

Product Family Overview

B



**IEC, A Frame, Full Voltage
Non-reversing and Reversing Starters**

Product Description

Eaton's Cutler-Hammer® Intelligent Technologies (IT) Electro-Mechanical line of Contactors and Starters is the result of a substantial engineering, manufacturing and marketing effort involving extensive customer input, combined with new advances in solid-state technology. IT. Electro-Mechanical products have greatly increased functionality, significantly reduced size and utilize the benefits of 24V DC control. The exclusive Pulse Width Modulation (PWM) control and digital microprocessor generate a minimized DC value which reduces energy to the contact block and provides the most compact system available.

Standards and Certifications

- Designed to meet or exceed UL, IEC and CSA
- UL Listed: UL File #E1491, Guide #NLDX – Open, UL 508
- CSA Certified: CSA File #156828, Class #3211 04 Open, C22.2 No. 14-95
- IEC: A – F Frames, IEC 60947-4-1, EN 60947-4-1
- 45 mm – 76 mm CSA Certified for Elevator Duty
- CE
- EMC IEC 61000-4
- KEMA



ISO 9002 Certification

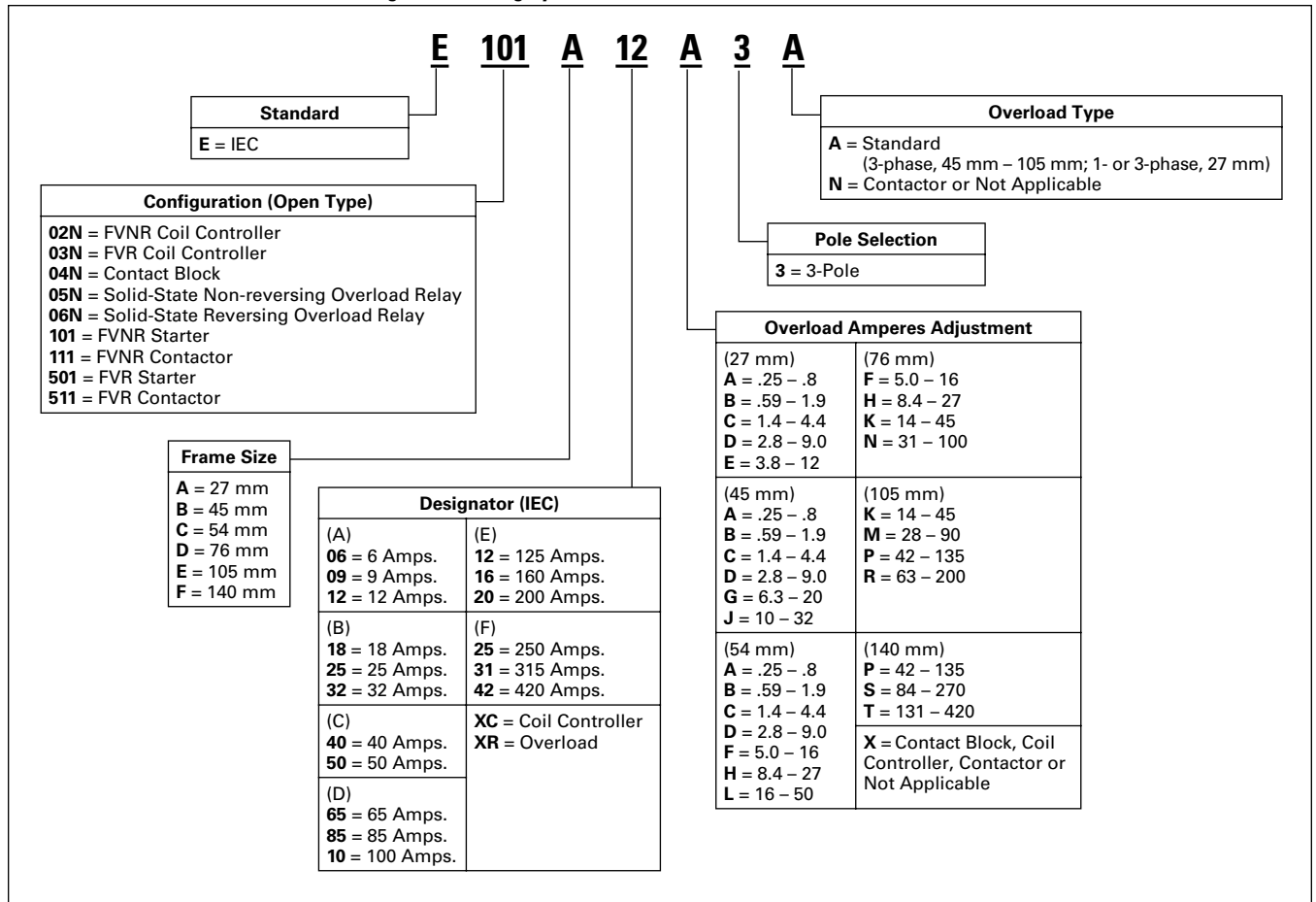
When you turn to Eaton's Cutler-Hammer Products, you turn to quality. The International Standards Organization (ISO) has established a series of standards acknowledged by 91 industrialized nations to bring harmony to the international quest for quality. The ISO Certification process covers 20 quality system elements in design, production and installation that must conform to achieve registration. This commitment to quality will result in increased product reliability and total customer satisfaction.

Publications

- | | |
|-------------|--|
| Pub. 49601 | IT. IEC Overload Relay 27 mm (A-Frame) Quick Setup Guide |
| Pub. 49602 | IT. IEC Overload Relay (B – F Frames) Quick Setup Guide |
| Pub. 49320 | IT. IEC Non-reversing Contactor 27 mm (A-Frame) Installation Guide |
| Pub. 49640 | IT. IEC Non-reversing Contactor 45 mm (B-Frame) Installation Guide |
| Pub. 49650 | IT. IEC Non-reversing Contactor 54 mm (C-Frame) Installation Guide |
| Pub. 49660 | IT. IEC Non-reversing Contactor 76 mm (D-Frame) Installation Guide |
| Pub. 49670 | IT. IEC Non-reversing Contactor 105 mm (E-Frame) Installation Guide |
| Pub. 49680 | IT. IEC Non-reversing Contactor 140 mm (F-Frame) Installation Guide |
| Pub. 49321 | IT. IEC Reversing Contactor 27 mm (A-Frame) Installation Guide |
| Pub. 49641 | IT. IEC Reversing Contactor 45 mm (B-Frame) Installation Guide |
| Pub. 49651 | IT. IEC Reversing Contactor 54 mm (C-Frame) Installation Guide |
| Pub. 49661 | IT. IEC Reversing Contactor 76 mm (D-Frame) Installation Guide |
| Pub. 49671 | IT. IEC Reversing Contactor 105 mm (E-Frame) Installation Guide |
| Pub. 49681 | IT. IEC Reversing Contactor 140 mm (F-Frame) Installation Guide |
| Pub. 49322 | IT. IEC Non-reversing Starter 27 mm (A-Frame) Installation Guide |
| Pub. 49642 | IT. IEC Non-reversing Starter 45 mm (B-Frame) Installation Guide |
| Pub. 49652 | IT. IEC Non-reversing Starter 54 mm (C-Frame) Installation Guide |
| Pub. 49662 | IT. IEC Non-reversing Starter 76 mm (D-Frame) Installation Guide |
| Pub. 49672 | IT. IEC Non-reversing Starter 105 mm (E-Frame) Installation Guide |
| Pub. 49682 | IT. IEC Non-reversing Starter 140 mm (F-Frame) Installation Guide |
| Pub. 49323 | IT. IEC Reversing Starter 27 mm (A-Frame) Installation Guide |
| Pub. 49643 | IT. IEC Reversing Starter 45 mm (B-Frame) Installation Guide |
| Pub. 49653 | IT. IEC Reversing Starter 54 mm (C-Frame) Installation Guide |
| Pub. 49663 | IT. IEC Reversing Starter 76 mm (D-Frame) Installation Guide |
| Pub. 49673 | IT. IEC Reversing Starter 105 mm (E-Frame) Installation Guide |
| Pub. 49683 | IT. IEC Reversing Starter 140 mm (F-Frame) Installation Guide |
| Pub. 49645 | IT. IEC Non-reversing Contactor Assembly Instructions (45 mm & 54 mm) |
| Pub. 49665 | IT. IEC Non-reversing Contactor & Starter Assembly Instructions (76 mm Contactor/Starter) (45 mm & 54 mm Starter) |
| Pub. 49325 | IT. IEC Non-reversing Starter 27 mm (A-Frame) Assembly Instructions |
| Pub. 49685 | IT. IEC Non-reversing Starter 140 mm (F-Frame) Assembly Instructions |
| Pub. 49326 | IT. IEC Reversing Starter 27 mm (A-Frame) Assembly Instructions |
| Pub. 49686 | IT. IEC Reversing Contactor & Starter 140 mm (F-Frame) Assembly Instructions |
| Pub. 49410 | IT. Front Mountable Auxiliary Contact Assembly Instructions |
| Pub. 49415 | IT. IEC Contact Blocks (B – E Frames) |
| Pub. 282782 | IT. Sinking Control Input Connections |
| Pub. 282719 | IT. Overload Trip/Alarm Output (Sourcing/Sinking) |

Catalogue Number Selection (Open Components)

Table B-206. /T. Electro-Mechanical Catalogue Numbering System



Note: When using the Catalogue Numbering System for Eaton's Cutler-Hammer /T. Electro-Mechanical products, care should be exercised to assure that the Catalogue Number for the Overload Relay aligns with the /T. Contact Block selected for type, frame size and ampacity, if purchased as separate components. **Example:** Select an **E05N_XR_3A** /T. Overload Relay for an IEC non-reversing application or an **E06N_XR_3A** for an IEC reversing application.

Examples:

- E02NCXCXNN — FVNR Coil Controller, 54 mm
- E04NB18X3N — Contact Block, 45 mm, 18 Amps
- E05NCXRL3A — Solid-State Non-reversing Overload Relay, 16 – 50 Amps
- E101B32J3A — FVNR B-Frame Starter, 32 Amps, with Solid-State Overload, 10 – 32 Amps
- E111F25X3N — FVNR F-Frame Contactor, 250 Amps
- E501D10K3A — FVR D-Frame Starter, 100 Amps, with Solid-State Overload, 14 – 45 Amps
- E511B18X3N — FVR B-Frame Contactor, 18 Amps

B

Contactors — Full Voltage, Non-reversing and Reversing

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IEC Full Voltage Non-reversing Contactor, C-Frame
Cat. No. E111C50X3N



IEC Full Voltage Reversing Contactor, D-Frame
Cat. No. E511D10X3N

Product Description

The Cutler-Hammer® Intelligent Technologies (IT) Electro-Mechanical Contactor from Eaton's electrical business consists of an IT Electro-Mechanical Contact Block and IT Electro-Mechanical Coil Controller as a Full Voltage Non-reversing (FVNR) or Full Voltage Reversing (FVR) device. B-Frame (45 mm) to E-Frame (105 mm) Contact Blocks combined with Coil Controllers (factory or field assembled) are stand-alone Contactors. Only the A-Frame (27 mm) and F-Frame (140 mm) Contactors have internal factory assembled coil controllers.

Also available are the IT Manual and Combination Motor Controllers which combine a Manual Motor Protector, Wiring Connector Link and IT Contactor.

Application Description

When selecting an IEC Contactor, the user must consider the specific load, utilization category and required electrical life. Actual application life varies depending on environmental conditions and duty cycle.

Features

- 115V AC – 600V AC, 1/4 – 350 hp/ 3/4 – 250 kW, 50/60 Hz
- 24V DC Coil Control — safe, reliable global standard
- Most compact DC operated contactors available — e.g., A-Frame 27 mm wide, 7-1/2 hp @ 12A, 460V
- Frame sizes (mm): 27, 45, 54, 76, 105, 140
- No laminations, shading coils or magnet noise
- -40 to 149°F (-40 to 65°C) operating temperature
- No seal in auxiliary contacts required — control wiring is not needed between the contactor and overload relay

- Unique Pulse Width Modulated (PWM) coil controller minimizes energy and coil power consumption
- Conformal coated PWM board (coil controller) for environmental toughness
- Microprocessor-based control
- 95% humidity non-condensing (99% consult factory)
- Easily accessible mounting feet for panel mounting
- High immunity to ESD, harmonics — minimal Total Harmonic Distortion
- Front and side mounted Auxiliary Contacts: 1NO, 1NC, 2NO, 2NC, 1NO/1NC and logic level
- Built-in logic to provide either 2- or 3-wire control, eliminating the need to provide and wire auxiliary contacts to seal in and interlock the contactor coils
- Easy field assembly of control wiring — plug and unplug lockable control connector
- DIN rail mounting, 6 – 100A (A – D Frames)
- Common accessories
- Long-life silver nickel (A – B Frames) and silver tin oxide (C – F Frames) contacts provide excellent conductivity and superior resistance to welding and arc erosion
- Environmentally friendly materials
- IP20 Finger Protection
- Low wattage coils and minimal heat dissipation

Reversing Contactors

- Includes Reversing Power Wiring and bus bars
- Mounting plates for B-Frame (45 mm) to E-Frame (105 mm)
- Exclusive internal electronic interlock for reversing
- Unique coil controller energizes both forward and reverse contactors — one control point for wiring

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Contactors — Full Voltage, Non-reversing and Reversing

Product Selection

When Ordering

Select required contactor by amp rating, frame size, kW/hp, voltage and non-reversing or reversing.

Non-reversing Contactors

Note:

- An E111 (45 – 105 mm) consists of an E04N (Contact Block) and an E02N (FVNR Coil Controller), factory assembled.
- An E111 (27 and 140 mm) has an internal coil controller, factory assembled.



IEC A-Frame FVNR Contactor
Cat. No. E111A12X3N



IEC B-Frame FVNR Contactor
Cat. No. E111B32X3N

B

Table B-207. 3-Pole DC-Operated Full Voltage Non-reversing Contactors ① (A – F Frames)

Max. AC-3 Amp. Rating 480V AC (Ie)	IEC 60947-4-1 AC-1 Thermal Current 480V AC and (Ith)	Frame Size ②	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) 50/60 Hz						3-Pole Open Type		
			3-Phase						1-Phase			3-Phase			Catalogue Number	Price	
			220V/240V	380V	400V/415V	440V/460V	500V	550V/575V	115V/120V	220V/230V	200V/208V	230V/240V	380V/415V	460V/480V			575V/600V
6	12	A	1.1	2.2	2.2	3	3	3	1/4	1/2	1	1-1/2	3	3	3	E111A06X3N	
9	16	A	2.2	4	4	4	4	4	1/3	1	2	2	3	5	5	E111A09X3N	
12	20	A	3	5.5	5.5	6.5	6.5	6.5	1/2	2	3	3	5	7-1/2	7-1/2	E111A12X3N	
18	25	B	4	7.5	9	9	10	11	1	3	5	5	10	10	10	E111B18X3N	
25	40	B	5.5	12.5	12.5	13	15	15	2	3	5	7-1/2	10	15	15	E111B25X3N	
32	50	B	9	15	15	18.5	18.5	18.5	2	5	7-1/2	10	15	20	20	E111B32X3N	
40	63	C	11	18.5	22	22	22	25	3	7-1/2	10	10	20	25	25	E111C40X3N	
50	85	C	12.5	22	25	30	30	33	3	10	15	15	25	30	30	E111C50X3N	
65	100	D	18.5	30	33	40	40	45	5	10	20	20	40	50	50	E111D65X3N	
85	115	D	25	45	45	51	51	55	7-1/2	15	25	30	50	60	60	E111D85X3N	
100	130	D	25	51	55	59	59	63	10	20	30	30	50	75	75	E111D10X3N	
125	200	E	33	63	63	80	80	80	10	25	40	40	60	100	100	E111E12X3N	
160	225	E	45	80	80	100	100	100	15	30	50	60	75	125	125	E111E16X3N	
200	250	E	59	100	110	110	110	132	—	40	60	75	100	150	150	E111E20X3N	
250	300	F	75	132	140	160	160	160	—	50	75	100	150	200	200	E111F25X3N	
315	375	F	90	160	160	200	200	200	—	—	100	125	150	250	250	E111F31X3N	
420	450	F	110	220	220	257	257	257	—	—	150	150	200	350	350	E111F42X3N	

① 24V DC coil voltage.

②

Frame Size

- A = 27 mm
- B = 45 mm
- C = 54 mm
- D = 76 mm
- E = 105 mm
- F = 140 mm

Note:

- If required, accessories are available starting on Page B-194.
- Integral solid-state auxiliary hold-in circuit.
- 3 main contacts.
- See Table B-216 for 24V DC power supply requirements.
- Control inputs (P, F) are rated 24V DC (3 – 5 mA).

Accessories Pages B-194 – B-197
 Technical Data Pages B-190 – B-193
 Dimensions Pages B-200 – B-202
 Discount Symbol MC7

Contactors — Full Voltage, Non-reversing and Reversing

Reversing Contactors

Note:

- An **E511** (45 – 105 mm) consists of two **E04N** (Contact Blocks), an **E03N** (FVR Coil Controller), Mechanical Interlock, Fanning Strips and Mounting Plate, factory assembled.
- An **E511F** (140 mm) consists of two **E111F** (Contactors), Mechanical Interlock, Crossover Bus Bars and Wiring Harness, factory assembled.
- An **E511A** (27 mm) Contactor is factory assembled only.



IEC B-Frame FVR Contactor
Cat. No. E511B32X3N

Table B-208. 3-Pole DC-Operated Full Voltage Reversing Contactors ① (A – F Frames)

Max. AC-3 Amp. Rating 480V AC (Ie)	IEC 60947-4-1 AC-1 Thermal Current 480V AC and (Ith)	Frame Size ②	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) 50/60 Hz						3-Pole Open Type		
			3-Phase						1-Phase		3-Phase				Catalogue Number	Price	
			220V/240V	380V	400V/415V	440V/460V	500V	550V/575V	115V/120V	220V/230V	200V/208V	230V/240V	380V/415V	460V/480V			575V/600V
6 9 12	12 16 20	A A A	1.1 2.2 3	2.2 4 5.5	2.2 4 5.5	3 4 6.5	3 4 6.5	3 4 6.5	1/4 1/3 1/2	1/2 1 2	1 2 3	1-1/2 2 3	3 3 5	3 5 7-1/2	3 5 7-1/2	E511A06X3N E511A09X3N E511A12X3N	
18 25 32	25 40 50	B B B	4 5.5 9	7.5 12.5 15	9 12.5 15	9 13 18.5	10 15 18.5	11 15 18.5	1 2 2	3 3 5	5 5 7-1/2	5 7-1/2 10	10 10 15	10 15 20	10 15 20	E511B18X3N E511B25X3N E511B32X3N	
40 50	63 85	C C	11 12.5	18.5 22	22 25	22 30	22 30	25 33	3 3	7-1/2 10	10 15	10 15	20 25	25 30	25 30	E511C40X3N E511C50X3N	
65 85 100	100 115 130	D D D	18.5 25 25	30 45 51	33 45 55	40 51 59	40 51 59	45 55 63	5 7-1/2 10	10 15 20	20 25 30	20 30 30	40 50 50	50 60 75	50 60 75	E511D65X3N E511D85X3N E511D10X3N	
125 160 200	200 225 250	E E E	33 45 59	63 80 100	63 80 110	80 100 110	80 100 110	80 100 132	10 15 —	25 30 40	40 50 60	40 60 75	60 75 100	100 125 150	100 125 150	E511E12X3N E511E16X3N E511E20X3N	
250 315 420	300 375 450	F F F	75 90 110	132 160 220	140 160 220	160 200 257	160 200 257	160 200 257	— — —	50 — —	75 100 150	100 125 150	150 200 350	200 250 350	200 250 350	E511F25X3N E511F31X3N E511F42X3N	

① 24V DC coil voltage.

②

Frame Size

- A = 27 mm
- B = 45 mm
- C = 54 mm
- D = 76 mm
- E = 105 mm
- F = 140 mm

Note:

- If required, accessories are available starting on **Page B-194**.
- Integral solid-state auxiliary hold-in circuit.
- 3 main contacts.
- See **Table B-216** for 24V DC power supply requirements.
- Control inputs (P, F, R) are rated 24V DC (3 – 5 mA).

Accessories **Pages B-194 – B-197**
 Technical Data **Pages B-190 – B-193**
 Dimensions **Pages B-200 – B-202**
 Discount Symbol **MC7**

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Starters — Full Voltage, Non-reversing and Reversing

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**IEC Full Voltage Reversing Starter, E Frame
Cat. No. E501E20R3A**

Product Description

The Cutler-Hammer® Intelligent Technologies (IT.) Electro-Mechanical Starter from Eaton's electrical business consists of an IT. Electro-Mechanical Contact Block or Contactor and IT. Electro-Mechanical Solid-State Overload Relay as a Full Voltage Non-reversing (FVNR) or Full Voltage Reversing (FVR) device. A-Frame (27 mm) to F-Frame (140 mm) Starters are factory or field assembled.

Features

- 115V AC – 600V AC, 1/4 – 350 hp/.75 – 250 kW, .25A – 420A Overload Amperes range, 50/60 Hz
- 24V DC coil control power – safe, reliable, global standard
- Unique Pulse Width Modulated (PWM) coil controller minimizes energy and coil power consumption
- Microprocessor based control
- Phase loss and current unbalance protection, user selectable
- Standard user-selectable Trip Class 10 (factory default), 20 or 30 – no individual part numbers – no programming software
- Ambient compensated
- Motor temperature and power-up protection with thermal memory
- Easily accessible mounting feet for panel mounting
- For use on the load side of an Adjustable Frequency Drive, consult the factory.

- LED status indication – trip, trip class, motor thermal state, reset, overload state
- Unique “Alarm without Trip” option for critical must run applications
- Lockable overload cover protects against unauthorized adjustment and reset functions
- No control wiring needed between contactor and overload relay – eliminates seal in auxiliary contacts
- Minimal heat – no full voltage coils
- -40° to 149°F (-40° to 65°C) operating temperature
- Wide 3.2:1 current adjustment range
- Exclusive internal 24-bit floating point math calculations with RMS calibrated current measurement
- High immunity to ESD, harmonics – minimal Total Harmonic Distortion
- IP20 Finger Protection
- Motor running thermal utilization indication
- Manual, Automatic or Remote Reset
- Easy field assembly of control wiring – plug and unplug lockable control connector
- DIN rail mounting, 6A – 100A (A – D Frames)
- Communication Interface with Starter Network Adapter Product (SNAP)
- 2- or 3-wire control
- Solid-state alarm output indication
- Front and side mounted Auxiliary Contacts: 1NO, 1NC, 2NO, 2NC, 1NO/1NC, logic level (1NO/1NC)
- Type 2 Coordination
- Conformal coated PWM overload board for environmental toughness

Reversing Starters

- Includes Reversing Power Wiring and bus bars
- Mounting plates for B-Frame (45 mm) to E-Frame (105 mm)
- Built-in electronic interlock for FVR units
- Unique overload board energizes both forward and reverse starters – one control point for wiring



**IEC FVNR Starter, C Frame
Cat. No. E101C50L3A**



Overload Relay with Cover Open – FLA/Trip Class/Phase Protection Dial

TEST Button

RESET Button



Overload Relay with Cover Closed (front view)

B

Starters — Full Voltage, Non-reversing and Reversing

Product Selection

When Ordering

Select required Starter by kW/hp rating, voltage, phase and overload adjustment range (amperes).

B



IEC A-Frame, Full Voltage Non-reversing Starter



IEC B-Frame, Full Voltage Non-reversing Starter

Non-reversing Starters

Table B-209. Full Voltage Non-reversing DC-Operated, Open Type Starters (A – B Frames), with 3-Pole Solid-State Overload Protection

Max. AC-3 Amp. Rating 480V AC (Ie)	Overload Adjustment Range (Amperes)	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) Rating 50/60 Hz						Catalogue Number	Price
		3-Phase						1-Phase		3-Phase					
		220V/ 240V	380V	400V/ 415V	460V	500V	550V/ 575V	115V/ 120V	220V/ 230V	200V/ 208V	230V/ 240V	380V/ 415V	460V/ 480V		

A-Frame 27 mm

6	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 3.8 – 12	1.1	2.2	2.2	3	3	3	1/4	1/2	1	1-1/2	3	3	3	E101A06A3A E101A06B3A E101A06C3A E101A06D3A E101A06E3A
9	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 3.8 – 12	2.2	4	4	4	4	4	1/3	1	2	2	3	5	5	E101A09A3A E101A09B3A E101A09C3A E101A09D3A E101A09E3A
12	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 3.8 – 12	3	5.5	5.5	6.5	6.5	6.5	1/2	2	3	3	5	7-1/2	7-1/2	E101A12A3A E101A12B3A E101A12C3A E101A12D3A E101A12E3A

B-Frame 45 mm

18	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	4	7.5	9	9	10	11	—	—	5	5	10	10	10	E101B18A3A E101B18B3A E101B18C3A E101B18D3A E101B18G3A E101B18J3A
25	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	5.5	12.5	12.5	13	15	15	—	—	5	7-1/2	10	15	15	E101B25A3A E101B25B3A E101B25C3A E101B25D3A E101B25G3A E101B25J3A
32	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	9	15	15	18.5	18.5	18.5	—	—	7-1/2	10	15	20	20	E101B32A3A E101B32B3A E101B32C3A E101B32D3A E101B32G3A E101B32J3A

Note:

- If required, accessories are available starting on **Page B-194**.
- A-Frame 27 mm **IT** Starter is for 1 – or 3-phase applications.
- The standard B – F-Frame (45 mm to 140 mm) **IT** Starters are for 3-phase applications.

- Class 10 (factory default), 20 and 30TripTimes see **Figure B-141** on **Page B-193**.
- An **E101** (27 – 105 mm) consists of an **E04N** (Contact Block) or **E111A** (Contactor) and an **E05N** (Non-reversing Overload Relay), factory assembled. An **E101F** (140 mm) consists of an **E111** (Contactor) and an **E05N** (Non-reversing Overload Relay), factory assembled.

- See **Table B-216** for 24V DC power supply requirements.
- Control inputs (P, F, 1) are rated 24V DC (3 – 5 mA).

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 Technical Data **Pages B-190 – B-193**
 Dimensions **Pages B-203 – B-205**
 Discount Symbol **MC7**



**IEC C-Frame
FVNR Starter**

B

Non-reversing Starters, continued

Table B-210. Full Voltage Non-reversing DC-Operated, Open Type Starters (C – D Frames), with 3-Pole Solid-State Overload Protection

Max. AC-3 Amp. Rating 480V AC (Ie)	Overload Adjustment Range (Amperes)	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) Rating 50/60 Hz						Catalogue Number	Price
		3-Phase						1-Phase		3-Phase					
		220V/ 240V	380V	400V/ 415V	460V	500V	550V/ 575V	115V/ 120V	220V/ 230V	200V/ 208V	230V/ 240V	380V/ 415V	460V/ 480V		

C-Frame 54 mm

40	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 5.0 – 16 8.4 – 27 16 – 50	11	18.5	22	22	22	25	—	—	10	10	20	25	25	E101C40A3A E101C40B3A E101C40C3A E101C40D3A E101C40F3A E101C40H3A E101C40L3A
50	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 5.0 – 16 8.4 – 27 16 – 50	12.5	22	25	30	30	33	—	—	15	15	25	30	30	E101C50A3A E101C50B3A E101C50C3A E101C50D3A E101C50F3A E101C50H3A E101C50L3A

D-Frame 76 mm

65	5.0 – 16 8.4 – 27 14 – 45 31 – 100	18.5	30	33	40	40	45	—	—	20	20	40	50	50	E101D65F3A E101D65H3A E101D65K3A E101D65N3A
85	5.0 – 16 8.4 – 27 14 – 45 31 – 100	25	45	45	51	51	55	—	—	25	30	50	60	60	E101D85F3A E101D85H3A E101D85K3A E101D85N3A
100	5.0 – 16 8.4 – 27 14 – 45 31 – 100	25	51	55	59	59	63	—	—	30	30	50	75	75	E101D10F3A E101D10H3A E101D10K3A E101D10N3A

Note:

- If required, accessories are available starting on **Page B-194**.
- A-Frame 27 mm IT. Starter is for 1 – or 3-phase applications.
- The standard B – F-Frame (45 mm to 140 mm) IT. Starters are for 3-phase applications.

- Class 10 (factory default), 20 and 30 Trip Times see **Figure B-141** on **Page B-193**.
- An **E101** (27 – 105 mm) consists of an **E04N** (Contact Block) or **E111A** (Contactor) and an **E05N** (Non-reversing Overload Relay), factory assembled. An **E101F** (140 mm) consists of an **E111** (Contactor) and an **E05N** (Non-reversing Overload Relay), factory assembled.

- See **Table B-216** for 24V DC power supply requirements.
- Control inputs (P, F, 1) are rated 24V DC (3 – 5 mA).

Accessories **Pages B-194 – B-197**
 Technical Data **Pages B-190 – B-193**
 Dimensions **Pages B-203 – B-205**
 Discount Symbol **MC7**

Starters — Full Voltage, Non-reversing and Reversing

B



**IEC F- and E-Frame (105 mm and 140 mm)
Full Voltage Non-reversing Starters**

Non-reversing Starters, continued

Table B-211. Full Voltage Non-reversing DC-Operated, Open Type Starters (E – F Frames) with 3-Pole Solid-State Overload Protection

Max. AC-3 Amp. Rating 480V AC (Ie)	Overload Adjustment Range (Amperes)	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) Rating 50/60 Hz						Catalogue Number	Price	
		3-Phase						1-Phase		3-Phase						
		220V/ 240V	380V	400V/ 415V	460V	500V	550V/ 575V	115V/ 120V	220V/ 230V	200V/ 208V	230V/ 240V	380V/ 415V	460V/ 480V			575V/ 600V
E-Frame 105 mm																
125	14 – 45 28 – 90 42 – 135 63 – 200	33	63	63	80	80	80	—	—	40	40	60	100	100	E101E12K3A E101E12M3A E101E12P3A E101E12R3A	
160	14 – 45 28 – 90 42 – 135 63 – 200	45	80	80	100	100	100	—	—	50	60	75	125	125	E101E16K3A E101E16M3A E101E16P3A E101E16R3A	
200	14 – 45 28 – 90 42 – 135 63 – 200	59	100	110	110	110	132	—	—	60	75	100	150	150	E101E20K3A E101E20M3A E101E20P3A E101E20R3A	
F-Frame 140 mm																
250	42 – 135 84 – 270 131 – 420	75	132	140	160	160	160	—	—	75	100	150	200	200	E101F25P3A E101F25S3A E101F25T3A	
315	42 – 135 84 – 270 131 – 420	90	160	160	200	200	200	—	—	100	125	150	250	250	E101F31P3A E101F31S3A E101F31T3A	
420	42 – 135 84 – 270 131 – 420	110	220	220	257	257	257	—	—	150	150	200	350	350	E101F42P3A E101F42S3A E101F42T3A	

Note:

- If required, accessories are available starting on **Page B-194**.
- A-Frame 27 mm **IT** Starter is for 1 – or 3-phase applications.
- The standard B – F-Frame (45 mm to 140 mm) **IT** Starters are for 3-phase applications.

- Class 10 (factory default), 20 and 30 Trip Times see **Figure B-141** on **Page B-193**.
- An **E101** (27 – 105 mm) consists of an **E04N** (Contact Block) or **E111A** (Contactor) and an **E05N** (Non-reversing Overload Relay), factory assembled. An **E101F** (140 mm) consists of an **E111** (Contactor) and an **E05N** (Non-reversing Overload Relay), factory assembled.

- See **Table B-216** for 24V DC power supply requirements.
- Control inputs (P, F, 1) are rated 24V DC (3 – 5 mA).

Accessories **Pages B-194 – B-197**
 Technical Data **Pages B-190 – B-193**
 Dimensions **Pages B-203 – B-205**
 Discount Symbol **MC7**



**IEC A-Frame
Reversing Starter**

B

Reversing Starters

Table B-212. Full Voltage Reversing DC-Operated, Open Type Starters (A – B Frames) with 3-Pole Solid-State Overload Protection ^①

Max. AC-3 Amp. Rating 480V AC (Ie)	Overload Adjustment Range (Amperes)	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) Rating 50/60 Hz						Catalogue Number	Price
		3-Phase						1-Phase		3-Phase					
		220V/ 240V	380V	400V/ 415V	440V/ 460V	500V	550V/ 575V	115V/ 120V	220V/ 230V	200V/ 208V	230V/ 240V	380V/ 415V	460V/ 480V		
A-Frame 27 mm															
6	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 3.8 – 12	1.1	2.2	2.2	3	3	3	1/4	1/2	1	1-1/2	3	3	3	E501A06A3A E501A06B3A E501A06C3A E501A06D3A E501A06E3A
9	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 3.8 – 12	2.2	4	4	4	4	4	1/3	1	2	2	3	5	5	E501A09A3A E501A09B3A E501A09C3A E501A09D3A E501A09E3A
12	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 3.8 – 12	3	5.5	5.5	6.5	6.5	6.5	1/2	2	3	3	5	7-1/2	7-1/2	E501A12A3A E501A12B3A E501A12C3A E501A12D3A E501A12E3A
B-Frame 45 mm															
18	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	4	7.5	9	9	10	11	—	—	5	5	10	10	10	E501B18A3A E501B18B3A E501B18C3A E501B18D3A E501B18G3A E501B18J3A
25	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	5.5	12.5	12.5	13	15	15	—	—	5	7-1/2	10	15	15	E501B25A3A E501B25B3A E501B25C3A E501B25D3A E501B25G3A E501B25J3A
32	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	9	15	15	18.5	18.5	18.5	—	—	7-1/2	10	15	20	20	E501B32A3A E501B32B3A E501B32C3A E501B32D3A E501B32G3A E501B32J3A

^① 24V DC coil voltage.

Note:

- If required, accessories are available starting on **Page B-194**.
- A-Frame 27 mm *IT* Starter is for 1 – or 3-phase applications.
- The standard B – F-Frame (45 mm to 140 mm) *IT* Starters are for 3-phase applications.

- An **E501** (45 – 105 mm) consists of two **E04N** (Contact Blocks), an **E06N** (Reversing Overload Relay), Fanning Strips, Mechanical Interlock and Mounting Plate. An **E501F** (140 mm) consists of two **E111F** (Contactors), an **E06NF** (Reversing Overload Relay), Mechanical Interlock, Crossover Bus Bars and Reversing Wiring Harness.
- An **E501A** (27 mm) consists of an **E511A** (Contactor) and **E06NA** (Reversing Overload Relay).

■ See **Table B-216** for 24V DC power supply requirements.

■ Control inputs (P, F, R, 1) are rated 24V DC (3 – 5 mA).

Accessories **Pages B-194 – B-197**
 Technical Data **Pages B-190 – B-193**
 Dimensions **Pages B-203 – B-205**
 Discount Symbol **MC7**

Starters — Full Voltage, Non-reversing and Reversing



IEC C-Frame
Reversing Starter

B

Reversing Starters, continued

Table B-213. Full Voltage Reversing DC-Operated, Open Type Starters (C – D Frames) with 3-Pole Solid-State Overload Protection ①

Max. AC-3 Amp. Rating 480V AC (Ie)	Overload Adjustment Range (Amperes)	Maximum kW Rating @ Ue (V) 50/60 Hz						Maximum UL Horsepower (hp) Rating 50/60 Hz						Catalogue Number	Price
		3-Phase						1-Phase		3-Phase					
		220V/ 240V	380V	400V/ 415V	440V/ 460V	500V	550V/ 575V	115V/ 120V	220V/ 230V	200V/ 208V	230V/ 240V	380V/ 415V	460V/ 480V		
C-Frame 54 mm															
40	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 5.0 – 16 8.4 – 27 16 – 50	11	18.5	22	22	22	25	—	—	10	10	20	25	25	E501C40A3A E501C40B3A E501C40C3A E501C40D3A E501C40F3A E501C40H3A E501C40L3A
50	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 5.0 – 16 8.4 – 27 16 – 50	12.5	22	25	30	30	33	—	—	15	15	25	30	30	E501C50A3A E501C50B3A E501C50C3A E501C50D3A E501C50F3A E501C50H3A E501C50L3A
D-Frame 76 mm															
65	5.0 – 16 8.4 – 27 14 – 45 31 – 100	18.5	30	33	40	40	45	—	—	20	20	40	50	50	E501D65F3A E501D65H3A E501D65K3A E501D65N3A
85	5.0 – 16 8.4 – 27 14 – 45 31 – 100	25	45	45	51	51	55	—	—	25	30	50	60	60	E501D85F3A E501D85H3A E501D85K3A E501D85N3A
100	5.0 – 16 8.4 – 27 14 – 45 31 – 100	25	51	55	59	59	63	—	—	30	30	50	75	75	E501D10F3A E501D10H3A E501D10K3A E501D10N3A

① 24V DC coil voltage.

Note:

- If required, accessories are available starting on Page B-194.
- A-Frame 27 mm IT. Starter is for 1 – or 3-phase applications.
- The standard B – F-Frame (45 mm to 140 mm) IT. Starters are for 3-phase applications.

- An E501 (45 – 105 mm) consists of two E04N (Contact Blocks), an E06N (Reversing Overload Relay), Fanning Strips, Mechanical Interlock and Mounting Plate. An E501F (140 mm) consists of two E111F (Contactors), an E06NF (Reversing Overload Relay), Mechanical Interlock, Crossover Bus Bars and Reversing Wiring Harness.
- An E501A (27 mm) consists of an E511A (Contactor) and E06NA (Reversing Overload Relay).

- See Table B-216 for 24V DC power supply requirements.
- Control inputs (P, F, R, 1) are rated 24V DC (3 – 5 mA).

Accessories Pages B-194 – B-197
 Technical Data Pages B-190 – B-193
 Dimensions Pages B-203 – B-205
 Discount Symbol MC7



IEC E-Frame FVR Starter
Cat. No. E501E20P3A



IEC F-Frame Reversing Starter

B

Reversing Starters, continued

Table B-214. Full Voltage Reversing DC-Operated, Open Type Starters (E – F Frames) with 3-Pole Solid-State Overload Protection ①

Max. AC-3 Amp. Rating 480V AC (Ie)	Overload Adjustment Range (Amperes)	Maximum kW Rating @ Ue (V)						Maximum UL Horsepower (hp) Rating						Catalogue Number	Price	
		50/60 Hz						50/60 Hz								
		3-Phase						1-Phase		3-Phase						
		220V/ 240V	380V	400V/ 415V	440V/ 460V	500V	550V/ 575V	115V/ 120V	220V/ 230V	200V/ 208V	230V/ 240V	380V/ 415V	460V/ 480V	575V/ 600V		

E-Frame 105 mm

125	14 – 45 28 – 90 42 – 135 63 – 200	33	63	63	80	80	80	—	—	40	40	60	100	100	E501E12K3A E501E12M3A E501E12P3A E501E12R3A	
160	14 – 45 28 – 90 42 – 135 63 – 200	45	80	80	100	100	100	—	—	50	60	75	125	125	E501E16K3A E501E16M3A E501E16P3A E501E16R3A	
200	14 – 45 28 – 90 42 – 135 63 – 200	59	100	110	110	110	132	—	—	60	75	100	150	150	E501E20K3A E501E20M3A E501E20P3A E501E20R3A	

F-Frame 140 mm

250	42 – 135 84 – 270 131 – 420	75	132	140	160	160	160	—	—	75	100	150	200	200	E501F25P3A E501F25S3A E501F25T3A	
315	42 – 135 84 – 270 131 – 420	90	160	160	200	200	200	—	—	100	125	150	250	250	E501F31P3A E501F31S3A E501F31T3A	
420	42 – 135 84 – 270 131 – 420	110	220	220	257	257	257	—	—	150	150	200	350	350	E501F42P3A E501F42S3A E501F42T3A	

① 24V DC coil voltage.

Note:

- If required, accessories are available on **Page B-194.**
- A-Frame 27 mm *IT* Starter is for 1 – or 3-phase applications.
- The standard B – F-Frame (45 mm to 140 mm) *IT* Starters are for 3-phase applications.

- An **E501** (45 – 105 mm) consists of two **E04N** (Contact Blocks), an **E06N** (Reversing Overload Relay), Fanning Strips, Mechanical Interlock and Mounting Plate. An **E501F** (140 mm) consists of two **E111F** (Contactors), an **E06NF** (Reversing Overload Relay), Mechanical Interlock, Crossover Bus Bars and Reversing Wiring Harness.
- An **E501A** (27 mm) consists of an **E511A** (Contactor) and **E06NA** (Reversing Overload Relay).

- See **Table B-216** for 24V DC power supply requirements.
- Control inputs (P, F, R 1) are rated 24V DC (3 – 5 mA).

Accessories **Pages B-194 – B-197**
 Technical Data **Pages B-190 – B-193**
 Dimensions **Pages B-203 – B-205**
 Discount Symbol **MC7**

Technical Data and Specifications

Table B-215. Specifications

Description	A-Frame 27 mm	B-Frame 45 mm	C-Frame 54 mm	D-Frame 76 mm	E-Frame 105 mm	F-Frame 140 mm
Overall Dimensions in Inches (mm) ① — <i>w x h x d</i>						
Non-reversing Contactor	1.1 x 3.0 x 2.4 (27 x 75 x 60)	1.8 x 4.4 x 2.4 (45 x 111 x 60)	2.1 x 4.4 x 2.4 (54 x 113 x 60)	3.0 x 5.9 x 3.1 (76 x 150 x 79)	4.1 x 8.0 x 3.5 (105 x 203 x 90)	5.6 x 14.0 x 7.0 (142 x 356 x 178)
Reversing Contactor	2.4 x 2.9 x 2.4 (60 x 73 x 60)	3.8 x 5.9 x 2.7 (96 x 149 x 69)	4.5 x 5.9 x 2.6 (114 x 149 x 67)	6.2 x 7.4 x 3.3 (158 x 188 x 84)	8.5 x 9.5 x 3.8 (216 x 242 x 97)	11.7 x 17.2 x 7.0 (297 x 437 x 178)
Non-reversing Starter	1.2 x 4.0 x 3.1 (31 x 102 x 79)	1.8 x 5.0 x 2.5 (45 x 127 x 63)	2.1 x 5.4 x 2.5 (54 x 138 x 63)	3.0 x 5.9 x 3.1 (76 x 150 x 79)	4.1 x 8.0 x 3.5 (105 x 203 x 90)	5.7 x 19.4 x 7.0 (145 x 493 x 178)
Reversing Starter	2.5 x 4.0 x 3.1 (64 x 102 x 79)	3.8 x 5.9 x 2.7 (96 x 149 x 69)	4.5 x 5.9 x 2.6 (114 x 149 x 67)	6.2 x 7.4 x 3.3 (158 x 188 x 84)	8.5 x 9.5 x 3.8 (216 x 242 x 97)	11.8 x 21.0 x 7.0 (300 x 533 x 178)
Mounting Hole Spacing in Inches (mm) — <i>w x h</i>						
Non-reversing Contactor	.76 x 2.64 (19.2 x 67)	1.33 x 4.0 (33.8 x 101)	1.46 x 4.10 (37 x 104)	.94 x 2.87 (24 x 73)	1.33 x 4.13 (33.8 x 105)	1.75 x 13.0 (44.5 x 330)
Reversing Contactor	1.31 x 2.52 (33.2 x 64)	3.15 x 5.35 (80 x 136)	3.15 x 5.35 (80 x 136)	5.51 x 6.89 (140 x 175)	7.87 x 9.06 (200 x 230)	7.82 x 13.0 (199 x 330)
Non-reversing Starter	.76 x 3.70 (19.3 x 94.0)	1.33 x 4.62 (33.8 x 117.3)	1.46 x 5.04 (37 x 128)	.94 x 2.87 (24 x 73)	1.33 x 4.13 (33.8 x 105)	1.75 x 18.3 (44.5 x 465)
Reversing Starter	1.31 x 3.52 (33.2 x 89.4)	3.15 x 5.35 (80 x 136)	3.15 x 5.35 (80 x 136)	5.51 x 6.89 (140 x 175)	7.87 x 9.06 (200 x 230)	7.82 x 18.3 (198.5 x 465)
Mounting Positions						
Panel-Vertical	Yes	Yes	Yes	Yes	Yes	Yes
Panel-Horizontal	Yes	Yes	Yes	Yes	Yes	Yes
DIN Rail Mountable	Yes	Yes ②	Yes ②	Yes ②	No	No
Weights in Lb. (kg)						
Non-reversing Contactor	.3 (.14)	.7 (.31)	.9 (.42)	2.8 (1.27)	6.7 (3.05)	20 (9.1)
Reversing Contactor	.6 (.27)	1.9 (.86)	2.6 (1.17)	6.9 (3.13)	16.9 (7.67)	48 (21.8)
Non-reversing Starter	.4 (.18)	.9 (.40)	1.2 (.53)	2.9 (1.32)	7.1 (3.20)	27 (12.3)
Reversing Starter	.9 (.40)	2.0 (.90)	2.6 (1.20)	7.1 (3.20)	16.8 (7.60)	55 (25.0)
Mechanical Operating Rate						
Maximum	6/sec	3/sec	3/sec	2/sec	2/sec	1/sec
Mechanical Life						
	23,000,000	10,000,000	10,000,000	8,000,000	8,000,000	5,000,000
Humidity						
③	95% non-condensing	95% non-condensing	95% non-condensing	95% non-condensing	95% non-condensing	95% non-condensing
Insulation Voltage (Ui)						
	690V	690V	690V	690V	690V	690V
Impulse Withstand Voltage (Uimp)						
	6 kV	6 kV	6 kV	6 kV	6 kV	6 kV
Max. Current Ratings @ 480V Ue						
AC-1 Thermal Current (Ith)	20	50	85	130	250	450
AC-2, AC-3 Operating Current (Ie)	12	32	50	100	200	420
AC-4 Operating Current (Ie)	10	32	50	100	150	270
Max. Current Ratings @ 600V Ue						
AC-1 Thermal Current (Ith)	16	40	68	104	200	360
AC-2, AC-3 Operating Current (Ie)	9	25	40	80	160	336
AC-4 Operating Current (Ie)	8	18	34	68	120	150

① Auxiliaries add approximately 1.0" (25 mm) to depth for single, 1.2" (30 mm) for dual.

② Non-reversing contactors and starters only.

③ 99% by application.

Table B-215. Specifications (Continued)

Description	A-Frame 27 mm	B-Frame 45 mm	C-Frame 54 mm	D-Frame 76 mm	E-Frame 105 mm	F-Frame 140 mm
Finger Protection						
Front	IP20	IP20	IP20	IP20	IP20	IP20
At Terminals	IP20	IP10	IP10	IP00	IP00	IP00
At Terminals with max. size wire installed	IP20	IP20	IP10	IP10	IP00	IP00
Terminals L1, L2, L3/T1, T2, T3 ①						
1 Wire per Terminal (stranded or solid)	16 – 12 AWG (1.5 – 2.5 mm ²)	14 – 8 AWG (1.5 – 10 mm ²)	14 – 4 AWG (1.5 – 16 mm ²)	14 – 1 AWG (1.5 – 35 mm ²)	6 – 250 MCM (16 – 120 mm ²)	4 – 750 MCM (25 – 420 mm ²)
2 Wires per Terminal (stranded or solid)	16 – 12 AWG ② (1.5 – 2.5 mm ²)	14 – 10 AWG (1.5 – 4 mm ²)	14 – 6 AWG (1.5 – 16 mm ²)	14 – 2 AWG (1.5 – 25 mm ²)	6 – 3/0 AWG (16 – 70 mm ²)	1/0 – 300 MCM (50 – 150 mm ²)
Strip Length	.32" (8 mm)	.45" (11 mm)	.5" (12 mm)	.7" (18 mm)	.8" (21 mm)	1.5" (40 mm)
Torque (max.)	18 lb-in (2.0 Nm)	20 lb-in (2.2 Nm) for 14 – 10 AWG (1.5 – 6 mm ²); 25 lb-in (2.8 Nm) for 8 AWG (10 mm ²)	35 lb-in (4.0 Nm) for 14 – 10 AWG (1.5 – 6 mm ²); 40 lb-in (4.5 Nm) for 8 AWG (10 mm ²); 45 lb-in (5.0 Nm) for 6 – 4 AWG (16 mm ²)	45 lb-in (5.0 Nm) for Single 14 – 8 AWG (1.5 – 10 mm ²); 100 lb-in (11 Nm) for Single 6 – 1 AWG (16 – 35 mm ²) and Dual Wire Combinations	250 lb-in (28 Nm)	550 lb-in (62 Nm)
Driver Flat Hex Key	PZ1 or 3/16"	— 2.5 mm	— 3 mm	— 4 mm [5/32"]	— 8 mm [5/16"]	— 8 mm [5/16"]
Operation Performance						
Coil Voltage (nominal)	24V DC	24V DC	24V DC	24V DC	24V DC	24V DC
Coil Operating Voltage Range (VDC)	20 – 28	20 – 28	20 – 28	20 – 28	20 – 28	20 – 28
Control Terminals						
(- and +) 1 Wire per Terminal	14 – 12 AWG ③ (1.5 – 2.5 mm ²)	14 – 12 AWG (1.5 – 2.5 mm ²)	14 – 12 AWG (1.5 – 2.5 mm ²)	14 – 12 AWG (1.5 – 2.5 mm ²)	14 – 12 AWG (1.5 – 2.5 mm ²)	14 – 12 AWG (1.5 – 2.5 mm ²)
(- and +) 2 Wires per Terminal	14 AWG ③ (1.5 mm ²)	14 AWG (1.5 mm ²)	14 AWG (1.5 mm ²)	14 AWG (1.5 mm ²)	14 AWG (1.5 mm ²)	14 AWG (1.5 mm ²)
(P, F, R, 1, 2, 3) 1 Wire per Terminal	22 – 12 AWG ③ (0.5 – 2.5 mm ²)	22 – 12 AWG (0.5 – 2.5 mm ²)	22 – 12 AWG (0.5 – 2.5 mm ²)	22 – 12 AWG (0.5 – 2.5 mm ²)	22 – 12 AWG (0.5 – 2.5 mm ²)	22 – 12 AWG (0.5 – 2.5 mm ²)
(P, F, R, 1, 2, 3) 2 Wires per Terminal	18 – 14 AWG ③ (0.75 – 1.5 mm ²)	18 – 14 AWG (0.75 – 1.5 mm ²)	18 – 14 AWG (0.75 – 1.5 mm ²)	18 – 14 AWG (0.75 – 1.5 mm ²)	18 – 14 AWG (0.75 – 1.5 mm ²)	18 – 14 AWG (0.75 – 1.5 mm ²)
Torque (max.)	4.5 lb-in (.5 Nm)	4.5 lb-in (.5 Nm)	4.5 lb-in (.5 Nm)	4.5 lb-in (.5 Nm)	4.5 lb-in (.5 Nm)	4.5 lb-in (.5 Nm)
Strip Length	.25 (7 mm)	.25 (7 mm)	.25 (7 mm)	.25 (7 mm)	.25 (7 mm)	.25 (7 mm)
Driver (Flat)	.13 (3.5 mm) ③	.13 (3.5 mm)	.13 (3.5 mm)	.13 (3.5 mm)	.13 (3.5 mm)	.13 (3.5 mm)
Temperature ④						
Operating	-40° to +149°F (-40° to +65°C)	-40° to +149°F (-40° to +65°C)	-40° to +149°F (-40° to +65°C)	-40° to +149°F (-40° to +65°C)	-40° to +149°F (-40° to +65°C)	-40° to +149°F (-40° to +65°C)
Storage	-58° to +176°F (-50° to +80°C)	-58° to +176°F (-50° to +80°C)	-58° to +176°F (-50° to +80°C)	-58° to +176°F (-50° to +80°C)	-58° to +176°F (-50° to +80°C)	-58° to +176°F (-50° to +80°C)

- ① Use Class B 75°C copper wire only (or 90°C copper wire sized for 75°C operation per NEC).
- ② Not applicable to starter T1, T2, T3. One wire per terminal.
- ③ 27 mm Non-reversing Starter –
 - (- and +) 14 AWG (1.5 mm²) only
 - P, F, 1, A: 1 wire per terminal only, 22 – 14 AWG (0.5 – 1.5 mm²)
 - Torque: 2.25 lb-in (.25 Nm)
 - Driver: .09 in (2.5 mm)
- ④ Consult Eaton for higher ratings.

B

Technical Data and Specifications

Table B-215. Specifications (Continued)

Description	A-Frame 27 mm	B-Frame 45 mm	C-Frame 54 mm	D-Frame 76 mm	E-Frame 105 mm	F-Frame 140 mm
Environmental						
Shock/Vibration	15G/5G	15G/5G	15G/5G	15G/5G	15G/5G	15G/5G ③
Pollution Degree ①	2	2	2	2	2	2
EMC Environment	1	1	1	1	1	1
Altitude ① in Ft. (m)	6600 (2000)	6600 (2000)	6600 (2000)	6600 (2000)	6600 (2000)	6600 (2000)
Pull-In Time (mS) @ 24V DC						
Excl. Debounce Time	15	15	15	25	30	70 – 200
Incl. Debounce Time	67 ②	75	80	88	95	120 – 250 ②
Dropout Time (mS) @ 24V DC						
Excl. Debounce Time	8	5	5	12	15	50 – 150
Incl. Debounce Time	60 ②	65	70	75	80	70 – 200 ②

① Consult factory for higher ratings.

② Add 50 mS for 27 and 140 mm Starters for additional microprocessor.

③ The Non-reversing Starter requires the use of all six mounting screws for the maximum rating.

Note: At other temperatures expressed in °C, for either inrush or sealed, use the 20°C value from the table in the following:

$$\text{Watts} = W_{20} [1.1 - .005(T) \text{ and}]$$

$$\text{Amps} = A_{20} [1.1 - .005(T)]$$

For example, inrush requirements for a

D-Frame Starter at -25°C would be:

$$\text{Watts} = 130 [1.1 - .005(-25)] = 160$$

$$\text{Amps} = 5.4 [1.1 - .005(-25)] = 6.6$$

Note:

■ Response time for Control Inputs = Debounce Time

■ The time between operating forward and reverse must be greater than the Debounce Time.

Table B-216. 24V DC Power Supply Requirements @ 68°F (20°C) (see Note at bottom left) ④⑤

Contactor/Starter Size	Sealed In	Inrush				
		Wattage	Amps	Wattage	Amps	Duration (mS)
Catalogue Number ⑥	Frame/mm					
E_11A_X3N	A/27	1.3	.054	20	.83	30
E_01A_3A	A/27	2.0	.083	20	.83	30
E_11B_X3N	B/45	3.7	.15	80	3.3	50
E_01B_3A	B/45	3.2	.13	80	3.3	50
E_11C_X3N	C/54	4.2	.18	90	3.8	50
E_01C_3A	C/54	3.6	.15	90	3.8	50
E_1D_3_	D/76	5.0	.21	130	5.4	65
E_1E_3_	E/105	5.6	.23	140	5.8	85
E_1F_X3N	F/140	12.0	.50	200	8.3	250
E_01F_3A	F/140	13.0	.54	200	8.3	250

④ The sum of the sealed in values of the contactors/starters must be less than the power supply sealed in value. The largest contactor/starter inrush value must be less than the power supply inrush value.

⑤ Refer to **Tab I** for further power supply information.

⑥ _ indicates missing digit/character of the Catalogue Number; July have multiple values.

Electrical Life — AC-1, AC-2, AC-3 and AC-4 Utilization Categories

Table B-217. Utilization Categories

The International Electrotechnical Commission (IEC) has developed utilization categories for contactors and auxiliary contacts. The categories describe the type of electrical load and the conditions for making and breaking the current.

Category	Typical Application
AC-1	Non-inductive or slightly inductive loads: Resistance furnaces, heating.
AC-2	Slip-ring motors: Starting and stopping of running motors
AC-3	Squirrel cage motors: Starting, switching off motors during running (motors in most industrial applications typically fall into this category).
AC-4	Squirrel cage motors: Starting, plugging ①, inching ② (very few applications in industry are totally AC-4).

- ① Plugging is stopping or reversing the motor rapidly by reversing the connections while the motor is running.
- ② Inching or jogging is energizing the motor once or repeatedly for short durations to obtain small movements of the motor driven load.

Life Load Curves — Eaton's Cutler-Hammer /7. Electro-Mechanical Series IEC contactors have been designed and manufactured for superior life performance. All testing has been based on requirements as found in IEC 60947-4-1 and conducted by us. When selecting a contactor designed to IEC requirements, the specifier must give attention to the specific load, utilization category and the required electrical life. For a definition of Utilization Categories, see **Table B-217** above.

Note: AC-3 tests are conducted at rated device currents and AC-4 tests are conducted at six-times rated device currents. All tests have been run at 460V, 60 Hz.

Actual application life July vary, depending on environmental conditions and application duty cycle.

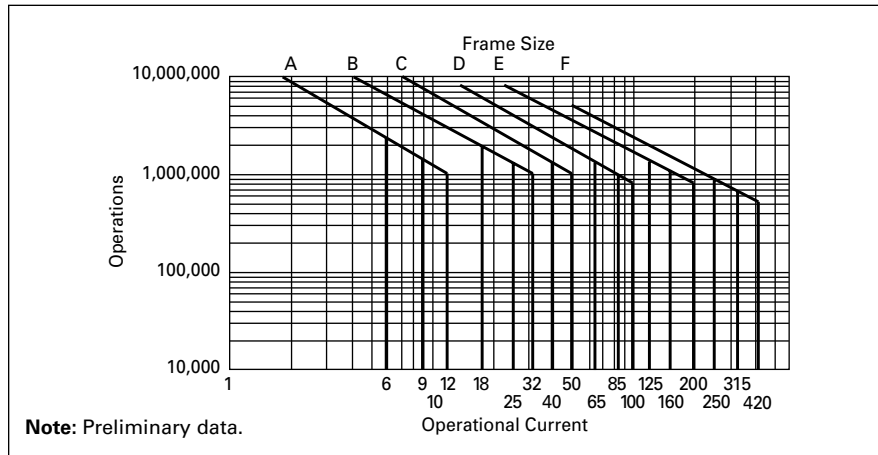


Figure B-139. Electrical Life — AC-3 Utilization Category

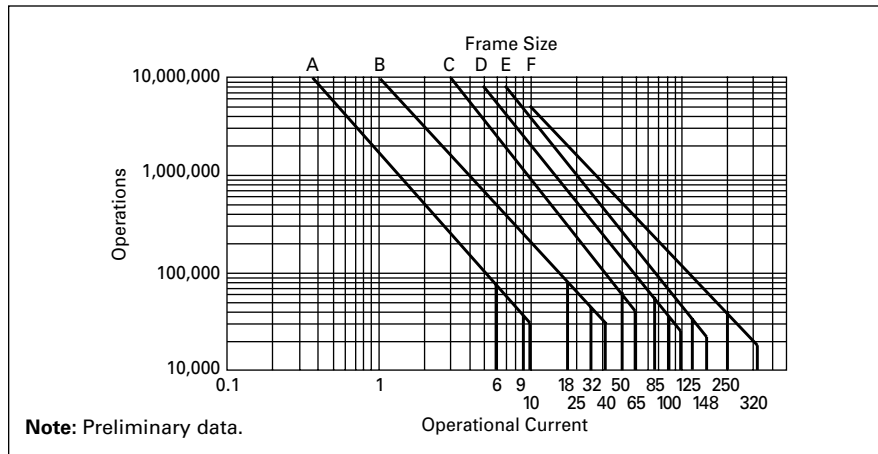


Figure B-140. Electrical Life — AC-4 Utilization Category

Trip Times

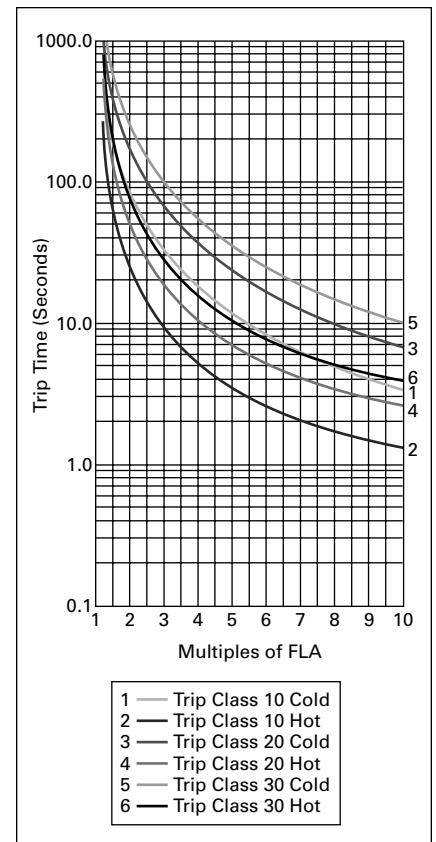


Figure B-141. Class 10, 20 and 30 Trip Curves

Contactors Choice —

- Decide what utilization category the application is and choose the appropriate curve from **Figure B-139** or **Figure B-140**.
- Locate the intersection of the life-load curve with the operational current (I_e) of the application, as found on the horizontal axis.
- Read the estimated contact life along the vertical axis in number of operations.

B

B

Modular Components — Contactor Field Assembly

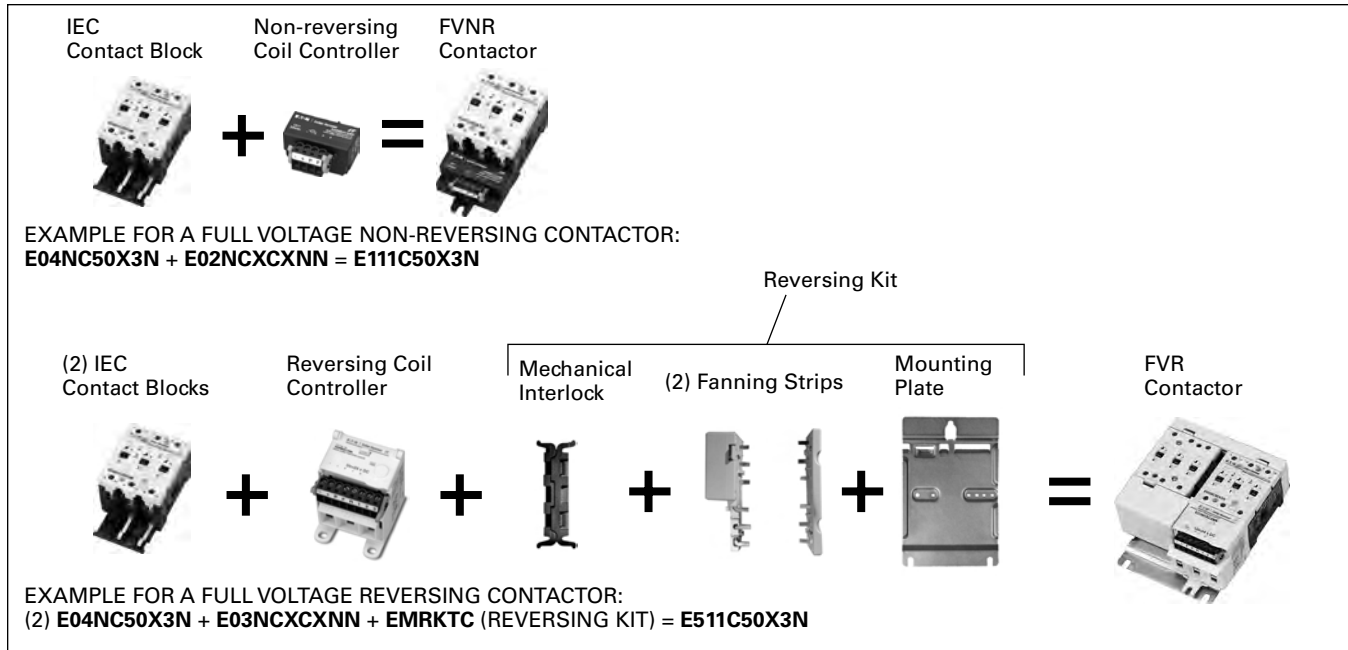


Figure B-142. Modular Contactor Assembly

Modular Components — Starter Field Assembly

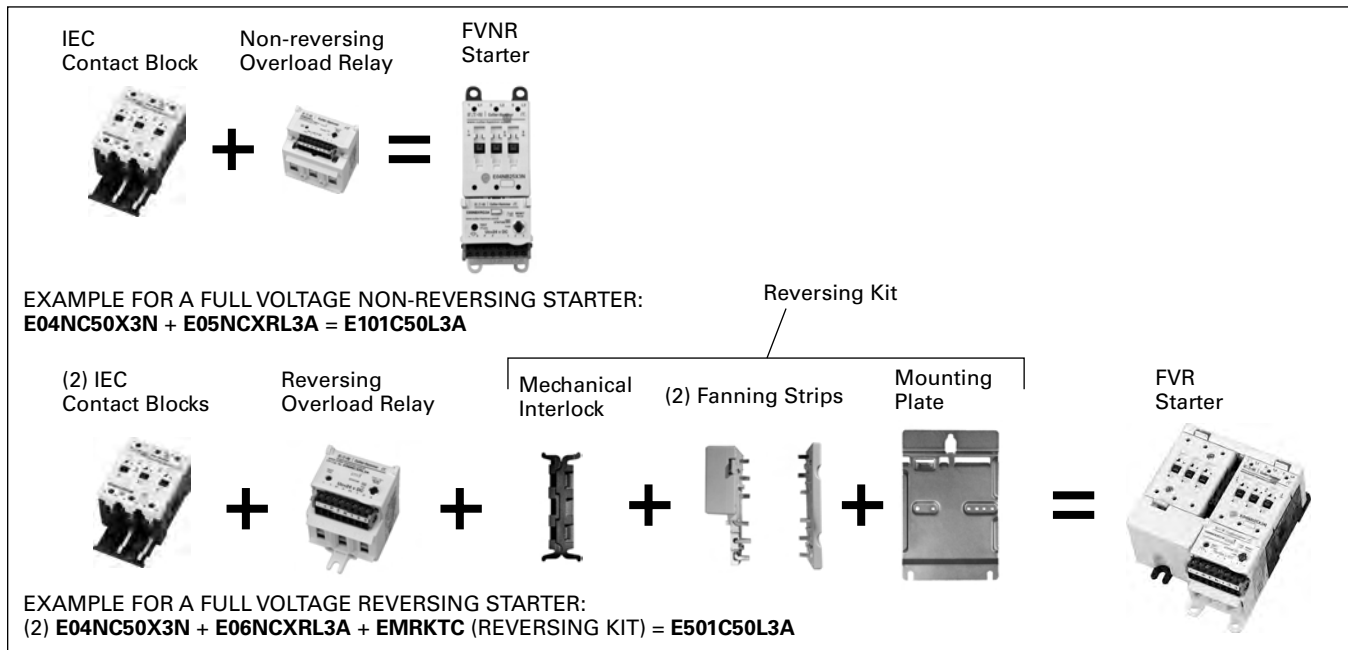


Figure B-143. Modular Starter Assembly

IEC Contact Block

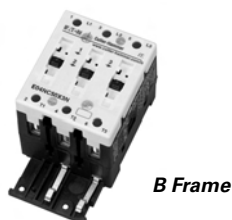


Table B-218. IEC Contact Block

Frame	Amperes	Catalogue Number	Price
B-Frame 45 mm	18	E04NB18X3N	
	25	E04NB25X3N	
	32	E04NB32X3N	
C-Frame 54 mm	40	E04NC40X3N	
	50	E04NC50X3N	
D-Frame 76 mm	65	E04ND65X3N	
	85	E04ND85X3N	
	100	E04ND10X3N	
	125	E04NE12X3N	
E-Frame 105 mm	160	E04NE16X3N	
	200	E04NE20X3N	

Note:

- E04N + E05N = E101; E04N + E02N = E111 (45 – 105 mm)
- E04N + E06N = E501; E04N + E03N = E511 (45 – 105 mm)

IEC Coil Controller

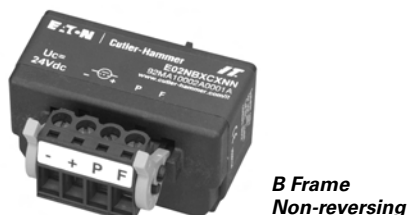


Table B-219. IEC Coil Controller

Frame	Catalogue Number	Price
Non-reversing		
B-Frame – 45 mm	E02NBXCXNN	
C-Frame – 54 mm	E02NCXCXNN	
D-Frame – 76 mm	E02NDXCXNN	
E-Frame – 105 mm	E02NEXCXNN	
F-Frame – 140 mm	EMUCCF	
Reversing		
B-Frame – 45 mm	E03NBXCXNN	
C-Frame – 54 mm	E03NCXCXNN	
D-Frame – 76 mm	E03NDXCXNN	
E-Frame – 105 mm	E03NEXCXNN	
F-Frame – 140 mm	EMUCCF	

IEC Solid-State Overload Relay



Table B-220. IEC Solid-State Overload Relay

Frame	Overload Adjustment Range (Amperes)	Catalogue Number	Price
Non-reversing			
A-Frame 27 mm	.25 – .8	E05NAXRA3A	
	.59 – 1.9	E05NAXRB3A	
	1.4 – 4.4	E05NAXRC3A	
	2.8 – 9.0	E05NAXRD3A	
B-Frame 45 mm	3.8 – 12	E05NAXRE3A	
	.25 – .8	E05NBXRA3A	
	.59 – 1.9	E05NBXRB3A	
	1.4 – 4.4	E05NBXRC3A	
C-Frame 54 mm	2.8 – 9.0	E05NBXRD3A	
	6.3 – 20	E05NBXRG3A	
	10 – 32	E05NBXRJ3A	
	.25 – .8	E05NCXRA3A	
	.59 – 1.9	E05NCXRB3A	
	1.4 – 4.4	E05NCXRC3A	
D-Frame 76 mm	2.8 – 9.0	E05NCXRD3A	
	5.0 – 16	E05NCXRF3A	
	8.4 – 27	E05NCXRH3A	
	16 – 50	E05NCXRL3A	
E-Frame 105 mm	5.0 – 16	E05NDXRF3A	
	8.4 – 27	E05NDXRH3A	
	14 – 45	E05NDXRK3A	
	31 – 100	E05NDXRN3A	
F-Frame 140 mm	14 – 45	E05NEXRK3A	
	28 – 90	E05NEXRM3A	
	42 – 135	E05NEXRP3A	
	63 – 200	E05NEXRR3A	
A-Frame 27 mm	42 – 135	E05NFXP3A	
	84 – 270	E05NFXR3A	
	131 – 420	E05NFXT3A	
	Reversing		
B-Frame 45 mm	.25 – .8	E06NBXRA3A	
	.59 – 1.9	E06NBXRB3A	
	1.4 – 4.4	E06NBXRC3A	
	2.8 – 9.0	E06NBXRD3A	
C-Frame 54 mm	6.3 – 20	E06NBXRG3A	
	10 – 32	E06NBXRJ3A	
	.25 – .8	E06NCXRA3A	
	.59 – 1.9	E06NCXRB3A	
D-Frame 76 mm	1.4 – 4.4	E06NCXRC3A	
	2.8 – 9.0	E06NCXRD3A	
	5.0 – 16	E06NCXRF3A	
	8.4 – 27	E06NCXRH3A	
E-Frame 105 mm	16 – 50	E06NCXRL3A	
	5.0 – 16	E06NDXRF3A	
	8.4 – 27	E06NDXRH3A	
	14 – 45	E06NDXRK3A	
F-Frame 140 mm	31 – 100	E06NDXRN3A	
	14 – 45	E06NEXRK3A	
	28 – 90	E06NEXRM3A	
	42 – 135	E06NEXRP3A	
E-Frame 105 mm	63 – 200	E06NEXRR3A	

B

Accessories

Auxiliary Contacts



Auxiliary Contacts are available for mounting on IT. Electro-Mechanical Contactors and Starters. The various choices available for non-reversing models are shown in Tables B-221 and B-222, and their ratings in Tables B-223 – B-226. For reversing models, the number of auxiliaries indicated is for each of the contactors/starters in the assembly.

Table B-221. Auxiliary Contact Availability — A – F Frames

Front Mounted (Maximum Auxiliaries per Contactor/ Starter) ②						Contact Type	Catalogue Number	Price
A-Frame 27 mm	B-Frame 45 mm	C-Frame 54 mm	D-Frame 76 mm	E-Frame 105 mm	F-Frame 140 mm			
1	3	3	3	3	—	1NO	EMA13	
1	3	3	3	3	—	1NC	EMA14	
—	2	2 ①	3	3	—	1NO-1NC	EMA15	
—	2	2 ①	3	3	—	2NO	EMA16	
—	2	2 ①	3	3	—	2NC	EMA17	
1	2	3	3	3	3	Logic Level 1NO-1NC	EMA70	

① Other combinations: “Single, dual, single”; “Dual, single, dual”; “Dual, logic level, dual”
② For reversers, multiply quantities by two.

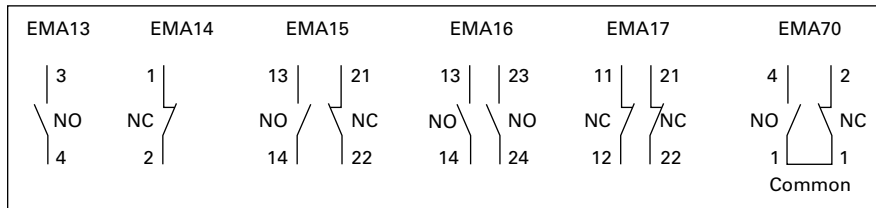


Figure B-144. Connecting Diagram — A – F Frames

Table B-222. Auxiliary Contact Availability — F-Frame 140 mm

Auxiliary Contacts per Non-reversing and Reversing Contactor or Starter				
Max.	Contact Type	Description	Catalogue Number	Price
2	1NO	Base auxiliary (max. 1 per side)	C320KGS41	
2	1NO-1NC	Base auxiliary (max. 1 per side)	C320KGS42	
6	1NO	C320KGS41 or C320KGS42 required (max. 3 Add-on auxiliaries per side)	C320KGS20	
2	1NO Logic Level	C320KGS41 or C320KGS42 required (max. 1 Add-on auxiliary per side)	C320KGS20L	
6	1NC	C320KGS41 or C320KGS42 required (max. 2 Add-on auxiliaries per side)	C320KGS21	
2	1NC Logic Level	C320KGS41 or C320KGS42 required (max. 1 Add-on auxiliary per side)	C320KGS21L	
2	1NO-1NC	C320KGS41 or C320KGS42 required (max. 1 Add-on auxiliary per side)	C320KGS22	
2	1NO-1NC Logic Level	C320KGS41 or C320KGS42 required (max. 1 Add-on auxiliary per side)	C320KGS22L ③	
3	1NO-1NC Logic Level	Front Mounted Only	EMA70 ④	

③ Form C Contacts.
④ For reversers, multiply quantities by two.

Note:

- Side Mounted: Maximum (10) total circuits.
- Front Mounted: Maximum (6) total circuits. ④
- Maximum 4 auxiliaries per side (base + 3 side mounted).
- EMASA/B_ have been superseded by the above Catalogue Numbers.

Table B-223. IEC Ratings

DC-13		AC-15	
U _e Voltage	I _e Amps.	U _e Voltage	I _e Amps.
24	5	48	8
48	2.5	120	6
125	1.1	240	4
250	.55	440	2

Table B-224. NEMA A600 Ratings

Current	AC Voltage			
	120	240	480	600
Make and Interrupting	60	30	15	12
Break	6	3	1.5	1.2
Continuous	10	10	10	10
Thermal	10	10	10	10

Table B-225. NEMA P300 Ratings

Current	DC Voltage	
	125	250
Make and Interrupting	1.1	.55
Break	1.1	.55
Continuous	5	5
Thermal	5	5

Table B-226. EMA70 Auxiliary Contact

DC-12		AC-12	
U _e	I _e	U _e	I _e
30	.1	250	.1

IEC Reversing Mounting Plates



Table B-227. IEC Reversing Mounting Plates

Frame Size	Catalogue Number	Price
B – C	EMA9B	
D	EMA9D	
E	EMA9E	

IEC Reversing Kits

Table B-228. IEC Reversing Kits

Frame Size	Description	Catalogue Number	Price
B	For Contactor and Starter ①	EMRKTB	
C	For Contactor and Starter ①	EMRKTC	
D	For Contactor and Starter ①	EMRKTD	
E	For Contactor and Starter ①	EMRKTE	
F	For Contactor ②	EMRKTf	

- ① Includes Fanning Strips, Mechanical Interlock, Mounting Plate and hardware.
- ② Includes Fanning Strips (Bus Bar Set), Mechanical Interlock and hardware.

IEC Control Terminals



Table B-232. IEC Control Terminals

No. of Pins	Terminal Markings	IEC Size	Coil Controller		Contactor		Overload		Starter		Catalogue Number	Price
			Non-reversing	Reversing	Non-reversing	Reversing	Non-reversing	Reversing	Non-reversing	Reversing		
8	-+PFR123	A						X		X	EMA76L	
		B		X		X	X	X	X	X		
		C		X		X	X	X	X	X		
		D	X	X	X	X	X	X	X	X		
		E	X	X	X	X	X	X	X	X		
		F					X	X	X	X		
5	-+PFR	F	X	X	X	X					EMA77L	
5	RFP+-	F		X		X		X		X	EMA77LR	
4	-+PF	A			X						EMA78L	
		B	X		X							
		C	X		X							
6	-+PF1A	A					X		X		EMA81 ⑤	
(2) 5	-+PFR and RFP+-	F				X				X	EMA80L ⑥	

- ⑤ Non-locking.
- ⑥ Consists of (1) EMA77L and (1) EMA77LR inter-wired.

IEC Mechanical Interlock

Table B-229. IEC Mechanical Interlock

Frame Size ③	Catalogue Number	Price
B – E	EMMB	
F ④	C321KM50	

- ③ The A-Frame 27 mm does not have a separate mechanical interlock due to its embedded design and board requirements.
- ④ The F-Frame 140 mm uses the Freedom Series Mechanical Interlock.

IEC 2-Wire Reversing Interface

Table B-230. IEC 2-Wire Reversing Interface

Description	Catalogue Number	Price
8-Pin for 45 – 140 mm (IEC 6A – 420A Reversing Starters)	EMA2WR8	
8-Pin for 45 – 105 mm (IEC 18A – 200A Reversing Contactors)		

DIN Rail Catch



Table B-231. DIN Rail Catch

Frame Size	Description	Catalogue Number	Price
B – C	Catch with Leaf Spring and Pad	EMDRCB	
D	Catch with Leaf Spring and Pad	EMDRCD	

B

Renewal Parts

IEC Contact Kits



Table B-233. IEC Contact Kits

Frame Size	Description	Catalogue Number	Price
C	3-Pole, 40A Hold Open	EMCKT40	
	3-Pole, 40A Non-hold Open	EMCKT40NH	
	3-Pole, 50A Hold Open	EMCKT50	
	3-Pole, 50A Non-hold Open	EMCKT50NH	
D	3-Pole, 65A Hold Open	EMCKT65	
	3-Pole, 65A Non-hold Open	EMCKT65NH	
	3-Pole, 85A Hold Open	EMCKT85	
	3-Pole, 85A Non-hold Open	EMCKT85NH	
	3-Pole, 100A Hold Open	EMCKT100	
	3-Pole, 100A Non-hold Open	EMCKT100NH	
E	3-Pole, 125A	EMCKT125	
	3-Pole, 160A	EMCKT160	
	3-Pole, 200A	EMCKT200	
F	3-Pole, 250A	EMCKT250	
	3-Pole, 315A	EMCKT315	
	3-Pole, 420A	EMCKT420	

24V DC Coils

Table B-234. 24V DC Coils

	Frame Size	Catalogue Number	Price
	B	EMCB	
	C	EMCC	
	D	EMCD	
	E	EMCE	
	F	EMCF	

Table B-237. Ring Lug Retrofit Kits

Product	IECA-Frame			IEC E-Frame			IEC F-Frame		
	Catalogue Number			Catalogue Number			Catalogue Number		
	Factory Installed	Retrofit Kits ②	Lug Kits ③	Factory Installed	Retrofit Kits ②	Lug Kits ③	Factory Installed	Retrofit Kits ②	Lug Kits ③
E111		EMRTXKTA		Add "-RTX"	EMRTXKTEN	EMLUGREN	Add "-RTX"	EMRTXKTF	EMLUGRFC
E511		EMRTXKTA		Add "-RTX"	EMRTXKTER	EMLUGRER	Add "-RTX"	EMRTXKTF	EMLUGRFC
E101		EMRTXKTA		Add "-RTX"	EMRTXKTEN	EMLUGREN	Add "-RTX"	EMRTXKTF	EMLUGRFS
E501		EMRTXKTA		Add "-RTX"	EMRTXKTER	EMLUGRER	Add "-RTX"	EMRTXKTF	EMLUGRFS
E05N				Add "-RTX"			Add "-RTX"		
E06N				Add "-RTX"			Add "-RTX"		
E02N				Add "-RTX"					
E03N				Add "-RTX"					
E04N				Add "-RTX"					

② Retrofit Kits used to field install ring lugs on standard lug units.

③ Lug Kits used to field install standard lugs into factory assembled ring lug units.

Fanning Strips

Table B-235. Reversing Fanning Strips

Frame Size	Description	Catalogue Number	Price
A	Line and Load Side Wire Sets	EMFRA	
B	Line Side	EMFRLB	
	Load Side	EMFRTB	
C	Line Side	EMFRLC	
	Load Side	EMFRTC	
D	Line Side	EMFRLD	
	Load Side	EMFRTD	
E	Line Side	EMFRLE	
	Load Side	EMFRTE	
F	Line Side Bus Bar Set	EMFRLF	
	Load Side Bus Bar Set	EMFRTF	

Lug Kits



Table B-236. Lug Kits

Frame Size	Description	Catalogue Number	Price
C	3 pc.	EMLUGKTC	
D	1 pc.	EMLUGKTD	
E	1 pc. — For Contactor and Line Side Starter	EMLUGKTL	
	1 pc. — For Load Side Starter	EMLUGKTE	
F	Horizontal Box Lug ①	EMLUGKTF	
	Vertical Box Lug	EMLUGKTFB	

① Kit includes Lug Cover — required for contactors only.

July 2008

Wiring Diagrams

B

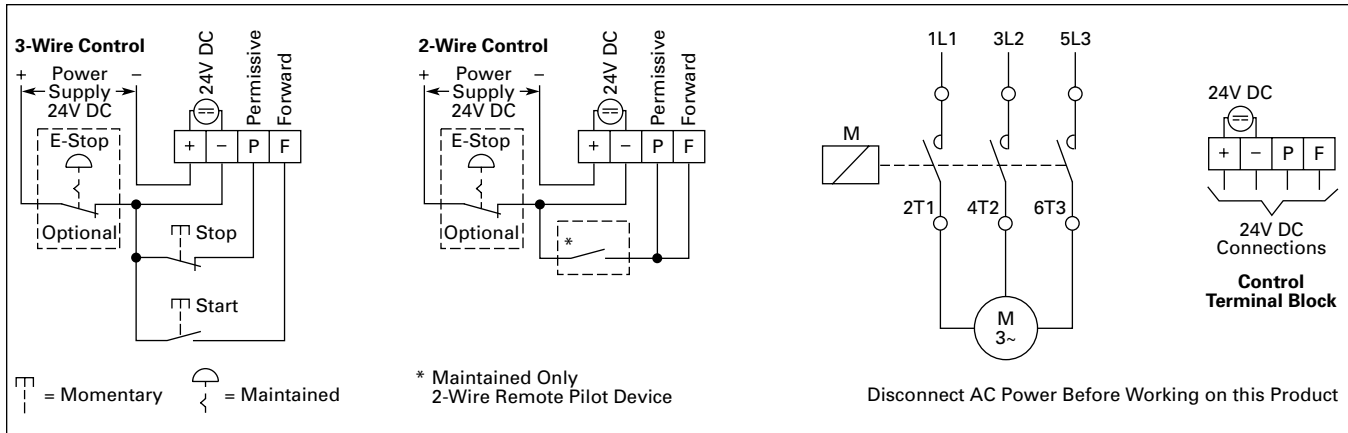


Figure B-145. Wiring – Non-reversing Contactor

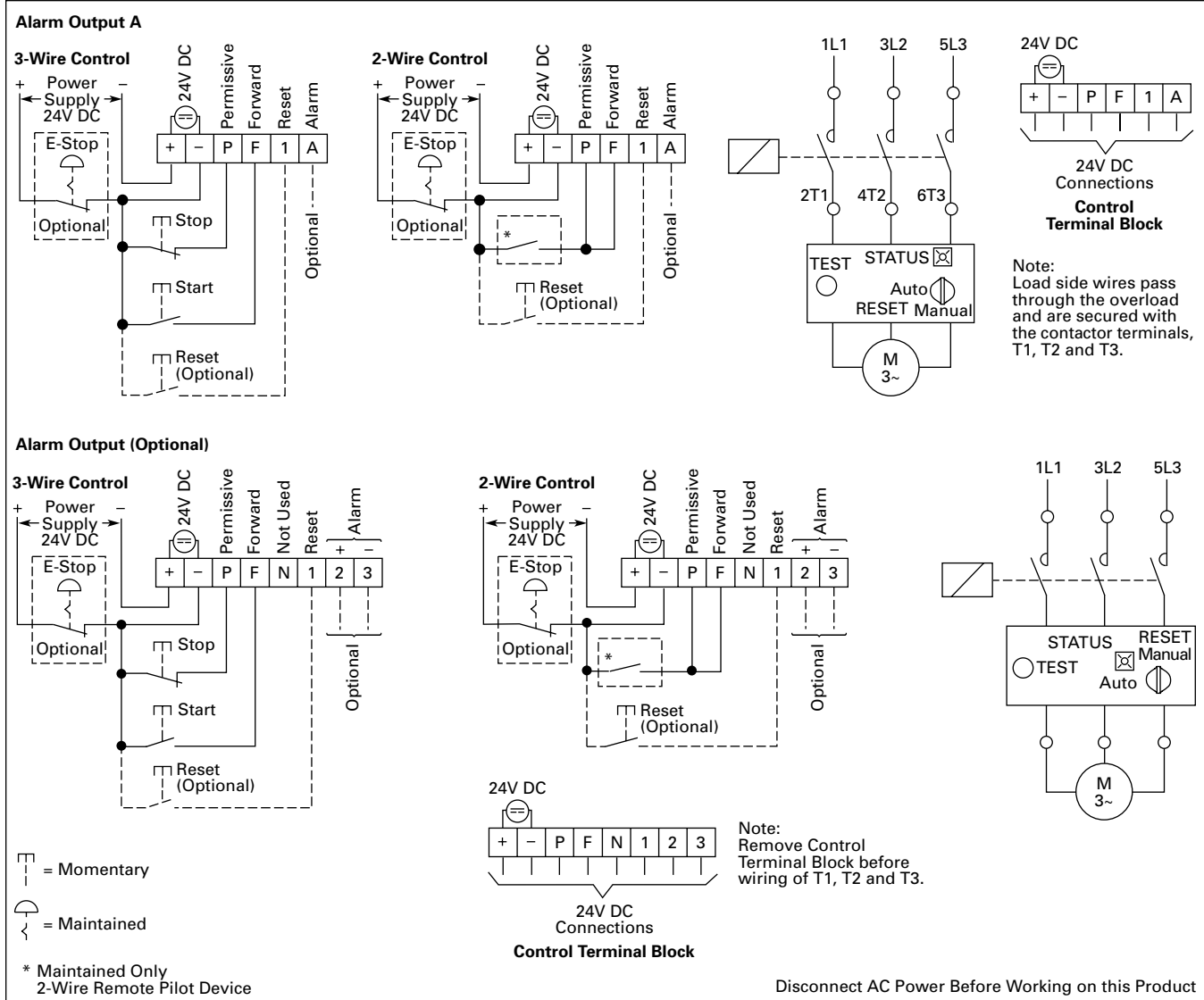


Figure B-146. Wiring – Non-reversing Starters

Dimensions

Non-reversing and Reversing Contactors (Frame A)

Table B-238. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes				Req. Mtg. Screws	Terminals		
	Width	Height	Depth	Depth w/ Auxiliary	Depth added w/DIN Rail	Width	Height	Mtg. Hole to Top	DIN Rail to Top		Control	Line	Load
	A	B	C	D	E	F	G	H	J		P	Q	R
Non-reversing													
A	1.1 (27)	3.0 (75)	2.4 (60)	3.5 (88)	.2 (5)	.76 (19.2)	2.64 (67)	.1 (3.5)	.6 (15)	(3) #8 M4	.6 (16)	1.7 (43)	1.7 (43)
Reversing													
A	2.4 (60)	2.9 (73)	2.4 (60)	3.5 (88)	.2 (5)	1.31 (33.2)	2.52 (64)	.2 (5)	.5 (13)	(3) #8 M4	.6 (16)	1.7 (43)	1.7 (43)

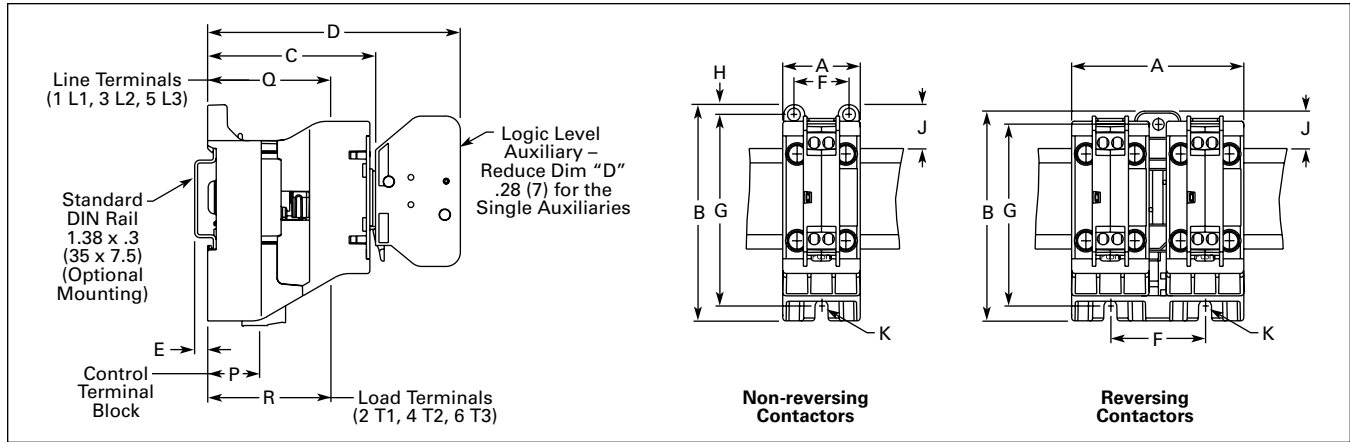


Figure B-147. Approximate Dimensions — Inches (mm)

Non-reversing Contactors (Frames B & C)

Table B-239. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes				Req. Mtg. Screws	Terminals		
	Width	Height	Depth	Depth w/ Auxiliary	Depth added w/DIN Rail	Width	Height	Mtg. Hole to Top	DIN Rail to Top		Control	Line	Load
	A	B	C	D	E	F	G	H	J		P	Q	R
B	1.8 (45)	4.4 (111)	2.4 (60)	3.6 (91)	.1 (3)	1.33 (33.8)	4.0 (101)	.2 (5)	.9 (23)	(3) #8 M4	.7 (19)	1.2 (30)	1.2 (30)
C	2.1 (54)	4.45 (113)	2.4 (60)	3.6 (91)	.1 (3)	1.46 (37)	4.1 (104)	.2 (5)	.8 (20)	(3) #8 M4	.7 (19)	1.2 (30)	1.2 (30)

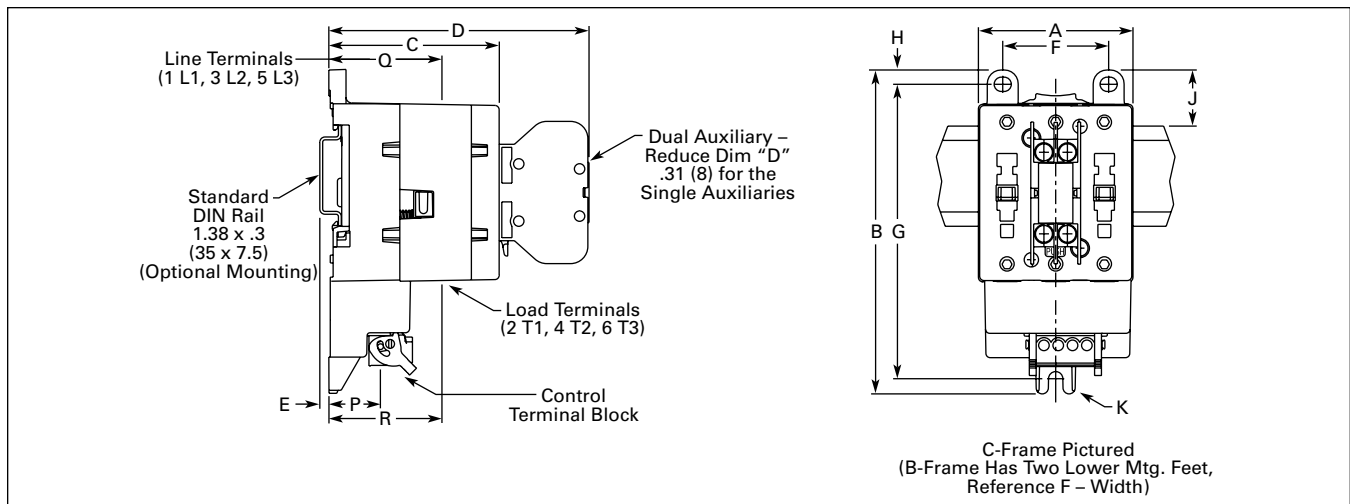


Figure B-148. Approximate Dimensions — Inches (mm)

Dimensions

Non-reversing Contactors (Frames D & E)

Table B-240. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes				Req. Mtg. Screws	Terminals		
	Width	Height	Depth	Depth w/ Auxiliary	Depth added w/DIN Rail	Width	Height	Mtg. Hole to Top	DIN Rail to Top		Control	Line	Load
	A	B	C	D	E	F	G	H	J		P	Q	R
D	3.0 (76)	5.9 (150)	3.1 (79)	4.2 (107)	.2 (4)	.94 (24)	2.87 (73)	.5 (13)	.9 (23)	(4) #6 x 2 M3.5 x 50	2.4 (60)	1.5 (37)	.6 (14)
E	4.1 (105)	8.0 (203)	3.5 (90)	4.7 (119)	—	1.33 (33.8)	4.13 (105)	.6 (15)	—	(4) #8 x 1.5 M4 x 40	2.8 (72)	1.7 (42)	.3 (8)

B

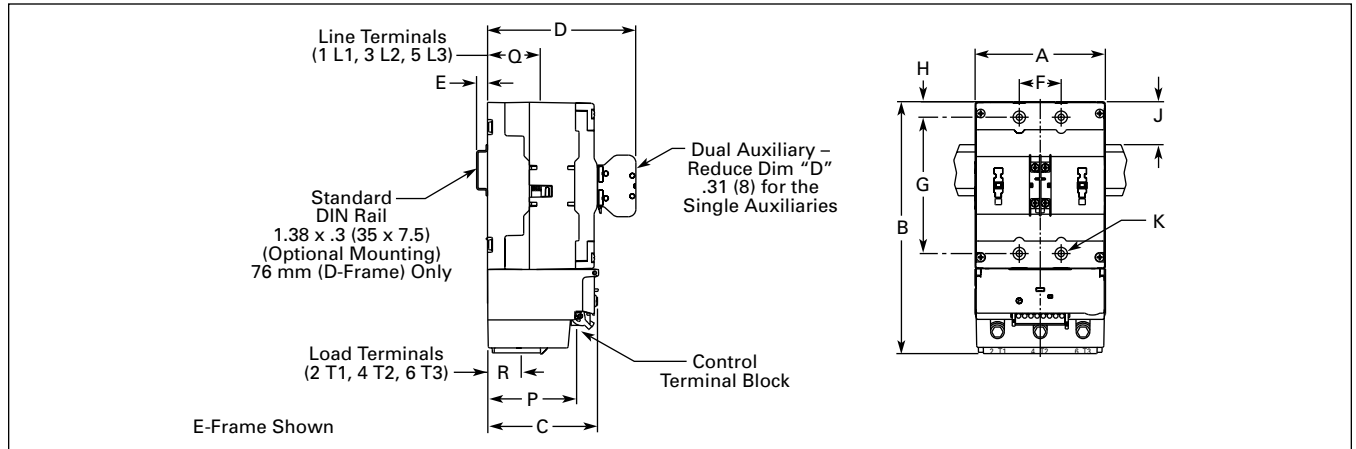


Figure B-149. Approximate Dimensions — Inches (mm)

Non-reversing Contactors (Frame F)

Table B-241. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes			Req. Mtg. Screws	Terminals		
	Width	Height	Depth	Depth w/Logic Level Auxiliary	Width w/Side Auxiliaries	Width	Height	Mounting Hole to Top		Control	Line	Load
	A	B	C	D	E	F	G	H		P	Q	R
F	5.6 (142)	14.0 (356)	7.0 (178)	8.2 (208)	6.70 (170)	1.75 (44.5)	13.0 (330)	0.58 (14.7)	(4) 5/16 M8	.8 (20)	4.4 (112)	4.4 (112)

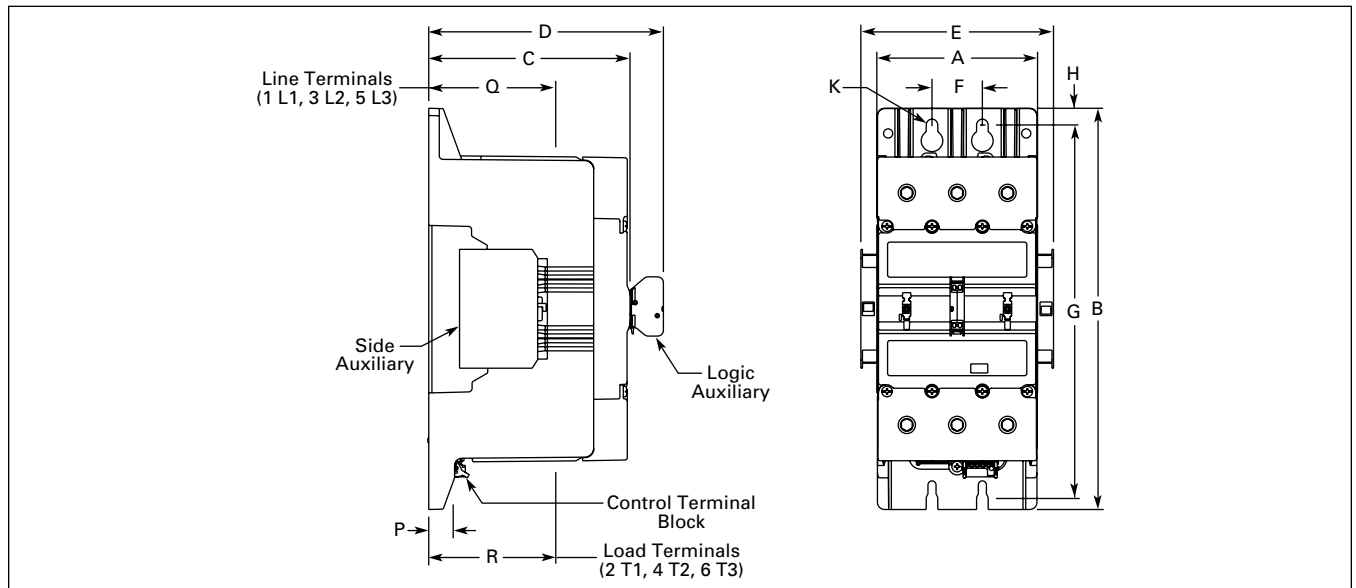


Figure B-150. Approximate Dimensions in Inches (mm)

Dimensions

Reversing Contactors (Frames B – E)

Table B-242. Approximate Dimensions in Inches (mm)

Frame Size	Overall				Mounting Holes			Req. Mtg. Screws	Terminals		
	Width	Height	Depth	Depth w/ Auxiliary	Width	Height	Mtg. Hole to Top		Control	Line	Load
	A	B	C	D	F	G	H		P	Q	R
B	3.8 (96)	5.9 (149)	2.7 (69)	3.8 (96)	3.15 (80)	5.35 (136)	.3 (7)	(3) #10 M5	2.0 (50)	1.5 (38)	.9 (22)
C	4.5 (114)	5.9 (149)	2.6 (67)	3.8 (96)	3.15 (80)	5.35 (136)	.3 (7)	(3) #10 M5	2.0 (50)	1.5 (38)	.6 (16)
D	6.2 (158)	7.4 (188)	3.3 (84)	4.4 (112)	5.51 (140)	6.89 (175)	.2 (6)	(3) #10 M5	2.6 (67)	1.9 (48)	.9 (22)
E	8.5 (216)	9.5 (242)	3.8 (97)	4.9 (125)	7.87 (200)	9.06 (230)	.2 (6)	(3) #10 M5	3.1 (80)	2.1 (54)	.7 (17)

B

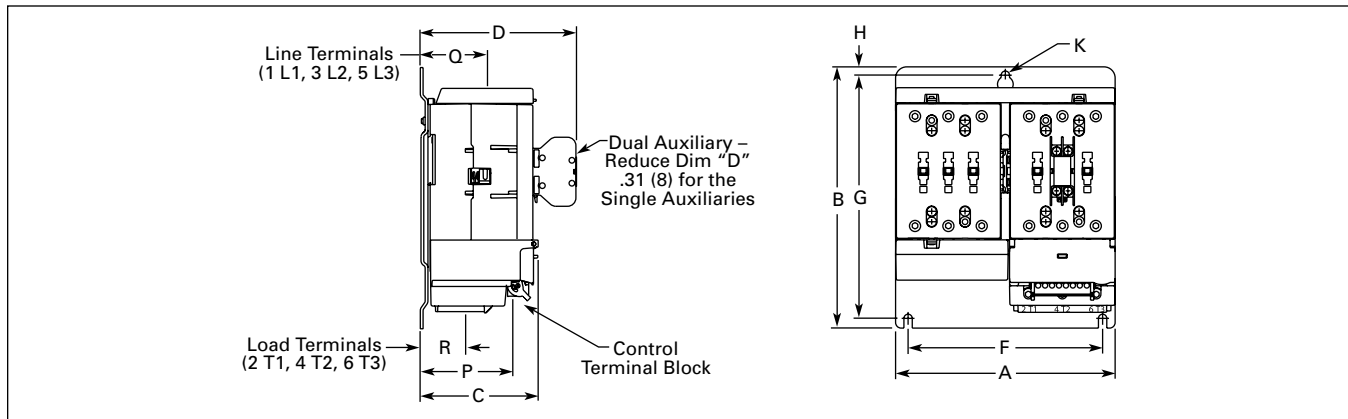


Figure B-151. Approximate Dimensions — Inches (mm)

Reversing Contactors (Frame F)

Table B-243. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes			Req. Mtg. Screws	Terminals		
	Width	Height	Depth	Depth w/Logic Level Auxiliary	Width w/Side Auxiliaries	Width	Height	Mounting Hole to Top		Control	Line	Load
	A	B	C	D	E	F	G	H		P	Q	R
F	11.7 (297)	17.2 (437)	7.0 (178)	8.2 (208)	12.8 (325)	7.8 (198.5)	13.0 (330)	2.19 (55.5)	(4) 5/16 M8	.8 (20)	4.4 (112)	4.4 (112)

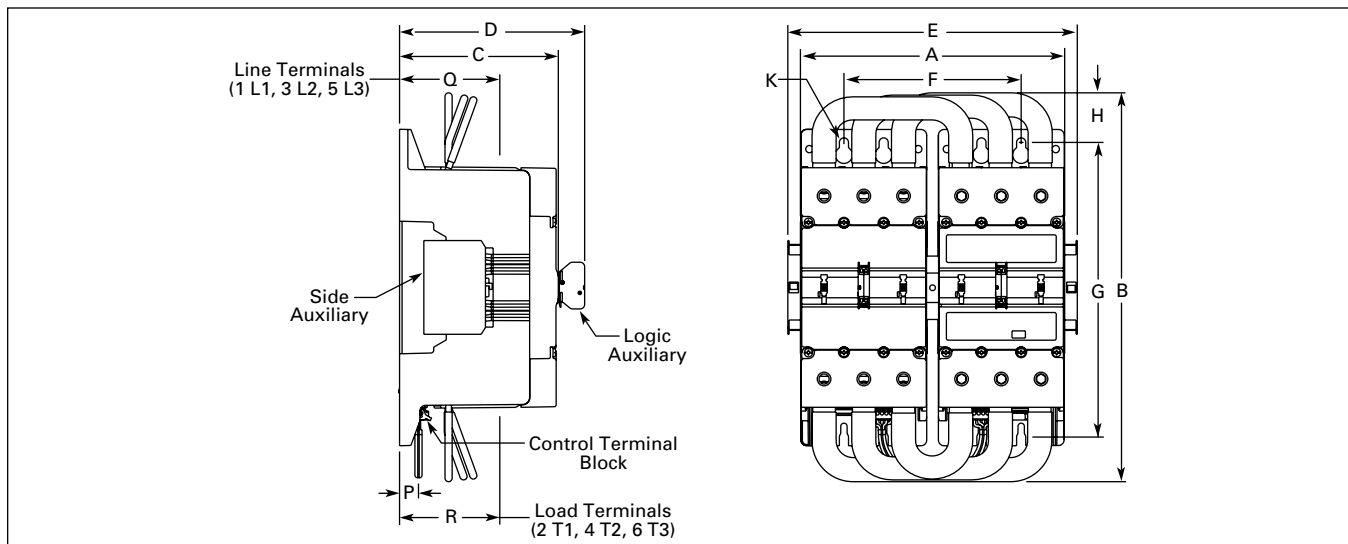


Figure B-152. Approximate Dimensions in Inches (mm)

July 2008

Dimensions

Non-reversing and Reversing Starters (Frame A)

Table B-244. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes				Req. Mtg. Screws	Reset Button			Terminals		
	Width	Height	Depth	Depth w/ Auxiliary	Depth added w/DIN Rail	Width	Height	Mtg. Hole to Top	DIN Rail to Top		Width	Height	Depth	Control	Line	Load
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
Non-reversing																
A	1.20 (31)	4.0 (102)	3.1 (79)	3.5 (89)	.2 (5)	.76 (19.3)	3.70 (94.0)	.1 (3.5)	.6 (15)	(3) #8 M4	.3 (8.0)	2.9 (72.4)	3.1 (78)	2.2 (55)	1.7 (43)	1.8 (45)
Reversing																
A	2.50 (64)	4.0 (102)	3.1 (79)	3.5 (89)	.2 (5)	1.31 (33.2)	3.52 (89.4)	.2 (5)	.5 (13)	(3) #8 M4	.9 (24)	3.0 (76.0)	3.1 (78)	2.2 (55)	1.7 (43)	1.8 (45)

B

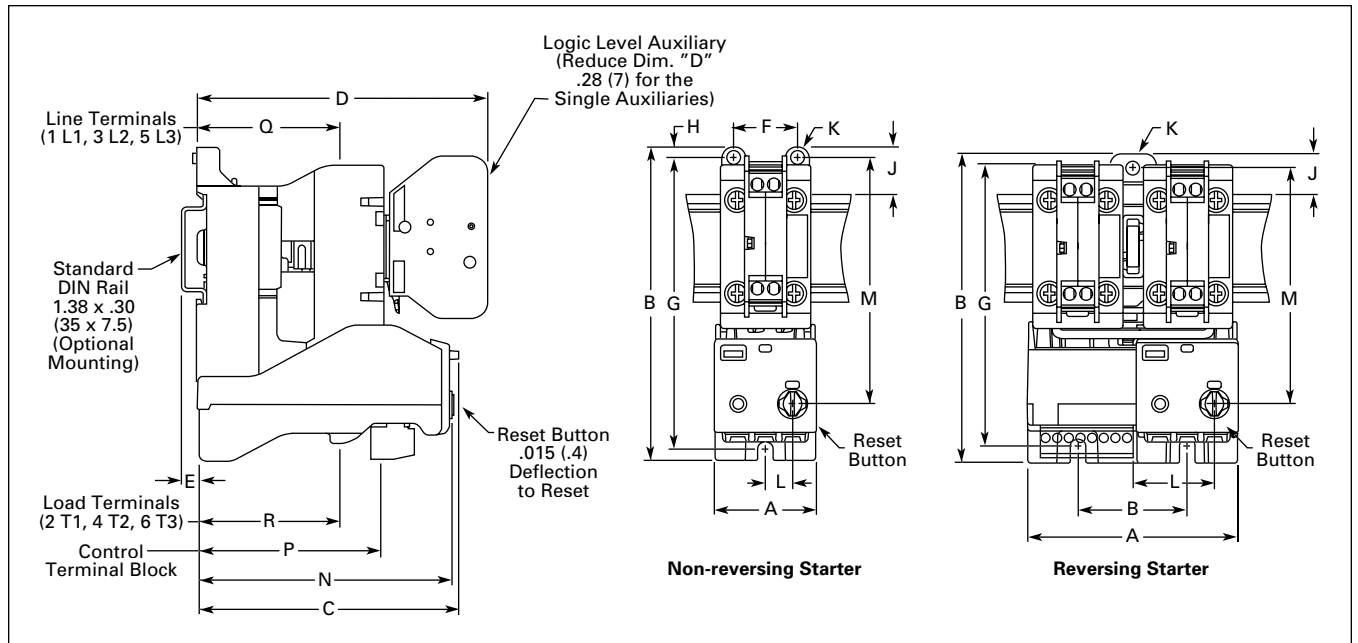


Figure B-153. Approximate Dimensions — Inches (mm)

Dimensions

Non-reversing Starters (Frames B – E)

Table B-245. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes		Req. Mtg. Screws	Reset Button			Terminals		
	Width	Height	Depth	Depth w/ Auxiliary	Depth added w/DIN Rail	Width	Height		Width	Height	Depth	Control	Line	Load
	A	B	C	D	E	F	G		L	M	N	P	Q	R
B	1.8 (45)	5.0 (127)	2.5 (63)	3.6 (91)	.1 (3)	1.33 (33.8)	4.62 (117.3)	(3) #8 M4	.6 (14)	3.6 (91)	2.5 (63)	1.7 (44)	1.2 (30)	.6 (16)
C	2.1 (54)	5.4 (138)	2.5 (63)	3.6 (91)	.1 (3)	1.46 (37)	5.04 (128)	(3) #8 M4	.7 (17)	3.7 (93)	2.4 (62)	1.8 (45)	1.2 (30)	.3 (8)
D	3.0 (76)	5.9 (150)	3.1 (79)	4.2 (107)	.2 (4)	.94 (24)	2.87 (73)	(4) #6 x 2 M3.5 x 50	.7 (17)	4.2 (106)	3.1 (78)	2.4 (60)	1.5 (37)	.6 (14)
E	4.1 (105)	8.0 (203)	3.5 (90)	4.7 (119)	—	1.33 (33.8)	4.13 (105)	(4) #8 x 1.5 M4 x 40	.7 (17)	5.7 (146)	3.5 (88)	2.8 (72)	1.7 (42)	.3 (8)

B

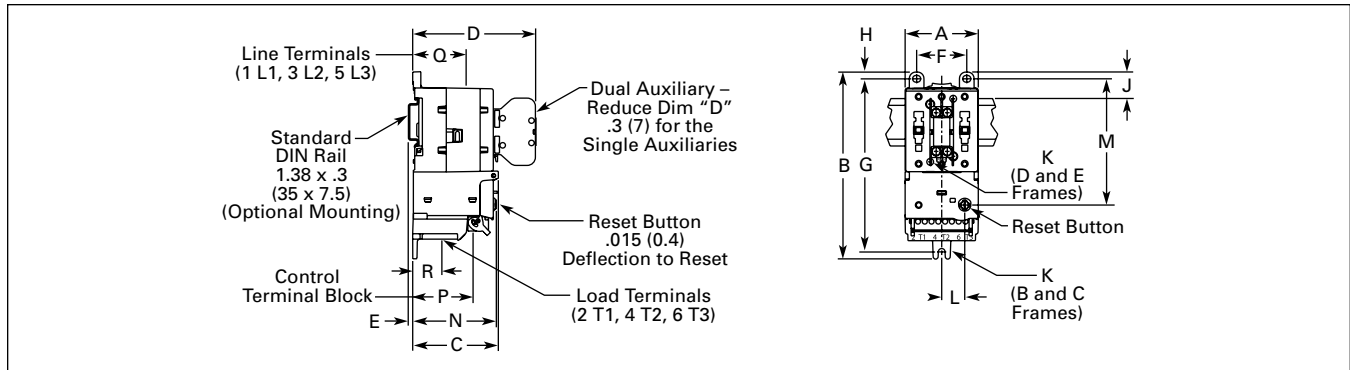


Figure B-154. Approximate Dimensions — Inches (mm)

Non-reversing Starter (Frame F)

Table B-246. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes			Req. Mtg. Screws	Reset Button			Terminals			
	Width	Length	Depth	Depth w/Logic Level Auxiliary	Width w/Side Auxiliaries	Width	Height	Mntg. Hole to Top		Width	Height	Depth	Control	Line	Load	Load
	A	B	C	D	E	F	G	I		L	M	N	P	Q	R	S
F	5.7 (145)	19.4 (493)	7.0 (178)	8.2 (208)	6.7 (170)	1.75 (44.5)	18.3 (465)	.58 (14.7)	(4) 5/16 M8	2.4 (61)	12.4 (315)	5.3 (135)	5.0 (126)	4.4 (112)	3.0 (75)	4.0 (101)

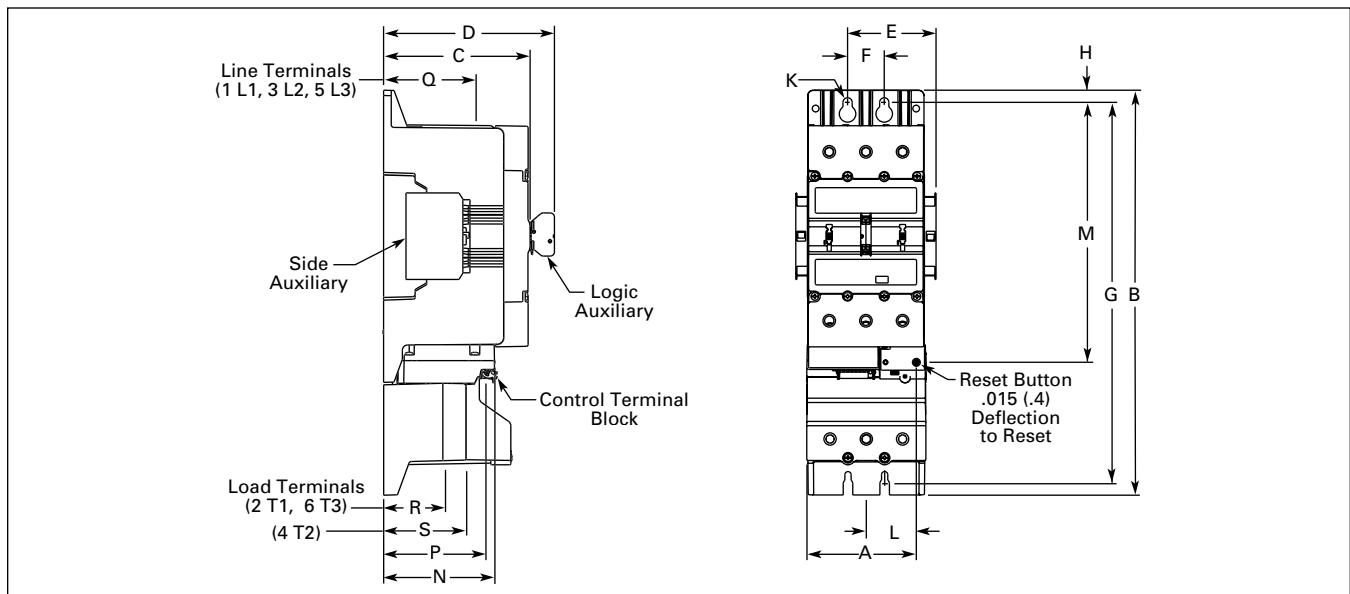


Figure B-155. Approximate Dimensions in Inches (mm)

Dimensions

Reversing Starters (Frames B – E)

Table B-247. Approximate Dimensions in Inches (mm)

Frame Size	Overall				Mounting Holes			Req. Mtg. Screws	Reset Button			Terminals		
	Width	Length	Depth	Depth w/ Auxiliary	Width	Height	Mtg. Hole to Top		Width	Height	Depth	Control	Line	Load
	A	B	C	D	F	G	H		L	M	N	P	Q	R
B	3.8 (96)	5.9 (149)	2.7 (69)	3.8 (96)	3.15 (80)	5.35 (136)	.28 (7)	(3) #10 M5	1.6 (40)	3.8 (97)	2.7 (68)	2.0 (50)	1.5 (38)	.9 (22)
C	4.5 (114)	5.9 (149)	2.6 (67)	3.8 (96)	3.15 (80)	5.35 (136)	.28 (7)	(3) #10 M5	1.7 (43)	4.1 (104)	2.6 (65)	2.0 (50)	1.5 (38)	.6 (16)
D	6.2 (158)	7.4 (188)	3.3 (84)	4.4 (112)	5.51 (140)	6.89 (175)	.24 (6)	(3) #10 M5	2.3 (58)	5.5 (139)	3.3 (83)	2.6 (67)	1.9 (48)	.9 (22)
E	8.5 (216)	9.5 (242)	3.8 (97)	4.9 (125)	7.87 (200)	9.06 (230)	.24 (6)	(3) #10 M5	2.9 (73)	7.2 (182)	3.7 (94)	3.1 (80)	2.1 (54)	.7 (17)

B

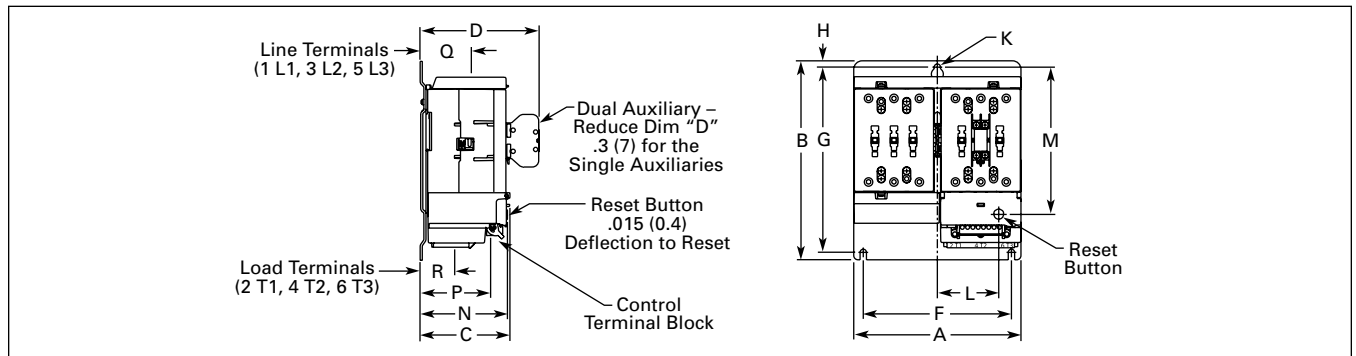


Figure B-156. Approximate Dimensions — Inches (mm)

Reversing Starter (Frame F)

Table B-248. Approximate Dimensions in Inches (mm)

Frame Size	Overall					Mounting Holes				Req. Mtg. Screws	Reset Button			Terminals			
	Width	Length	Depth	Depth w/Logic Level Auxiliary	Width w/Side Auxiliaries	Width	H1	Mntg. Hole to Top	H2		Width	Height	Depth	Control	Line	Load	Load
	A	B	C	D	E	F	G	H	I		K	L	M	N	P	Q	R
F	11.8 (300)	21.0 (533)	7.0 (178)	8.2 (208)	12.8 (325)	7.82 (199)	18.3 (465)	2.19 (55.5)	13 (330)	(5) 5/16 M8	5.4 (138)	12.4 (315)	5.3 (135)	5.0 (126)	4.4 (112)	3.0 (75)	4.0 (101)

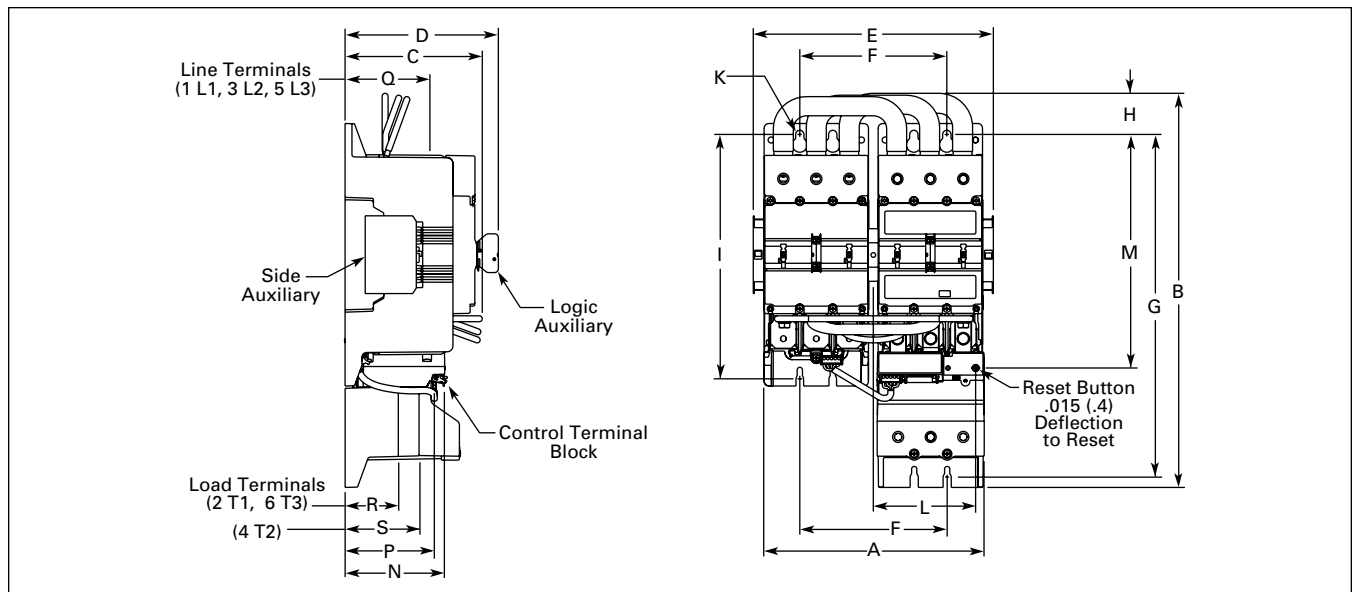


Figure B-157. Approximate Dimensions in Inches (mm)

Product Family Overview

B



IEC Size B
Cat. No. CE15BNS3AB



IEC Size D
Cat. No. AE16DN0BC



32 Ampere Overload
Cat. No. C306DN3B



Series B
Heater Pack

Product Description

Eaton's electrical business has been supplying quality Industrial Control products for more than 100 years — the Cutler-Hammer® Freedom Series line of Contactors and Starters continue in this tradition. The IEC Freedom Series Contactors and Starters feature a compact space-saving design, using state-of-the-art technology and the latest in high strength, impact and temperature resistant insulating materials.

Features

Freedom IEC Features

Freedom IEC contactors and starters are designed to IEC standards and comply with the International Standard IEC 947-4-1. IEC products are a perfect choice when electrical and mechanical application parameters are known. They are typically smaller in size and provide higher ratings in a smaller package. They are available in 16 sizes to match the contactor to the application.

- Complies with IEC 947-4-1, EN, CENELEC, UL and CSA standards.
- 16 Sizes of contactors through 200 hp.
- DIN rail mountable through 20 hp.
- Adjustable bimetal overload relays

Standards and Certifications

- Standard: Designed to meet or exceed UL, NEMA, IEC, CSA, VDE and BS
- UL Listed: UL File #E1491, Guide #NLDX — Open
- CSA Certified: CSA File #LR353, Class #321104 Open
- IEC: Sizes A – S, IEC 947-4-1

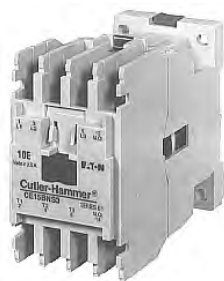
Certified Type 2 Coordination

Eaton's Cutler-Hammer Freedom Series IEC starters are now UL Certified to achieve IEC 947 Type 2 coordination against 100,000A short circuit fault currents. Any brand of properly selected fuse can be used. Type 2 coordination means that the starter will be suitable for further use following a short circuit fault.

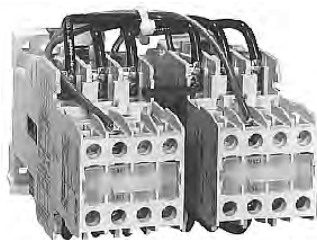
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Note: For more information, see CA03402001E.



IEC Size B
Cat. No. CE15BNS3AB



IEC Size D
Cat. No. CE55DN3AB

Product Description

Non-reversing

Contactors are most commonly used to switch motor loads in applications where running over current protection is either not required or is provided separately. Contactors consist of a magnetically actuated switch which can be remotely operated by a push-button station or pilot device such as a proximity switch, limit switch, float switch, auxiliary contacts, etc.

Reversing

Reversing contactors are used primarily for reversing single- or three-phase motors in applications where running over current protection is either not required or is provided separately. They consist of two contactors mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features

- **EN60947-4-1 IEC 947-4-1 Compliance** — new International Standard for low voltage switchgear and control devices.
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion.
- Designed to 2,000,000 electrical and 20,000,000 mechanical operations at maximum hp ratings through 20 hp at 460V. Adequate for most general duty control applications.

Non-reversing

- UL listed and CSA certified.
- Highest horsepower rating in a compact, space-saving design, 45 mm frame rated maximum 20 hp at 460V, 65 mm frame rated maximum 50 hp, 90 mm frame rated 100 hp, 180 mm frame rated 200 hp.
- 45 mm open contactors, Sizes A – F, have DIN rail or universal base mounting, 65 mm open contactors have molded feet for panel mounting, and 90 mm to 180 mm have steel mounting plates (optional on smaller sizes).
- DIN rail release mechanism conveniently located on line side of contactor.

- IP20 finger protection shields available.
- Contactor and terminal markings conform to CENELEC EN50011.
- Holding circuit contact(s) supplied as standard:
 - Sizes A – N have a NO auxiliary contact block mounted on right hand side (on Sizes A – C, contact occupies 4th power pole position — no increase in width).
 - Sizes P – S have a NO-NC contact block mounted on the left hand side.
- Lugs supplied standard.

Reversing

- Highest horsepower rating in a compact, space-saving design, 45 mm frame rated maximum 20 hp, 65 mm frame rated maximum 50 hp and 90 mm frame rated maximum 75 hp at 460V. If larger devices are required, order components.
- 45 mm open type reversing contactors, Sizes A – F, have DIN rail or panel mounting capability. DIN rail release mechanism conveniently located on line side of contactor. A steel mounting plate is optional.
- 65 mm reversing contactors, Sizes G – K and 90 mm Sizes L – N are supplied with steel mounting plate as standard.
- Sizes A – K have a wired NC top mounted electrical interlock on each contactor. Sizes L – N have one NO-NC side mounted electrical interlock on each contactor.

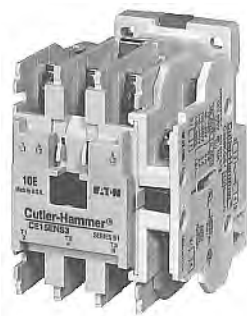
B

Contactors — Non-reversing and Reversing

Product Selection —
3-Pole Contactors

When Ordering Specify

- Select required contactor by Catalogue Number and replace the magnet coil alpha designation in the Catalogue Number () with the proper Code Suffix from Tables B-251 and , on Page B-210.
- For Sizes A – K, the magnet coil alpha designation is the second-to-last digit of the Catalogue Number. Example: for a 240V/60 Hz coil, order CE15ANS3BB.



IEC Size E
Cat. No. CE15ENS3AB



IEC Size N
Cat. No. CE15NN3A

Table B-249. Type CE15/CE55 IEC Product Selection — 3-Pole Contactors

Max. UL AC-3 Amp. Rating 600V AC	IEC 947 AC-1 Thermal Current 600V	Maximum kW Rating					Maximum UL Horsepower						3-Pole — Non-reversing ①②		3-Pole — Reversing ③	
		3-Phase					1-Phase		3-Phase				Catalogue Number	Price	Catalogue Number	Price
		220V	380V	415/440V	500/550V	660V	115V	230V	200V	230V	460V	575V				
7	20	1.1	2.2	2.2	4	1.5	1/4	1/2	1-1/2	1-1/2	3	5	CE15ANS3_B		CE55AN3_B	
10	20	1.5	4	4	5.5	2.2	1/2	1	2	2	5	7-1/2	CE15BNS3_B		CE55BN3_B	
12	20	2.2	5.5	5.5	7.5	4	1/2	2	3	3	7-1/2	10	CE15CNS3_B		CE55CN3_B	
18	32	4	7.5	7.5	11	5.5	1	3	5	5	10	15	CE15DNS3_B		CE55DN3_B	
25	32	5.5	11	11	15	7.5	2	3	5	7-1/2	15	20	CE15ENS3_B		CE55EN3_B	
32	32	7.5	15	15	18.5	10	2	5	7-1/2	10	20	25	CE15FNS3_B		CE55FN3_B	
37	50	—	18.5	18.5	22	11	3	5	7-1/2	10	25	30	CE15GNS3_B		CE55GN3_B	
44	60	11	22	22	30	15	3	7-1/2	10	15	30	40	CE15HNS3_B		CE55HN3_B	
60	75	15	30	30	30	18.5	5	10	15	20	40	40	CE15JNS3_B		CE55JN3_B	
73	80	18.5	37	37	37	22	5	10	20	25	50	50	CE15KNS3_B		CE55KN3_B	
85	100	22	45	45	55	37	7-1/2	10	25	30	60	75	CE15LN3_		CE55LN3_	
105	135	30	55	55	75	45	10	10	30	40	75	100	CE15MN3_		CE55MN3_	
140	175	37	75	75	90	45	10	10	40	50	100	125	CE15NN3_		CE55NN3_	
170	185	45	90	90	90	45	—	—	50	60	125	125	CE15PN3_		—	
200	220	55	110	110	110	55	—	—	60	75	150	150	CE15RN3_		—	
300	315	90	160	160	160	75	—	—	75	100	200	200	CE15SN3_		—	

- ① IEC Sizes A – N are supplied with a NO auxiliary contact. On IEC Sizes A – C, the 4th power pole position is used as the auxiliary contact and adds no additional width. Open type Sizes A – K can be ordered with a top mounted auxiliary contact instead of a side mounted contact. To order, change the 7th digit of the listed Catalogue Number from “S” to “T.” Example: CE15ANT3AB. On open type Sizes A – K, if the NO auxiliary contact is not required, drop the “S” from the listed Catalogue Number.
- ② Auxiliary contacts: Sizes P – S have 1NO-1NC.
- ③ Sizes A – K IEC contactors do not include holding circuit contacts. For factory installed NO auxiliary contacts, insert “S” (side mounted) or “T” (top mounted) after 6th digit of listed Catalogue Number. Example: Change CE55AN3AB to CE55ANS3AB. For “T,” top mounted NC contact blocks are replaced with NO-NC blocks — for “S” they are replaced with NO-NC side mounted blocks.

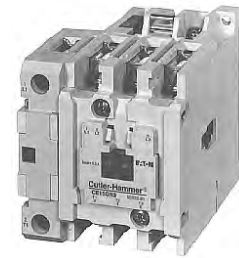
Accessories Pages B-218 – B-224
Discount Symbol MC7

July 2008

Contactors — Non-reversing and Reversing

**Product Selection —
2-, 4- and 5-Pole Contactors**

■ For DC Magnet Coils, see Accessories, Page B-220.



**IEC Size G
4-Pole Contactor
Cat. No. CE15GN4AB**

B

When Ordering Specify

- Select required contactor by Catalogue Number and replace the magnet coil alpha designation in the Catalogue Number (α) with the proper Code Suffix from the adjacent table.
- For Sizes A – K, the magnet coil alpha designation is the second-to-last digit of the Catalogue Number. Example: for a 240V/60 Hz coil, order CE15ANS3BB.

Table B-250. Type CE15 IEC Product Selection — 2-, 4- and 5-Pole Contactors — Non-reversing

Max. UL AC-3 Ampere Rating 600V AC	IEC 947 AC-1 Thermal Current 600V	Maximum kW Rating					Maximum UL Horsepower						Catalogue Number	Price
		3-Phase					1-Phase		3-Phase					
		220V	380V	415/440V	500/550V	660V	115V	230V	200V	230V	460V	575V		
2-Pole ①														
7	20	1.1	2.2	2.2	4	1.5	1/4	1/2	1-1/2	1-1/2	3	5	CE15ANS2_B	
10	20	1.5	4	4	5.5	2.2	1/2	1	2	2	5	7-1/2	CE15BNS2_B	
12	20	2.2	5.5	5.5	7.5	4	1/2	2	3	3	7-1/2	10	CE15CNS2_B	
18	32	4	7.5	7.5	11	5.5	1	3	5	5	10	15	CE15DNS2_B	
25	32	5.5	11	11	15	7.5	2	3	5	7-1/2	15	20	CE15ENS2_B	
32	32	7.5	15	15	18.5	10	2	5	7-1/2	10	20	25	CE15FNS2_B	
37	50	—	18.5	18.5	22	11	3	5	7-1/2	10	25	30	CE15GNS2_B	
44	60	11	22	22	30	15	3	7-1/2	10	15	30	40	CE15HNS2_B	
60	75	15	30	30	30	18.5	5	10	15	20	40	40	CE15JNS2_B	
73	80	18.5	37	37	37	22	5	10	20	25	50	50	CE15KNS2_B	
85	100	22	45	45	55	37	7-1/2	10	25	30	60	75	CE15LN2_	
105	135	30	55	55	75	45	10	10	30	40	75	100	CE15MN2_	
140	175	37	75	75	90	45	10	10	40	50	100	125	CE15NN2_	
4-Pole														
7	20	1.1	2.2	2.2	4	1.5	1/4	1/2	1-1/2	1-1/2	3	5	CE15AN4_B	
10	20	1.5	4	4	5.5	2.2	1/2	1	2	2	5	7-1/2	CE15BN4_B	
12	20	2.2	5.5	5.5	7.5	4	1/2	2	3	3	7-1/2	10	CE15CN4_B	
18	32	4	7.5	7.5	11	5.5	1	3	5	5	10	15	—	
25	32	5.5	11	11	15	7.5	2	3	5	7-1/2	15	20	—	
32	32	7.5	15	15	18.5	10	2	5	7-1/2	10	20	25	—	
37	50	—	18.5	18.5	22	11	3	5	7-1/2	10	25	30	CE15GN4_B	
44	60	11	22	22	30	15	3	7-1/2	10	15	30	40	CE15HN4_B	
60	75	15	30	30	30	18.5	5	10	15	20	40	40	CE15JN4_B	
73	80	18.5	37	37	37	22	5	10	20	25	50	50	—	
5-Pole														
32	32	7.5	15	15	18.5	10	2	5	7-1/2	10	20	25	—	
37	50	—	18.5	18.5	22	11	3	5	7-1/2	10	25	30	CE15GN5_B	
44	60	11	22	22	30	15	3	7-1/2	10	15	30	40	CE15HN5_B	
60	75	15	30	30	30	18.5	5	10	15	20	40	40	CE15JN5_B	
73	80	18.5	37	37	37	22	5	10	20	25	50	50	—	

① Sizes A – N 2-pole contactors are supplied with a NO auxiliary contact. On Sizes A – C, the 4th power pole is used as the auxiliary contact and adds no additional width. Open type Sizes A – K can be ordered with a top mounted auxiliary contact instead of a side mounted contact. To order, change the “S” to a “T”.

Accessories Pages B-218 – B-224
Discount Symbol MC7

Contactors — Non-reversing and Reversing

B

Table B-251. AC Coil Suffixes

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	A
240/60 or 220/50	B
480/60 or 440/50	C
600/60 or 550/50	D
208/60	E
277/60	H
208-240/60 ①	J
240/50	K
380-415/50	L
550/50	N
380/60	P
24/60, 24/50 ②	T
24/50	U
32/50	V
48/60	W
48/50	Y

- ① IEC Sizes A – F only.
- ② IEC Sizes A – F only. Sizes G – S are 24/60 only.

Table B-252. DC Coil Suffixes

Contactor or Starter Size — IEC	Volts	NCI Interlock	Code Suffix
Non-reversing			
A – F	12	C320KGD1	R1
	24	C320KGD1	T1
	48	C320KGD1	W1
	120	C320KGD1	A1
A – F	12	C320KGD2 ③	R4
	24	C320KGD2 ③	T4
	48	C320KGD2 ③	W4
	120	C320KGD2 ③	A4
G – K	12	C320KGD5	R4
	24	C320KGD5	T4
	48	C320KGD5	W4
	120	C320KGD5	A4
L – N	12	C320KGD3	R1
	24	C320KGD3	T1
	48	C320KGD3	W1
	120	C320KGD3	A1
P – S	24	C320KGD3	T1B
	48	C320KGD3	W1B
	120	C320KGD3	A1B
	240	C320KGD3	B1B
Reversing			
A – F	12	(2) C320KGD1	R1 ④
	24	(2) C320KGD1	T1 ④
	48	(2) C320KGD1	W1 ④
	120	(2) C320KGD1	A1 ④
G – K	12	(2) C320KGD3	R1 ④
	24	(2) C320KGD3	T1 ④
	48	(2) C320KGD3	W1 ④
	120	(2) C320KGD3	A1 ④

- ③ These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.
- ④ Factory installed DC coils on IEC contactors and starters include a NC top mounted auxiliary contact on each contactor for electrical interlocking.

Discount Symbol **MC7**

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Note: For more information, see CA03402001E.



**IEC Size D
Cat. No. AE16DN0BC**

Product Description

Non-reversing

IEC Freedom Series Starters utilize an Interchangeable Heater Pack Overload Relay which allows increased flexibility. Starters are available to cover 3-phase motors with fractional horsepower ratings up to 200 hp at 600V.

Reversing

Three-phase, full voltage magnetic starters are used primarily for reversing of 3-phase squirrel cage motors. They consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features

- **EN60947-4-1 IEC 947-4-1 Compliance** — International Standard for low voltage switchgear and control devices.
- UL listed and CSA certified.
- **Bimetallic Ambient Compensated Overload Relays** — available in three basic sizes covering applications up to 200 hp (100 hp Reversing) — reducing number of different contactor/overload relay combinations that have to be stocked. These overload relays feature:
 - Selectable Manual or Automatic Reset operation.
 - Interchangeable Heater Packs adjustable $\pm 24\%$ to match motor FLA and calibrated for 1.0 and 1.15 service factors. Heater packs for smaller overload relay will mount in larger overload relay — useful in derating applications such as jogging.
 - Meets UL508 Single-Phasing requirements, Class 20 or Class 10 trip time.
 - Overload trip indication.
 - Electrically isolated NO-NC contacts (pull RESET button to test).
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion.
- Designed to 2,000,000 electrical and 20,000,000 mechanical operations through 20 hp at 460V. Adequate for most general duty motor control applications.

Non-reversing

- Highest horsepower rating in compact, space-saving designs, 45 mm frame rated maximum 20 hp at 460V, 65 mm frame rated maximum 50 hp, 90 mm frame rated maximum 100 hp, and 180 mm rated maximum 200 hp.
- IP20 finger protection shields available.
- Contactor and terminal markings conform to CENELEC EN50011.

- One NO right-side mounted auxiliary contact supplied as standard on Sizes A – N (on Sizes A – C, contact occupies 4th power pole — no increase in width). Sizes P – S have NO-NC.
- 45 mm open type starters, sizes A – F, have DIN rail or universal base mounting. DIN rail release mechanism conveniently located on line side of starter. A steel mounting plate is optional.
- 65 mm starters, sizes G – K; 90 mm starters, sizes L – N; and P – S 180 mm supplied with steel mounting plate as standard.
- Four basic starter frame widths — 45 mm, 65 mm, 90 mm and 180 mm — simplifying panel layout.

Reversing

- Highest horsepower rating in compact, space-saving designs. 45 mm frame rated maximum 20 hp at 460V, 65 mm frame rated maximum 50 hp, and 90 mm frame rated maximum 100 hp.
- 45 mm open type reversing starters, Sizes A – F, have DIN rail or universal base mounting. DIN rail release mechanisms conveniently located on line side of starters. A steel mounting plate is optional.
- 65 mm reversing starters, Sizes G – K, and 90 mm reversing starters, Sizes L – N, are supplied with steel mounting plate as standard.
- Sizes A – K have a wired NC top mounted electrical interlock on each contactor. Sizes L – N have one NO-NC side mounted electrical interlock on each contactor.
- A full time of snap-on accessories — top and side mounted auxiliary contacts, solid-state and pneumatic timers, etc.
- Straight-through wiring — line lugs at top, load lugs at bottom.
- Horizontal or vertical mounting on upright panel for application freedom.
- Screw type power terminals have captive, backed-out self-lifting pressure plates with \pm screws — reducing wiring time.

B

Starters — Interchangeable Heater

Product Selection

When Ordering Specify

- Select required starter by Catalogue Number and replace the magnet coil alpha designation in the Catalogue Number () with the proper Code Suffix from **Table B-256** on **Page B-213**.

- Example: for a Size B starter with a 480V/60 Hz coil, order AE16BNS0CC.
- For **DC Magnet Coils**, see Accessories, **Page B-220**.

B

Table B-253. Type AE16/AE56 Starters — Interchangeable Heater Overload Relay — 3-Pole — Non-reversing ①

Max. UL AC-3 Ampere Rating	IEC 947 AC-1 Thermal Current 600V	Maximum kW Rating					Maximum UL Horsepower						Catalogue Number	Price
		3-Phase					1-Phase		3-Phase					
		220V	380V	415/440V	500/550V	660V	115V	230V	208V	240V	480V	600V		
7	20	1.1	2.2	2.2	4	1.5	1/4	1/2	1-1/2	1-1/2	3	5	AE16ANS0_C	
10	20	1.5	4	4	5.5	2.2	1/2	1	2	2	5	7-1/2	AE16BNS0_C	
12	20	2.2	5.5	5.5	7.5	4	1/2	2	3	3	7-1/2	10	AE16CNS0_C	
18	32	4	7.5	7.5	11	5.5	1	3	5	5	10	15	AE16DNS0_C	
25	32	5.5	11	11	15	7.5	2	3	5	7-1/2	15	20	AE16ENS0_C	
32	32	7.5	15	15	18.5	10	2	5	7-1/2	10	20	25	AE16FNS0_C	
37	50	—	18.5	18.5	22	11	3	5	7-1/2	10	25	30	AE16GNS0_B	
44	60	11	22	22	30	15	3	7-1/2	10	15	30	40	AE16HNS0_B	
60	75	15	30	30	30	18.5	5	10	15	20	40	40	AE16JNS0_B	
73	80	18.5	37	37	37	22	5	10	20	25	50	50	AE16KNS0_B	
85	100	22	45	45	55	37	7-1/2	10	25	30	60	75	AE16LN0_	
105	135	30	55	55	75	45	10	10	30	40	75	100	AE16MN0_	
140	175	37	75	75	90	45	10	10	40	50	100	125	AE16NN0_	
170	185	45	90	90	90	45	—	—	50	60	125	125	AE16PN0_	
200	220	55	110	110	110	55	—	—	60	75	150	150	AE16RN0_	
300	315	90	160	160	160	75	—	—	75	100	200	200	AE16SN0_	

① IEC Sizes A – N, open are supplied with a NO auxiliary contact. On IEC Sizes A – C, the 4th power pole position is used as the auxiliary contact and adds no additional width. Open type Sizes A – K can be ordered with a top mounted auxiliary contact instead of a side mounted contact. To order, change the 7th digit of the listed Catalogue Number from “S” to “T.” Example: AE16ANT0AC. On open type Sizes A – K, if the NO auxiliary contact is not required, drop the “S” from the listed Catalogue Number. Example: AE16AN0AC. On IEC Sizes P – S, a NO-NC side mounted is standard.

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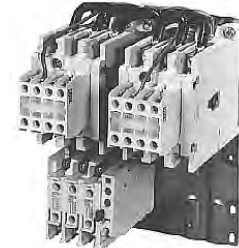
Starters — Interchangeable Heater

When Ordering Specify

- Select required starter by Catalogue Number and replace the magnet coil alpha designation in the Catalogue Number () with the proper Code Suffix from **Table B-256** below.
- Example: for a Size B starter with a 480V/60 Hz coil, order AE16BNS0CC.
- For **DC Magnet Coils**, see Accessories, **Page B-220**.



IEC Size F
Cat. No. AE56DN0BC



IEC Size G
Cat. No. AE56GN0BB

B

Table B-254. Type AE16/AE56 Starters — Interchangeable Heater Overload Relay — 3-Pole — Reversing ①

Max. UL AC-3 Ampere Rating	IEC 947 AC-1 Thermal Current 600V	Maximum kW Rating					Maximum UL Horsepower						Catalogue Number	Price
		3-Phase					1-Phase		3-Phase					
		220V	380V	415/440V	500/550V	660V	115V	230V	208V	240V	480V	600V		
7	20	1.1	2.2	2.2	4	1.5	1/4	1/2	1-1/2	1-1/2	3	5	AE56AN0_C	
10	20	1.5	4	4	5.5	2.2	1/2	1	2	2	5	7-1/2	AE56BN0_C	
12	20	2.2	5.5	5.5	7.5	4	1/2	2	3	3	7-1/2	10	AE56CN0_C	
18	32	4	7.5	7.5	11	5.5	1	3	5	5	10	15	AE56DN0_C	
25	32	5.5	11	11	15	7.5	2	3	5	7-1/2	15	20	AE56EN0_C	
32	32	7.5	15	15	18.5	10	2	5	7-1/2	10	20	25	AE56FN0_C	
37	50	—	18.5	18.5	22	11	3	5	7-1/2	10	25	30	AE56GN0_B	
44	60	11	22	22	30	15	3	7-1/2	10	15	30	40	AE56HN0_B	
60	75	15	30	30	30	18.5	5	10	15	20	40	40	AE56JN0_B	
73	80	18.5	37	37	37	22	5	10	20	25	50	50	AE56KN0_B	
85	100	22	45	45	55	37	7-1/2	10	25	30	60	75	AE56LN0_	
105	135	30	55	55	75	45	10	10	30	40	75	100	AE56MN0_	
140	175	37	75	75	90	45	10	10	40	50	100	125	AE56NN0_	

① Sizes A – K IEC starters do not include holding circuit contacts. For factory installed NO auxiliary contacts, insert “S” (side mounted) or “T” (top mounted) after 6th digit of listed Catalogue Number. Example: Change AE56AN0AC to AE56ANS0AC. For “T” top mounted NC contact blocks are replaced with NO-NC blocks — for “S” they are replaced with NO-NC side mounted blocks.

Table B-255. Maximum Horsepower Rating of Starters for 380V 50 Hz Application

IEC Size	A	B	C	D	E	F	G	H
hp	3	5	5	10	10	15	20	25
IEC Size	J	K	L	M	N	P	R	S
hp	30	40	50	60	75	100	125	150

Table B-256. AC Coil Suffixes

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	A
240/60 or 220/50	B
480/60 or 440/50	C
600/60 or 550/50	D
208/60	E
277/60	H
208-240/60 ②	J
240/50	K
380-415/50	L
550/50	N
24/60, 24/50 ③	T
24/50	U
32/50	V
48/60	W
48/50	Y

② IEC Sizes A – F only.
③ IEC Sizes A – F only. Sizes G – S are 24/60 only.

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Relays — Interchangeable Heater Overload

B

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Note: For more information, see CA03402001E.



32 Ampere Overload
Cat. No. C306DN3B

Product Description

C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144 amperes.

Features

- Selectable manual or automatic reset operation.
- Interchangeable heater packs adjustable $\pm 24\%$ to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors.
 - Heater packs for 32 ampere overload relay will mount in 75 ampere overload relay — useful in derating applications such as jogging.
- Class 10 or 20 heater packs.
- Load lugs built into relay base.
- Bimetallic, ambient compensated operated. Trip free mechanism.

- Electrically isolated NO-NC contacts (pull RESET button to test).
- Overload trip indication.
- Shrouded or “fingerproof” terminals to reduce possibility of electrical shock.
- Meets UL508 single-phasing requirements.

Standards and Certifications

- UL listed
- CSA certified
- NEMA compliance and EN60947-4-1 IEC 947-4-1 and (CE) Mark

Factory Modifications



Cat. No. C306TB1

Table B-257. C306 Thermal Overload Relays with Mounting Adapter

Consists of a thermal overload relay mounted to a terminal base adapter — permits fast and easy installation.		
Description	Catalogue Number	Price
C306DN3B + C306TB1 C306GN3B + C306TB2B	C306DT3B C306GT3B	

Accessories

Table B-258. DIN Rail and Panel Mounting Adapter

These adapters are required when component overload relays are to be separately mounted. The terminal base adapter includes line terminals and connects with the overload relays listed in Table B-257 .		
Description	Catalogue Number	Price
For 32 Ampere Overload Relay For 75 Ampere Overload Relay	C306TB1 C306TB2B ①	

① This Series “B” adapter will accept Series “A” or “B” overload relays (C306GN3 or C306GN3B). C306TB2 can only be used with C306GN3.

Discount Symbol **MC7**



Table B-259. Locking Cover for Overload Relay — C306 Only

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial — helps prevent accidental or unauthorized changes to trip and reset setting.			
Description	Min. Order Quantity (Std. Pkg.)	Catalogue Number	Price
Clear cover, no accessibility	50	C320PC3	
Gray cover, no accessibility, with Auto only nib	50	C320PC4	
Gray cover, no accessibility, with Manual only nib	50	C320PC5	
Gray cover with FLA dial accessibility, A, B, C, D positions and Auto only nib	50	C320PC6	
Gray cover with FLA dial accessibility, A, B, C, D positions and Manual only nib	50	C320PC7	

Overload Lug Adapter Kit



**Cat. No. C306KAL1-3
Overload Relay Lug
Adapter Kit**

These kits are used in conjunction with Catalogue Numbers H2001B – H2014B or H2101B – H2114B heater packs as a means of utilizing these Series “B” heater packs in Catalogue Numbers C306DN3 and C306GN3 Series “A1” overload relays. The kit consists of 3 lug adapters and installation

instructions. When installing Series “B” heater packs plus lug adapters in Series “A” overload relays, refer to heater pack FLA adjustment tables originally supplied with equipment (also supplied with kit).

Table B-260. Product Selection

Description	Catalogue Number	Price
Series “A1” Overload Relay Lug Adapter Kit	C306KAL1-3B	

Replacement Parts

Heater Pack Replacement

The heater pack series is determined by the 6th character of the Catalogue Number. Series A or prior heater packs (identified by either “A” or “-” as the 6th character) have built-in load lugs. Series B or later heater packs do not (load lugs are on overload relay). Replacement of Series A or earlier heater packs with Series B or later heater packs, requires the one time addition of Lug Adapter Kit C306KAL1-3B to the Series A1 overload relay.



**Superseded
Series A
Heater Pack**



**Series B
Heater Pack**

B

Table B-261. Heater Pack Replacement Requirements

Existing Heater Pack Catalogue Numbers	Replacement Product Required
H2001-3 – H2013-3 H2001A-3 – H2013A-3	Lug Adapter Kit C306KAL1-3B and Series B Heater Pack
H2001B-3 – H2013B-3	Series B Heater Pack
H2014-3 H2014A-3	When inventory is exhausted, replace with Lug Adapter Kit C306KAL1-3B and Series B Heater Pack
H2014B-3	Series B Heater Pack
H2015-3 – H2017-3	When inventory is exhausted, replace with heater pack chosen from Table B-264
H2015A-3 – H2017A-3	When inventory is exhausted, replace with Lug Adapter Kit C306KAL1-3B and Series B Heater Pack
H2015B-3 – H2017B-3	Series B Heater Pack

Table B-262. Heater Pack Ratings

Motor Full Load Ampere Rating				Order Heater Pack Catalogue Number	Price
Dial Position					
A	B	C	D		
29.0	32.5	36.0	39.5	H2015A-3	
39.6	44.3	49.1	53.8	H2016A-3	
53.9	60.4	66.8	74.9	H2017A-3	

Overload Relay Replacement — Series “A” Only

When replacing a Catalogue Number C306DN3 (Part Number 10-6044) or C306GN3 (10-6319) Series “A” overload relay on a starter, order a Series “B” overload relay and Series “B” heater packs.



**Superseded 32 Ampere
Series “A” Overload Relay
Cat. No. C306DN3**



**Superseded 75 Ampere
Series “A” Overload Relay
Cat. No. C306GN3**

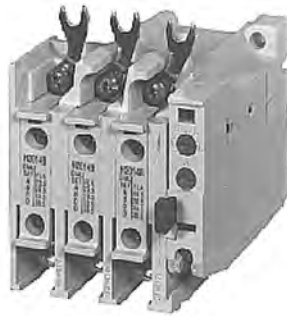
Relays — Interchangeable Heater Overload

Product Selection

B



32A Overload
Cat. No. C306DN3B



75A Overload
Cat. No. C306GN3B

Table B-263. C306 Thermal Overload Relays

For Use with Freedom Series Contactors		Maximum Ampere Rating	Number of Poles	Open Type		Open Type with Adapter for DIN Rail or Panel Mount		NEMA 1 Enclosed	
NEMA	IEC			Catalogue Number	Price	Catalogue Number	Price	Catalogue Number	Price
00, 0	A – F	32 ②	3	C306DN3B		C306DT3B		C306DG3B	
1, 2	G – K	75 ②	3	C306GN3B		C306GT3B		C306GG3B	
3	L – M	105 ③	3	C306KN3		—		—	
4	N	144 ③	3	C306NN3		—		—	
5 – 8 ①	—	—	—	—		—		—	

- ① NEMA Sizes 5 – 8 use the 32 ampere overload in conjunction with CTs.
- ② Series “B” overload relays have load lugs built into relay base and will only accept Series “B” heater packs. These relays can be directly attached to contactor or they can be DIN rail mounted using adapter on **Page B-214**.
- ③ These relays can be panel mounted only.

Heater Pack Selection



Heater Pack
H2001B – H2017B



Heater Pack
H2101B – H2117B



Heater Pack
H2018 – H2024

Heater packs H2001B to H2017B and H2101B to H2117B are to be used only with Series B overload relays Catalogue Numbers C306DN3B (Part No. 10-7016) and C306GN3B (Part No. 10-7020). The load lugs are built into the overload relay base to allow load wiring prior to heater pack installation. The previous heater design had integral load lugs. The Series B heater packs are electrically equivalent to the previous heater design. Heaters H2018-3 to H2024-3 have not changed.

Table B-264. Starters with Series B Overload Relays

NEMA — AN Type		IEC — AE Type	
Size	Series	Size	Series
00 – 0	C	A – F	C
1 – 2	B	G – K	B
5	B		
6	C		
7 – 8	B		

Note: The series of a starter is the last digit of the listed Catalogue Number. EXAMPLE: AE16DN0AB.

Discount Symbol MC7

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Relays — Interchangeable Heater Overload

Table B-265. Standard Trip — Class 20

Overload Relay Size	Motor Full Load Ampere Rating				Catalogue Number (Includes 3 Heater Packs)	Price
	Dial Position					
	A	B	C	D		

For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B

32A or 75A	.254	.306	.359	.411	H2001B-3	
	.375	.452	.530	.607	H2002B-3	
	.560	.676	.791	.907	H2003B-3	
	.814	.983	1.15	1.32	H2004B-3	
	1.20	1.45	1.71	1.96	H2005B-3	
	1.79	2.16	2.53	2.90	H2006B-3	
	2.15	2.60	3.04	3.49	H2007B-3	
	3.23	3.90	4.56	5.23	H2008B-3	
	4.55	5.50	6.45	7.40	H2009B-3	
	6.75	8.17	9.58	11.0	H2010B-3	
32A or 75A	9.14	10.8	12.4	14.0	H2011B-3	
	14.0	16.9	19.9	22.8	H2012B-3	
	18.7	22.7	26.7	30.7	H2013B-3	
	23.5	28.5	33.5	38.5	H2014B-3	

For Use with NEMA Size 2, IEC Sizes G – K Only — Series B

75A	29.0	34.0	39.1	44.1	H2015B-3	
	39.6	45.5	51.5	57.4	H2016B-3	
	53.9	60.9	67.9	74.9	H2017B-3	

For Use with NEMA Sizes 3 – 4, IEC Sizes L – N Only — Series A

105A or 144A	8.0	9.2	10.3	11.5	H2025-3	
	11.4	12.8	14.3	15.7	H2026-3	
	14.3	15.7	17.4	19.0	H2027-3	
	18.0	20.2	22.3	24.5	H2018-3	
	24.6	27.6	30.5	33.4	H2019-3	
	33.5	37.5	41.5	45.6	H2020-3	
	45.7	51.2	56.7	62.1	H2021-3	
	62.2	69.7	77.1	84.6	H2022-3	
	84.7	95.0	105.0	115.0	H2023-3	
	106.0	118.0	131.0	144.0	H2024-3	

For Use with Size 5 Starters — Series B and IEC P, R and S with 300/5 CT

32A ①	49	59	69	79	H2004B-3	
	72	87	103	118	H2005B-3	
	107	130	152	174	H2006B-3	
	129	156	182	209	H2007B-3	
	194	234	274	—	H2008B-3	

For Use with Size 6 Starters Only — Series B with 600/5 CT

32A ①	144	174	205	235	H2005B-3	
	215	259	304	348	H2006B-3	
	258	312	365	419	H2007B-3	
	388	468	547	627	H2008B-3	

For Use with Size 7 Starters Only — Series B with 1000/5 CT

32A ①	163	197	230	264	H2004B-3	
	240	290	342	392	H2005B-3	
	358	432	506	580	H2006B-3	
	430	520	608	698	H2007B-3	
	646	780	912	—	H2008B-3	

For Use with Size 8 Starters Only — Series B with 1500/5 CT

32A ①	244	295	345	396	H2004B-3	
	360	435	513	588	H2005B-3	
	537	648	759	870	H2006B-3	
	645	780	912	1047	H2007B-3	
	969	1170	1368	—	H2008B-3	

① Sizes 5 – 8 and IEC P – S use the 32A overload relay with current transformers.

Table B-266. Fast Trip — Class 10

Overload Relay Size	Motor Full Load Ampere Rating				Catalogue Number (Includes 3 Heater Packs)	Price
	Dial Position					
	A	B	C	D		

For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B

32A or 75A	.260	.313	.367	.420	H2101B-3	
	.384	.464	.543	.623	H2102B-3	
	.570	.688	.806	.924	H2103B-3	
	.846	1.02	1.20	1.37	H2104B-3	
	1.28	1.55	1.83	2.10	H2105B-3	
	1.92	2.33	2.74	3.15	H2106B-3	
	2.30	2.79	3.28	3.77	H2107B-3	
	3.38	4.10	4.82	5.54	H2108B-3	
	4.96	6.03	7.09	8.16	H2109B-3	
	7.07	8.58	10.1	11.6	H2110B-3	
32A or 75A	9.60	11.2	12.8	14.4	H2111B-3	
	14.4	17.5	20.7	23.8	H2112B-3	
	18.7	21.8	25.0	28.1	H2113B-3	
	23.5	27.3	31.0	34.8	H2114B-3	

For Use with NEMA Size 2, IEC Sizes G – K Only — Series B

75A	28.3	32.6	37.0	41.3	H2115B-3	
	36.6	42.3	48.1	53.8	H2116B-3	
	53.8	60.8	67.9	74.9	H2117B-3	

For Use with Size 5 Starters Only — Series B and IEC P, R and S with 300/5 CT

32A ②	51	61	72	82	H2104B-3	
	77	93	110	126	H2105B-3	
	115	140	164	189	H2106B-3	
	138	167	197	226	H2107B-3	
	203	246	289	—	H2108B-3	

For Use with Size 6 Starters Only — Series B with 600/5 CT

32A ②	154	186	220	252	H2105B-3	
	230	280	329	378	H2106B-3	
	276	335	394	452	H2107B-3	
	406	492	578	—	H2108B-3	

For Use with Size 7 Starters Only — Series B with 1000/5 CT

32A ②	169	204	240	274	H2104B-3	
	256	310	366	420	H2105B-3	
	384	466	543	630	H2106B-3	
	460	558	656	754	H2107B-3	
	676	820	—	—	H2108B-3	

For Use with Size 8 Starters Only — Series B with 1500/5 CT

32A ②	254	306	360	411	H2104B-3	
	384	465	549	630	H2105B-3	
	576	699	822	945	H2106B-3	
	690	837	984	1131	H2107B-3	
	1014	1230	—	—	H2108B-3	

② Sizes 5 – 8 and IEC P – S use the 32A overload relay with current transformers.

Note: Heater packs are shipped 3 to a carton. Catalogue Numbers are for 3 heater packs.

B

Accessories

Auxiliary Contacts

NEMA Sizes 00 – 2 — IEC Sizes A – K

The auxiliary contacts listed below are designed for installation on Freedom Series starters and contactors. Snap-on design facilitates quick, easy installation.

B These bifurcated design contact blocks, featuring silver cadmium alloy contacts, are well suited for use in very low energy (logic level) circuits.



Side Mounted



Top Mounted

Table B-267. Selection Product

Description	Contact Configuration Code ^①	Catalogue Number	Price
Side Mounted			
1NO	10	C320KGS1	
1NO (Logic Level)	10	C320KGS1L	
1NC	01	C320KGS2	
1NO-1NC	11	C320KGS3	
1NO-1NC (Logic Level)	11	C320KGS3L	
2NO	20	C320KGS4	
2NO (Logic Level)	20	C320KGS4L	
2NC	02	C320KGS5	
1NO-1NCI	N/A	C320KGS6	
1NO (EC)-1NC (LO)	N/A	C320KGS7	
1NCI	N/A	C320KGS8	
Top Mounted			
1NO	10	C320KGT1	
1NC	01	C320KGT2	
1NO-1NC	11	C320KGT3	
1NO-1NC (Logic Level)	11	C320KGT3L	
2NO	20	C320KGT4	
2NC	02	C320KGT5	
1NO-1NCI	N/A	C320KGT6	
1NO (EC)-1NC (LO)	N/A	C320KGT7	
1NCI	N/A	C320KGT8	
3NO	30	C320KGT9	
2NO-1NC	21	C320KGT10	
1NO-2NC	12	C320KGT11	
3NC	03	C320KGT12	
4NO	40	C320KGT13	
3NO-1NC	31	C320KGT14	
2NO-2NC	22	C320KGT15	
2NO-2NC (Logic Level)	22	C320KGT15L	
1NO-3NC	13	C320KGT16	
4NC	04	C320KGT17	
3NO-1NCI	N/A	C320KGT18	
2NO-1NCI-1NC	N/A	C320KGT19	
2NO-1NO (EC)-1NC (LO)	N/A	C320KGT20	
1NO-1NC-1NO (EC)-1NC (LO)	N/A	C320KGT21	

Note: NCI = Normally Closed early opening designed for use in reversing applications. EC = Early Closing. LO = Late Opening.

^① For reference only — not part of Catalogue Number. See above right.

Contact Configuration Code

This two-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

NEMA Sizes 3 – 8 — IEC Sizes L – S

Table B-268. Product Selection

Circuit	Contact Configuration Code ^②	Catalogue Number	Price
---------	---	------------------	-------

Base Auxiliary Contacts — NEMA Sizes 3 – 5, IEC Sizes L – S

Circuit	Contact Configuration Code	NEMA Size 3 IEC Sizes L – N	NEMA Sizes 4 – 5 IEC Sizes P – S	Price
		C320KGS31	C320KGS41	

Auxiliary Contacts — NEMA Sizes 3 – 5, IEC Sizes L – S

Circuit	Contact Configuration Code	Catalogue Number	Price
		C320KGS20 C320KGS21 C320KGS22	

Auxiliary Contacts — NEMA Sizes 6 – 8

Circuit	Contact Configuration Code	Size	Catalogue Number	Price
		NEMA 8 NEMA 6 – 7	C320KA5 C320KA6 C320KA8	

^② For reference only — not part of Catalogue Number. See above.

^③ NO-NC occupies two positions — L2 and L3, or R2 and R3. See next page.



*Base Auxiliary Contact
Cat. No. C320KGS42*



*Auxiliary Contact
Cat. No. C320KGS22*

Auxiliary Contact Location

NEMA Sizes 00 – 2, IEC Sizes A – K

The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor or starter and their locations.

Table B-269. Auxiliary Contacts

Catalogue Number	Size	Poles	Available Mounting Positions ①②	
			Open Type	Enclosed
AE16	A – K	3	T1, L1	L1
AN16	00	3	T1, L1, R1	L1
	0 – 2	3	T1, L1	L1
AE56	A – K	3	L1, R1	L1, R1
AN56	00 – 2	3	T1, T2	—
CE15	A – C	2 – 4	T1, L1, R1	L1, R1
	D – K	3	T1, L1	L1
	G – J	4	T1, R1	—
	G – J	5	T1	—
CN15	00	2 – 4	T1, L1, R1	L1
	0 – 2	2 – 3	T1, L1	L1
	1, 2	4	T1, L1	—
	1, 2	5	T1, L1	—
CN35	10A	2 – 4	T1, L1, R1	L1
	20 – 60A	2 – 3	T1, L1	L1
	60A	4	T1, L1	—
	60A	5	T1, L1	—
CE55	A – K	3	L1, R1	L1, R1
CN55	00 – 2	3	T1, T2	—

① Available positions on contactors or starters other than what is factory installed.

② When a pneumatic timer is mounted on contactor, only side mounted auxiliary contact positions are available. The solid-state timer, when added, takes up side mounted auxiliary contact position.

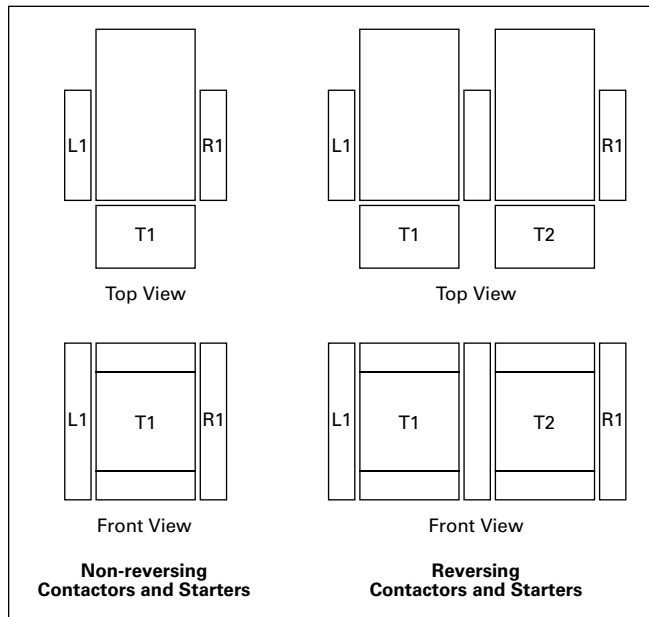


Figure B-158. Auxiliary Contact Location

NEMA Sizes 3 – 8, IEC Sizes L – S

The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor and their locations.

Note: A Base Auxiliary Contact must be added in position R1 before additional auxiliary contacts can be mounted on NEMA Size 3 and IEC Sizes L – N, or in L1 on NEMA Sizes 4 – 5 and IEC Sizes P – S.

Table B-270. Auxiliary Contacts

Size	Available Mounting Positions ③
NEMA Size 3, IEC Sizes L – N	R2, R3, L1, L2, L3
NEMA Sizes 4 – 5, IEC Sizes P – S	L2, L3, R1, R2, R3
NEMA Sizes 6 – 7	R1
NEMA Size 8	L2, R2

③ Available positions on contactors or starters other than what is factory installed.

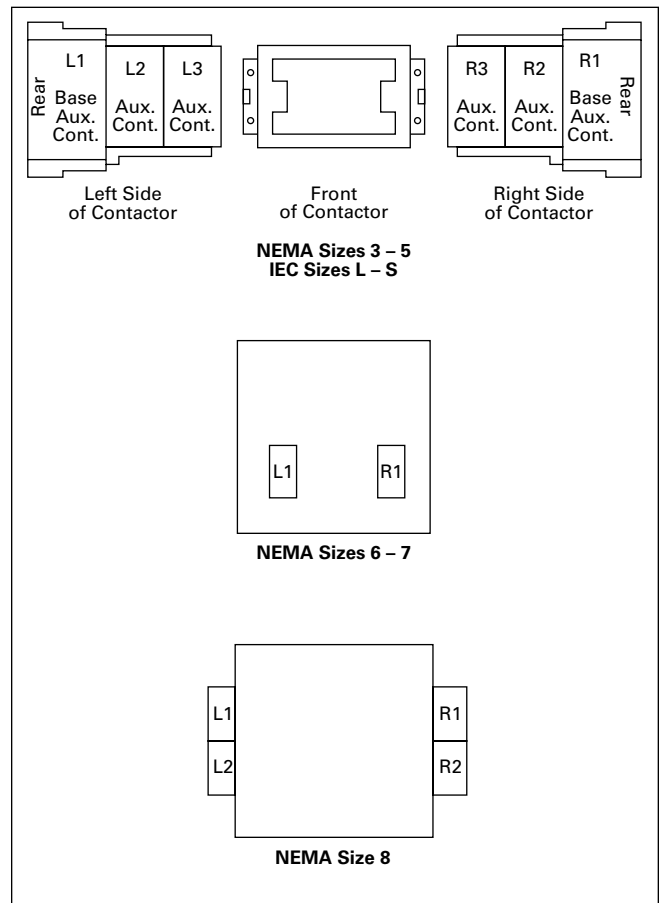


Figure B-159. Auxiliary Contact Location

B

Accessories

DC Magnet Coils

When Ordering Specify

Conversion Kit for Field Assembly

- Catalogue Number

Factory Installed DC Coil

- For factory installed DC magnet coil on AC contactors or non-combination starters (open type only), substitute the Code Suffix from table below for the magnet coil identifier in the device Catalogue Number.

EXAMPLE: For Size 0 AC contactor with a 24V DC coil, change CN15BN3AC to CN15BN3T1C.

Application

- Connect for separate control
- Not for use with cover control switch operators
- Use twin break, heavy-duty pilot devices
- Designed for +10%, -20% rated voltage, continuous duty operation

Non-reversing Kit Consists of:

- 1 Encapsulated DC magnet coil
- 1 NCI or NO/NCI side mounted auxiliary contact

Note: These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.

- 2 Blue colored connection wires
- 1 Instruction publication

Operation

These DC coil kits have separate pick-up and seal windings. A **special** (side mounted) early-break NCI auxiliary contact is used to either disconnect the pick-up winding or insert the seal winding in series with the pick-up winding, depending on the frame size of the contactor. DC coil kits come in two styles, a suffix 1 and a suffix 4. The 1 suffix contains only the **special** (side mounted) early break NCI auxiliary contact. The 4 suffix contains a NO contact in the same package as the **special** (side mounted) early-break NCI auxiliary contact.

Note: For NEMA Sizes 00 and 0 and IEC Sizes A – F, contactors July utilize either suffix 1 or 4 DC coil kits; starters July utilize suffix 4 DC coil kits only. For NEMA Sizes 1 and 2 and IEC Sizes G – K, both contactors and starters July utilize a suffix 4 DC coil kit only.

On the above sizes only, when the **special** auxiliary package is mounted on the side of a contactor or starter, **no** standard auxiliary contact July be mounted on the same side.

Note: For NEMA Sizes 3 – 5 and IEC Sizes L – S, the special coil NCI clearing contact is an add-on auxiliary (**must** mount on a base mount auxiliary contact; normally a 1NO). This arrangement will normally account for two of the three contact positions on the side of each contactor or starter.

Table B-271. Product Selection DC Magnet Coils

Contactor or Starter Size		Conversion Data					Complete Conversion Kit			Factory Installed	
NEMA	IEC	Volts	Magnet Coil			NCI Interlock Number	Catalogue Number	Price	Ship Wt. Lbs. (kg)	Code Suffix	Adder
			Coil Number	Amps PU./Seal	Watts PU./Seal						
Non-reversing — Kit includes NCI Side Mounted Auxiliary Contact											
00 and 0 CN35 – A, B, D D15 Relays	A – F	12	9-2988-11	6.4/.28	76.8/3.36	C320KGD1	C335KD3R1		1.0 (.5)	R1	
		24	9-2988-12	3.2/.14	76.8/3.36	C320KGD1	C335KD3T1			T1	
		48	9-2988-13	1.6/.07	76.8/3.36	C320KGD1	C335KD3W1			W1	
		120	9-2988-14	.64/.028	76.8/3.36	C320KGD1	C335KD3A1			A1	
① 00 and 0 CN35 – A, B, D D15 Relays	A – F	12	9-2988-11	6.4/.28	76.8/3.36	C320KGD2 ①	C335KD3R4		1.0 (.5)	R4	
		24	9-2988-12	3.2/.14	76.8/3.36	C320KGD2 ①	C335KD3T4			T4	
		48	9-2988-13	1.6/.07	76.8/3.36	C320KGD2 ①	C335KD3W4			W4	
		120	9-2988-14	.64/.028	76.8/3.36	C320KGD2 ①	C335KD3A4			A4	
1 and 2 CN35 – G	G – K	12	9-2990-1	15.4/.42	185/4.98	C320KGD5	C335KD4R4		1.0 (.5)	R4	
		24	9-2990-2	7.7/.21	185/4.96	C320KGD5	C335KD4T4			T4	
		48	9-2990-3	3.9/.11	185/5.04	C320KGD5	C335KD4W4			W4	
		120	9-2990-4	1.5/.041	185/4.87	C320KGD5	C335KD4A4			A4	
3 CN35 – K	L – N	12	9-3002-1	24/.40	293/4.84	C320KGD3	C335KD5R1		2.0 (.9)	R1	
		24	9-3002-2	12/.20	288/4.75	C320KGD3	C335KD5T1			T1	
		48	9-3002-3	6.1/.097	295/4.67	C320KGD3	C335KD5W1			W1	
		120	9-3002-4	2.5/.038	298/4.57	C320KGD3	C335KD5A1			A1	
4 and 5 CN35 – N, S	P – S	24	9-2026-4	18/.22	400/5.3	C320KGD3	C335KA3T1		2.5 (1.1)	T1B	
		48	9-2026-3	9/.11	400/5.2	C320KGD3	C335KA3W1			W1B	
		120	9-2026-2	3.3/.05	450/5.4	C320KGD3	C335KA3A1			A1B	
		240	9-2026-1	1.7/.02	440/4.9	C320KGD3	C335KA3B1			B1B	

Reversing

00 and 0 CN35 – A, B, D D15 Relays	A – F	12	9-2988-1 ⑤	6.4/.28	76.8/3.36	C320KGD1 ⑤	C335KD3R1 ②⑤	1.0 (0.9)	R1 ③	
		24	9-2988-2 ⑤	3.2/.14	76.8/3.36	C320KGD1 ⑤	C335KD3T1 ②⑤		T1 ③	
		48	9-2988-3 ⑤	1.6/.07	76.8/3.36	C320KGD1 ⑤	C335KD3W1 ②⑤		W1 ③	
		120	9-2988-4 ⑤	.64/.028	76.8/3.36	C320KGD1 ⑤	C335KD3A1 ②⑤		A1 ③	
1 and 2 CN35 – G	G – K	12	9-2990-1 ⑤	15.4/.42	185/4.98	C320KGD3 ⑤	④		R1 ③	
		24	9-2990-2 ⑤	7.7/.21	185/4.96	C320KGD3 ⑤			T1 ③	
		48	9-2990-3 ⑤	3.9/.11	185/5.04	C320KGD3 ⑤			W1 ③	
		120	9-2990-4 ⑤	1.5/.041	185/4.87	C320KGD3 ⑤			A1 ③	

① These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.

② Kit does not include mechanical interlock or crossover wiring. Two NO/NCI top mounted auxiliary contacts are supplied for electrical interlocking.

③ Factory installed DC coils on NEMA contactors and starters include a NO/NC top mounted auxiliary contact on each contactor for electrical interlocking. On IEC contactors and starters, a NC top mounted auxiliary contact is supplied on each contactor for electrical interlocking.

④ Available factory assembled only.

⑤ Two required per reversing assembly.

Discount Symbol MC7

July 2008

Accessories

**Remote Reset Module
(32A Overload Relay)**

The C316RR remote reset module for the C316F, C316S and C316U overload relays allows remote resetting of tripped (32A) overload relays by means of an electrical solenoid attachment which mounts on the side of the overload relay.

Table B-272. Product Selection

Remote Reset Module Operating Voltage	Catalogue Number	Price
24V 50/60 Hz	C316RR1U	
110V 50/60 Hz	C316RR1A	

Metal Mounting Plates



Table B-273. For Use on IEC Style Contactors, Starters and Overload Relays

Application	Catalogue Number	Price
Contactors IEC Sizes A – F IEC Sizes G – K	C321MP1 C321MP2	
Non-reversing Starters IEC Sizes A – F IEC Sizes G – K	C321MP3 C321MP4	
Overload Relays ① 32A 75A	C321MP5 C321MP6	
Reversing Starters IEC Sizes A – F IEC Sizes G – K IEC Sizes L – N	C321MP7 C321MP12 C321MP11	
Reversing Contactors IEC Sizes A – F IEC Sizes G – K IEC Sizes L – N	C321MP8 C321MP9 C321MP13	

① For use with DIN rail and base mounting adapters listed on Page B-214.

Table B-274. Metal Mounting Plates — Approximate Dimensions and Shipping Weights

Catalogue Number	Dimensions in Inches (mm)			Ship Wt. Lbs. (kg)
	Wide	High	Mounting	
C321MP1	2.00 (50.8)	3.88 (98.6)	1.50 x 3.38 (38.1 x 85.9)	.2 (.1)
C321MP2	2.56 (65.0)	5.05 (128.3)	2.00 x 4.50 (50.8 x 114.3)	.4 (.2)
C321MP3	1.80 (45.7)	6.60 (167.6)	6.07 (154.2) ②	.7 (.3)
C321MP4	2.56 (65.0)	8.08 (205.2)	2.00 x 7.63 (50.8 x 193.8)	.6 (.3)
C321MP5	1.77 (45.0)	4.63 (117.6)	4.27 (108.5) ②	.3 (.1)
C321MP6	2.52 (64.0)	5.14 (130.6)	2.00 x 4.59 (50.8 x 116.6)	.4 (.2)
C321MP7	4.20 (106.7)	7.38 (187.5)	3.50 x 6.87 (88.9 x 174.5)	.8 (.4)
C321MP8	4.20 (106.7)	4.35 (110.5)	3.50 x 3.86 (88.9 x 98.0)	.5 (.2)
C321MP9	5.66 (143.8)	5.05 (128.3)	5.25 x 3.63 (133.4 x 92.2)	.8 (.4)
C321MP11	8.70 (221.0)	11.35 (288.3)	7.00 x 10.81 (177.8 x 274.6) ③	1.2 (.5)
C321MP12	5.71 (145.0)	8.08 (205.2)	5.25 x 6.75 (133.4 x 171.5) ③	.9 (.4)
C321MP13	8.70 (221.0)	7.17 (182.1)	7.00 x 6.63 (177.8 x 168.4) ③	.9 (.4)

② 2-hole mounting.

③ 3-hole mounting.

3-Pole Top Mounted Fuse Block Kit

IEC Sizes A – K, NEMA Sizes 00 – 2



Field mount to Freedom Series starters and contactors. Designed to save space and reduce installation costs. They provide short circuit protection for branch circuits.

Table B-275. Selection Product

Fuse Type	Catalogue Number	Price
Class H — 30A 250V	C350KH21	
Class R — 30A 250V	C350KR21	
Class G — 15A 300V	C350KG37	
Class G — 20A 300V	C350KG38	
Class G — 30A 300V	C350KG31	
Class G — 60A 300V	C350KG32	
Class T — 30A 300V	C350KT31	
Class T — 60A 300V	C350KT32	
Class J — 30A 600V	C350KJ61	
Class J — 60A 600V	C350KJ62	
Type M — 30A 600V ④	C350KM61	
Class CC — 30A 600V	C350KC63	
Class T — 30A 600V	C350KT61	
Class T — 60A 600V	C350KT62	

④ Type M fuse block not approved for branch circuit protection.

Discount Symbol **MC7**

B

Accessories

B

Mechanical Interlock and Reversing Kits

Mechanical interlocks and reversing kits are designed for field assembly of reversing contactors or starters from Freedom Series components. The Reversing Kits include a Mechanical Interlock, stabilizer bar and a pre-cut, trimmed and formed wire set. Auxiliary contacts, if required, must be ordered separately. See **Page B-218**.



Cat. No.
C321KM60B



Part No.
23-7165



Wire Set

Table B-276. Reversing Kits (Horizontal Contactor Mounting Only)

Application		Catalogue Number	Price
NEMA Size	IEC Size		
00	A – C	C321KM60K14B C321KM60K13B C321KM60K15B	
0	D – F		
1	—		
2	G – K	C321KM60K16B C321KM60K17 ①	
3	—		
—	L and M	C321KM60K21 ① C321KM60K18 ① C321KM60K19 ① C321KM60K20 ① C321KM60K44 ①	
—	N		
4	—		
5	—		
—	P – S		
—	—		

① Kit includes (2) NC auxiliary contacts.

Table B-277. Mechanical Interlock Only ②③

Application			Catalogue Number	Price
NEMA Size	IEC Size	Contactor Mounting		
00 – 2	A – K	Horizontal	C321KM60B	
3	L – N	Horizontal	C321KM30	
3 to 4	N to P	Horizontal	C321KM43	
4	P – S	Horizontal	C321KM40	
4 to 5	—	Horizontal	C321KM45	
4 to 6	—	Horizontal	C321KM80	
5	—	Horizontal	C321KM50	
5 to 6	—	Horizontal	C321KM56	
6	—	Horizontal	C321KM70	
6 to 7	—	Horizontal	C321KM90	
7	—	Horizontal	C321KM34	
4 or 5 to 5	P – S to 5	Vertical	C321KM55	
5 to 6	—	Vertical	C321KM65	
6	—	Vertical	C321KM66	
6 to 7	—	Vertical	C321KM67	

② Without cross-wiring.

③ For use with latest series product.

Solid-State Timers

Solid-State ON DELAY Timer — Side Mounted on Freedom Series NEMA 00 – 2, IEC A – K and C25D, C25E and C25F Frame



This timer is designed to be **wired in SERIES with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON DELAY timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.

Table B-278. Product Selection — Mounted Timer

Timing Range	Catalogue Number ④⑤⑥	Price
.1 – 1.0 Seconds	C320TDN1_ C320TDN30_ C320TDN300_ C320TDN2000_	
1 – 30 Seconds		
30 – 300 Seconds		
5 – 30 Minutes		

④ Add operating voltage Suffix to Catalogue Number. A = 120V, B = 240V, E = 208V

⑤ Rated .5 ampere pilot duty – not to be used on larger contactors.

⑥ Terminal connections are quick connects only. Two per side.

Shorting Bar Kits

These kits provide phase-to-phase power connections of contactors for field assembly. The kits include bus connections and mounting hardware. The shorting bars connect all three phases of a single contactor.

Table B-279. Product Selection

Description	Catalogue Number	Price
NEMA Size 3, IEC Sizes L – N	C321SB18 C321SB19 C321SB21 C321SB22	
NEMA Size 4, IEC Sizes P – S		
NEMA Size 5		
NEMA Size 6		

Pneumatic Timers — Top Mounted



Attachment mounts on top of any NEMA Size 00 – 2 or IEC Size A – K Freedom Series starter or contactor (top mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has 1NO-1NC isolated timed contacts — circuits in each pole must be the same polarity. Units are convertible from OFF to ON DELAY or vice-versa.

Table B-280. Maximum Ampere Ratings

Description	Volts AC			
	120	240	480	600
Make	30	15	7.5	6
Break	3	1.5	.75	.6

Table B-281. Product Selection


Timing Range	Catalogue Number	Price
.1 to 30 Seconds	C320TP1 C320TP2	
10 to 180 Seconds		

Discount Symbol **MC7**

Locking Cover for Overload Relay — C306 Only

Snap on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial — helps prevent accidental or unauthorized changes to trip and reset setting.

Table B-282. Product Selection

Description	Min. Ordering Qty. (Std. Pkg.)	Catalogue Number	Price
 Clear cover, no accessibility	50	C320PC3	
Gray cover, no accessibility, with Auto only nib	50	C320PC4	
Gray cover, no accessibility, with Manual only nib	50	C320PC5	
Gray cover with FLA dial accessibility, A, B, C, D positions and Auto only nib	50	C320PC6	
Gray cover with FLA dial accessibility, A, B, C, D positions and Manual only nib	50	C320PC7	

Control Circuit Fuse Block



These panel mounted fuse holders, designed for control circuit protection or other similar low current requirements, have extractor type fuse caps. The Class CC rejection type fuses (KTK-R) used in these holders are intended for use with equipment designated as being suitable for use on systems having high available fault currents. If branch circuit protective device is 45A or greater, C320FBR fuse kit July be required for control circuit protection per NEC 430-72.

Table B-283. Product Selection

Type	Max. Amperes	Catalogue Number	Price
Fuse Holder Only	15 30	C320FB ① C320FBR ②	

- ① A fuse is not supplied, but holder will accept a Bussman Type KTK or KTK-R (13/32" x 1-1/2") fuse, 600V maximum.
- ② Includes a 5A, 600V KTK-R fuse.

DIN Rail Mounting Channel — 35 mm

Designed for DIN rail mounting of IEC style contactors and starters.



DIN Rail

Table B-284. Product Selection

Description	Catalogue Number	Price
1 Meter Length	MC382MA1	

Finger Protection Shields

Snap-on shields for both contactors and starters provide IEC Type IP20 Finger Protection. Prevents accidental contact with line/load terminals.

Table B-285. Product Selection

Application	Catalogue Number	Price
NEMA Size 00, IEC Sizes A – C	C320LS1	
NEMA Size 0, IEC Sizes D – F	C320LS2	
NEMA Sizes 1 – 2, IEC Sizes G – K Contactors Reversing Contactors	C320LS3 C320LS4	
NEMA Size 1 Starters Reversing Starters	C320LS5 C320LS6	
NEMA Size 2, IEC Sizes G – K Starters Reversing Starters	C320LS7 C320LS8	

Adapter to DIN Rail Mount

NEMA 1 – 2 and IEC G – K Contactors
Designed to allow DIN rail mounting of NEMA 1 – 2 and IEC G – K contactors. Includes all hardware required to convert contactors from panel mounting to 35 mm DIN rail mounting.

Table B-286. Product Selection

Catalogue Number	Price
C320DN65	

Transient Suppressor Kits

NEMA Sizes 00 – 2, IEC Sizes A – K



Cat. No. C320TS2

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24 – 120V, 208 – 240V or 277 – 480V coils respectively.

These devices mount directly to the coil terminals of Freedom Series contactors or starters NEMA Sizes 00 – 2, IEC Sizes A – K and lighting contactors 10 – 60A. Reversing devices will require two.

Table B-287. Product Selection

Description	Coil Voltage 50/60 Hz ③	Catalogue Number	Price
Transient Suppressor	24 – 120V 208 – 240V 277 – 480V	C320TS1 C320TS2 C320TS3	

- ③ Suppressor is compatible with coil voltages/ranges as shown, 50 and 60 Hz.

NEMA Sizes 3 – 5, IEC Sizes L – S



This device mounts on top of any side mounted auxiliary contact on Freedom Series NEMA Sizes 3 – 5, IEC Sizes L – S and lighting contactors 100 – 300A. It connects across coil terminals on any 120V contactor or starter magnet coil (reversing starters or contactors require 2).

Limits high voltage transients produced in the circuit when power is removed from the coil.

Table B-288. Product Selection

Description	Coil Voltage	Catalogue Number	Price
Transient Suppressor	120V	C320AS1	

Accessories

DC/AC Interface Module



**Cat. No.
C320DC**

The Catalogue Number C320DC Interface Module is an optically isolated solid-state switch which provides a means of operating AC coils with a 5 – 48V DC control signal. It acts as a space saving interposing relay which

can switch a specified 50/60 Hz AC source to the contactor or starter coil.

The module may be directly attached to the coil terminals of any Freedom Series contactor or starter – NEMA Sizes 00 – 3, IEC Sizes A – N and lighting contactors 10 – 100A. It also has provisions for DIN rail mounting.

The module will operate coils within the voltage ranges shown below.

Design Characteristics

- DC Input: 5 – 48V DC ±10% at mA nominal
- AC Operating Voltage: 240V AC max. (360 VA) ±10% 50/60 Hz
- DC Operating Voltage: 30V DC max. (5A)
- AC Current Rating:
 - 10A make (inrush)
 - 1A break (sealed)

Table B-289. Controller Coil Voltage Ranges

Controller Catalogue Number Prefix	Controller Size or Rating	Coil Range Volts AC
AE16, AE17, AE56, AE57, CE15, CE55	A – F G – K L – N	24 – 240 48 – 240 110 – 240
AN16, AN56, CN15, CN55	00 – 0 1 – 2 3	24 – 240 48 – 240 110 – 240
CN35	10 – 30A 60A 100A	24 – 240 48 – 240 110 – 240

Table B-290. Product Selection

Coil Voltage	Catalogue Number	Price
6V DC	C320DC2V6	
9V DC	C320DC2V9	
12V DC	C320DC2V12	
24V DC	C320DC2V24	
48V DC	C320DC2V48	

Adhesive Dust Cover

NEMA Sizes 00 – 2, IEC Sizes A – K

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom NEMA Sizes 00 – 2 and IEC Sizes A – K. Adhesive covers are easily applied to side opening where auxiliaries are not installed

and provide extra protection from metal filings and other debris.

Table B-291. Product Selection

Catalogue Number	Price
C320DSTCVR (25 to a package)	

Add-On Power Pole Kit

NEMA Sizes 00 – 2, IEC A – K

This device mounts on the side of Freedom NEMA Size 00 – 2 and IEC Size A – K contactors. One unit can be mounted on each side and carries UL, cUL and IEC ratings. The device is rated for resistive, inductive and lighting applications.

Table B-292. Product Selection — Add-On Power Pole Kit

UL Ampere Rating						IEC 947 Ampere Rating			1NO Power Pole Catalogue Number	Price
Inductive 600V	Resistive 600V	hp 1-Phase		Locked Rotor 240V	Lighting Ballast Tungsten 480V	AC-1 600V	AC-3 600V	AC-5a AC-5b 480V		
		115V	230V							
15	20	1/2	2	96	20	20	12	18	C320PPD10	

Discount Symbol **MC7**

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Renewal Parts

Table B-293. For Catalogue Numbers AE16, AE17, AE56, AE57, CE15 and CE55 — IEC Frames A – F

Description	IEC Frames A – F		IEC Frames A – C ①		Price	IEC Frames D – F ①		Price
	Series A1	Part No.	Series B1	Series C1		Series B1	Series C1	
	Part No.		Part No.	Part No.		Part No.		
Renewal Parts Publication Number	None		None	None		None	None	

Contact Kits

2-Pole	②		②	②		②	②	
3-Pole	②		②	②		②	②	
4-Pole	②		②	②		②	②	
5-Pole	②		②	②		②	②	

Magnet Coils

Coil Suffix

120V 60 Hz or 110V 50 Hz	A	②		9-2875-1	9-2875-1		9-2876-1	9-2876-1	
240V 60 Hz or 220V 50 Hz	B	②		9-2875-2	9-2875-2		9-2876-2	9-2876-2	
480V 60 Hz or 440V 50 Hz	C	②		9-2875-3	9-2875-3		9-2876-3	9-2876-3	
600V 60 Hz or 550V 50 Hz	D	②		9-2875-4	9-2875-4		9-2876-4	9-2876-4	
208V 60 Hz	E	②		9-2875-5	9-2875-5		9-2876-5	9-2876-5	
277V 60 Hz	H	②		9-2875-12	9-2875-12		9-2876-12	9-2876-12	
208/240V 60 Hz	J	—		9-2875-37	9-2875-37		9-2876-37	9-2876-37	
240V 50 Hz	K	②		9-2875-11	9-2875-11		9-2876-11	9-2876-11	
380 – 415V 50 Hz	L	②		9-2875-6	9-2875-6		9-2876-6	9-2876-6	
24V 60 Hz – 24V 50 Hz	T	—		9-2875-36	9-2875-36		9-2876-36	9-2876-36	
24V 60 Hz	T	②		—	—		—	—	
24V 50 Hz	U	②		9-2875-13	9-2875-13		9-2876-13	9-2876-13	
32V 50 Hz	V	②		9-2875-16	9-2875-16		9-2876-16	9-2876-16	
48V 60 Hz	W	②		9-2875-8	9-2875-8		9-2876-8	9-2876-8	
48V 50 Hz	Y	②		9-2875-9	9-2875-9		9-2876-9	9-2876-9	

Overload Relays

For replacement on existing starters: 3-Pole — Ambient									
Compensated Bimetallic	C306DN3B		C306DN3B	C306DN3B		C306DN3B	C306DN3B		

Current Transformer

Transformer	—		—	—		—	—		
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Magnet Frame Armature

Lower Magnet Frame	②		②	②		②	②		
Upper Magnet Frame	②		②	②		②	②		

- ① Non-encapsulated coils.
- ② Replace with complete contactor.

B

Discount Symbol **MC17**

Renewal Parts

Note: For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

Table B-294. For Catalogue Numbers AE16, AE17, AE56, AE57, CE15 and CE55 — IEC Frames G and H

Description	IEC Frame G		Price	IEC Frame H		Price
	Series A1	Series B1		Series A1	Series B1	
	Part No.	Part No.		Part No.	Part No.	
Renewal Parts Publication Number	20862	22178		20862	22178	

B

Contact Kits

2-Pole	6-65-3	6-65-3		6-65-5	6-65-5	
3-Pole	6-65-4	6-65-4		6-65-6	6-65-6	
4-Pole	6-65-11	6-65-11		6-65-13	6-65-13	
5-Pole	6-65-12	6-65-12		6-65-14	6-65-14	

Magnet Coils

Coil Suffix

120V 60 Hz or 110V 50 Hz	A	9-2703-1	9-2703-1		9-2703-1	9-2703-1	
240V 60 Hz or 220V 50 Hz	B	9-2703-2	9-2703-2		9-2703-2	9-2703-2	
480V 60 Hz or 440V 50 Hz	C	9-2703-3	9-2703-3		9-2703-3	9-2703-3	
600V 60 Hz or 550V 50 Hz	D	9-2703-4	9-2703-4		9-2703-4	9-2703-4	
208V 60 Hz	E	9-2703-9	9-2703-9		9-2703-9	9-2703-9	
277V 60 Hz	H	9-2703-7	9-2703-7		9-2703-7	9-2703-7	
240V 50 Hz	K	9-2703-14	9-2703-14		9-2703-14	9-2703-14	
380 – 415V 50 Hz	L	9-2703-8	9-2703-8		9-2703-8	9-2703-8	
24V 60 Hz – 24V 50 Hz	T	—	—		—	—	
24V 60 Hz	T	9-2703-6	9-2703-6		9-2703-6	9-2703-6	
24V 50 Hz	U	9-2703-12	9-2703-12		9-2703-12	9-2703-12	
32V 50 Hz	V	9-2703-10	9-2703-10		9-2703-10	9-2703-10	
48V 60 Hz	W	9-2703-11	9-2703-11		9-2703-11	9-2703-11	
48V 50 Hz	Y	9-2703-13	9-2703-13		9-2703-13	9-2703-13	

Overload Relays

For replacement on existing starters: 3-Pole — Ambient Compensated Bimetallic	C306GN3B	C306GN3B		C306GN3B	C306GN3B	
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Current Transformer

Transformer	—	—		—	—	
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Magnet Frame Armature

Lower Magnet Frame	17-18200	17-18200		17-18200	17-18200	
Upper Magnet Frame	48-1936	48-1936		48-1936	48-1936	

Discount Symbol **MC17**

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Renewal Parts

Note: For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

Table B-295. For Catalogue Numbers AE16, AE17, AE56, AE57, AE800, CE15 and CE55 — IEC Frames J and K

Description	IEC Frame J		Price	IEC Frame K		Price
	Series A1	Series B1		Series A1	Series B1	
	Part No.	Part No.		Part No.	Part No.	
Renewal Parts Publication Number	20862	22178		20862	22178	

Contact Kits

2-Pole	6-65-7	6-65-7		6-65-18	6-65-18	
3-Pole	6-65-8	6-65-8		6-65-19	6-65-19	
4-Pole	6-65-15	6-65-15		—	—	
5-Pole	6-65-16	6-65-16		—	—	

Magnet Coils

Coil Suffix

120V 60 Hz or 110V 50 Hz	A	9-2703-1	9-2703-1		9-2703-1	9-2703-1	
240V 60 Hz or 220V 50 Hz	B	9-2703-2	9-2703-2		9-2703-2	9-2703-2	
480V 60 Hz or 440V 50 Hz	C	9-2703-3	9-2703-3		9-2703-3	9-2703-3	
600V 60 Hz or 550V 50 Hz	D	9-2703-4	9-2703-4		9-2703-4	9-2703-4	
208V 60 Hz	E	9-2703-9	9-2703-9		9-2703-9	9-2703-9	
277V 60 Hz	H	9-2703-7	9-2703-7		9-2703-7	9-2703-7	
240V 50 Hz	K	9-2703-14	9-2703-14		9-2703-14	9-2703-14	
380 – 415V 50 Hz	L	9-2703-8	9-2703-8		9-2703-8	9-2703-8	
24V 60 Hz – 24V 50 Hz	T	—	—		—	—	
24V 60 Hz	T	9-2703-6	9-2703-6		9-2703-6	9-2703-6	
24V 50 Hz	U	9-2703-12	9-2703-12		9-2703-12	9-2703-12	
32V 50 Hz	V	9-2703-10	9-2703-10		9-2703-10	9-2703-10	
48V 60 Hz	W	9-2703-11	9-2703-11		9-2703-11	9-2703-11	
48V 50 Hz	Y	9-2703-13	9-2703-13		9-2703-13	9-2703-13	

Overload Relays

For replacement on existing starters: 3-Pole — Ambient Compensated Bimetallic	C306GN3B	C306GN3B		C306GN3B	C306GN3B	
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Current Transformer

Transformer	—	—		—	—	
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Magnet Frame Armature

Lower Magnet Frame	17-18200	17-18200		17-18200	17-18200	
Upper Magnet Frame	48-1936	48-1936		48-1936	48-1936	

B

Discount Symbol MC17

Renewal Parts

Note: For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

Table B-296. For Catalogue Numbers AE16, AE17, AE56, AE57, AE800, CE15 and CE55 — IEC Frames L – N

Description	IEC Frame L	Price	IEC Frame M	Price	IEC Frame N	Price
	Part No.		Part No.		Part No.	
Renewal Parts Publication Number	20427		20427		20427	

Contact Kits

2-Pole	6-43-3		6-43		6-43-5	
3-Pole	6-43-4		6-43-2		6-43-6	
4-Pole	—		—		—	
5-Pole	—		—		—	

Magnet Coils

Coil Suffix

120V 60 Hz or 110V 50 Hz	A	9-2756-1		9-2756-1		9-2756-1
240V 60 Hz or 220V 50 Hz	B	9-2756-2		9-2756-2		9-2756-2
480V 60 Hz or 440V 50 Hz	C	9-2756-3		9-2756-3		9-2756-3
600V 60 Hz or 550V 50 Hz	D	9-2756-4		9-2756-4		9-2756-4
208V 60 Hz	E	9-2756-5		9-2756-5		9-2756-5
277V 60 Hz	H	9-2756-9		9-2756-9		9-2756-9
240V 50 Hz	K	9-2756-13		9-2756-13		9-2756-13
380 – 450V 50 Hz	L	—		—		—
340V 60 Hz	L	9-2756-12		9-2756-12		9-2756-12
415V 60 Hz	M	9-2756-8		9-2756-8		9-2756-8
550V 50 Hz	N	9-2756-14		9-2756-14		9-2756-14
24V 60 Hz – 24V 50 Hz	T	—		—		—
24V 60 Hz	T	9-2756-6		9-2756-6		9-2756-6
24V 50 Hz	U	9-2756-11		9-2756-11		9-2756-11
32V 50 Hz	V	9-2756-10		9-2756-10		9-2756-10
48V 60 Hz	W	9-2756-15		9-2756-15		9-2756-15
48V 50 Hz	Y	9-2756-7		9-2756-7		9-2756-7

Overload Relays

For replacement on existing starters: 3-Pole — Ambient Compensated Bimetallic	10-6530		10-6530-2		10-6530-3	
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Current Transformer

Transformer	—		—		—	
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Magnet Frame Armature

Lower Magnet Frame	17-8955-2		17-8955-2		17-8955-2	
Upper Magnet Frame	48-1902		48-1902		48-1902	

Discount Symbol **MC17**

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Renewal Parts

Note: For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

Table B-297. For Catalogue Number CE15 Contactors — IEC Frames P – S

Description	IEC Frame P	Price	IEC Frame R	Price	IEC Frame S	Price
	Part No.		Part No.		Part No.	
Renewal Parts Publication Number	22278		22278		22278	
Contact Kits	Size	6-294	6-288		6-286	

Magnet Coils

Coil Suffix

120V 60 Hz or 110V 50 Hz	A	9-1891-1		9-1891-1		9-1891-1	
200V 50 Hz or 118V 60 Hz	E	—		—		—	
240V 60 Hz or 220V 50 Hz	B	9-1891-2		9-1891-2		9-1891-2	
254V 50 Hz or 277V 60 Hz	H	—		—		—	
380V 50 Hz or 415V 60 Hz	L	—		—		—	
480V 60 Hz or 440V 50 Hz	C	9-1891-3		9-1891-3		9-1891-3	
600V 60 Hz or 550V 50 Hz	D	9-1891-4		9-1891-4		9-1891-4	
208V 60 Hz	E	9-1891-13		9-1891-13		9-1891-13	
277V 60 Hz	H	9-1891-26		9-1891-26		9-1891-26	
240V 50 Hz	K	9-1891-20		9-1891-20		9-1891-20	
380V 50 Hz	L	9-1891-14		9-1891-14		9-1891-14	
415V 50 Hz	M	9-1891-21		9-1891-21		9-1891-21	
24V 60 Hz	T	9-1891-15		9-1891-15		9-1891-15	

Overload Relays — Reference C316 Overload Relays

Magnet Frame Armature

Lower Magnet Frame	48-1030		48-1030		48-1030	
Upper Magnet Frame	48-1029-2		48-1029-2		48-1029-2	

B

Discount Symbol **MC17**

15 Series — Freedom 600V Multipole

D15 Series — Freedom 600V Multipole

B



4-Pole Relay



4-Pole Relay with Front Contact Pole Deck Assembled

Product Description

Contact poles on the D15 relay are of the fixed design and are not convertible. The basic 4-pole relay will accept a front-mounted contact pole deck and/or side-mounted contact blocks (one per side). In addition, a side-mounted solid-state timer or a front-mounted pneumatic timer can be added to the relay. Only one front-mounted attachment can be added to the basic relay.

Application Description

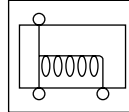
Side-mounted contact blocks can be used to provide additional poles in applications where a pneumatic timer is installed on the front of the relay. They can also be used where panel depth is restricted.

The maximum number of contacts recommended per relay is 8, 6 of which can be NC. When a pneumatic timer is used, the maximum recommended number of NC contacts is 3.

Relays with DC coils are supplied with a coil clearing NC contact mounted on the side of the relay.

Features

- 600V, 10A continuous thermal current
- State indicator visually shows relay ON or OFF status
- Relay base has mounting holes on 35 x 60 mm centers, permitting direct replacement of competitive relays
- Relay also mounts on 35 mm DIN rail as standard
- Magnet coil has three terminals, permitting either top or diagonal wiring — easy to replace European or U.S. relays without changing wiring layout
- Contact pole terminals have captive, backed-out, self-lifting pressure plates with ± screws — reduced wiring time
- All terminals are shrouded or “finger-proofed” to reduce possibility of electrical shock
- Designed to meet or exceed UL, NEMA, IEC, CSA, VDE, BS and other international standards



Standards and Certifications



Terminal Marking

Relay terminals are identified by a two digit number in accordance with International Standards approved by CEN-ELEC (European Committee for Electrotechnical Standardization). The number is marked on the relay and is used to identify location and status of the contacts.

The first digit indicates the location of the contact on the relay. The numbering begins with 1 and continues without a break from left to right.

The second digit indicates the status of the contacts (NO or NC). Terminal marking 1 and 2 mean NC and 3 and 4 mean NO.

Example of marking with 2NO and 2NC contacts:

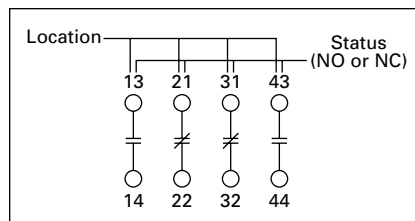


Figure B-160. Terminal Marking

Technical Data

Table B-298. Contact Ratings

NEMA A600		
Continuous Thermal Rating: 10A		
AC Volts	Make	Break
120	60	6.0
240	30	3.0
480	15	1.5
600	12	1.2

NEMA P300	
Continuous Thermal Rating: 5A	
DC Volts	Make/Break Amperes
125	1.1
250	0.55

Table B-299. Magnet Coil Data

AC Voltage	Pick-Up		Sealed	
	VA	Watts	VA	Watts
12 – 600V	80	49	7.5	2.4

DC Voltage	Pick-Up		Sealed	
	Amps	Watts	VA	Watts
12	6.4	76.8	0.28	3.36
24	3.2	76.8	0.14	3.36
48	1.6	76.8	0.07	3.36
120	0.64	76.8	0.028	3.36

Accessories

Pneumatic Timer Attachment

Attachment mounts on top of any Freedom Series relay (top-mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has DPST timed contacts — circuits in each pole must be the same polarity. Units are convertible from OFF to ON Delay or vice-versa.



C320 Pneumatic Timer Attachment

Table B-300. Pneumatic Timer Attachment

Timing Range	catalogue Number	Price
0.1 to 30 Seconds 10 to 180 Seconds	C320TP1 C320TP2	

Table B-301. Maximum Ampere Ratings

Description	Volts AC			
	120	240	480	600
Make	30	15	7.5	6
Break	3	1.5	0.75	0.6

Discount Symbol MC7

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D15 Series — Freedom 600V Multipole

Finger Protection Shields

Snap-on shields for both contactors and starters provide IEC Type IP20 Finger Protection. Prevents accidental contact with line/load terminals.

Table B-302. Finger Protection Shields

Application	Catalogue Number	Price
D15	C320LS1	

Adhesive Dust Cover

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom D15. Adhesive covers are easily applied to side opening where auxiliaries are not installed and provide extra protection from metal filings and other debris.

Table B-303. Adhesive Dust Cover

Catalogue Number	Price
C320DSTCVR (25 to a package)	

Solid-State ON DELAY Timer — Side Mounted on Freedom Series NEMA 00 – 2, D15, IEC A – K and C25D, C25E and C25F Frame

This timer is designed to be **wired in series with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON Delay timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.



Solid-State Timer

Table B-304. Mounted Timer

Timing Range	Catalogue Number ^{①②}	Price
0.1 – 1.0 Seconds	C320TDN1_	
1 – 30 Seconds	C320TDN30_	
30 – 300 Seconds	C320TDN300_	
5 – 30 Minutes	C320TDN3000_	

① Add operating voltage Suffix to catalogue Number. A = 120V, B = 240V, E = 208V

② Rated 0.5 ampere pilot duty — not to be used on larger contactors.

Terminal connections are quick connects only. Two per side.

Metal Mounting Plate

Fits all D15 Multipole Relays.



Table B-305. Mounting Plate

Description	Catalogue Number	Price
Metal Mounting Plate	C321MP1	

Mounting Channel (DIN Rail)

Designed for DIN rail mounting of Freedom Series relays.



DIN Rail

Table B-306. Mounting Channel (DIN Rail)

Description	Catalogue Number	Price
1 Meter Length	MC382MA1	

Transient Suppressor Kits

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24 – 120V, 208 – 240V or 277 – 480V coils respectively.



Cat. No. C320TS2

These devices mount directly to the coil terminals.

Table B-307. Transient Suppressor Kits

Description	Coil Voltage 50/60 Hz ^③	Catalogue Number	Price
Transient Suppressor	24/120V 208/240V 277/480V	C320TS1 C320TS2 C320TS3	

③ Suppressor is compatible with coil voltages/ ranges as shown, both 50 and 60 Hz.

Identification Markers



Identification Marker

Designed to snap-on the face of contactor for easy, personalized identification of individual devices. Includes holder and labels.

Table B-308. Identification Markers

Description	Catalogue Number	Price
Identification Marker (Pack of 100)	C320DL2	

B

Discount Symbol **MC7**

D15 Series — Freedom 600V Multipole

Dimensions

Table B-309. Approximate Dimensions in Inches (mm) and Shipping Weights.

Description	Dimension C in Inches (mm)	Shipping Weights Lbs. (kg)
Relay Only	3.30 (83.8)	1.3 (0.6)
Relay with Timer Attachment	5.55 (141.0)	1.5 (0.7)
Relay with Front Contact Pole Deck	4.66 (118.4)	1.7 (0.8)

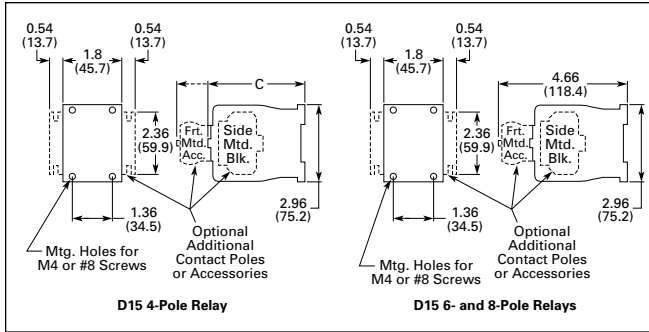


Figure B-161. Approximate Dimensions in Inches (mm)



Product Selection

When Ordering Specify

- Catalogue Number and Magnet Coil Code Letter. Example For a 4-pole relay having 4NO contacts with a 120V 60 Hz coil, order Catalogue Number D15CR40AB.

Table B-310. Factory Assembled Multipole Relays

Number of Poles	Type of Contacts		Open Type Catalogue Number ^①	Price
	NO	NC		
4	4	0	D15CR40_B	
	3	1	D15CR31_B	
	2	2	D15CR22_B	
	1	3	D15CR13_B	
	0	4	D15CR04_B	
6 (4-Pole Relay with 2-Pole Front-Mounted Deck)	6	0	D15CR60_B	
	5	1	D15CR51_B	
	4	2	D15CR42_B	
	3	3	D15CR33_B	
	2	4	D15CR24_B	
	1	5	D15CR15_B ②	
	0	6	D15CR06_B ②	
8 (4-Pole Relay with 4-Pole Front-Mounted Deck)	8	0	D15CR80_B	
	7	1	D15CR71_B	
	6	2	D15CR62_B	
	5	3	D15CT53_B	
	4	4	D15CR44_B	
	3	5	D15CR35_B ②	
	2	6	D15CR26_B ②	

- ① Underscore indicates missing code suffix for magnet coil — see Selection Table below.
- ② Not all Suffix Codes available: consult Customer Support Centre.

Table B-311. Additional Contact Poles

Description	Catalogue Number	Price
Front Contact Pole Deck		
1NO-1NC	C320KGT3	
2NO	C320KGT4	
2NC	C320KGT5	
1NO (E.C.) – 1NC (L.O.)	C320KGT7	
4NO	C320KGT13	
3NO-1NC	C320KGT14	
2NO-2NC	C320KGT15	
1NO-3NC	C320KGT16	
4NC	C320KGT17	
Side-Mounted Contact Blocks		
1NO-1NC	C320KGS3	
2NO	C320KGS4	
2NC	C320KGS5	
1NO (E.C.) – 1NC (L.O.)	C320KGS7	

E.C. = Early Closing L.O. = Late Opening

Table B-312. Magnet Coil Selection Table

AC Coils Volts and Hertz	Code Suffix	AC Coils Volts and Hertz	Code Suffix	DC Coils Volts	Code Suffix
120/60 or 110/50	A	208/60	E	12	R1
240/60 or 220/50	B	277/60	H	24	T1
480/60 or 440/50	C	208 – 240/60	J	48	W1
600/60 or 550/50	D	24/60	T	120	A1

Discount Symbol MC7