

# PowerFlex Digital DC Drive

Catalog Numbers 20P, 23P



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## Additional Resources

These documents contain more information on related products from Rockwell Automation.

Resource	Description
PowerFlex Digital DC Drive User Manual, publication <a href="#">20P-UM001</a>	Provides basic information that is required to install, start-up, and troubleshoot the PowerFlex DC drive.
A Global Reference Guide for Reading Schematic Diagrams, publication <a href="#">100-2.10</a>	Provides a simple cross-reference of common schematic/wiring diagram symbols that are used throughout various parts of the world.
Guarding Against Electrostatic Damage, publication <a href="#">8000-4.5.2</a>	Explains the causes of ESD and how to guard against its effects.
Preventive Maintenance of Industrial Control and Drive System Equipment, publication <a href="#">DRIVES-TD001</a>	Provides a recommended preventative maintenance checklist.
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 in the form of individual devices or packaged assemblies that incorporate solid-state components.
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.

For other information, contact Allen-Bradley Drives Technical Support at: <http://www.ab.com/support/abdrives>

## Product Description

The PowerFlex Digital DC drive provides digital control for precise speed and current regulation, easy programmability, extensive diagnostics, and non-regenerative or regenerative operation. PowerFlex DC drives can run various applications, including extruder operations, finishing, drawing, and coating. The PowerFlex DC drive can effectively control applications that exhibit shock loads, high inertia, rapid acceleration and deceleration rates, or continuous regeneration. These features of the PowerFlex Digital DC drive make it an excellent choice for existing DC machinery upgrades. The compact design of this drive includes a fully contained power module and a common control structure for the entire range of horsepower. And, to make connectivity even easier, the PowerFlex DC drive provides a standard DPI™ interface that is compatible with all PowerFlex DPI communication products.

The standard hardware offers consists of an open type enclosure, armature converter, regulated field converter for field weakening or economy applications, and an advanced regulator with integrated DPI functionality. The standard I/O includes eight digital inputs, four digital outputs, three analog inputs, two analog outputs, a DC tachometer, and encoder capability.

Note: Optional I/O and feedback modules are available and are sold separately from the standard hardware offering. See I/O Option Kits and Feedback Option Kit on page [9](#).

# Standard Drives Program

## Packaging and Mounting

- **IP20, NEMA / UL Type Open** - For conventional mounting inside or outside a control cabinet.

## Communication Tools

The PowerFlex Digital DC drive provides common communication tools that are familiar and easy to use, including the LCD Human Interface Module (HIM) and PC-based configuration tools.

- The LCD HIM provides:
  - Large and easy to read 7 line x 21 character, backlit display
  - 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:
  - Connected Components Workbench™ software (CCW) software v2.0. This software leverages proven Rockwell Automation and Microsoft® Visual Studio® technologies for drive configuration and programming. CCW can be downloaded for free from <http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software>.
  - DriveTools™ SP (v4.01 or higher is required with a PowerFlex DC drive specific software patch. The patch can be downloaded from <http://www.ab.com/support/abdrives/webupdate/>). A suite of software tools that provide an intuitive way to program, troubleshoot, and maintain Allen-Bradley drives, including the PowerFlex DC Drive Start-Up Wizard.
  - DriveExplorer™ and DriveExplorer Lite (v5.02 or higher). A simple and flexible “online” tool to monitor and configure while connected to a drive.
- Internal communications allow you to integrate the drive into the manufacturing process. Status indicators for all internal communication options are visible on the cover for easy setup and monitoring of drive communications. You can easily manage information from “shop floor to top floor” and seamlessly integrate a complete system as you control, configure, and collect data.

## Drive Features

- Fast-acting **Current Limit** and **Voltage Regulation** result in maximum accel/decel without tripping.
- **High-speed analog inputs** improve drive response to torque or speed commands.
- **Programming flexibility** allows parameters to be linked within the drive.
- **Field flashable firmware** through DPI interface.
- **Flying Start** delivers smooth and instantaneous connection into a rotating load, regardless of commanded direction, without the need for any speed feedback.
- **Single Phase Regulated Field supply** (10A, 14A, 20A, 40A, and 70A, depending on the drive size) standard on all frames.
- **Integral Process PI Control** replaces the need for a separate controller for a process loop.
- **TorqProve™** assures control of the load when control is transferred between the drive and a mechanical brake.
- **Speed Regulation** - Open Loop or Closed Loop
  - Armature Feedback provides a 2000:1 rpm speed range
  - DC Tachometer Feedback provides up to 0.1% speed regulation
  - Encoder Feedback provides up to 0.1% speed regulation for the tightest application requirements.
- **Torque Regulation** - Open Loop or Closed Loop
  - Open-loop torque regulation provides  $\pm 5\%$  regulation.
  - Encoder Feedback provides  $\pm 1\%$  regulation and the ability to hold full load at zero speed.

## Unsurpassed Capability in Network Communication

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

BAcnet®	ControlNet™	DeviceNet™	EtherNet/IP™	PROFIBUS	Remote I/O (1)	RS-485 DF1	Description
	√	√	√				<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.
√	√	√	√			√	<b>Adapter Routing</b> - Plug personal computer into one drive and talk to all other Allen-Bradley drives on same network, without being routed through network scanner.
√	√	√	√	√	√	√	Access to 100% of all parameters over the network.
√		√	√	√			<b>AutoBaud</b> capability makes initial connections less problematic.
		√					<b>Change of State</b> significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Flexible configuration for each node (Example: "reference must change by more than 5%").
		√	√				<b>Peer Control</b> provides master-slave type control between drives. With this feature, one or more slave drives (consumers) can run based on the status of a master drive (producer), which can also significantly reduce network traffic.
		√					<b>ADR (Automatic Device Replacement)</b> saves significant time and effort when replacing a drive. The scanner can be configured to detect a new drive and download the required parameter settings.
√	√	√	√	√	√	√	<b>Flexible Fault Configuration</b> - Adapters can be programmed to take fault-based actions, such as ramp to stop, and send user-configurable logic control and speed reference values. The drive can take different actions that are based on whether the network experienced a serious problem (broken cable, etc.) versus network idle condition (PLC set to "Program").

(1) This item has Silver Series status. For information, see <http://www.ab.com/silver>.

# Catalog Number Explanation

1-3			4	5	6	7	8-10		11	12	13	14	15	16
a			b	c	d	e	f		g	h	i	j	k	l
20P			4	1	A	D	4P1		R	A	0	N	N	N

**a**

Drive	
Code	Type
20P	PowerFlex DC

**b**

Motor Operation	
Code	Type
2	Two Quadrant Operation *
4	Four Quadrant Operation

\* Not available for 230V AC input drives.

**c**

Input Type	
Code	Type
1	6 Pulse

**d**

Enclosure		
Code	Enclosure Rating	Conform. Coat
A	IP20, NEMA/UL Type Open	Yes

**e**

Input Voltage	
Code	Voltage
B	230V AC
D	460V AC *
E	600V AC
F	690V AC

\* Use this code for 400V AC input applications.

**f1**

230V, 60 Hz Input				
Code	Hp	Armature Amps	Frame	Field Amps
7P0	1.5	7	A	10
9P0	2	9	A	10
012	3	12	A	10
020	5	20	A	10
029	7.5	29	A	10
038	10	38	A	10
055	15	55	A	10
073	20	73	A	14
093	25	93	A	14
110	30	110	A	14
146	40	146	B	20
180	50	180	B	20
218	60	218	B	20
265	75	265	B	20
360	100	360	B	20
434	125	434	B	20
521	150	521	C	20
700	200	700	C	20
875	250	875	D	40
1K0	300	1050	D	40

**f2**

460V, 60 Hz Input				
Code	Hp	Armature Amps	Frame	Field Amps
4P1	2	4.1	A	10
6P0	3	6	A	10
010	5	10	A	10
014	7.5	14	A	10
019	10	19	A	10
027	15	27	A	10
035	20	35	A	10
045	25	45	A	10
052	30	52	A	10
073	40	73	A	14
086	50	86	A	14
100	60	100	A	14
129	75	129	A	14
167	100	167	B	20
207	125	207	B	20
250	150	250	B	20
330	200	330	B	20
412	250	412	B	20
495	300	495	C	20
667	400	667	C	20
830	500	830	D	40
996	600	996	D	40
1K1	700	1162	D	70
1K3	800	1328	D	70
1K4	900	1494	D	70

**f3 \***

575V, 60 Hz Input				
Code	Hp	Armature Amps	Frame	Field Amps
067	50	67.5	B	20
101	75	101.3	B	20
135	100	135	B	20
270	200	270	B	20
405	300	405	B	20
540	400	540	C	20
675	500	675	C	20
810	600	810	D	40
1K0	800	1080	D	40
1K2	900	1215	D	40
1K3	1000	1350	D	40
1K6	1250	1668	D	40

**f4 \***

690V, 60 Hz Input				
Code	Hp	Armature Amps	Frame	Field Amps
452	400	452	C	20
565	500	565	C	20
678	600	678	D	40
791	700	791	D	40
904	800	904	D	40
1K0	900	1017	D	40
1K1	1000	1130	D	70
1K2	1100	1243	D	70
1K4	1250	1413	D	70
1K5	1400	1582	D	70

## Catalog Number Explanation, Continued

1-3	4	5	6	7	8-10	Position 11	12	13	14	15	16
20P	4	1	A	D	4P1	R	A	0	N	N	N
<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>

*g*

Field Supply	
Code	Type
R	Single-Phase Regulated

*h*

Packaging/Documentation		
Code	Shipping Carton	User Manual
A	Yes	Yes

*i*

HIM	
Code	Operator Interface
0	Blank Cover *

\* Standard - for user installed options, see Human Interface and Wireless Interface Modules on page 9.

*j*

I/O Options*	
Code	Control
N	None (8 - 24V DC Digital Inputs, 4 Digital Outputs, 3 Analog Inputs, and 2 Analog Outputs are Standard)

\* All I/O Options are purchased separately and are user installed. See I/O Options on page 9.

*k*

Communication Options	
Code	Description
N	None *

\* Standard - for user installed options, see Communication Option Kits on page 10.

*l*

Cabinet Options	
Code	Type
N	None

## Standard Drives Product Selection

### IP20, NEMA / UL Type Open (Position d = A)

All drives are rated 150% overload for 60 seconds, 200% for 3 seconds.

#### 230V AC, Three-Phase

Drive Output Rating			Non-Regenerative Drives <sup>(1)</sup>	Regenerative Drives	Frame Size
Normal Duty kW	Normal Duty Hp	Amps	Cat. No.	Cat. No.	
1.2	1.5	7	20P21AB7PORA0NNN	20P41AB7PORA0NNN	A
1.5	2	9	20P21AB9PORA0NNN	20P41AB9PORA0NNN	A
2.2	3	12	20P21AB012RA0NNN	20P41AB012RA0NNN	A
3.7	5	20	20P21AB020RA0NNN	20P41AB020RA0NNN	A
5.5	7.5	29	20P21AB029RA0NNN	20P41AB029RA0NNN	A
7.5	10	38	20P21AB038RA0NNN	20P41AB038RA0NNN	A
11	15	55	20P21AB055RA0NNN	20P41AB055RA0NNN	A
15	20	73	20P21AB073RA0NNN	20P41AB073RA0NNN	A
18.5	25	93	20P21AB093RA0NNN	20P41AB093RA0NNN	A
22	30	110	20P21AB110RA0NNN	20P41AB110RA0NNN	A
30	40	146	20P21AB146RA0NNN	20P41AB146RA0NNN	B
37	50	180	20P21AB180RA0NNN	20P41AB180RA0NNN	B
45	60	218	20P21AB218RA0NNN	20P41AB218RA0NNN	B
56	75	265	20P21AB265RA0NNN	20P41AB265RA0NNN	B
75	100	360	20P21AB360RA0NNN	20P41AB360RA0NNN	B
93	125	434	20P21AB434RA0NNN	20P41AB434RA0NNN	B
112	150	521	20P21AB521RA0NNN	20P41AB521RA0NNN	C
149	200	700	20P21AB700RA0NNN	20P41AB700RA0NNN	C
186	250	875	20P21AB875RA0NNN	20P41AB875RA0NNN	D
224	300	1050	20P21AB1K0RA0NNN	20P41AB1K0RA0NNN	D

(1) Currently not available for sale.

#### 460V AC, Three-Phase

Drive Output Rating			Non-Regenerative Drives	Regenerative Drives	Frame Size
Normal Duty kW	Normal Duty Hp	Amps	Cat. No.	Cat. No.	
1.5	2	4.1	20P21AD4P1RA0NNN	20P41AD4P1RA0NNN	A
2.2	3	6	20P21AD6PORA0NNN	20P41AD6PORA0NNN	A
3.7	5	10	20P21AD010RA0NNN	20P41AD010RA0NNN	A
5.5	7.5	14	20P21AD014RA0NNN	20P41AD014RA0NNN	A
7.5	10	19	20P21AD019RA0NNN	20P41AD019RA0NNN	A
11	15	27	20P21AD027RA0NNN	20P41AD027RA0NNN	A
15	20	35	20P21AD035RA0NNN	20P41AD035RA0NNN	A
18.5	25	45	20P21AD045RA0NNN	20P41AD045RA0NNN	A
22	30	52	20P21AD052RA0NNN	20P41AD052RA0NNN	A
30	40	73	20P21AD073RA0NNN	20P41AD073RA0NNN	A
37	50	86	20P21AD086RA0NNN	20P41AD086RA0NNN	A

Drive Output Rating			Non-Regenerative Drives	Regenerative Drives	Frame Size
Normal Duty kW	Normal Duty Hp	Amps	Cat. No.	Cat. No.	
45	60	100	20P21AD100RA0NNN	20P41AD100RA0NNN	A
56	75	129	20P21AD129RA0NNN	20P41AD129RA0NNN	A
75	100	167	20P21AD167RA0NNN	20P41AD167RA0NNN	B
93	125	207	20P21AD207RA0NNN	20P41AD207RA0NNN	B
112	150	250	20P21AD250RA0NNN	20P41AD250RA0NNN	B
149	200	330	20P21AD330RA0NNN	20P41AD330RA0NNN	B
187	250	412	20P21AD412RA0NNN	20P41AD412RA0NNN	B
224	300	495	20P21AD495RA0NNN	20P41AD495RA0NNN	C
298	400	667	20P21AD667RA0NNN	20P41AD667RA0NNN	C
373	500	830	20P21AD830RA0NNN	20P41AD830RA0NNN	D
447	600	996	20P21AD996RA0NNN	20P41AD996RA0NNN	D
552	700	1162	20P21AD1K1RA0NNN	20P41AD1K1RA0NNN	D
597	800	1328	20P21AD1K3RA0NNN	20P41AD1K3RA0NNN	D
671	900	1494	20P21AD1K4RA0NNN	20P41AD1K4RA0NNN	D

### 575V AC, Three-Phase

Drive Output Rating			Non-Regenerative Drives	Regenerative Drives	Frame Size
Normal Duty kW	Normal Duty Hp	Amps	Cat. No.	Cat. No.	
37	50	67.5	20P21AE067RA0NNN	20P41AE067RA0NNN	B
56	75	101.3	20P21AE101RA0NNN	20P41AE101RA0NNN	B
75	100	135	20P21AE135RA0NNN	20P41AE135RA0NNN	B
149	200	270	20P21AE270RA0NNN	20P41AE270RA0NNN	B
224	300	405	20P21AE405RA0NNN	20P41AE405RA0NNN	B
298	400	540	20P21AE540RA0NNN	20P41AE540RA0NNN	C
373	500	675	20P21AE675RA0NNN	20P41AE675RA0NNN	C
447	600	810	20P21AE810RA0NNN	20P41AE810RA0NNN	D
597	800	1080	20P21AE1K0RA0NNN	20P41AE1K0RA0NNN	D
671	900	1215	20P21AE1K2RA0NNN	20P41AE1K2RA0NNN	D
746	1000	1350	20P21AE1K3RA0NNN	20P41AE1K3RA0NNN	D
932	1250	1688	20P21AE1K6RA0NNN	20P41AE1K6RA0NNN	D

### 690V AC, Three-Phase

Drive Output Rating			Non-Regenerative Drives	Regenerative Drives	Frame Size
Normal Duty kW	Normal Duty Hp	Amps	Cat. No.	Cat. No.	
298	400	452	20P21AF452RA0NNN	20P41AF452RA0NNN	C
373	500	565	20P21AF565RA0NNN	20P41AF565RA0NNN	C
447	600	678	20P21AF678RA0NNN	20P41AF678RA0NNN	D
552	700	791	20P21AF791RA0NNN	20P41AF791RA0NNN	D
597	800	904	20P21AF904RA0NNN	20P41AF904RA0NNN	D
671	900	1017	20P21AF1K0RA0NNN	20P41AF1K0RA0NNN	D
746	1000	1130	20P21AF1K1RA0NNN	20P41AF1K1RA0NNN	D
820	1100	1243	20P21AF1K2RA0NNN	20P41AF1K2RA0NNN	D
932	1250	1413	20P21AF1K4RA0NNN	20P41AF1K4RA0NNN	D
1044	1400	1582	20P21AF1K5RA0NNN	20P41AF1K5RA0NNN	D



## Factory Installed Options

Each PowerFlex DC drive includes one encoder and DC analog tachometer input. No other factory installed options are currently available.

## User Installed Options

### Human Interface Modules

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, Full Numeric	20-HIM-A6	20-HIM-C6S ‡

\* For indoor use only.

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



20-HIM-A0



20-HIM-A3



20-HIM-A5



20-HIM-A6



20-HIM-C3S



20-HIM-C5S



20-HIM-C6S

### 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
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).

### I/O Option Kits

Description	Cat. No.
I/O Expansion board (4 24V DC Digital Inputs, 4 Digital Outputs, 2 Analog Outputs)	20P-S5V62
115V AC to 24V DC 8 Channel I/O Converter Board (converts 8 Digital Inputs)	20P-S520L

### Feedback Option Kit

Description	Cat. No.
Resolver Feedback Option Module	20P-RES-A0

## User Installed Options, Continued

### 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
Dual-Port EtherNet/IP™ Communication Adapter	20-COMM-ER
HVAC Communication Adapter	20-COMM-H
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
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 to DPI/SCANport Module	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

✧ This item has Silver Series status. For information, refer to: <http://www.ab.com/silver>.

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

### PC Programming Software

Description
Connected Components Workbench™ Software *
DriveTools™ SP Software ‡
DriveExplorer™ Software (Full) ✧

\* Connected Components Workbench is available for free download at: <http://ab.rockwellautomation.com/Programmable-Controllers/Connected-Components-Workbench-Software>

‡ DriveTools SP is available for order using the "Build This Catalog Number" link at: <http://ab.rockwellautomation.com/Drives/Software/9303-DriveTools-SP#/tab6>

✧ DriveExplorer Full is available for free download at: <http://www.ab.com/support/abdrives/webupdate/software.html#>

## Isolation Transformers

Isolation Transformers are available for installations that have specific types of AC supply configurations or require drive protection due to AC line disturbances.

Three Phase Primary Voltage			Three Phase Secondary Voltage		
kVA	kW (Hp)	Voltage	230V AC Catalog Number	460V AC Catalog Number	575V AC Catalog Number
5	1.2...2.2 (1.5...3)	230	1321-3TW005-AA	1321-3TW005-AB	N/A
		460	1321-3TW005-BA	1321-3TW005-BB	N/A
		575	1321-3TW005-CA	1321-3TW005-CB	N/A
7.5	3.7 (5)	230	1321-3TW007-AA	1321-3TW007-AB	N/A
		460	1321-3TW007-BA	1321-3TW007-BB	N/A
		575	1321-3TW007-CA	1321-3TW007-CB	N/A
11	5.5 (7.5)	230	1321-3TW011-AA	1321-3TW011-AB	N/A
		460	1321-3TW011-BA	1321-3TW011-BB	N/A
		575	1321-3TW011-CA	1321-3TW011-CB	N/A
14	7.5 (10)	230	1321-3TW014-AA	1321-3TW014-AB	N/A
		460	1321-3TW014-BA	1321-3TW014-BB	N/A
		575	1321-3TW014-CA	1321-3TW014-CB	N/A
20	11 (15)	230	1321-3TW020-AA	1321-3TW020-AB	N/A
		460	1321-3TW020-BA	1321-3TW020-BB	N/A
		575	1321-3TW020-CA	1321-3TW020-CB	N/A
27	15 (20)	230	1321-3TW027-AA	1321-3TW027-AB	N/A
		460	1321-3TW027-BA	1321-3TW027-BB	N/A
		575	1321-3TW027-CA	1321-3TW027-CB	N/A

Three Phase Primary Voltage		Three Phase Secondary Voltage			
kVA	kW (Hp)	Voltage	230V AC Catalog Number	460V AC Catalog Number	575V AC Catalog Number
34	18.5 (25)	230	1321-3TW034-AA	1321-3TW034-AB	N/A
		460	1321-3TW034-BA	1321-3TW034-BB	N/A
		575	1321-3TW034-CA	1321-3TW034-CB	N/A
40	22 (30)	230	1321-3TW040-AA	1321-3TW040-AB	N/A
		460	1321-3TW040-BA	1321-3TW040-BB	N/A
		575	1321-3TW040-CA	1321-3TW040-CB	N/A
51	30 (40)	230	1321-3TW051-AA	1321-3TW051-AB	N/A
		460	1321-3TW051-BA	1321-3TW051-BB	N/A
		575	1321-3TW051-CA	1321-3TW051-CB	N/A
63	37 (50)	230	1321-3TH063-AA	1321-3TH063-AB	1321-3TH063-AC
		460	1321-3TH063-BA	1321-3TH063-BB	1321-3TH063-BC
		575	1321-3TH063-CA	1321-3TH063-CB	1321-3TH063-CC
75	45 (60)	230	1321-3TH075-AA	1321-3TH075-AB	1321-3TH075-AC
		460	1321-3TH075-BA	1321-3TH075-BB	1321-3TH075-BC
		575	1321-3TH075-CA	1321-3TH075-CB	1321-3TH075-CC
93	56 (75)	230	1321-3TH093-AA	1321-3TH093-AB	1321-3TH093-AC
		460	1321-3TH093-BA	1321-3TH093-BB	1321-3TH093-BC
		575	1321-3TH093-CA	1321-3TH093-CB	1321-3TH093-CC
118	75 (100)	230	1321-3TH118-AA	1321-3TH118-AB	1321-3TH118-AC
		460	1321-3TH118-BA	1321-3TH118-BB	1321-3TH118-BC
		575	1321-3TH118-CA	1321-3TH118-CB	1321-3TH118-CC
145	93 (125)	230	1321-3TH145-AA	1321-3TH145-AB	1321-3TH145-AC
		460	1321-3TH145-BA	1321-3TH145-BB	1321-3TH145-BC
		575	1321-3TH145-CA	1321-3TH145-CB	1321-3TH145-CC
175	112 (150)	230	1321-3TH175-AA	1321-3TH175-AB	1321-3TH175-AC
		460	1321-3TH175-BA	1321-3TH175-BB	1321-3TH175-BC
		575	1321-3TH175-CA	1321-3TH175-CB	1321-3TH175-CC
220	145 (200)	230	1321-3TH220-AA	1321-3TH220-AB	1321-3TH220-AC
		460	1321-3TH220-BA	1321-3TH220-BB	1321-3TH220-BC
		575	1321-3TH220-CA	1321-3TH220-CB	1321-3TH220-CC
275	187 (250)	230	1321-3TH275-AA	1321-3TH275-AB	1321-3TH275-AC
		460	1321-3TH275-BA	1321-3TH275-BB	1321-3TH275-BC
		575	1321-3TH275-CA	1321-3TH275-CB	1321-3TH275-CC
330	224 (300)	230	1321-3TH330-AA	1321-3TH330-AB	1321-3TH330-AC
		460	1321-3TH330-BA	1321-3TH330-BB	1321-3TH330-BC
		575	1321-3TH330-CA	1321-3TH330-CB	1321-3TH330-CC
440	298 (400)	230	N/A	1321-3TH440-AB	1321-3TH440-AC
		460	N/A	1321-3TH440-BB	1321-3TH440-BC
		575	N/A	1321-3TH440-CB	1321-3TH440-CC
550	373 (500)	230	N/A	1321-3TH550-AB	1321-3TH550-AC
		460	N/A	1321-3TH550-BB	1321-3TH550-BC
		575	N/A	1321-3TH550-CB	1321-3TH550-CC
660	448 (600)	230	N/A	1321-3TH660-AB	1321-3TH660-AC
		460	N/A	1321-3TH660-BB	1321-3TH660-BC
		575	N/A	1321-3TH660-CB	1321-3TH660-CC
770	522 (700)	230	N/A	1321-3TH770-AB	1321-3TH770-AC
		460	N/A	1321-3TH770-BB	1321-3TH770-BC
		575	N/A	1321-3TH770-CB	1321-3TH770-CC
880	597 (800)	230	N/A	1321-3TH880-AB	1321-3TH880-AC
		460	N/A	1321-3TH880-BB	1321-3TH880-BC
		575	N/A	1321-3TH880-CB	1321-3TH880-CC

## AC Input Line Reactors and Contactors

If a DC Contactor is used, an AC Input contactor is not needed.

### 230V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (Hp)	AC Input Contactor Cat. No.
A	7P0	7	5.7	1.5	1321-3R8-A	0.75 (1)	100-C12D10
	9P0	9	7.4	2	1321-3R12-A	1.49 (2)	100-C12D10
	012	12	9.8	3	1321-3R18-A	0.75...3.7 (1...5)	100-C12D10
	020	20	16	5	1321-3R18-A	0.75...3.7 (1...5)	100-C23D10
	029	29	24	7.5	1321-3R55-A	5.5...11 (7.5...15)	100-C30D10
	038	38	31	10	1321-3R55-A	5.5...11 (7.5...15)	100-C37D10
	055	55	45	15	1321-3R55-A	5.5...11 (7.5...15)	100-C60D10
	073	73	60	20	1321-3R80-A	15 (20)	100-C60D10
	093	93	76	25	1321-3R100-A	18.5...22 (25...30)	100-C85D10
	110	110	90	30	1321-3R100-A	18.5...22 (25...30)	100-D110D11
B	146	146	119	40	1321-3R160-A	30...37 (40...50)	100-D140D11
	180	180	147	50	1321-3R160-A	30...37 (40...50)	100-D180D11
	218	218	178	60	1321-3RB250-A	45...56 (60...75)	100-D180D11
	265	265	217	75	1321-3RB250-A	45...56 (60...75)	100-D250ED11
	360	360	294	100	1321-3RB320-A	75 (100)	100-D300ED11
	434	434	355	125	1321-3RB400-A	93 (125)	100-D420ED11
C	521	521	426	150	1321-3R500-A	112 (150)	100-D630ED11
	700	700	572	200	1321-3R600-A	149 (200)	100-D630ED11
D	875	875	715	250	1321-3R750-A	186 (250)	100-D860ED11
	1K0	1050	858	300	1321-3R850-A	224 (300)	100-D860ED11

### 460V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (Hp)	AC Input Contactor Cat. No.
A	4P1	4.1	3.3	2	1321-3R4-A	0.55 (0.75)	100-C12D10
	6P0	6	4.9	3	1321-3R8-A	0.75 (1)	100-C12D10
	010	10	8.2	5	1321-3R18-B	1.5...7.5 (2...10)	100-C12D10
	014	14	11.4	7.5	1321-3R18-B	1.5...7.5 (2...10)	100-C12D10
	019	19	15.5	10	1321-3R18-B	1.5...7.5 (2...10)	100-C23D10
	027	27	22.1	15	1321-3R55-B	11...22 (15...30)	100-C23D10
	035	35	28.6	20	1321-3R55-B	11...22 (15...30)	100-C30D10
	045	45	36.8	25	1321-3R55-B	11...22 (15...30)	100-C37D10
	052	52	42.5	30	1321-3R55-B	11...22 (15...30)	100-C43D10
	073	73	59.6	40	1321-3R80-B	30 (40)	100-C60D10
	086	86	70.3	50	1321-3R100-B	37...45 (50...60)	100-C85D10
	100	100	81.7	60	1321-3R100-B	37...45 (50...60)	100-C85D10
	129	129	105.4	75	1321-3R160-B	56...75 (75...100)	100-D110D11
B	167	167	136.4	100	1321-3R160-B	56...75 (75...100)	100-D140D11
	207	207	169.1	125	1321-3RB250-B	93...112 (125...150)	100-D180D11
	250	250	204.3	150	1321-3RB250-B	93...112 (125...150)	100-D210ED11
	330	330	269.6	200	1321-3RB320-B	149 (200)	100-D300ED11
	412	412	336.6	250	1321-3RB400-B	186.4 (250)	100-D420ED11

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (Hp)	AC Input Contactor Cat. No.
C	495	495	404.4	300	1321-3R500-B	223.7 (300)	100-D420ED11
	667	667	544.9	400	1321-3R600-B	298.3 (400)	100-D630ED11
D	830	830	678.1	500	1321-3R750-B	372.8 (500)	100-D860ED11
	996	996	813.7	600	1321-3R850-B	447.4 (600)	100-D860ED11
	1K1	1162	949.4	700	1321-3R1000-B	552 (700)	100-G860KD22
	1K3	1328	1085.0	800	2 x 1321-3R600-B	596.6 (800)	100-G860KD22
	1K4	1494	1220.6	900	2 x 1321-3R600-B	671.1 (900)	100-G1200KD12

### 575V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (Hp)	AC Input Contactor Cat. No.
B	067	67.5	55.1	50	1321-3R55-B	37 (50)	100-C60D10
	101	101.25	82.7	75	1321-3R100-B	56 (75)	100-C85D10
	135	135	110.3	100	1321-3R130-B	75 (100)	100-D110D11
	270	270	220.6	200	1321-3RB250-B	149 (200)	100-D250ED11
	405	405	330.9	300	1321-3RB320-B	224 (300)	100-D420ED11
C	540	540	441.2	400	1321-3RB500-B	298 (400)	100-D630ED11
	675	675	551.5	500	1321-3R600-B	373 (500)	100-D630ED11
D	810	810	661.8	600	1321-3R750-B	447 (600)	100-D860ED11
	1K0	1080	882.4	800	1321-3R1000-B	597 (800)	100-G700KD22
	1K2	1215	992.7	900	1321-3R1000-B	671 (900)	100-G860KD22
	1K3	1350	1103.0	1000	2 x 1321-3R600-B	746 (1000)	100-G1000KD12
	1K6	1687.5	1378.7	1250	2 x 1321-3R750-B	—	(1)

(1) No AC Input Contactor available for this drive rating - must be sourced locally.

### 690V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (Hp)	AC Input Contactor Cat. No.
C	452	452	369	400	1321-3RB500-C	—	100-D420ED11
	565	565	462	500	1321-3RB600-C	—	100-D630ED11
D	678	678	554	600	1321-3R750-C	—	100-D630ED11
	791	791	646	700	1321-3R750-C	—	100-D860ED11
	904	904	739	800	1321-3R1000-C	—	100-D860ED11
	1K0	1017	831	900	1321-3R1000-C	—	100-D860ED11
	1K1	1130	923	1000	2 x 1321-3R600-C	—	100-G700KD22
	1K2	1243	1016	1100	2 x 1321-3R600-C	—	100-G860KD22
	1K4	1412.5	1154	1250	2 x 1321-3R750-C	—	100-G1200KD12
	1K5	1582	1292	1400	2 x 1321-3R750-C	—	100-G1200KD12

## Dynamic Brake Resistor Kits and DC Output Contactors

See Alternate Dynamic Brake Resistor Kits and DC Output Contactors on page 16 for recommended alternate DC Output Contactors for 575V and 690V AC input drives, respectively.

### 230V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	Total DB Resistance (ohms)	DC Loop Contactor Cat. No. <sup>(2)</sup>		DC Contactor Crimp Lugs Cat. No. <sup>(3)</sup>
								Drive without Dynamic Brake	Drive with Dynamic Brake	
A	7P0	7	5.7	1.5	1370-DBL62	240	20	1370-NC56	1370-DC56	1370-LG40
	9P0	9	7.4	2	1370-DBL63	240	20	1370-NC56	1370-DC56	1370-LG40
	012	12	9.8	3	1370-DBL64	240	15	1370-NC56	1370-DC56	1370-LG40
	020	20	16	5	1370-DBL65	240	8.6	1370-NC56	1370-DC56	1370-LG40
	029	29	24	7.5	1370-DBL66	240	6	1370-NC56	1370-DC56	1370-LG40
	038	38	31	10	1370-DBL67	240	5	1370-NC56	1370-DC56	1370-LG40
	055	55	45	15	1370-DBL68	240	3.5	1370-NC56	1370-DC56	1370-LG56
	073	73	60	20	1370-DBL69	240	2.6	1370-NC110	1370-DC110	1370-LG92
	093	93	76	25	1370-DBL70	240	2	1370-NC110	1370-DC110	1370-LG92
	110	110	90	30	1370-DBL71	240	2	1370-NC110	1370-DC110	1370-LG110
B	146	146	119	40	1370-DBL72	240	1.4	1370-NC180	1370-DC180	1370-LG160
	180	180	147	50	1370-DBL73	240	1.0	1370-NC180	1370-DC180	1370-LG180
	218	218	178	60	1370-DBL74	240	1.0	1370-NC280	1370-DC280	1370-LG228
	265	265	217	75	1370-DBL75	240	0.67	1370-NC280	1370-DC280	1370-LG268
	360	360	294	100	1370-DBL76	240	0.47	ABB_EHDB360C2P-1L2S	ABB_EHDB360C-1L2SS	(4)
	434	434	355	125	CUTLER-HAMMER_G3AP50 (Qty 4 - Two in series, Two in parallel)	240	0.4	ABB_EHDB520C2P-1L2S	ABB_EHDB520C-1L2SS	(4)
C	521	521	426	150	HUBBELL_Y139W322 GB	240	0.322			(4)
	700	700	572	200	(1)	240	0.25	ABB_EHDB800C2P-1L2S	ABB_EHDB800C-1L2SS	(4)
D	875	875	715	250	(1)	240	0.2	ABB_EHDB960C2P-1L2S	ABB_EHDB960C-1L2SS	(4)
	1K0	1050	858	300	(1)	240	0.2	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	(4)

(1) No Dynamic Brake Resistor kit available for this drive rating - must be sourced locally.

(2) Coil voltage = 115V AC, 50/60Hz.

(3) See DC Contactor Crimp Lug Kit Specifications on page 15 for more information.

(4) Wire and Lug size dependent on enclosure dimensions and local codes.

### 460V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	Total DB Resistance (ohms)	DC Loop Contactor Cat. No. <sup>(2)</sup>		DC Contactor Crimp Lugs Cat. No. <sup>(3)</sup>
								Drive without Dynamic Brake	Drive with Dynamic Brake	
A	4P1	4.1	3.3	2	1370-DBH63	500	81	1370-NC56	1370-DC56	1370-LG40
	6P0	6	4.9	3	1370-DBH64	500	62	1370-NC56	1370-DC56	1370-LG40
	010	10	8.2	5	1370-DBH65	500	45	1370-NC56	1370-DC56	1370-LG40
	014	14	11.4	7.5	1370-DBH66	500	27	1370-NC56	1370-DC56	1370-LG40
	019	19	15.5	10	1370-DBH67	500	20	1370-NC56	1370-DC56	1370-LG40
	027	27	22.1	15	1370-DBH68	500	12	1370-NC56	1370-DC56	1370-LG40
	035	35	28.6	20	1370-DBH69	500	10	1370-NC56	1370-DC56	1370-LG40
	045	45	36.8	25	1370-DBH70	500	9	1370-NC56	1370-DC56	1370-LG52
	052	52	42.5	30	1370-DBH71	500	7	1370-NC56	1370-DC56	1370-LG52
	073	73	59.6	40	1370-DBH72	500	5.2	1370-NC110	1370-DC110	1370-LG92
	086	86	70.3	50	1370-DBH73	500	4	1370-NC110	1370-DC110	1370-LG92
	100	100	81.7	60	1370-DBH74	500	4	1370-NC110	1370-DC110	1370-LG110
	129	129	105.4	75	1370-DBH75	500	3	1370-NC180	1370-DC180	1370-LG140

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	Total DB Resistance (ohms)	DC Loop Contactor Cat. No. <sup>(2)</sup>		DC Contactor Crimp Lugs Cat. No. <sup>(3)</sup>
								Drive without Dynamic Brake	Drive with Dynamic Brake	
B	167	167	136.4	100	1370-DBH76	500	2.1	1370-NC180	1370-DC180	1370-LG180
	207	207	169.1	125	1370-DBH77	500	2.1	1370-NC280	1370-DC280	1370-LG228
	250	250	204.3	150	1370-DBH78	500	1.5	1370-NC280	1370-DC280	1370-LG268
	330	330	269.6	200	1370-DBH79	500	1.05	ABB_EHDB360C2P-1L2S	ABB_EHDB360C-1L22SS	(4)
	412	412	336.6	250	HUBBELL_Y95W808GB	500	1	ABB_EHDB520C2P-1L2S	ABB_EHDB520C-1L22SS	(4)
C	495	495	404.4	300	HUBBELL_Y101W595GB	500	0.8	ABB_EHDB520C2P-1L2S	ABB_EHDB520C-1L22SS	(4)
	667	667	544.9	400	HUBBELL_Y109W542GB	500	0.625	ABB_EHDB800C2P-1L2S	ABB_EHDB800C-1L22SS	(4)
D	800	830	678.1	500	(1)	500	0.463	ABB_EHDB960C2P-1L2S	ABB_EHDB960C-1L22SS	(4)
	960	996	813.7	600	(1)	500	0.322	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	(4)
	1K1	1162	949.4	700	(1)	500	0.322	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	(4)
	1K3	1328	1085.0	800	(1)	500	0.255	CUTLER-HAMMER_6702ED636-2 (Qty 2)	CUTLER-HAMMER_6702ED636-2 (Qty 1)	(4)
	1K4	1494	1220.6	900	(1)	500	0.255	CUTLER-HAMMER_6702ED636-2 (Qty 2)	CUTLER-HAMMER_6702ED636-2 (Qty 1)	(4)

- (1) No Dynamic Brake Resistor kit available for this drive rating - must be sourced locally.  
(2) Coil voltage = 115V AC, 50/60Hz.  
(3) See DC Contactor Crimp Lug Kit Specifications on page 15 for more information.  
(4) Wire and Lug size dependent on enclosure dimensions and local codes.

## DC Contactor Crimp Lug Kit Specifications

Use the information that is provided in this table to help you order the correct Lug kit for your application.

Rated Motor Armature Current <sup>(1)</sup> <i>A DC</i>	DC Contactor Rating <i>A DC</i>	Armature Conductor Size <sup>(2)</sup> <i>AWG</i>	DB Conductor Size <sup>(3)</sup> <i>AWG</i>	Armature Conductor Crimp Lug Hole Size	DB Conductor Crimp Lug Hole Size	Lug Kit Catalog Number
4.1...35	56	8	8	#10	#10	1370-LG40
45...52	56	6	8	#10	#10	1370-LG52
55	56	4	8	#10	#10	1370-LG56
60...86	110	2	6	0.25 in.	0.25 in.	1370-LG92
100...110	110	1/0	4	0.25 in.	0.25 in.	1370-LG110
129	180	2/0	2	0.3125 in.	0.3125 in.	1370-LG140
146	180	3/0	2	0.3125 in.	0.3125 in.	1370-LG160
147...167	180	4/0	2	0.3125 in.	0.3125 in.	1370-LG180
207...218	280	300MCM	1/0	0.5 in.	0.375 in.	1370-LG228
250...265	280	400MCM	2/0	0.5 in.	0.375 in.	1370-LG268
266...280	280	500MCM	3/0	0.5 in.	0.375 in.	1370-LG280

- (1) The Rated Motor Armature Current is taken directly from the motor nameplate or motor data. The current listed in this column is the maximum current that is allowed for the Armature Conductor Size (column 3) and the DC Contactor Rating (column 2).  
(2) The armature conductors are sized by multiplying the Rated Motor Armature Current by 1.25 as provided for in NEC 420-22 (1987). The DC lug ratings are determined from NEC Table 310-16 (1987) for copper conductors, insulation temperature that is rated at 75° C (167° F) at an ambient temperature of 30° C (86° F). If conditions are other than shown in NEC Table 310-16, then refer to application codes.  
(3) The dynamic braking (DB) conductors are sized as in footnote 2, but at half ampacity due to the short time duration of current flow in these conductors, and has been sized to satisfy NEMA Standard ICS 3-302.62 - Dynamic Braking. If the load inertia is larger than the motor inertia, calculations must be made to determine correct conductor sizing and DB resistor wattage per NEMA Standard ICS 3-302.62.

## Alternate Dynamic Brake Resistor Kits and DC Output Contactors

The following alternate dynamic brake resistor kits and/or DC output contactors can be used with the corresponding PowerFlex DC drives but must be sourced separately from the drive.

### 575V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	Armature Voltage (Volts)	DB Resistor Size (ohms)	DC Loop Contactor Cat. No. <sup>(1)</sup>		DC Contactor Crimp Lugs Cat. No. <sup>(2)</sup>
							Drive w/No Dynamic Brake	Drive w Dynamic Brake	
B	067	67.5	55.1	50	600	5.93	ABB_EHDB220C2P-1L2S	ABB_EHDB220C-1L22SS	<sup>(3)</sup>
	101	101	83	75	600	3.95	ABB_EHDB220C2P-1L2S	ABB_EHDB220C-1L22SS	
	135	135	110	100	600	2.96	ABB_EHDB220C2P-1L2S	ABB_EHDB220C-1L22SS	
	270	270	221	200	600	1.48	ABB_EHDB360C2P-1L2S	ABB_EHDB360C-1L22SS	
	405	405	331	300	600	0.988	ABB_EHDB520C2P-1L2S	ABB_EHDB520C-1L22SS	
C	540	540	441	400	600	0.741	ABB_EHDB650C2P-1L2S	ABB_EHDB650C-1L22SS	
	675	675	551	500	600	0.593	ABB_EHDB800C2P-1L2S	ABB_EHDB800C-1L22SS	
D	810	810	662	600	600	0.494	ABB_EHDB960C2P-1L2S	ABB_EHDB960C-1L22SS	
	1K0	1080	882	800	600	0.370	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	1K2	1215	993	900	600	0.329	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	1K3	1350	1103	1000	600	0.296	CUTLER-HAMMER_6702ED636-2 (Qty 2)	CUTLER-HAMMER_6702ED636-2 (Qty 1)	
	1K6	1688	1379	1250	600	0.237	CUTLER-HAMMER_6702ED636-2 (Qty 2)	CUTLER-HAMMER_6702ED636-2 (Qty 1)	

(1) Coil voltage = 115V AC, 50/60Hz.

(2) See DC Contactor Crimp Lug Kit Specifications on page 15 for more information.

(3) Wire and Lug size dependent on enclosure dimensions and local codes.

### 690V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Hp	Armature Voltage (Volts)	DB Resistor Size (ohms)	DC Loop Contactor Cat. No. <sup>(1)</sup>		DC Contactor Crimp Lugs Cat. No. <sup>(2)</sup>
							Drive w/No Dynamic Brake	Drive w Dynamic Brake	
C	452	452	369	400	700	1.03	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	<sup>(3)</sup>
	565	565	462	500	700	0.826	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
D	678	678	554	600	700	0.688	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	791	791	646	700	700	0.590	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	904	904	739	800	700	0.516	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	1K0	1017	831	900	700	0.459	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	1K1	1130	923	1000	700	0.413	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	1K2	1243	1016	1100	700	0.375	SIEMENS-MFG_14-193-101-58-2 (Qty 2)	SIEMENS-MFG_14-193-101-58-2 (Qty 1)	
	1K4	1413	1154	1250	700	0.330	CUTLER-HAMMER_6702ED636-2 (Qty 2)	CUTLER-HAMMER_6702ED636-2 (Qty 1)	
	1K5	1582	1292	1400	700	0.295	CUTLER-HAMMER_6702ED636-2 (Qty 2)	CUTLER-HAMMER_6702ED636-2 (Qty 1)	

(1) Coil voltage = 115V AC, 50/60Hz.

(2) See DC Contactor Crimp Lug Kit Specifications on page 15 for more information.

(3) Wire and Lug size dependent on enclosure dimensions and local codes.



## Frame D Terminal Adapter Kits

The following frame D drives require the listed terminal adapter kits to meet UL installation requirements.

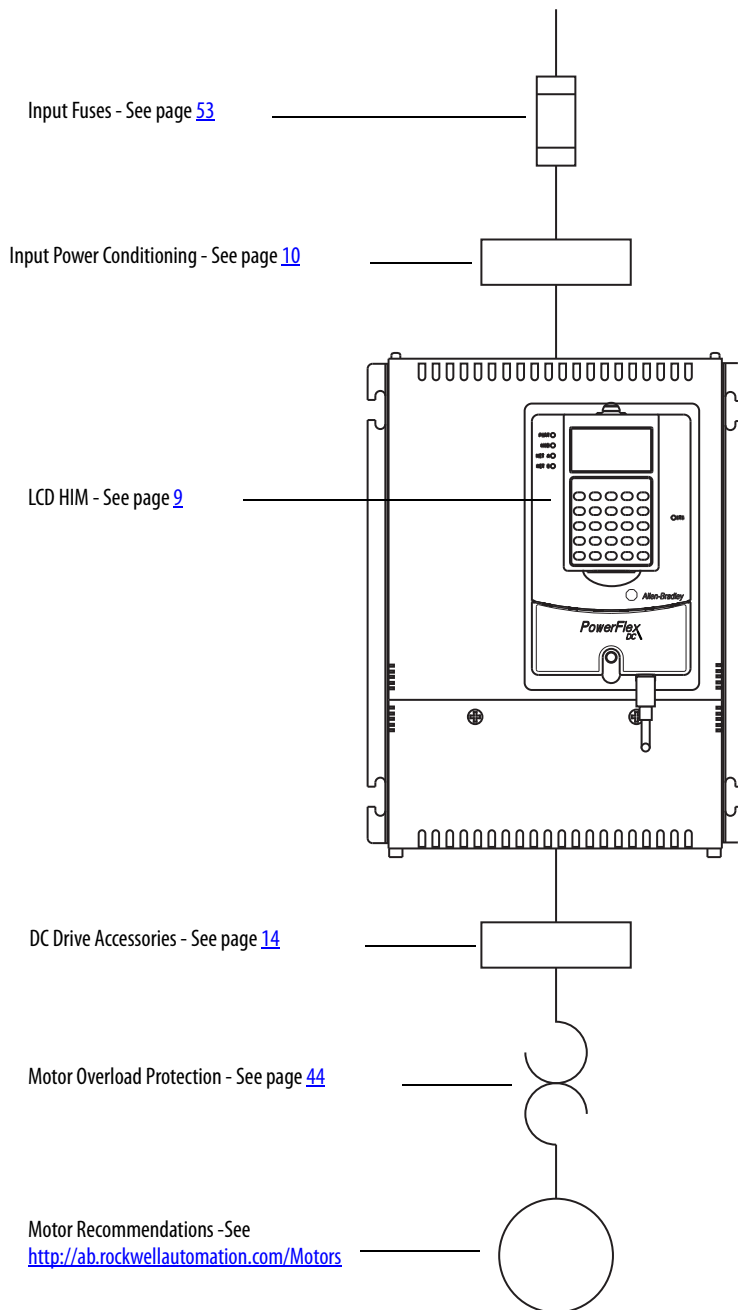
<b>Voltage Class</b>	<b>Drive Current Rating Code</b>	<b>U, V, W Terminal Adapter Kit Number</b>	<b>C, D Terminal Adapter Kit Number</b>
230	1K0	SK-20P-S726172	–
460	1K1	SK-20P-S726171	–
	1K3		–
	1K4		–
575	1K0	SK-20P-S726172	–
	1K2	SK-20P-S726171	–
	1K3		–
	1K6		SK-20P-S726173
690	1K0	SK-20P-S726172	–
	1K1	SK-20P-S726171	–
	1K2		–
	1K4		–
	1K5		–

## Installation Considerations

The PowerFlex Digital DC drive has the following built in protective features to help simplify installation:

- Ground fault protection during startup and operation to help provide reliable operation
- Electronic motor overload protection increases motor life

There are many other factors that must be considered for optimal performance in any given application. This block diagram highlights the primary installation considerations.



## Power Wiring

### AC Input Voltages

PowerFlex DC drives are rated for the following AC input voltages @ 50/60 Hz  $\pm 5\%$ :

#### Mains Circuit (Terminals U, V, W)

- 230V  $\pm 10\%$ , 3Ph
- 400V  $\pm 10\%$ , 3Ph
- 440V  $\pm 10\%$ , 3Ph
- 460V  $\pm 10\%$ , 3Ph
- 480V  $\pm 10\%$ , 3Ph
- 575V  $\pm 10\%$ , 3Ph
- 690V  $\pm 10\%$ , 3Ph

#### Field Circuit (Terminals U1, V1)

- 230V  $\pm 10\%$ , 1Ph
- 400V  $\pm 10\%$ , 1Ph
- 460V  $\pm 10\%$ , 1Ph

#### Control Circuit (Terminals U2, V2)

- 115V  $\pm 15\%$  or 230V  $\pm 15\%$ , 1Ph

Note: For only frame B and C drives, a jumper must be placed between terminals SA-SB when 115V AC input power is used for the control circuit. See Frame B drives SA-SB Terminal Block Location on page [38](#) and Frame C Drives SA-SB Terminal Block Location on page [39](#) for terminal block locations.

### DC Output Voltages

The output voltages that are listed in the Armature Circuit and Field Circuit tables take into account an AC input undervoltage within the stated tolerance limits and a voltage drop of 4% due to an AC input line reactor. It is the same as the rated armature voltage suggested for the connected motor.

#### Armature Circuit

AC Input Voltage (Terminals U, V, W)	DC Output Armature Voltage (Terminals C & D)	
	Two Quadrant Drive	Four Quadrant Drive
230V $\pm 10\%$ , 3Ph	260V	240V
400V $\pm 10\%$ , 3Ph	470V	420V
440V $\pm 10\%$ , 3Ph	530V	460V
460V $\pm 10\%$ , 3Ph	560V	480V
480V $\pm 10\%$ , 3Ph	580V	500V
575V $\pm 10\%$ , 3Ph	680V	600V
690V $\pm 10\%$ , 3Ph	810V	720V

#### Field Circuit

AC Input Voltage (Terminals U1 & V1)	DC Output Field Voltage <sup>(1)</sup> (Terminals C1 & D1)	
	Fixed Field	Adjustable Field
230V $\pm 10\%$ , 1Ph	200V	200V
400V $\pm 10\%$ , 1Ph	310V	310V
460V $\pm 10\%$ , 1Ph	360V	360V

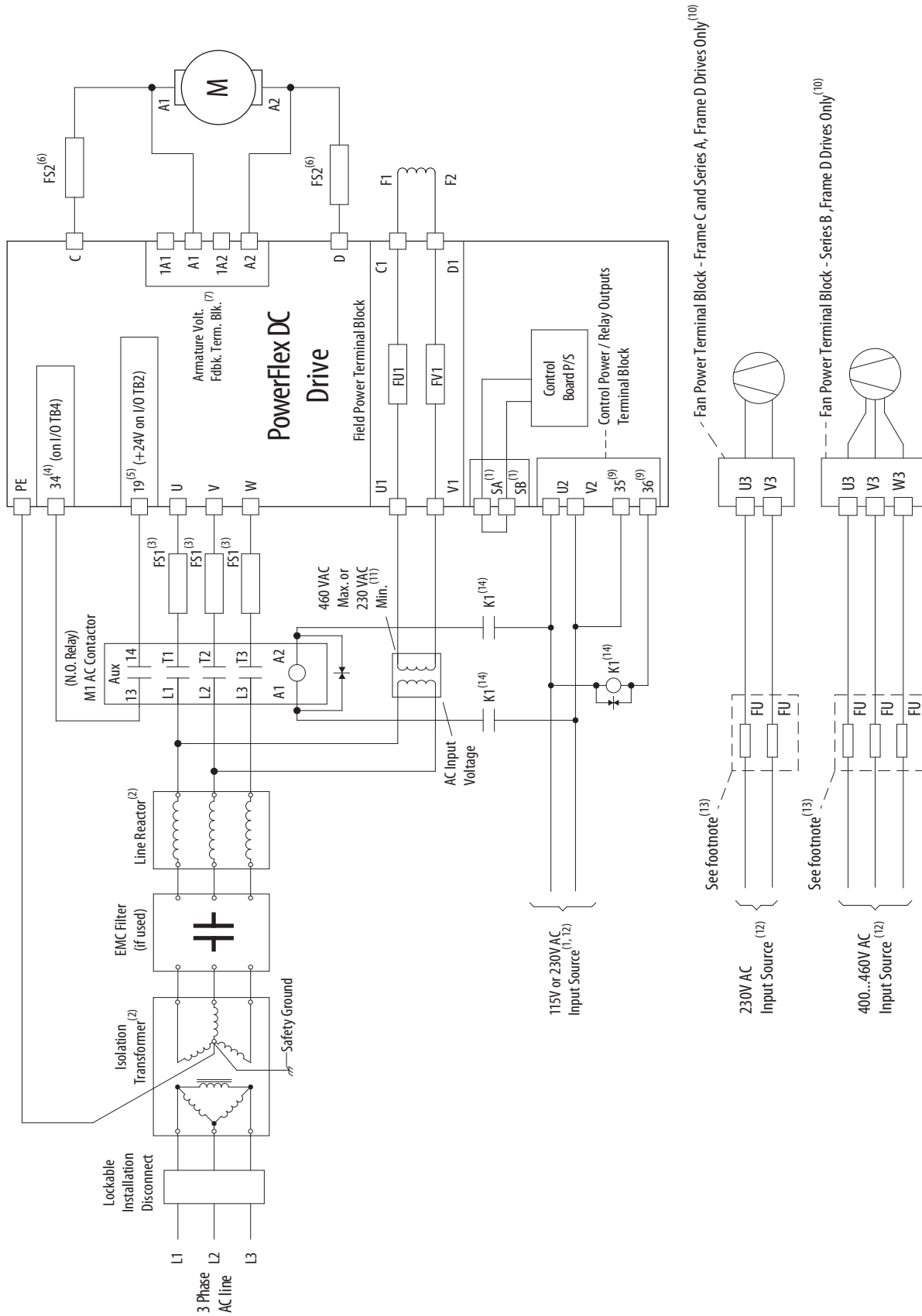
<sup>(1)</sup> The max field voltage is equal to 0.85 x AC input line voltage

### Typical Power Wiring Diagrams

The following diagrams represent recommended power wiring configurations for standard PowerFlex DC drive installations.

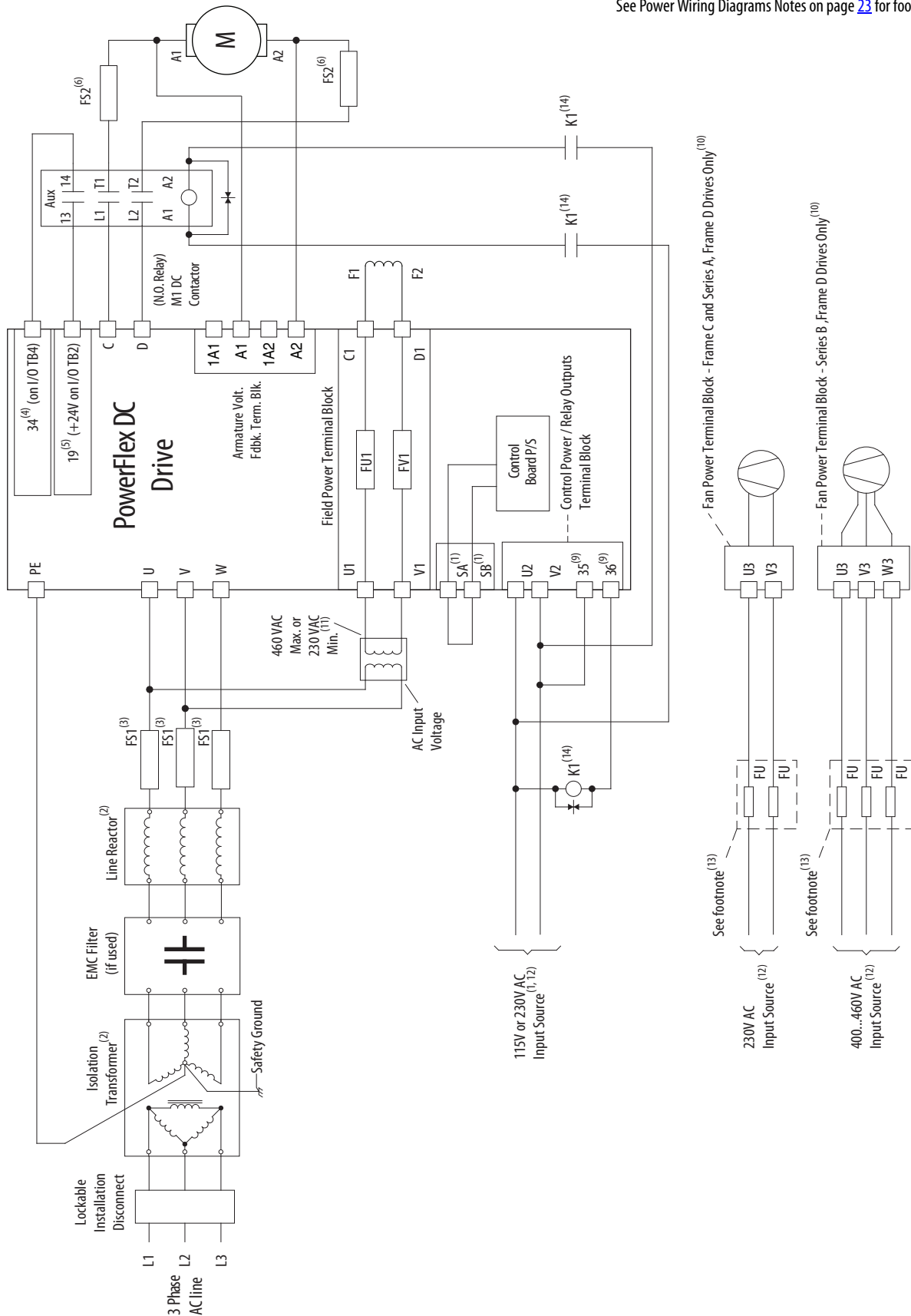
## Power Wiring with AC Input Contactor

See Power Wiring Diagrams Notes on page 23 for footnotes.



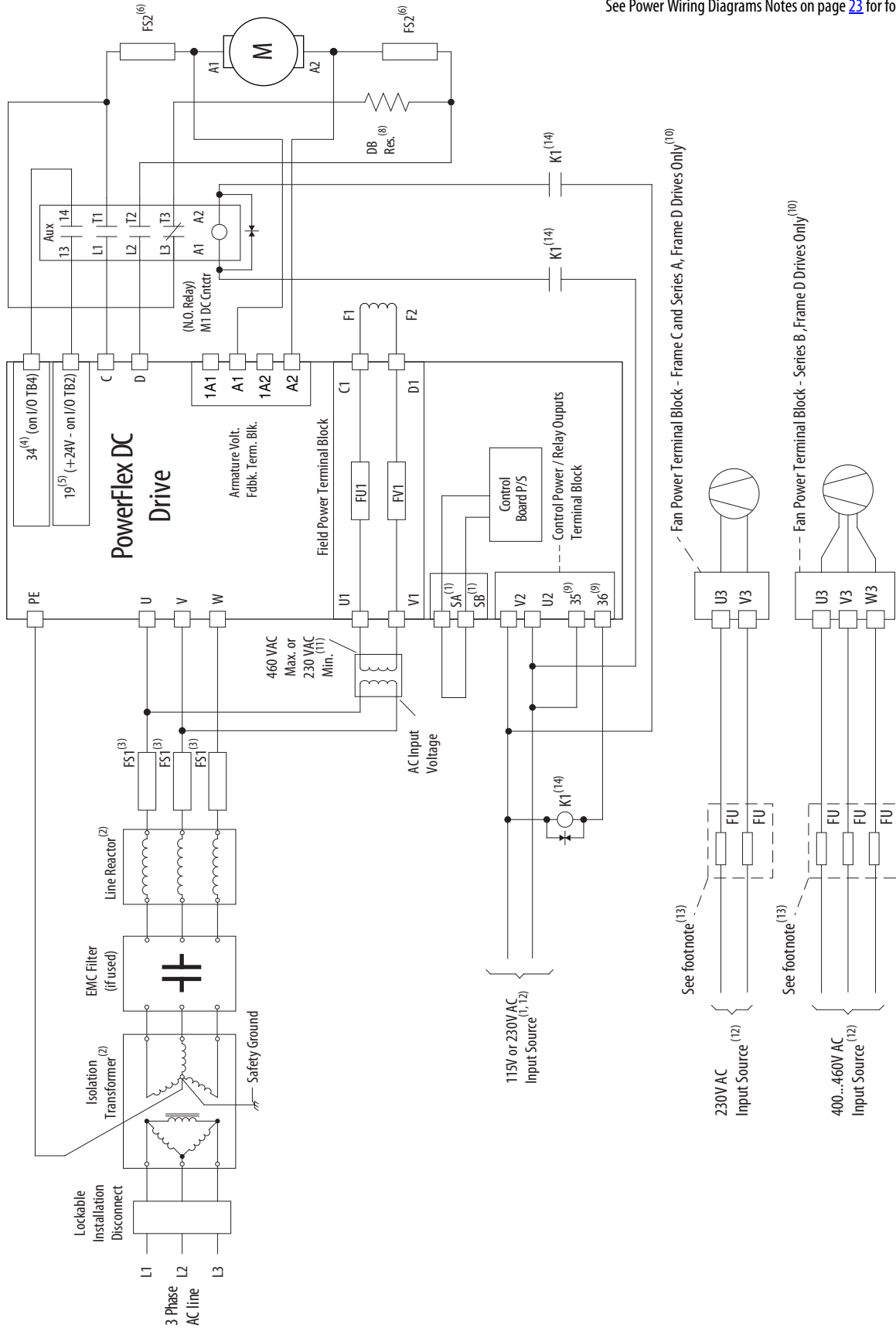
# Power Wiring with DC Output Contactor

See Power Wiring Diagrams Notes on page 23 for footnotes.



### Power Wiring with DC Output/Dynamic Braking Contactor and a Dynamic Brake

See Power Wiring Diagrams Notes on page 23 for footnotes.



## Power Wiring Diagrams Notes

1. For frame B and C drives only, a jumper is required between terminals SA and SB for 115V AC control input power. See Control Circuit Input Power on page [35](#) for more information.
2. An Isolation Transformer and/or 3...5% impedance Line Reactor is required. If the Isolation Transformer provides the required 3...5% impedance, a Line Reactor is not required. See Isolation Transformers on page [10](#) for recommendations and AC Input Line Reactors and Contactors on page [12](#). It is recommended that the isolation transformer has a grounded Wye secondary neutral. If the PowerFlex DC drive is installed in a system with an ungrounded Wye neutral or with an impedance ground connection, see Grounding for Installations in an Ungrounded or High-Impedance Neutral Ground or System in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information.
3. AC input fuses for the armature converter are not provided for frame A and B drives (the customer must purchase). AC input fuses for the armature converter are internally mounted on frame C and D drives. See Circuit Protection on page [53](#) for fuse recommendations.
4. Par 140 [Digital In8 Sel] set to 31 “Contactor.”
5. If the +24V internal power supply is used, terminal 18 (24V common) must be jumpered to terminal 35 (digital input common).
6. For four quadrant frame A and B drives, armature output fuses are required (the customer must purchase). For two quadrant frame A and B drives, armature output fuses are recommended (the customer must purchase). See Circuit Protection on page [53](#) for fuse recommendations.
7. When using an AC input contactor, armature voltage feedback is not required.
8. The “Enable” input must be removed to perform a dynamic braking stop.
9. Par 1391 [ContactorControl] = 1 “AC Cntctr” and Par 1392 [Relay Out 1 Sel] = 25 “Contactor”. Important: Terminal 35 and 36 are on the Control Power / Relay Outputs Terminal block, NOT the I/O terminal blocks. See Frame A Contact Relay and Thermistor Terminal Block Locations on page [45](#)...Frame D Contact Relay and Thermistor Terminal Block Locations on page [47](#).
10. Only Frame C and D drives only require an external power supply for the heatsink cooling fans. See Frame C Heatsink Cooling Fan Specifications on page [40](#) and Frame D, Series B Heatsink Cooling Fan Specifications on page [42](#) for more information.
11. See Field Converter Connections on page [31](#).
12. If sourced from the main three-phase AC input, the connections must be taken from the primary side of the Isolation Transformer or Line Reactor (clean power).
13. Fuses or a circuit breaker. See Frame C Heatsink Cooling Fan Specifications on page [40](#) and Frame D, Series B Heatsink Cooling Fan Specifications on page [42](#) for more information.
14. For frames B, C, and D drives, a pilot relay is required for the contactor coil.

## Armature Power Terminal Connections

Terminals	Description
U, V, W	Three-phase AC input to the armature converter
C, D	DC output to the motor armature
PE	Safety ground

## Frame A Armature Terminal Block Locations

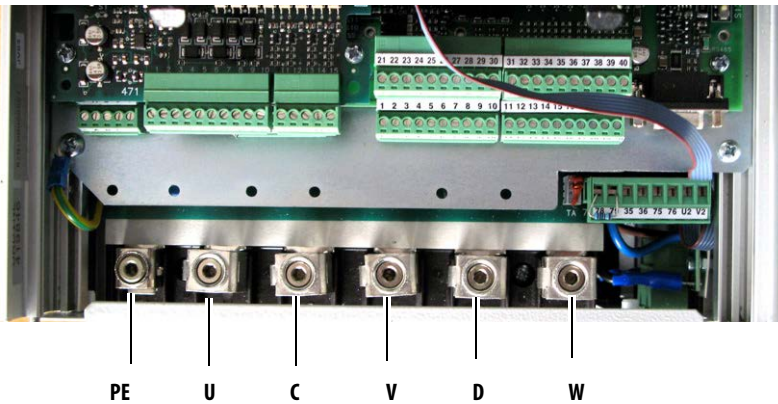
**Bottom View**



Loosen the two screws that secure the power terminal cover to the drive chassis and remove the terminal cover to connect the armature power wiring.

**Front View**

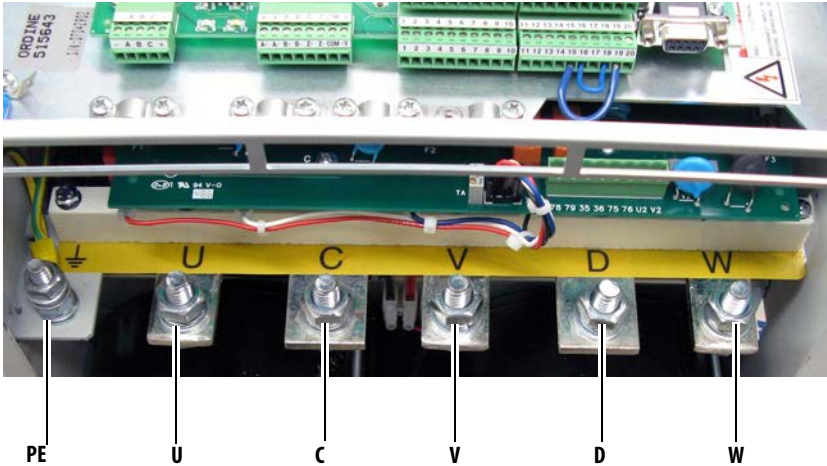
Note: Front view of drive that is shown with bottom protective and power terminal covers removed.



**ATTENTION:** Do not operate the drive with the power terminal cover removed. Operating the drive with the power terminal cover removed can result in a hazardous condition that could cause personal injury and/or equipment damage.

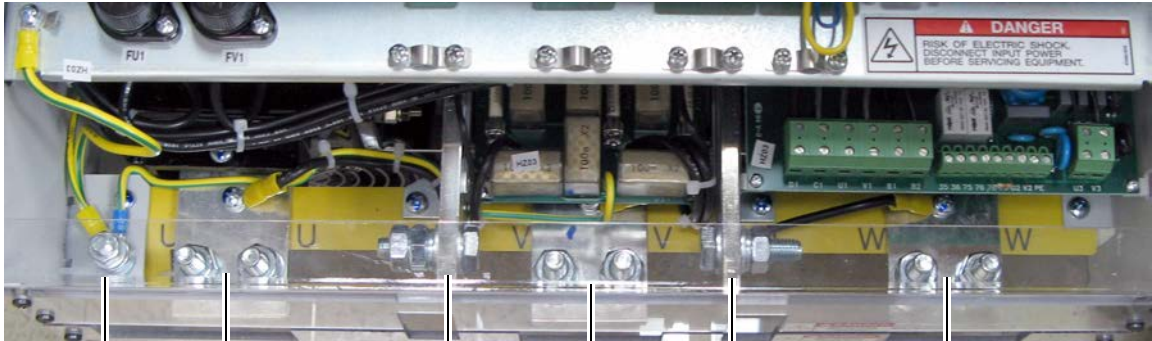


*Frame B Armature Terminal Block Locations*



*Frame C Armature Terminal Block Locations*

**Front View**

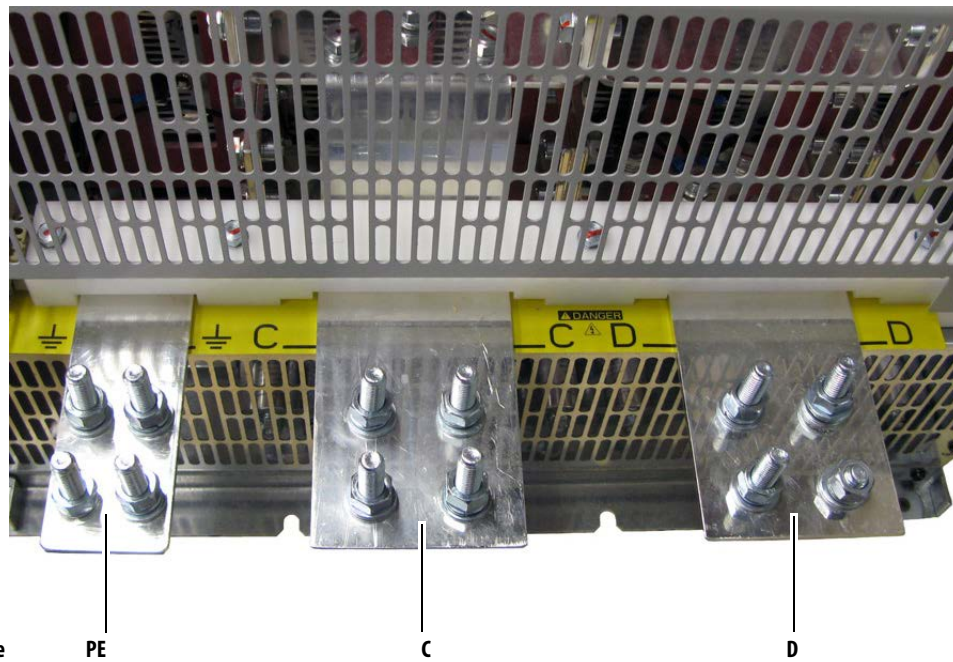
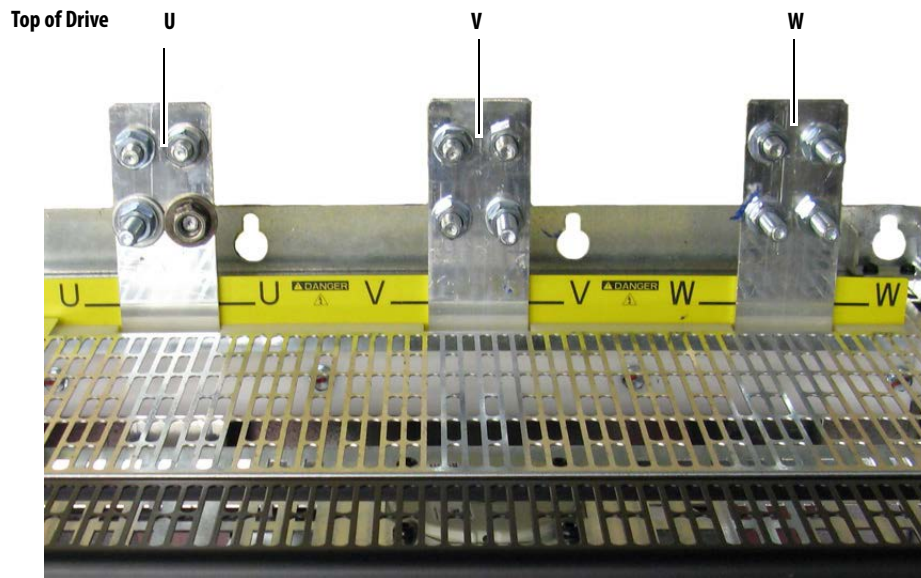


**Bottom View**



### Frame D Armature Terminal Block Locations

Important: Certain frame D drives require the use of a terminal adapter kits for terminals U, V, W, C and D.  
See Frame D Terminal Adapter Kits on page 17 for details.



## Armature Power Terminal and Ground (PE) Wire Sizes

Frame	Drive Current Rating Code <sup>(1)</sup>				Terminals	Wire Size and Type	Terminal Bolt Size (mm)	Final Torque N·m (lb·in)
	230V	460V	575V	690V				
A	7P0...055	4P1...052	–	–	U, V, W, C, D, PE	See “Cable and Wiring Recommendations” in the PowerFlex Digital DC Drive User Manual, publication <a href="#">20P-UM001</a> .	5	6 (53)
	073...110	073...129	–	–			Terminal Block	12 (106)
B	All	All	–	–	U, V, W, C, D		10	25 (221)
					PE		8	15 (132.75)
C	All	All	–	–	U, V, W, C, D		10	25 (221)
					PE		8	15 (132.75)
D	All	All	All	All	U, V, W, C, D, PE		12	45 (398.2)

(1) See Catalog Number Explanation on page 5, positions 8, 9 and 10 for corresponding drive Hp rating, armature amp rating, and field amp rating.

**IMPORTANT** Certain frame D drives require the use of a terminal adapter kit for terminals U, V, W, C, and D. See Frame D Terminal Adapter Kits on page 17 for details.

## Armature Voltage Feedback Connections

The armature voltage feedback terminals can be used to monitor the armature voltage of the motor, regardless of the state of a DC contactor or inverting fault device (fuse or breaker).

If these terminals are not connected to the motor armature, jumpers must be installed between A1 to 1A1 and A2 to 1A2 to allow internal calculation of motor speed from armature voltage (needed when no speed feedback device is used). If a DC contactor is used without a speed feedback device present, the drive will not be able to determine motor speed from the armature voltage feedback signal

**IMPORTANT** By default, these terminals are jumpered - 1A1 to A1 and 1A2 to A2. If these terminals are not wired to the motor terminals, the jumpers must be installed.

This terminal block is not present on drives that were shipped from the factory prior to drives with version 3.001 firmware installed. However, new pulse transformer boards that are shipped as replacement parts from the factory contain this terminal block and can be used with any version of firmware.

## Armature Voltage Feedback Terminals

Terminal	Description
1A1	Jumpered to A1 when internal armature voltage feedback is used. Not used when A1 is connected to motor terminal A1.
A1	Voltage feedback from motor terminal A1.
1A2	Jumpered to A2 when internal armature voltage feedback is used. Not used when A2 is connected to motor terminal A2.
A2	Voltage feedback from motor terminal A2.

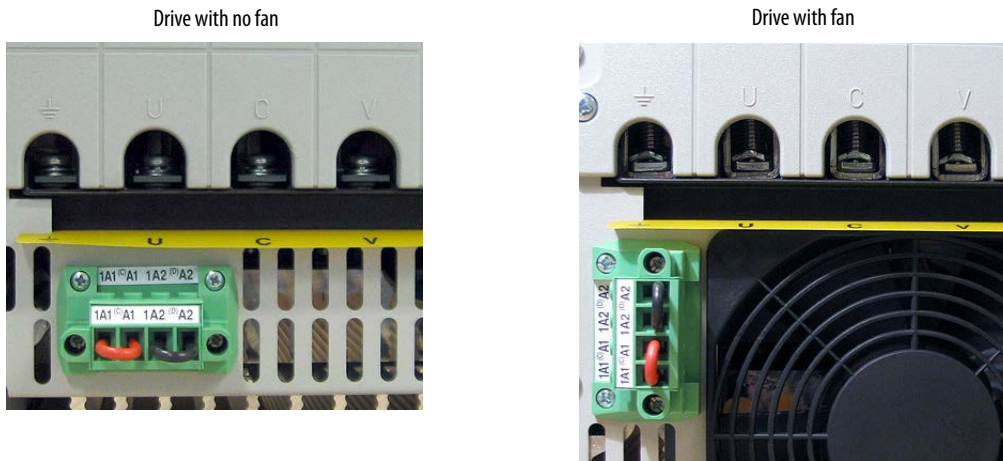
## Armature Voltage Feedback Circuit Wire Sizes and Terminal Specifications

Frame	Terminals	Wire Size and Type <sup>(1)</sup>	Tightening Torque N·m (lb·in)
A, B & C	1A1, A1, 1A2, A2	24...10 AWG/kcmils	0.5...0.6 (4.4...5.3)
D		22...8 AWG/kcmils	0.8...1.6 (7.1...14.2)

(1) Wire with an insulation rating of 600V or greater is recommended. See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

## Frame A Armature Voltage Feedback Circuit Terminal Block Location

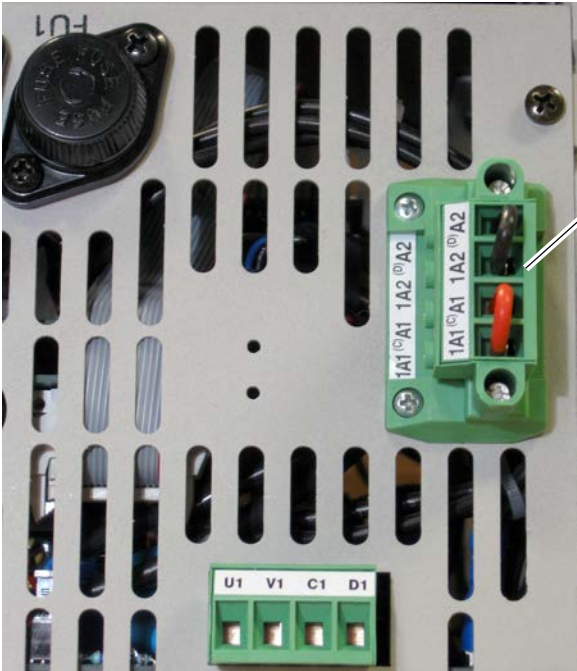
### Bottom of View of Drives



Shown with terminals jumpered for internal armature voltage feedback.



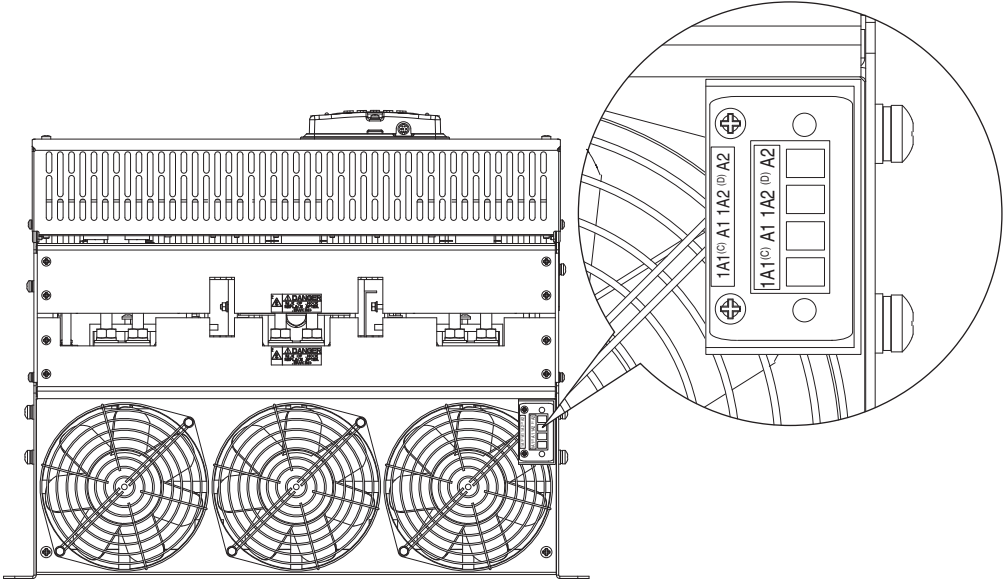
*Frame B Armature Voltage Feedback Circuit Terminal Block Location*



**Top of Drive**

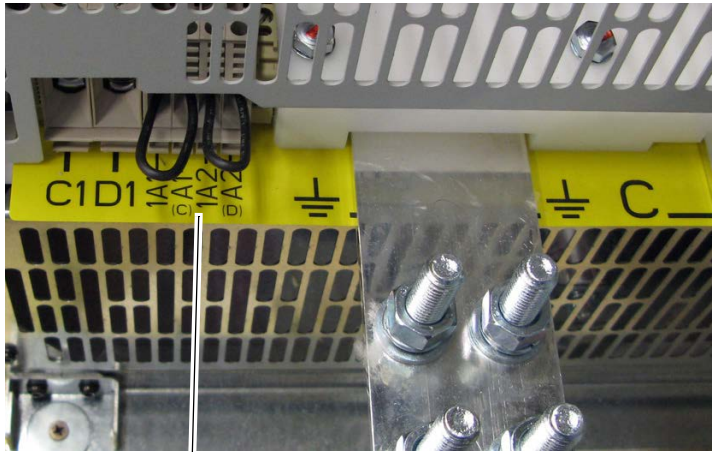
Shown with terminals jumpered for internal armature voltage feedback.

*Frame C Armature Voltage Feedback Circuit Terminal Block Location*



**Bottom of Drive**

### Frame D Armature Voltage Feedback Circuit Terminal Block Location



Shown with terminals jumpered for internal armature voltage feedback.

**Bottom of Drive,  
Left Side**

## Field Converter Connections

For only 575V or 690V AC input drives, a step-down transformer with the following specifications must be installed before the input to the field control circuit (terminals U1, V1):

- For a 150V motor field, use a step-down transformer with a 230VAC secondary
- For a 300V motor field, use a step-down transformer with a 460VAC secondary

Also, If the rated voltage of the DC motor field is not compatible with the field DC output voltage of the drive, an external field control transformer must be used. See the following example for transformer selection information.

Example: 10 Hp, 240V Armature, 17.2A, 240V Field, 2.0 A motor

- The field control transformer must have a 230V primary, a 460V secondary, and be single-phase, 60 Hz
- $kVA = 2 \text{ A} \times 460\text{VAC} \times 1.5 = 1.38 \text{ kVA}$  (1.5 kVA is closest)

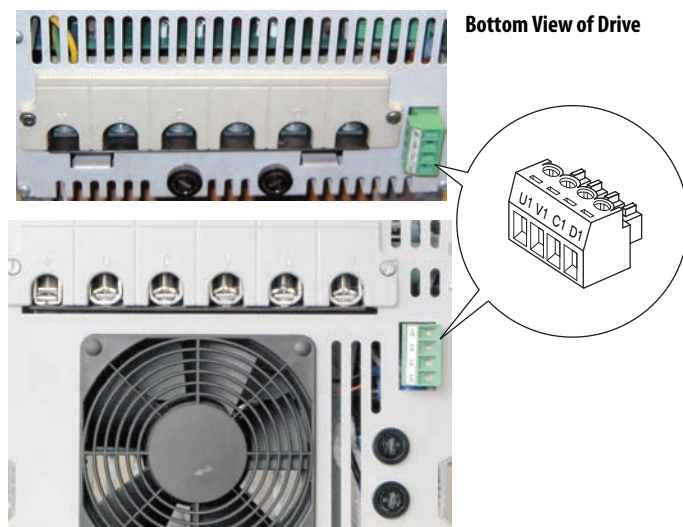
In addition, the following configuration must be completed in the PowerFlex DC drive:

- Control board DIP switch S14 must be set to select a value of 2 A.
- Parameter 374 [Drv Fld Brdg Cur] must be programmed to match DIP switch S14 = “2.”
- Parameter 280 [Nom Mtr Fld Amps] must be programmed to the rated motor nameplate field current “2.”

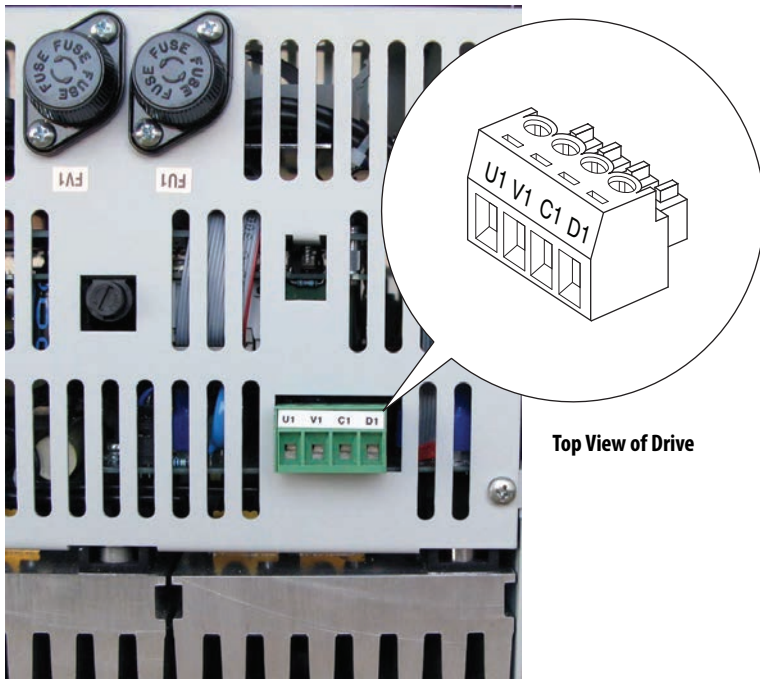
### Field Converter Terminal Designations

Terminal	Description
U1, V1	Single-phase AC line input power to the field circuit.
C1, D1	DC output power to the motor field.

### Frame A Field Circuit Terminal Block Location

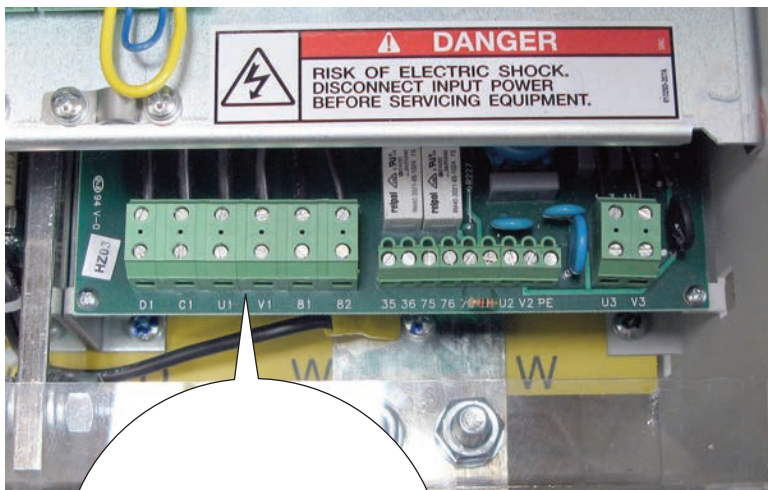


### Frame B Field Circuit Terminal Block Location



Top View of Drive

### 230V/460V AC Input Frame C Field Circuit Terminal Block Location



Front View of Drive



## 575V/690V AC Input Frame C Field Circuit Terminal Block Location

Top, Left Side of Drive

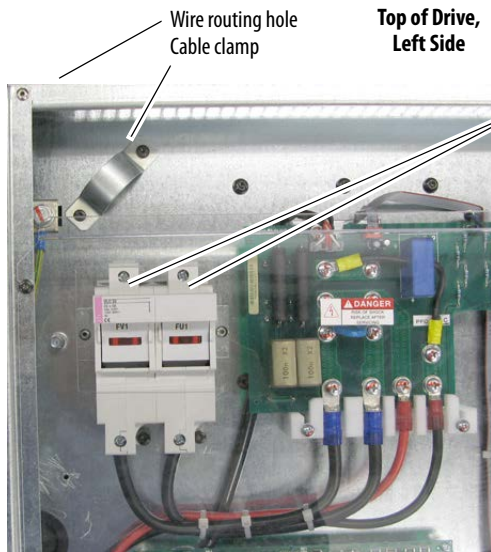


## Frames A...C Field Circuit Wire Sizes and Terminal Specifications

Terminals	Wire Size and Type <sup>(1)</sup>	Tightening Torque N·m (lb·in)
U1, V1, C1, D1	24...10 AWG/kcmils	0.5...0.8 (4.4...7.1)

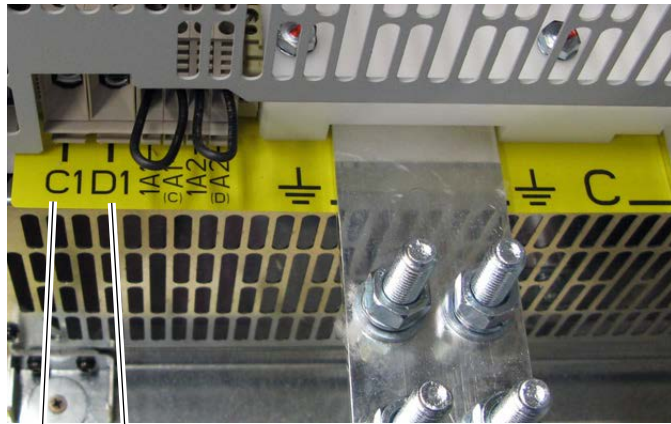
(1) See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

### Frame D Field Circuit Terminal Block Location



AC input for field is at top of fuse holder (marked FU1, FV1)

Shown with control cover removed.  
Remove control cover to access terminals.



C1

D1

Bottom of Drive,  
Left Side

### Frame D Field Circuit Wire Sizes and Terminal Specifications

Drive Current Rating Code <sup>(1)</sup>				Terminals	Wire Size <sup>(2)</sup>	Tightening Torque N-m (lb-in)
230V	460V	575V	690V			
875	830	810	678	U1, V1, C1, D1	6 AWG	4.0 (35.4)
1K0	996	1K0	791			
—	—	1K2	904			
—	—	1K3	1K0			
—	—	1K6	—			
—	1K1	—	1K1			
—	1K3	—	1K2		2 AWG	
—	1K4	—	1K4			
—	—	—	1K5			
—	—	—	—			

(1) See Catalog Number Explanation on page 5, positions 8, 9 and 10 for corresponding drive Hp rating, armature amp rating, and field amp rating.

(2) See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

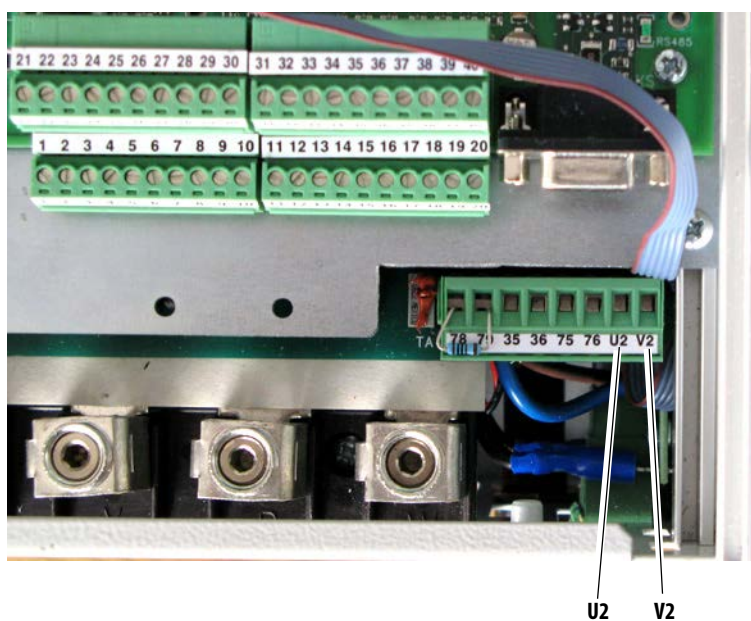
## Control Circuit Input Power

Supply power to the control circuit by using an external 230V AC or 115V AC single phase power supply. For frame B and C drives only, a jumper is required between terminals SA and SB for 115V AC control input power. See Frame B drives SA-SB Terminal Block Location on page [38](#) and Frame C Drives SA-SB Terminal Block Location on page [39](#) for terminal block locations.

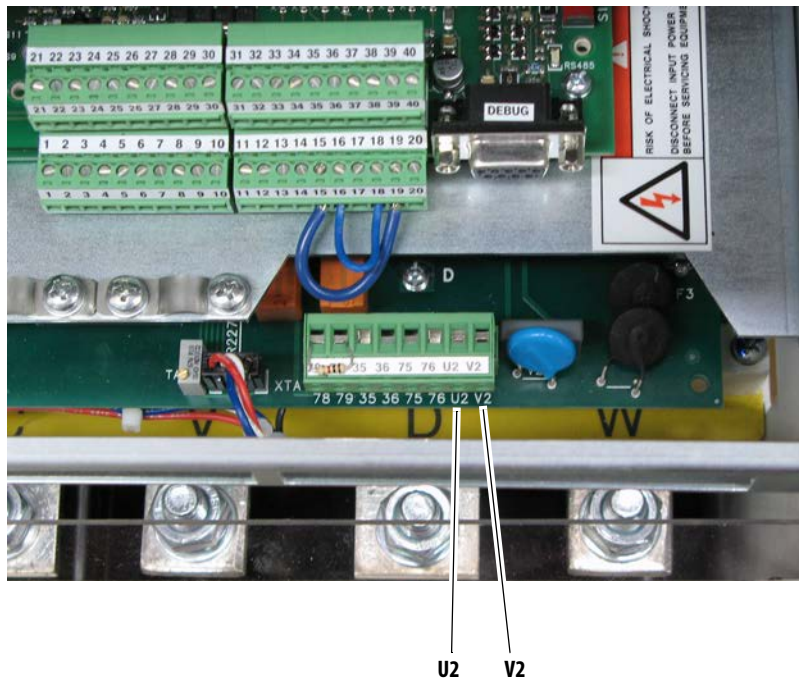
### Control Circuit Terminal Designations

Terminal	Description
U2	Single-phase AC power for the control circuits.
V2	

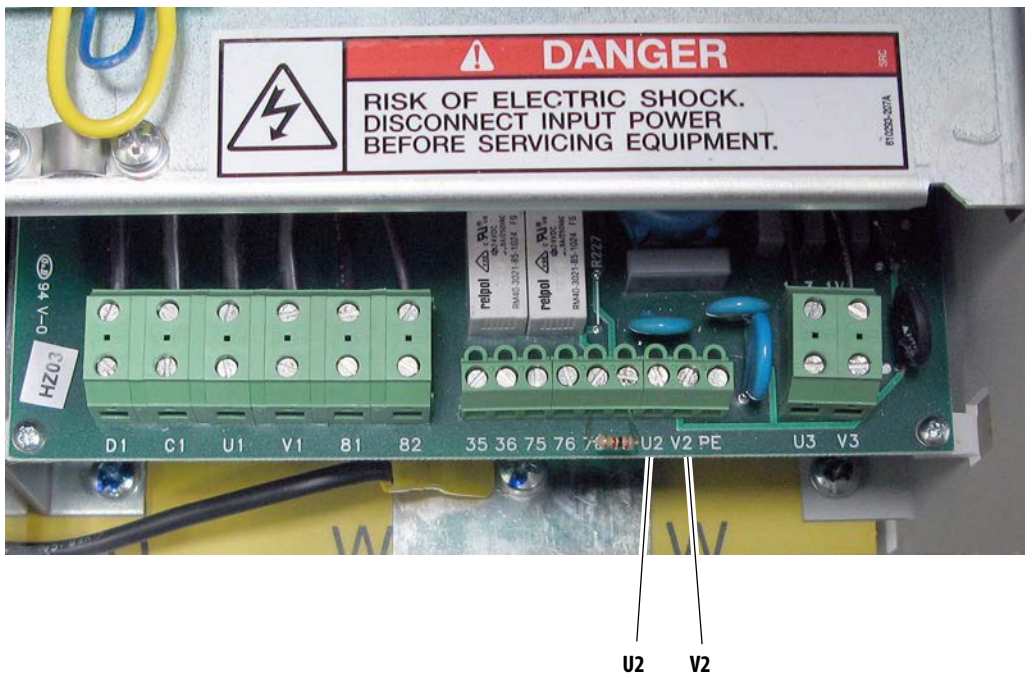
### Frame A Control Circuit Terminal Block Location



### Frame B Control Circuit Terminal Block Location



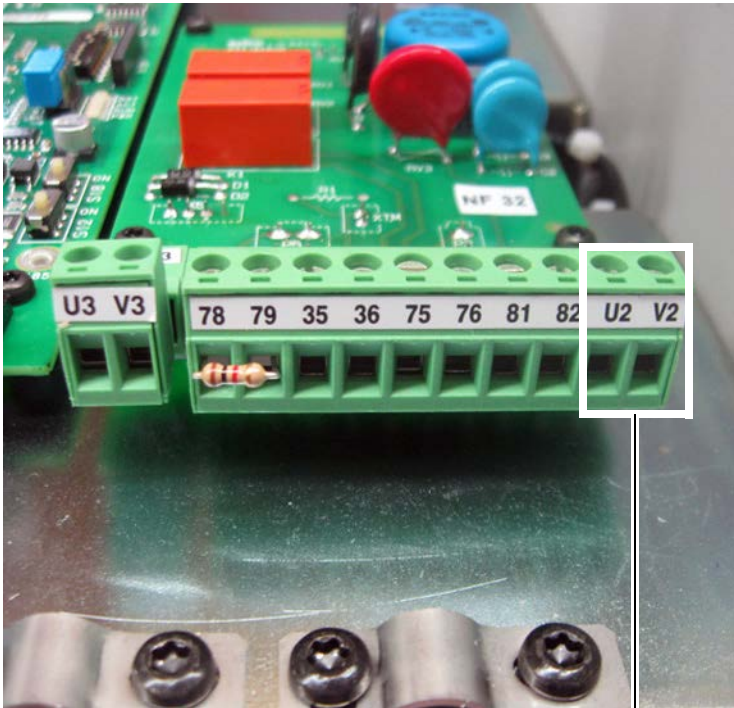
### 230V/460V AC Input Frame C Control Circuit Terminal Block Location





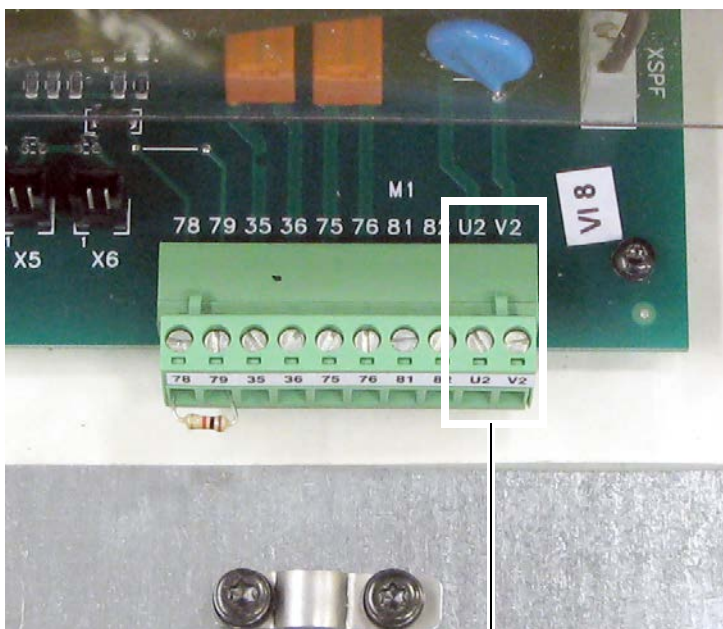
### 575V/690V AC Input Frame C Control Circuit Terminal Block Location

Lower, right side of the control pan.



U2 V2

### Frame D Control Circuit Terminal Block Location



U2 V2

### Control Circuit Wire Sizes

Terminals	Wire Size and Type <sup>(1)</sup>			Tightening Torque N·m (lb·in)
	Flexible (mm <sup>2</sup> )	Multi-core (mm <sup>2</sup> )	AWG	
U2, V2	0.14...1.5	0.14...2.5	26...14	0.5 (4.4)
PE	2.5...10	2.5...10	12...8	2.0 (18.0)

(1) See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

### Frame B drives SA-SB Terminal Block Location

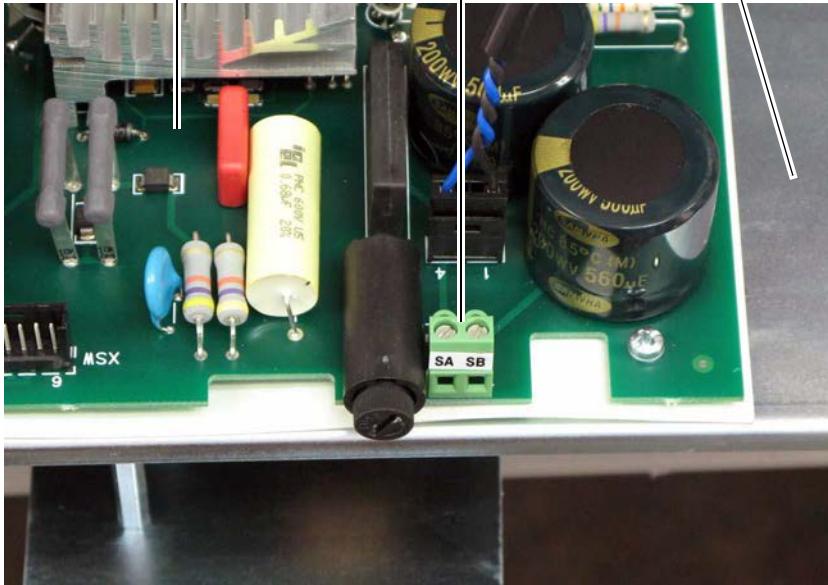


### Frame C Drives SA-SB Terminal Block Location

Switching Power Supply Board  
(on the back of the Control EMI shield)

SA-SB terminals

Control EMI Shield  
(Shown in the open position)



Front of drive that is shown with top protective cover

Control EMI shield



## Frame C Heatsink Cooling Fan Specifications

Frame C drives require an external 230V AC power supply for the heatsink cooling fans. If sourced from the main 3-phase AC input, the power supply connections must be taken from the primary side of the installed Isolation Transformer or Line Reactor (clean power).

In addition, the fan power input terminals U3 and V3 are required to be short circuit protected. This protection can be provided by using a circuit breaker or fuses.

- If a circuit breaker is used, it must be rated for the short circuit available current of the feeder source for this circuit and the inrush current of the fan. Size the circuit breaker to protect the wiring from the circuit breaker connections to terminals U3 and V3, and not nuisance trip or blow from the inrush current.
- If fuses are used, they must be rated for either 230V AC, 2.0 Amps (slow blow).

### Frame C Heatsink Cooling Fans Terminal Designations

Terminal	Description	Maximum Voltage	Maximum Current
U3	Single-phase AC input power for cooling fans.	230V AC	1 A
V3			

### Frame C Heatsink Cooling Fans Wire Sizes and Terminal Specifications

Terminals	Wire Size and Type <sup>(1)</sup>			Tightening Torque N·m (lb·in)
	Flexible (mm <sup>2</sup> )	Multi-core (mm <sup>2</sup> )	AWG	
U3, V3	0.14...1.5	0.14...2.5	26...16	0.4 (3.5)

(1) See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

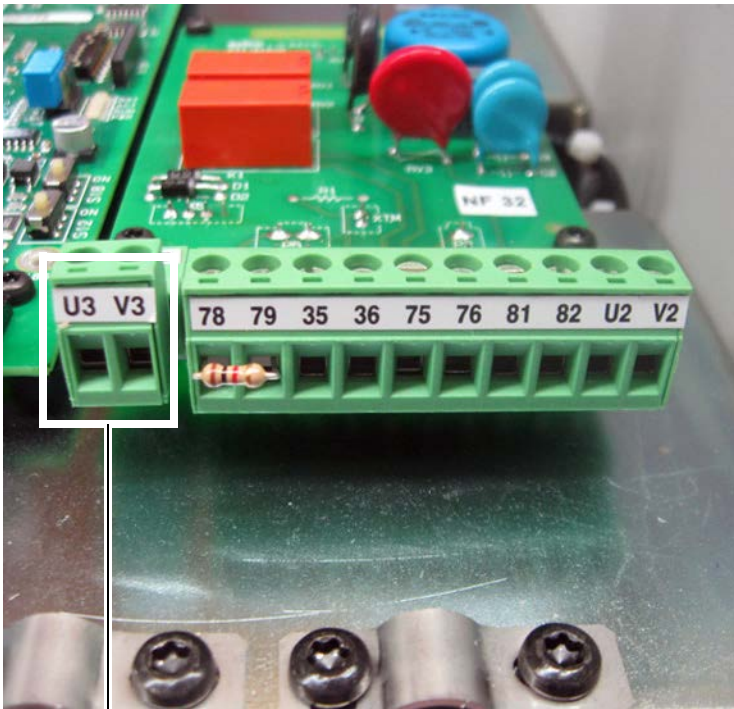
### 230V/460V AC Input Frame C Heatsink Cooling Fan Terminal Block Location





### 575V/690V AC Input Frame C Heatsink Cooling Fan Terminal Block Location

Lower, right side of the control pan.



U3 V3

## Frame D, Series B Heatsink Cooling Fan Specifications


The frame D, series B drive cooling fan requires three phase (50/60 Hz), 400...460V AC input power. If sourced from the main three phase AC input, the power supply connections must be taken from the primary side of the installed isolation transformer or line reactor (clean power).

The cooling fan power input terminals U3, V3, and W3 are required to be short circuit protected. This protection can be provided by using a circuit breaker or fuses.

- If a circuit breaker is used, it must be rated for the short circuit available current of the feeder source for this circuit and the inrush current of the fan. Size the circuit breaker to protect the wiring from the circuit breaker connections to terminals U3, V3, and W3, and not nuisance trip or blow from the inrush current.
- If fuses are used, they must be rated for either 400V AC, 2.5 Amps (slow blow), or 460V AC, 3.15 Amps (slow blow).

A normally closed (N.C.) contact wired to terminals 31 and 32 of the fan terminal block can be connected to an external device to provide indication of a fan supply failure or can be wired to drive digital input terminals that are configured for 14 “Aux Fault” (via Pars 133...144).

**Table 1 - Frame D, Series B Heatsink Cooling Fan Terminal Designations**

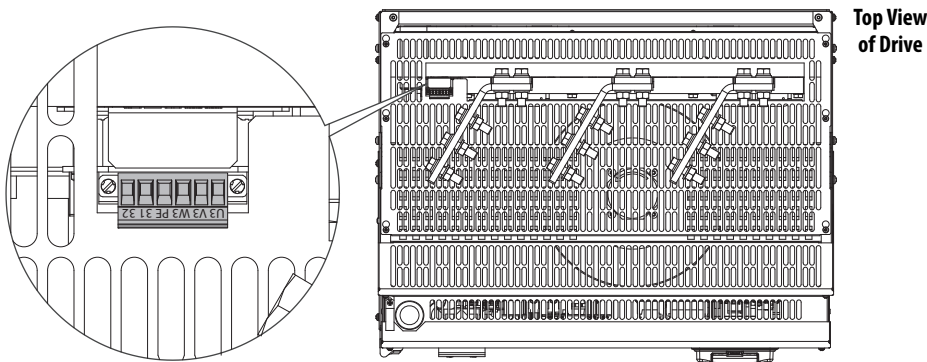
Terminal Block	Terminal	Description	AC Voltage	Max Current
	U3	Three-phase AC input power connections	400...460V AC (50/60 Hz)	1.5 A
	V3			
	W3			
	PE	Safety ground	–	–
	31	Normally closed contact	250V AC	1 A
	32			

**Table 2 - Frame D Heatsink Cooling Fan Signal Wire Sizes and Terminal Specifications**

Terminals	Wire Size and Type <sup>(1)</sup>			Tightening Torque N-m (lb-in)
	Flexible (mm <sup>2</sup> )	Multi-core (mm <sup>2</sup> )	AWG	
U3, V3, W3, 31, 32, PE	0.14...1.5	0.14...2.5	28...12	0.5...0.6 (4.4...5.3)

(1) See Cable and Wiring Recommendations in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information.

**Figure 1 - Frame D, Series B Heatsink Cooling Fan Terminal Block Location**



## Frame C and D Armature Fuse Signal Terminals

Terminals 81 and 82 on frame C and D drives are connected to the internal armature circuit protection fuses and can be connected to an external device to provide indication that the fuses have opened. Alternatively, terminals 81 and 82 can be wired to drive digital input terminals that are configured for 64 “Invert Flt” (via Pars 133...144).

### Armature Fuse Signal Terminal Designations

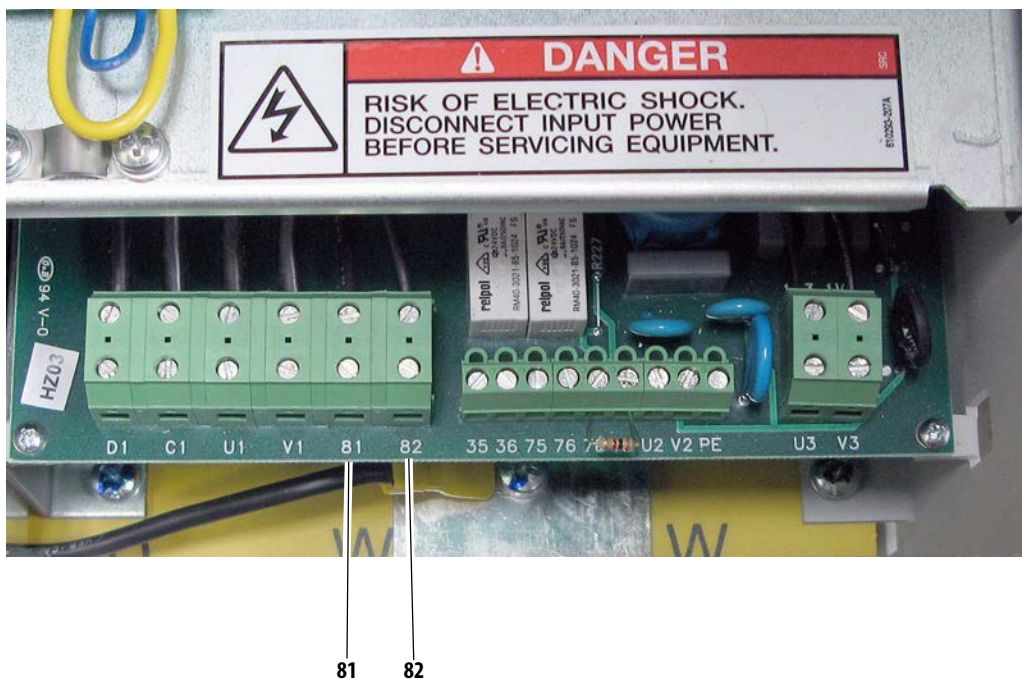
Terminal	Description	Maximum Voltage	Maximum Current
81	Internal armature fuse intervention signal.	250V AC	1 A
82			

### Armature Fuse Signal Wire Size and Terminal Specifications

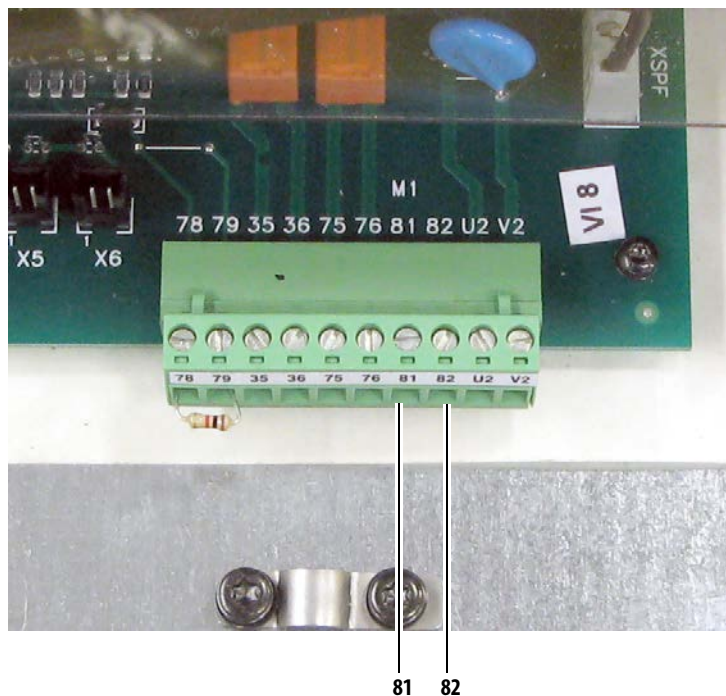
Terminals	Wire Size and Type <sup>(1)</sup>			Tightening Torque N·m (lb·in)
	Flexible (mm <sup>2</sup> )	Multi-core (mm <sup>2</sup> )	AWG	
81, 82	0.14...1.5	0.14...2.5	26...16	0.4 (3.5)

(1) See “Cable and Wiring Recommendations” in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

### Frame C Internal Armature Fuse Signal Terminal Block Location



### Frame D Internal Armature Fuse Signal Terminal Block Location



## Relay Outputs

Terminals 35 and 36 and 75 and 76 are N.O. relay outputs. The relay output between terminals 35 and 36 is configured with parameter 1392 [Relay Out 1 Sel]. The relay output between terminals 75 and 76 is configured with parameter 629 [Relay Out 2 Sel]. See “Using Contactors” in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information.

## Thermistors and Thermal Switches

To detect motor overheating and protect the motor from overloading, an external, user-supplied thermistor (PTC) or thermal switch must be connected to terminals 78 and 79. The drive’s response to a motor over temperature fault is configured in parameter 365 [OverTemp Flt Cfg]. If a temperature sensor is not used, a 1 k $\Omega$  resistor must be connected between terminals 78 and 79 (installed at the factory). The instructions for installing a thermal sensor are detailed here.

### Thermistors (PTC)

PTC thermistors that are fitted in the motor can be connected directly to the drive via terminals 78 and 79. In this case, the 1 k $\Omega$  resistor is not required between terminals 78 and 79.

### Thermal Switches (Klixon) in the Motor Windings

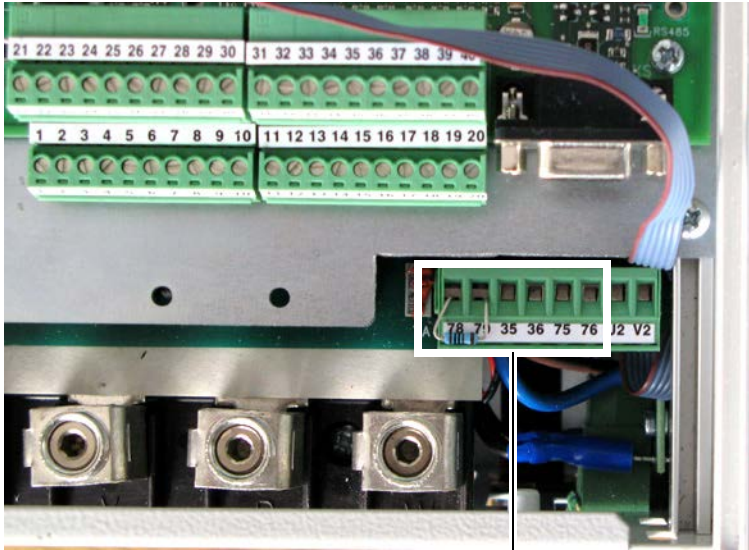
Klixon type temperature-dependent contacts can disconnect the drive from the motor via an external control or can be configured as an external fault using a digital input on drive. They can also be connected to terminals 78 and 79 to indicate a drive “Motor Over Temp” fault (F16). However, this configuration is not recommended due to the noise sensitivity of the current threshold circuitry. If a thermal switch is used, a 1 k $\Omega$  resistor must be placed in series between the switch and one of the terminals.



## Contact Relay and Thermistor Terminal Designations

Terminal	Description
35	Normally open contact. Configured with parameter 1392 [Relay Out 1 Sel] - set to 25 "Contactor" by default.
36	
75	Normally open contact. Configured with parameter 629 [Relay Out 2 Sel] - set to 5 "Ready" by default.
76	
78	Motor thermistor connections (PTC)
79	

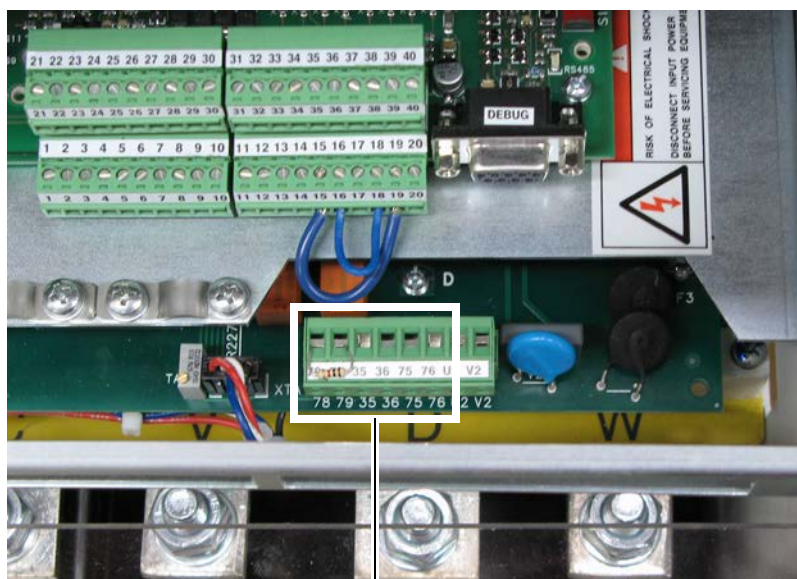
## Frame A Contact Relay and Thermistor Terminal Block Locations



Note: Terminals 78 and 79 shown with 1k ohm resistor in place of temperature sensor.

**78 79 35 36 75 76**

## Frame B Contact Relay and Thermistor Terminal Block Locations



**78 79 35 36 75 76**

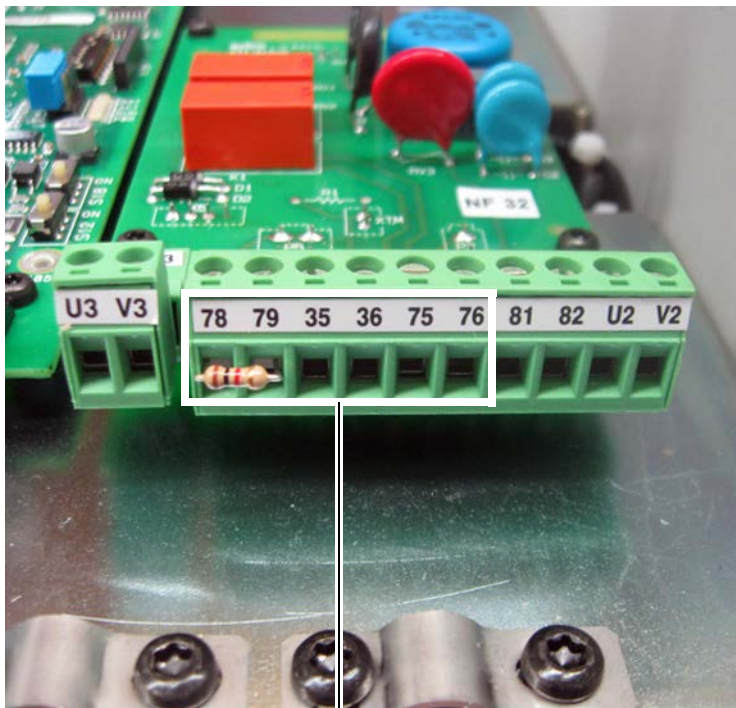
### 230V/460V AC Input Frame C Contact Relay and Thermistor Terminal Block Locations



35 36 75 76 78 79

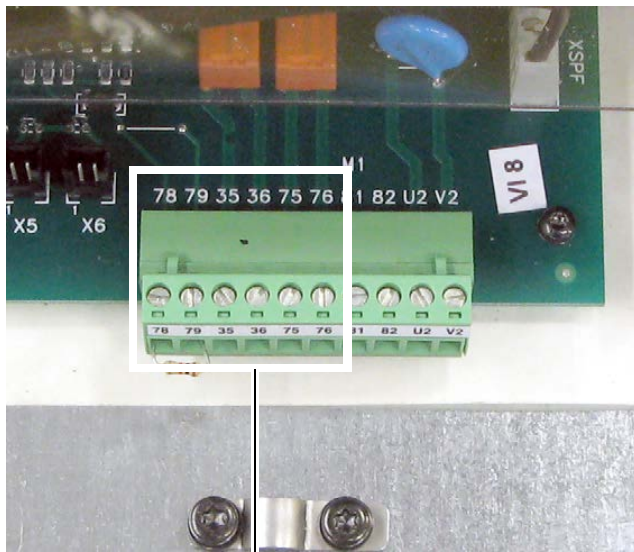
### 575V/690V AC Input Frame C Contact Relay and Thermistor Terminal Block Locations

Lower, right side of the control pan.



78 79 35 36 75 76

### Frame D Contact Relay and Thermistor Terminal Block Locations



78 79 35 36 75 76

On control pan to the left of the HIM cradle.

### Recommended Signal Wire Size for Relay Outputs and Thermistor/Thermal Switch Terminals

Signal Type	Terminals	Wire Size and Type <sup>(1)</sup>			Tightening Torque N·m (lb·in)
		Flexible (mm <sup>2</sup> )	Multi-core (mm <sup>2</sup> )	AWG	
Relay Outputs	35 & 36, 75 & 76	0.140...1.500	0.140...1.500	26...14	0.5 (4.4)
Thermistor and Thermal Switches	78 & 79				

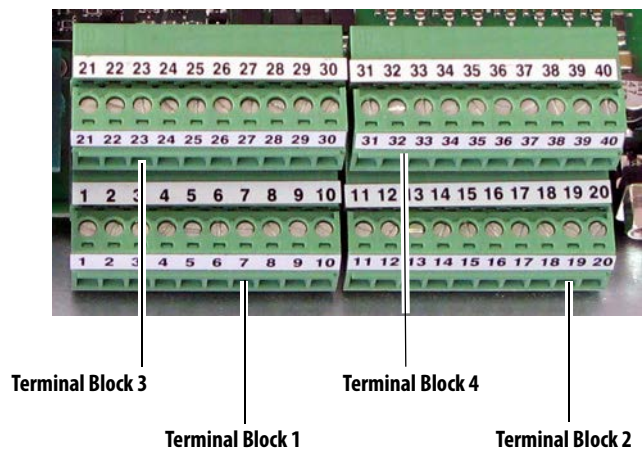
(1) See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

## I/O Signal and Control Wiring

Eight digital inputs, four digital outputs, three analog inputs, and two analog outputs are available on the standard I/O terminal blocks that are provided with the drive. One digital input (1...8) must be configured for “Enable”.

More digital and analog I/O is available when using the optional I/O expansion circuit board. See Appendix F - “Optional Analog and Digital I/O Expansion Circuit Board”, in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information. You can also use the optional 115V AC converter circuit board to convert 115V AC to 24V DC digital inputs signals to interface with the digital inputs on the standard I/O terminal blocks. See Appendix G Optional 115V AC to 24V DC I/O Converter Circuit Board in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information. All I/O terminal blocks are on the control board.

### I/O Terminal Block Locations



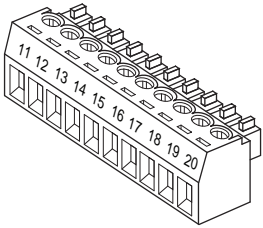
### I/O Terminal Block 1 Designations

No.	Signal	Description	Factory Default	Related Parameter
1	Analog Input 1 (+)	Isolated <sup>(1)</sup> , bipolar, differential,	1 “Speed Ref A”	70 [Anlg In1 Sel]
2	Analog Input 1 (-)	$\pm 10V / 0 \dots 20 \text{ mA}$ , or $4 \dots 20 \text{ mA}$ .		
3	Analog Input 2 (+)	<b>Important:</b> $0 \dots 20 \text{ mA}$ or $4 \dots 20 \text{ mA}$ operation requires that switch S9, S10, and S11 on the Control board be in the “Off” position. Drive damage can occur if the switch is not in the correct position that is based on the type of input signal. See “DIP Switch and Jumper Settings” in the PowerFlex Digital DC Drive User Manual, publication <a href="#">20P-UM001</a> . Max $\pm 10V$ , Max $0.25 \text{ mA}$ .	0 “Off”	75 [Anlg In2 Sel]
4	Analog Input 2 (-)			
5	Analog Input 3 (+)		0 “Off”	80 [Anlg In3 Sel]
6	Analog Input 3 (-)			
7	+10V Pot Reference	$2 \dots 5 \text{ k ohm}$ load. Max $\pm 10V$ , Max $10 \text{ mA}$ .	–	–
8	-10V Pot Reference			
9	Pot Common	For (+) and (-) 10V pot references.	–	–
10	PE ground	PE ground to drive chassis.	–	–

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

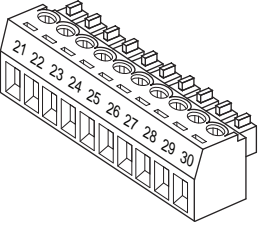


## I/O Terminal Block 2 Designations



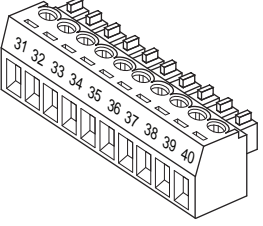
No.	Signal	Description	Factory Default	Related Parameter
11	Internal 0V		–	–
12	Digital Input 1	Max Volt. +30V, Max Cur. 15V/3.2mA, 24V/5mA, and 30V/6.4mA.	2 "Stop/CF"	133 [Digital In1 Sel]
13	Digital Input 2		3 "Start"	134 [Digital In2 Sel]
14	Digital Input 3		11 "Jog"	135 [Digital In3 Sel]
15	Digital Input 4	A digital input (1...8) must be configured for "Enable".	1 "Enable"	136 [Digital In4 Sel]
16	Digital Input Common	<b>Important:</b> When using the internal +24V DC supply (terminal 19) for digital inputs 1...4, you must connect the digital input common (terminal 16) to the +24V supply common (terminal 18).	–	–
17	Not Used		–	–
18	24V Supply Common	Common for the internal power supply.	–	–
19	Internal +24V DC Supply	Drive supplied +24V DC I/O power. Max. +20...30V, 200 mA <b>Note:</b> The total current draw is the sum of encoder power, digital outputs, and any other loads that are connected to terminal 19.	–	–
20	PE ground	PE ground to drive chassis.	–	–

## I/O Terminal Block 3 Designations



No.	Signal	Description	Factory Default	Related Parameter
21	Analog Output 1 (+)	Max. ±10V, Max. 5 mA.	12 "Motor Speed"	66 [Anlg Out1 Sel]
22	Analog Output 1 (–)			
23	Analog Output 2 (+)		13 "Motor Curr"	67 [Anlg Out2 Sel]
24	Analog Output 2 (–)			
25	Digital Output Common		–	–
26	Digital Output 1	Max. +30V, Max 50 mA	5 "Ready"	145 [Digital Out1 Sel]
27	Digital Output 2		9 "Fault"	146 [Digital Out2 Sel]
28	Digital Output 3		2 "Spd Thresh"	147 [Digital Out3 Sel]
29	Digital Output 4		4 "CurrentLimit"	148 [Digital Out4 Sel]
30	Digital Output +24V DC Source	Tie point for the internal supply or customer supplied voltage for the digital outputs. Max. +30V DC, 80 mA. <b>Important:</b> When using the internal +24V DC supply (terminal 19) for digital outputs 1...4, you must connect terminal 19 to terminal 30 and the digital output common (terminal 25) to the +24V supply common (terminal 18).	–	–

## I/O Terminal Block 4 Designations



No.	Signal	Description	Factory Default	Related Parameter
31	Digital Input 5	Max Volt. +30V, Max Cur. 15V/3.2mA, 24V/5mA, and 30V/6.4mA.	17 "Speed Sel 1"	137 [Digital In5 Sel]
32	Digital Input 6		18 "Speed Sel 2"	138 [Digital In6 Sel]
33	Digital Input 7		19 "Speed Sel 3"	139 [Digital In7 Sel]
34	Digital Input 8	A digital input (1...8) must be configured for "Enable".	31 "Contactor"	140 [Digital In8 Sel]
35	Digital Input Common	<b>Important:</b> When using the internal +24V DC supply (terminal 19) for digital inputs 5...8, you must connect the digital input common (terminal 35) to the +24V supply common (terminal 18).	–	–
36	Not Used		–	–
...				
40				

## Recommended Signal Wire Size for Analog I/O and Digital I/O

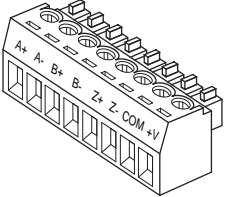
Signal Type	Terminal Block (Terminals)	Wire Size and Type <sup>(1)</sup>			Tightening Torque N·m (lb·in)
		Flexible (mm <sup>2</sup> )	Multi-core (mm <sup>2</sup> )	AWG	
Analog and Digital I/O	TB1...4 (1...40)	0.140...1.500	0.140...1.500	26...16	0.4 (3.5)

(1) See "Cable and Wiring Recommendations" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for cable spacing information.

## Digital Encoder Terminal Block

Always connect the encoder connection cables directly to the terminals on the encoder terminal block. The encoder cable must be composed of twisted pairs with the shield connected to the shield ground on the drive side. Do not connect the shield to ground on the motor side. In some cases (i.e., cable lengths that exceed 100 meters), it can be necessary to ground the shield of each twisted pair on the power supply. See Appendix A of the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for Digital Encoder specifications.

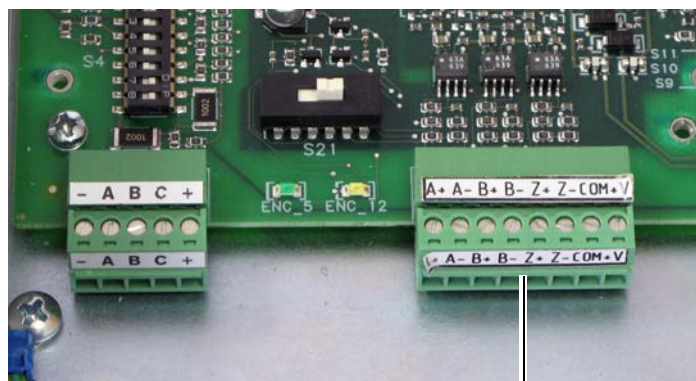
### Digital Encoder Terminal Designations

Terminal Block	Label	Signal	Description
	A+	Encoder A	Single channel or quadrature A input
	A-	Encoder A (NOT)	
	B+	Encoder B	Dual channel quadrature B input
	B-	Encoder B (NOT)	
	Z+	Encoder Z	Pulse, marker or registration input <sup>(2)</sup>
	Z-	Encoder Z (NOT)	
	COM	+5/12...15V <sup>(1)</sup> DC Return	Internal power common
	+V	+5/12...15V <sup>(1)</sup> DC Power	Internal power source 200 mA

(1) Selectable via switch S21 on the Control board. See "DIP Switch and Jumper Settings" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information.

(2) Selectable via switch S20 on the Control board. See "DIP Switch and Jumper Settings" in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information.

### Digital Encoder Terminal Block Location



Digital Encoder terminal block

### Sample Encoder Power Wiring

Power Source	Connection Example
<b>Internal Drive Power<sup>(1)</sup></b> Internal (drive) +5/12...15V DC, 200 mA	
<b>External Power Source</b>	

(1) Shield connection is on the drive Control EMI Shield. See Digital Encoder Terminal Block Location on page 50.

### Sample Encoder Signal Wiring

Encoder Signal	Connection Example
<b>Single-Ended, Dual Channel</b>	
<b>Differential, Dual Channel</b>	

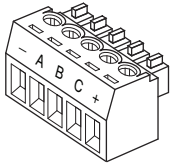
## DC Analog Tachometer Terminal Block



**ATTENTION:** The Drive can overspeed if DIP switch S4 is set incorrectly, or the tachometer is wired incorrectly. Failure to do so could result in damage to, or destruction of, the equipment.

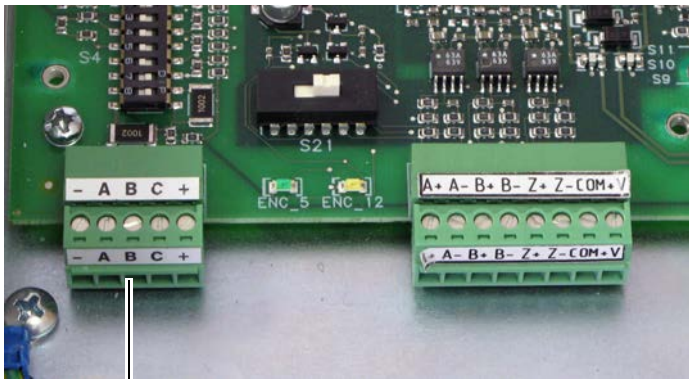
### DC Analog Tachometer Terminal Designations

No.	Signal	Description
–	Negative input	–
A	(Not Used)	
B		
C		
+	Positive input Feedback polarity is determined during the start-up routine.	22.7 / 45.4 / 90.7 / 181.6 / 302.9V <sup>(1)</sup> max voltage 8 mA max current



(1) Maximum voltage depends on the configuration of DIP switch S4. See the PowerFlex® Digital DC Drive User Manual, publication [20P-UM001](#) for information on jumper settings.

### Analog Tachometer Terminal Block Location



Analog Tachometer terminal block

### Recommended Signal Wire Size for DC Analog Tachometer

Signal Type	Terminal Block (Terminals)	Wire Type and Size <sup>(1)</sup>			Tightening Torque N·m (lb·in)
		Flexible (mm <sup>2</sup> )	multi-core (mm <sup>2</sup> )	AWG	
DC Analog Tach	M3 (+ and –)	0.140...1.500	0.140...1.500	26...16	0.4 (3.5)

(1) See “Cable and Wiring Recommendations in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#).

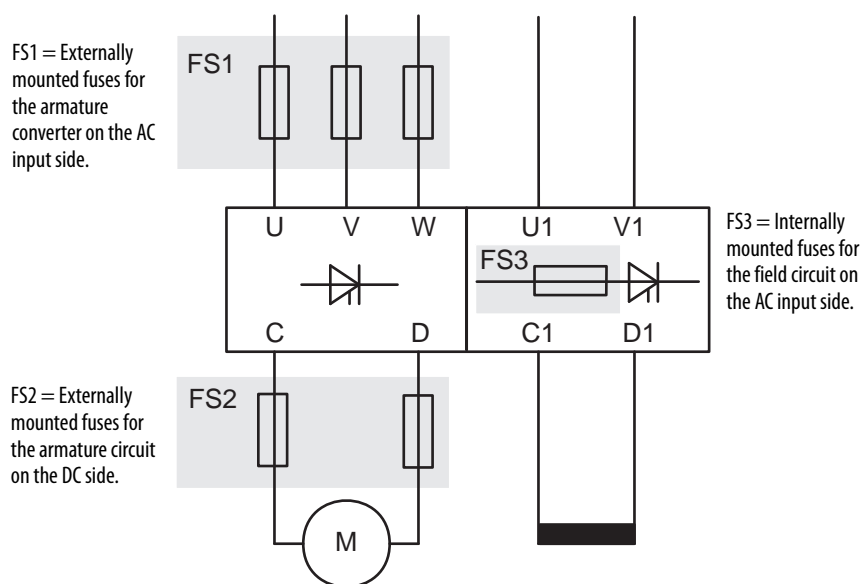
## Resolver Feedback Module

The resolver feedback module (catalog number 20P-RES-A0), which provides a drive interface to a selection of compatible resolvers, must be ordered and purchased separately from the drive. The resolver option module includes the PowerFlex DC Drive Resolver Feedback Module Installation Instructions, publication 20P-IN071, which provides installation and wiring information. See “Resolver Type Selection” in the PowerFlex Digital DC Drive User Manual, publication [20P-UM001](#), for more information on compatible resolvers.

## Circuit Protection

The tables on the following pages provide the fuses required for protecting the armature and field circuits. Externally mounted fuses (as indicated in Frame A and B Fuse Designations) must be sourced separately when installing the drive. Internally mounted fuses are provided with the drive. See page 59 for frames C and D fuse information.

### Frame A and B Fuse Information



### Frame A and B AC Input Line Fuses

AC input line fuses are externally mounted for frame A and B drives and must be sourced separately. See Fuse Code FS1 in Frame A and B Fuse Information on page 53.

#### 230V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann		Mersen	
				Ferrule FWP Type	North American FWP Type	Ferrule A70QS Type	North American A70P / A70QS Type
A	7P0	7	5.7	FWP-10A14F	FWP-10B	A70QS10-14F	A70P10-4
	9P0	9	7.4	FWP-15A14F	FWP-15B	A70QS16-14F	A70P15-4
	012	12	9.8	FWP-20A14F	FWP-20B	A70QS20-14F	A70P20-4
	020	20	16	FWP-25A14F	FWP-25B	A70QS25-14F	A70P25-4
	029	29	24	FWP-40A22F	FWP-40B	A70QS40-22F	A70QS40-4
	038	38	31	FWP-63A22F	FWP-60B	A70QS63-22F	A70QS60-4
	055	55	45	FWP-80A22F	FWP-80B	A70QS80-22F	A70QS80-4
	073	73	60	–	FWP-100A	–	A70QS100-4K
	093	93	76	–	FWP-150A	–	A70QS150-4K
	110	110	90	–	FWP-175A	–	A70QS175-4K

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann		Mersen	
				Ferrule FWP Type	North American FWP Type	Ferrule A70QS Type	North American A70P / A70QS Type
B	146	146	119	—	FWP-250A	—	A70QS250-4
	180	180	147	—	FWP-300A	—	A70QS300-4
	218	218	178	—	FWP-350A	—	A70QS350-4
	265	265	217	—	FWP-400A	—	A70QS400-4
	360	360	294	—	FWP-600A	—	A70QS600-4K
	434	434	355	—	FWP-600A	—	A70QS600-4

#### 460V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann		Mersen	
				Ferrule FWP Type	North American FWP Type	Ferrule A70QS Type	North American A70P / A70QS Type
A	4P1	4.1	3.3	FWP-10A14F	FWP-10B	A70QS10-14F	A70P10-4
	6P0	6	4.9	FWP-10A14F	FWP-10B	A70QS10-14F	A70P10-4
	010	10	8.2	FWP-20A14F	FWP-20B	A70QS20-14F	A70P25-4
	014	14	11.4	FWP-25A14F	FWP-25B	A70QS25-14F	A70P25-4
	019	19	15.5	FWP-25A14F	FWP-25B	A70QS25-14F	A70P25-4
	027	27	22.1	FWP-40A22F	FWP-40B	A70QS40-22F	A70QS40-4
	035	35	28.6	FWP-63A22F	FWP-60B	A70QS63-22F	A70QS60-4
	045	45	36.8	FWP-80A22F	FWP-80B	A70QS80-22F	A70QS80-4
	052	52	42.5	FWP-80A22F	FWP-80B	A70QS80-22F	A70QS80-4
	073	73	59.6	—	FWP-100A	—	A70QS100-4K
	086	86	70.3	—	FWP-150A	—	A70QS150-4K
	100	100	81.7	—	FWP-175A	—	A70QS175-4K
	129	129	105.4	—	FWP-175A	—	A70QS175-4K
B	167	167	136.4	—	FWP-300A	—	A70QS300-4
	207	207	169.1	—	FWP-350A	—	A70QS350-4
	250	250	204.3	—	FWP-400A	—	A70QS400-4
	330	330	269.6	—	FWP-600A	—	A70QS600-4K
	412	412	336.6	—	FWP-600A	—	A70QS600-4

#### 575V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann	Mersen
				North American FWP Type	North American A70QS Type
B	067	67.5	55.1	FWP-100A	A70QS100-4
	101	101.3	82.7	FWP-175A	A70QS175-4K
	135	135	110.3	FWP-225A	A70QS225-4
	270	270	220.6	FWP-450A	A70QS450-4
	405	405	330.9	FWP-600A	A70QS600-4K

#### Frame A and B Armature DC Output Fuses

Armature DC output fuses are externally mounted for frame A and B drives and must be sourced separately. These fuses are required on four quadrant drives only, but highly recommended on two quadrant drives. See Fuse Code FS2 in Frame A and B Fuse Information on page [53](#).

## 230V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann		Mersen	
				Ferrule FWP Type	North American FWP Type	Ferrule A70QS Type	North American A70P / A70QS Type
A	7P0	7	5.7	FWP-15A14F	FWP-15B	A70QS16-14F	A70P15-4
	9P0	9	7.4	FWP-20A14F	FWP-20B	A70QS20-14F	A70P20-4
	012	12	9.8	FWP-25A14F	FWP-25B	A70QS25-14F	A70P25-4
	020	20	16	FWP-40A14F	FWP-40B	A70QS40-14F	A70QS40-4
	029	29	24	FWP-63A22F	FWP-60B	A70QS63-22F	A70QS60-4
	038	38	31	FWP-80A22F	FWP-80B	A70QS80-22F	A70QS80-4
	055	55	45	–	FWP-125A	–	A70QS125-4K
	073	73	60	–	FWP-150A	–	A70QS150-4K
	093	93	76	–	FWP-200A	–	A70QS200-4K
	110	110	90	–	FWP-225A	–	A70QS250-4
B	146	146	119	–	FWP-300A	–	A70QS300-4
	180	180	147	–	FWP-350A	–	A70QS350-4
	218	218	178	–	FWP-450A	–	A70QS450-4
	265	265	217	–	FWP-600A	–	A70QS600-4K
	360	360	294	–	FWP-700A	–	A70QS700-4
	434	434	355	–	FWP-900A	–	A70P900-4

## 460V AC Input Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann		Mersen	
				Ferrule FWP Type	North American FWP Type	Ferrule A70QS Type	North American A70P / A70QS Type
A	4P1	4.1	3.3	FWP-10A14F	FWP-10B	A70QS10-14F	A70P10-4
	6P0	6	4.9	FWP-15A14F	FWP-15B	A70QS16-14F	A70P15-4
	010	10	8.2	FWP-20A14F	FWP-20B	A70QS20-14F	A70P20-4
	014	14	11.4	FWP-30A14F	FWP-30B	A70QS32-14F	A70P30-4
	019	19	15.5	FWP-40A14F	FWP-40B	A70QS40-14F	A70QS40-4
	027	27	22.1	FWP-63A22F	FWP-60B	A70QS63-22F	A70QS60-4
	035	35	28.6	FWP-80A22F	FWP-70B	A70QS80-22F	A70QS70-4
	045	45	36.8	FWP-100A22F	FWP-90B	–	A70QS90-4
	052	52	42.5	FWP-100A22F	FWP-100B	–	A70QS100-4
	073	73	59.6	–	FWP-150A	–	A70QS150-4K
	086	86	70.3	–	FWP-175A	–	A70QS175-4K
	100	100	81.7	–	FWP-200A	–	A70QS200-4K
	129	129	105.4	–	FWP-250A	–	A70QS250-4
	B	167	167	136.4	–	FWP-350A	–
207		207	169.1	–	FWP-400A	–	A70QS400-4
250		250	204.3	–	FWP-500A	–	A70QS500-4K
330		330	269.6	–	FWP-700A	–	A70QS700-4
412		412	336.6	–	FWP-800A	–	A70QS800-4

**575V AC Input Drives**

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Bussmann	Mersen
				North American FWP Type	North American A70P / A70QS Type
B	067	67.5	55.1	FWP-125A	A70QS125-4K
	101	101.3	82.7	FWP-200A	A70QS200-4K
	135	135	110.3	FWP-250A	A70QS250-4
	270	270	220.6	FWP-600A	A70QS600-4K
	405	405	330.9	FWP-800A	A70QS800-4

*Frame A and B Field Circuit Fuses*

Field circuit fuses are internally mounted and provided with the drive. See Fuse Code FS3 in Frame A and B Fuse Information on page [53](#). Also, see Frame A Field AC Input Line Fuses Location on page [58](#) and Frame B Field AC Input Line Fuses Location on page [58](#) for fuse locations.

**230V AC Input Drives**

Frame	Drive Current Rating Code	Field Amps	Type	Quantity	Bussmann	Mersen	SIBA
A	7P0	10	6 x 32 mm	2	FWH-016A6F	E085449	70 125 40.16
	9P0						
	012						
	020						
	029						
	038						
	055						
	14	073					
		093					
		110					
B	146	20	10 x 38 mm	2	FWC-25A10F	A60Q25-2	60 033 05.25
	180						
	218						
	265						
	360						
	434						



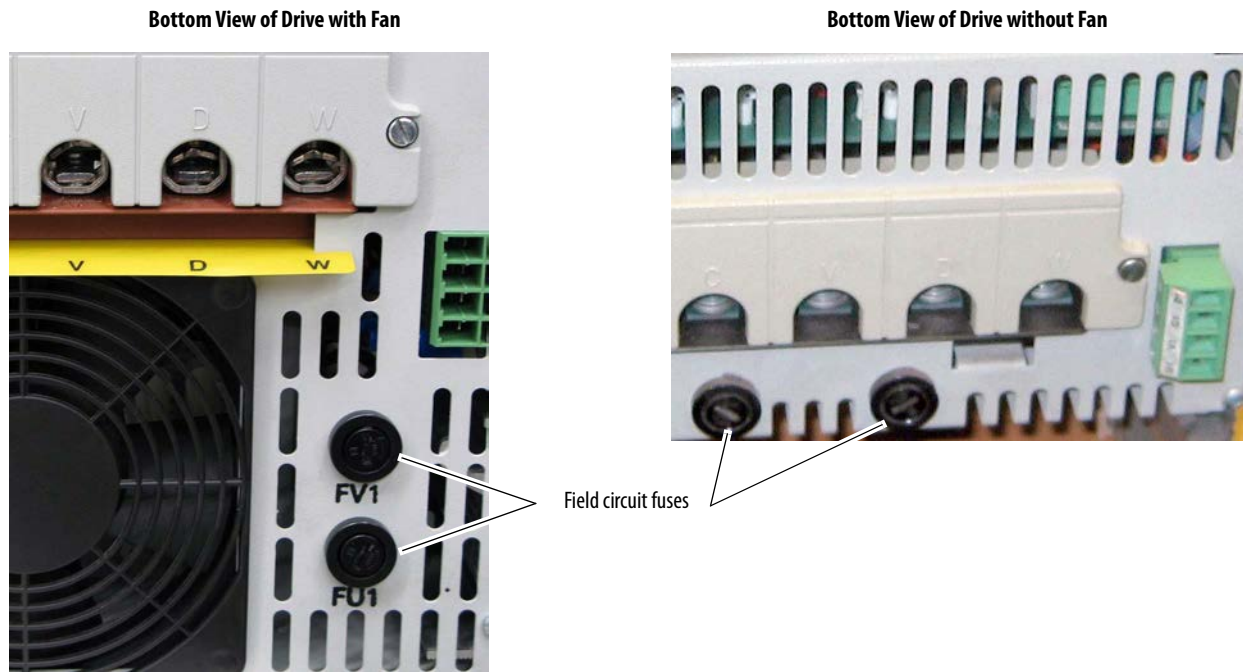
**460V AC Input Drives**

Frame	Drive Current Rating Code	Field Amps	Type	Quantity	Bussmann	Mersen	SIBA	
A	4P1	10	6 x 32 mm	2	FWH-016A6F	E085449	70 125 40.16	
	6P0							
	010							
	014							
	019							
	027							
	035							
	045							
	052							
	073							
	B	086	14					
		100						
		129						
167								
B	207	20	10 x 38 mm	2	FWC-25A10F	A60Q25-2	60 033 05.25	
	250							
	330							
	412							

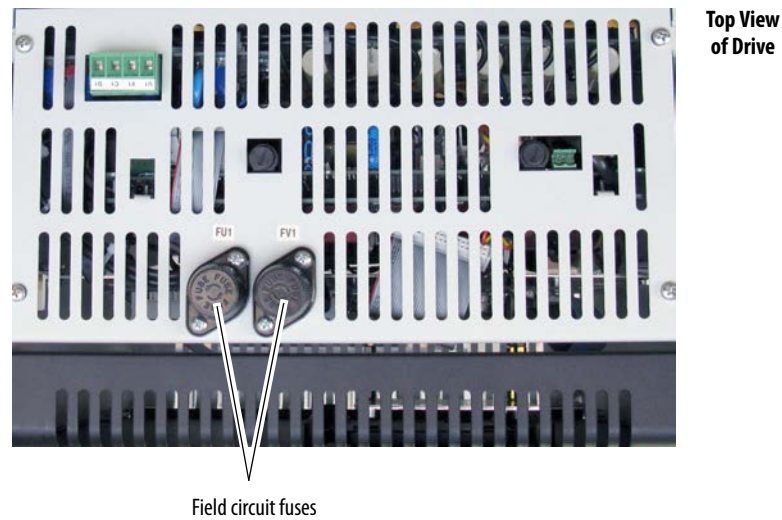
**575V AC Input Drives**

Frame	Drive Current Rating Code	Field Amps	Quantity	Type	Bussmann	Mersen	SIBA
B	067	20	2	10 x 38 mm	FWC-25A10F	A60Q25-2	60 033 05.25
	101						
	135						
	270						
	405						

### Frame A Field AC Input Line Fuses Location

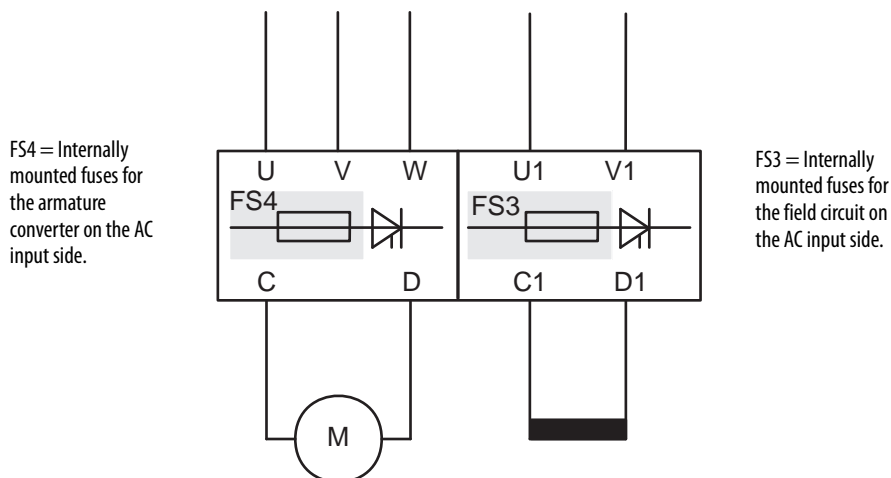


### Frame B Field AC Input Line Fuses Location



## Frame C and D Fuse Information

All fuses for armature and field circuit protection are internally mounted and provided with frame C and D drives.



### Frame C and D Field Circuit Fuses

Field circuit fuses for frames C and D drives are internally mounted (labeled FU1 and FV1) and provided with the drive. See Fuse Code FS3 in Frame C and D Fuse Information on page 59. Also, see Frame C Field Circuit Fuse Location on page 60 and Frame D Field Circuit Fuse Location on page 60 for locations.

#### 230V AC Input Drives

Frame	Drive Current Rating Code	Field Amps	Type	Qty	Bussmann	Mersen	SIBA
C	521	20	10 x 38 mm	2	FWC-25A10F	A60Q25-2	6003305.25
D	875 1K0	40	22 x 58 mm		FWP-50A22F	A70QS50-22F	5014006.50

#### 460V AC Input Drives

Frame	Drive Current Rating Code	Field Amps	Type	Qty	Bussmann	Mersen	SIBA
C	495 667	20	10 x 38 mm	2	FWC-25A10F	A60Q25-2 A60Q25-8	6003305.25
D	830 996 1K1 1K3 1K4	40 70	22 x 58 mm		FWP-50A22F FWP-100A22F	A70QS50-22F A70QS100-22F	5014006.50 5014006.100

#### 575V AC Input Drives

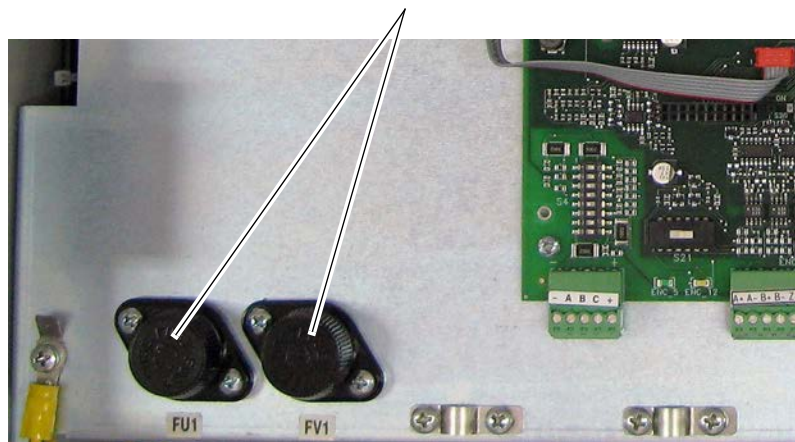
Frame	Drive Current Rating Code	Field Amps	Type	Qty	Bussmann	Mersen	SIBA
C	540 675	20	10 x 38 mm	2	FWC-25A10F	A60Q25-2 A60Q25-8	6003305.25
D	810 1K0 1K2 1K3 1K6	40	22 x 58 mm		FWP-50A22F	A70QS50-22F	5014006.50

**690V AC Input Drives**

Frame	Drive Current Rating Code	Field Amps	Type	Qty	Bussmann	Mersen	SIBA
C	452	20	10 x 38 mm	2	FWC-25A10F	A60Q25-2	6003305.25
	565					A60Q25-8	
D	678	40	22 x 58 mm		FWP-50A22F	A70QS50-22F	5014006.50
	791						
	904						
	1K0						
	1K1	70			FWP-100A22F	A70QS100-22F	5014006.100
	1K2						
	1K4						
	1K5						

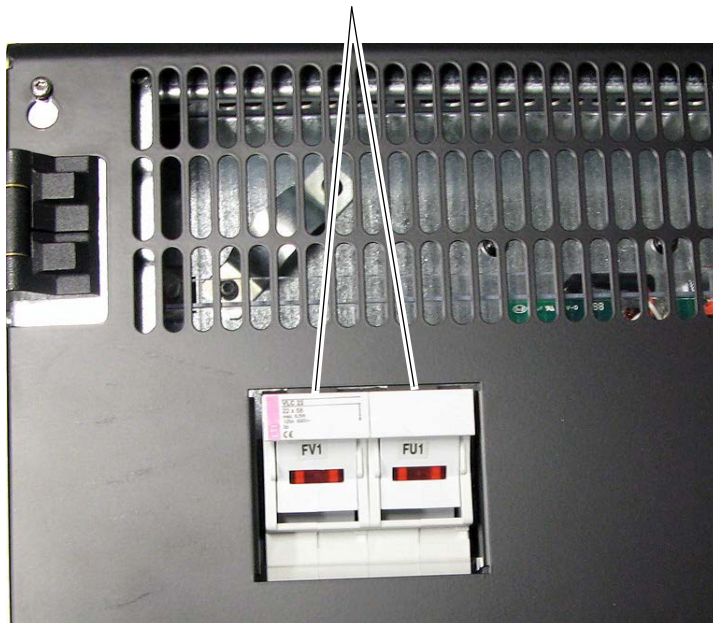
*Frame C Field Circuit Fuse Location*

Field AC input fuses are on the control EMI shield, which holds the control board.



*Frame D Field Circuit Fuse Location*

Top, left side of drive control panel.



## Fuses for Regenerative Frame C and D Drives

Leg fuses are internally mounted and provided with frames C and D drives. See Fuse Code FS4 in Frame C and D Fuse Information on page 59. Also, see Frame C Regenerative Drive - Leg Fuse Location and Frame D Regenerative Drive - Leg Fuse Location on page 62.

### Leg Fuses - 230V AC Input Frame C Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	521	521	426	6	170M5464 + switch 170H0069	6,9 URD 32 TTF 800 + switch MS 3-V1-5 BS	20 671 32.800 + switch 28 001 04
	700	700	571	6	170M5464 + switch 170H0069	6,9 URD 32 TTF 800 + switch MS 3V 1-5 BS	20 671 32.800 + switch 28 001 04

### Leg Fuses - 230V AC Input Frame D Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	875	875	715	6	170M6263 + switch 170H0069	Y300263 + switch MS 3V 1-5 UR	20 635 32.900 + switch 28 001 04
	1K0	1050	858	6	170M6264 + switch 170H0069	Z300264 + switch MS 3V 1-5 UR	20 635 32.1000 + switch 28 001 04

### Leg Fuses - 460V AC Input Frame C Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	495	495	404.4	6	170M5462 + switch 170H0069	6,9 URD 32 TTF 630 + switch MS 3-V1-5 BS	20 671 32.630 + switch 28 001 04
	667	667	544.9	6	170M5464 + switch 170H0069	6,9 URD 32 TTF 800 + switch MS 3-V1-5 BS	20 671 32.800 + switch 28 001 04

### Leg Fuses - 460V AC Input Frame D Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	830	830	678.1	6	170M6262 + switch 170H0069	X300262 + switch MS 3V 1-5 UR	20 635 32.800 + switch 28 001 04
	996	996	813.7	6	170M6264 + switch 170H0069	Z300264 + switch MS 3V 1-5 UR	20 635 32.1000 + switch 28 001 04
	1K1	1162	949.4	6	170M6265 + switch 170H0069	A300262 + switch MS 3V 1-5 UR	20 635 32.1100 + switch 28 001 04
	1K3	1328	1085.0	6	170M6266 + switch 170H0069	B300266 + switch MS 3V 1-5 UR	20 635 32.1250 + switch 28 001 04
	1K4	1494	1220.6	6	170M6267 + switch 170H0069	C300267 + switch MS 3V 1-5 UR	20 635 32.1400 + switch 28 001 04

### Leg Fuses - 575V AC Input Frame C Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	540	540	441	6	—	11 URD 72 TTF 0800 + switch MS 3V 1-5 BS	20 771 32.800 + switch 28 001 04
	675	675	551	6	—	11 URD 72 TTF 0800 + switch MS 3V 1-5 BS	20 771 32.800 + switch 28 001 04

### Leg Fuses - 575V AC Input Frame D Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	810	810	661	6	170M6246 + switch 170H0069	J300572 + switch MS 3V 1-5 UR	20 735 32.800 + switch 28 001 04
	1K0	1080	881	6	170M6248 + switch 170H0069	L300574 + switch MS 3V 1-5 UR	20 735 32.1000 + switch 28 001 04
	1K2	1215	991	12	170M6244 + switch 170H0069	G300570 + switch MS 3V 1-5 UR	20 735 32.630 + switch 28 001 04
	1K3	1350	1102	12	170M6245 + switch 170H0069	H300571 + switch MS 3V 1-5 UR	20 735 32.700 + switch 28 001 04
	1K6	1688	1377	12	170M6246 + switch 170H0069	J300572 + switch MS 3V 1-5 UR	20 735 32.800 + switch 28 001 04



**Leg Fuses - 690V AC Input Frame C Drives**

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	452	452	369	6	170M5394 + switch 170H0069	12,5 URD 72 TTF 0500 + switch MS 3V 1-5 BS	20 771 32.500 + switch 28 001 04
	565	565	461	6	–	12,5 URD 72 TTF 0630 + switch MS 3V 1-5 BS	20 771 32.630 + switch 28 001 04

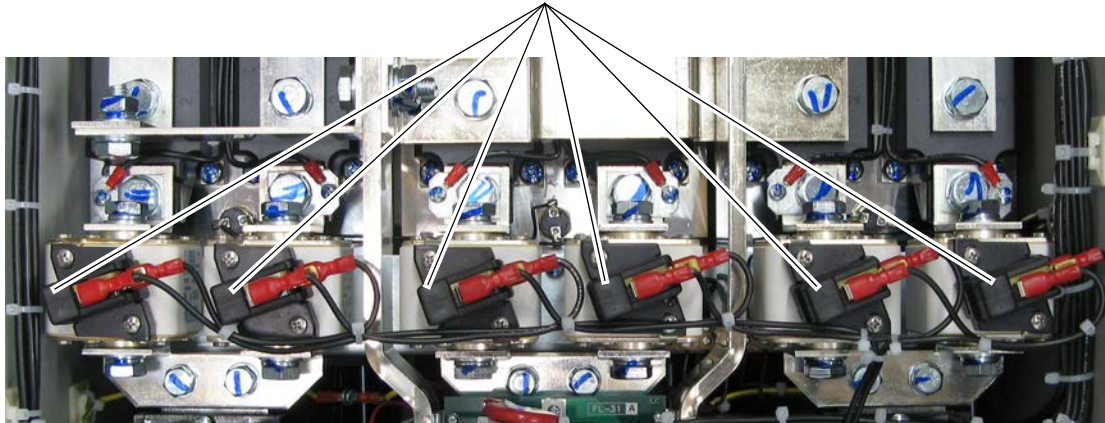
**Leg Fuses - 690V AC Input Frame D Drives**

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	678	678	553	6	170M6244 + switch 170H0069	G300570 + switch MS 3V 1-5 UR	20 735 32.630 + switch 28 001 04
	791	791	645	6	170M6246 + switch 170H0069	J300572 + switch MS 3V 1-5 UR	20 735 32.800 + switch 28 001 04
	904	904	738	6	170M6247 + switch 170H0069	K300573 + switch MS 3V 1-5 UR	20 735 32.900 + switch 28 001 04
	1K0	1017	830	6	170M6248 + switch 170H0069	L300574 + switch MS 3V 1-5 UR	20 735 32.1000 + switch 28 001 04
	1K1	1130	922	12	170M6244 + switch 170H0069	G300570 + switch MS 3V 1-5 UR	20 735 32.630 + switch 28 001 04
	1K2	1243	1014	12	170M6244 + switch 170H0069	G300570 + switch MS 3V 1-5 UR	20 735 32.630 + switch 28 001 04
	1K4	1413	1153	12	170M6245 + switch 170H0069	H300571 + switch MS 3V 1-5 UR	20 735 32.700 + switch 28 001 04
	1K5	1582	1291	12	170M6246 + switch 170H0069	J300572 + switch MS 3V 1-5 UR	20 735 32.800 + switch 28 001 04

*Frame C Regenerative Drive - Leg Fuse Location*

Note: Drive shown with front covers removed and Control EMI shield lowered.

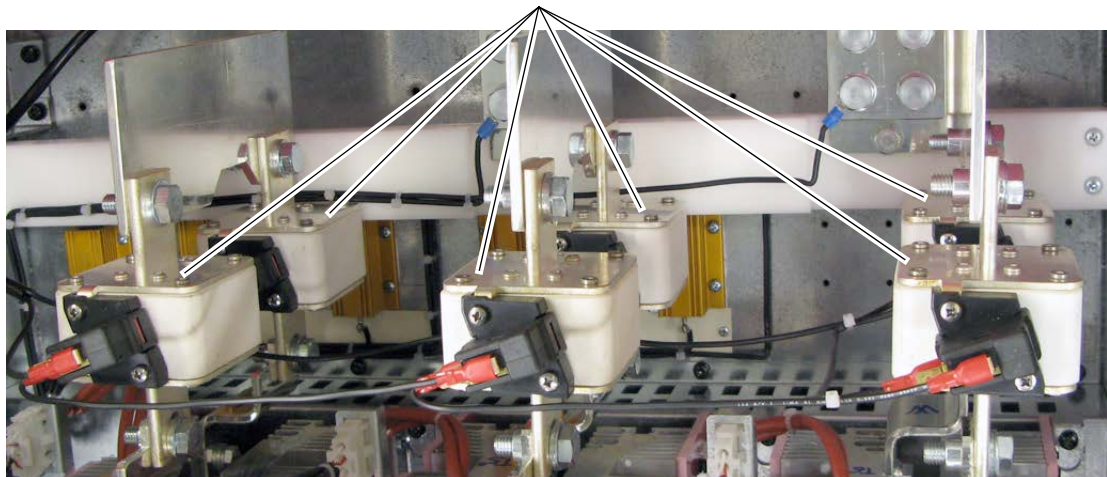
Leg fuses and switches are on the bus bars behind the Control EMI shield, which holds the Control board.



*Frame D Regenerative Drive - Leg Fuse Location*

Note: Drive shown with Control EMI shield in open position.

Leg fuses and switches are on the bus bars behind the Control EMI shield, which holds the Control board.



## Fuses for Non-Regenerative Frame C and D Drives

AC input line and/or leg fuses are internally mounted and provided with frames C and D drives. See Fuse Code FS4 in Frame C and D Fuse Information on page 59. Also, see Frame C Non-Regenerative Drive - AC Input Line Fuse Location on page 64.

### AC Input Line Fuses - 230V AC Input Frame C

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	521	521	426	3	170M5466 + switch 170H0069	6,9 URD 32 TTF 1000 + switch MS 3-V1-5 BS	20 671 32.1000 + switch 28 001 04
	700	700	571	3	170M5466 + switch 170H0069	6,9 URD 32 TTF 1000 + switch MS 3V 1-5 BS	20 671 32.1000 + switch 28 001 04

### Leg Fuses - 230V AC Input Frame D Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	875	875	715	6	170M6263 + switch 170H0069	Y300263 + switch MS 3V 1-5 UR	20 635 32.900 + switch 28 001 04
	1K0	1050	858	6	170M6264 + switch 170H0069	Z300264 + switch MS 3V 1-5 UR	20 635 32.1000 + switch 28 001 04

### AC Input Line Fuses - 460V AC Input Frame C

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	495	495	404.4	3	170M5464 + switch 170H0069	6,9 URD 32 TTF 800 + switch MS 3-V1-5 BS	20 671 32.800 + switch 28 001 04
	667	667	544.9	3	170M5466 + switch 170H0069	6,9 URD 32 TTF 1000 + switch MS 3-V1-5 BS	20 671 32.1000 + switch 28 001 04

### Leg Fuses - 460V AC Input Frame D Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	830	830	678.1	6	170M6262 + switch 170H0069	X300262 + switch MS 3V 1-5 UR	20 635 32.800 + switch 28 001 04
	996	996	813.7	6	170M6264 + switch 170H0069	Z300264 + switch MS 3V 1-5 UR	20 635 32.1000 + switch 28 001 04
	1K1	1162	949.4	6	170M6265 + switch 170H0069	A300262 + switch MS 3V 1-5 UR	20 635 32.1100 + switch 28 001 04
	1K3	1328	1085.0	6	170M6266 + switch 170H0069	B300266 + switch MS 3V 1-5 UR	20 635 32.1250 + switch 28 001 04
	1K4	1494	1220.6	6	170M6267 + switch 170H0069	C300267 + switch MS 3V 1-5 UR	20 635 32.1400 + switch 28 001 04

### AC Input Line Fuses - 575V AC Input Frame C Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	540	540	441	3	170M5466 + switch 170H0069	6,9 URD 32 TTF 1000 + switch MS 3V 1-5 BS	20 671 32.1000 + switch 28 001 04
	675	675	551	3	170M5466 + switch 170H0069	6,9 URD 32 TTF 1000 + switch MS 3V 1-5 BS	20 671 32.1000 + switch 28 001 04

### Leg Fuses - 575V AC Input Frame D Drives

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	810	810	661	6	170M6262 + switch 170H0069	X300262 + switch MS 3V 1-5 UR	20 635 32.800 + switch 28 001 04
	1K0	1080	881	6	170M6264 + switch 170H0069	Z300264 + switch MS 3V 1-5 UR	20 635 32.1000 + switch 28 001 04
	1K2	1215	991	6	170M6265 + switch 170H0069	A300262 + switch MS 3V 1-5 UR	20 635 32.1100 + switch 28 001 04
	1K3	1350	1102	6	170M6266 + switch 170H0069	B300266 + switch MS 3V 1-5 UR	20 635 32.1250 + switch 28 001 04
	1K6	1688	1377	12	170M6262 + switch 170H0069	X300262 + switch MS 3V 1-5 UR	20 635 32.800 + switch 28 001 04

### AC Input Line Fuses - 690V AC Input Frame C Drives

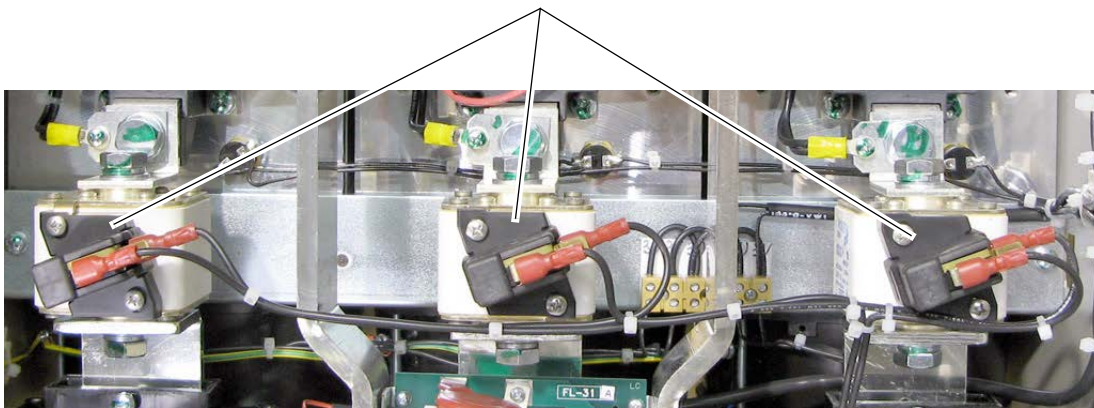
Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - Flush End Contact		
C	452	452	369	6	170M5463 + switch 170H0069	6,9 URD 32 TTF 0700 + switch MS 3V 1-5 BS	20 671 32.700 + switch 28 001 04
	565	565	461	6	170M5465 + switch 170H0069	6,9 URD 32 TTF 0900 + switch MS 3V 1-5 BS	20 671 32.900 + switch 28 001 04

**Leg Fuses - 690V AC Input Frame D Drives**

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Qty	Bussmann	Mersen	SIBA
					Square Body - DIN 43653 Stud-Mount		
D	678	678	553	6	170M6260 + switch 170H0069	V300260 + switch MS 3V 1-5 UR	20 635 32.630 + switch 28 001 04
	791	791	645	6	170M6262 + switch 170H0069	X300262 + switch MS 3V 1-5 UR	20 635 32.800 + switch 28 001 04
	904	904	738	6	170M6263 + switch 170H0069	Y300263 + switch MS 3V 1-5 UR	20 635 32.900 + switch 28 001 04
	1K0	1017	830	6	170M6264 + switch 170H0069	Z300264 + switch MS 3V 1-5 UR	20 635 32.1000 + switch 28 001 04
	1K1	1130	922	6	170M6265 + switch 170H0069	A300262 + switch MS 3V 1-5 UR	20 635 32.1100 + switch 28 001 04
	1K2	1243	1014	6	170M6266 + switch 170H0069	B300266 + switch MS 3V 1-5 UR	20 635 32.1250 + switch 28 001 04
	1K4	1413	1153	6	170M6267 + switch 170H0069	C300267 + switch MS 3V 1-5 UR	20 635 32.1400 + switch 28 001 04
	1K5	1582	1291	12	170M6262 + switch 170H0069	X300262 + switch MS 3V 1-5 UR	20 635 32.800 + switch 28 001 04

*Frame C Non-Regenerative Drive - AC Input Line Fuse Location*

AC Input fuses and switches are on the bus bars behind the Control EMI shield, which holds the Control board.



Note: Drive shown with front covers removed and Control EMI shield lowered.



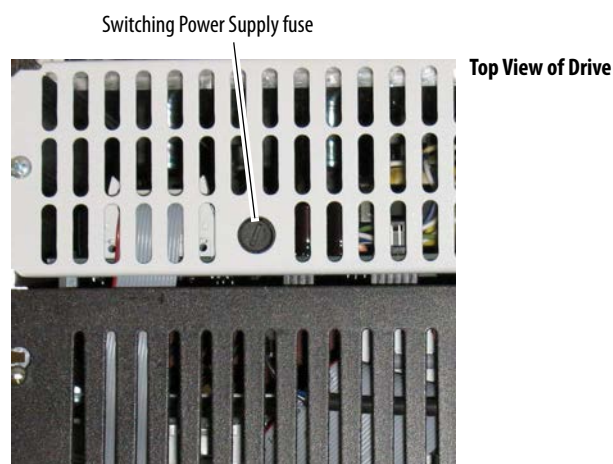
## Control Power Circuit Protection Fuses

The following fuses are used to protect the switching power supply circuit.

**IMPORTANT** Before you order and install fuses, verify the circuit board revision.

Frame	Circuit Board ID / Revision	Designation	Fuse (5 x 20 mm)
A	SW1-31 / H and below	F1	1 A, 250V, slow
	SW1-31 / I and above	F1	2.5 A, 250V, slow
B	SW2-32 / H and below	F1	3.15 A, 250V fast
		F2	2.5 A, 250V slow
	SW2-32 / I and above	F1	2.5 A, 250V slow
		F2	
C	SW3-32 / H and below	F1	3.15 A, 250V fast
		F2	2.5 A, 250V slow
	SW3-32 / I and above	F1	2.5 A, 250V slow
		F2	
D	SW1-31 / I and above	F1	2.5 A, 250V, slow

### Frame A Switching Power Supply Fuse Location



### Frame B Switching Power Supply Fuse Location

**Top View of Drive**

F1 = 3.15A fuse  
(Board Rev. "H" and below only)

F2 = 2.5A fuse  
(Board Rev. "H" and below only)



### Frame C Switching Power Supply Fuse Location

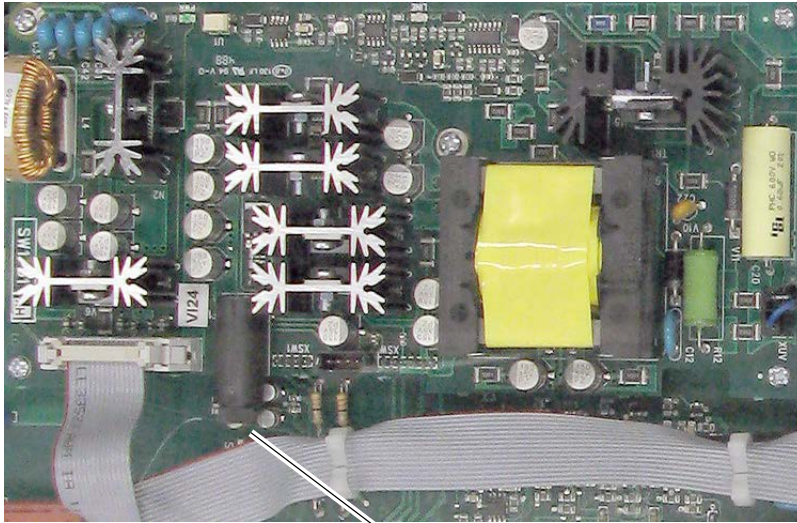


F1 = 3.15A fuse  
(Board Rev. "H" and below only)

F2 = 2.5A fuse  
(Board Rev. "H" and below only)

Fuses are on the Switching Power Supply circuit board (SW-2) on the back of the Control EMI shield, which holds the Control board.

### Frame D Switching Power Supply Circuit Board Fuse Location



Switching Power Supply fuse holder

The Switching Power Supply circuit board is on the Control EMI shield.

## Mounting

### Maximum Surrounding Air Temperature Specifications

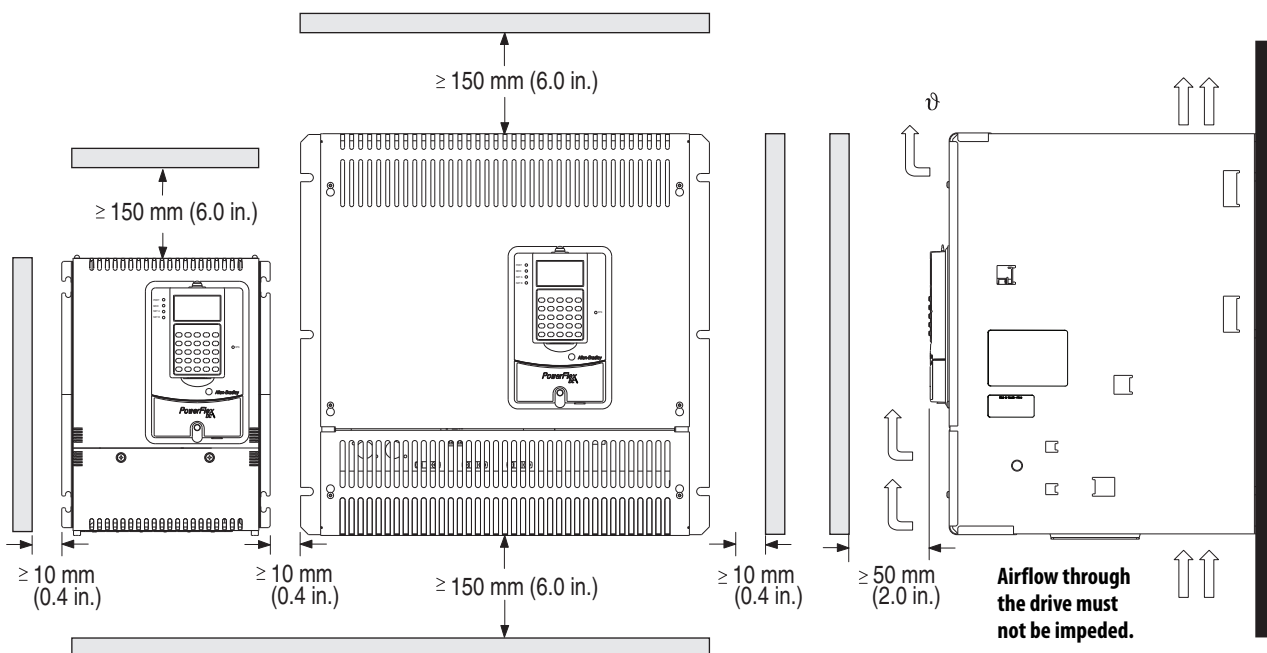
- 0...50 °C (32...122 °F), typical
- De-rate 1.25% for every 1 °C (°F) over 50 °C (122 °F), to 55 °C (131 °F)
- Additional cooling is required for temperatures above 55 °C (131 °F)

### Operating Conditions

The drive must be mounted in a clean, dry location. Contaminants such as oils, corrosive vapors, and abrasive debris must be kept out of the enclosure. NEMA / UL Type Open, IP20 enclosures are intended for indoor use primarily to provide a degree of protection against contact with enclosed equipment. These enclosures offer no protection against airborne contaminants.

### Minimum Mounting Clearances

Minimum clearance requirements (shown here) are intended to be from drive to drive. Other objects can occupy this space; however, reduced airflow can cause protection circuits to fault the drive. The drive must be mounted in a vertical orientation (as shown in the illustration) and must not be mounted at an angle greater than 30° from vertical. In addition, inlet air temperature must not exceed the product specification.

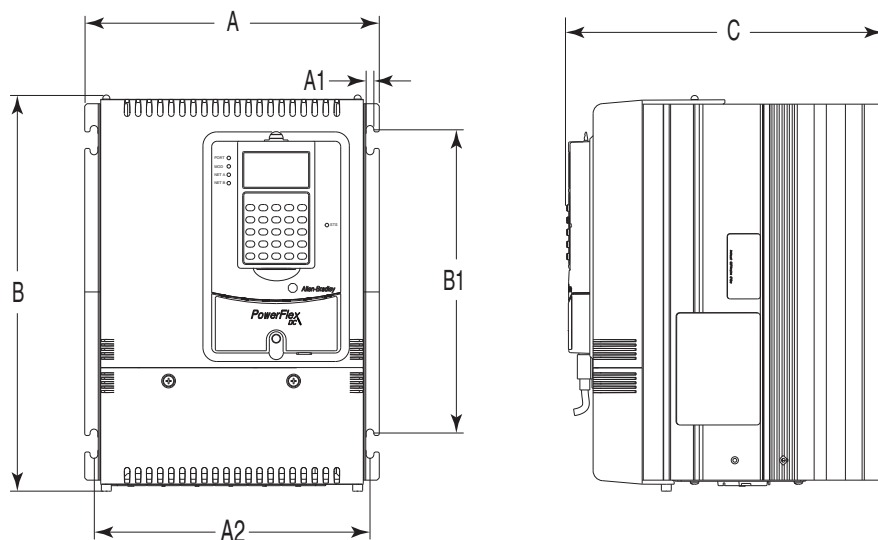


**IMPORTANT** Verify that all mounting screws are properly tightened before and after operation.

## Approximate Dimensions

### Frame A Dimensions

A	B	C	A1	A2	B1
mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)
267 (10.5)	359 (14.0)	287 (11.3)	7 (0.3)	250 (9.8)	275 (10.8)



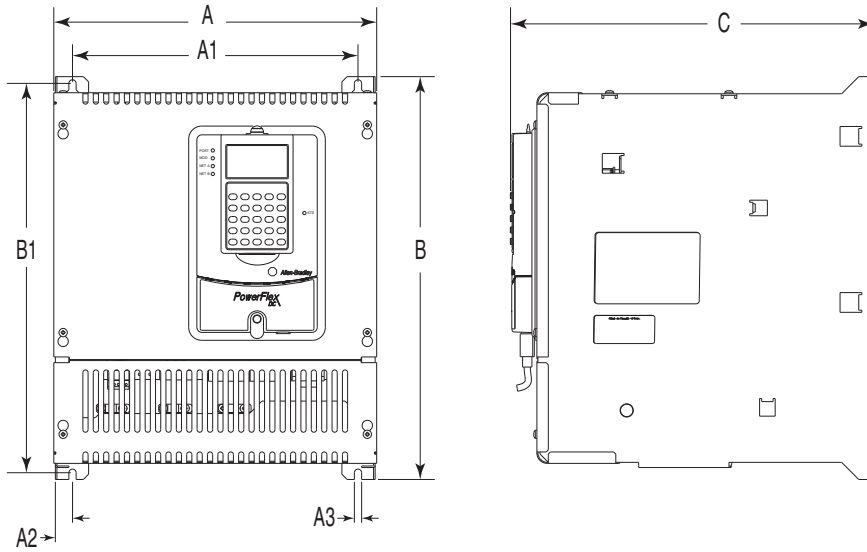
### Frame A Weights

Drive w/ND Rating Code		Weight	
		Drive	Drive and Packaging
230V	460V	kg (lb)	kg (lb)
7P0	4P1	8.4 (19.5)	10.5 (23.1)
9P0	6P0		
012	010		
020	014		
–	019		
029	027	8.8 (19.4)	11 (24.3)
038	035		
055	045		
–	052	10.8 (23.8)	13 (28.7)
073	073		
093	086		
110	–		
–	100		
–	129		

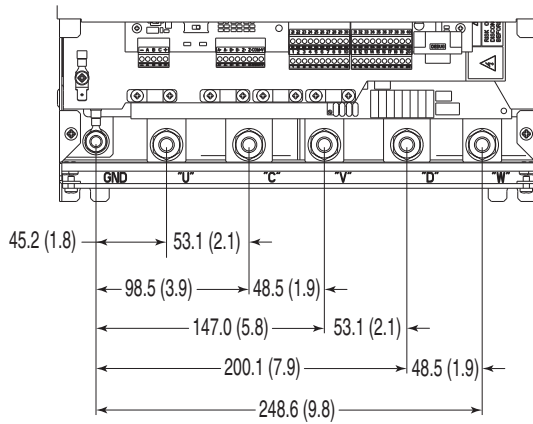
## Frame B Dimensions

A	A1	A2	A3	B	B1	C1	C2 <sup>(1)</sup>
mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)
311 (12.2)	275 (10.8)	16.5 (0.65)	7 (0.3)	388 (15.3)	375 (14.8)	350 (13.8)	380 (15.0)

(1) Only frame B drive catalog numbers 20P21AD330, 20P21AD412, 20P21AE405, 20P41AB360, 20P41AB434, 20P41AD330, 20P41AD412, 20P41AE405.



Terminal Details Dimensions in mm (in.)

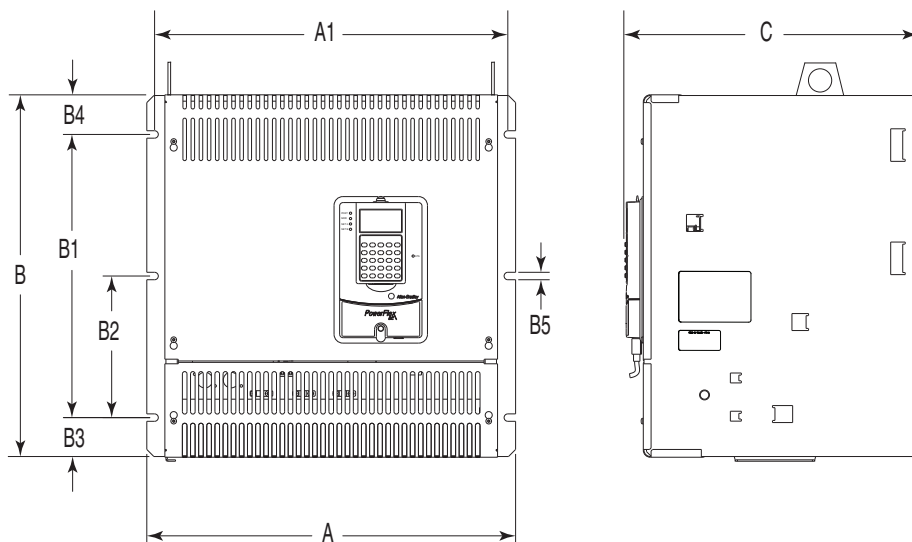


## Frame B Weights

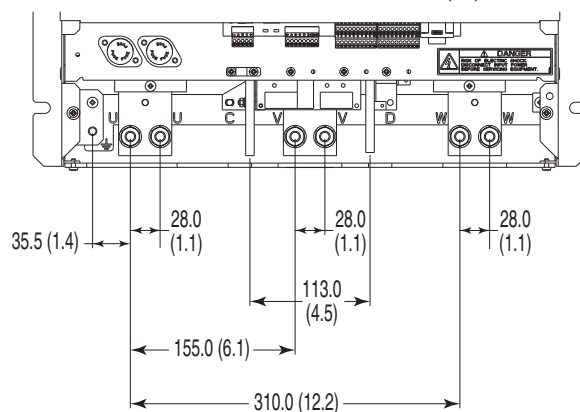
Drive w/ND Rating Code			Weight	
			Drive	Drive and Packaging
230V	460V	575V	kg (lb)	kg (lb)
146	167	067	25.5 (56.2)	27.5 (60.6)
180	207	101		
218	—	135		
265	250	270	29.5 (65.0)	31.5 (69.5)
360	330	405	32 (70.5)	34 (75)
434	412	—		

## Frame C Dimensions

A	A1	B	B1	B2	B3	B4	B5	C
mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)
521 (20.5)	499 (19.7)	511 (20.1)	400 (15.7)	200 (7.9)	55 (2.2)	56 (2.2)	10.5 (0.4)	416 (16.4)



Terminal Details Dimensions in mm (in.)



## Frame C Weights

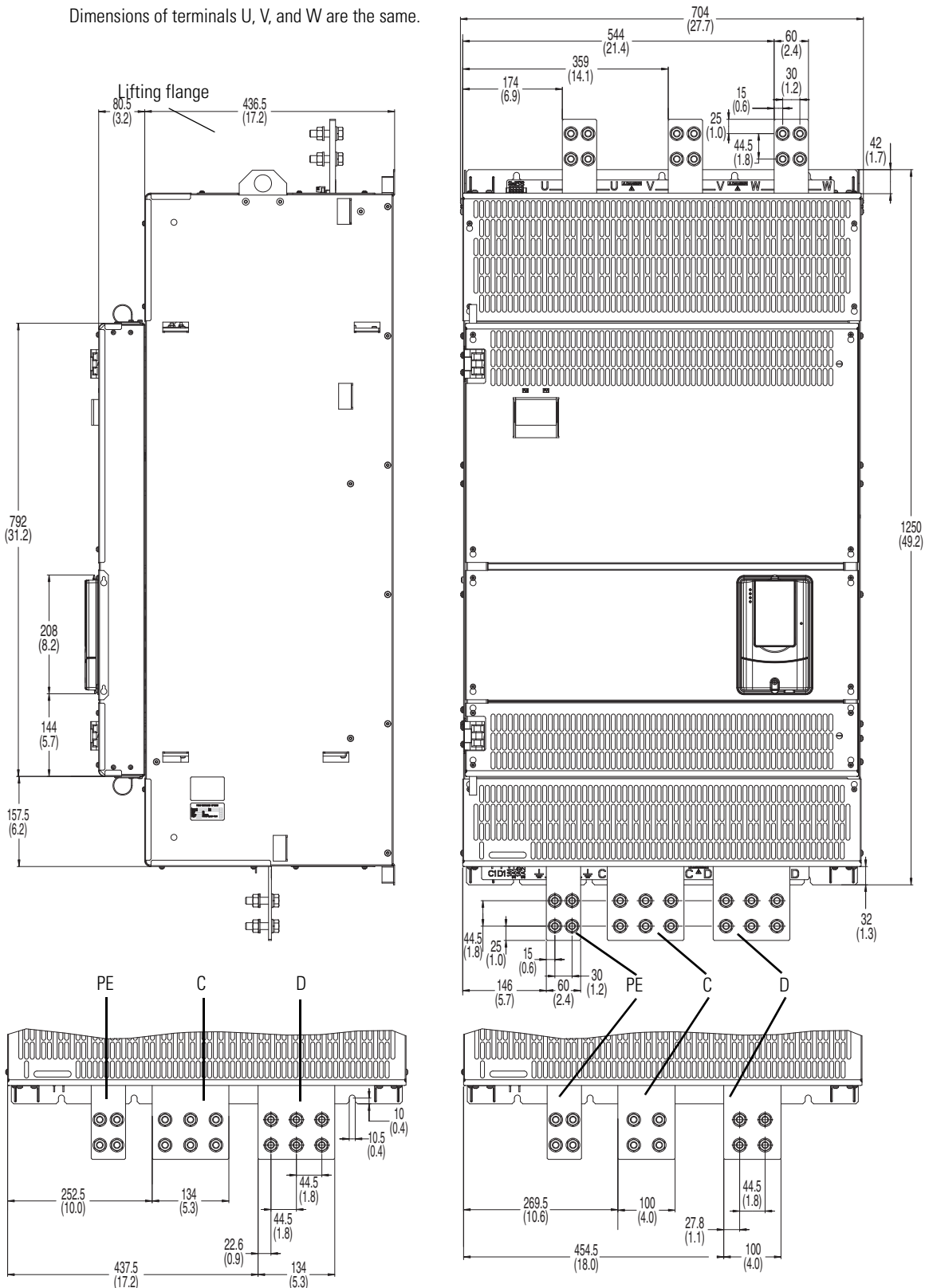
Drive w/ND Rating Code				Weight - Regenerative Drives		Weight - Non-regenerative Drives	
				Drive	Drive and Packaging	Drive	Drive and Packaging
230V	460V	575V	690V	kg (lb)	kg (lb)	kg (lb)	kg (lb)
–	495	–	–	61 (134.5)	83 (183.0)	57 (125.7)	79 (174.2)
521	667	–	–	65 (143.3)	87 (191.8)	62 (136.7)	84 (185.2)
700	–	–	–	–	–	–	–
–	–	540	452	72 (158.7)	94 (207.2)	68 (150.0)	90 (198.4)
–	–	675	565	–	–	–	–



## Frame D Dimensions - Right Side and Front Views

Dimensions are shown in mm and (in.)

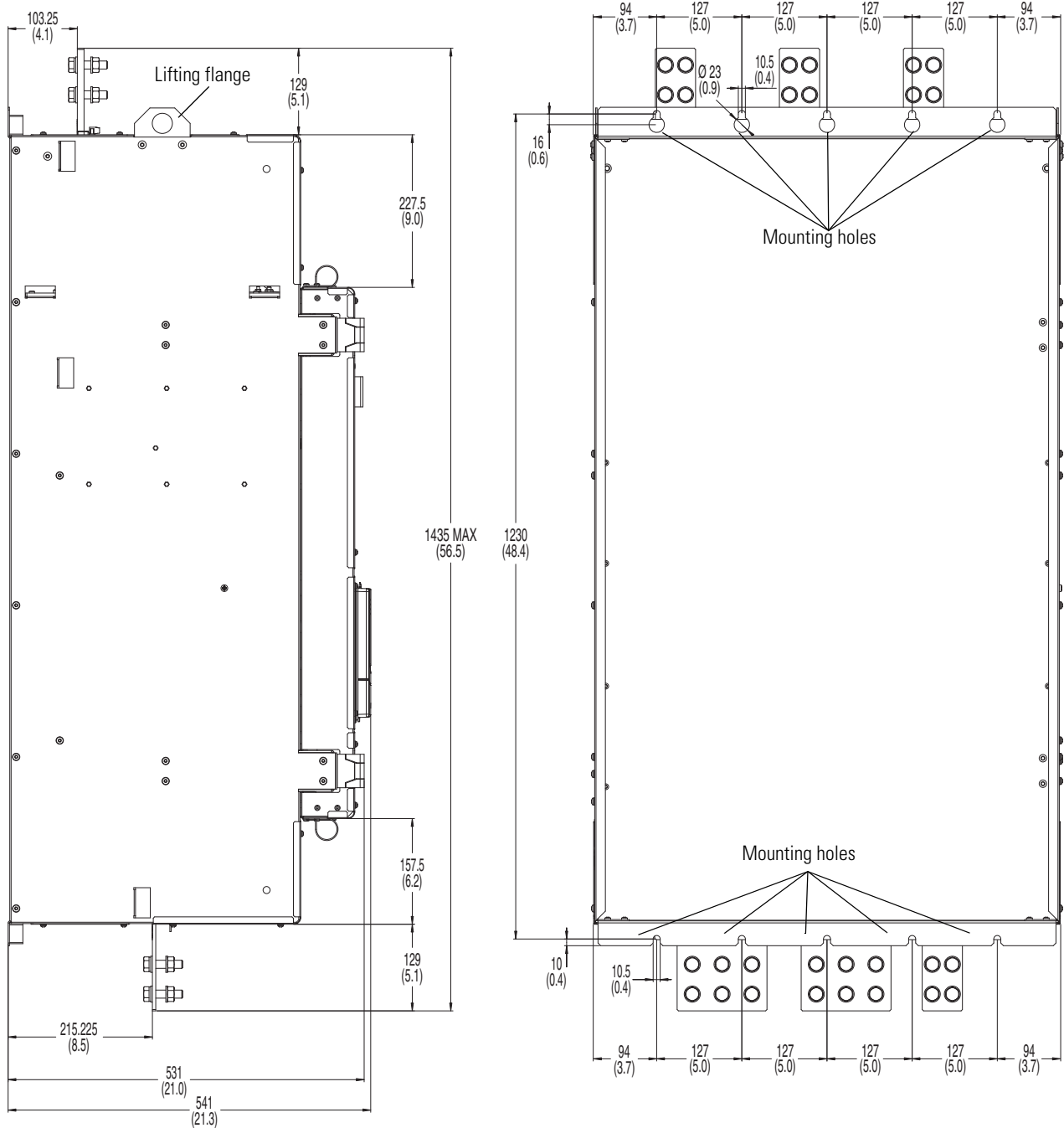
Dimensions of terminals U, V, and W are the same.



Note: 134 mm (5.3 in.) C and D terminals are installed on 460V AC input, 800 Hp and 900 Hp, 575V AC input, 1000 Hp, and 690V AC input, 1100, 1200, 1250, and 1,400 Hp drives only. All other frame D ratings have 100 mm (4.0 in.) C and D terminals.

## Frame D Dimensions - Left Side and Back Views

Dimensions are shown in mm and (in.)



## Frame D - 230V AC Input Drive Weights

Drive w/ND Rating Code	Weight - Regenerative Drives		Weight - Non-regenerative Drives	
	Drive kg (lb)	Drive and Packaging kg (lb)	Drive kg (lb)	Drive and Packaging kg (lb)
875	203 (447.5)	281 (619.5)	152 (335.1)	230 (507.1)
1K0				

## Frame D - 460V AC Input Drive Weights

Drive w/ND Rating Code	Weight - Regenerative Drives		Weight - Non-regenerative Drives	
	Drive	Drive and Packaging	Drive	Drive and Packaging
	kg (lb)	kg (lb)	kg (lb)	kg (lb)
830	202 (445.3)	280 (617.3)	152 (335.1)	230 (507.1)
996				
1K1				
1K3	215 (474.0)	293 (646.0)	165 (363.8)	243 (535.7)
1K4				

## Frame D - 575V AC Input Drive Weights

Drive w/ND Rating Code	Weight - Regenerative Drives		Weight - Non-regenerative Drives	
	Drive	Drive and Packaging	Drive	Drive and Packaging
	kg (lb)	kg (lb)	kg (lb)	kg (lb)
810	198 (436.5)	276 (608.5)	148 (326.3)	226 (498.2)
1K0				
1K2	215 (474.0)	293 (646.0)	165 (363.8)	243 (535.7)
1K3	222 (489.4)	300 (661.4)	172 (379.2)	250 (551.2)
1K6	241 (531.3)	319 (703.3)	191 (421.1)	269 (593.0)

## Frame D - 690V AC Input Drive Weights

Drive w/ND Rating Code	Weight - Regenerative Drives		Weight - Non-regenerative Drives	
	Drive	Drive and Packaging	Drive	Drive and Packaging
	kg (lb)	kg (lb)	kg (lb)	kg (lb)
678	198 (436.5)	276 (608.5)	148 (326.3)	226 (498.2)
791				
904	200 (440.9)	278 (612.9)	150 (330.7)	228 (502.7)
1K0	202 (445.3)	280 (617.3)	152 (335.1)	230 (507.1)
1K1				
1K2	215 (474.0)	293 (646.0)	165 (363.8)	243 (535.7)
1K4				
1K5	241 (531.3)	319 (703.3)	172 (379.2)	250 (551.2)
			191 (421.1)	269 (593.0)

# PowerFlex DC Packaged Drives



## Overview

PowerFlex DC Packaged drives let you create drive packages that are based on their specific needs. This program enhances stand-alone drive functionality through additional control, power, and packaging options, which are ideal for Original Equipment Manufacturers (OEM) and end users with special installation needs. This program consists of:

- Standard Packaged Drives
- Engineer To Order Packaged Drives

## Standard Packaged Drives

The Standard Packaged Drives program a means for creating a drive package that is based on a specific need. A complete drive package can be specified by assembling a catalog number string that includes a base drive and all required options. Packaging is available for 230V and 460V AC requirements in IP20, NEMA / UL Type 1 MCC style enclosures or rigid-panel mounted for installation in an existing enclosure. The program consists of a fully defined catalog string that is identified within this publication. Focused on higher volume, repeat business, the standard designs provide consistent manufacturing and minimizes customer resources by reducing engineering, manufacturing, and installation time. Products can be ordered by contacting your Local Solution Center / Fastrac team.

## Engineer To Order Packaged Drives

The Engineer To Order (ETO) Packaged Drives program offers you the ability to create drive packages beyond the Standard Packaged Drives offering. Some options are defined within this publication. Products can be ordered by contacting your FasTrac representative or one of the Local Drive Solution Centers. Our engineering experts can help with defining the specific requirements of your application.

The Standard Packaged Drive designs can be modified to meet the design criteria or a complete custom package can be designed for any application. The typical lead time of an ETO order is 8...12 weeks based on the lead time and availability of unique components of the design.

## Benefits

- Simplified installation and start-up by use of common options that are assembled at the factory
- Drive functionality exceeds options that are offered with a standard drive
- Multiple packaging options specific to customer needs
- Pre-engineered options for easy order entry, consistent manufacturing, high quality, and reduced delivery time
- Selectable configurations to meet application requirements

## Features

- Standard PowerFlex Digital DC drives and drive-related options
- 6 pulse
- Enclosure options: IP20 MCC, IP42 Filter, IP00 (mounted on a panel), either conformal coated circuit boards or without
- Pre-engineered options
- Custom/engineered solutions
- UL panel recognition from the factory for pre-engineered options

## Factory Installed Options

### Enclosure Options

The PowerFlex DC Packaged drives can be ordered in the following MCC style enclosures:

- IP20, NEMA / UL Type 1
- IP43, NEMA / UL Type 1 with fan and filter

For both of these enclosures, the drive incoming disconnect and any specified operator devices are mounted and wired in the cabinet or on the door, as required. If a cabinet-mounted input line reactor is specified, it is mounted in the cabinet for drives ratings of 200 Hp or less. The drive can also be ordered on a rigid panel for installation in a users existing cabinet. For these designs, the drive and all panel-mounted parts are mounted and wired. The incoming disconnect, operator devices, and input line reactor are shipped loose for customer mounting and wiring per local codes.

All MCC cabinets are 2,286 mm H x 635 mm D (90 in. H x 25 in. D) with the width determined by the size of the drive and the options requested. The standard width enclosures are 508, 635, 889 mm (20, 25 and 35 in.) wide. The rigid panel mount designs are shipped on a 1,981 mm H x 508 mm W or 813 mm W (78 in. H x 20 in. W or 32 in. W) panel to fit a standard 610 mm W X 914 mm W (24 in. W or 36 in. W) enclosure.

### Human Interface Module (HIM) Options

The PowerFlex DC Packaged drives can be ordered with various HIM modules to meet the needs of each drive. The HIM is installed on the door of the enclosure or shipped loose on the open panel designs. All designs have the door-mounted bezel and interconnect cable to the drive. A HIM can be installed or updated in the field.



No HIM (BlankPlate)  
CatalogCode:0



LCDDisplay Full  
NumericKeypad  
CatalogCode:C



LCDDisplay  
Programme Only  
CatalogCode:E

### I/O Options

The PowerFlex DC Packaged drive has built-in configurable digital and analog I/O. The digital I/O is 24V DC and the analog I/O can be configured for voltage or current operation. Extra 24V DC and analog I/O can be added or an I/O conversion card can be added to accommodate 115V AC digital I/O.

I/O Options	
Control	Code
I/O Expansion Card (4 Additional 24V DC Digital Inputs & Outputs, 2 Analog Outputs)	A
115V AC Conversion Card (8 Digital Inputs)	B
8 - 24V DC Digital Inputs, 4 Digital Outputs, 3 Analog Inputs, & 2 Analog Outputs	N

## Communication Options

PowerFlex DC Packaged drives are fully compatible with a wide variety of DPI communication adapters, offering the following options.

Description	Catalog No.
ControlNet™ Communication Adapter (Coax)	C
DeviceNet™ Communication Adapter	D
EtherNet/IP™ Communication Adapter	E
Lonworks™ Communication Adapter	L
PROFIBUS™ DP Communication Adapter	P
ControlNet™ Communication Adapter (Fiber)	Q
Remote I/O Communication Adapter ❖	R
None	N

❖ This item has Silver Series status. For information, refer to: <http://www.ab.com/silver>.

## Cabinet Options

The Packaged Drive enclosure can be equipped with various the following predefined standard user options. Other options can be ordered through the ETO program.

Description	Catalog No.
None	N
Start and Stop PB's	1
Local/Remote SS	2
E-Stop PB	3
Jog	4
Blower Motor Starter	5
Options 1 & 2	A
Options 1 & 3	B
Options 1 & 4	C
Options 1 - 3	D
Options 1 - 4	E
Options 1 - 5	F
Options A & 4	G
Options A & 5	H
Options B & 4	J
Options B & 5	K

## Certifications

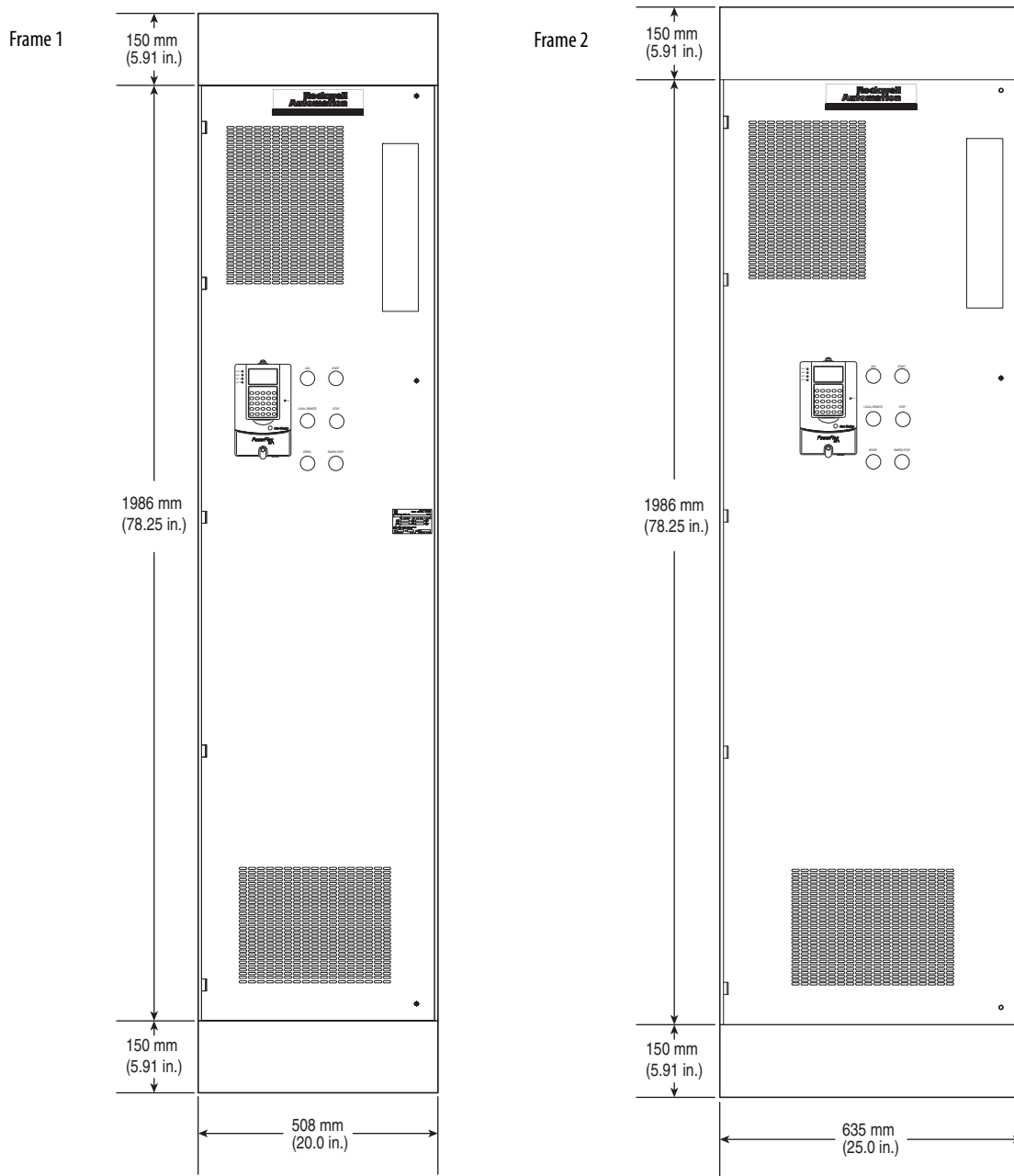


The PowerFlex DC drive is a UL/cUL certified product. The Packaged Drive enclosure can also be built to UL/cUL certification and to CSA certification.

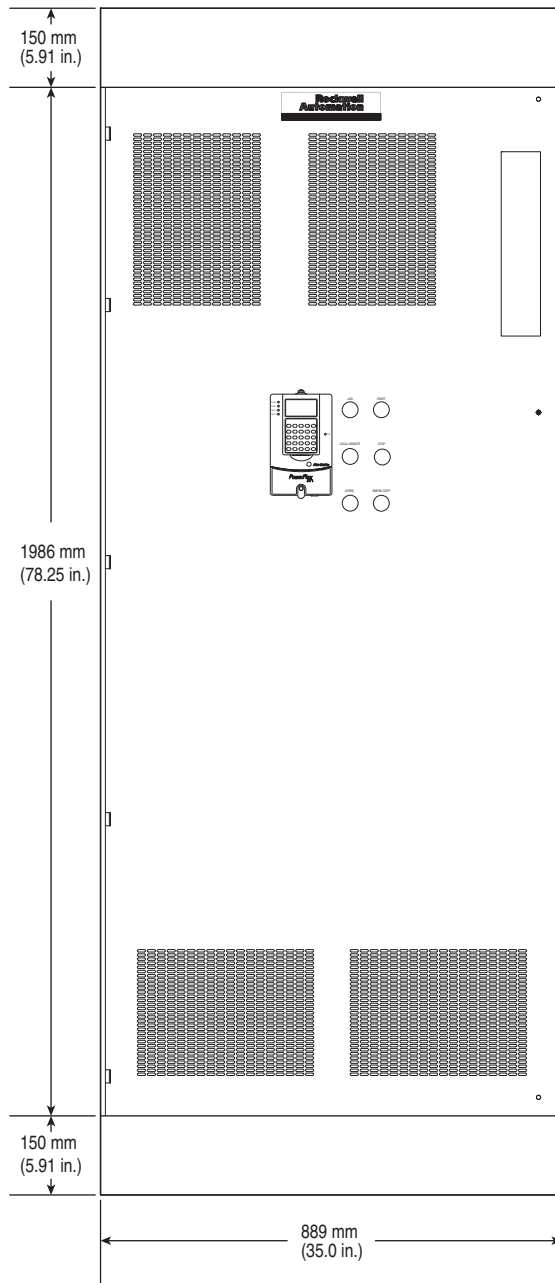
Description	Code
None (Drive unit is UL/cUL)	N
UL/cUL	1
CSA Inspection & certification	2

Please contact your local distributor or sales office for product availability.

### Packaged Drive Enclosure Dimensions - Frames 1 and 2



### Packaged Drive Enclosure Dimensions - Frame 3



## Specifications

Category	Specification	
Agency Certification	c-UL-us	Listed to UL508C and CAN/CSA C22.2 No. 14-05.
	CE	In conformity with the following European Directives: EMC Directive (2004/108/EC) Low Voltage Directive (2006/95/EC) Standards applied: EN 50178 EN 61800-3
	RCM	Certified by Rockwell Automation to be in conformity with the requirements of the applicable Australian legislation and the standards referenced: IEC 61800-3.
	Korean KC Registration	MSIP-REM-RAA-20P See the certificate of registration for specific drive catalog numbers that have this certification. <sup>(1)</sup>
	The drive is also designed to meet the following specifications: NFPA 70 - US National Electrical Code	

(1) See the product certifications website, <http://www.rockwellautomation.com/products/certification/>, for declarations of conformity, certificates, and other certification details.

Category	Specification	
Drive Type	Full Wave Regen, 6 Pulse, Regulated Field Supply	
Protection	Heat Sink Thermistor:	Monitored by microprocessor overtemp trip
	Drive Overcurrent Trip	
	Software Overcurrent Trip:	Programmable, 0...250% of rated current (175% default)
	Hardware Overcurrent Trip:	Based on armature circuit fusing
	Line transients:	Up to 2,000 volts peak per IEC 6100-4-5
	Control Logic Noise Immunity:	Showering arc transients up to 1500V peak
	Power Ride-Thru:	15 milliseconds at full load
Environment <sup>(1)</sup>	Logic Control Ride-Thru:	0.5 seconds minimum, 2 seconds typical
	Altitude:	1,000 m (3,300 ft) max. without derating. De-rate output power by 1.2% for every 100 meters (328 ft) above 1,000 meters (3,300 ft).
	Maximum Surrounding Air Temperature IP20, NEMA Type Open:	0...50 °C (32...122 °F), typical. De-rate 1.25% for every 1 °C over 50 °C (122 °F), to 55 °C (131 °F). More cooling is required for temps. above 55 °C.
	Storage Temp. (all const.):	-25...55 °C (-13...131 °F)
	Atmosphere:	<b>Important:</b> Drive <b>must not</b> be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors, or dust. If the drive is not going to be immediately installed, it must be stored in an area where it is not exposed to a corrosive atmosphere.
	Relative Humidity:	Operating: 5...85% non-condensing Storage: 5...95% non-condensing
	Shock:	15G peak for 11 ms duration (±1.0 ms)
Vibration:	0.152 mm (0.006 in.) displacement, 1G peak	

(1) PowerFlex DC drives must be installed in a Pollution Degree 2 environment.

Category	Specification		
Drive Type	Full Wave Regen, 6 Pulse, Regulated Field Supply		
Electrical	Input Voltages:	Armature: 230V to 690V AC +/- 10%, 3 Phase Field: 230V to 460V AC +/- 10%, 1 Phase Control: 115V AC or 230V AC +/- 15%, 1 Phase (115V AC input control power requires a jumper between terminals SA and SB for frame B and C drives only.) (See AC Input Voltages on page 19 for details.)	
	Input Frequency:	50/60 Hz +/- 5%	
	Max. Rate of Change of Input Frequency:	2 Hz/Sec.	
	Armature Output Voltage:	Two Quadrant Drives	Four Quadrant Drives
		260V DC @ 230V AC 470V DC @ 400V AC 530V DC @ 440V AC 560V DC @ 460V AC 580V DC @ 480V AC 680V DC @ 575V AC 810V DC @ 690V AC	240V DC @ 230V AC 420V DC @ 400V AC 460V DC @ 440V AC 480V DC @ 460V AC 500V DC @ 480V AC 600V DC @ 575V AC 720V DC @ 690V AC
	Output Horsepower (Cont.)	1.5...300 Hp @ 230V AC 2...900 Hp @ 460V AC 50...1250 Hp @ 575V AC 400...1400 Hp @ 690V AC	
	Output Current:	7...1050 A @ 230V AC 4.1...1494 A @ 400V AC 67.5...1688 A @ 575V AC 452...1582 A @ 690V AC	
	Drive Overload Capability:	100% rated continuous current 150% rated current for 1 minute then fault 200% rated current for 3 seconds then fault	
	Motor Overload Protection:	Standard Duty: <ul style="list-style-type: none"> <li>150% motor rated current for 60 seconds</li> <li>200% motor rated current for 3 seconds, configurable as a fault or alarm</li> </ul> Heavy Duty: <ul style="list-style-type: none"> <li>200% motor rated current for 60 seconds, configurable as a fault or alarm</li> </ul> Note: PowerFlex DC drives, v6.xxx and later, provide configurable speed-sensitive overload protection, thermal memory retention, and motor over-temperature sensing.	
	Field Output Voltage	200V DC @ 230V AC 310V DC @ 400V AC 360V DC @ 460V AC Maximum field output voltage is 0.85 x AC input line voltage.	
Controller Current Overload:	150% rated current for 1 minute 200% rated current for 3 seconds		
Max. Short Circuit Rating:	100,000 A		

Category	Specification	
<b>Control</b>	Speed Regulation:*	<p>All operating modes:</p> <p>Max. speed: 8,000 rpm</p> <p>Digital reference resolution: 0.1 rpm</p> <p>Analog reference resolution: <math>\geq 0.25</math> rpm</p> <p>with Digital Incremental Encoder/Resolver</p> <p>Speed feedback resolution better than 0.5 rpm (based on encoder PPR or resolver resolution)</p> <p>Operating range better than 1000:1 rpm, bi-directional</p> <p>Performance Accuracy <math>\pm 0.02\%</math> typical</p> <p>170 rad/sec bandwidth</p> <p>with DC Analog Tachometer</p> <p>Speed feedback resolution better than 2000:1 rpm</p> <p>Operating range better than 1000:1 rpm, bi-directional</p> <p>Performance accuracy <math>\pm 0.1\%</math></p> <p>170 rad/sec bandwidth</p> <p>with Armature Voltage Feedback</p> <p>Voltage feedback resolution better than 2000:1 rpm</p> <p>Operating range better than 100:1 rpm, bi-directional</p> <p>Performance accuracy: <math>\pm 2.0\%</math> typical</p> <p>80 rad/sec bandwidth</p> <p>*Subject to motor specs. and current loop tuning.</p>
	Torque Regulation	<p>Current feedback resolution better than 2000:1</p> <p>Performance accuracy: 1.0% typical</p> <p>500 rad/sec bandwidth</p>
<b>Feedback Devices</b>	Encoder	<p>Type: Incremental, dual channel, two channel optional (with jumper), differential (recommended) or single-ended</p> <p>Input Voltage: Configurable for 2.5...5.2V (switch S21 in ENC_5 position) or 5.4...15.2V (switch S21 in ENC_12 position)</p> <p>Input Current: 4.5 mA / 6.8...10.9 mA each channel</p> <p>Quadrature: <math>90^\circ \pm 27^\circ</math> @ 25°C</p> <p>Duty cycle: 50% <math>\pm</math> 10% Source/Sink capable</p> <p>Pulses Per Revolution: 100...32770</p> <p>Maximum Frequency: 150 kHz</p> <p>Maximum Cable Length: Shielded, 150 m (0.75 mm<sup>2</sup>), 125 m (0.5 mm<sup>2</sup>), 55 m (0.22 mm<sup>2</sup>)</p>
	Resolver	See the PowerFlex DC Drive Resolver Feedback Option Module Installation Instructions, publication <a href="#">20P-IN071</a> for details.
	DC Analog Tachometer	<p>Input Voltage: 22.7, 45.4, 90.7, 181.6, &amp; 302.9V max.</p> <p>Input Current: 8 mA full scale</p> <p>Maximum Cable Length: Shielded, depends on the installation, typical 150 m.</p>
<b>Inputs</b>	Analog Inputs	<p>Three configurable, isolated, differential</p> <p><math>\pm 10V</math>, 0...10V, 0...20 mA or 4...20 mA.</p> <p>Resolution: 11 Bit + sign</p>
	Digital Inputs	<p>Eight standard configurable, four additional configurable with the I/O Expansion circuit board.</p> <p>Max Voltage +30V DC input, 200 mA (total current draw is the sum of encoder power, digital outputs, and any other loads that are connected to terminal 19)</p>
<b>Outputs</b>	Analog Outputs	<p>Two standard configurable, two additional configurable with the I/O Expansion circuit board.</p> <p>Sample rate 2 ms.</p> <p><math>\pm 10V</math>, 5 mA, bipolar (current is not bipolar)</p> <p>Resolution: 11 Bit + sign</p>
	Digital Outputs	<p>Four standard configurable, four additional configurable with the I/O Expansion circuit board.</p> <p>30V, 50 mA</p>
	Relay Outputs	<p>Two configurable, N.O. contacts</p> <p>Max. 250V AC, 1A AC1</p>

## Watts Loss and Cooling Fan Attributes

Watts loss and cooling fan attributes data that are shown in the following tables is based on the rated current of the drive.

### Frame A Drives

Drive Current Rating Code <sup>(1)</sup>		Total Watts Loss	Total Value for Fan				
@ 230V AC	@ 460V AC		AC Input Voltage	Rated Current (A)	Max. Air Flow Noise Level		
7P0	4P1	131	(no fan)				
9P0	6P0						
012	010						
020	014						
–	019						
029	027	186	(Internal power supply)				
038	035	254				80 m <sup>3</sup> /h 37 dB(A)	
055	045						
–	052						
073	073	408				160 m <sup>3</sup> /h 45 dB(A)	
093	086	476					
110	–	553					
–	100						
–	129						

(1) See Catalog Number Explanation on page 5, positions 8...10 for corresponding drive Hp rating, armature amp rating, and field amp rating.

### Frame B Drives

Drive			Total Value for Fans							
Current Rating Code <sup>(1)</sup>	AC Input Voltage	Total Watts Loss	AC Input Voltage	Rated Current (A)	Max. Air Flow Noise Level					
146	230	781	(Internal power supply)							
180		939				320 m <sup>3</sup> /h 48 dB(A)				
218										
265										
360								1693	680 m <sup>3</sup> /h 53 dB(A)	
434	460	781				(Internal power supply)				
167		939							320 m <sup>3</sup> /h 48 dB(A)	
207										
250										
330										
412	1693	680 m <sup>3</sup> /h 53 dB(A)								
067	575	400	(Internal power supply)							
101		553							320 m <sup>3</sup> /h 48 dB(A)	
135										
270										
405						1693	680 m <sup>3</sup> /h 53 dB(A)			

(1) See Catalog Number Explanation on page 5, positions 8...10 for corresponding drive Hp rating, armature amp rating, and field amp rating.



## Frame C Drives

Drive			Total Value for Fans <sup>(2)</sup>		
Current Rating Code <sup>(1)</sup>	AC Input Voltage	Total Watts Loss	AC Input Voltage	Rated Current	Max. Air Flow Noise Level
521	230	2143	230V AC	0.75 A	1,050 m <sup>3</sup> /h 62.5 dB(A)
700		2700			
495	460	2143			
667		2590			
540	575	2300			
675		2620			
452	690	1700			
565		2300			

- (1) See Catalog Number Explanation on page 5, positions 8...10 for corresponding drive Hp rating, armature amp rating, and field amp rating.
- (2) Fans on frames C drives must be powered by an external 230V AC, 50/60 Hz power supply, which is connected to terminals U3 and V3.

## Frame D Drives with a Series A Fan

Drive			Total Value for Fan <sup>(2)</sup>		
Current Rating Code <sup>(1)</sup>	AC Input Voltage	Total Watts Loss	AC Input Voltage	Rated Current	Max. Air Flow Noise Level
875	230	2694	230V AC	2.4 A @ 50 Hz and 3.3 A @ 60 Hz	2,400 m <sup>3</sup> /h 80 dB(A)
1K0		3284			
830	480	3200			
996		3568			
1K1		4189			
1K3		5229			
1K4		5117			
810	575	3122			
1K0		3819			
1K2		4679			
1K3		4879			
1K6		5720			
678	690	3174			
791		3582			
904		4028			
1K0		4064			
1K1		4509			
1K2		5368			
1K4		5543			
1K5		5886			

- (1) See Catalog Number Explanation on page 5, positions 8...10 for corresponding drive Hp rating, armature amp rating, and field Amp rating.
- (2) Fans on frames D drives are powered by an external 230V AC, 50/60 Hz power supply, which is connected to terminals U3 and V3.

## Frame D Drives with a Series B Fan

Drive			Total Values for Fan <sup>(2)</sup>		
Current Rating Code <sup>(1)</sup>	AC Input Voltage	Total Watts Loss	AC Input Voltage	Rated Current	Max. Air Flow Noise Level
875	230	2694	Three-phase 400V AC 50 Hz or 460V AC 60 Hz	1.15 A @ 50 Hz and 1.4 A @ 60 Hz	2,400 m <sup>3</sup> /h @ 400VAC 50 Hz 2,800 m <sup>3</sup> /h @ 460VAC 60 Hz 83 dB(A) @ 400VAC 50 Hz 2,000 m <sup>3</sup> /h 86 dB(A) @ 460VAC 60 Hz 2,000 m <sup>3</sup> /h
1K0		3284			
830	480	3200			
996		3568			
1K1		4189			
1K3		5229			
1K4		5117			
810	575	3122			
1K0		3819			
1K2		4679			
1K3		4879			
1K6		5720			
678	690	3174			
791		3582			
904		4028			
1K0		4064			
1K1		4509			
1K2		5368			
1K4		5543			
1K5		5886			

(1) See Catalog Number Explanation on page 5, positions 8 . . . 10 for corresponding drive Hp rating, armature amp rating, and field Amp rating.

(2) Fans on frames D drives are powered by an external three-phase 400/460V AC, 50/60 Hz power supply, which is connected to terminals U3, V3, and W3.

## PowerFlex DC Stand-Alone Regulator

Catalog Number <sup>(1)</sup>	Total Watts Loss	Total Value for Fans		
		AC Input Voltage	Rated Current	Max. Air Flow Noise Level
23PMD4	303	(Internal power supply)		160 m <sup>3</sup> /h 40 dB(A)
23PMD7	357			
23PMF4	374			
23PMF7	428			

(1) See Catalog Numbers in the PowerFlex DC Stand-Alone Regulator and Gate Amplifier User Manual Armature Voltage Feedback Terminals, publication [23P-UM001](#), for a description of ratings.

## Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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

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

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Publication 20P-TD001H-EN-P - September 2014

Supersedes Publication 20P-TD001G-EN-P - February 2014

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