

PowerXL DC1 Series Drives



Product Description

Eaton's PowerXL® DC1 variable frequency drives are the next generation of drives specifically engineered for today's machinery applications.

The DC1 is compact with only 14 basic parameters, SmartWire-DT® and EtherNet/IP connectivity, and outstanding ease of mounting and installation. The newest version adds support for sensorless vector control and permanent magnet motor compatibility. The DC1 is perfect for quick commissioning and is ideal for panel builders. This drive supports single-phase motor applications, and detachable terminal blocks make control wiring much easier.

Models rated at 480 volts, three-phase, 50/60 Hz are available in sizes ranging from 1 to 30 hp. Models rated at 240 volts, single- or three-phase, 50/60 Hz are available in sizes ranging from 0.5 to 15 hp. Models rated at 115 volts, single-phase, 50/60 Hz are available in the 0.5 to 3 hp size range.

Features

- Compact, space-saving design
- Rugged and reliable—175% for 2 s, 50 °C rated
- DIN rail and screw mountable (FS1 and FS2)
- Side-by-side installation
- Industry-leading efficiency delivers energy savings to the customer
- Optional integrated EMC filters make the unit suitable for commercial and industrial networks
- Brake chopper as standard in frames 2 and higher
- Temperature-controlled fan
- RS-485/Modbus® and CANopen™ as standard
- PI controller as standard
- SmartWire capability
- Dual EtherNet/IP communication module
- Removable I/O terminal blocks
- Contactor style power wiring
- Designed for shaded-pole, single-phase motors and permanent split capacitor single-phase motors
- Sensorless vector control
- Permanent magnet motor compatibility

Standards and Certifications

Product

- Complies with EN61800-3 (2004)

EMC (At Default Settings)

- EMC Category C1, C2 and C3 at default settings (1 m, 5 m, 25 m)

Safety^①

- 61800-5-1
- EN 60529
- CE
- UL
- cUL
- UkrSepro
- c-Tick
- RoHS compliant



Note

- ① See unit nameplate for more detailed approvals.

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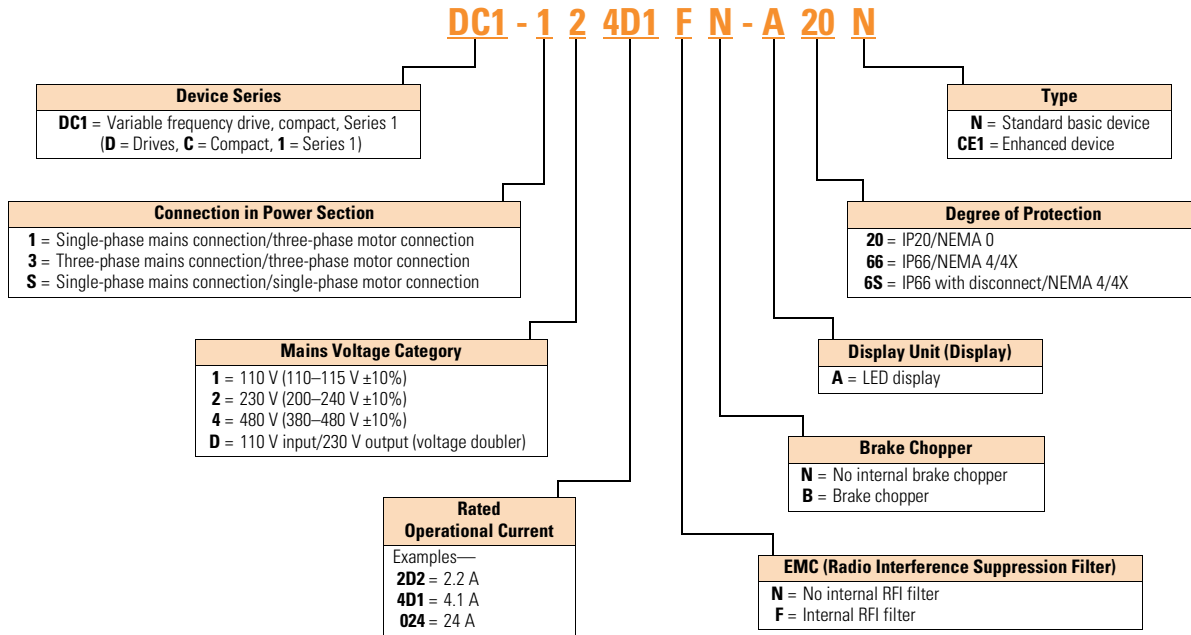
Adjustable Frequency Drives

PowerXL DC1 Series Drives

Catalog Number Selection

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DC1 Series Adjustable Frequency AC Drives



Product Selection

IP20

DC1 Series IP20 Enclosure Drives ^①

hp ^②	kW	Volts	100% Continuous Current In (A)	Frame Size ^③	Catalog Number
0.5	0.37	115 V single-phase in/ ^④	7	1	DC1-S17D0NN-A20N
0.75	0.55	115 V single-phase out	10.5	2	DC1-S1011NB-A20N
0.5	0.37	200–240 V single-phase in/ ^④	4.3	1	DC1-S24D3NN-A20N ^⑤
1	0.75	200–240 V single-phase out	7	1	DC1-S27D0NN-A20N ^⑤
1.5	1.1		10	2	DC1-S2011NB-A20N ^⑤
0.5	0.37	115 V single-phase in/ 230 V three-phase out	2.3	1	DC1-1D2D3NN-A20CE1
1	0.75		4.3	1	DC1-1D4D3NN-A20CE1
1.5	1.1		5.8	2	DC1-1D5D8NB-A20CE1
0.5	0.37	200–240 V single-phase in/ 230 V three-phase out	2.3	1	DC1-122D3NN-A20CE1 ^⑤
1	0.75		4.3	1	DC1-124D3NN-A20CE1 ^⑤
2	1.5		7	1	DC1-127D0NN-A20CE1 ^⑤
2	1.5		7	2	DC1-127D0NB-A20CE1 ^⑤
3	2.2		10.5	2	DC1-12011NB-A20CE1 ^⑤
5	4		15	3	DC1-12015NB-A20CE1
7.5	5.6		24	4	DC1-32024NB-A20CE1 ^⑤
0.5	0.37	200–240 V three-phase in/ 230 V three-phase out	2.3	1	DC1-322D3NN-A20CE1
1	0.75		4.3	1	DC1-324D3NN-A20CE1
2	1.5		7	1	DC1-327D0NN-A20CE1
2	1.5		7	2	DC1-327D0NB-A20CE1 ^⑤
3	2.2		10.5	2	DC1-32011NB-A20CE1 ^⑤
5	4		18	3	DC1-32018NB-A20CE1 ^⑤
10	7.5		30	4	DC1-32030NB-A20CE1 ^⑤
15	11		46	4	DC1-32046NB-A20CE1 ^⑤
1	0.75	380–480 V three-phase in/ 480 V three-phase out	2.2	1	DC1-342D2NN-A20CE1 ^⑤
2	1.5		4.1	1	DC1-344D1NN-A20CE1 ^⑤
2	1.5		4.1	2	DC1-344D1NB-A20CE1 ^⑤
3	2.2		5.8	2	DC1-345D8NB-A20CE1 ^⑤
5	4		9.5	2	DC1-349D5NB-A20CE1 ^⑤
7.5	5.5		14	3	DC1-34014NB-A20CE1 ^⑤
10	7.5		18	3	DC1-34018NB-A20CE1 ^⑤
15	11		24	3	DC1-34024NB-A20CE1 ^⑤
20	15		30	4	DC1-34030NB-A20CE1 ^⑤
25	18.5		39	4	DC1-34039FB-A20N ^⑤
30	22		46	4	DC1-34046FB-A20N ^⑤

Notes

- ① These are constant torque/high overload rated drives.
- ② For all applications, select the unit such that the motor current is less than or equal to the rated continuous output current.
- ③ Brake chopper circuit available as standard in frames 2, 3 and 4.
- ④ Only for use with shaded pole or split capacitor single-phase motors.
- ⑤ RFI version available. Substitute with DC1-*****F*.**** for this option.

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Adjustable Frequency Drives

PowerXL DC1 Series Drives

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IP66 NEMA 4/4X Interior DC1 Drive

The IP66 version of the DC1 is a unique solution to allow for mounting the drive outside of a control panel or next to a motor for distributed control.

“-A66...” Option

This version comes with the keypad that is similar to that of IP20 version. There are no additional cover controls to address security concerns.

“-A6S...” Option

This version has an integrated potentiometer, a forward/off/reverse switch and a disconnect switch with lock-off capability with the standard keypad. This allows for reduced labor and materials when compared to a IP20 solution in separate enclosure.

IP66



IP66S



DC1 Series IP66 Enclosure Drives ^①

hp ^②	kW	Volts	100% Continuous Current In (A)	Frame Size ^③	Catalog Number
0.5	0.37	115 V single-phase in/ 115 V single-phase out	7	1	DC1-S17D0NN-A6SN ^④
0.75	0.55		10.5	2	DC1-S1011NB-A6SN ^④
0.5	0.37	200–240 V single-phase in/ 200–240 V single-phase out	4.3	1	DC1-S24D3NN-A6SN ^{④⑤}
1	0.75		7	1	DC1-S27D0NN-A6SN ^{④⑤}
1.5	1.1		10	2	DC1-S2011NB-A6SN ^{④⑤}
0.5	0.37	115 V single-phase in/ 230 V three-phase out	2.3	1	DC1-1D2D3NN-AS6CE1 ^④
1	0.75		4.3	1	DC1-1D4D3NN-AS6CE1 ^④
1.5	1.1		5.8	2	DC1-1D5D8NB-AS6CE1 ^④
0.5	0.37	200–240 V single-phase in/ 230 V three-phase out	2.3	1	DC1-122D3NN-AS6CE1 ^{④⑤}
1	0.75		4.3	1	DC1-124D3NN-AS6CE1 ^{④⑤}
2	1.5		7	1	DC1-127D0NN-AS6CE1 ^{④⑤}
2	1.5		7	2	DC1-127D0NB-AS6CE1 ^{④⑤}
3	2.2		10.5	2	DC1-12011NB-AS6CE1 ^{④⑤}
5	4		15	3	DC1-12015NB-AS6CE1 ^④
0.5	0.37	200–240 V three-phase in/ 230 V three-phase out	2.3	1	DC1-322D3NN-AS6CE1 ^④
1	0.75		4.3	1	DC1-324D3NN-AS6CE1 ^④
2	1.5		7	1	DC1-327D0NN-AS6CE1 ^④
2	1.5		7	2	DC1-327D0NB-AS6CE1 ^{④⑤}
3	2.2		10.5	2	DC1-32011NB-AS6CE1 ^{④⑤}
5	4		18	3	DC1-32018NB-AS6CE1 ^{④⑤}
1	0.75	380–480 V three-phase in/ 460 V three-phase out	2.2	1	DC1-342D2NN-AS6CE1 ^{④⑤}
2	1.5		4.1	1	DC1-344D1NN-AS6CE1 ^{④⑤}
2	1.5		4.1	2	DC1-344D1NB-AS6CE1 ^{④⑤}
3	2.2		5.8	2	DC1-345D8NB-AS6CE1 ^{④⑤}
5	4		9.5	2	DC1-349D5NB-AS6CE1 ^{④⑤}
7.5	5.5		14	3	DC1-34014NB-AS6CE1 ^{④⑤}
10	7.5		18	3	DC1-34018NB-AS6CE1 ^{④⑤}

Notes

- ① These are constant torque/high overload rated drives.
- ② For all applications, select the unit such that the motor current is less than or equal to the rated continuous output current.
- ③ Brake chopper circuit available as standard in frames 2, 3 and 4.
- ④ Non-disconnect version available. Substitute with **-A66...**
- ⑤ RFI version available. Substitute with DC1-*******F******* for this option.

Accessories

DC1 Series

PC Communication Kit and Copy/Paste Module

Description	Catalog Number
Bluetooth copy/paste communication stick	DX-COM-STICK2
USB to RJ45 panel mount kit	DX-COM-PCKIT
USB to RJ45 PC Tool cable	DX-CBL-PC-3M0

Encoder Feedback Plug-In Option Module and Miscellaneous Cards

Description	Catalog Number
Local control/test option card	DXC-EXT-LOCSIM
HVACO drive running and tripped relay output card	DXC-EXT-2R01A0
Dual relay output card	DXC-EXT-2R0
110 V logic input card	DXC-EXT-IO110
230 V logic input card	DXC-EXT-IO230

Remote Keypad

Description	Catalog Number
LED remote keypad—7-segment display, IP54 rated	DX-KEY-LED2 ^①
OLED remote keypad—full text display, multi-line text, multi-language, IP54 hand/auto buttons	DX-KEY-OLED ^①

Brake Resistor (FR2 and FR3)

Description	Catalog Number
DC1, DA1 internal mount 200 W, 100 R	DX-BR3-100

Extension Cables and Data Cable Splitter

Description	Catalog Number
RJ45 communication cable w/terminating resistor	EASY-NT-R
RS-485 data cable, RJ45, 0.5 m	DX-CBL-RJ45-0M5
RS-485 data cable, RJ45, 1.0 m	DX-CBL-RJ45-1M0
RS-485 data cable, RJ45, 3.0 m	DX-CBL-RJ45-3M0
RS-485 three-way data cable splitter, RJ45	DX-SPL-RJ45-3SL
RS-485 data cable splitter, RJ45, (1 connector to 2 socket)	DX-SPL-RJ45-2SL1PL

Communication Modules

Description	Catalog Number
SmartWire-DT interface for DE1 and DC1 IP20	DX-NET-SWD3
Dual EtherNet/IP interface for DE1 and DC1 IP20	DX-NET-ETHERNET2-2

Optional Communication Modules

Description	Catalog Number
EtherNet/IP plug-in interface module ^②	DX-NET-ETHERNET2-2

Notes

- ^① Includes 1 m RS-485 data cable.
- ^② Available June 2016.

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Adjustable Frequency Drives

PowerXL DC1 Series Drives

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Line and Load Reactors

A line and load reactor is a three-phase inductance filter that can be placed on the line and load side of the AFD to help improve the harmonic performance of the system. Consult the factory for additional filtering options and further technical details.

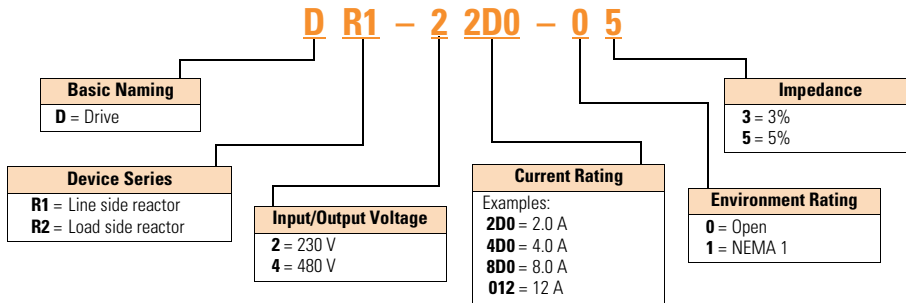
DR1 Line Reactor

A line reactor helps to provide a moderate reduction in current harmonics similar to a DC choke. It also provides increased input protection for AFD and its semiconductors from line transients helping to extend the life of the AFD.

DR2 Output Reactor

An output filter is used to reduce the transient voltage (dV/dt) at the motor terminals. The output filter is recommended for cable lengths exceeding 100 ft (30 m) with a drive of 3 hp and above and for cable lengths of 33 ft (10 m) with a drive of 2 hp and below.

Line and Load Reactors—Catalog Number Selection



Line and Load Reactors—230 V

hp (CT)	Open Load Reactor		Line Reactor		NEMA 1 Load Reactor		Line Reactor	
	3%	5%	3%	5%	3%	5%	3%	5%
0.5	DR2-22D0-03	DR2-22D0-05	DR1-22D2-03	DR1-22D2-05	DR2-22D0-13	DR2-22D0-15	DR1-22D2-13	DR1-22D2-15
1	DR2-24D0-03	DR2-28D0-05	DR1-24D2-03	DR1-24D2-05	DR2-24D0-13	DR2-28D0-15	DR1-24D2-13	DR1-24D2-15
1.5	DR2-28D0-03	DR2-28D0-05	DR1-26D0-03	DR1-26D0-05	DR2-28D0-13	DR2-28D0-15	DR1-26D0-13	DR1-26D0-15
2	DR2-28D0-03	DR2-28D0-05	DR1-26D8-03	DR1-26D8-05	DR2-28D0-13	DR2-28D0-15	DR1-26D8-13	DR1-26D8-15
3	DR2-2012-03	DR2-2012-05	DR1-29D6-03	DR1-29D6-05	DR2-2012-13	DR2-2012-15	DR1-29D6-13	DR1-29D6-15
5	DR2-2018-03	DR2-2018-05	DR1-2015-03	DR1-2015-05	DR2-2018-13	DR2-2018-15	DR1-2015-13	DR1-2015-15
7.5	DR2-2025-03	DR2-2025-05	DR1-2022-03	DR1-2022-05	DR2-2025-13	DR2-2025-15	DR1-2022-13	DR1-2022-15
10	DR2-2035-03	DR2-2035-05	DR1-2028-03	DR1-2028-05	DR2-2035-13	DR2-2035-15	DR1-2028-13	DR1-2028-15
15	DR2-2045-03	DR2-2045-05	DR1-2042-03	DR1-2042-05	DR2-2045-13	DR2-2045-15	DR1-2042-13	DR1-2042-15

Line and Load Reactors—480 V

hp (CT)	Open Load Reactor		Line Reactor		NEMA 1 Load Reactor		Line Reactor	
	3%	5%	3%	5%	3%	5%	3%	5%
1	DR2-42D0-03	DR2-42D0-05	DR1-42D1-03	DR1-42D1-05	DR2-42D0-13	DR2-42D0-15	DR1-42D1-13	DR1-42D1-15
2	DR2-44D0-03	DR2-44D0-05	DR1-43D4-03	DR1-43D4-05	DR2-44D0-13	DR2-44D0-15	DR1-43D4-13	DR1-43D4-15
3	DR2-48D0-03	DR2-48D0-05	DR1-44D8-03	DR1-44D8-05	DR2-48D0-13	DR2-48D0-15	DR1-44D8-13	DR1-44D8-15
5	DR2-48D0-03	DR2-48D0-05	DR1-47D6-03	DR1-47D6-05	DR2-48D0-13	DR2-48D0-15	DR1-47D6-13	DR1-47D6-15
7.5	DR2-4012-03	DR2-4012-05	DR1-4011-03	DR1-4011-05	DR2-4012-13	DR2-4012-15	DR1-4011-13	DR1-4011-15
10	DR2-4018-03	DR2-4018-05	DR1-4014-03	DR1-4014-05	DR2-4018-13	DR2-4018-15	DR1-4014-13	DR1-4014-15
15	DR2-4025-03	DR2-4025-05	DR1-4021-03	DR1-4021-05	DR2-4025-13	DR2-4025-15	DR1-4021-13	DR1-4021-15
20	DR2-4025-03	DR2-4025-05	DR1-4027-03	DR1-4027-05	DR2-4025-13	DR2-4025-15	DR1-4027-13	DR1-4027-15
25	DR2-4035-03	DR2-4035-05	DR1-4034-03	DR1-4034-05	DR2-4035-13	DR2-4035-15	DR1-4034-13	DR1-4034-15
30	DR2-4045-03	DR2-4045-05	DR1-4040-03	DR1-4040-05	DR2-4045-13	DR2-4045-15	DR1-4040-13	DR1-4040-15

Technical Data and Specifications

DC1 Series

Ratings

PowerXL DC1 Basic Controller IP20 Standard Ratings

Description	Specification
Protections	
Overload protection	150% for 60s for every 600 seconds
Overvoltage protection	Yes
Undervoltage protection	Yes
Ground fault protection	Yes
Overtemperature protection	Yes
Motor overload protection	Yes
Motor stall protection	Yes
Short-circuit withstand rating	100 kAIC with Type J fuses

Programmable Parameters

Description
Built-in Help card
14 Standard operation parameters
Reference scaling
Programmable start and stop functions
DC-brake at start and stop
Programmable V/Hz curve
Adjustable switching frequency
Autorestart function after fault
Protections and supervisions
Power section fault indication
External fault
Fieldbus communication
Second deceleration time
Analog input range selection, signal scaling and filtering
PI controller
Skip frequencies

Specifications

PowerXL DC1 Series Drives

Description	Specification
Input Ratings	
Input voltage (V_{in})	$\pm 10\%$
Input frequency (f_{in})	50/60 Hz (variation up to 48–62 Hz)
Connection to power	Maximum of one time every 30 seconds
Output Ratings	
Output voltage	0 to V_{in} ^①
Continuous output current	Continuous rated current I_N at ambient temperature max. 122 °F (50 °C), 150% for 60 seconds, 175% for 2 seconds
Output frequency	0 to 500 Hz
Frequency resolution	0.1 Hz
Initial output current (I_{H})	175% for 2s for every 20 seconds Torque depends on motor
Control Characteristics	
Operation mode	U/f control, slip compensation
Switching frequency	4 to 32 kHz
Voltage reference	10 Vdc (max. 10 mA)
Field weakening point	0 to 500 Hz
Acceleration time	0.1 to 600 seconds
Deceleration time	0.1 to 600 seconds
Brake Resistor (Minimum Values) ^②	
230 V Series	FS2 and FS3 47 ohms
400 V Series	FS2 100 ohms, FS3 47 ohms
Ambient Conditions	
Ambient operating temperature	+14 °F (–10 °C), no frost to +122 °F (+50 °C); Rated loadability I_N IP20—NEMA 0
Storage temperature	–40 °F (–40 °C) to +140 °F (+60 °C)
Relative humidity	0 to 95% RH, noncondensing, non-corrosive, no dripping water
Enclosure class	IP20 (FS1–FS4)

Notes

^① Exception: 115 V single-phase in, 230 V three-phase out.

^② Only FS2, FS3 and FS4 drives are equipped with brake chopper circuit.

Standards—DC1 Series

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I/O Specifications

- Digital inputs DI1–DI4 are programmable
- Digital, relay and analog outputs are programmable

Includes:

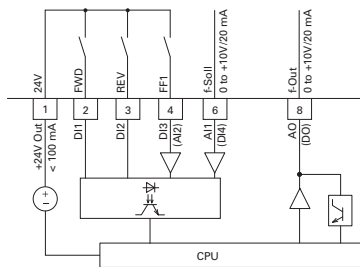
- Four inputs (two digital and two digital/analog)
- Analog inputs
 - 4–20 mA
 - 0–10 V
- One output (analog or digital)
- One relay output
- RS-485 interface

Reliability

- Pretested components
- Computerized testing
- Final test with full load
- Conformal-coated boards
- Eaton's Electrical Services & Systems: national network of AF drive specialists

DC1 Series I/O Interface

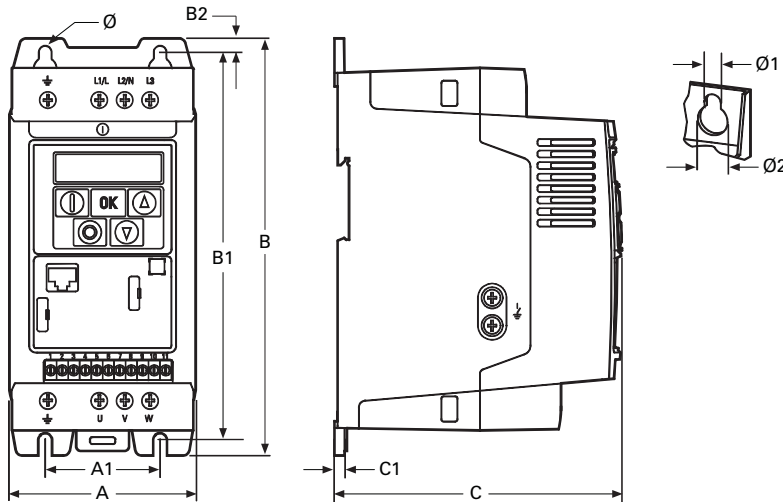
Terminal	Signal	Factory Preset	Description
1	+24 Vdc	Control voltage for DI1–DI4	— Maximum load 100 mA Reference potential V
2	DI1	Digital Input 1	Start Enable FWD
3	DI2	Digital Input 2	Start Enable REV
4	DI3	Digital Input 3	Fixed frequency FF1
	AI2	Analog Input 2	Fixed frequency FF1
			Digital: 8–30 V (high) Analog: 0 to +10 V ($R_i > 72 \text{ k}\Omega$) 0/4–20 mA ($R_B = 500 \Omega$) Can be switched with parameter P-16
5	+10 Vdc	Reference voltage, Output (+10 V)	— Maximum load 10 mA Reference potential 0 V
6	AI1	Analog Input 1	Frequency reference value (fixed frequency)
	DI4	Digital Input 5	Frequency reference value (fixed frequency)
			Analog: 0 to +10 V ($R_i > 72 \text{ k}\Omega$) 0/4–20 mA ($R_B = 500 \Omega$) Can be switched with parameter P-16
7	0 V	Reference potential	— 0 V = connection terminal 9
8	AO1	Analog Output 1	Output frequency
	DO1	Digital Output 1	Output frequency
			Analog: 0 to +10 V, maximum 20 mA Can be switched with parameter P-25 Digital: 8 to +24 V
9	0 V	Reference potential	— 0 V connection terminal 7
10	K13	Relay 1, normally open contact	Active = RUN
11	K14	Relay 1, normally open contact	Active = RUN
			Maximum switching load: 250 Vac/6 A or 30 Vdc/5 A



Dimensions

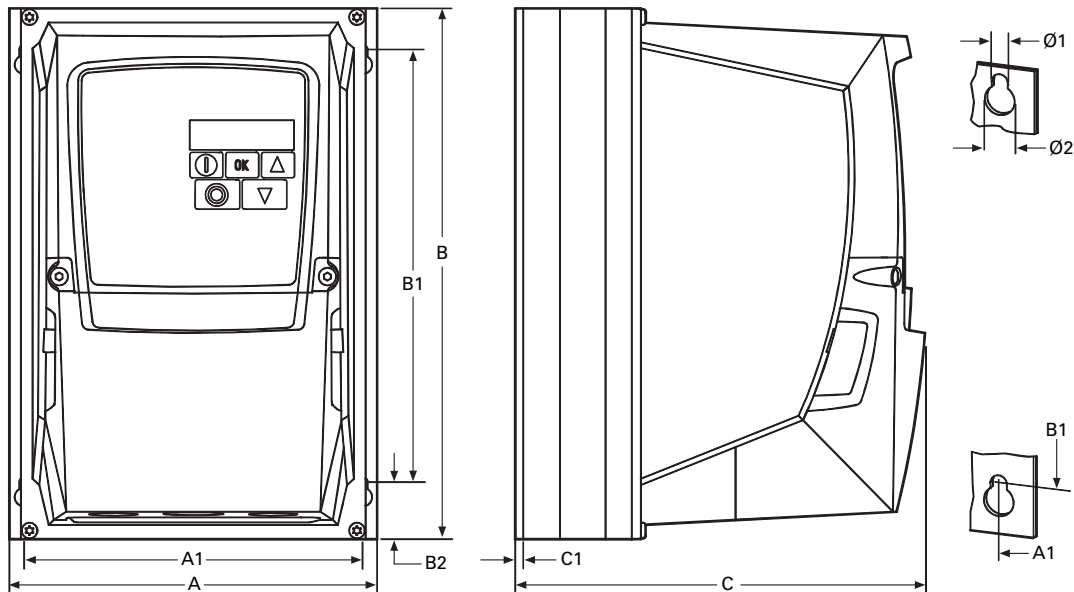
Approximate Dimensions in Inches (mm)

DC1, Sizes FS1–FS4, Degree of Protection IP20/NEMA 0



Frame Size	A	A1	B	B1	B2	C	C1	Ø1	Ø2	Weight lbs (kg)
FS1	3.19 (81)	1.97 (50)	7.24 (184)	6.69 (170)	0.28 (7)	4.88 (124)	0.16 (4)	0.24 (6)	0.47 (12)	2.43 (1.1)
FS2	4.21 (107)	2.95 (75)	9.09 (231)	8.46 (215)	0.31 (8)	5.98 (152)	0.20 (5)	0.24 (6)	0.47 (12)	5.73 (2.6)
FS3	5.08 (129)	3.94 (100)	10.75 (273)	10.04 (255)	0.33 (8.5)	6.89 (175)	0.20 (5)	0.24 (6)	0.47 (12)	8.82 (4.0)
FS4	6.81 (173)	4.92 (125)	16.48 (418.5)	15.75 (400)	0.41 (10.5)	8.31 (211)	0.16 (4)	0.31 (8)	0.57 (14.5)	18.52 (8.4)

DC1, Sizes FS1–FS3, Degree of Protection IP66/NEMA 4



Frame Size	A	A1	B	B1	B2	C	C1	Ø1	Ø2	Weight lbs (kg)
FS1	6.34 (161)	5.85 (148.5)	9.13 (232)	7.44 (189)	0.98 (25)	7.24 (184)	0.14 (3.5)	0.16 (4)	0.31 (8)	6.17 (2.8)
FS2	7.40 (188)	6.93 (176)	10.12 (257)	7.87 (200)	1.10 (28)	7.56 (192)	0.14 (3.5)	0.17 (4.2)	0.33 (8.5)	11.02 (5.0)
FS3	8.27 (210)	7.78 (197.5)	12.20 (310)	9.92 (252)	1.30 (33)	9.45 (240)	0.14 (3.5)	0.17 (4.2)	0.33 (8.5)	18.08 (8.2)

2.3

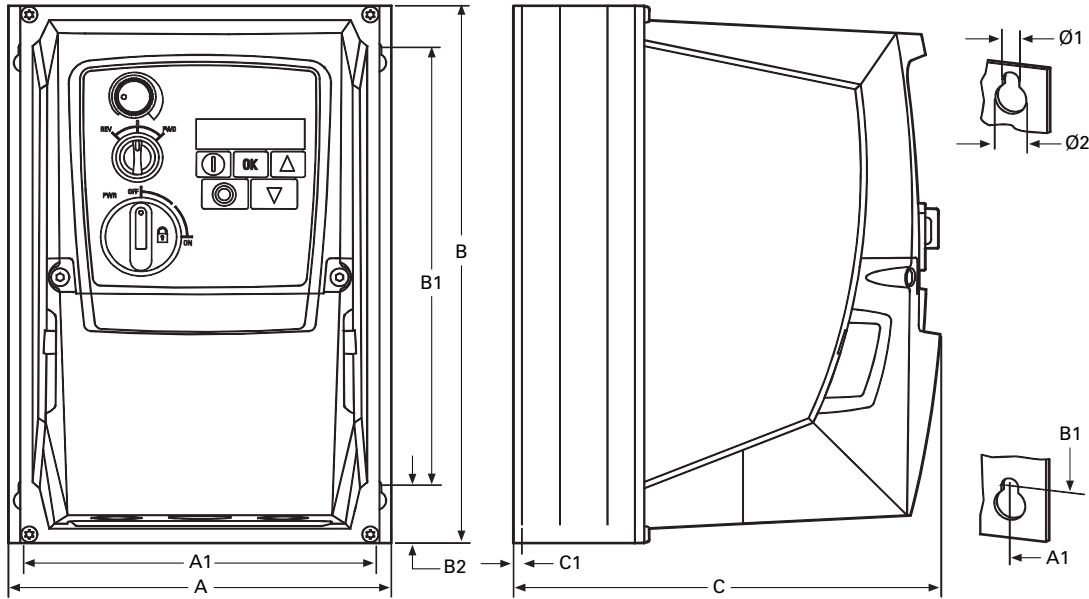
Adjustable Frequency Drives

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Approximate Dimensions in Inches (mm)

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DC1, Sizes FS1–FS3, Degree of Protection IP66/NEMA 4, with Local Controls



Frame Size	A	A1	B	B1	B2	C	C1	Ø1	Ø2	Weight lbs (kg)
FS1	6.34 (161)	5.85 (148.5)	9.13 (232)	7.44 (189)	0.98 (25)	7.24 (184)	0.14 (3.5)	0.16 (4)	0.31 (8)	6.17 (2.8)
FS2	7.40 (188)	6.93 (176)	10.12 (257)	7.87 (200)	1.10 (28)	7.56 (192)	0.14 (3.5)	0.17 (4.2)	0.33 (8.5)	11.02 (5.0)
FS3	8.27 (210)	7.78 (197.5)	12.20 (310)	9.92 (252)	1.30 (33)	9.45 (240)	0.14 (3.5)	0.17 (4.2)	0.33 (8.5)	18.08 (8.2)