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PowerFlex® 4M

TECHNICAL DATA

ADJUSTABLE FREQUENCY AC DRIVES

eforsan
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ALLEN-BRADLEY • ROCKWELL SOFTWARE
Rockwell Automation

Product Overview

Providing users with powerful motor speed control in a compact, space saving design, the Allen-Bradley® PowerFlex® 4M AC drive is the smallest and most cost effective member of the PowerFlex® family of drives. Ideal for machine level speed control, the PowerFlex 4M drive provides the application versatility to meet the demands of global OEMs and end users who require space savings and easy-to-use AC drives that provide application flexibility, feed-through wiring and ease-of-programming. The PowerFlex 4M AC drive is available in three frame sizes (A, B and C) and power ratings from 0.2 to 11 kW (0.25 to 15 Hp) and in voltage classes of 120, 240 and 480 volts.

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Reference Materials

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

Title	Publication	Available Online at . . .
PowerFlex 4M User Manual	22F-UM001…	**www.rockwellautomation.com/literature**
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**

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Start Up, Programming and Operation

- An **integral keypad** provides out of the box operation using the local potentiometer and control keys.
- The 12 most common application parameters are contained in the **Basic Program Group**, making programming fast and easy.
- The **programming keys** have the same function as all other PowerFlex drives, so if you can program one PowerFlex drive, you can program them all.
- **4 digit display** with 10 additional LED indicators provides an intuitive display of drive status and information.
- Integral **RS-485 communications** can be used for programming from a PC. It can also be used in a multi-drop network configuration. A serial converter module provides connectivity to any controller with a DF1 port.
- A **NEMA/UL Type 4X** remote and **NEMA/UL Type 1 hand-held LCD keypad** provide additional programming and control flexibility, both featuring the popular CopyCat function.

Packaging and Mounting

- Installation can be a virtual snap using the **DIN rail mounting** feature on A and B frame drives. Panel mounting is also available, providing added flexibility.
- **Zero Stacking**™ is allowable for ambient temperatures up to 40°C, saving valuable panel space. 50°C ambient temperatures are permitted with minimal spacing between drives.
- Integral filtering is available on all 240V single phase and 480V three phase ratings, providing a cost-effective means of meeting EN61800-3. External filters for all PowerFlex 4M drive ratings are also available.

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Optimized Performance

- **Removable MOV** to ground ensures reliable operation with ungrounded or resistive distribution systems.
- A **relay pre-charge** limits inrush current.
- **Integral brake transistor**, available on Frame C drives, provides dynamic braking capability with simple low cost brake resistors.
- DIP switch settable **24V DC sink or source control** for control wiring flexibility.
- 150% overload for 60 seconds or 200% overload for 3 seconds provides **robust overload protection**.
- Adjustable PWM frequency up to 10 kHz ensures quiet operation.
- Volts per Hertz Control Performance.
- Drive automatically provides auto boost (IR compensation) and slip compensation.
- Provides excellent speed regulation and high levels of torque across the entire speed range of the drive, and improved speed regulation even as loading increases.

Communications

- A **Serial Converter Module** provides connectivity to any controller that has the ability to initiate DFI messaging.
  - 22-SCM-232 – RS232/DF1 to RS 485/DSI
  - Bluetooth® - Wireless/DF1 to RS 485/DSI
- **Integral RS485/DSI communications** enable the drives to be used in a multi-drop network configuration.
- Integral communication cards such as **DeviceNet**™, **EtherNet/IP**™, **PROFIBUS**™ **DP**, **LonWorks**®, **BACnet**® and, **ControlNet**™ can improve machine performance. These cards are optional and *can only be used with an external DSI communications kit*.
- The DSI Wireless Interface Module (WIM) provides a wireless communication interface between a Pocket PC, laptop computer or desktop computer equipped with Bluetooth® wireless technology, and any Allen-Bradley® product supporting the DSI™ protocol.
- RS485/DSI = Modbus RTU*
  - Directly compatible with PanelView products using RTU master capability
  - Direct compatibility with MicroLogix RTU master capability
  - Compatible with SLC-500 and ControlLogix, using 3rd-party scanners with RTU Master capability

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Feed-through Wiring Design

- Feed through wiring for simple retrofitting into applications requiring variable speed motor control.
- Feed-through wiring design provides simple variable speed motor control with minimal installation and retrofitting time.

PC Programming Software

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

DriveExplorer Software

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

DriveTools SP Software

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

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Catalog Number Explanation

Position

1-3	4	5	6-8	9	10	11	12	13-14
22F	–	D	018	N	1	0	4	AA
a		b	c	d	e	f	g	h

a

Drive	
Code	Type
22F	PowerFlex 4M

b

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

c1

Rating		
100…120V ac, Single-Phase Input		
Code	Amps	kW (Hp)
1P6	1.6	0.2 (0.25)
2P5	2.5	0.4 (0.5)
4P5	4.5	0.75 (1.0)
6P0	6.0	1.1 (1.5)

c2

Rating		
200…240V ac, Single-Phase Input		
Code	Amps	kW (Hp)
1P6	1.6	0.2 (0.25)
2P5	2.5	0.4 (0.5)
4P2	4.2	0.75 (1.0)
8P0	8.0	1.5 (2.0)
011	11	2.2 (3.0)

c3

Rating		
200-240V ac, Three-Phase Input		
Code	Amps	kW (Hp)
1P6	1.6	0.2 (0.25)
2P5	2.5	0.4 (0.5)
4P2	4.2	0.75 (1.0)
8P0	8.0	1.5 (2.0)
012	12.0	2.2 (3.0)
017	17.5	3.7 (5.0)
025	25.0	5.5 (7.5)
033	33.0	7.5 (10.0)

c4

Rating		
380…480V ac, Three-Phase Input		
Code	Amps	kW (Hp)
1P5	1.5	0.4 (0.5)
2P5	2.5	0.75 (1.0)
4P2	4.2	1.5 (2.0)
6P0	6.0	2.2 (3.0)
8P7	8.7	3.7 (5.0)
013	13.0	5.5 (7.5)
018	18.0	7.5 (10.0)
024	24.0	10.0 (15.0)

d

Enclosure	
Code	Enclosure
N	Panel Mount - IP20 (NEMA/UL Type Open)

e

HIM	
Code	Interface Module
1	Fixed Keypad

f

Emission Class	
Code	EMC Filter
0	No Filter
1	Filter

g

Brake	
Code	Description
3	No Brake IGBT
4	Standard

h

Reserved	
Code	Description
AA through ZZ	Reserved

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Product Selection

120V ac, Single-Phase Drives (50/60 Hz)

Drive Ratings				IP20, NEMA/UL Open Type
		Output Current		
kW	Hp	A	Frame Size	Cat. No.
0.2	0.25	1.6	A	22F-V1P6N103
0.4	0.5	2.5	A	22F-V2P5N103
0.75	1	4.5	B	22F-V4P5N103
1.1	1.5	6	B	22F-V6P0N103

240V ac, Single-Phase Drives (50/60 Hz)

Drive Ratings				IP20, NEMA/UL Open Type	w/Integral "S Type" EMC Filter ❄
		Output Current			
kW	Hp	A	Frame Size	Cat. No.	Cat. No.
0.2	0.25	1.6	A	22F-A1P6N103	22F-A1P6N113
0.4	0.5	2.5	A	22F-A2P5N103	22F-A2P5N113
0.75	1	4.2	A	22F-A4P2N103	22F-A4P2N113
1.5	2	8	B	22F-A8P0N103	22F-A8P0N113
2.2	3	11	B	22F-A011N103	22F-A011N113

❄ This filter is suitable for use with a cable length of up to 5 meters for class A environments and up to 1 meter for class B environments.

240V ac, Three-Phase Drives (50/60 Hz)

Drive Ratings				IP20, NEMA/UL Open Type
		Output Current		
kW	Hp	A	Frame Size	Cat. No.
0.2	0.25	1.6	A	22F-B1P6N103
0.4	0.5	2.5	A	22F-B2P5N103
0.75	1	4.2	A	22F-B4P2N103
1.5	2	8	A	22F-B8P0N103
2.2	3	12	B	22F-B012N103
3.7	5	17.5	B	22F-B017N103
w/Brake				
5.5	7.5	25	C	22F-B025N104
7.5	10	33	C	22F-B033N104

480V ac, Three-Phase Drives (50/60 Hz)

Drive Ratings				IP20, NEMA/UL Open Type	w/Integral "S Type" EMC Filter ❄
		Output Current			
kW	Hp	A	Frame Size	Cat. No.	Cat. No.
0.4	0.5	1.5	A	22F-D1P5N103	22F-D1P5N113
0.75	1	2.5	A	22F-D2P5N103	22F-D2P5N113
1.5	2	4.2	A	22F-D4P2N103	22F-D4P2N113
2.2	3	6	B	22F-D6P0N103	22F-D6P0N113
3.7	5	8.7	B	22F-D8P7N103	22F-D8P7N113
w/Brake					
5.5	7.5	13	C	22F-D013N104	22F-D013N114
7.5	10	18	C	22F-D018N104	22F-D018N114
11	15	24	C	22F-D024N104	22F-D024N114

❄ This filter is suitable for use with a cable length of up to 10 meters for Class A environments.

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User Installed Options

Human Interface Module Option Kits and Accessories

Description	Cat. No.
Remote (Panel Mount) LCD Display, Digital Speed Control, CopyCat Capable. IP66 (NEMA/UL Type 4X/12) Indoor Use Only. Includes 2.0 meter cable.	22-HIM-C2S ∗
Remote Handheld, LCD Display, Full Numeric Keypad, Digital Speed Control, CopyCat Capable. IP30 (NEMA/UL Type 1). Includes 1.0 meter cable. Panel mount with optional Bezel Kit.	22-HIM-A3
Remote Handheld, Wireless Interface Module with Bluetooth® Technology. IP30 (NEMA/UL Type 1). Panel Mount with optional Bezel Kit.	22-WIM-N1
Remote (Panel Mount), Wireless Interface Module with Bluetooth Technology. IP66 (NEMA/UL Type 4X/12) Indoor Use Only.	22-WIM-N4S
Bezel Kit. Panel Mount for LCD Display, Remote Handheld Unit. IP30 (NEMA/UL Type 1). Includes a 22-RJ45CBL-C20 cable.	22-HIM-B1
DSI HIM Cable (DSI HIM to RJ45 cable)	
1.0 Meter (3.3 Feet)	22-HIM-H10
2.9 Meter (9.51 Feet)	22-HIM-H30

∗ The 22-HIM-C2S is smaller than the 22-HIM-C2 and cannot be used as a direct replacement.

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.

Communication Option Kits

Description	Cat. No.
Serial Converter Module (RS485 to RS232) Provides serial communication via DF1 protocol for use with DriveExplorer and DriveExecutive™ software. Includes DSI to RS232 serial converter, 1203-SFC serial cable, 22-RJ45CBL-C20 cable, and DriveExplorer Lite CD.	22-SCM-232
Serial Cable 2.0 meter with a locking low profile connector. Connects the serial converter to a 9-pin sub-miniature D female computer connector.	1203-SFC
Serial Null Modem Adapter Use when connecting the serial converter to DriveExplorer on a handheld PC.	1203-SNM
Universal Serial Bus™ (USB) Converter includes 2m USB, 20-HIM-H10 & 22-HIM-H10 Cables	1203-USB
DSI Cable 2.0 meter RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Splitter Cable RJ45 one to two port splitter cable.	AK-U0-RJ45-SC1
Terminating Resistors 120 Ohm resistor embedded in an RJ45 connector (2 pieces).	AK-U0-RJ45-TR1
Terminal Block RJ45 two position terminal block (6 pieces) with two 120 Ohm terminating resistors (loose).	AK-U0-RJ45-TB2P
DSI External Communications Kit External mounting kit for 22-COMM Communication Adapters.	22-XCOMM-DC-BASE
External Comms Power Supply Optional 100…240V ac Power Supply for External DSI Communications Kit.	20-XCOMM-AC-PS1
BACnet® MS/TP RS485 Communication Adapter ‡	22-COMM-B
ControlNet™ Communication Adapter ‡	22-COMM-C
DeviceNet™ Communication Adapter ‡	22-COMM-D
EtherNet/IP™ Communication Adapter ‡	22-COMM-E
PROFIBUS™ DP Communication Adapter ‡	22-COMM-P
Compact I/O Module (3 Channel)	1769-SM2

‡ PowerFlex 4M drives require External DSI Communication Kits. Communication Adapters cannot be drive mounted.

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Dynamic Brake Resistors

Drive Ratings			Minimum Resistance	
Input Voltage	kW	Hp	Ω	Cat. No.∗
240V, 50/60 Hz, Three-Phase	5.5	7.5	13	AK-R2-030P1K2
	7.5	10	10	AK-R2-030P1K2
480V, 50/60 Hz, Three-Phase	5.5	7.5	55	AK-R2-120P1K2
	7.5	10	39	AK-R2-120P1K2
	11	15	24	AK-R2-120P1K2 ❄

∗ Resistors listed in this table are rated 5% duty cycle.
❄ Requires two resistors wired in parallel.

Input Line Reactors - 3% Impedance

Input Voltage	kW	Hp	Fundamental Amps	Maximum Continuous Amps	Inductance	Watts Loss	Cat. No.∗
			A	A	mh	W	
240V, 50/60 Hz, Three-Phase	0.2	0.25	2.0	3.0	12	7.5	1321-3R2-A
	0.4	0.5	4.0	6.0	6.5	20	1321-3R4-B
	0.75	1.0	8.0	12	3.0	29	1321-3R8-B
	1.5	2.0	8.0	12	1.5	19.5	1321-3R8-A
	2.2	3.0	12	18	1.25	26	1321-3R12-A
	3.7	5.0	18	27	0.8	36	1321-3R18-A
	5.5	7.5	25	37.5	0.5	48	1321-3R25-A
	7.5	10	35	52.5	0.4	49	1321-3R35-A
480V, 50/60 Hz, Three-Phase	0.4	0.5	2.0	3.0	20	11.3	1321-3R2-B
	0.75	1.0	4.0	6.0	9.0	20	1321-3R4-C
	1.5	2.0	4.0	6.0	6.5	20	1321-3R4-B
	2.2	3.0	8.0	12	5.0	25.3	1321-3R8-C
	4.0	5.0	12	18	2.5	31	1321-3R8-B
	5.5	7.5	12	18	2.5	31	1321-3R12-B
	7.5	10	18	27	1.5	43	1321-3R18-B
	11	15	25	37.5	1.2	52	1321-3R25-B

∗ Catalog numbers listed are for 3% impedance open style units. NEMA/UL Type 1 and 5% impedance reactor types are also available. Refer to publication 1321-TD001….

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EMC Filters §

Drive Ratings			S Type Filter	L Type Filter
Input Voltage	kW	Hp	Cat. No. ∗	Cat. No. ‡
120V, 50/60 Hz, Single-Phase	0.2	0.25	–	22F-RF010-AL
	0.4	0.5	–	22F-RF010-AL
	0.75	1.0	–	22F-RF025-BL
	1.1	1.5	–	22F-RF025-BL
240V, 50/60 Hz, Single-Phase	0.2	0.25	❄	22F-RF010-AL
	0.4	0.5	❄	22F-RF010-AL
	0.75	1.0	❄	22F-RF010-AL
	1.5	2.0	❄	22F-RF025-BL
	2.2	3.0	❄	22F-RF025-BL
240V, 50/60 Hz, Three-Phase	0.2	0.25	22F-RF9P5-AS	22F-RF9P5-AL
	0.4	0.5	22F-RF9P5-AS	22F-RF9P5-AL
	0.75	1.0	22F-RF9P5-AS	22F-RF9P5-AL
	1.5	2.0	22F-RF9P5-AS	22F-RF9P5-AL
	2.2	3.0	22F-RF021-BS	22F-RF021-BL
	3.7	5.0	22F-RF021-BS	22F-RF021-BL
	5.5	7.5	22F-RF039-CS	22F-RF039-CL
	7.5	10	22F-RF039-CS	22F-RF039-CL
480V, 50/60 Hz, Three-Phase ❄	0.4	0.5	22F-RF6P0-AS	22F-RF6P0-AL
	0.75	1.0	22F-RF6P0-AS	22F-RF6P0-AL
	1.5	2.0	22F-RF6P0-AS	22F-RF6P0-AL
	2.2	3.0	22F-RF012-BS	22F-RF012-BL
	3.7	5.0	22F-RF012-BS	22F-RF012-BL
	5.5	7.5	22F-RF026-CS	22F-RF026-CL
	7.5	10	22F-RF026-CS	22F-RF026-CL
	11	15	22F-RF026-CS	22F-RF026-CL

§ EMC Filters not available at time of publication, verify availability before ordering.
∗ This filter is suitable for use with a cable length of up to 5 meters for Class A and 1 meter for Class B environments.
❄ Drives are available in these ratings with internal “S Type” filters.
‡ This filter is suitable for use with a cable length of up to 100 meters for Class A and 25 meters for Class B environments.

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Installation Considerations

Control Wiring

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

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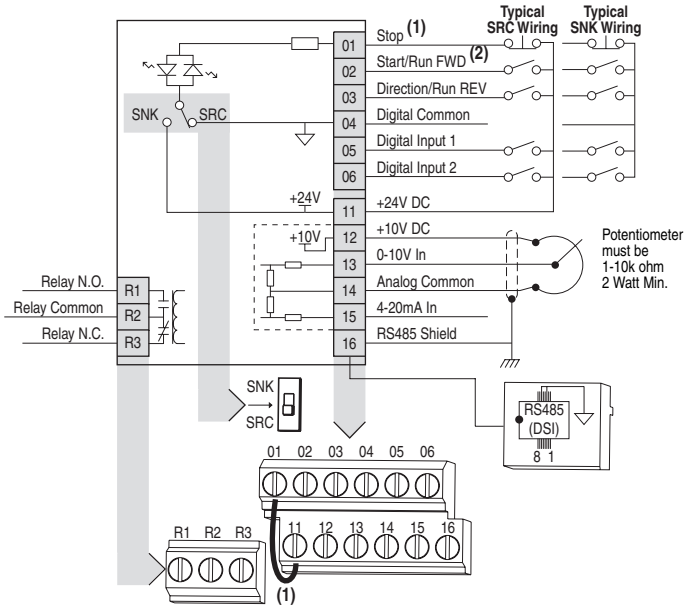

No.	Signal	Default	Description	Param.
R1	Relay N.O.	Fault	Normally open contact for output relay.	t221
R2	Relay Common	–	Common for output relay.	
R3	Relay N.C.	Fault	Normally closed contact for output relay.	t221
Sink/Source DIP Switch		Source (SRC)	Inputs can be wired as Sink (SNK) or Source (SRC) via DIP Switch setting.	
01	Stop (1)	Coast	The factory installed jumper or a normally closed input must be present for the drive to start.	P106 (1)
02	Start/Run FWD	Not Active	Command comes from the integral keypad by default. To disable reverse operation, see A095 [Reverse Disable].	P106, P107
03	Direction/Run REV	Not Active		P106, P107, A434
04	Digital Common	–	For digital inputs. Electronically isolated with digital inputs from analog I/O.	
05	Digital Input 1	Preset Freq	Program with t201 [Digital In1 Sel].	t201
06	Digital Input 2	Preset Freq	Program with t202 [Digital In2 Sel].	t202
11	+24V DC	–	Drive supplied power for digital inputs. Maximum output current is 100mA.	
12	+10V DC	–	Drive supplied power for 0-10V external potentiometer. Maximum output current is 15mA.	P108
13	0-10V In (3)	Not Active	For external 0-10V input supply (input impedance = 100k ohm) or potentiometer wiper.	P108
14	Analog Common	–	For 0-10V In or 4-20mA In. Electronically isolated with analog inputs from digital I/O.	
15	4-20mA In (3)	Not Active	For external 4-20mA input supply (input impedance = 250 ohm).	P108
16	RS485 (DSI) Shield	–	Terminal should be connected to safety ground - PE when using the RS485 (DSI) communications port.	

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

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Specifications

Drive Ratings								
Catalog Number	Output Ratings		Input Ratings			Branch Circuit Protection		
	kW (HP)	*Amps*	*Voltage Range*	*kVA*	*Amps*	*Fuses*	*140M Motor Protectors(2)*	*Contactors*
100 - 120V AC (±10%) – 1-Phase Input, 0 - 230V 3-Phase Output								
22F-V1P6N103	0.2 (0.25)	1.6	90-126	0.8	6.4	10	140M-C2E-C10	100-C09
22F-V2P5N103	0.4 (0.5)	2.5	90-126	1.1	9.0	15	140M-C2E-C16	100-C12
22F-V4P5N103	0.75 (1.0)	4.5	90-126	2.2	18.0	30	140M-D8E-C20	100-C23
22F-V6P0N103	1.1 (1.5)	6.0	90-126	2.9	24.0	40	140M-F8E-C32	100-C30
200 - 240V AC (±10%) – 1-Phase Input, 0 - 230V 3-Phase Output								
22F-A1P6N103	0.2 (0.25)	1.6	180-265	0.7	5.3	10	140M-C2E-B63	100-C09
22F-A2P5N103	0.4 (0.5)	2.5	180-265	1.6	6.5	10	140M-C2E-C10	100-C09
22F-A4P2N103	0.75 (1.0)	4.2	180-265	2.0	8.2	15	140M-C2E-C16	100-C12
22F-A8P0N103	1.5 (2.0)	8.0	180-265	5.4	22.3	35	140M-D8E-C25	100-C23
22F-A011N103	2.2 (3.0)	11.0	180-265	5.9	24.3	40	140M-F8E-C32	100-C30
200 - 240V AC (±10%) – 1-Phase Input, 0 - 230V 3-Phase Output, with Filter								
22F-A1P6N113	0.2 (0.25)	1.6	180-265	1.3	5.3	10	140M-C2E-B63	100-C09
22F-A2P5N113	0.4 (0.5)	2.5	180-265	1.6	6.5	10	140M-C2E-C10	100-C09
22F-A4P2N113	0.75 (1.0)	4.2	180-265	2.0	8.2	15	140M-C2E-C16	100-C12
22F-A8P0N113	1.5 (2.0)	8.0	180-265	5.4	22.3	35	140M-D8E-C25	100-C23
22F-A011N113	2.2 (3.0)	11.0	180-265	5.9	24.3	40	140M-F8E-C32	100-C30
200 - 240V AC (±10%) – 3-Phase Input, 0 - 230V 3-Phase Output								
22F-B1P6N103	0.2 (0.25)	1.6	180-265	0.8	1.9	3	140M-C2E-B25	100-C09
22F-B2P5N103	0.4 (0.5)	2.5	180-265	1.2	2.7	6	140M-C2E-B40	100-C09
22F-B4P2N103	0.75 (1.0)	4.2	180-265	2.1	4.9	10	140M-C2E-C63	100-C09
22F-B8P0N103	1.5 (2.0)	8.0	180-265	4.0	9.5	15	140M-C2E-C16	100-C12
22F-B012N103	2.2 (3.0)	12.0	180-265	6.3	15.0	25	140M-C2E-C20	100-C23
22F-B017N103	3.7 (5.0)	17.5	180-265	8.8	21.1	35	140M-F8E-C25	100-C23
22F-B025N104(1)	5.5 (7.5)	25.0	180-265	11.4	27.2	45	140M-F8E-C32	100-C37
22F-B033N104(1)	7.5 (10.0)	33.0	180-265	16.1	38.5	60	140M-F8E-C45	100-C60
380 - 480V AC (±10%) – 3-Phase Input, 0 - 460V 3-Phase Output								
22F-D1P5N103	0.4 (0.5)	1.5	340-528	1.5	1.8	3	140M-C2E-B25	100-C09
22F-D2P5N103	0.75 (1.0)	2.5	340-528	3.0	3.5	6	140M-C2E-B40	100-C09
22F-D4P2N103	1.5 (2.0)	4.2	340-528	5.0	6.0	10	140M-C2E-C10	100-C09
22F-D6P0N103	2.2 (3.0)	6.0	340-528	5.2	6.2	10	140M-C2E-C10	100-C09
22F-D8P7N103	3.7 (5.0)	8.7	340-528	7.0	8.3	15	140M-C2E-C16	100-C12
22F-D013N104(1)	5.5 (7.5)	13.0	340-528	12.9	15.4	25	140M-D8E-C20	100-C23
22F-D018N104(1)	7.5 (10.0)	18.0	340-528	16.3	19.5	30	140M-F8E-C25	100-C23
22F-D024N104(1)	11.0 (15.0)	24.0	340-528	21.7	26.1	40	140M-F8E-C32	100-C30
380 - 480V AC (±10%) – 3-Phase Input, 0 - 460V 3-Phase Output, with Filter								
22F-D1P5N113	0.4 (0.5)	1.5	340-528	1.5	1.8	3	140M-C2E-B25	100-C09
22F-D2P5N113	0.75 (1.0)	2.5	340-528	3.0	3.5	6	140M-C2E-B40	100-C09
22F-D4P2N113	1.5 (2.0)	4.2	340-528	5.0	6.0	10	140M-C2E-C10	100-C09
22F-D6P0N113	2.2 (3.0)	6.0	340-528	5.2	6.2	10	140M-C2E-C10	100-C09
22F-D8P7N113	3.7 (5.0)	8.7	340-528	7.0	8.3	15	140M-C2E-C16	100-C12
22F-D013N114(1)	5.5 (7.5)	13.0	340-528	12.9	15.4	25	140M-D8E-C20	100-C23
22F-D018N114(1)	7.5 (10.0)	18.0	340-528	16.3	19.5	30	140M-F8E-C25	100-C23
22F-D024N114(1)	11.0 (15.0)	24.0	340-528	21.7	26.1	40	140M-F8E-C32	100-C30

(1) Catalog suffix ending with '4', such as N104 and N114, indicate that an internal brake IGBT is supplied.

(2) Refer to the selection guide for Bulletin 140M motor protectors to determine the frame and breaking capacity required for your application.

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Input/Output Ratings	Approvals
Output Frequency: 0-400 Hz (Programmable) *Efficiency:* 97.5% (Typical)	UL508C, CSA 22.2, C-Tick CE: EMC Directive 89/336 LV: EN 50178, EN 60204 EMC: EN 61800-3, EN 50081-1, EN 50082-2

Digital Control Inputs (Input Current = 6mA)		Analog Control Inputs
SRC (Source) Mode: 18-24V = ON 0-6V = OFF	SNK (Sink) Mode: 0-6V = ON 18-24V = OFF	*4-20mA Analog:* 250 ohm input impedance *0-10V DC Analog:* 100k ohm input impedance *External Pot:* 1-10k ohms, 2 Watt minimum

Control Output (Programmable Output, form C relay)	
Resistive Rating: 3.0A at 30V DC, 125V AC and 240V AC	*Inductive Rating:* 0.5A at 30V DC, 125V AC, and 240V AC

Recommended Fuses and Circuit Breakers

Fuse: UL Class J, RK1, T or Type BS88; 600V (550V) or equivalent. *Circuit Breakers:* HMCP or Bulletin 140M or equivalent.

Protective Features

Motor Protection: I^2t overload protection - 150% for 60 Secs, 200% for 3 Secs (Provides Class 10 protection)	
Overcurrent: 200% hardware limit, 300% instantaneous fault	
Over Voltage:	100-120V AC Input – Trip occurs at 405V DC bus voltage (equivalent to 150V AC incoming line) 200-240V AC Input – Trip occurs at 405V DC bus voltage (equivalent to 290V AC incoming line) 380-460V AC Input – Trip occurs at 810V DC bus voltage (equivalent to 575V AC incoming line)
Under Voltage:	100-120V AC Input – Trip occurs at 210V DC bus voltage (equivalent to 75V AC incoming line) 200-240V AC Input – Trip occurs at 210V DC bus voltage (equivalent to 150V AC incoming line) 380-480V AC Input – Trip occurs at 390V DC bus voltage (equivalent to 275V AC incoming line)
Control Ride Through: Minimum ride through is 0.5 Secs - typical value 2 Secs	
Faultless Power Ride Through: 100 milliseconds	

Dynamic Braking

Internal brake IGBT included with power ratings 5.5 kW (7.5 HP) and 7.5 kW (10.0 HP) for 240V, 3-phase drives and 5.5 kW (7.5 HP), 7.5 kW (10.0 HP) and 11.0 kW (15.0 HP) for 480V, 3-phase drives. See the PowerFlex 4M *User Manual* for ordering information.

Category	Specification	
Environment	Altitude:	1000 m (3300 ft) max. without derating
	Maximum Surrounding Air Temperature without derating: IP20: IP20 zero stacking:	 –10 to 50° C (14 to 122° F) –10 to 40° C (14 to 104° F)
	Cooling Method Convection: Fan:	 120V, 1-Phase, 0.75 kW (1 HP) and below 240V, 1-Phase, 0.4 kW (0.5 HP) and below 240V, 3-Phase, 0.75 kW (1 HP) and below 480V, 3-Phase, 0.75 kW (1 HP) and below All other drive ratings.
	Storage Temperature:	–40 to 85 degrees C (–40 to 185 degrees F)
	Atmosphere:	**Important:** Drive **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.
	Relative Humidity:	0 to 95% non-condensing
	Shock (operating):	15G peak for 11ms duration (±1.0ms)
	Vibration (operating):	1G peak, 5 to 2000 Hz
Control	Carrier Frequency	2-10 kHz. Drive rating based on 4 kHz.
	Frequency Accuracy Digital Input: Analog Input:	 Within ±0.05% of set output frequency. Within 0.5% of maximum output frequency.
	Speed Regulation - Open Loop with Slip Compensation:	±2% of base speed across a 40:1 speed range.
	Stop Modes:	Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S Curve.
	Acceleration/Deceleration:	Two independently programmable acceleration and deceleration times. Each time may be programmed from 0 - 600 seconds in 0.1 second increments.
	Intermittent Overload:	150% Overload capability for up to 1 minute 200% Overload capability for up to 3 seconds
	Electronic Motor Overload Protection	Class 10 protection with speed sensitive response and power-down overload retention function.

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Parameter Cross Reference - by Name

Parameter Name	Number	Group
Accel Time 1	P109	Basic Program
Accel Time 2	A401	Advanced Program
Analog In 0-10V	d020	Display
Analog In 4-20mA	d021	Display
Anlg In 0-10V Hi	t212	Terminal Block
Anlg In 0-10V Lo	t211	Terminal Block
Anlg In4-20mA Hi	t214	Terminal Block
Anlg In4-20mA Lo	t213	Terminal Block
Auto Rstrt Delay	A452	Advanced Program
Auto Rstrt Tries	A451	Advanced Program
Boost Select	A453	Advanced Program
Bus Reg Mode	A441	Advanced Program
Comm Data Rate	C302	Communications
Comm Format	C306	Communications
Comm Loss Action	C304	Communications
Comm Loss Time	C305	Communications
Comm Node Addr	C303	Communications
Comm Status	d015	Display
Comm Write Mode	C307	Communications
Commanded Freq	d002	Display
Compensation	A436	Advanced Program
Contrl In Status	d013	Display
Control Source	d012	Display
Control SW Ver	d016	Display
Current Limit	A441	Advanced Program
DB Duty Cycle	A428	Advanced Program
DB Resistor Sel	A427	Advanced Program
DC Brake Level	A425	Advanced Program
DC Brake Time	A424	Advanced Program
DC Bus Voltage	d005	Display
Decel Time 1	P110	Basic Program
Decel Time 2	A402	Advanced Program
Dig In Status	d014	Display
Digital In1 Sel	t201	Terminal Block
Digital In2 Sel	t202	Terminal Block
Drive Status	d006	Display
Drive Temp	d022	Display
Drive Type	d017	Display
Elapsed Run Time	d018	Display
Fault 1 Code	d007	Display
Fault 2 Code	d008	Display
Fault 3 Code	d009	Display

Parameter Name	Number	Group
Fault Clear	A450	Advanced Program
Flying Start En	A435	Advanced Program
Internal Freq	A409	Advanced Program
Jog Accel/Decel	A405	Advanced Program
Jog Frequency	A404	Advanced Program
Language	C301	Communications
Maximum Freq	P105	Basic Program
Maximum Voltage	A457	Advanced Program
Minimum Freq	P104	Basic Program
Motor NP FLA	A461	Advanced Program
Motor NP Hertz	P102	Basic Program
Motor NP Volts	P101	Basic Program
Motor OL Current	P103	Basic Program
Motor OL Ret	P111	Basic Program
Motor OL Select	A444	Advanced Program
Output Current	d003	Display
Output Freq	d001	Display
Output Voltage	d004	Display
Preset Freq 0	A410	Advanced Program
Preset Freq 1	A411	Advanced Program
Preset Freq 2	A412	Advanced Program
Preset Freq 3	A413	Advanced Program
Process Display	d010	Display
Process Factor	A440	Advanced Program
Process Time Hi	A439	Advanced Program
Process Time Lo	A438	Advanced Program
Program Lock	A458	Advanced Program
PWM Frequency	A446	Advanced Program
Relay Out Level	t222	Terminal Block
Relay Out Sel	t221	Terminal Block
Reset To Defalts	P112	Basic Program
Reverse Disable	A434	Advanced Program
S Curve %	A403	Advanced Program
Skip Freq Band	A419	Advanced Program
Skip Frequency	A418	Advanced Program
Slip Hertz @ FLA	A437	Advanced Program
Speed Reference	P108	Basic Program
Start At PowerUp	A433	Advanced Program
Start Source	P106	Basic Program
Stop Mode	P107	Basic Program
SW Current Trip	A448	Advanced Program
Testpoint Data	d019	Display
Testpoint Sel	A459	Advanced Program

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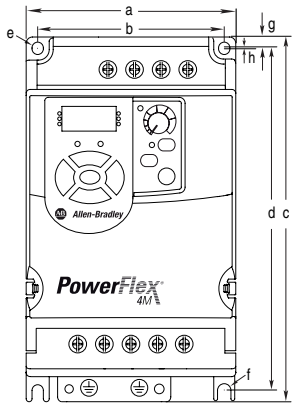
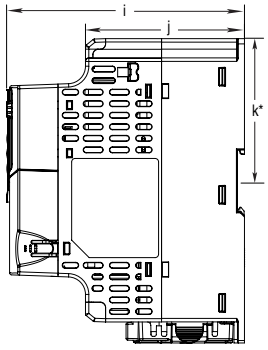
Product Dimensions

PowerFlex 4M Panel Mount Drives – Ratings are in kW and (HP)

Frame	120V AC – 1-Phase	240V AC – 1-Phase	240V AC – 3-Phase	480V AC – 3-Phase
A	0.2 (0.25) 0.4 (0.5)	0.2 (0.25) 0.4 (0.5) 0.75 (1.0)	0.2 (0.25) 0.4 (0.5) 0.75 (1.0) 1.5 (2.0)	0.4 (0.5) 0.75 (1.0) 1.5 (2.0)
B	0.75 (1.0) 1.1 (1.5)	1.5 (2.0) 2.2 (3.0)	2.2 (3.0) 3.7 (5.0)	2.2 (3.0) 3.7 (5.0)
C	—	—	5.5 (7.5) 7.5 (10.0)	5.5 (7.5) 7.5 (10.0) 11.0 (15.0)

PowerFlex 4M Panel Mount Drives
– Dimensions are in millimeters and (inches). Weights are in kilograms and (pounds).





Note:
DIN rail mounting is not applicable to Frame C.

Frame	a	b	c	d	e	f	g	h	i	j	k	Shipping Weight
A	72.0 (2.83)	59.0 (2.32)	174.0 (6.85)	151.6 (5.97)	∅ 5.4 (0.21)	∅ 5.4 (0.21)	5.2 (0.20)	—	136.0 (5.35)	90.9 (3.58)	81.3 (3.20)	1.6 (3.5)
B	100 (3.94)	89.0 (3.50)	174.0 (6.85)	163.5 (6.44)	∅ 5.4 (0.21)	∅ 5.4 (0.21)	5.2 (0.20)	0.5 (0.02)	136.0 (5.35)	90.9 (3.58)	81.3 (3.20)	2.1 (4.6)
C	130.0 (5.12)	116.0 (4.57)	260.0 (10.24)	247.5 (9.74)	∅ 5.5 (0.22)	∅ 5.5 (0.22)	6.0 (0.24)	1.0 (0.04)	180.0 (7.09)	128.7 (5.07)	—	4.8 (10.6)

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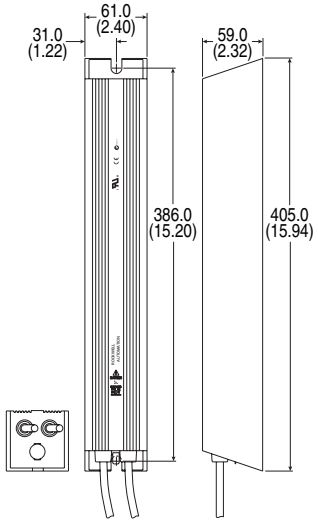
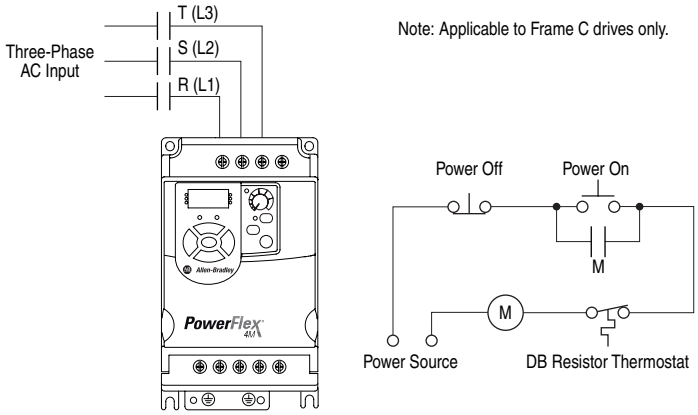
Dynamic Brake Modules – Dimensions are in millimeters and (inches)

Frame B



Frame	Catalog Number
B	AK-R2-030P1K2, AK-R2-120P1K2

Recommended External Brake Resistor Circuitry



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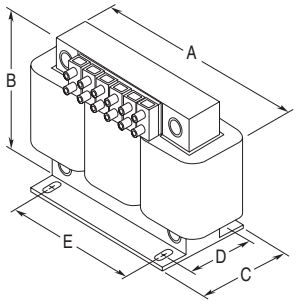
Bulletin 1321-3R Series Line Reactors

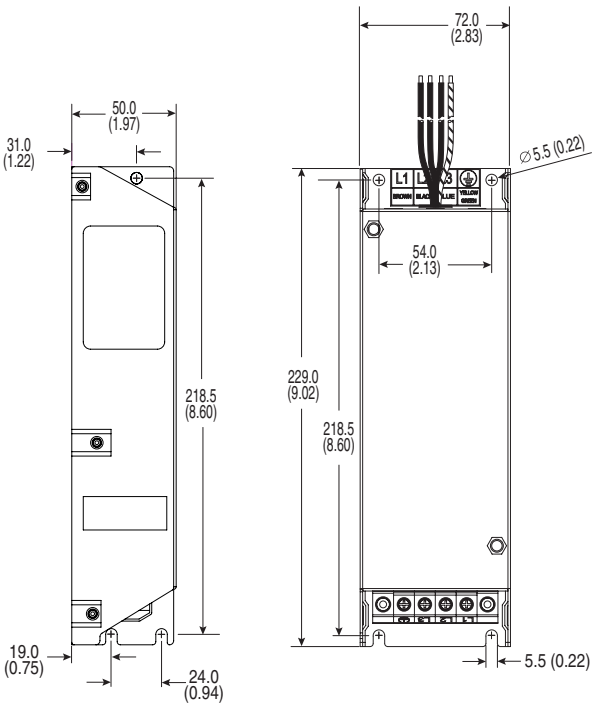
– Dimensions are in millimeters and (inches). Weights are in kilograms and (pounds).



Catalog Number	A	B	C	D	E	Weight
1321-3R2-A	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-B	112 (4.40)	104 (4.10)	70 (2.75)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-B	112 (4.40)	104 (4.10)	76 (3.00)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-C	112 (4.40)	104 (4.10)	86 (3.38)	60 (2.35)	37 (1.44)	2.3 (5)
1321-3R4-D	112 (4.40)	104 (4.10)	92 (3.62)	66 (2.60)	37 (1.44)	2.7 (6)
1321-3R8-A	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	3.1 (7)
1321-3R8-B	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	3.6 (8)
1321-3R8-C	152 (6.00)	127 (5.00)	85 (3.35)	63 (2.48)	51 (2.00)	4.9 (11)
1321-3R12-A	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	4.1 (9)
1321-3R12-B	152 (6.00)	127 (5.00)	76 (3.00)	53 (2.10)	51 (2.00)	4.5 (10)
1321-3R18-A	152 (6.00)	133 (5.25)	79 (3.10)	54 (2.13)	51 (2.00)	4.1 (9)
1321-3R18-B	152 (6.00)	135 (5.30)	89 (3.50)	63 (2.48)	51 (2.00)	5.5 (12)
1321-3R25-A	183 (7.20)	146 (5.76)	85 (3.35)	60 (2.35)	76 (3.00)	4.9 (11)
1321-3R25-B	183 (7.20)	147 (5.80)	89 (3.50)	60 (2.35)	76 (3.00)	6.4 (14)
1321-3R35-A	193 (7.60)	146 (5.76)	91 (3.60)	66 (2.60)	76 (3.00)	6.3 (14)

Frame A EMC Line Filters – Dimensions are in millimeters and (inches)

Catalog Numbers: 22F-RF010-AL; 22F-RF9P5-AS, 22F-RF9P5-AL; 22F-RF6P0-AS, 22F-RF6P0-AL



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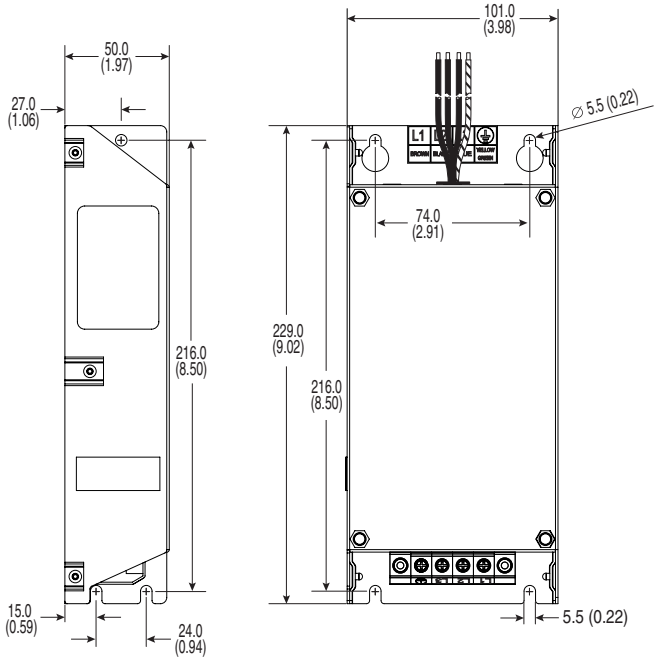
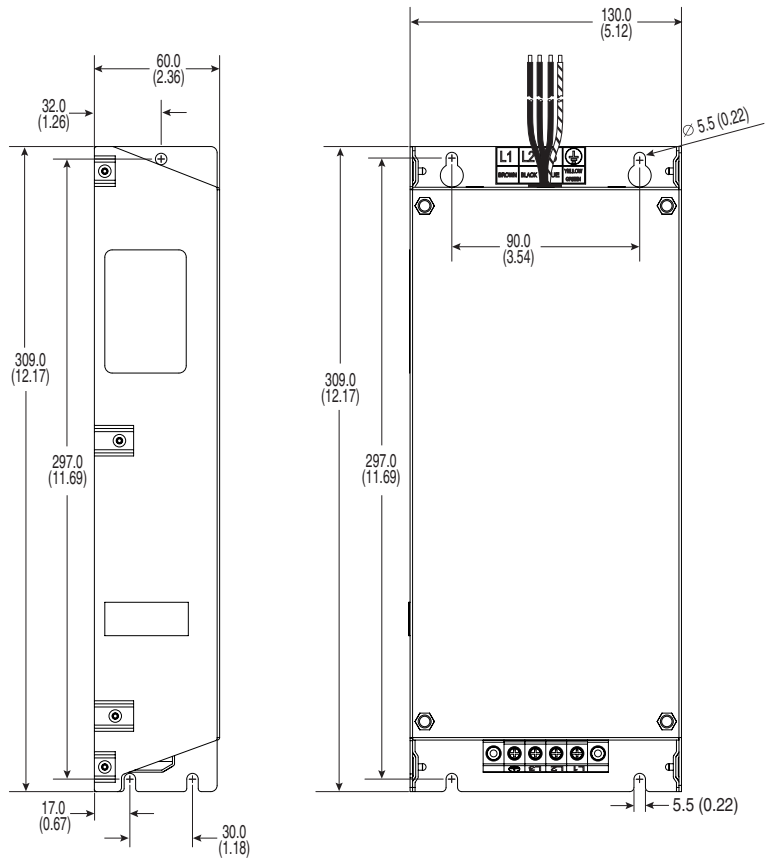
Frame B EMC Line Filters – Dimensions are in millimeters and (inches)
Catalog Numbers: 22F-RF018-BL; 22F-RF025-BL; 22F-RF021-BS, 22F-RF021-BL; 22F-RF012-BS, 22F-RF012-BL



Frame C EMC Line Filters – Dimensions are in millimeters and (inches)
Catalog Numbers: 22F-RF039-CS, 22F-RF039-CL; 22F-RF026-CS, 22F-RF026-CL



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