321-3R4-B | 1321-3RA4-B |
| 20AD3P4 | Normal Duty | 2 | 1321-3R4-B | 1321-3RA4-B | 1321-3R4-B | 1321-3RA4-B |
| 20AD5P0 | Heavy Duty | 2 | 1321-3R4-B | 1321-3RA4-B | 1321-3R8-C | 1321-3RA8-C |
| 20AD5P0 | Normal Duty | 3 | 1321-3R8-C | 1321-3RA8-C | 1321-3R8-C | 1321-3RA8-C |
| 20AD8P0 | Heavy Duty | 3 | 1321-3R8-C | 1321-3RA8-C | 1321-3R8-B | 1321-3RA8-B |
| 20AD8P0 | Normal Duty | 5 | 1321-3R8-B | 1321-3RA8-B | 1321-3R8-B | 1321-3RA8-B |
| 20AD011 | Heavy Duty | 5 | 1321-3R8-B | 1321-3RA8-B | 1321-3R12-B | 1321-3RA12-B |
| 20AD011 | Normal Duty | 7.5 | 1321-3R12-B | 1321-3RA12-B | 1321-3R12-B | 1321-3RA12-B |
| 20AD014 | Heavy Duty | 7.5 | 1321-3R12-B | 1321-3RA12-B | 1321-3R18-B | 1321-3RA18-B |
| 20AD014 | Normal Duty | 10 | 1321-3R18-B | 1321-3RA18-B | 1321-3R18-B | 1321-3RA18-B |
| 20AD022 | Heavy Duty | 10 | 1321-3R18-B | 1321-3RA18-B | 1321-3R25-B | 1321-3RA25-B |
| 20AD022 | Normal Duty | 15 | 1321-3R25-B | 1321-3RA25-B | 1321-3R25-B | 1321-3RA25-B |
| 20AD027 | Heavy Duty | 15 | 1321-3R25-B | 1321-3RA25-B | 1321-3R25-B | 1321-3RA25-B |
| 20AD027 | Normal Duty | 20 | 1321-3R35-B | 1321-3RA35-B | 1321-3R25-B | 1321-3RA25-B |
| 20AD034 | Heavy Duty | 20 | 1321-3R35-B | 1321-3RA35-B | 1321-3R35-B | 1321-3RA35-B |
| 20AD034 | Normal Duty | 25 | 1321-3R35-B | 1321-3RA35-B | 1321-3R35-B | 1321-3RA35-B |
| 20AD040 | Heavy Duty | 25 | 1321-3R35-B | 1321-3RA35-B | 1321-3R45-B | 1321-3RA45-B |
| 20AD040 | Normal Duty | 30 | 1321-3R45-B | 1321-3RA45-B | 1321-3R45-B | 1321-3RA45-B |
| 20AD052 | Heavy Duty | 30 | 1321-3R45-B | 1321-3RA45-B | 1321-3R55-B | 1321-3RA55-B |
| 20AD052 | Normal Duty | 40 | 1321-3R55-B | 1321-3RA55-B | 1321-3R55-B | 1321-3RA55-B |
| 20AD065 | Heavy Duty | 40 | 1321-3R55-B | 1321-3RA55-B | 1321-3R80-B | 1321-3RA80-B |
| 20AD065 | Normal Duty | 50 | 1321-3R80-B | 1321-3RA80-B | 1321-3R80-B | 1321-3RA80-B |

⁽¹⁾ Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

480V, 60 Hz, Three-Phase, 5% Impedance

| Drive Cat. No. | Duty | Hp | Input Line Reactor ⁽¹⁾ | | Output Line Reactor ⁽¹⁾ | |
|----------------|-------------|------|-----------------------------------|-----------------------------|------------------------------------|-----------------------|
| | | | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) |
| | | | Cat. No. | Cat. No. | Cat. No. | Cat. No. |
| 20AD1P1 | Heavy Duty | 0.33 | 1321-3R1-B | 1321-3RA1-B | 1321-3R2-C | 1321-3RA2-C |
| 20AD1P1 | Normal Duty | 0.5 | 1321-3R1-B | 1321-3RA1-B | 1321-3R2-C | 1321-3RA2-C |
| 20AD2P1 | Heavy Duty | 0.75 | 1321-3R2-C | 1321-3RA2-C | 1321-3R2-B | 1321-3RA2-B |
| 20AD2P1 | Normal Duty | 1 | 1321-3R2-B | 1321-3RA2-B | 1321-3R2-B | 1321-3RA2-B |
| 20AD3P4 | Heavy Duty | 1.5 | 1321-3R4-D | 1321-3RA4-D | 1321-3R4-D | 1321-3RA4-D |
| 20AD3P4 | Normal Duty | 2 | 1321-3R4-D | 1321-3RA4-D | 1321-3R4-D | 1321-3RA4-D |
| 20AD5P0 | Heavy Duty | 2 | 1321-3R4-D | 1321-3RA4-D | 1321-3R8-D | 1321-3RA8-D |
| 20AD5P0 | Normal Duty | 3 | 1321-3R8-D | 1321-3RA8-D | 1321-3R8-D | 1321-3RA8-D |
| 20AD8P0 | Heavy Duty | 3 | 1321-3R8-D | 1321-3RA8-D | 1321-3R8-C | 1321-3RA8-C |
| 20AD8P0 | Normal Duty | 5 | 1321-3R8-C | 1321-3RA8-C | 1321-3R8-C | 1321-3RA8-C |
| 20AD011 | Heavy Duty | 5 | 1321-3R8-C | 1321-3RA8-C | 1321-3R12-C | 1321-3RA12-C |
| 20AD011 | Normal Duty | 7.5 | 1321-3R12-C | 1321-3RA12-C | 1321-3R12-C | 1321-3RA12-C |
| 20AD014 | Heavy Duty | 7.5 | 1321-3R12-C | 1321-3RA12-C | 1321-3R18-C | 1321-3RA18-C |
| 20AD014 | Normal Duty | 10 | 1321-3R18-C | 1321-3RA18-C | 1321-3R18-C | 1321-3RA18-C |
| 20AD022 | Heavy Duty | 10 | 1321-3R18-C | 1321-3RA18-C | 1321-3R25-C | 1321-3RA25-C |
| 20AD022 | Normal Duty | 15 | 1321-3R25-C | 1321-3RA25-C | 1321-3R25-C | 1321-3RA25-C |
| 20AD027 | Heavy Duty | 15 | 1321-3R25-C | 1321-3RA25-C | 1321-3R25-C | 1321-3RA25-C |
| 20AD027 | Normal Duty | 20 | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ | 1321-3R25-C | 1321-3RA25-C |
| 20AD034 | Heavy Duty | 20 | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ | 1321-3R35-C | 1321-3RA35-C |
| 20AD034 | Normal Duty | 25 | 1321-3R35-C | 1321-3RA35-C | 1321-3R35-C | 1321-3RA35-C |
| 20AD040 | Heavy Duty | 25 | 1321-3R35-C | 1321-3RA35-C | 1321-3R45-C | 1321-3RA45-C |
| 20AD040 | Normal Duty | 30 | 1321-3R45-C | 1321-3RA45-C | 1321-3R45-C | 1321-3RA45-C |
| 20AD052 | Heavy Duty | 30 | 1321-3R45-C | 1321-3RA45-C | 1321-3R55-C | 1321-3RA55-C |
| 20AD052 | Normal Duty | 40 | 1321-3R55-C | 1321-3RA55-C | 1321-3R55-C | 1321-3RA55-C |
| 20AD065 | Heavy Duty | 40 | 1321-3R55-C | 1321-3RA55-C | 1321-3R80-C | 1321-3RA80-C |
| 20AD065 | Normal Duty | 50 | 1321-3R80-C | 1321-3RA80-C | 1321-3R80-C | 1321-3RA80-C |

⁽¹⁾ Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

⁽²⁾ 4% impedance.

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

| Drive Cat. No. | Duty | Hp | Input Line Reactor ⁽¹⁾ | | Output Line Reactor ⁽¹⁾ | |
|----------------|-------------|------|-----------------------------------|-----------------------|------------------------------------|-----------------------|
| | | | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) |
| | | | Cat. No. | Cat. No. | Cat. No. | Cat. No. |
| 20AE0P9 | Heavy Duty | 0.33 | 1321-3R1-C | 1321-3RA1-C | 1321-3R1-B | 1321-3RA1-B |
| 20AE0P9 | Normal Duty | 0.5 | 1321-3R1-C | 1321-3RA1-C | 1321-3R1-B | 1321-3RA1-B |
| 20AE1P7 | Heavy Duty | 0.75 | 1321-3R2-B | 1321-3RA2-B | 1321-3R2-B | 1321-3RA2-B |
| 20AE1P7 | Normal Duty | 1 | 1321-3R2-B | 1321-3RA2-B | 1321-3R2-B | 1321-3RA2-B |
| 20AE2P7 | Heavy Duty | 1.5 | 1321-3R2-A | 1321-3RA2-A | 1321-3R4-D | 1321-3RA4-D |
| 20AE2P7 | Normal Duty | 2 | 1321-3R4-C | 1321-3RA4-C | 1321-3R4-D | 1321-3RA4-D |
| 20AE3P9 | Heavy Duty | 2 | 1321-3R4-C | 1321-3RA4-C | 1321-3R4-C | 1321-3RA4-C |
| 20AE3P9 | Normal Duty | 3 | 1321-3R4-C | 1321-3RA4-C | 1321-3R4-C | 1321-3RA4-C |
| 20AE6P1 | Heavy Duty | 3 | 1321-3R4-C | 1321-3RA4-C | 1321-3R8-C | 1321-3RA8-C |
| 20AE6P1 | Normal Duty | 5 | 1321-3R8-C | 1321-3RA8-C | 1321-3R8-C | 1321-3RA8-C |
| 20AE9P0 | Heavy Duty | 5 | 1321-3R8-C | 1321-3RA8-C | 1321-3R12-C | 1321-3RA12-C |
| 20AE9P0 | Normal Duty | 7.5 | 1321-3R12-C | 1321-3RA12-C | 1321-3R12-C | 1321-3RA12-C |
| 20AE011 | Heavy Duty | 7.5 | 1321-3R12-C | 1321-3RA12-C | 1321-3R12-B | 1321-3RA12-B |
| 20AE011 | Normal Duty | 10 | 1321-3R12-B | 1321-3RA12-B | 1321-3R12-B | 1321-3RA12-B |
| 20AE017 | Heavy Duty | 10 | 1321-3R12-B | 1321-3RA12-B | 1321-3R18-B | 1321-3RA18-B |
| 20AE017 | Normal Duty | 15 | 1321-3R18-B | 1321-3RA18-B | 1321-3R18-B | 1321-3RA18-B |
| 20AE022 | Heavy Duty | 15 | 1321-3R18-B | 1321-3RA18-B | 1321-3R25-B | 1321-3RA25-B |
| 20AE022 | Normal Duty | 20 | 1321-3R25-B | 1321-3RA25-B | 1321-3R25-B | 1321-3RA25-B |
| 20AE027 | Heavy Duty | 20 | 1321-3R25-B | 1321-3RA25-B | 1321-3R35-C | 1321-3RA35-C |
| 20AE027 | Normal Duty | 25 | 1321-3R35-C | 1321-3RA35-C | 1321-3R35-C | 1321-3RA35-C |
| 20AE032 | Heavy Duty | 25 | 1321-3R35-C | 1321-3RA35-C | 1321-3R35-B | 1321-3RA35-B |
| 20AE032 | Normal Duty | 30 | 1321-3R35-B | 1321-3RA35-B | 1321-3R35-B | 1321-3RA35-B |
| 20AE041 | Heavy Duty | 30 | 1321-3R35-B | 1321-3RA35-B | 1321-3R45-B | 1321-3RA45-B |
| 20AE041 | Normal Duty | 40 | 1321-3R45-B | 1321-3RA45-B | 1321-3R45-B | 1321-3RA45-B |
| 20AE052 | Heavy Duty | 40 | 1321-3R45-B | 1321-3RA45-B | 1321-3R55-B | 1321-3RA55-B |
| 20AE052 | Normal Duty | 50 | 1321-3R55-B | 1321-3RA55-B | 1321-3R55-B | 1321-3RA55-B |

⁽¹⁾ Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

600V, 60 Hz, Three-Phase, 5% Impedance

| Drive Cat. No. | Duty | Hp | Input Line Reactor ⁽¹⁾ | | Output Line Reactor ⁽¹⁾ | |
|----------------|-------------|------|-----------------------------------|-----------------------------|------------------------------------|-----------------------------|
| | | | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) | IP00 (NEMA/UL Type Open) | IP11 (NEMA/UL Type 1) |
| | | | Cat. No. | Cat. No. | Cat. No. | Cat. No. |
| 20AE0P9 | Heavy Duty | 0.33 | 1321-3R1-A | 1321-3RA1-A | 1321-3R1-B | 1321-3RA1-B |
| 20AE0P9 | Normal Duty | 0.5 | 1321-3R1-B | 1321-3RA1-B | 1321-3R1-B | 1321-3RA1-B |
| 20AE1P7 | Heavy Duty | 0.5 | 1321-3R1-B | 1321-3RA1-B | 1321-3R2-C | 1321-3RA2-C |
| 20AE1P7 | Normal Duty | 1 | 1321-3R2-C | 1321-3RA2-C | 1321-3R2-C | 1321-3RA2-C |
| 20AE2P7 | Heavy Duty | 1 | 1321-3R2-C | 1321-3RA2-C | 1321-3R4-D ⁽²⁾ | 1321-3RA4-D ⁽²⁾ |
| 20AE2P7 | Normal Duty | 2 | 1321-3R4-D ⁽²⁾ | 1321-3RA4-D ⁽²⁾ | 1321-3R4-D ⁽²⁾ | 1321-3RA4-D ⁽²⁾ |
| 20AE3P9 | Heavy Duty | 2 | 1321-3R4-D ⁽²⁾ | 1321-3RA4-D ⁽²⁾ | 1321-3R4-D | 1321-3RA4-D |
| 20AE3P9 | Normal Duty | 3 | 1321-3R4-D | 1321-3RA4-D | 1321-3R4-D | 1321-3RA4-D |
| 20AE6P1 | Heavy Duty | 3 | 1321-3R4-D | 1321-3RA4-D | 1321-3R8-D | 1321-3RA8-D |
| 20AE6P1 | Normal Duty | 5 | 1321-3R8-D | 1321-3RA8-D | 1321-3R8-D | 1321-3RA8-D |
| 20AE9P0 | Heavy Duty | 5 | 1321-3R8-D | 1321-3RA8-D | 1321-3R12-C ⁽²⁾ | 1321-3RA12-C ⁽²⁾ |
| 20AE9P0 | Normal Duty | 7.5 | 1321-3R12-C ⁽²⁾ | 1321-3RA12-C ⁽²⁾ | 1321-3R12-C ⁽²⁾ | 1321-3RA12-C ⁽²⁾ |
| 20AE011 | Heavy Duty | 7.5 | 1321-3R12-C ⁽²⁾ | 1321-3RA12-C ⁽²⁾ | 1321-3R12-C | 1321-3RA12-C |
| 20AE011 | Normal Duty | 10 | 1321-3R12-C | 1321-3RA12-C | 1321-3R12-C | 1321-3RA12-C |
| 20AE017 | Heavy Duty | 10 | 1321-3R12-C | 1321-3RA12-C | 1321-3R18-C | 1321-3RA18-C |
| 20AE017 | Normal Duty | 15 | 1321-3R18-C | 1321-3RA18-C | 1321-3R18-C | 1321-3RA18-C |
| 20AE022 | Heavy Duty | 15 | 1321-3R18-C | 1321-3RA18-C | 1321-3R25-C ⁽²⁾ | 1321-3RA25-C ⁽²⁾ |
| 20AE022 | Normal Duty | 20 | 1321-3R25-C ⁽²⁾ | 1321-3RA25-C ⁽²⁾ | 1321-3R25-C ⁽²⁾ | 1321-3RA25-C ⁽²⁾ |
| 20AE027 | Heavy Duty | 20 | 1321-3R25-C ⁽²⁾ | 1321-3RA25-C ⁽²⁾ | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ |
| 20AE027 | Normal Duty | 25 | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ |
| 20AE032 | Heavy Duty | 25 | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ |
| 20AE032 | Normal Duty | 30 | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ |
| 20AE041 | Heavy Duty | 30 | 1321-3R35-C ⁽²⁾ | 1321-3RA35-C ⁽²⁾ | 1321-3R45-C | 1321-3RA45-C |
| 20AE041 | Normal Duty | 40 | 1321-3R45-C | 1321-3RA45-C | 1321-3R45-C | 1321-3RA45-C |
| 20AE052 | Heavy Duty | 40 | 1321-3R45-C | 1321-3RA45-C | 1321-3R55-C | 1321-3RA55-C |
| 20AE052 | Normal Duty | 50 | 1321-3R55-C | 1321-3RA55-C | 1321-3R55-C | 1321-3RA55-C |

⁽¹⁾ Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

⁽²⁾ 4% impedance.

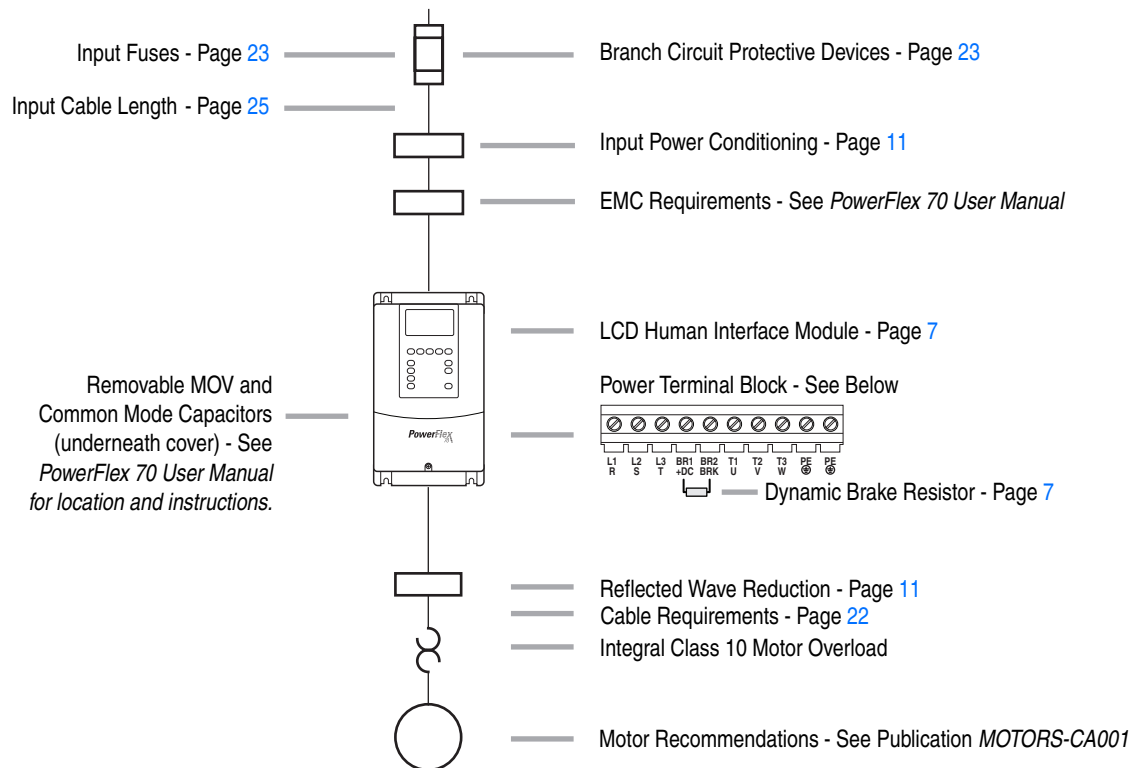
Installation Considerations

Power Wiring

The PowerFlex 70 has the following built in protective features to help simplify installation:

- Ground fault protection during start-up and running helps ensure reliability
- Electronic motor overload protection increases motor life
- Removable MOV to ground and common mode capacitors to ground ensure compatibility with ungrounded systems. These devices must be disconnected if the drive is installed on an ungrounded, high-resistance or B phase grounded distribution system. These devices must also be disconnected if a regenerative unit is used as a bus supply or brake.
- 6kV transient protection 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 *Wiring and Grounding Guidelines for AC Drives* (publication *DRIVES-IN001*) available on-line at www.rockwellautomation.com/literature, for detailed recommendations on input power conditioning, dynamic braking, reflected wave protection, motor cables types.



Terminal Blocks

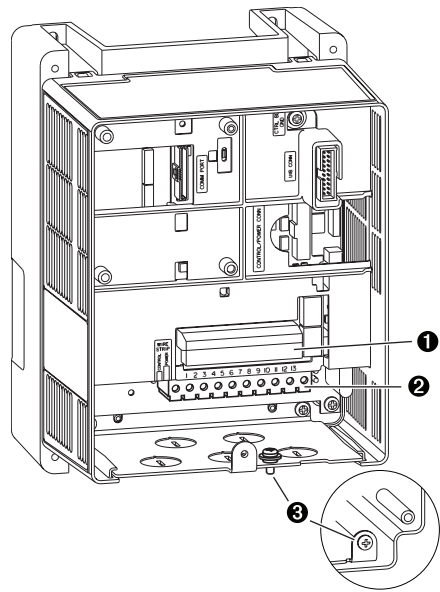
Terminal Block Specifications

| No. | Name | Description | Frame | Wire Size Range ⁽¹⁾ | | Torque | |
|-----|----------------------|--------------------------------------|-----------|--------------------------------|-------------------------------|------------------------|-----------------------|
| | | | | Maximum | Minimum | Maximum | Recommended |
| ① | I/O Terminal Block | Signal and control connections | All | 1.5 mm ² (16 AWG) | 0.05 mm ² (30 AWG) | 0.55 N-m (4.9 lb.-in.) | 0.5 N-m (4.4 lb.-in.) |
| ② | Power Terminal Block | Input power and motor connections | A, B, & C | 3.5 mm ² (12 AWG) | 0.3 mm ² (22 AWG) | 0.66 N-m (5.5 lb.-in.) | 0.6 N-m (5 lb.-in.) |
| | | | D | 8.4 mm ² (8 AWG) | 0.8 mm ² (18 AWG) | 1.7 N-m (15 lb.-in.) | 1.4 N-m (12 lb.-in.) |
| | | | E | 25.0 mm ² (3 AWG) | 2.5 mm ² (14 AWG) | 2.71 N-m (24 lb.-in.) | 2.71 N-m (24 lb.-in.) |
| ③ | SHLD terminal | Terminating point for wiring shields | All | — | — | 1.6 N-m (14 lb.-in.) | 1.6 N-m (14 lb.-in.) |

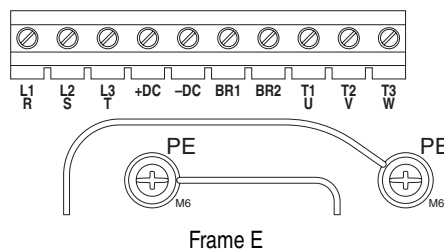
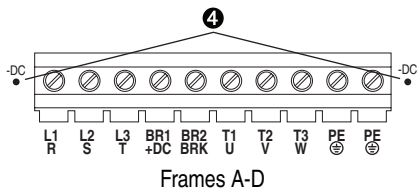
(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

| Terminal | Description | Notes |
|----------|------------------------|--|
| BR1 | DC Brake (+) | DB Resistor Connection - Important: Do not connect both an internal and external DB resistor at the same time. This may violate the minimum allowed DB resistance and cause drive damage. |
| BR2 | DC Brake (-) | |
| +DC | DC Bus (+) | ④ Test point on Frames A-D located to the left or right of the Power Terminal Block. Frame E has a dedicated terminal. |
| -DC | DC Bus (-) | |
| PE | PE Ground | |
| U, V, W | U (T1), V (T2), W (T3) | To Motor |
| R, S, T | R (L1), S (L2), T (L3) | AC Line Input Power |

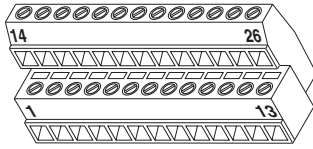
Typical Terminal Block Location



Power Terminals



Control Terminals



| No. | Signal | Factory Default | Description | Related Param. |
|-----|--|----------------------------------|--|----------------|
| 1 | Digital In 1 | Stop – CF (CF = Clear Fault) | 11.2 mA @ 24V DC 19.2V minimum on state | 361 - 366 |
| 2 | Digital In 2 | Start | 3.2V maximum off state | |
| 3 | Digital In 3 | Auto/Man | Important: Use only 24V DC, not suitable for 115V AC circuitry. ⁽³⁾ Inputs can be wired as sink or source. | |
| 4 | Digital In 4 | Speed Sel 1 | | |
| 5 | Digital In 5 | Speed Sel 2 | | |
| 6 | Digital In 6 | Speed Sel 3 | | |
| 7 | 24V Common | – | Drive supplied power for Digital In1-6 inputs only. | 380 - 387 |
| 8 | Digital In Common | – | Not intended for use on circuits outside of the drive. | |
| 9 | +24V DC | – | See examples beginning on page 20 . 150mA maximum load. | |
| 10 | +10V Pot Reference | – | 2 k ohm minimum load. | |
| 11 | Digital Out 1 – N.O. ⁽¹⁾ | NOT Fault | <u>Max Resistive Load</u> 250V AC / 30V DC 50 VA / 60 Watts | 380 - 387 |
| 12 | Digital Out 1 Common | | <u>Max Inductive Load</u> 250V AC / 30V DC 25 VA / 30 Watts | |
| 13 | Digital Out 1 – N.C. ⁽¹⁾ | Fault | <u>Minimum DC Load</u> 10 µA, 10 mV DC | |
| 14 | Analog In 1 (– Volts) | ⁽²⁾ | Non-isolated, 0 to +10V, 10 bit, 100k ohm input impedance. ⁽⁴⁾ | 320 - 327 |
| 15 | Analog In 1 (+ Volts) | Voltage – Reads value at 14 & 15 | | |
| 16 | Analog In 1 (– Current) | | Non-isolated, 4-20mA, 10 bit, 100 ohm input impedance. ⁽⁴⁾ | |
| 17 | Analog In 1 (+ Current) | | | |
| 18 | Analog In 2 (– Volts) | ⁽²⁾ | Isolated, bipolar, differential, 0 to +10V unipolar (10 bit) or ±10V bipolar (10 bit & sign), 100k ohm input impedance. ⁽⁵⁾ Isolated, 4-20mA, 10 bit & sign, 100 ohm input impedance. ⁽⁵⁾ | |
| 19 | Analog In 2 (+ Volts) | Voltage – Reads value at 18 & 19 | | |
| 20 | Analog In 2 (– Current) | | | |
| 21 | Analog In 2 (+ Current) | | | |
| 22 | 10V Pot Common Analog Out (– Volts) Analog Out (– Current) | ⁽²⁾ Output Freq | 0 to +10V, 10 bit, 10k ohm (2k ohm minimum) load. 0 to 20mA, 10 bit, 400 ohm maximum load. ⁽⁶⁾ Referenced to chassis ground. Common if internal 10V supply (terminal 10) is used. | 340 - 344 |
| 23 | Analog Out (+ Volts) Analog Out (+ Current) | | | |
| 24 | Digital Out 2 – N.O. ⁽¹⁾ | Run | See description at No.s 11-13. | 380 - 387 |
| 25 | Digital Out 2 Common | | | |
| 26 | Digital Out 2 – N.C. ⁽¹⁾ | NOT Run | | |

⁽¹⁾ Contacts shown in unpowered state. Any relay programmed as Fault or Alarm will energize (pick up) when power is applied to drive and deenergize (drop out) when fault or alarm exists. Relays selected for other functions will energize only when that condition exists and will deenergize when condition is removed.

⁽²⁾ These inputs/outputs are dependent on a number of parameters. See “Related Parameters.”

⁽³⁾ For use with 115V AC circuitry. A 115V AC interface option (AK-M9-115VAC-1) must be used

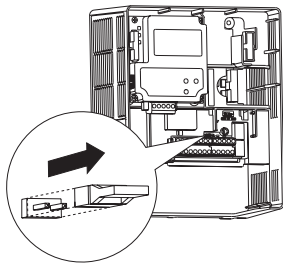
⁽⁴⁾ Differential Isolation - External source must be less than 10V with respect to PE.

⁽⁵⁾ Differential Isolation - External source must be maintained at less than 160V with respect to PE. Input provides high common mode immunity.

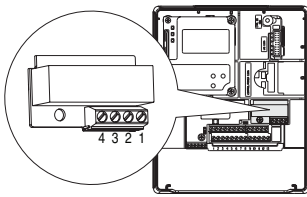
⁽⁶⁾ Analog output current is only available with Enhanced Control drives.

Hardware Enable Circuitry (Enhanced Control Only)

By default, the user can program a digital input as an Enable input. The status of this input is *interpreted by drive software*. If the application requires the drive to be disabled *without* software interpretation, a hardware enable configuration can be utilized. This is done by removing the enable jumper (ENBL JMP) and wiring the enable input to “Digital In 6”.



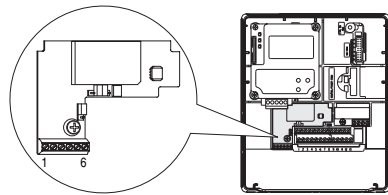
1. Remove drive cover.
2. Locate and remove the “Enable Jumper on the Main Control Board.
3. Wire Enable to “Digital In 6.”
4. Verify that 366 [Digital In6 Sel] is set to option 1 “Enable.”

Safe Off Board Terminal Block (Enhanced Control Only)

| No. | Signal | Description |
|-----|----------------|--|
| 1 | Monitor - N.C. | Normally closed contacts for monitoring relay status. |
| 2 | Common - N.C. | Maximum Resistive Load: 250V ac / 30V dc / 50 VA / 60 Watts Maximum Inductive Load: 250V ac / 30V dc / 25 VA / 30 Watts |
| 3 | +24V dc | Connections for user supplied power to energize coil. |
| 4 | 24V Common | |

Connection Examples

For detailed connection examples refer to the DriveGuard™ Safe-Off Option (Series B) for PowerFlex® 40P and PowerFlex® 70 AC Drives *User Manual*, publication PFLEX-UM003.

Encoder Interface Terminal Block (Enhanced Control Only)

| No. | Signal | Description | Jumper Settings |
|-----|----------------------------|---|-----------------|
| 1 | 5-12V Power ⁽¹⁾ | Internal power source 250 mA (isolated) | |
| 2 | Power Return | | |
| 3 | Encoder B (NOT) | Single channel or quadrature B input. | |
| 4 | Encoder B | | |
| 5 | Encoder A (NOT) | Single channel or quadrature A input. | |
| 6 | Encoder A | | |

(1) Jumper selectable +5/12V is available on 20A-ENC-1 Encoder Boards.

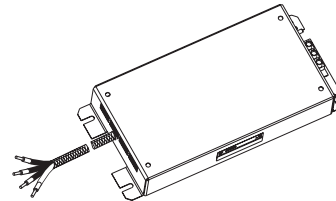
Sample Encoder Wiring

| 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 | |

EMC Filters

| Description | Frame | Catalog Number | |
|--|---------|----------------|---------------------------------|
| | | User Installed | Factory Installed (Position 13) |
| External 1-Phase 200-240V, 8A Filter | A | 20A-RF-08-A1 | N/A |
| External 3-Phase 200-480V, 5A Filter | A | 20A-RF-05-A3 | N/A |
| Internal 3-Phase 200-480 Filter ^❶ | B, C, D | – | A |

❶ Standard on Frames C and D. Optional on Frame B (Frame A ratings increase to Frame B).

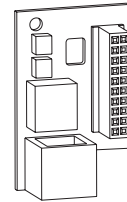


EMC Filter
20A-RF-08-A1
20A-RF-05-A3

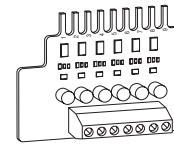
Other Options

| Description | Catalog No. | | |
|----------------------------|------------------|-------------------|---------------|
| | User Installed | Factory Installed | |
| | | (Position 15) | (Position 16) |
| Service Connection Board ❷ | SK-M9-SCB1 | N/A | N/A |
| 115 Volt AC Interface Card | AK-M9-115VAC-1 | N/A | N/A |
| Frame E Flange Gasket | AK-M9-GASKET1-E4 | N/A | N/A |

❷ Provides temporary DPI/HIM connection for NEMA 1 and Flange drives with cover removed.



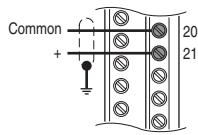
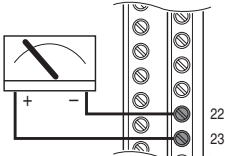
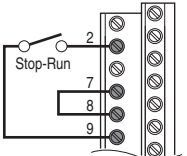
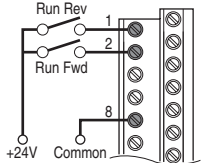
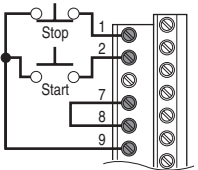
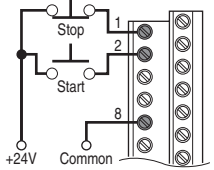
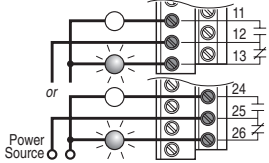
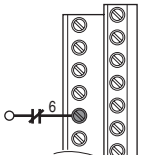
Service Connection Board
SK-M9-SCB1



115V Interface Card
AK-M9-115VAC-1

I/O Wiring Examples

| Input/Output | Connection Example | Required Parameter Settings |
|--|--------------------|--|
| Potentiometer Unipolar Speed Reference 10k Ohm Pot. Recommended (2k Ohm minimum) | | Select Speed Reference source: Param. 090 = 1 "Analog In 1" Adjust Scaling: Param. 091, 092, 322, 323 Check Results: Param. 016 |
| Joystick Bipolar Speed Reference ±10V Input | | Set Direction Mode: Param. 190 = 1 "Bipolar" Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017 |
| Analog Input Bipolar Speed Reference ±10V Input | | Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017 |
| Analog Input Unipolar Speed Reference 0 to +10V Input | | Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017 |
| Analog Input, PTC PTC OT set > 5V PTC OT cleared < 4V PTC Short < 0.2V | | Set Fault Config 1: Param. 238, Bit #7 = 1 "Enabled" Set Alarm Config 1: Param. 259, Bit #11 = 1 "Enabled" |

| Input/Output | Connection Example | Required Parameter Settings |
|---|--|---|
| Analog Input Unipolar Speed Reference 4-20 mA Input |  | Configure Input for Current: Param. 320, Bit #1 = 1 "Current" Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017 |
| Analog Output Unipolar 0 to +10V Output. Can Drive a 2k Ohm load (25 mA short circuit limit) |  | Select Source Value: Param. 342 Adjust Scaling: Param. 343, 344 |
| 2 Wire Control Non-Reversing | Internal Supply  | Disable Digital Input 1: Param. 361 = 0 "Not Used" Set Digital Input 2: Param. 362 = 7 "Run" |
| 2 Wire Control Reversing | External Supply  | Set Digital Input 1: Param. 361 = 8 "Run Forward" Set Digital Input 2: Param. 362 = 9 "Run Reverse" |
| 3 Wire Control | Internal Supply  | Use factory default parameter settings. |
| 3 Wire Control | External Supply  | Use factory default parameter settings. |
| Digital Output Form C Relays Energized in Normal State. |  | Select Source: Param. 380, 384 |
| Enable Input Shown in enabled state. |  | Standard Control Configure with parameter 366 Enhanced Control Configure with parameter 366 For dedicated hardware Enable: Remove Enable Jumper (ENBL JMP) located on the Main Control Board. |

Cable Recommendations

Cable Types Acceptable for 200-600 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 meters (1 foot) for every 10 meters (32.8 feet) of length. In all cases, long parallel runs must be avoided. Do not use cable with an insulation thickness less than or equal to 15 mils (0.4mm/0.015 in.). Use Copper wire only. Wire gauge requirements and recommendations are based on 75° C. Do not reduce wire gauge when using higher temperature wire. See table below.

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. **Do not use THHN or similarly coated wire in wet areas.** Any wire chosen must have a minimum insulation thickness of 15 Mils and should not have large variations in insulation concentricity.

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 Guidelines for 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 bundle 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.

| 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 XLP 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-7xxxxx 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. |

Single-Phase Input Power

The PowerFlex 70 drive is typically used with a three-phase input supply. Single-phase operation of the drive is not currently rated under the UL 508C listing. Rockwell Automation has verified that single-phase operation with output current derated by 50% of the three-phase ratings identified in the tables in the Power Ratings and Branch Circuit Protection below.

Power Ratings and Branch Circuit Protection

208 Volt AC Input Protection Devices (See [page 24](#) for Notes)

| Drive Catalog Number | Frame ⁽¹⁾ | HP Rating | | Input Ratings | | Output Amps | | | Dual Element Time Delay Fuse | | Non-Time Delay Fuse | | Circuit Breaker ⁽⁴⁾ | Motor Circuit Protector ⁽⁶⁾ | 140M Motor Protector with Adjustable Current Range ^{(7) (8)} | | | |
|----------------------|----------------------|-------------------|------|---------------|------|-------------|--------|--------|------------------------------|---------------------|---------------------|---------------------|--------------------------------|--|---|--------------|--------------|--------------|
| | | ND | HD | Amps | kVA | Cont. | 1 Min. | 3 Sec. | Min. ⁽²⁾ | Max. ⁽³⁾ | Min. ⁽²⁾ | Max. ⁽³⁾ | Max. ⁽⁵⁾ | Max. ⁽⁵⁾ | Available Catalog Numbers ⁽⁹⁾ | | | |
| | | 208 Volt AC Input | | | | | | | | | | | | | | | | |
| 20AB2P2 | A | 0.5 | 0.33 | 2.9 | 1.1 | 2.5 | 2.7 | 3.7 | 6 | 6 | 6 | 10 | 15 | 7 | 140M-C2E-B40 | 140M-D8E-B40 | – | – |
| 20AB4P2 | A | 1 | 0.75 | 5.6 | 2 | 4.8 | 5.5 | 7.4 | 10 | 10 | 10 | 17.5 | 15 | 7 | 140M-C2E-B63 | 140M-D8E-B63 | – | – |
| 20AB6P8 | B | 2 | 1.5 | 10 | 3.6 | 7.8 | 10.3 | 13.8 | 15 | 15 | 15 | 30 | 30 | 15 | 140M-C2E-C10 | 140M-D8E-C10 | 140M-F8E-C10 | – |
| 20AB9P6 | B | 3 | 2 | 14 | 5.1 | 11 | 12.1 | 16.5 | 20 | 25 | 20 | 40 | 40 | 30 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AB015 | C | 5 | 3 | 16 | 5.8 | 17.5 | 19.2 | 26.6 | 20 | 35 | 20 | 70 | 70 | 30 | 140M-C2E-C20 | 140M-D8E-C20 | 140M-F8E-C20 | – |
| 20AB022 | D | 7.5 | 5 | 23.3 | 8.3 | 25.3 | 27.8 | 37.9 | 30 | 50 | 30 | 100 | 100 | 30 | 140M-C2E-C25 | 140M-D8E-C25 | 140M-F8E-C25 | 140-CMN-2500 |
| 20AB028 | D | 10 | 7.5 | 29.8 | 10.7 | 32.2 | 37.9 | 50.6 | 40 | 70 | 40 | 125 | 125 | 50 | – | – | 140M-F8E-C32 | 140-CMN-4000 |
| 20AB042 | D | 15 | 10 | 39.8 | 14.3 | 43 | 55.5 | 74 | 60 | 100 | 60 | 175 | 175 | 70 | – | – | 140M-F8E-C45 | 140-CMN-6300 |
| 20AB054 | E | 20 | 15 | 57.5 | 20.7 | 62.1 | 72.4 | 96.6 | 80 | 125 | 80 | 200 | 200 | 100 | – | – | – | 140-CMN-6300 |
| 20AB070 | E | 25 | 20 | 72.3 | 26.0 | 78.2 | 93.1 | 124 | 90 | 175 | 90 | 300 | 300 | 100 | – | – | – | 140-CMN-9000 |

240 Volt AC Input Protection Devices (See [page 24](#) for Notes)

| Drive Catalog Number | Frame ⁽¹⁾ | HP Rating | | Input Ratings | | Output Amps | | | Dual Element Time Delay Fuse | | Non-Time Delay Fuse | | Circuit Breaker ⁽⁴⁾ | Motor Circuit Protector ⁽⁶⁾ | 140M Motor Protector with Adjustable Current Range ^{(7) (8)} | | | |
|----------------------|----------------------|-------------------|------|---------------|------|-------------|--------|--------|------------------------------|---------------------|---------------------|---------------------|--------------------------------|--|---|--------------|--------------|--------------|
| | | ND | HD | Amps | kVA | Cont. | 1 Min. | 3 Sec. | Min. ⁽²⁾ | Max. ⁽³⁾ | Min. ⁽²⁾ | Max. ⁽³⁾ | Max. ⁽⁵⁾ | Max. ⁽⁵⁾ | Available Catalog Numbers ⁽⁹⁾ | | | |
| | | 240 Volt AC Input | | | | | | | | | | | | | | | | |
| 20AB2P2 | A | 0.5 | 0.33 | 2.5 | 1.1 | 2.2 | 2.4 | 3.3 | 3 | 4.5 | 3 | 8 | 15 | 3 | 140M-C2E-B25 | 140M-D8E-B25 | – | – |
| 20AB4P2 | A | 1 | 0.75 | 4.8 | 2 | 4.2 | 4.8 | 6.4 | 6 | 9 | 6 | 15 | 15 | 7 | 140M-C2E-B63 | 140M-D8E-B63 | – | – |
| 20AB6P8 | B | 2 | 1.5 | 8.7 | 3.6 | 6.8 | 9 | 12 | 15 | 15 | 15 | 25 | 25 | 15 | 140M-C2E-C10 | 140M-D8E-C10 | 140M-F8E-C10 | – |
| 20AB9P6 | B | 3 | 2 | 12.2 | 5.1 | 9.6 | 10.6 | 14.4 | 20 | 20 | 20 | 35 | 35 | 15 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AB015 | C | 5 | 3 | 13.9 | 5.8 | 15.3 | 17.4 | 23.2 | 20 | 30 | 20 | 60 | 60 | 30 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AB022 | D | 7.5 | 5 | 19.9 | 8.3 | 22 | 24.4 | 33 | 25 | 45 | 25 | 80 | 80 | 30 | 140M-C2E-C25 | 140M-D8E-C25 | 140M-F8E-C25 | 140-CMN-2500 |
| 20AB028 | D | 10 | 7.5 | 25.7 | 10.7 | 28 | 33 | 44 | 35 | 60 | 35 | 110 | 110 | 50 | – | – | 140M-F8E-C32 | 140-CMN-4000 |
| 20AB042 | D | 15 | 10 | 38.7 | 16.1 | 42 | 46.2 | 63 | 50 | 90 | 50 | 150 | 150 | 50 | – | – | 140M-F8E-C45 | 140-CMN-6300 |
| 20AB054 | E | 20 | 15 | 49.8 | 20.7 | 54 | 63 | 84 | 60 | 100 | 60 | 200 | 200 | 100 | – | – | – | 140-CMN-6300 |
| 20AB070 | E | 25 | 20 | 64.5 | 26.8 | 70 | 81 | 108 | 90 | 150 | 90 | 275 | 275 | 100 | – | – | – | 140-CMN-9000 |

400 Volt AC Input Protection Devices (See [page 24](#) for Notes).

| Drive Catalog Number | Frame ⁽¹⁾ | kW (400V) HP (480V) Rating | | Input Ratings | | Output Amps | | | Dual Element Time Delay Fuse | | Non-Time Delay Fuse | | Circuit Breaker ⁽⁴⁾ | Motor Circuit Protector ⁽⁶⁾ | 140M Motor Protector with Adjustable Current Range ^{(7) (8)} | | | |
|----------------------|----------------------|----------------------------------|------|---------------|------|-------------|--------|--------|------------------------------|----------|---------------------|----------|--------------------------------|--|---|--------------|--------------|--------------|
| | | ND | HD | Amps | kVA | Cont. | 1 Min. | 3 Sec. | Min. (2) | Max. (3) | Min. (2) | Max. (3) | Max. (5) | Max. (5) | Available Catalog Numbers ⁽⁹⁾ | | | |
| | | 400 Volt AC Input | | | | | | | | | | | | | | | | |
| 20AC1P3 | A | 0.37 | 0.25 | 1.6 | 1.1 | 1.3 | 1.4 | 1.9 | 3 | 3 | 3 | 5 | 15 | 3 | 140M-C2E-B16 | – | – | – |
| 20AC2P1 | A | 0.75 | 0.55 | 2.5 | 1.8 | 2.1 | 2.4 | 3.2 | 4 | 6 | 4 | 8 | 15 | 7 | 140M-C2E-B25 | 140M-D8E-B25 | – | – |
| 20AC3P5 | A | 1.5 | 1.1 | 4.3 | 3 | 3.5 | 4.5 | 6 | 6 | 6 | 6 | 12 | 15 | 7 | 140M-C2E-B63 | 140M-D8E-B63 | – | – |
| 20AC5P0 | B | 2.2 | 1.5 | 6.5 | 4.5 | 5 | 5.5 | 7.5 | 10 | 10 | 10 | 20 | 20 | 15 | 140M-C2E-C10 | 140M-D8E-C10 | 140M-F8E-C10 | – |
| 20AC8P7 | B | 4 | 3 | 11.3 | 7.8 | 8.7 | 9.9 | 13.2 | 15 | 17.5 | 15 | 30 | 30 | 15 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AC011 | C | 5.5 | 4 | 11 | 7.6 | 11.5 | 13 | 17.4 | 15 | 25 | 15 | 45 | 40 | 15 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AC015 | C | 7.5 | 5.5 | 15.1 | 10.4 | 15.4 | 17.2 | 23.1 | 20 | 30 | 20 | 60 | 60 | 20 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AC022 | D | 11 | 7.5 | 21.9 | 15.2 | 22 | 24.2 | 33 | 30 | 45 | 30 | 80 | 80 | 30 | 140M-C2E-C25 | 140M-D8E-C25 | 140M-F8E-C25 | 140-CMN-2500 |
| 20AC030 | D | 15 | 11 | 30.3 | 21 | 30 | 33 | 45 | 40 | 60 | 40 | 120 | 120 | 50 | – | – | 140M-F8E-C32 | 140-CMN-4000 |
| 20AC037 | D | 18.5 | 15 | 35 | 24.3 | 37 | 45 | 60 | 50 | 80 | 50 | 125 | 140 | 50 | – | – | 140M-F8E-C45 | 140-CMN-4000 |

| Drive Catalog Number | Frame ⁽¹⁾ | kW (400V) HP (480V) Rating | | Input Ratings | | Output Amps | | | Dual Element Time Delay Fuse | | Non-Time Delay Fuse | | Circuit Breaker ⁽⁴⁾ | Motor Circuit Protector ⁽⁶⁾ | 140M Motor Protector with Adjustable Current Range ^{(7) (8)} | | | |
|----------------------|----------------------|----------------------------------|------|---------------|------|-------------|--------|--------|------------------------------|---------------------|---------------------|---------------------|--------------------------------|--|---|---|---|--------------|
| | | ND | HD | Amps | kVA | Cont. | 1 Min. | 3 Sec. | Min. ⁽²⁾ | Max. ⁽³⁾ | Min. ⁽²⁾ | Max. ⁽³⁾ | Max. ⁽⁵⁾ | Max. ⁽⁵⁾ | Available Catalog Numbers ⁽⁹⁾ | | | |
| 20AC043 | D | 22 | 18.5 | 40.7 | 28.2 | 43 | 56 | 74 | 60 | 90 | 60 | 150 | 160 | 70 | – | – | – | 140-CMN-6300 |
| 20AC060 | E | 30 | 22 | 56.8 | 39.3 | 60 | 66 | 90 | 80 | 125 | 80 | 225 | 240 | 80 | – | – | – | 140-CMN-6300 |
| 20AC072 | E | 37 | 30 | 68.9 | 47.8 | 72 | 90 | 120 | 90 | 150 | 90 | 250 | 280 | 100 | – | – | – | 140-CMN-9000 |

480 Volt AC Input Protection Devices.

| Drive Catalog Number | Frame ⁽¹⁾ | kW (400V) HP (480V) Rating | | Input Ratings | | Output Amps | | | Dual Element Time Delay Fuse | | Non-Time Delay Fuse | | Circuit Breaker ⁽⁴⁾ | Motor Circuit Protector ⁽⁶⁾ | 140M Motor Protector with Adjustable Current Range ^{(7) (8)} | | | |
|----------------------------|----------------------|--|------|------------------|------|-------------|--------|--------|------------------------------------|---------------------|------------------------|---------------------|-----------------------------------|--|---|--------------|--------------|--------------|
| | | ND | HD | Amps | kVA | Cont. | 1 Min. | 3 Sec. | Min. ⁽²⁾ | Max. ⁽³⁾ | Min. ⁽²⁾ | Max. ⁽³⁾ | Max. ⁽⁵⁾ | Max. ⁽⁵⁾ | Available Catalog Numbers ⁽⁹⁾ | | | |
| | | 480 Volt AC Input | | | | | | | | | | | | | | | | |
| 20AD1P1 | A | 0.5 | 0.33 | 1.3 | 1.1 | 1.1 | 1.2 | 1.6 | 3 | 3 | 3 | 4 | 15 | 3 | 140M-C2E-B16 | – | – | – |
| 20AD2P1 | A | 1 | 0.75 | 2.4 | 2 | 2.1 | 2.4 | 3.2 | 3 | 6 | 3 | 8 | 15 | 3 | 140M-C2E-B25 | 140M-D8E-B25 | – | – |
| 20AD3P4 | A | 2 | 1.5 | 3.8 | 3.2 | 3.4 | 4.5 | 6 | 6 | 6 | 6 | 12 | 15 | 7 | 140M-C2E-B40 | 140M-D8E-B40 | – | – |
| 20AD5P0 | B | 3 | 2 | 5.6 | 4.7 | 5 | 5.5 | 7.5 | 10 | 10 | 10 | 20 | 20 | 15 | 140M-C2E-B63 | 140M-D8E-B63 | – | – |
| 20AD8P0 | B | 5 | 3 | 9.8 | 8.4 | 8 | 8.8 | 12 | 15 | 15 | 15 | 30 | 30 | 15 | 140M-C2E-C10 | 140M-D8E-C10 | 140M-F8E-C10 | – |
| 20AD011 | C | 7.5 | 5 | 9.5 | 7.9 | 11 | 12.1 | 16.5 | 15 | 20 | 15 | 40 | 40 | 15 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AD014 | C | 10 | 7.5 | 12.5 | 10.4 | 14 | 16.5 | 22 | 20 | 30 | 20 | 50 | 50 | 20 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AD022 | D | 15 | 10 | 19.9 | 16.6 | 22 | 24.2 | 33 | 25 | 45 | 25 | 80 | 80 | 30 | 140M-C2E-C25 | 140M-D8E-C25 | 140M-F8E-C25 | – |
| 20AD027 | D | 20 | 15 | 24.8 | 20.6 | 27 | 33 | 44 | 35 | 60 | 35 | 100 | 100 | 50 | – | – | 140M-F8E-C32 | 140-CMN-2500 |
| 20AD034 | D | 25 | 20 | 31.2 | 25.9 | 34 | 40.5 | 54 | 40 | 70 | 40 | 125 | 125 | 50 | – | – | 140M-F8E-C45 | 140-CMN-4000 |
| 20AD040 | D | 30 | 25 | 36.7 | 39.7 | 40 | 51 | 68 | 50 | 90 | 50 | 150 | 150 | 50 | – | – | 140M-F8E-C45 | 140-CMN-4000 |
| 20AD052 | E | 40 | 30 | 47.7 | 39.7 | 52 | 60 | 80 | 60 | 110 | 60 | 200 | 200 | 70 | – | – | – | 140-CMN-6300 |
| 20AD065 | E | 50 | 40 | 59.6 | 49.6 | 65 | 78 | 104 | 80 | 125 | 80 | 250 | 250 | 100 | – | – | – | 140-CMN-9000 |

600 Volt AC Input Protection Devices

| Drive Catalog Number | Frame ⁽¹⁾ | HP Rating | | Input Ratings | | Output Amps | | | Dual Element Time Delay Fuse | | Non-Time Delay Fuse | | Circuit Breaker ⁽⁴⁾ | Motor Circuit Protector ⁽⁶⁾ | 140M Motor Protector with Adjustable Current Range ^{(7) (8)} | | | |
|----------------------|----------------------|-------------------|------|---------------|------|-------------|--------|--------|------------------------------|---------------------|---------------------|---------------------|--------------------------------|--|---|--------------|--------------|--------------|
| | | ND | HD | Amps | kVA | Cont. | 1 Min. | 3 Sec. | Min. ⁽²⁾ | Max. ⁽³⁾ | Min. ⁽²⁾ | Max. ⁽³⁾ | Max. ⁽⁵⁾ | Max. ⁽⁵⁾ | Available Catalog Numbers ⁽⁹⁾ | | | |
| | | 600 Volt AC Input | | | | | | | | | | | | | | | | |
| 20AE0P9 | A | 0.5 | 0.33 | 1.3 | 1.3 | 0.9 | 1.1 | 1.4 | 3 | 3 | 3 | 3.5 | 15 | 3 | 140M-C2E-B16 | – | – | – |
| 20AE1P7 | A | 1 | 0.75 | 1.9 | 2 | 1.7 | 2 | 2.6 | 3 | 6 | 3 | 6 | 15 | 3 | 140M-C2E-B25 | 140M-D8E-B25 | – | – |
| 20AE2P7 | A | 2 | 1.5 | 3 | 3.1 | 2.7 | 3.6 | 4.8 | 4 | 6 | 4 | 10 | 15 | 7 | 140M-C2E-B40 | 140M-D8E-B40 | – | – |
| 20AE3P9 | B | 3 | 2 | 4.4 | 4.5 | 3.9 | 4.3 | 5.9 | 6 | 8 | 6 | 15 | 15 | 7 | 140M-C2E-B63 | 140M-D8E-B63 | – | – |
| 20AE6P1 | B | 5 | 3 | 7.5 | 7.8 | 6.1 | 6.7 | 9.2 | 10 | 12 | 10 | 20 | 20 | 15 | 140M-C2E-C10 | 140M-D8E-C10 | 140M-F8E-C10 | – |
| 20AE9P0 | C | 7.5 | 5 | 7.7 | 8 | 9 | 9.9 | 13.5 | 10 | 20 | 10 | 35 | 35 | 15 | 140M-C2E-C10 | 140M-D8E-C10 | 140M-F8E-C10 | – |
| 20AE011 | C | 10 | 7.5 | 9.8 | 10.1 | 11 | 13.5 | 18 | 15 | 20 | 15 | 40 | 40 | 15 | 140M-C2E-C16 | 140M-D8E-C16 | 140M-F8E-C16 | – |
| 20AE017 | D | 15 | 10 | 15.3 | 15.9 | 17 | 18.7 | 25.5 | 20 | 35 | 20 | 60 | 60 | 30 | 140M-C2E-C20 | 140M-D8E-C20 | 140M-F8E-C20 | – |
| 20AE022 | D | 20 | 15 | 20 | 20.8 | 22 | 25.5 | 34 | 25 | 45 | 25 | 80 | 80 | 30 | 140M-C2E-C25 | 140M-D8E-C25 | 140M-F8E-C25 | 140-CMN-2500 |
| 20AE027 | D | 25 | 20 | 24.8 | 25.7 | 27 | 33 | 44 | 35 | 60 | 35 | 100 | 100 | 50 | – | – | 140M-F8E-C25 | 140-CMN-2500 |
| 20AE032 | D | 30 | 25 | 29.4 | 30.5 | 32 | 40.5 | 54 | 40 | 70 | 40 | 125 | 125 | 50 | – | – | 140M-F8E-C32 | 140-CMN-4000 |
| 20AE041 | E | 40 | 30 | 37.6 | 39.1 | 41 | 48 | 64 | 50 | 90 | 50 | 150 | 150 | 100 | – | – | 140M-F8E-C45 | 140-CMN-4000 |
| 20AE052 | E | 50 | 40 | 47.7 | 49.6 | 52 | 61.5 | 82 | 60 | 110 | 60 | 200 | 200 | 100 | – | – | – | 140-CMN-6300 |

(1) For IP 66 (NEMA/UL Type 4X/12) enclosures, drives listed as Frame A increase to Frame B and drives listed as Frame C increase to Frame D.

(2) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.

(3) Maximum protection device size is the highest rated device that supplies drive protection. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.

(4) Circuit Breaker - inverse time breaker. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.

(5) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.

(6) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.

(7) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(8) 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 systems in single motor applications.

(9) The AIC ratings of the Bulletin 140M Motor Protector may vary. See Industrial Controls online catalog at www.ab.com.

Maximum Motor Cable Lengths

In the following tables, a “●” in any of the latter columns will indicate that this drive rating can be used with an Allen-Bradley Terminator (1204-TFA1/1204-TFB2) and/or Reflected Wave Reduction Device with Common Mode Choke (1204-RWC-17) or without choke (1204-RWR2).

- For the Terminator, the maximum cable length is 182.9 meters (600 feet) for 400/480/600V drives. The PWM frequency must be 2 kHz. The 1204-TFA1 can be used only on low HP (5 HP & below), while the 1204-TFB2 can be used from 2-800 HP.
- 1204 Reflected Wave Reduction Device (all motor insulation classes):
 - (1) 1204-RWR2-09
2kHz: 182.9m (600 ft.) at 400/480V and 121.9m (400 ft.) at 600V. 4 kHz: 91.4m (300 ft.) at 400/480V and 61.0m (200 ft.) at 600V.
 - (2) 1204-RWC-17
2 kHz: 365.8m (1200 ft.) at 400/480/600V. 4 kHz: 243.8m (800 ft.) at 400/480V and 121.9m (400 ft.) at 600V.

For both devices, power dissipation in the damping resistor limits maximum cable length.

The 1321-RWR is a complete reflected wave reduction solution available for many of the PowerFlex drives. If available, a 1321-RWR catalog number will be indicated in the “Reactor/RWR” column. When not available, use the reactor and resistor information provided to build a solution.

| <i>For Further Information on ...</i> | <i>see Publication ...</i> |
|--|-----------------------------------|
| 1321-RWR | 1321-TD001 |
| 1204-RWR2 | 1204-5.1 |
| 1204-RWC | 1204-IN001 |
| 1204-TFxx | 1204-IN002 |

PowerFlex 70 (Standard/Enhanced), 400V Shielded/Unshielded Cable - Meters (Feet)

| Drive Frame | Rating | | No Solution | | | | Reactor Only | | | | Reactor + Damping Resistor or 1321-RWR | | | | Reactor/RWR | Resistor | | Available Options | | | |
|-------------|--------|-----|--------------|----------------|-----------------|-----------------|---------------|-----------------|-----------------|-----------------|--|-----------------|-----------------|-----------------|---------------|----------|-------|-------------------|------|------|-----|
| | kW | kHz | 1000V | 1200V | 1488V | 1600V | 1000V | 1200V | 1488V | 1600V | 1000V | 1200V | 1488V | 1600V | Cat. No. | Ohms | Watts | TFA1 | TFB2 | RWR2 | RWC |
| A | 0.37 | 2 | 7.6 (25) | 53.3 (175) | 53.3 (175) | 53.3 (175) | 91.4 (300) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | | | | ● | | ● | ● |
| | | 4 | 7.6 (25) | 53.3 (175) | 53.3 (175) | 53.3 (175) | 18.3 (60) | 91.4 (300) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | | | | | | ● | ● |
| | 0.75 | 2 | 7.6 (25) | 83.8 (275) | 83.8 (275) | 83.8 (275) | 91.4 (300) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | | | | ● | | ● | ● |
| | | 4 | 7.6 (25) | 76.2 (250) | 76.2 (250) | 76.2 (250) | 18.3 (60) | 91.4 (300) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | | | | | | ● | ● |
| | 1.5 | 2 | 7.6 (25) | 83.8 (275) | 83.8 (275) | 83.8 (275) | 91.4 (300) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | ● | ● | ● | ● |
| | | 4 | 7.6 (25) | 76.2 (250) | 76.2 (250) | 76.2 (250) | 18.3 (60) | 91.4 (300) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | | | ● | ● |
| B | 2.2 | 2 | 7.6 (25) | 137.2 (450) | 182.9 (600) | 182.9 (600) | 91.4 (300) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | ● | ● | ● | ● |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 182.9 (600) | 18.3 (60) | 91.4 (300) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | | | ● | ● |
| | 4 | 2 | 7.6 (25) | 137.2 (450) | 243.8 (800) | 243.8 (800) | 91.4 (300) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 1321-RWR8-DP | | | | ● | | ● |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 182.9 (600) | 243.8 (800) | 243.8 (800) | 1321-RWR8-DP | | | | | | ● |
| C | 5.5 | 2 | 7.6 (25) | 137.2 (450) | 304.8 (1000) | 304.8 (1000) | 91.4 (300) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 1321-RWR12-DP | | | | ● | | ● |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 182.9 (600) | 304.8 (1000) | 304.8 (1000) | 1321-RWR12-DP | | | | | | ● |
| | 7.5 | 2 | 7.6 (25) | 137.2 (450) | 365.8 (1200) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR18-DP | | | | ● | | ● |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 1321-RWR18-DP | | | | | | ● |
| D | 11 | 2 | 7.6 (25) | 137.2 (450) | 365.8 (1200) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR25-DP | | | | ● | | |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 304.8 (1000) | 365.8 (1200) | 1321-RWR25-DP | | | | | | |
| | 15 | 2 | 7.6 (25) | 137.2 (450) | 365.8 (1200) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-DP | | | | ● | | |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 304.8 (1000) | 365.8 (1200) | 1321-RWR35-DP | | | | | | |
| D | 18.5 | 2 | 7.6 (25) | 137.2 (450) | 365.8 (1200) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-DP | | | | ● | | |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 304.8 (1000) | 365.8 (1200) | 1321-RWR35-DP | | | | | | |
| D | 22 | 2 | 7.6 (25) | 137.2 (450) | 365.8 (1200) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR45-DP | | | | ● | | |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 304.8 (1000) | 365.8 (1200) | 1321-RWR45-DP | | | | | | |
| E | 30 | 2 | 7.6 (25) | 137.2 (450) | 304.8 (1000) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR55-DP | | | | ● | | |
| | | 4 | 7.6 (25) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 304.8 (1000) | 365.8 (1200) | 1321-RWR55-DP | | | | | | |
| | 37 | 2 | 12.2 (40) | 137.2 (450) | 304.8 (1000) | 365.8 (1200) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR80-DP | | | | ● | | |
| | | 4 | 12.2 (40) | 91.4 (300) | 152.4 (500) | 213.4 (700) | 18.3 (60) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 304.8 (1000) | 365.8 (1200) | 1321-RWR80-DP | | | | | | |

PowerFlex 70 (Standard/Enhanced), 480V Shielded/Unshielded Cable - Meters (Feet)

| Drive Frame | Rating | | No Solution | | | | Reactor Only | | | | Reactor + Damping Resistor or 1321-RWR | | | | Reactor/RWR | | Resistor | | Available Options | | | |
|-------------|--------|-----|--------------|--------------|----------------|----------------|--------------|---------------|-----------------|-----------------|--|-----------------|-----------------|-----------------|---------------|------|----------|--|-------------------|------|------|-----|
| | HP | kHz | 1000V | 1200V | 1488V | 1600V | 1000V | 1200V | 1488V | 1600V | 1000V | 1200V | 1488V | 1600V | Cat. No. | Ohms | Watts | | TFA1 | TFB2 | RWR2 | RWC |
| A | 0.5 | 2 | 7.6 (25) | 12.2 (40) | 53.3 (175) | 53.3 (175) | 7.6 (25) | 91.4 (300) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | | | | | ● | | ● | ● |
| | | 4 | 7.6 (25) | 12.2 (40) | 53.3 (175) | 53.3 (175) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | | | | | | | ● | ● |
| | 1 | 2 | 7.6 (25) | 12.2 (40) | 83.8 (275) | 83.8 (275) | 7.6 (25) | 91.4 (300) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | | | | | ● | | ● | ● |
| | | 4 | 7.6 (25) | 12.2 (40) | 76.2 (250) | 76.2 (250) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | | | | | | | ● | ● |
| | 2 | 2 | 7.6 (25) | 12.2 (40) | 83.8 (275) | 83.8 (275) | 7.6 (25) | 91.4 (300) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | | ● | ● | ● | ● |
| | | 4 | 7.6 (25) | 12.2 (40) | 76.2 (250) | 76.2 (250) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | | | | ● | ● |
| | 3 | 2 | 7.6 (25) | 12.2 (40) | 129.5 (425) | 129.5 (425) | 7.6 (25) | 91.4 (300) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | | ● | ● | ● | ● |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 121.9 (400) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | | | | | | ● | ● |
| B | 5 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 91.4 (300) | 243.8 (800) | 243.8 (800) | 182.9 (600) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 1321-RWR8-DP | | | | ● | ● | ● | ● |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 243.8 (800) | 182.9 (600) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 1321-RWR8-DP | | | | | | ● | ● |
| | 10 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR18-DP | | | | | ● | | ● |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR18-DP | | | | | | | ● |
| C | 15 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR25-DP | | | | | ● | | |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR25-DP | | | | | | | |
| | 20 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 91.4 (300) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-DP | | | | | ● | | |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-DP | | | | | | | |
| | 25 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 76.2 (250) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-DP | | | | | ● | | |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 274.3 (900) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-DP | | | | | | | |
| | 30 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 76.2 (250) | 365.8 (1200) | 365.8 (1200) | 182.9 (600) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR45-DP | | | | | ● | | |
| | | 4 | 7.6 (25) | 12.2 (40) | 121.9 (400) | 182.9 (600) | 7.6 (25) | 12.2 (40) | 121.9 (400) | 243.8 (800) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 365.8 (1200) | 1321-RWR45-DP | | | | | | | |
| E | 40 | 2 | 7.6 (25) | 12.2 (40) | 137.2 (450) | 182.9 (600) | 7.6 (25) | 76.2 (250) | 365.8 (1200) | 365.8 (1200) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR55-DP | | | | | ● | | |
| | | 4 | 7.6 (25) | 12.2 (40) | 106.7 (350) | 152.4 (500) | 7.6 (25) | 12.2 (40) | 106.7 (350) | 228.6 (750) | 121.9 (400) | 243.8 (800) | 365.8 (1200) | 365.8 (1200) | 1321-RWR55-DP | | | | | | | |
| | 50 | 2 | 12.2 (40) | 18.3 (60) | 137.2 (450) | 182.9 (600) | 12.2 (40) | 61.0 (200) | 304.8 (1000) | 365.8 (1200) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR80-DP | | | | | ● | | |
| | | 4 | 7.6 (25) | 12.2 (40) | 91.4 (300) | 152.4 (500) | 12.2 (40) | 18.3 (60) | 106.7 (350) | 228.6 (750) | 91.4 (300) | 243.8 (800) | 365.8 (1200) | 365.8 (1200) | 1321-RWR80-DP | | | | | | | |

PowerFlex 70 (Standard/Enhanced), 600V Shielded/Unshielded Cable - *Meters (Feet)*

| Drive Frame | Rating | | No Solution | | Reactor Only | | 1321-RWR | | RWR | Available Options | | | |
|-------------|--------|-----|-------------|-------------|--------------|--------------|--------------|--------------|---------------|-------------------|------|------|-----|
| | HP | kHz | 1488V | 1850V | 1488V | 1850V | 1488V | 1850V | Cat. No. | TFA1 | TFB2 | RWR2 | RWC |
| A | 1 | 2 | 42.7 (140) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | 121.9 (400) | | ● | | ● | ● |
| | | 4 | 30.5 (100) | 121.9 (400) | 30.5 (100) | 121.9 (400) | 121.9 (400) | 121.9 (400) | | | | ● | ● |
| | 2 | 2 | 42.7 (140) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | 152.4 (500) | | ● | | ● | ● |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 152.4 (500) | 152.4 (500) | | | | ● | ● |
| B | 3 | 2 | 42.7 (140) | 152.4 (500) | 152.4 (500) | 182.9 (600) | 182.9 (600) | 182.9 (600) | | ● | | ● | ● |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 182.9 (600) | 182.9 (600) | | | | ● | ● |
| | 5 | 2 | 42.7 (140) | 152.4 (500) | 152.4 (500) | 243.8 (800) | 243.8 (800) | 243.8 (800) | 1321-RWR8-EP | ● | | ● | ● |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 243.8 (800) | 243.8 (800) | 1321-RWR8-EP | | | ● | ● |
| C | 7.5 | 2 | 42.7 (140) | 152.4 (500) | 152.4 (500) | 304.8 (1000) | 304.8 (1000) | 304.8 (1000) | 1321-RWR12-EP | | | | ● |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 304.8 (1000) | 304.8 (1000) | 1321-RWR12-EP | | | | ● |
| | 10 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR12-EP | | | | ● |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR12-EP | | | | ● |
| D | 15 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR18-EP | | | | |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR18-EP | | | | |
| | 20 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR25-EP | | ● | | |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR25-EP | | | | |
| | 25 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-EP | | ● | | |
| | | 4 | 30.5 (100) | 137.2 (450) | 30.5 (100) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR35-EP | | | | |
| | 30 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR35-EP | | ● | | |
| | | 4 | 30.5 (100) | 137.2 (450) | 36.6 (120) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR35-EP | | | | |
| E | 40 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR45-EP | | ● | | |
| | | 4 | 30.5 (100) | 137.2 (450) | 36.6 (120) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR45-EP | | | | |
| | 50 | 2 | 42.7 (140) | 182.9 (600) | 152.4 (500) | 365.8 (1200) | 365.8 (1200) | 365.8 (1200) | 1321-RWR55-EP | | ● | | |
| | | 4 | 36.6 (120) | 137.2 (450) | 45.7 (150) | 152.4 (500) | 304.8 (1000) | 365.8 (1200) | 1321-RWR55-EP | | | | |

Mounting

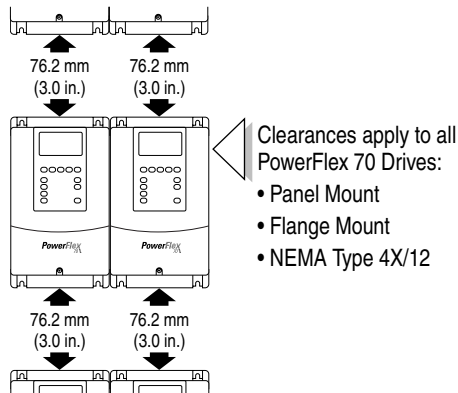
Maximum Surrounding Air Temperature

| Enclosure Rating | Temperature Range |
|---|---|
| Open Type, IP 20, NEMA/UL Type 1 & Flange Mount | 0 to 50 degrees C (32 to 122 degrees F) |
| IP 66, NEMA/UL Type 4X/12 | 0 to 40 degrees C (32 to 104 degrees F) |
| IP 54, NEMA/UL Type 12 | 0 to 40 degrees C (32 to 104 degrees F) |

Important: Some drives are equipped with an adhesive label on the top of the chassis. Removing the adhesive label from the drive changes the enclosure rating from NEMA/UL Type 1 Enclosed to Type Open.

Minimum Mounting Clearances

Specified vertical clearance requirements are intended to be from drive to drive. Other objects can occupy this space; however, reduced airflow may cause protection circuits to fault the drive. In addition, inlet air temperature must not exceed the product specification.

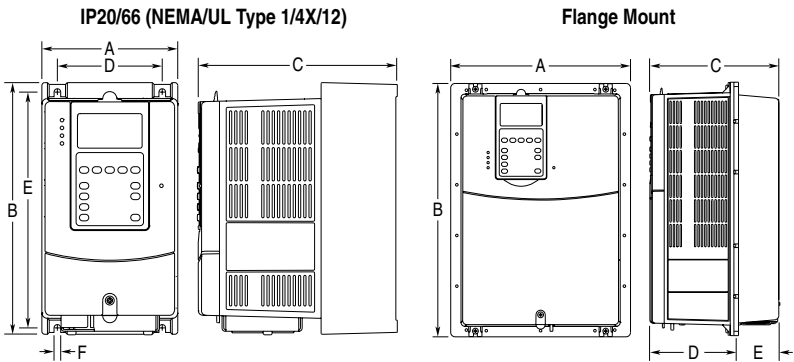


PowerFlex 70 Frames

| Output Power | | Frame Size | | | | | | | |
|---------------|---------------|-------------------|----------|--------------|-------------------|----------|--------------|---------------|----------|
| kW ND (HD) | HP ND (HD) | 208-240V AC Input | | | 400-480V AC Input | | | 600V AC Input | |
| | | Not Filtered | Filtered | IP66 (4X/12) | Not Filtered | Filtered | IP66 (4X/12) | Not Filtered | Filtered |
| 0.37 (0.25) | 0.5 (0.33) | A | B | B | A | B | B | A | — |
| 0.75 (0.55) | 1 (0.75) | A | B | B | A | B | B | A | — |
| 1.5 (1.1) | 2 (1.5) | B | B | B | A | B | B | A | — |
| 2.2 (1.5) | 3 (2) | B | B | B | B | B | B | B | — |
| 4 (3) | 5 (3) | — | C | D | B | B | B | B | — |
| 5.5 (4) | 7.5 (5) | — | D | D | — | C | D | C | — |
| 7.5 (5.5) | 10 (7.5) | — | D | D | — | C | D | C | — |
| 11 (7.5) | 15 (10) | — | D | D | — | D | D | D | — |
| 15 (11) | 20 (15) | — | E | E | — | D | D | D | — |
| 18.5 (15) | 25 (20) | — | E | E | — | D | D | — | — |
| 22 (18.5) | 30 (25) | — | — | — | — | D | D | — | — |
| 30 (22) | 40 (30) | — | — | — | — | E | E | — | — |
| 37 (30) | 50 (40) | — | — | — | — | E | E | — | — |

Approximate Dimensions

Frames A-E

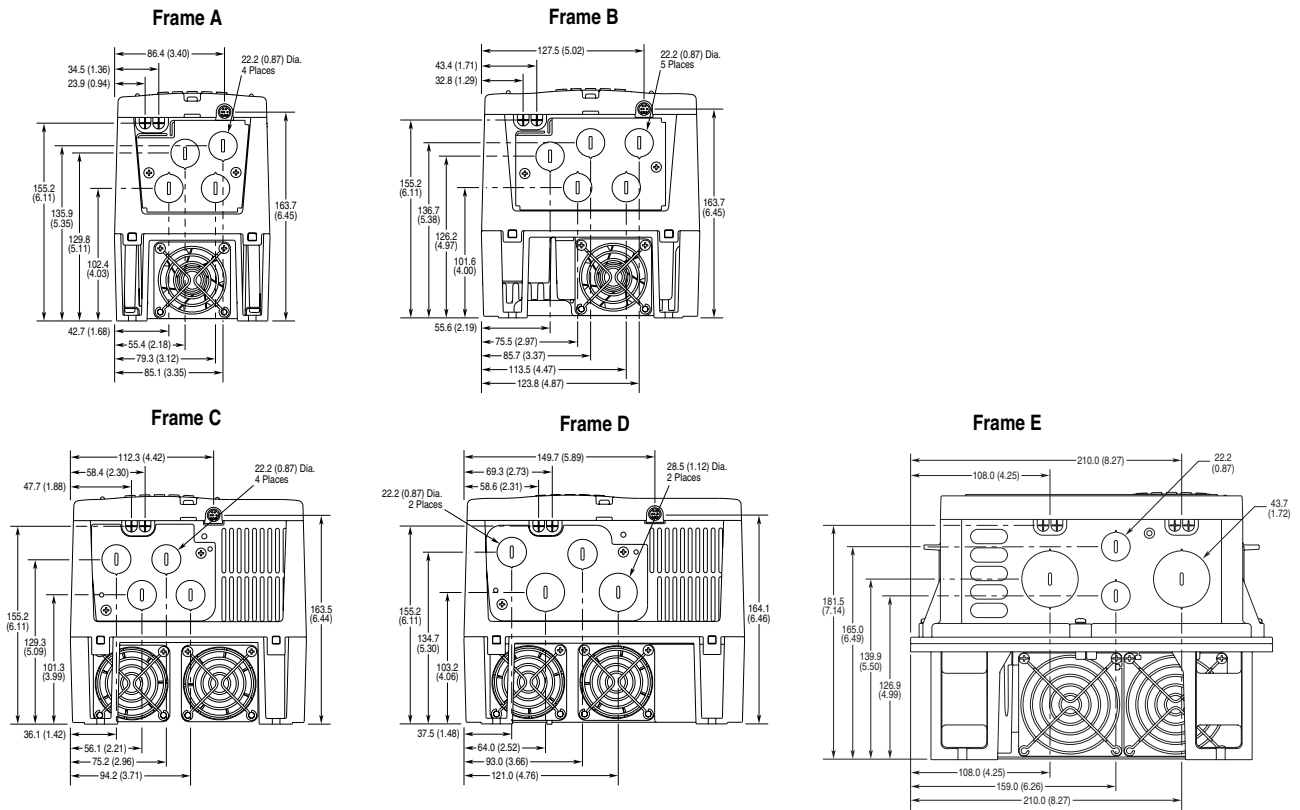


Dimensions are in millimeters and (inches).

| Frame | Dimension | | | | | | Weight ⁽¹⁾ kg (lbs.) |
|-------|--------------------------|---------------|--------------|--------------|---------------|------------|------------------------------------|
| | A | B | C | D | E | F | |
| | IP20, NEMA/UL Type 1 | | | | | | |
| A | 122.4 (4.82) | 225.7 (8.89) | 179.8 (7.08) | 94.2 (3.71) | 211.6 (8.33) | 5.8 (0.23) | 2.71 (6.0) |
| B | 171.7 (6.76) | 234.6 (9.24) | 179.8 (7.08) | 122.7 (4.83) | 220.2 (8.67) | 5.8 (0.23) | 3.60 (7.9) |
| C | 185.0 (7.28) | 300.0 (11.81) | 179.8 (7.08) | 137.6 (5.42) | 285.6 (11.25) | 5.8 (0.23) | 6.89 (15.2) |
| D | 219.9 (8.66) | 350.0 (13.78) | 179.8 (7.08) | 169.0 (6.65) | 335.6 (13.21) | 5.8 (0.23) | 9.25 (20.4) |
| E | 280.3 (11.04) | 555.8 (21.88) | 207.1 (8.15) | 200.0 (7.87) | 491.0 (19.33) | 6.9 (0.27) | 18.60 (41.0) |
| | IP66, NEMA/UL Type 4X/12 | | | | | | |
| B | 171.7 (6.76) | 239.8 (9.44) | 203.3 (8.00) | 122.7 (4.83) | 220.2 (8.67) | 5.8 (0.23) | 3.61 (8.0) |
| D | 219.9 (8.66) | 350.0 (13.78) | 210.7 (8.29) | 169.0 (6.65) | 335.6 (13.21) | 5.8 (0.23) | 9.13 (20.1) |
| E | 280.3 (11.04) | 555.8 (21.88) | 219.8 (8.65) | 200.0 (7.87) | 491.0 (19.33) | 6.9 (0.27) | 18.60 (41.0) |
| | Flange Mount | | | | | | |
| A | 156.0 (6.14) | 225.8 (8.89) | 178.6 (7.03) | 123.0 (4.84) | 55.6 (2.19) | — | 2.71 (6.0) |
| B | 205.2 (8.08) | 234.6 (9.24) | 178.6 (7.03) | 123.0 (4.84) | 55.6 (2.19) | — | 3.60 (7.9) |
| C | 219.0 (8.62) | 300.0 (11.81) | 178.6 (7.03) | 123.0 (4.84) | 55.6 (2.19) | — | 6.89 (15.2) |
| D | 248.4 (9.78) | 350.0 (13.78) | 178.6 (7.03) | 123.0 (4.84) | 55.6 (2.19) | — | 9.25 (20.4) |
| E | 280.3 (11.04) | 555.8 (21.88) | 207.1 (8.15) | 117.2 (4.61) | 89.9 (3.54) | — | 18.60 (41.0) |

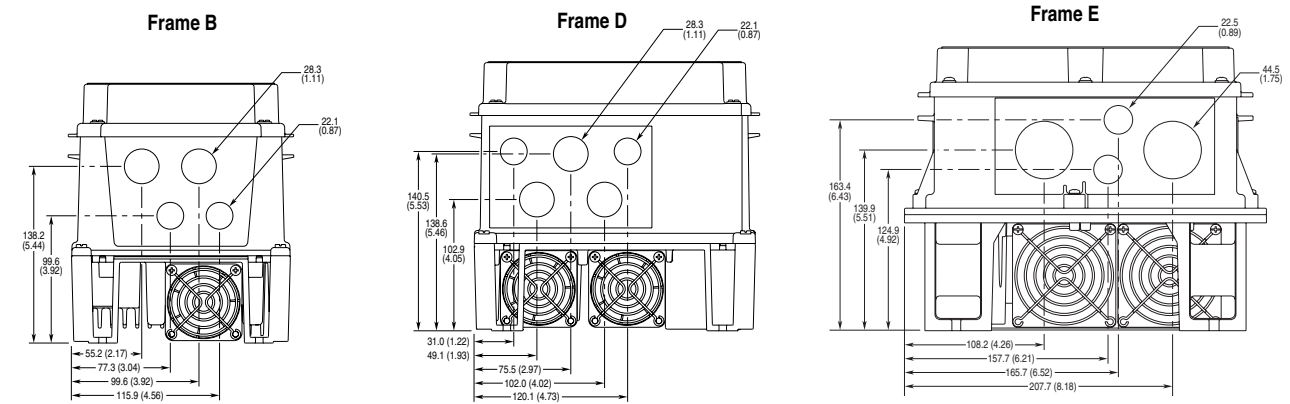
(1) Weights include HIM and Standard I/O.

IP20, NEMA/UL Type 1 Bottom View Dimensions



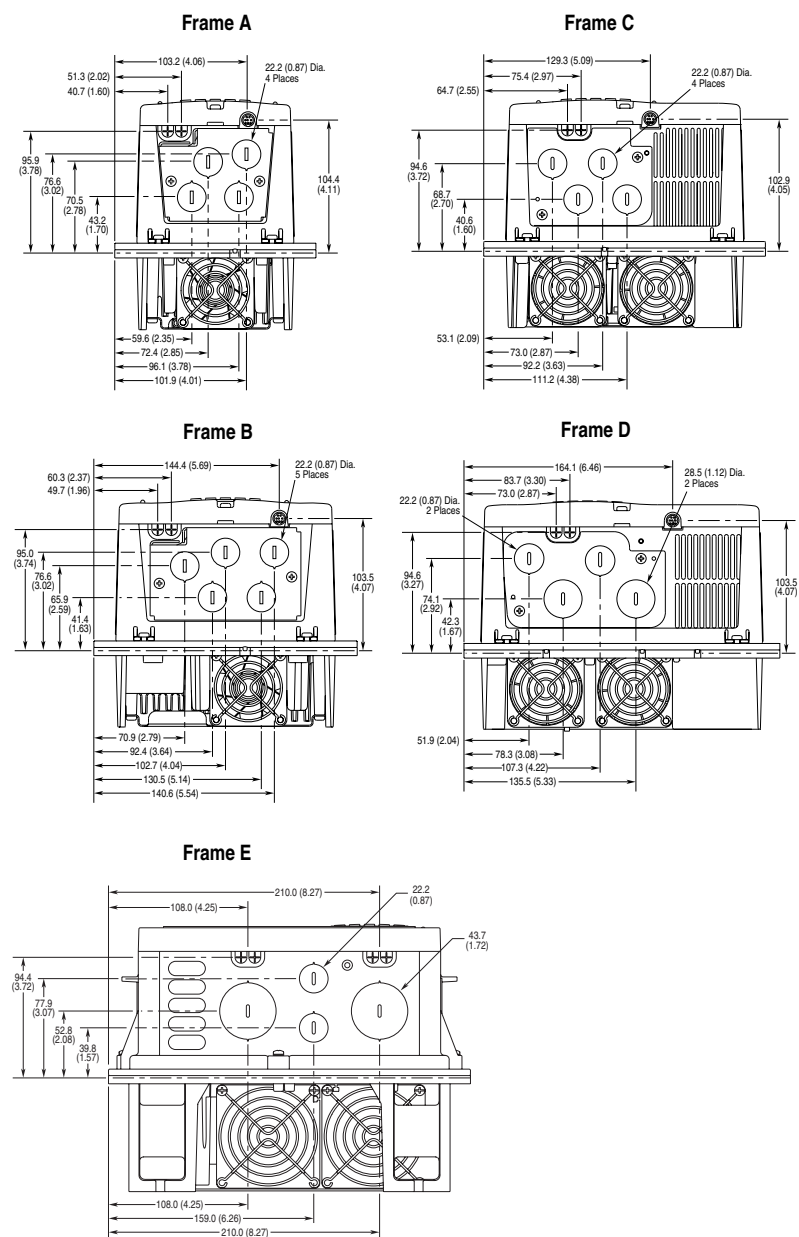
Dimensions are in millimeters and (inches).

IP 66 (NEMA/UL Type 4X/12) Bottom View Dimensions



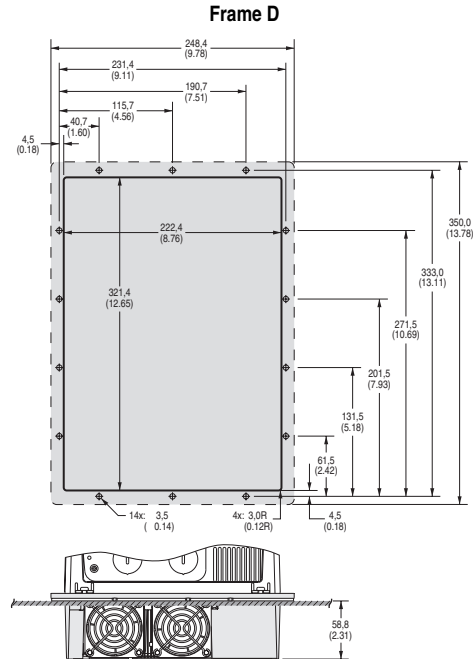
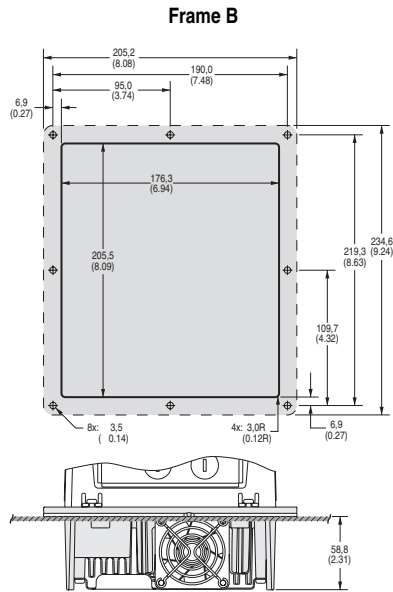
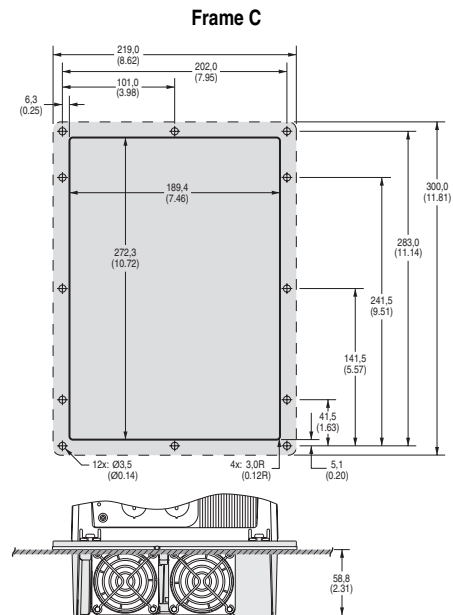
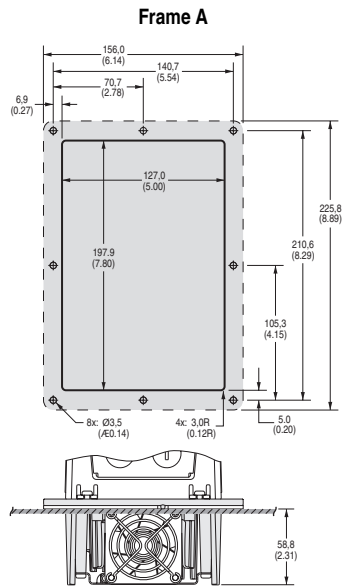
Dimensions are in millimeters and (inches).

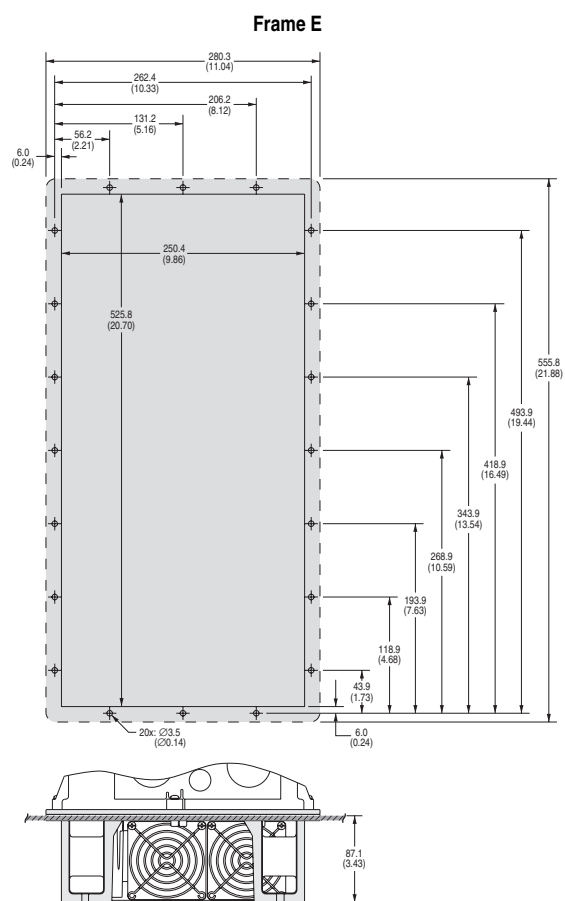
Flange Mount Bottom View Dimensions



Dimensions are in millimeters and (inches).

Cutout Dimensions





PowerFlex 70 Configured Drives

The PowerFlex 70 Packaged Drives Program allows users to create drive packages based on their specific needs. This program enhances stand-a-lone drive functionality through additional control, power and packaging options which are ideal for OEM and end users with special installation needs.

The program has three levels:

Catalog Configured Drives

The Catalog Configured Drives Program allows users to create drive packages based on their specific needs. A complete drive package may be specified by assembling a single catalog number string that includes a base drive and all required options. Packaging is available for 480V requirements in NEMA Type 1 (IP20), NEMA 4/12 (IP65) indoor, and NEMA 3/4 (IP65) outdoor. The program consists of a fully defined catalog string identified within the price sheet. Focused on higher volume, repeat business, the standard designs provide consistent manufacturing and minimizes customer resources by reducing engineering, manufacturing and installation time. Typical delivery is 10 business days from order entry and can be ordered through the Passport order entry system. *This program uses the Enhanced Control version of the PowerFlex 70.*

Modified Configured Drives

The Modified Configured Drives Program offers users the ability to create drive packages beyond the Catalog Configured Drives offering. Packaging is available for 208V, 240V, 480V and 600V requirements. *This program supports both the Standard and the Enhanced Control versions of the PowerFlex 70.* Options may or may not be defined within this publication. Product can be ordered by:

- Assembling a catalog string from the options listed in this publication.
Configured options that are listed within this publication will be specified by the heading “*Modified Configured Drives Program Only*” and will have varied lead-times.
- Entering a custom quote request for additional options not listed.
A custom quote will require a Passport quote using “SP-SDB-CUSTOM” as the line item part number and entering a description of the base catalog string and custom options in the Competitive Summary. For questions or help with a custom quote please contact the Configured Drives Group at 262-512-8415.

Catalog Configured Drives Program

NEMA Type 1

NEMA Type 4/12 Indoor

NEMA Type 3/4 Outdoor

- Enhanced Control
- Flange Mount Drive
- Welded Construction
- 480V Rating

All Enclosure Types

- Drive Input Protection Options
- Input/Output Contactors
- Bypass Options
- Input/Output Line Reactor Options
- 115V Control Power Options
- Control Interface and Feedback Options
- Human Interface Modules
- Motor Interface Options
- Operator Devices
- Drawing and Test Options



Approximate Dimensions

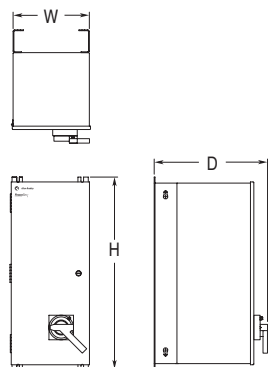


Figure 1

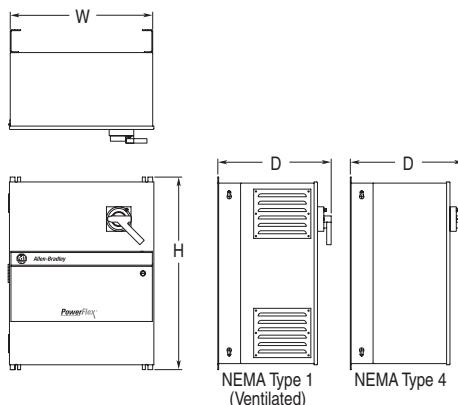


Figure 2

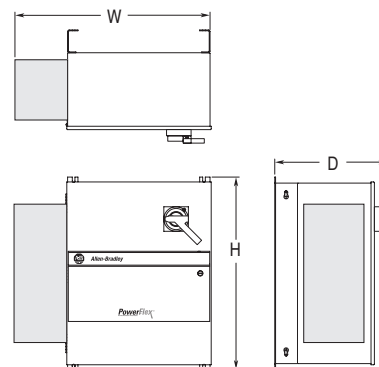


Figure 3

Maximum Enclosure Dimensions

| Ratings | | Drive Frame Size | Power Flex 70 Flange Drive Cat. No. | Enclosure Style for Flange Mounted Drives | | | | | | | | | | | | | | | | | |
|-----------------------------|----------|------------------------|---|--|-------|--------|-------|------------------------------------|-------|---|-------|-------------------------------|-------|------------------------------|-------|---|-------|-------------------------------|----------|-------------|-------|
| ND Hp | HD Hp | | | NEMA Type 1, Option Code A | | | | NEMA Type 4 Indoor, Option Code D | | | | | | NEMA Type 3/4, Option Code E | | | | | | | |
| | | | | | | | | NEMA Type 12 Indoor, Option Code G | | | | | | | | | | | | | |
| | | | | B0, C1, C5, S1, S9...S13, S16, P1...P3 or P6, Drive Mounted Options & All HIMs | | | | All Options | | B0, C1, C5, S1, S9...S13, S16, P1...P3 or P6, Drive Mounted Options & All NEMA 4 HIMs | | All Options Less Line Reactor | | All Options | | B0, C1, C5, S1, S9...S13, S16, P1...P3 or P6, Drive Mounted Options | | All Options Less Line Reactor | | All Options | |
| | | | | Figure | Style | Figure | Style | Figure | Style | Figure | Style | Figure | Style | Figure | Style | Figure | Style | Figure | Style | Figure | Style |
| 480V ac, Three-Phase Drives | | | | | | | | | | | | | | | | | | | | | |
| 0.5 | 0.33 | A | D1P1 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | | |
| 1.0 | 0.75 | A | D2P1 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | | |
| 2.0 | 1.5 | A | D3P4 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 4 | | |
| 3.0 | 2.0 | B | D5P0 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 4 | 1 | 1 | 2 | 3 | 2 | 5 | | |
| 5.0 | 3.0 | B | D8P0 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 4 | 1 | 1 | 2 | 3 | 2 | 5 | | |
| 7.5 | 5.0 | C | D011 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 4 | 1 | 1 | 2 | 3 | 2 | 5 | | |
| 10 | 7.5 | C | D014 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 4 | 1 | 1 | 2 | 3 | 2 or 3 ① | 5 or 8 ① | | |
| 15 | 10 | D | D022 | 1 | 1 | 2 | 4 | 1 | 1 | 2 | 4 | 2 | 5 | 16 | 1 | 2 | 4 | 2 or 3 ① | 5 or 8 ① | | |
| 20 | 15 | D | D027 | 1 | 1 | 2 | 4 | 1 | 1 | 2 | 4 | 2 | 5 | 1 | 1 | 2 | 4 | 3 | 8 | | |
| 25 | 20 | D | D034 | 1 | 1 | 2 | 4 | 1 | 1 | 2 | 4 | 2 | 5 | 1 | 1 | 2 | 5 | 3 | 8 | | |
| 30 | 25 | D | D040 | 1 | 1 | 2 | 4 | 1 | 1 | 2 | 4 | 2 | 5 | 1 | 1 | 2 | 5 | 3 | 8 | | |
| 40 | 30 | E | D052 | 1 | 2 | 2 | 6 | 1 | 2 | 2 | 6 | 2 | 7 | 1 | 2 | 2 | 6 | 3 | 9 | | |
| 50 | 40 | E | D065 | 1 | 2 | 2 | 6 | 1 | 2 | 2 | 6 | 2 | 7 | 1 | 2 | 2 | 6 | 3 | 9 | | |

① Figure 2, Style 5 when one line reactor selected. Figure 3, Style 8 when two line reactors selected.

Enclosure Dimensions

| Figure | Style | Enclosure Rating | Option Code (Position d) | Dimensions | |
|--------|-------|----------------------------------|-----------------------------|-------------------------|--------------------|
| | | | | H x W x D (mm) | H x W x D (in) |
| 1 | 1 | NEMA 1 | A | 812.8 x 330.2 x 484.1 | 32 x 13 x 19.06 |
| 1 | 2 | NEMA 1 | A | 1,270.0 x 406.4 x 484.1 | 50 x 16 x 19.06 |
| 2 | 3 | NEMA 1 | A | 812.8 x 609.6 x 484.1 | 32 x 24 x 19.06 |
| 2 | 4 | NEMA 1 | A | 965.2 x 609.6 x 484.1 | 38 x 24 x 19.06 |
| 2 | 6 | NEMA 1 | A | 1,270.0 x 762.0 x 484.1 | 50 x 30 x 19.06 |
| 1 | 1 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 812.8 x 330.2 x 484.1 | 32 x 13 x 19.06 |
| 1 | 2 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 1,270.0 x 406.4 x 484.1 | 50 x 16 x 19.06 |
| 2 | 3 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 812.8 x 609.6 x 484.1 | 32 x 24 x 19.06 |
| 2 | 4 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 965.2 x 609.6 x 484.1 | 38 x 24 x 19.06 |
| 2 | 5 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 1,270.0 x 609.6 x 484.1 | 50 x 24 x 19.06 |
| 2 | 6 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 1,270.0 x 762.0 x 484.1 | 50 x 30 x 19.06 |
| 2 | 7 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 1,270.0 x 914.4 x 484.1 | 50 x 36 x 19.06 |
| 3 | 8 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 812.8 x 831.9 x 484.1 | 50 x 32.75 x 19.06 |
| 3 | 9 | NEMA 4/12 Indoor, NEMA 4 Outdoor | D, G, E | 1,270.0 x 984.3 x 484.1 | 50 x 38.75 x 19.06 |









① Depth includes 6.35 mm (2.5 in) for Operator Handle when ordered.

Modified Configured Drives Program

- Drive Packages beyond the Catalog Configured Drives Program
- Enhanced and Standard Control
- Defined and Undefined Options
- Pre-determined Options or Custom Quotation

Standard Drive Specifications

| Category | Specification | | | | | | |
|-------------|---|---|---------|---------|---------|---------|------|
| Protection | Drive | 200-208V | 240V | 380/400 | 480V | 600V | 690V |
| | AC Input Overvoltage Trip: | 247VAC | 285VAC | 475VAC | 570VAC | 690VAC | |
| | AC Input Undervoltage Trip: | 120VAC | 138VAC | 233VAC | 280VAC | 345VAC | |
| | Bus Overvoltage Trip: | 405VDC | 405VDC | 810VDC | 810VDC | 1013VDC | |
| | Bus Undervoltage Output Shutoff: | 300VDC | 300VDC | 407V DC | 407V DC | 508V DC | |
| | Bus Undervoltage Fault Level: | 160V DC | 160V DC | 300V DC | 300V DC | 375V DC | |
| | Nominal Bus Voltage: | 281VDC | 324VDC | 540VDC | 648VDC | 810VDC | |
| | All Drives | | | | | | |
| | Heat Sink Thermistor: | Monitored by microprocessor overtemp trip | | | | | |
| | Drive Overcurrent Trip | | | | | | |
| | Software Current Limit: | 20-160% of rated current | | | | | |
| | Hardware Current Limit: | 200% of rated current (typical) | | | | | |
| | Instantaneous Current Limit: | 220-300% of rated current (dependent on drive rating) | | | | | |
| | Line transients: | up to 6000 volts peak per IEEE C62.41-1991 | | | | | |
| | Control Logic Noise Immunity: | Showering arc transients up to 1500V peak | | | | | |
| Environment | Power Ride-Thru: | 15 milliseconds at full load | | | | | |
| | Logic Control Ride-Thru: | 0.5 seconds minimum, 2 seconds typical | | | | | |
| | Ground Fault Trip: | Phase-to-ground on drive output | | | | | |
| | Short Circuit Trip: | Phase-to-phase on drive output | | | | | |
| | Altitude: | 1000 m (3300 ft) max. without derating | | | | | |
| | Maximum Surrounding Air Temperature without derating: | | | | | | |
| | IP20, NEMA/UL Type 1: | 0 to 50 degrees C (32 to 122 degrees F) | | | | | |
| | Flange Mount: | 0 to 50 degrees C (32 to 122 degrees F) | | | | | |
| | IP66, NEMA/UL Type 4X/12 indoor: | 0 to 40 degrees C (32 to 104 degrees F) | | | | | |
| | Storage Temperature (all const.): | -40 to 70 degrees C (-40 to 158 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: | 5 to 95% non-condensing | | | | | |
| | Shock: | 15G peak for 11ms duration (±1.0 ms) | | | | | |
| | Vibration | 0.152 mm (0.006 in.) displacement, 1G peak | | | | | |

| Category | Specification | | |
|---|--|-------------|---|
| Agency Certification | Type 1, IP30 | Flange Type | Type 4X/12, IP66 Indoor |
| | ✓ | ✓ | ✓ |
| | | ✓ | |
| | ✓ | ✓ | ✓ |
| | ✓ | ✓ | ✓ |
| | | | ✓ |
| | ✓ | ✓ | ✓ |
| | ✓ | ✓ | ✓ |
| | ✓ | ✓ | ✓ |
|  Listed to UL508C and CAN/CSA-C2.2 No. 14-M91 | | | |
|  Listed to UL508C for plenums (Rear heatsink only) | | | |
|  Marked for all applicable European Directives ⁽¹⁾ EMC Directive (89/336/EEC) EN 61800-3 Adjustable Speed electrical power drive systems Low Voltage Directive (73/23/EEC) EN 50178 Electronic Equipment for use in Power Installations | | | |
|  Compliant with IEC 61800-3:2004 | | | |
|  Certified to Criteria C-2, 1983. | | | |
|  Certified to EN 954-1, Category 3 for 240V, 400V, and 480V ratings of PowerFlex 70 Enhanced Control with DriveGuard Safe-Off option. | | | |
|  TUV Approved to EN 954-1, Category 3 for 600V ratings of PowerFlex 70 Enhanced Control with DriveGuard Safe-Off option. | | | |
|  RINA (Registro Italiano Navale - marine certification) | | | |
| 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. | | | |
| Electrical | Voltage Tolerance: | | -10% of minimum, +10% of maximum. See page C-17 for Full Power and Operating Range. |
| | Frequency Tolerance: | | 47-63 Hz. |
| | Input Phases: | | Three-phase input provides full rating for all drives. Single-phase operation provides 50% of rated current. Refer to page 23 for additional information. |
| | Displacement Power Factor (all drives): | | 0.98 across speed range. |
| | Efficiency: | | 97.5% at rated amps, nominal line volts. |
| | Maximum Short Circuit Rating: | | 200,000 Amps symmetrical. |
| | Max. Short Circuit Current Rating: Using Recommended Fuse or Circuit Breaker Type | | Maximum short circuit current rating to match specified fuse/circuit breaker capability. |
| | | | |
| Control | Method: | | Sine coded PWM with programmable carrier frequency. Ratings apply to all drives. |
| | Carrier Frequency: | | 2, 3, 4, 5, 6, 7, 8, 9 & 10 kHz Standard . 2, 4, 8 & 12 kHz EC . Drive rating based on 4 kHz. |
| | Output Voltage Range: | | 0 to rated motor voltage |
| | Output Frequency Range: | | 0 to 400 Hz Standard . 0 to 500 Hz EC . |
| | Frequency Accuracy Digital Input: Analog Input: | | Within ±0.01% of set output frequency. Within ±0.4% of maximum output frequency. |

| Category | Specification | |
|------------------------|---------------------------------------|---|
| Control (continued) | Frequency Control - Speed Regulation | with Slip Compensation (V/Hz Mode) 0.5% of base speed across 40:1 speed range 40:1 operating range 10 rad/sec bandwidth |
| | | with Slip Compensation (Sensorless Vector Mode) 0.5% of base speed across 80:1 speed range 80:1 operating range 20 rad/sec bandwidth |
| | | with feedback (Sensorless Vector Mode) EC 0.1% of base speed across 80:1 speed range 80:1 operating range 20 rad/sec bandwidth |
| | Speed Control - Speed Regulation | without feedback (Vector Control Mode) EC 0.1% of base speed across 120:1 speed range 120:1 operating range 30 rad/sec bandwidth |
| | | with feedback (Vector Control Mode) EC 0.001% of base speed across 120:1 speed range 1000:1 operating range 125 rad/sec bandwidth |
| | Torque Regulation | without feedback +/-10% EC |
| | | with feedback +/-5% EC |
| | Selectable Motor Control: | Sensorless Vector with full tuning. Standard V/Hz with full custom capability and vector control. |
| | Stop Modes: | Multiple programmable stop modes including - Ramp, Coast, DC-Brake, FastBrake, Ramp-to-Hold and S-curve. |
| | Accel/Decel: | Two independently programmable accel & decel times. Each time may be programmed from 0-3600 seconds in 0.1 sec. increments |
| Encoder | Intermittent Overload: | 110% Overload capability for up to 1 minute 150% Overload capability for up to 3 seconds |
| | Current Limit Capability: | Proactive Current Limit programmable from 20 to 160% of rated output current. Independently programmable proportional and integral gain. |
| | Electronic Motor Overload Protection: | Class 10 protection with speed sensitive response. Investigated by U.L. to comply with N.E.C. Article 430. U.L. File E59272, volume 12. |
| | Type: | Incremental, dual channel |
| | Supply: | 5V/12V Configurable +/-5% |
| | Quadrature: | 90° +/-27° at 25° C. |
| | Duty Cycle: | 50% +10% |
| | Requirements | Encoders must be line driver type, quadrature (dual channel) or pulse (single channel), single-ended or differential and capable of supplying a minimum of 10 mA per channel. The Encoder Interface Board accepts 5V or 12V DC square-wave with a minimum high state voltage of 3.5V DC (5V mode) and 7.0V DC (12V mode). Maximum low state voltage is 1V DC (for both 5V and 12V modes). Maximum input frequency is 250 kHz. |

(1) Applied noise impulses may be counted in addition to the standard pulse train causing erroneously high [Pulse Freq] readings.

Watts Loss (Rated Load, Speed & PWM)⁽¹⁾

| Voltage | ND HP | External Watts | Internal Watts | Total Watts Loss |
|-------------|-------|----------------|----------------|------------------|
| 208V | 0.5 | 12.2 | 19.2 | 31.4 |
| | 1.0 | 30.7 | 20.5 | 51.2 |
| | 2.0 | 44.6 | 22.6 | 67.2 |
| | 3.0 | 67.3 | 25.4 | 92.7 |
| | 5.0 | 141.3 | 33.2 | 174.5 |
| | 7.5 | 205.7 | 34.2 | 239.9 |
| | 10 | 270.4 | 48.1 | 318.5 |
| | 15 | 385.6 | 40.3 | 425.9 |
| | 20 | 494.6 | 44.9 | 539.5 |
| | 25 | 650.7 | 51.6 | 702.3 |
| 240V | 0.5 | 12.2 | 19.2 | 31.4 |
| | 1.0 | 30.7 | 20.5 | 51.2 |
| | 2.0 | 44.6 | 22.6 | 67.2 |
| | 3.0 | 67.3 | 25.4 | 92.7 |
| | 5.0 | 141.3 | 33.2 | 174.5 |
| | 7.5 | 205.7 | 34.2 | 239.9 |
| | 10 | 270.4 | 48.1 | 318.5 |
| | 15 | 385.6 | 40.3 | 425.9 |
| | 20 | 494.6 | 44.9 | 539.5 |
| | 25 | 650.7 | 51.6 | 702.3 |
| 400V | 0.37 | 11.5 | 17.9 | 29.4 |
| | 0.75 | 27.8 | 19.5 | 47.3 |
| | 1.5 | 43.6 | 21.6 | 65.2 |
| | 2.2 | 64.6 | 24.0 | 88.6 |
| | 4.0 | 99.5 | 28.2 | 127.7 |
| | 5.5 | 140.0 | 27.8 | 167.8 |
| | 7.5 | 193.3 | 32.0 | 225.3 |
| | 11 | 305.4 | 34.2 | 339.6 |
| | 15 | 432.9 | 42.9 | 475.8 |
| | 18.5 | 363.8 | 40.5 | 404.3 |
| | 22 | 396.8 | 41.5 | 438.3 |
| | 30 | 500.8 | 50.0 | 550.8 |
| | 37 | 632.0 | 57.7 | 689.7 |
| 480V | 0.5 | 11.5 | 17.9 | 29.4 |
| | 1.0 | 27.8 | 19.5 | 47.3 |
| | 2.0 | 43.6 | 21.6 | 65.2 |
| | 3.0 | 64.6 | 24.0 | 88.6 |
| | 5.0 | 99.5 | 28.2 | 127.7 |
| | 7.5 | 140.0 | 27.8 | 167.8 |
| | 10 | 193.3 | 32.0 | 225.3 |
| | 15 | 305.4 | 34.2 | 339.6 |
| | 20 | 432.9 | 42.9 | 475.8 |
| | 25 | 363.8 | 40.5 | 404.3 |
| | 30 | 396.8 | 41.5 | 438.3 |
| | 40 | 500.8 | 50.0 | 550.8 |
| | 50 | 632.0 | 57.7 | 689.7 |
| 600V | 0.5 | 11.5 | 17.9 | 29.4 |
| | 1.0 | 27.8 | 19.5 | 47.3 |
| | 2.0 | 43.6 | 21.6 | 65.2 |
| | 3.0 | 64.6 | 24.0 | 88.6 |
| | 5.0 | 99.5 | 28.2 | 127.7 |
| | 7.5 | 140.0 | 27.8 | 167.8 |
| | 10 | 193.3 | 32.0 | 225.3 |
| | 15 | 305.4 | 34.2 | 339.6 |
| | 20 | 432.9 | 42.9 | 475.8 |
| | 25 | 281.4 | 42.4 | 323.8 |
| | 30 | 311.9 | 43.4 | 355.3 |
| | 40 | 389.9 | 51.8 | 441.7 |
| | 50 | 501.4 | 59.9 | 561.3 |

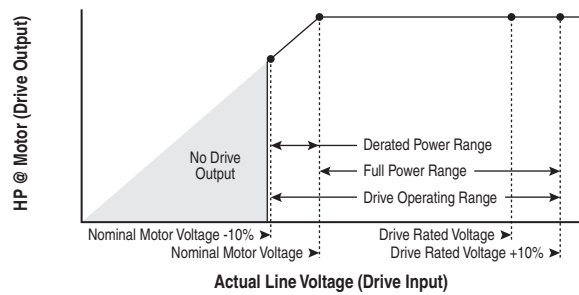
⁽¹⁾ Worst case condition including Vector Control board, HIM and Communication Module

Voltage Tolerance

| Drive Rating | Nominal Line Voltage | Nominal Motor Voltage | Drive Full Power Range | Drive Operating Range |
|--------------|----------------------|-----------------------|------------------------|-----------------------|
| 200-240 | 200 | 200† | 200-264 | 180-264 |
| | 208 | 208 | 208-264 | |
| | 240 | 230 | 230-264 | |
| 380-400 | 380 | 380† | 380-528 | 342-528 |
| | 400 | 400 | 400-528 | |
| | 480 | 460 | 460-528 | |
| 500-600 | 600 | 575† | 575-660 | 432-660 |

Drive Full Power Range = Nominal Motor Voltage to Drive Rated Voltage + 10%.
Rated current is available across the entire Drive Full Power Range

Drive Operating Range = Lowest† Nominal Motor Voltage - 10% to Drive Rated Voltage + 10%.
Drive Output is linearly derated when Actual Line Voltage is less than the Nominal Motor Voltage



Example:

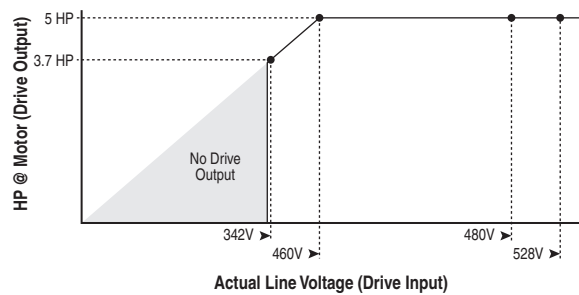
Calculate the maximum power of a 5 HP, 460V motor connected to a 480V rated drive supplied with 342V Actual Line Voltage input.

$$^2 \text{ Actual Line Voltage} / \text{Nominal Motor Voltage} = 74.3\%$$

$$^2 74.3\% \times 5 \text{ HP} = 3.7 \text{ HP}$$

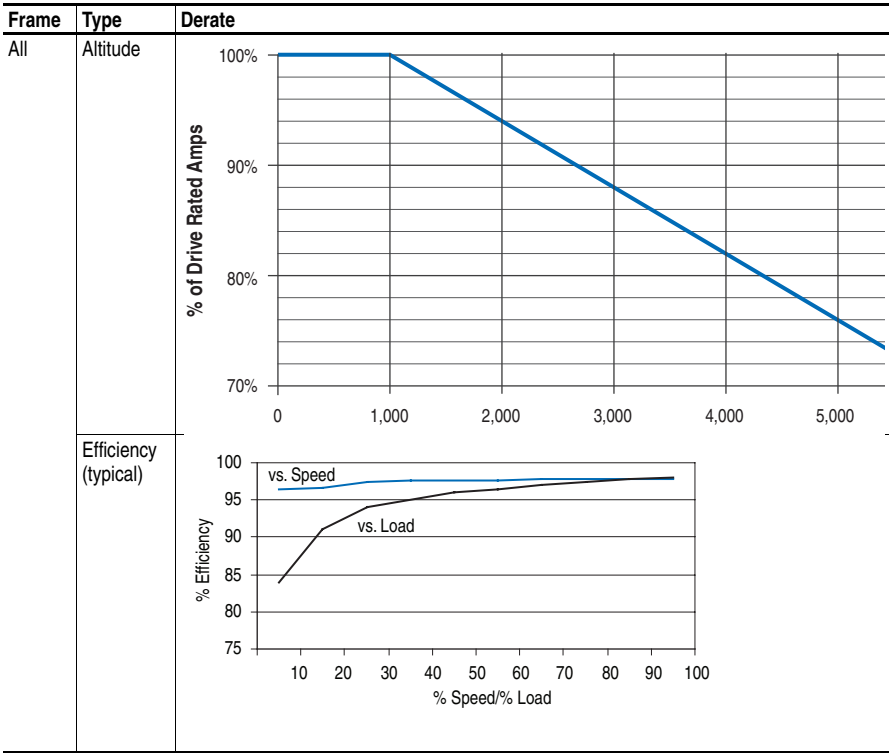
$$^2 74.3\% \times 60 \text{ Hz} = 44.6 \text{ Hz}$$

At 342V Actual Line Voltage, the maximum power the 5 HP, 460V motor can produce is 3.7 HP at 44.6 Hz.



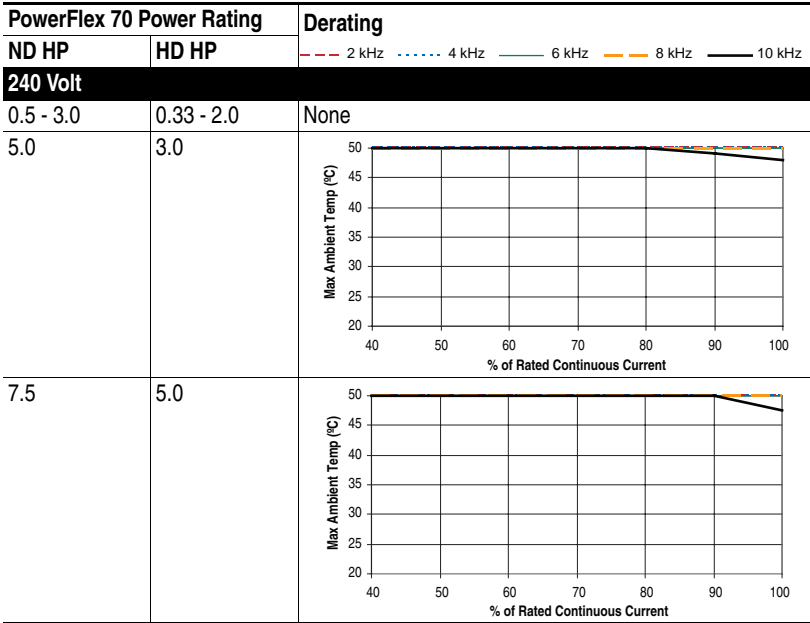
Derating Guidelines

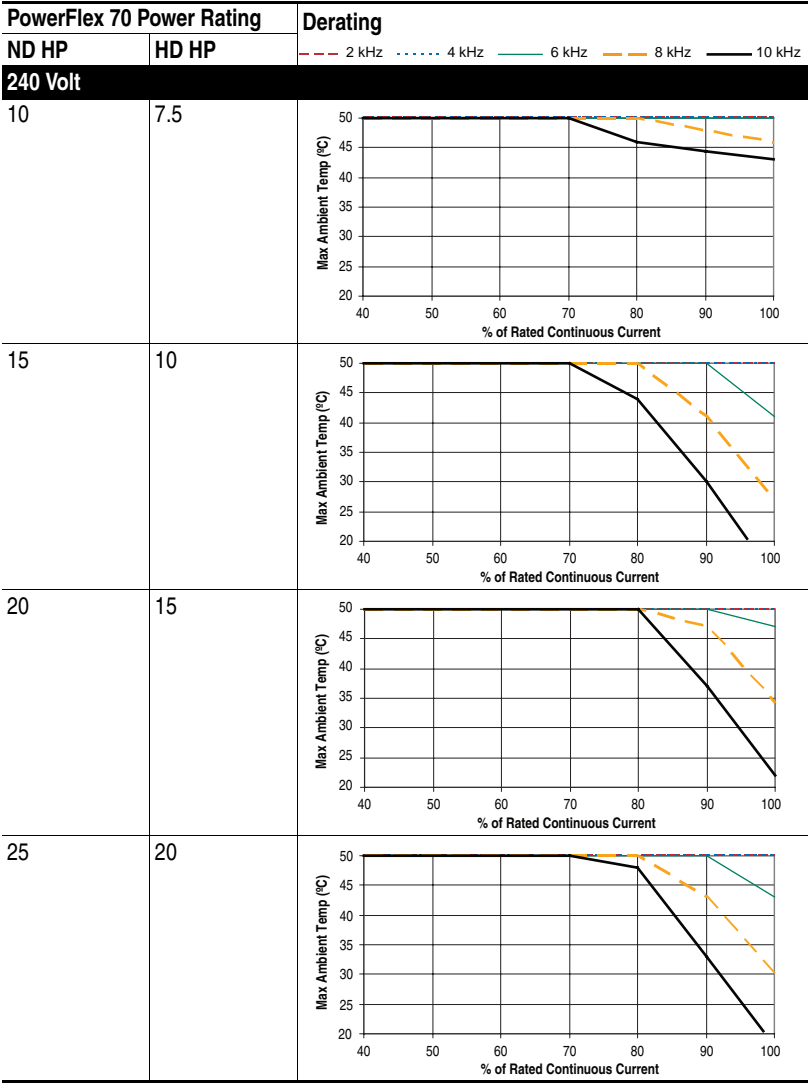
Altitude and Efficiency



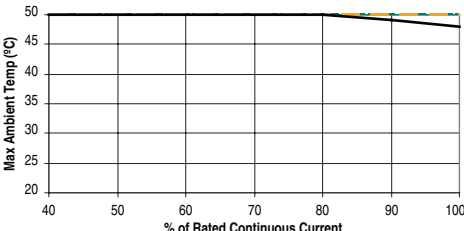
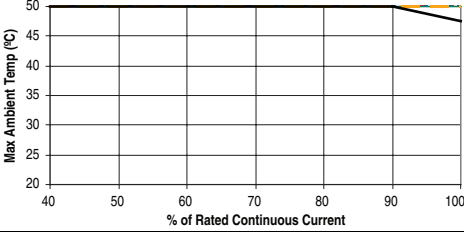
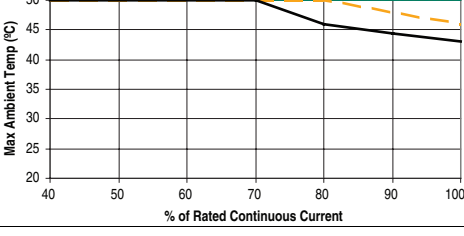
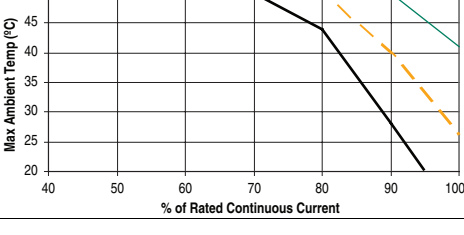
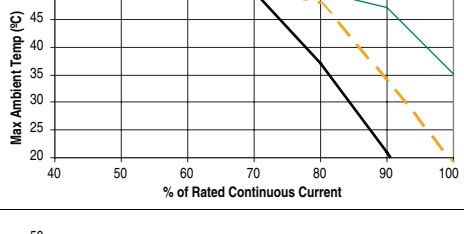
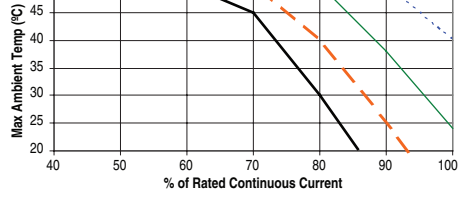
Ambient Temperature/Load

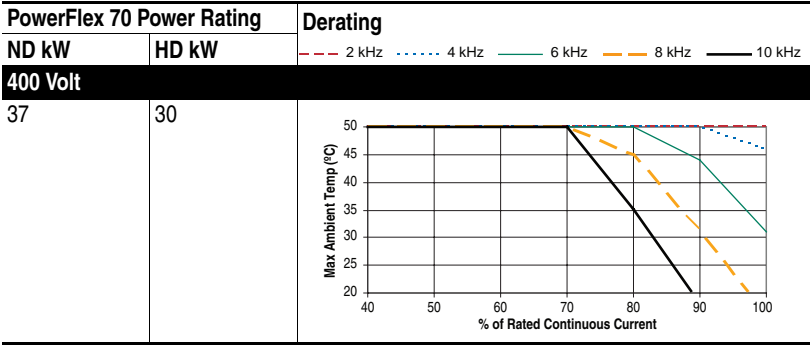
240V AC



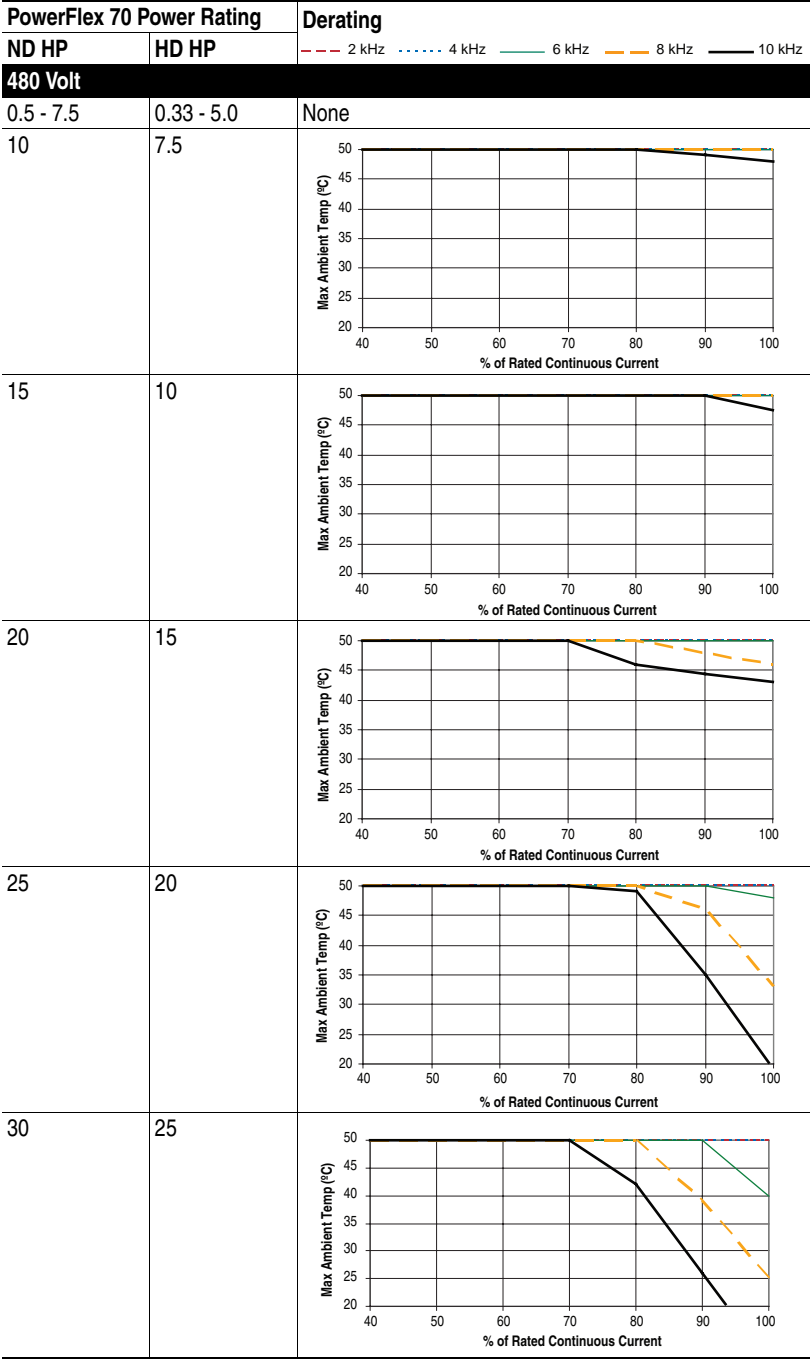


400V AC

| PowerFlex 70 Power Rating | | Derating |
|---------------------------|------------|---|
| ND kW | HD kW | |
| 400 Volt | | |
| 0.37 - 5.5 | 0.25 - 4.0 | None |
| 7.5 | 5.5 |  |
| 11 | 7.5 |  |
| 15 | 11 |  |
| 18.5 | 15 |  |
| 22 | 18.5 |  |
| 30 | 22 |  |



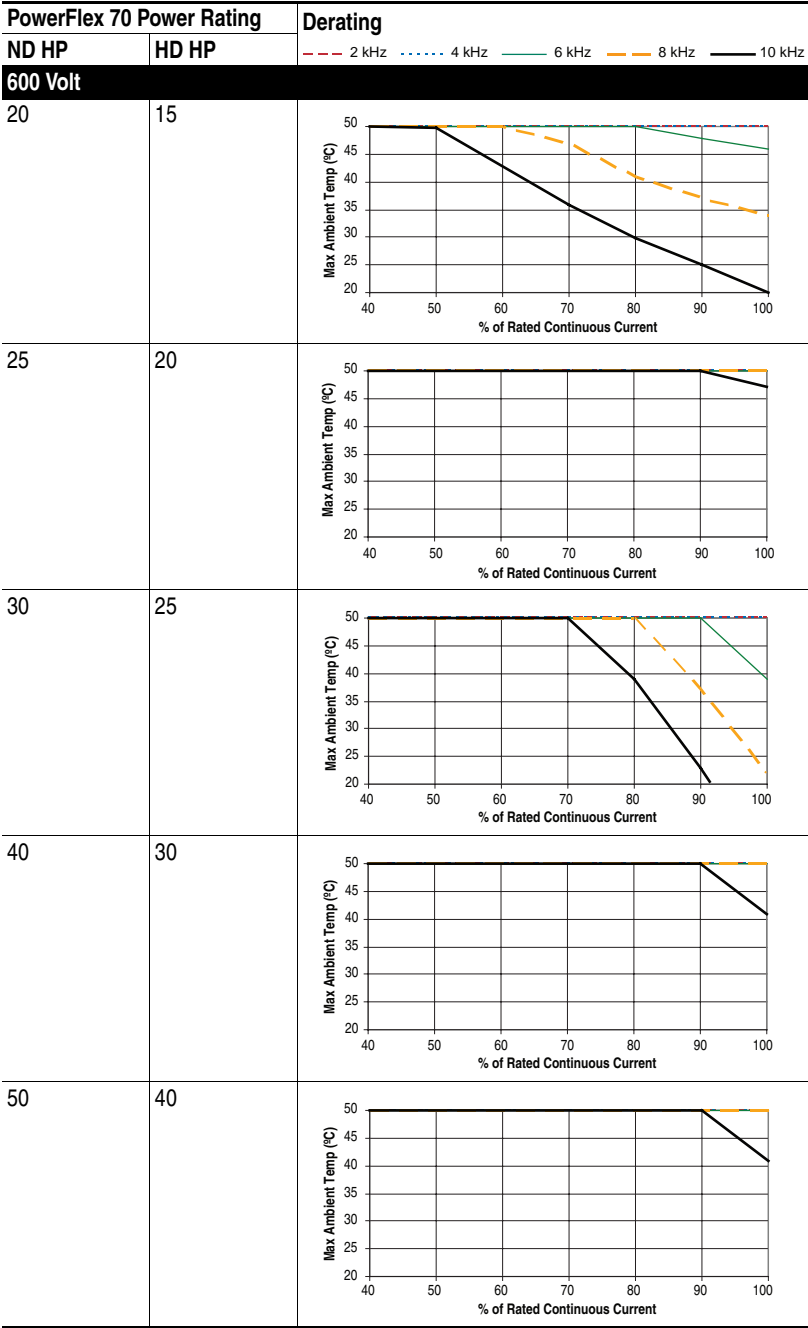
480V AC



| PowerFlex 70 Power Rating | | Derating |
|---------------------------|-------|--|
| ND HP | HD HP | |
| 480 Volt | | --- 2 kHz - - - 4 kHz — 6 kHz - - - 8 kHz — 10 kHz |
| 40 | 30 | |
| 50 | 40 | |

600V AC

| PowerFlex 70 Power Rating | | Derating |
|---------------------------|------------|--|
| ND HP | HD HP | |
| 600 Volt | | --- 2 kHz - - - 4 kHz — 6 kHz - - - 8 kHz — 10 kHz |
| 0.5 - 5.0 | 0.33 - 3.0 | None |
| 7.5 | 5.0 | |
| 10 | 7.5 | |
| 15 | 10 | |



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