

## Additional Resources

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

Resource	Description
PowerFlex 70 Adjustable Frequency AC Drive User Manual, publication <a href="#">20A-UM001</a>	Provides the basic information needed to start up and troubleshoot the PowerFlex® 70 Adjustable Frequency AC Drive.
PowerFlex 70 and 700 Reference Manual - Volume 1, publication <a href="#">PFLEX-RM001</a>	Provides detailed information for specifications and dimensions, operation, and dynamic brake selection for the drive.
PowerFlex 70 Adjustable Frequency AC Drive Installation Instructions, publication <a href="#">20A-IN009</a>	Provides the five basic steps needed to install and perform a basic startup of the PowerFlex 70 drive.
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication <a href="#">DRIVES-IN001</a>	Provides the basic information needed to properly wire and ground Pulse Width Modulated (PWM) AC drives.
Industry Installation Guidelines for Pulse Width Modulated (PWM) AC Drives, publication <a href="#">DRIVES-AT003</a>	Provides basic information for enclosure systems and environmental/location considerations (to help protect against environmental contaminants), and power and grounding considerations needed to properly install AC drives.
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control, publication <a href="#">SGI-1.1</a>	Provides general guidelines for the application, installation, and maintenance of solid-state control.
Preventive Maintenance of Industrial Control and Drive System Equipment, publication <a href="#">DRIVES-TD001</a>	Provides a guide to performing preventive maintenance.
Guarding Against Electrostatic Damage, publication <a href="#">8000-4.5.2</a>	Provides practices for guarding against Electrostatic damage (ESD)
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://www.ab.com">http://www.ab.com</a>	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

## Product Overview

PowerFlex 70 drives are designed to worldwide standards providing out-of-the-box performance around the globe. Available ratings include these options:

- 0.5...25 Hp output at 240V AC input
- 0.5...50 Hp output at 480V AC input
- 0.5...50 Hp output at 600V AC input

The PowerFlex 70 drive can be used with a full featured LCD human interface module (HIM) that 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. Computer tools such as DriveExplorer™ and DriveTools™ SP assist with programming, monitoring, and troubleshooting the PowerFlex 70.



## 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, other contaminants, 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 [122 °F] for IP20, NEMA / UL Type 1 and Flange Mount; 40 °C [104 °F] for IP66, NEMA / UL Type 4X/12).

## Space Saving Hardware Features

- Integral electromagnetic compatibility (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

The PowerFlex 7-Class AC drives provide common human interface tools that are familiar and easy to use. These include the LCD human interface modules and computer-based configuration tools.

The LCD HIMs provide these features and functions:

- 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

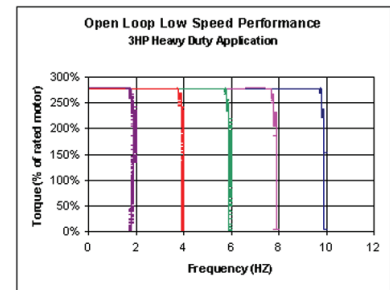
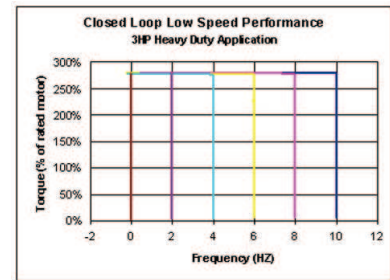
Remote versions for panel mount application

## Outstanding Control and Performance

- **Vector Control with FORCE™ Technology** <sup>(1)</sup> 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** <sup>(1)</sup>, 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 ISO 13849-1, Category 3.
- **Droop Control** <sup>(1)</sup> for load sharing applications.
- **Sleep/Wake Control** <sup>(1)</sup> for analog control of start and stop.



<sup>(1)</sup> The feature is available only for enhanced control.

## Unsurpassed Capability in Network Communications

PowerFlex drives are fully compatible with the wide variety of Allen-Bradley® DPI™ (drive peripheral interface) communication adapters, offering the following benefits.

BACnet	DeviceNet	ControlNet	EtherNet/IP	Remote I/O <sup>(1)</sup>	RS-485 DF1	Profibus DP	LonWorks	Modbus RTU	Modbus TCP	Metasys N2	Siemens P1 FLN	Description
X	X	X	X									<b>Unconnected Messaging</b> permits other network devices (for example, PanelView™) to communicate directly to a drive without routing the communication through the network scanner.
X	X	X	X	X			X					<b>Adapter Routing</b> -- Plug PC into one drive and talk to other Allen-Bradley drives on same network, without being routed through network scanner.
X	X	X	X	X	X	X	X	X	X	X	X	<b>Access to 100% of all parameters</b> over the network.
X	X		X		X							<b>AutoBaud</b> capability makes initial connections less problematic.
X												<b>Change Of State</b> significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Very flexible configuration for each node (for example, reference must change by more than 5%).
X		X										<b>Peer Control</b> 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), that can also significantly reduce network traffic.
X												<b>Automatic Device Replacement (ADR)</b> 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.
X	X	X	X	X	X	X	X	X	X	X	X	<b>Flexible Fault Configuration</b> – 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) versus a network idle condition (PLC set to 'Program.'

<sup>(1)</sup> The remote I/O has silver series status. For more information, refer to <http://www.ab.com/silver>.

# 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>

**a**

Drive	
Code	Type
20A	PowerFlex 70

**b**

Voltage Rating		
Code	Voltage	Ph.
B	240V AC	3
C	400V AC	3
D	480V AC	3
E	600V AC	3

**c1**

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

**c2**

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

**c3**

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

**c4**

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

**c5**

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

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

**d**

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 *

\* Only available on Frame E.

**e**

HIM	
Code	Interface Module
0	Blank Cover
3	Full Numeric LCD
5	Prog. Only LCD *

\* Only available with NEMA 4X, option C.

See [Catalog Number Explanation \(continued\)](#) on page 6 for more drive options.

### Catalog Number Explanation (continued)

Position Number											
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>

*f*

Documentation	
Code	Type
A	Manual
N	No Manual

*g*

Brake IGBT	
Code	w/Brake IGBT
Y	Yes

*h*

Internal Brake Resistor	
Code	w/Resistor
Y	Yes
N	No

*i*

Emission Class	
Code	Rating
A	Filtered* A* & B Frames (Optional) C, D, & E Frames (Standard)
N	Not Filtered* A & B Frames (Optional) C, D, & E Frames

\* 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.

*j*

Comm Slot	
Code	Network Type
C	ControlNet (Coax)
D	DeviceNet
E	EtherNet/IP
N	None

*k*

Control & I/O		
Code	Control	Safe-Off
N*	Standard	N/A
C	Enhanced	No
G*	Enhanced	Yes

\* No longer available for sale.

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

*l*

Feedback	
Code	Feedback
0	No Feedback - Enhanced Control
1	5V/12V Encoder w/Enhanced Control

## Factory Installed Options

### 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

### 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

### 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	Frame	Cat. Code
	$\Omega$		(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 and 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)
ControlNet™ Communication Adapter (Coax)	C
DeviceNet™ Communication Adapter	D
EtherNet/IP™ Communication Adapter	E

### Control Options

Description	Cat. Code (Position k)
Enhanced Control without DriveGuard	C
Enhanced Control with DriveGuard	G

### Feedback Options

Description	Cat. Code (Position l)
None	0
5V/12V Encoder	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



Enhanced LCD Display,  
Full Numeric Keypad  
20-HIM-A6



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



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



Enhanced LCD Display,  
Full Numeric Keypad  
20-HIM-A6S

Description	Handheld/Local (Drive Mount)	Remote (Panel Mount) IP66, NEMA/UL Type 4x/12 *
	Cat. No.	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 ‡
Enhanced LCD Display, Full Numeric Keypad	20-HIM-A6	20-HIM-A6S

\* For indoor use only.

‡ Includes a 1202-C30 interface cable, 3 m (9.8 ft), 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
		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 and E	Not Available	

These resistors have a limited duty cycle. Refer to the PowerFlex Dynamic Braking Resistor Calculator Application Technique, publication [PFLEX-AT001](#), to determine if an internal resistor is 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 Options

### Communication Option Kits

Description	Cat. No.
BACnet MS/TP RS485 Communication Adapter	20-COMM-B
ControlNet Communication Adapter (Coax)	20-COMM-C
DeviceNet Communication Adapter	20-COMM-D
EtherNet/IP Communication Adapter	20-COMM-E
HVAC Communication Adapter	20-COMM-H
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 † 1	20-COMM-R
RS485 DF1 Communication Adapter	20-COMM-S
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.

1 The remote I/O has silver series status. For more information, refer to <http://www.ab.com/silver>.

### 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.

## 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 and 240V Secondary	460V, 60 Hz, Three-phase, 460V Primary and 460V Secondary	575V, 60 Hz, Three-phase 575V Primary and 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

## 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.

**Table 1 - 240V, 60 Hz, Three-phase, 3% Impedance**

Drive Cat. No.	Duty	Hp	Input Line Reactor <sup>(1)</sup>		Output Line Reactor <sup>(1)</sup>	
			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.

**Table 2 - 240V, 60 Hz, Three-phase, 5% Impedance**

Drive Cat. No.	Duty	Hp	Input Line Reactor <sup>(1)</sup>		Output Line Reactor <sup>(1)</sup>	
			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.

**Table 3 - 480V, 60 Hz, Three-phase, 3% Impedance**

Drive Cat. No.	Duty	Hp	Input Line Reactor <sup>(1)</sup>		Output Line Reactor <sup>(1)</sup>	
			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.

**Table 4 - 480V, 60 Hz, Three-phase, 5% Impedance**

Drive Cat. No.	Duty	Hp	Input Line Reactor <sup>(1)</sup>		Output Line Reactor <sup>(1)</sup>	
			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 <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>	1321-3R25-C	1321-3RA25-C
20AD034	Heavy Duty	20	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>	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.

**Table 5 - 600V, 60 Hz, Three-phase, 3% Impedance**

Drive Cat. No.	Duty	Hp	Input Line Reactor <sup>(1)</sup>		Output Line Reactor <sup>(1)</sup>	
			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.

**Table 6 - 600V, 60 Hz, Three-phase, 5% Impedance**

Drive Cat. No.	Duty	Hp	Input Line Reactor <sup>(1)</sup>		Output Line Reactor <sup>(1)</sup>	
			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 <sup>(2)</sup>	1321-3RA4-D <sup>(2)</sup>
20AE2P7	Normal Duty	2	1321-3R4-D <sup>(2)</sup>	1321-3RA4-D <sup>(2)</sup>	1321-3R4-D <sup>(2)</sup>	1321-3RA4-D <sup>(2)</sup>
20AE3P9	Heavy Duty	2	1321-3R4-D <sup>(2)</sup>	1321-3RA4-D <sup>(2)</sup>	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 <sup>(2)</sup>	1321-3RA12-C <sup>(2)</sup>
20AE9P0	Normal Duty	7.5	1321-3R12-C <sup>(2)</sup>	1321-3RA12-C <sup>(2)</sup>	1321-3R12-C <sup>(2)</sup>	1321-3RA12-C <sup>(2)</sup>
20AE011	Heavy Duty	7.5	1321-3R12-C <sup>(2)</sup>	1321-3RA12-C <sup>(2)</sup>	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 <sup>(2)</sup>	1321-3RA25-C <sup>(2)</sup>
20AE022	Normal Duty	20	1321-3R25-C <sup>(2)</sup>	1321-3RA25-C <sup>(2)</sup>	1321-3R25-C <sup>(2)</sup>	1321-3RA25-C <sup>(2)</sup>
20AE027	Heavy Duty	20	1321-3R25-C <sup>(2)</sup>	1321-3RA25-C <sup>(2)</sup>	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>
20AE027	Normal Duty	25	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>
20AE032	Heavy Duty	25	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>
20AE032	Normal Duty	30	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>
20AE041	Heavy Duty	30	1321-3R35-C <sup>(2)</sup>	1321-3RA35-C <sup>(2)</sup>	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.

## Power Ratings and Branch Circuit Protection

See [Table 8](#) through [Table 13](#) for power ratings and branch circuit protection information.

### 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 [Table 11](#) through [Table 13](#).

**Table 8 - 208/240 Volt AC Three-phase Input Drive Ratings and Input Protection Devices**

Cat.No.	Frame <sup>(1)</sup>	Hp Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-time Delay Fuse		Circuit Breaker <sup>(4)</sup>	Motor Circuit Protector <sup>(6)</sup>	140M Motor Protector with Adjustable Current Range <sup>(7) (8)</sup>			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min <sup>(2)</sup>	Max <sup>(3)</sup>	Min <sup>(2)</sup>	Max <sup>(3)</sup>	Max <sup>(5)</sup>	Max <sup>(5)</sup>	Available Catalog Numbers <sup>(9)</sup>		Minimum Enclosure Volume (in. <sup>3</sup> ) <sup>(10)</sup>	
<b>208 Volt AC Input</b>																		
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	–	3441
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	–	3441
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	3441
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	3441
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	3441
20AB022	D	7.5	5	23.3	8.3	25.3	27.8	37.9	30	50	30	100	100	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AB028	D	10	7.5	29.8	10.7	32.2	37.9	50.6	40	70	40	125	125	50	–	–	140M-F8E-C32	5098
20AB042	D	15	10	39.8	14.3	43	55.5	74	60	100	60	175	175	70	–	–	140M-F8E-C45	5098
20AB054	E	20	15	57.5	20.7	62.1	72.4	96.6	80	125	80	200	200	100	–	–	–	–
20AB070	E	25	20	72.3	26.0	78.2	93.1	124	90	175	90	300	300	100	–	–	–	–
<b>240 Volt AC Input</b>																		
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	–	3441
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	–	3441
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	3441
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	3441
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	3441
20AB022	D	7.5	5	19.9	8.3	22	24.4	33	25	45	25	80	80	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AB028	D	10	7.5	25.7	10.7	28	33	44	35	60	35	110	110	50	–	–	140M-F8E-C32	5098
20AB042	D	15	10	38.7	16.1	42	46.2	63	50	90	50	150	150	50	–	–	140M-F8E-C45	5098
20AB054	E	20	15	49.8	20.7	54	63	84	60	100	60	200	200	100	–	–	–	–
20AB070	E	25	20	64.5	26.8	70	81	108	90	150	90	275	275	100	–	–	–	–

See [page 27](#) for notes.

**Table 9 - 400/480 Volt AC Three-phase Input Drive Ratings and Input Protection Devices**

Cat.No.	Frame <sup>(1)</sup>	Hp Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-time Delay Fuse		Circuit Breaker <sup>(4)</sup>	Motor Circuit Protector <sup>(6)</sup>	140M Motor Protector with Adjustable Current Range <sup>(7) (8)</sup>			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min <sup>(2)</sup>	Max <sup>(3)</sup>	Min <sup>(2)</sup>	Max <sup>(3)</sup>	Max <sup>(5)</sup>	Max <sup>(5)</sup>	Available Catalog Numbers <sup>(9)</sup>			Minimum Enclosure Volume (in. <sup>3</sup> ) <sup>(10)</sup>
<b>400 Volt AC Input</b>																		
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	–	–	3441
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	–	3441
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	–	3441
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	3441
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	3441
20AC011	C	5.5	4	10.5	7.6	11.5	13	17.4	15	25	15	45	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
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	3441
20AC022	D	11	7.5	21.9	15.2	22	24.2	33	30	45	30	80	80	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AC030	D	15	11	30.3	21	30	33	45	40	60	40	120	120	50	–	–	140M-F8E-C32	5098
20AC037	D	18.5	15	35	24.3	37	45	60	50	80	50	125	140	50	–	–	140M-F8E-C45	5098
20AC043	D	22	18.5	40.7	28.2	43	56	74	60	90	60	150	160	70	–	–	–	–
20AC060	E	30	22	56.8	39.3	60	66	90	80	125	80	225	240	80	–	–	–	–
20AC072	E	37	30	68.9	47.8	72	90	120	90	150	90	250	280	100	–	–	–	–
<b>480 Volt AC Input</b>																		
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	–	–	3441
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	–	3441
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	–	3441
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	–	3441
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	3441
20AD011	C	7.5	5	9.4	7.9	11	12.1	16.5	15	20	15	40	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AD014	C	10	7.5	12.4	10.4	14	16.5	22	20	30	20	50	50	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AD022	D	15	10	19.9	16.6	22	24.2	33	25	45	25	80	80	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AD027	D	20	15	24.8	20.6	27	33	44	35	60	35	100	100	50	–	–	140M-F8E-C32	5098
20AD034	D	25	20	31.2	25.9	34	40.5	54	40	70	40	125	125	50	–	–	140M-F8E-C45	5098
20AD040	D	30	25	36.7	30.5	40	51	68	50	90	50	150	150	50	–	–	140M-F8E-C45	5098
20AD052	E	40	30	47.7	39.7	52	60	80	60	110	60	200	200	70	–	–	–	–
20AD065	E	50	40	59.6	49.6	65	78	104	80	125	80	250	250	100	–	–	–	–

See page 27 for notes.

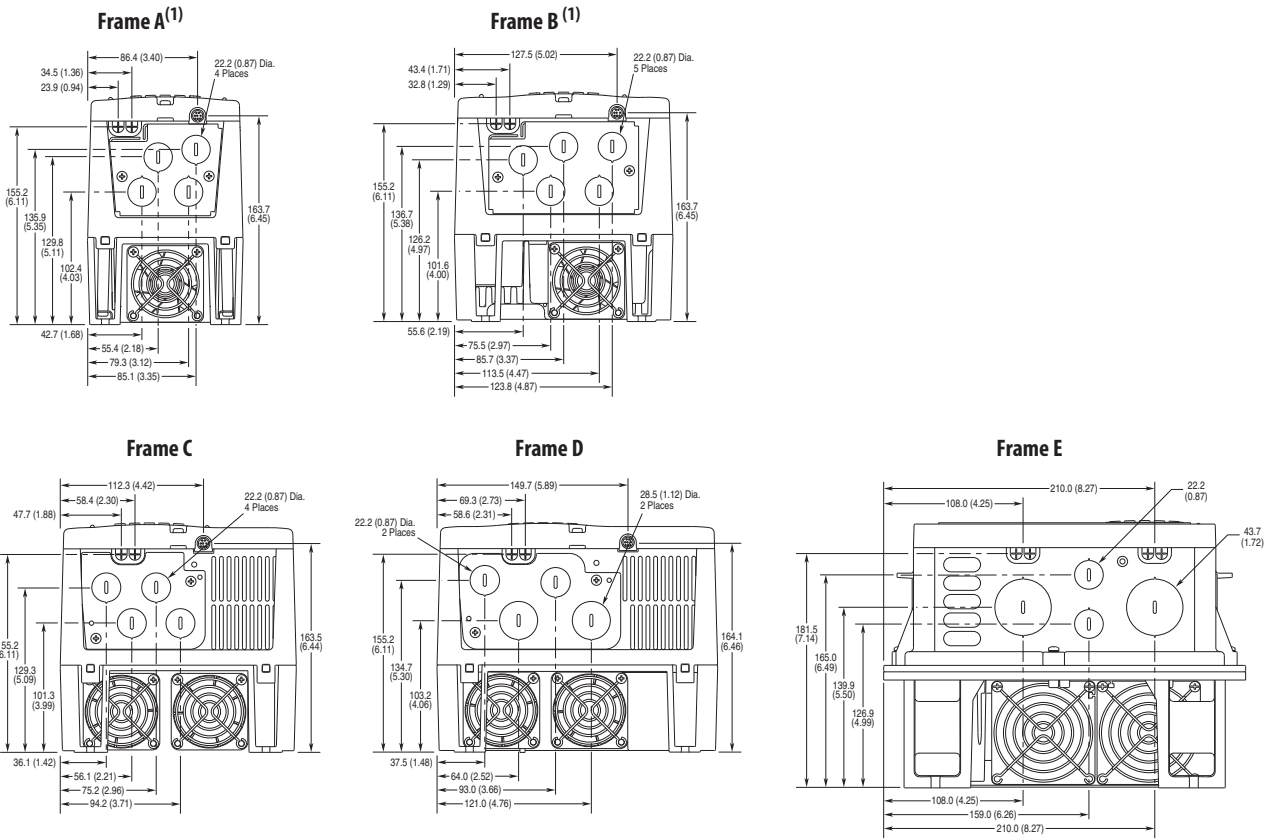
**Table 10 - 600 Volt AC Three-phase Input Drive Ratings and Input Protection Devices**

Cat.No.	Frame <sup>(1)</sup>	Hp Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-time Delay Fuse		Circuit Breaker <sup>(4)</sup>	Motor Circuit Protector <sup>(6)</sup>	140M Motor Protector with Adjustable Current Range <sup>(7) (8)</sup>			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min <sup>(2)</sup>	Max <sup>(3)</sup>	Min <sup>(2)</sup>	Max <sup>(3)</sup>	Max <sup>(5)</sup>	Max <sup>(5)</sup>	Available Catalog Numbers <sup>(9)</sup>			Minimum Enclosure Volume (in. <sup>3</sup> ) <sup>(10)</sup>
<b>600 Volt AC Input</b>																		
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	–	–	3441
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	–	3441
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	–	3441
20AE3P9	B	3	2	4.4	4.5	3.9	4.3	5.9	6	8	6	15	15	7	–	140M-D8E-B63	–	3441
20AE6P1	B	5	3	7.5	7.8	6.1	6.7	9.2	10	12	10	20	20	15	–	140M-D8E-C10	140M-F8E-C10	3441
20AE9P0	C	7.5	5	7.7	8	9	9.9	13.5	10	20	10	35	35	15	–	140M-D8E-C10	140M-F8E-C10	3441
20AE011	C	10	7.5	9.8	10.1	11	13.5	18	15	20	15	40	40	15	–	140M-D8E-C16	140M-F8E-C16	3441
20AE017	D	15	10	15.3	15.9	17	18.7	25.5	20	35	20	60	60	30	–	–	140M-F8E-C20	5098
20AE022	D	20	15	20	20.8	22	25.5	34	25	45	25	80	80	30	–	–	140M-F8E-C25	5098
20AE027	D	25	20	24.8	25.7	27	33	44	35	60	35	100	100	50	–	–	140M-F8E-C25	5098
20AE032	D	30	25	29.4	30.5	32	40.5	54	40	70	40	125	125	50	–	–	140M-F8E-C32	5098
20AE041	E	40	30	37.6	39.1	41	48	64	50	90	50	150	150	100	–	–	–	–
20AE052	E	50	40	47.7	49.6	52	61.5	82	60	110	60	200	200	100	–	–	–	–

See page 27 for notes.

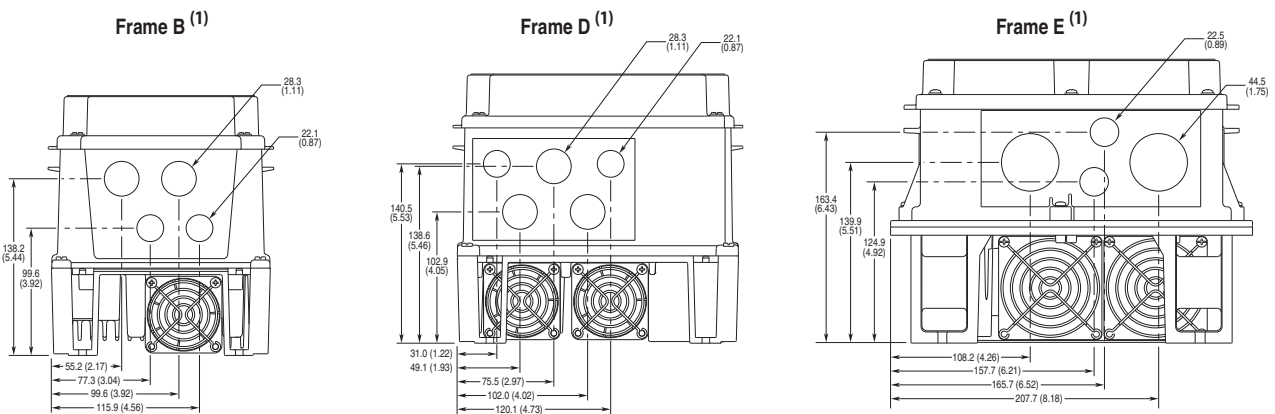


**Figure 2 - IP20, NEMA / UL Type 1 Bottom View Dimensions, mm (in.)**



(1) Fan existence is dependent on drive rating and package style.

**Figure 3 - IP 66 (NEMA / UL Type 4X/12) Bottom View Dimensions, mm (in.)**



(1) DPI Port 2 is not accessible from outside of the drive standard. A service connection board (catalog number SK-M9-SCB1) is required.