March 2002

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Note: Supplement to Publication No. CA08102001E.

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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

- Standard: Designed to meet or exceed UL, NEMA 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
- NEMA Certification, CN60947-4-1
- CSA Elevator Ratings
- CE
- NEMA ICS1, ICS2, ICS5

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.

Instructional Leaflets

50100	*IT.* NEMA Overload Relay Setup and Troubleshooting Manual
50200	*IT.* NEMA Contactor and Starter User Manual
49400	*IT.* IEC Contactor and Starter User Manual
50102	*IT.* NEMA Overload Relay Quick Setup Guide
50140	*IT.* NEMA Non-reversing Contactor Size 00 and 0 Installation Guide
50150	*IT.* NEMA Non-reversing Contactor Size 1 Installation Guide
50160	*IT.* NEMA Non-reversing Contactor Size 2 Installation Guide
50170	*IT.* NEMA Non-reversing Contactor Size 3 and 4 Installation Guide
50180	*IT.* NEMA Non-reversing Contactor Size 5 Installation Guide
50141	*IT.* NEMA Reversing Contactor Size 00 and 0 Installation Guide
50151	*IT.* NEMA Reversing Contactor Size 1 Installation Guide
50161	*IT.* NEMA Reversing Contactor Size 2 Installation Guide
50171	*IT.* NEMA Reversing Contactor Size 3 and 4 Installation Guide
50181	*IT.* NEMA Reversing Contactor Size 5 Installation Guide
50142	*IT.* NEMA Non-reversing Starter Size 00 and 0 Installation Guide
50152	*IT.* NEMA Non-reversing Starter Size 1 Installation Guide
50162	*IT.* NEMA Non-reversing Starter Size 2 Installation Guide
50172	*IT.* NEMA Non-reversing Starter Size 3 and 4 Installation Guide
50182	*IT.* NEMA Non-reversing Starter Size 5 Installation Guide
50143	*IT.* NEMA Reversing Starter Size 00 and 0 Installation Guide
50153	*IT.* NEMA Reversing Starter Size 1 Installation Guide
50163	*IT.* NEMA Reversing Starter Size 2 Installation Guide
50173	*IT.* NEMA Reversing Starter Size 3 and 4 Installation Guide
50183	*IT.* NEMA Reversing Starter Size 5 Installation Guide

For copies of these and other publications, contact the Literature Fulfillment Center at 800-957-7050, Fax: 877-840-2371 or find on-line at: www.cutler-hammer.eaton.com/it.

For International, call: (630) 377-9798 (English only), Fax: (630) 377-1753.

E-mail: wcsorders@wallace.com

Mail: Cutler-Hammer Fulfillment Center
1750 Wallace Avenue
St. Charles, IL 60174-3404

Catalog Number Selection (Open Components)

Table 33-1. *IT.* Electro-Mechanical Catalog Numbering System

N 101 B S0 J 3 A

Standard
N = NEMA

Configuration (Open Type)
02N = FVNR Coil Controller
03N = FVR Coil Controller
04N = Contact Block
05N = Solid-State Non-reversing Overload Relay
06N = Solid-State Reversing Overload Relay
071 = Stand-Alone Solid-State Overload Relay
101 = FVNR Starter
111 = FVNR Contactor
501 = FVR Starter
511 = FVR Contactor

Frame Width
B = 45 mm
C = 54 mm
D = 76 mm
E = 105 mm
F = 140 mm

Designator (NEMA)
SA = Size 00
S0 = Size 0
S1 = Size 1
S2 = Size 2
S3 = Size 3
S4 = Size 4
S5 = Size 5
XC = Coil Controller
XR = Overload

Overload Type
A = Standard
N = Contactor or Not Applicable

Pole Selection
3 = 3-Pole

Overload Full Amperes Adjustment	
(45 mm) **A** = .25 – .8 **B** = .59 – 1.9 **C** = 1.4 – 4.4 **D** = 2.8 – 9.0 **G** = 6.3 – 20 **J** = 10 – 32	(76 mm) **F** = 5.0 – 16 **H** = 8.4 – 27 **K** = 14 – 45 **N** = 31 – 100
(54 mm) **A** = .25 – .8 **B** = .59 – 1.9 **C** = 1.4 – 4.4 **D** = 2.8 – 9.0 **F** = 5.0 – 16 **H** = 8.4 – 27 **L** = 16 – 50	(105 mm) **K** = 14 – 45 **M** = 28 – 90 **P** = 42 – 135 **R** = 63 – 200 (140 mm) **P** = 42 – 135 **S** = 84 – 270 **T** = 125 – 400
X = Contact Block, Coil Controller, Contactor or Not Applicable	

Note: When using the Catalog Numbering System for Eaton's Cutler-Hammer *IT.* Electro-Mechanical products, care should be exercised to assure that the Catalog Number for the Overload Relay aligns with the *IT.* Contact Block selected for type, frame size and ampacity, if purchased as separate components.

Examples:
N101BS0J3A — Full Voltage Non-reversing, Size 0 Starter with a 10 – 32 amp overload range
N111FS5X3N — Full Voltage Non-reversing, Size 5 Contactor
N501DS2K3A — Full Voltage Reversing Starter with a 14 – 45 amp overload range
N02NCXCXNN — Coil Controller 54 mm
N04NBSAX3N — Contact Block Size 00

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Product Description

The *IT.* Electro-Mechanical Contactor 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. Size 00 to Size 4 Contact Blocks combined with Coil Controllers (factory or field assembled) are stand-alone Contactors. Only the Size 5 Contactors have internal factory assembled coil controllers.

Features

- Size 00 – 5, 9 – 270A, 2 – 200 hp, 460V
- 24V DC Coil Control — safe, reliable global standard
- Compact DC coil control — Size 00, 45 mm wide, 9A, 2 hp, 460V
- Frame width (mm): 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
- Conformal coated PWM board for environmental toughness
- 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
- Optional mounting plates for Size 00 – 5.
- Common accessories
- Long-life nickel silver tin contacts provide excellent conductivity and superior resistance to welding and arc erosion
- Environmentally friendly materials
- Low wattage coils and minimal heat dissipation
- Front mounted Auxiliary Contacts: 1NO, 1NC, 2NO, 2NC, 1NO/1NC and logic level
- 2- or 3-wire control

Reversing Contactors

- Includes Reversing Power Wiring
- Mounting Plates for Size 00 – 2
- Exclusive internal electrical interlock for reversing
- Field installed Reversing Kits
- Unique coil controller/overload energizes both forward and reverse contactors — one control point for wiring

Product Selection

When Ordering Specify

NEMA Size, Continuous Ampere Rating, Voltage, kW/hp and Non-reversing or Reversing

Note:

- An **N111** (Size 00 – 4) consists of an **N04N** (Contact Block) and an **N02N.**
- An **N111F** (Size 5) has an internal coil controller.

Table 33-2. Full Voltage 3-Pole DC-Operated Non-reversing Contactors ①

NEMA Size	Continuous Ampere Rating	Max. UL Horsepower (hp) 60 Hz						Max. UL Horsepower (hp) 50 Hz	3-Pole Non-reversing	Price U.S. $
		1-Phase		3-Phase				3-Phase		
		115V	230V	200V/ 208V	230V/ 240V	460V/ 480V	575V/ 600V	380V		
00	9	1/3	1	1-1/2	1-1/2	2	2	1-1/2	**N111BSAX3N**	164.
0	18	1	2	3	3	5	5	5	**N111BS0X3N**	206.
1	27	2	3	7-1/2	7-1/2	10	10	10	**N111CS1X3N**	241.
2	45	3	7-1/2	10	15	25	25	25	**N111DS2X3N**	438.
3	90	7-1/2	15	25	30	50	50	50	**N111ES3X3N**	714.
4	135	—	—	40	50	100	100	75	**N111ES4X3N**	1,704.
5	270	—	—	75	100	200	200	150	**N111FS5X3N**	3,694.

① 24V DC coil voltage.

Note:

- If required, accessories are available on **Page 33-12.**
- NEMA Size 5 information is preliminary.
- Consult factory for higher ampere ratings.
- Integral solid-state auxiliary hold-in circuit.
- Three main contacts.

Accessories ..... **Page 33-12 – 33-19**
Renewal Parts ..... **Page 33-20 – 33-21**
Technical Data ..... **Pages 33-10 – 33-11**
Dimensions ..... **Pages 33-22 – 33-26**
Discount Symbol **1CD1**

Product Selection

When Ordering Specify

NEMA Size, Continuous Ampere Rating, Voltage, kW/hp, and Non-reversing or Reversing

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Note:

- An **N511** (Size 00 – 4) consists of two **N04N** (Contact Blocks), an **N03N** (FVR Coil Controller), Mechanical Interlock, Fanning Strips and Mounting Plate, factory assembled.
- An **N511F** (Size 5) consists of two **N111F** (Contactors), an Internal Reversing Coil Controller, Mechanical Interlock and Wiring Harness, factory assembled.

Table 33-3. Full Voltage 3-Pole DC-Operated Reversing Contactors ①

NEMA Size	Continuous Ampere Rating	Max. UL Horsepower (hp) 60 Hz						Max. UL Horsepower (hp) 50 Hz	3-Pole Reversing	Price U.S. $
		1-Phase		3-Phase				3-Phase		
		115V	230V	200V/ 208V	230V/ 240V	460V/ 480V	575V/ 600V	380V		
00	9	1/3	1	1-1/2	1-1/2	2	2	1-1/2	**N511BSAX3N**	425.
0	18	1	2	3	3	5	5	5	**N511BS0X3N**	509.
1	27	2	3	7-1/2	7-1/2	10	10	10	**N511CS1X3N**	587.
2	45	3	7-1/2	10	15	25	25	25	**N511DS2X3N**	1,112.
3	90	7-1/2	15	25	30	50	50	50	**N511ES3X3N**	1,836.
4	135	—	—	40	50	100	100	75	**N511ES4X3N**	4,565.
5	270	—	—	75	100	200	200	150	**N511FS5X3N**	8,222.

① 24V DC coil voltage.

Note:

- If required, accessories are available on **Page 33-12**.
- NEMA Size 5 information is preliminary.
- Consult factory for higher ampere ratings.
- Integral solid-state auxiliary hold-in circuit.
- Three main contacts.

Accessories ..... **Page 33-12 – 33-19**
Renewal Parts ..... **Page 33-20 – 33-21**
Technical Data ..... **Pages 33-10 – 33-11**
Dimensions ..... **Pages 33-22 – 33-26**
Discount Symbol **1CD1**

Contents

Product Description

The *IT.* Electro-Mechanical Starter consists of an *IT.* Electro-Mechanical Contact Block and *IT.* Electro-Mechanical Solid-State Overload Relay as a Full Voltage Non-reversing (FVNR) or Full Voltage Reversing (FVR) device. Size 00 to Size 5 Starters are factory or field assembled.

Features

- 24V DC control power — safe, reliable global standard
- Unique Pulse Width Modulated coil utilizes minimum energy
- Microprocessor based control
- Phase loss and current unbalance protection
- Standard selectable Trip Class 10, 20 (factory default) or 30 — no individual part numbers — no programming software
- Ambient compensated
- Motor temperature and power-up protection with thermal memory
- Front mounted auxiliary contacts
- Built-in electronic interlock for FVR units
- Easily accessible mounting feet for panel mounting
- 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° – 65°C) operating temperature
- Wide 3.2:1 current adjustment range
- Exclusive internal 24-bit floating point math calculations with RMS calibrated current measurement
- Highest 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 mountable Size 00 – 2
- Communication Interface with Starter Network Adapter Product (SNAP)
- 2- or 3-wire control
- Solid-state alarm output indication
- Retrofit mounting plates for Cutler-Hammer Business A200, Freedom and Advantage
- Retrofit mounting plates for other manufacturers
- Optional mounting plates with "Ease of Installation" slotted hole design
- Auxiliary Contacts: 1NO, 1NC, 2NO, 2NC, 1NO/1NC, logic level (1NO/1NC)
- Stand-Alone Overload Relay — DIN or panel mounting
- Type 2 Coordination and "Weld-Free" devices
- Conformal coated PWM board for environmental toughness

Product Selection

When Ordering Specify

NEMA Size, Continuous Ampere Rating, Voltage, kW/hp, Non-reversing or Reversing and Overload Adjustment Range (Amperes)

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Note:

- An **N101** (00 – 4) consists of an **N04N** (Contact Block) and an **N05N** (Non-reversing Overload Relay).
- An **N101** (Size 5) consists of an **N111F** (Contactor) and an **N05N** (Non-reversing Overload Relay).

Table 33-4. Full Voltage Non-reversing DC-Operated, Open Type Starters (Size 00 – 5),① with 3-Pole Solid-State Overload Protection

NEMA Size	Contiuous Ampere Rating	Overload Adjustment Range (Amperes)	Max. UL Horsepower (hp) 60 Hz						Max. UL Horsepower (hp) 50 Hz	3-Pole Non-reversing	Price U.S. $
			1-Phase		3-Phase				3-Phase		
			115V	230V	200V/ 208V	230V/ 240V	460V/ 480V	575V/ 600V	380V		
00	9	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20	1/3	1	1-1/2	1-1/2	2	2	1-1/2	**N101BSAA3A** **N101BSAB3A** **N101BSAC3A** **N101BSAD3A** **N101BSAG3A**	199. 199. 199. 199. 199.
0	18	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	1	2	3	3	5	5	5	**N101BS0A3A** **N101BS0B3A** **N101BS0C3A** **N101BS0D3A** **N101BS0G3A** **N101BS0J3A**	248. 248. 248. 248. 248. 248.
1	27	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 5.0 – 16 8.4 – 27 16 – 50	2	3	7-1/2	7-1/2	10	10	10	**N101CS1A3A** **N101CS1B3A** **N101CS1C3A** **N101CS1D3A** **N101CS1F3A** **N101CS1H3A** **N101CS1L3A**	286. 286. 286. 286. 286. 286. 286.
2	45	5.0 – 16 8.4 – 27 14 – 45 31 – 100	3	7-1/2	10	15	25	25	25	**N101DS2F3A** **N101DS2H3A** **N101DS2K3A** **N101DS2N3A**	518. 518. 518. 518.
3	90	14 – 45 28 – 90 42 – 135 63 – 200	7-1/2	15	25	30	50	50	50	**N101ES3K3A** **N101ES3M3A** **N101ES3P3A** **N101ES3R3A**	846. 846. 846. 846.
4	135	14 – 45 28 – 90 42 – 135 63 – 200	—	—	40	50	100	100	75	**N101ES4K3A** **N101ES4M3A** **N101ES4P3A** **N101ES4R3A**	1,917. 1,917. 1,917. 1,917.
5	270	42 – 135 84 – 270 125 – 400	—	—	75	100	200	200	150	**N101FS5P3A** **N101FS5S3A** **N101FS5T3A**	4,678. 4,678. 4,678.

① 24V DC coil voltage.

Note:

- If required, accessories are available on **Page 33-12**.
- The standard *IT.* starter is for 3-phase applications only.
- NEMA Size 5 information is preliminary.

Accessories ..... **Page 33-12 – 33-19**
Renewal Parts ..... **Page 33-20 – 33-21**
Technical Data ..... **Pages 33-10 – 33-11**
Dimensions ..... **Pages 33-22 – 33-26**
Discount Symbol **1CD1**

Product Selection

When Ordering Specify

NEMA Size, Continuous Ampere Rating, Voltage, kW/hp, Non-reversing or Reversing and Overload Adjustment Range (Amperes)

Note:

- An **N501** (Size 00 – 4) consists of two **N04N** (Contact Blocks), **N06N** (Reversing Overload Relay), Fanning Strips, Mechanical Interlock and Mounting Plate.
- An **N501F** (Size 5) consists of two **N111F** (Contactors), **N06N** (Reversing Overload Relay), Fanning Strips, Mechanical Interlock and Reversing Wiring Harness.

Table 33-5. Full Voltage Reversing DC-Operated, Open Type Starters (Size 00 –5), ① with 3-Pole Solid-State Overload Protection

NEMA Size	Contiuous Ampere Rating	Overload Adjustment Range (Amperes)	Max. UL Horsepower (hp) 60 Hz						Max. UL Horsepower (hp) 50 Hz	3-Pole Reversing	Price U.S.$
			1-Phase		3-Phase				3-Phase		
			115V	230V	200V/ 208V	230V/ 240V	460V/ 480V	575V/ 600V	380V		
00	9	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20	1/3	1	1-1/2	1-1/2	2	2	1-1/2	**N501BSAA3A** **N501BSAB3A** **N501BSAC3A** **N501BSAD3A** **N501BSAG3A**	474. 474. 474. 474. 474.
0	18	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 6.3 – 20 10 – 32	1	2	3	3	5	5	5	**N501BS0A3A** **N501BS0B3A** **N501BS0C3A** **N501BS0D3A** **N501BS0G3A** **N501BS0J3A**	562. 562. 562. 562. 562. 562.
1	27	.25 – .8 .59 – 1.9 1.4 – 4.4 2.8 – 9.0 5.0 – 16 8.4 – 27 16 – 50	2	3	7-1/2	7-1/2	10	10	10	**N501CS1A3A** **N501CS1B3A** **N501CS1C3A** **N501CS1D3A** **N501CS1F3A** **N501CS1H3A** **N501CS1L3A**	641. 641. 641. 641. 641. 641. 641.
2	45	5.0 – 16 8.4 – 27 14 – 45 31 – 100	3	7-1/2	10	15	25	25	25	**N501DS2F3A** **N501DS2H3A** **N501DS2K3A** **N501DS2N3A**	1,208. 1,208. 1,208. 1,208.
3	90	14 – 45 28 – 90 42 – 135 63 – 200	7-1/2	15	25	30	50	50	50	**N501ES3K3A** **N501ES3M3A** **N501ES3P3A** **N501ES3R3A**	1,995. 1,995. 1,995. 1,995.
4	135	14 – 45 28 – 90 42 – 135 63 – 200	—	—	40	50	100	100	75	**N501ES4K3A** **N501ES4M3A** **N501ES4P3A** **N501ES4R3A**	4,867. 4,867. 4,867. 4,867.
5	270	42 – 135 84 – 270 125 – 400	—	—	75	100	200	200	150	**N501FS5P3A** **N501FS5S3A** **N501FS5T3A**	9,345. 9,345. 9,345.

① 24V DC coil voltage.

Note:

- If required, accessories are available on **Page 33-12**.
- The standard *IT.* starter is for 3-phase applications only.
- NEMA Size 5 information is preliminary.

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Discount Symbol **1CD1**

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Table 33-6. Specifications

Description	Size 00, 0	Size 1	Size 2	Size 3, 4	Size 5
Overall Dimensions in Inches (mm) ① — ***w x h x d***					
Non-reversing Contactor	1.8 x 4.4 x 2.4 (45 x 111 x 60)	2.1 x 4.5 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)	5.5 x 13.9 x 7.0 (140 x 354 x 178)
Reversing Contactor	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 13.9 x 7.2 (296 x 354 x 183)
Non-reversing Starter	1.8 x 4.4 x 2.4 (45 x 111 x 60)	2.1 x 4.5 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)	5.7 x 19.4 x 7.0 (145 x 492 x 178)
Reversing Starter	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 19.4 x 7.2 (300 x 492 x 183)
Weights in Lb. (kg)					
Non-reversing Contactor	.7 (.31)	.9 (.42)	2.8 (1.27)	6.7 (3.05)	20.0 (9.1)
Reversing Contactor	1.9 (.86)	2.6 (1.17)	6.9 (3.13)	16.9 (7.67)	48.0 (21.8)
Non-reversing Starter	.9 (.40)	1.2 (.53)	2.9 (1.32)	7.1 (3.20)	27.0 (12.3)
Reversing Starter	2.0 (.90)	2.6 (1.20)	7.1 (3.20)	16.8 (7.60)	55.0 (25.0)
Mounting Hole Spacing in Inches (mm) — *w x h*					
Non-reversing Contactor	1.33 x 4 (33.8 x 101)	1.46 x 4.10 (37 x 104)	.95 x 2.88 (24 x 73)	1.33 x 4.14 (33.8 x 105)	Consult factory
Reversing Contactor	3.15 x 5.36 (80 x 136)	3.15 x 5.36 (80 x 136)	5.51 x 6.89 (140 x 175)	7.88 x 9.06 (200 x 230)	
Non-reversing Starter	1.33 x 4.62 (33.8 x 117.3)	1.46 x 5.04 (37 x 128)	.95 x 2.88 (24 x 73)	1.33 x 4.14 (33.8 x 105)	
Reversing Starter	3.15 x 5.36 (80 x 136)	3.15 x 5.36 (80 x 136)	5.51 x 6.89 (140 x 175)	7.88 x 9.06 (200 x 230)	
Mounting Positions					
Panel-Vertical	Yes	Yes	Yes	Yes	Yes
Panel-Horizontal	Yes	Yes	Yes	Yes	Yes
DIN Rail Mountable	Yes ②	Yes ②	Yes ②	No	No
Temperature					
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)
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)
Insulation Voltage (Ui)					
	690V	690V	690V	690V	690V
Impulse Withstand Voltage (Uimp)					
	6 kV	6 kV	6 kV	6 kV	6 kV
Mechanical Life					
	10,000,000	10,000,000	8,000,000	8,000,000	5,000,000
Electrical Life ③⑤					
AC-2, AC-3 (@ max. amps.)	1,000,000 – 3,000,000	1,000,000 – 2,000,000	800,000 – 2,000,000	800,000 – 1,500,000	500,000 – 1,000,000
AC-4 (@ max. amps.)	—	—	—	—	—
Current Ratings @ 480V Maximum					
AC-1 Thermal Current Ith	50	85	130	250	TBD
AC-2, AC-3 Operating Current (Ie)	32	50	100	200	TBD
AC-4 Operating Current (Ie)	32	50	100	150	TBD
Operation Performance					
Coil Voltage (nominal)	24V DC	24V DC	24V DC	24V DC	24V DC
Coil Operating Voltage Range (V DC)	20 – 28	20 – 28	20 – 28	20 – 28	20 – 28
Coil Insulation Rating	180°C	180°C	180°C	180°C	180°C
Pull-In Time (ms) ●	14	14	24	31	TBD
Drop-Out Time (ms) ●	5	5	11	16	TBD
Mechanical Operating Rate					
	3/sec	3/sec	2/sec	2/sec	1/sec

① Auxiliaries add .91" (23 mm) to depth for single, .50" (30 mm) for dual.
② Non-reversing contactors and starters only.
③ See Technical Data in Publication No. CA03403002E, Life-Load Curves, for maximum operations per frame size at various amperes.
④ Excluding debounce time of 50 ms.
⑤ Preliminary data.

Table 33-6. Specifications, continued

Description	Size 00, 0	Size 1	Size 2	Size 3, 4	Size 5
AWG Wire Range (Stranded or Solid)					
Power Terminals	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 AWG – 250MCM (16 – 120 mm^2)	4 AWG – 600MCM (16 – 300 mm^2)
2 Conductors per terminal	(2) 14 – 10 AWG (1.5 – 4.0 mm^2)	(2) 14 – 6 AWG (1.5 – 16 mm^2)	(2) 14 – 2 AWG (1.5 – 25 mm^2)	(2) 6 – 3/0 AWG (16 – 70 mm^2)	(2) 4 AWG – 250MCM (16 – 120 mm^2)
Strip Length	.45" (11 mm)	.5" (12 mm)	.7" (18 mm)	.8" (21 mm)	1.5" (40 mm)
Torque (max.)	20 lb-in (2.2 Nm) per 14 – 10 AWG (1.5 – 6 mm^2); 25 lb-in (2.8 Nm) per 8 AWG (10 mm^2)	35 lb-in (4.0 Nm) per 14 – 10 AWG (1.5 – 6 mm^2); 40 lb-in (4.5 Nm) per 8 AWG (10 mm^2); 45 lb-in (5.0 Nm) per 6 – 4 AWG (16 mm^2)	45 lb-in (5.0 Nm)	250 lb-in (28 Nm)	550 lb-in (62 Nm)
Driver	2.5 mm Hex Key	3 mm Hex Key	5/32" (4 mm) Hex Key	5/16" (8 mm) Hex Key	5/16" (8 mm) Hex Key
Control Terminals	22 – 12 AWG (.5 – 25 mm^2)	22 – 12 AWG (.5 – 25 mm^2)	22 – 12 AWG (.5 – 25 mm^2)	22 – 12 AWG (.5 – 25 mm^2)	22 – 12 AWG (.5 – 25 mm^2)
Control Terminals (+ and -)	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)
Conductors per terminal	1	1	1	1	1
Torque lb-in (Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)
Strip Length	.25" (7 mm)	.25" (7 mm)	.25" (7 mm)	.25" (7 mm)	.25" (7 mm)
Environmental					
Shock	15G	15G	15G	15G	15G
Vibration	5G	5G	5G	5G	5G
Pollution Degree	3	3	3	3	3
EMC Environment	1	1	1	1	1
Altitude ①	2000 Meters	2000 Meters	2000 Meters	2000 Meters	2000 Meters
Coils					
Pull-In Time (ms) — Excluding debounce time of 50 ms					
@ 20.4V DC	17.2	19.2	26.9		
@ 24.0V DC	13.3	15.3	21.6	32.8	
@ 26.4V DC	12.2	13.8	19.8		
Including debounce time @ 24V DC	63.3	65.3	71.6	82.8	
Drop-Out Time —Excluding debounce time of 50 ms	37	23	95	27	

① Above 2000 meters, consult factory.

Table 33-7. 24V DC Power Supply Requirements @ 68°F (20°C) (see Note below)

Contactor/Starter Size			Sealed In		Inrush		
Catalog Number ②	Frame	mm	Wattage	Amps	Wattage	Amps	Duration (msecs)
N_11A_ _X3N	A	27	1.3	.054	20	.83	30
N_11B_ _X3N	B	45	3.7	.15	80	3.3	50
N_01B_ _ _3A	B	45	3.2	.13	80	3.3	50
N_11C_ _X3N	C	54	4.2	.18	90	3.8	50
N_01C_ _ _3A	C	54	3.6	.15	90	3.8	50
N_ _1D_ _ _3_	D	76	5.0	.21	130	5.4	65
N_ _1E_ _ _3_	E	105	5.6	.23	140	5.8	85
N_ _1F_ _ _3_	F	140	③	③	③	③	③

② _ indicates missing digit/character of the Catalog Number; may have multiple values.
③ Consult factory.

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

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

For example, inrush requirements for a D Frame Starter at -25°C would be:

$$Watts = 130\,[1.1 - .005\,(-25)] = 160$$
$$Amps = 5.4\,[1.1 - .005\,(-25)] = 6.6$$

Modular Components — Contactor Field Assembly

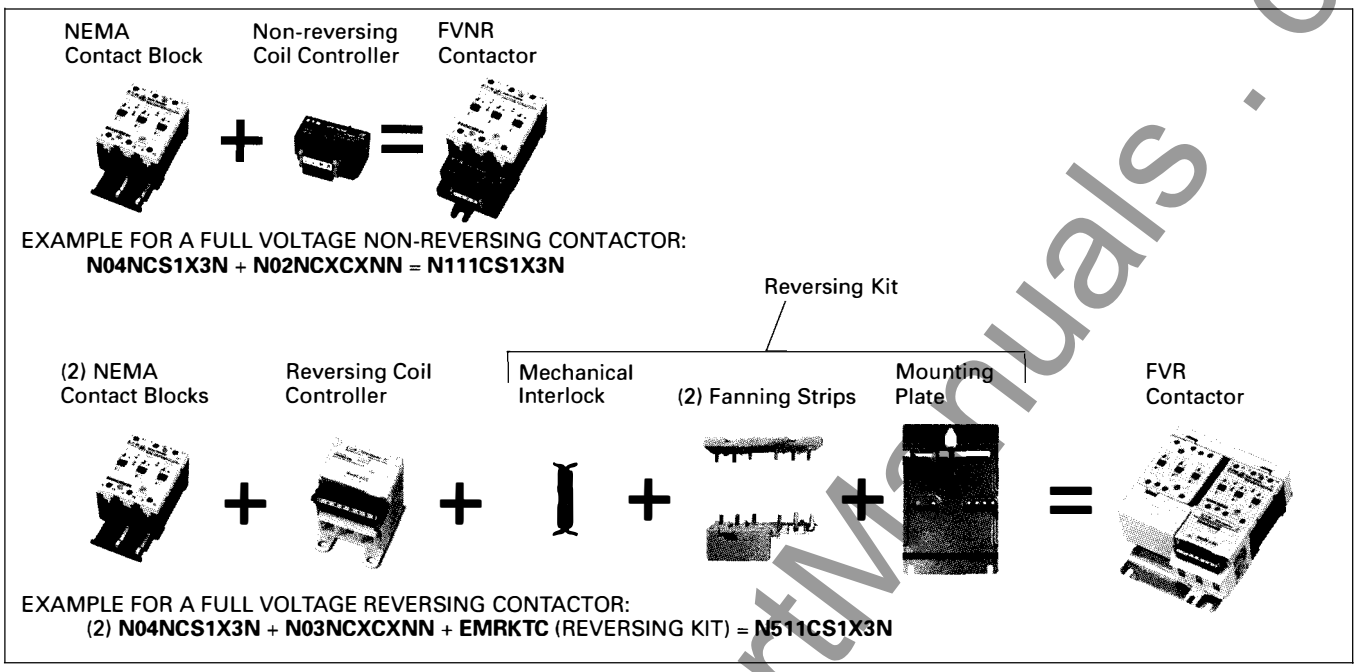

Figure 33-1. Modular Contactor Assembly

Modular Components — Starter Field Assembly

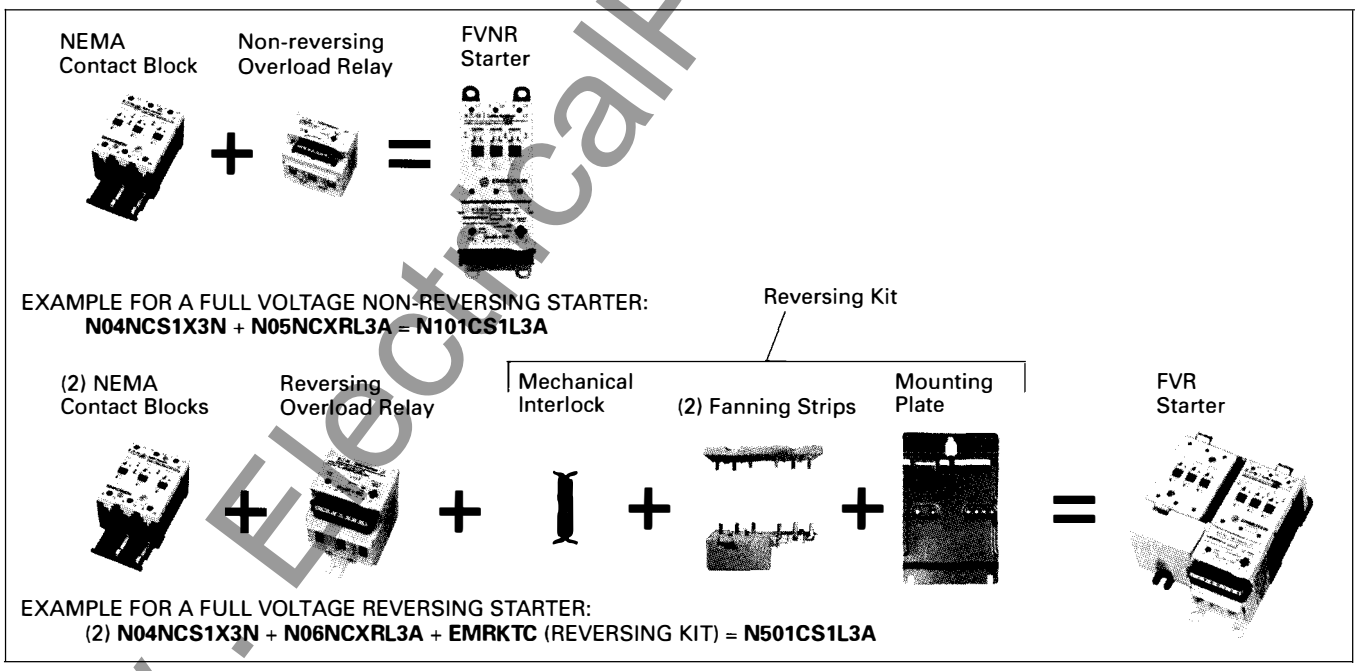

Figure 33-2. Modular Starter Assembly

NEMA Contact Block

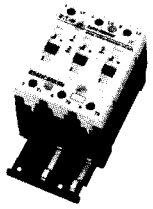

Table 33-8. NEMA Contact Block

SIZE	Amperes	Catalog Number	Price U.S. $
00	9	N04NBSAX3N	—
0	18	N04NBS0X3N	—
1	27	N04NCS1X3N	—
2	45	N04NDS2X3N	—
3	90	N04NES3X3N	—
4	135	N04NES4X3N	—

Note:

- N04N + N05N = N101; N04N + N02N = N111 (45 – 140 mm)
- N04N + N06N = N501; N04N + N03N = N511 (45 – 140 mm)

NEMA Solid-State Overload Relay — Non-reversing

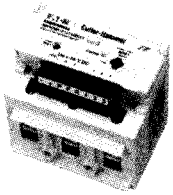

Table 33-9. NEMA Solid-State Overload Relay — Non-reversing

Size	Overload Adjustment Range (Amperes)	Catalog Number	Price U.S. $
00	.25 – .8	N05NBSAA3A	—
	.59 – 1.9	N05NBSAB3A	—
	1.4 – 4.4	N05NBSAC3A	—
	2.8 – 9.0	N05NBSAD3A	—
0	6.3 – 20	N05NBS0G3A	—
	10 – 32	N05NBS0J3A	—
1	.25 – .8	N05NCS1A3A	—
	.59 – 1.9	N05NCS1B3A	—
	1.4 – 4.4	N05NCS1C3A	—
	2.8 – 9.0	N05NCS1D3A	—
	5.0 – 16	N05NCS1F3A	—
	8.4 – 27	N05NCS1H3A	—
	16 – 50	N05NCS1L3A	—
2	5.0 – 16	N05NDS2F3A	—
	8.4 – 27	N05NDS2H3A	—
	14 – 45	N05NDS2K3A	—
	31 – 100	N05NDS2N3A	—
3	42 – 135	N05NES3K3A	—
	63 – 200	N05NES3M3A	—
4	42 – 135	N05NES4P3A	—
	63 – 200	N05NES4R3A	—
5	42 – 135	N05NFS5P3A	—
	84 – 270	N05NFS5S3A	—
	125 – 400	N05NFS5T3A	—

NEMA Coil Controller

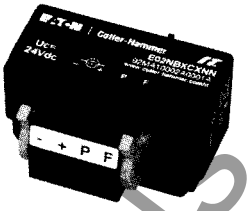

Table 33-10. NEMA Coil Controller — Non-reversing

Size	Catalog Number	Price U.S. $
Non-reversing		
00	N02NBSAXNN	—
0	N02NBS0XNN	—
1	N02NCS1XNN	—
2	N02NDS2XNN	—
3	N02NES3XNN	—
4	N02NES4XNN	—
5	N02NFS5XNN	—
Reversing		
00	N03NBSAXNN	—
0	N03NBS0XNN	—
1	N03NCS1XNN	—
2	N03NDS2XNN	—
3	N03NES3XNN	—
4	N03NES4XNN	—
5	EMUCCF	—

NEMA Overload Relay — Reversing

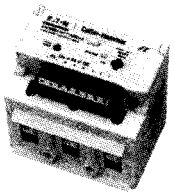

Table 33-11. NEMA Overload Relay — Reversing

Size	Overload Adjustment Range (Amperes)	Catalog Number	Price U.S. $
00	.25 – .8	N06NBSAA3A	—
	.59 – 1.9	N06NBSAB3A	—
	1.4 – 4.4	N06NBSAC3A	—
	2.8 – 9.0	N06NBSAD3A	—
0	6.3 – 20	N06NBS0G3A	—
	10 – 32	N06NBS0J3A	—
1	.25 – .8	N06NCS1A3A	—
	.59 – 1.9	N06NCS1B3A	—
	1.4 – 4.4	N06NCS1C3A	—
	2.8 – 9.0	N06NCS1D3A	—
	5.0 – 16	N06NCS1F3A	—
	8.4 – 27	N06NCS1H3A	—
	16 – 50	N06NCS1L3A	—
2	5.0 – 16	N06NDS2F3A	—
	8.4 – 27	N06NDS2H3A	—
	14 – 45	N06NDS2K3A	—
	31 – 100	N06NDS2N3A	—
3	14 – 45	N06NES3K3A	—
	28 – 90	N06NES3M3A	—
4	42 – 135	N06NES4P3A	—
	63 – 200	N06NES4R3A	—
5	42 – 135	N06NFS5P3A	—
	84 – 270	N06NFS5S3A	—
	125 – 400	N06NFS5T3A	—

Discount Symbol **1CD1**

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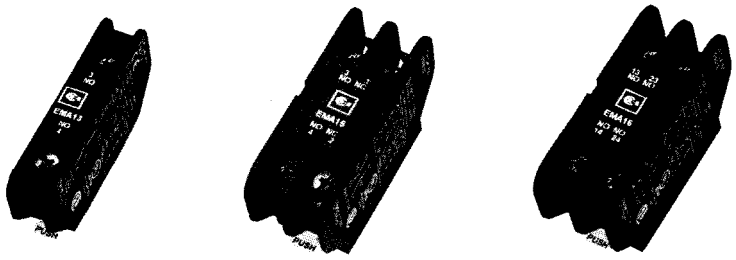
Auxiliary Contacts



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 33-12** and **33-13**, and their ratings in **Tables 33-14 – 33-16**. For reversing models, the number of auxiliaries indicated is for each of the contactors/starters in the assembly.

Table 33-12. Auxiliary Contact Availability — Sizes 00 – 4

Top Mounted (Maximum Circuits per Contactor/Starter)						
Contactor/Starter Size				Contact Type [?]	Catalog Number	Price U.S. $
Size 00, 0	Size 1	Size 2	Size 3, 4			
3	3	3	3	1NO	**EMA13**	20.90
3	3	3	3	1NC	**EMA14**	20.90
2	2	3	3	1NO-1NC	**EMA15**	28.00
2	2	3	3	2NO	**EMA16**	28.00
2	2	3	3	2NC	**EMA17**	28.00
2	3	3	3	Logic Level 1NO-1NC	**EMA70**	33.00

① One EMA70 contact may be used in the center position in conjunction with two EMA15, EMA16 or EMA17 contacts in the center positions.

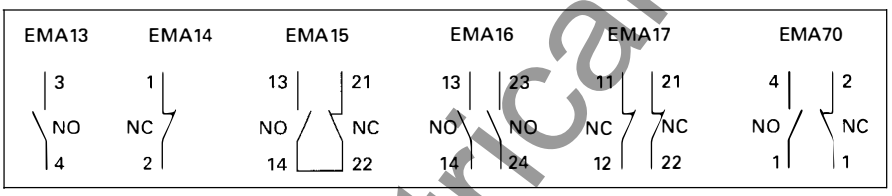


Figure 33-3. Connecting Diagram — Sizes 00 – 4

Table 33-13. Auxiliary Contact — Size 5

Front or Side Mounted ② — Maximum (14) Total Circuits				
Size 5	Contact Type [?]	Description	Catalog Number	Price U.S. $
1	1NO	Base auxiliary (max. 1 per side)	**EMASB13**	43.00
1	1NO-1NC	Base auxiliary (max. 1 per side)	**EMASB15**	43.00
2	1NO	Base auxiliary (max. 2 Add-on auxiliary per side) EMASB13 or EMASB15 required	**EMASA13**	43.00
2	1NC	Base auxiliary (max. 2 Add-on auxiliary per side) EMASB13 or EMASB15 required	**EMASA14**	58.00
1	1NO-1NC	Base auxiliary (max. 1 Add-on auxiliary per side) EMASB13 or EMASB15 required	**EMASA15**	58.00
3	1NO-1NC	Front mounted (max. 3)	**EMA70**	33.00

② Maximum (3) auxiliaries per side.

Table 33-14. IEC Ratings

DC-13		AC-15	
Ue Voltage	*Ie* Amps.	*Ue* Voltage	*Ie* Amps.
24	5	48	8
48	2.5	120	6
125	1.1	240	4
250	.55	440	2

Table 33-15. 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 33-16. NEMA P300 Ratings

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

Discount Symbol **1CD1**

Mounting Plates and DIN Rails

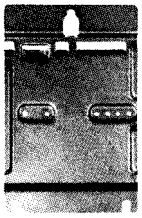


Table 33-17. Mounting Plates/DIN Rails

NEMA Size	Metal Reversing Contactor/Starter Plates		Metal Combo Device Plate Non-reversing		Stand-Alone Solid-State Overload Panel/ DIN	
	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
00, 0	EMA9B	—	EMA10B	—	EMA11B	—
1	EMA9C	—	EMA10C	—	EMA11C	—
2	EMA9D	—	EMA10D	—	EMA11D	—
3, 4	EMA9E	—	EMA10E	—	EMA11E	—
5	EMA9F	—	EMA10F	—	EMA11F	—

Fanning Strips

Table 33-18. Fanning Strips

NEMA Size	Reversing		Wye-Delta	
	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
00, 0	EMFRB	—	EMFWB	—
1	EMFRC	—	EMFWC	—
2	EMFRD	—	EMFWD	—
3, 4	EMFRE	—	EMFWE	—
5	EMFRF	—	EMFWF	—

Ring Terminals

Consult factory.

Reversing Kits

Includes Fanning Strips, Mechanical Interlock, Mounting Plate and hardware.

Table 33-19. Reversing Kits

NEMA Size	Description	Catalog Number	Price U.S. $
00, 0	For Contactor and Starter	EMRKB	—
1	For Contactor and Starter	EMRKC	—
2	For Contactor and Starter	EMRKD	—
3, 4	For Contactor and Starter	EMRKE	—
5	For Contactor	EMRCKF	—
5	For Starter	EMRSKF	—

Note: Also order separately the appropriate contact blocks and overload relay.

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Discount Symbol **1CD1**

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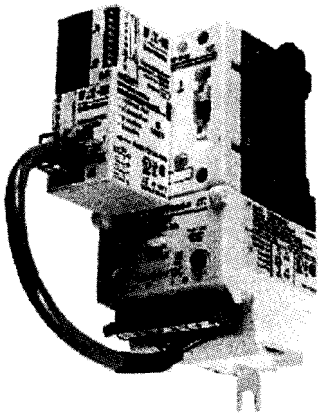
DeviceNet Starter Network Adapter Product (DSNAP)



Catalog Number D77B-DSNAP with 54 mm IT. Starter

The DeviceNet Starter Network Adapter Product (DSNAP) is a front-mount device that serves as a single node on DeviceNet, providing communication capability, control and monitoring to Eaton's Cutler-Hammer Intelligent Technologies (*IT.*) Electro-mechanical Starters, as well as the S751 Soft Start, as listed in **Tables 33-20 – 33-22**.

The product greatly increases the functionality of Eaton's Cutler-Hammer Intelligent Technologies (*IT.*) Electro-mechanical Starter and S751 Soft Start with the addition of enhanced features.

The *IT.* DSNAP is designed for use with the same 24V DC power as the starter. A starter power sensing circuit indicates to the user that the Starter does not have 24V DC power, signaling a fault or an E-Stop.

General Features

- Communication to DeviceNet consuming one DeviceNet MAC ID
- Manually set MAC ID and baud rate; configuration using a software application is not required for normal operation
- Advanced configuration using CH Studio software
- Includes pre-wired starter interconnect cable

Comprehensive Motor Data and Control

- RMS average current
- % thermal memory
- Integral contact position detection
- Operating status and fault codes
- At speed (soft starters)
- START/STOP control
- RUN/FORWARD-REVERSE control
- Trip Reset

Extended Starter Capabilities

- Ground fault detection (with accessory)
- Fault log
- Start-up nuisance trip avoidance (adjustable)
- Current level warning (adjustable)
- Underload warning (adjustable)

Approvals

- UL508
- CE
- CSAC22.2 No. 14-95 (pending)

Table 33-20. IEC SNAP Connectivity

IEC E101, E501		
Frame	**Size**	**Continuous Ampacity Rating**
45 mm	B	18 Amp
		25 Amp
		32 Amp
54 mm	C	40 Amp
		50 Amp
76 mm	D	65 Amp
		85 Amp
		100 Amp
105 mm	E	125 Amp
		160 Amp
		200 Amp
140 mm	F	250 Amp
		315 Amp
		400 Amp

Table 33-21. NEMA SNAP Connectivity

NEMA N101, N501	
Size	**Continuous Ampacity Rating**
00	9
0	18
1	27
2	45
3	90
4	135
5	270

Table 33-22. S751 SNAP Connectivity

S751 Soft Start	
54 mm	27 Amps

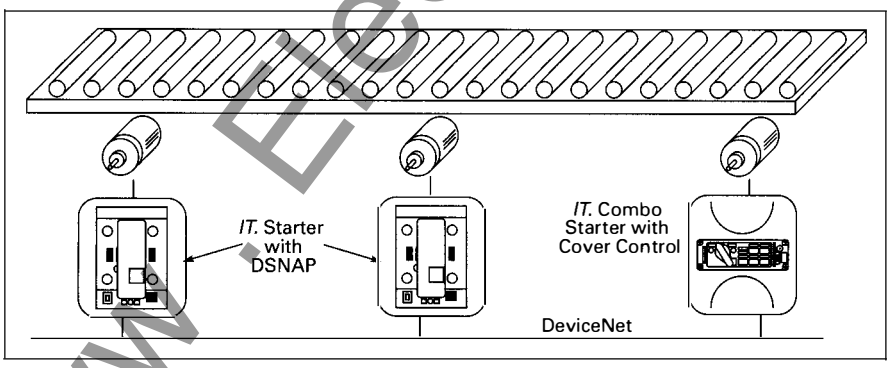


Figure 33-4. Typical DSNAP Application

Application

In a typical application, the DSNAP front mounts to an *IT.* starter or soft start. The DSNAP connects directly to DeviceNet, allowing for control and monitoring of the starter/soft start. A PC or PLC serves as the central control and scans the DSNAP for motor control and monitoring information.

Table 33-23. DeviceNet Specifications

DeviceNet Connections	**Group 2 Master Slave Connection Set Polling Bit Strobe Explicit No UCMM**
DeviceNet Baud Rate	125K, 250K, 500K
Module Current Draw	TBD

Table 33-24. DSNAP Specifications

Description	Specifications
Transportation	
Temperature	-58° to 176°F (-50° to 80°C)
Humidity	95% non-condensing
Storage	
Temperature	-58° to 176°F (-50° to 80°C)
Humidity	95% non-condensing
Operating	
Temperature	TBD
Humidity	95% non-condensing
Altitude	Above 2000 meters (6600 feet) consult factory
Shock	15 g's half-wave sinusoidal 11 msecs
Vibration	5 – 57.5 Hz (100 – 17 msecs) @ .3 mm SA 57.5 – 150 Hz (17 – 6.7 msecs) @ .35 mm SA
Pollution Degree IEC60947-1	3
Enclosure	IP20

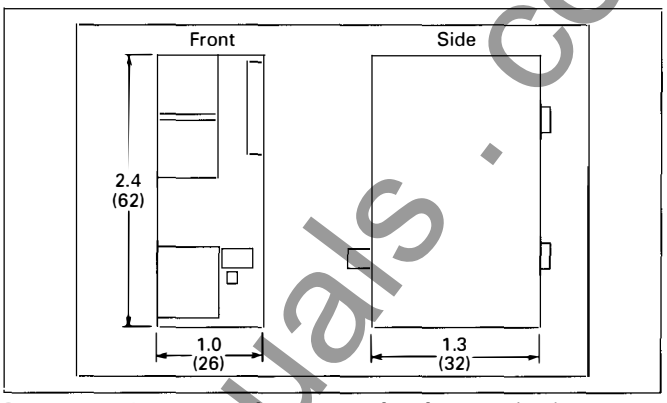


Figure 33-5. DSNAP Approximate Dimensions in Inches (mm)

Table 33-25. Product Selection

Description	Catalog Number	Price U.S. $
DeviceNet Starter Network Adapter Product and Prewired Starter Interconnect Cable	**D77B-DSNAP**	—
Auxiliary Contact and Jumper (for Full Voltage Reversing)	**TBD**	—

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Discount Symbol **1CD1**

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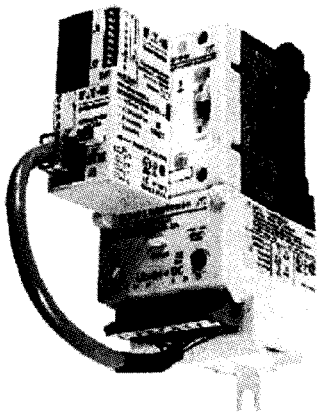
QCPort Starter Network Adapter Product (QSNAP)



Catalog Number D77B-QSNAP with 54 mm IT. Starter

The QCPort Starter Network Adapter Product (CSNAP) is a front-mount device that serves as a single QCPort device, providing communication capability, control and monitoring to Eaton's Cutler-Hammer Intelligent Technologies (*IT.*) Electromechanical Starters, as well as the S751 Soft Start, as listed **Tables 33-26 – 33-28**.

The product greatly increases the functionality of Eaton's Cutler-Hammer Intelligent Technologies (*IT.*) Electromechanical Starter and S751 Soft Start with the addition of enhanced features.

The *IT.* QSNAP is designed for use with the same 24V DC power as the starter. A starter power sensing circuit indicates to the user that the Starter does not have 24V DC power, signaling a fault or an E-Stop.

General Features

- Communication to QCPort consuming a single QCPort ID
- Manually set Group ID; configuration using a software application is not required for normal operation
- Advanced configuration using CH Studio software
- Includes pre-wired starter interconnect cable

Comprehensive Motor Data and Control

- RMS average current
- % thermal memory
- Integral contact position detection
- Operating status and fault codes
- At speed (soft starters)
- START/STOP control
- RUN/FORWARD-REVERSE control
- Trip Reset

Extended Starter Capabilities

- Ground fault detection (with accessory)
- Fault log
- Start-up nuisance trip avoidance (adjustable)
- Current level warnings (adjustable)
- Underload warnings (adjustable)

Approvals

- UL508
- CE
- CSAC22.2 No. 14-95 (pending)

Table 33-26. IEC SNAP Connectivity

IEC E101, E501		
Frame	**Size**	**Continuous Ampacity Rating**
45 mm	B	18 Amp
		25 Amp
		32 Amp
54 mm	C	40 Amp
		50 Amp
76 mm	D	65 Amp
		85 Amp
		100 Amp
105 mm	E	125 Amp
		160 Amp
		200 Amp
140 mm	F	250 Amp
		315 Amp
		400 Amp

Table 33-27. NEMA SNAP Connectivity

NEMA N101, N501	
Size	**Continuous Ampacity Rating**
00	9
0	18
1	27
2	45
3	90
4	135
5	270

Table 33-28. S751 SNAP Connectivity

S751 Soft Start	
54 mm	27 Amps

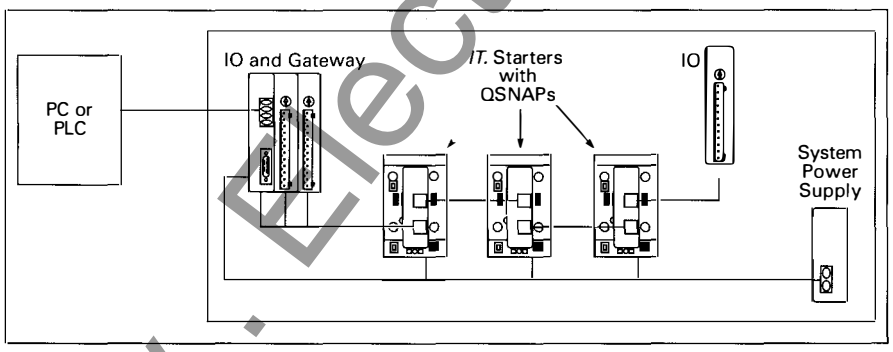


Figure 33-6. Typical QSNAP Application

Application

In a typical application, the QSNAP front mounts to an *IT.* starter or soft start. The QSNAP connects directly to QCPort, allowing for control and monitoring of the starter/soft start. A PC or PLC serves as the central control, and scans the DeviceNet Adapter (D77D-DNA), retrieving the QSNAP's motor control and monitoring information.

Table 33-29. QSNAP Specifications

Description	Specifications
Transportation	
Temperature	-58° to 176°F (-50° to 80°C)
Humidity	95% non-condensing
Storage	
Temperature	-58°F to 176°F (-50°C to 80°C)
Humidity	95% non-condensing
Operating	
Temperature	TBD
Humidity	95% non-condensing
Altitude	Above 2000 meters (6600 feet) consult factory
Shock	15 g's half-wave sinusoidal 11 msecs
Vibration	5 – 57.5 Hz (100 – 17 msecs) @ 0.3 mm SA 57.5 – 150 Hz (17 – 6.7 msecs) @ 0.35 mm SA
Pollution Degree IEC60947-1	3
Enclosure	IP20

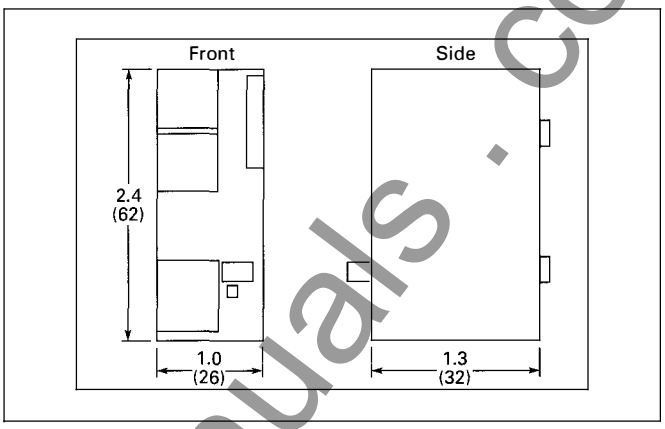


Figure 33-7. QSNAP Approximate Dimensions in Inches (mm)

Table 33-30. Product Selection

Description	Catalog Number	Price U.S. $
QCPort Starter Network Adapter Product and Prewired Starter Interconnect Cable	**D77B-QSNAP**	—
Auxiliary Contact and Jumper (for Full Voltage Reversing)	**TBD**	—

Discount Symbol **1CD1**

Contact Kits

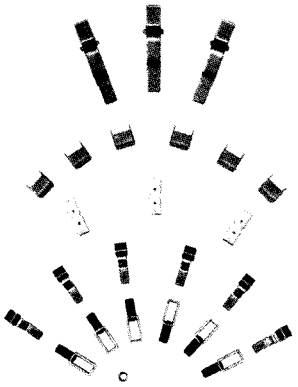


Table 33-31. Contact Kits

NEMA Size	Contact Kit Description	Catalog Number	Price U.S. $
1	40 Amp	**EMCKT40**	—
1	50 Amp	**EMCKT50**	—
2	65 Amp	**EMCKT65**	—
2	85 Amp	**EMCKT85**	—
2	100 Amp	**EMCKT100**	—
3, 4	125 Amp	**EMCKT125**	—
3, 4	160 Amp	**EMCKT160**	—
3, 4	200 Amp	**EMCKT200**	—
5	250 Amp	**EMCKT250**	—
5	315 Amp	**EMCKT315**	—
5	400 Amp	**EMCKT400**	—

Coils

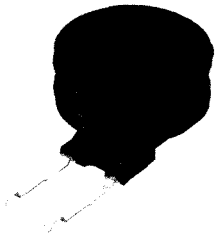


Table 33-32. Coils

Description ①	Catalog Number	Price U.S. $
Size 1 Coil	**EMCC**	—
Size 2 Coil	**EMCD**	—
Size 3, 4 Coil	**EMCE**	—
Size 5 Coil	**EMCF**	—

① For reversing contactors and starters, order two.

Din Rail Catch

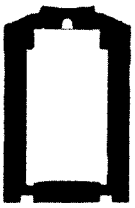


Table 33-33. DIN Rail Catch

NEMA Size	Description	Catalog Number	Price U.S. $
00 – 1	Catch with Leaf Spring & Pad	**EMDRCB**	—
2	Catch with Leaf Spring & Pad	**EMDRCD**	—

Bus Bars

Table 33-35. Bus Bars

NEMA Size	Description	Catalog Number	Price U.S. $
00, 0	For Contactors & Starters	**EMBBB**	—
1	For Starters	**EMBBC**	—
1	For Reversing Contactors & Reversing Starters	**EMBBRC**	—
2	For Starters	**EMBBD**	—
2	For Reversing Contactors & Reversing Starters	**EMBBRD**	—
3, 4	For Starters	**EMBBE**	—
3, 4	For Reversing Contactors & Reversing Starters	**EMBBRE**	—
5	Overload Relay	**EMBBOF**	—

Lugs

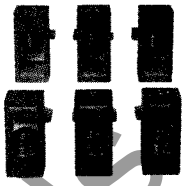


Table 33-34. Lug Kits

NEMA Size	Description	Catalog Number	Price U.S. $
1	Lug	**EMLUGC**	—
2	Lug	**EMLUGD**	—
3, 4	Lug	**EMLUGE**	—
5	Horizontal Box Lug Kit	**EMLUGFA**	—
5	Vertical Box Lug Kit	**EMLUGFB**	—
5	Dual Lug Kit	**EMLUGFC**	—
5	Ring Lug Kit	**EMLUGFD**	—

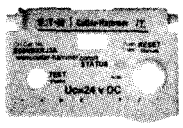
Connectors

Table 33-36. Control Terminal Connectors

No. of Pins	Pitch (mm)	Terminals	Description	Size	Used With ②	Catalog Number ●	Price U.S. $
4	5	- + P F	Size 00 – 1 Coil Controller	00 – 1	**_ 02N _ XCXNN**	**EMA78L**	—
8	5	- + P F R 1 2 3	Size 2 – 4 Coil Controller	00 – 5	**_ 02N _ XCXNN**	**EMA76L**	—
8	5	- + P F R 1 2 3	Reversing Coil Controller	00 – 5	**_ 03N _ XCXNN**	**EMA76L**	—
8	5	- + P F R 1 2 3	Overload (except Size 5)	00 – 4	**_ 05N _ XR _ 3A**	**EMA76L**	—
8	5	- + P F R 1 2 3	Reversing Overload (Size 5)	00 – 4	**_ 06N _ XR _ 3A**	**EMA76L**	—
(1) 5	5	- + P F R	Size 5 Contactor	5	**_ 111F _ X3N**	**EMA77L**	—
(1) 5	5	R F P + -	Size 5 Contactor	5	**_ 111F _ X3N**		—
(2) 5	5	- + P F R	Size 5 Reversing Contactor	5	**_ 511F _ X3N**	**EMA77L**	—
(2) 5	5	R F P + -	Size 5 Reversing Contactor	5	**_ 511F _ X3N**		—
(1) 8	5	- + P F R 1 2 3	Size 5 Overload	5	**_ 05NFXR _ 3A**	**EMA76L**	—
(1) 5	5	R F P + -	Size 5 Overload	5	**_ 05NFXR _ 3A**		—
(1) 8	5	- + P F R 1 2 3	Size 5 Reversing Overload	5	**_ 05NFXR _ 3A**	**EMA76L**	—
(1) 5	5	R F P + -	Size 5 Reversing Overload	5	**_ 05NFXR _ 3A**		—
(1) 8	5	- + P F R 1 2 3	Size 5 Reversing Overload	5	**_ 501F _ _ _ 3A**	**EMA76L**	—
(2) 5	5	R F P + -	Size 5 Reversing Overload	5	**_ 501F _ _ _ 3A**		—
(1) 5	5	- + P F R	Size 5 Reversing Overload	5	**_ 501F _ _ _ 3A**	**EMA77L**	—

① Suffix **L** indicates locking.
② _ indicates missing digit of the Catalog Number; may have multiple values.

Overload and Coil Controller Covers



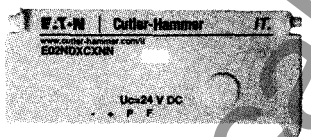


Table 33-37. Overload and Coil Controller Covers

NEMA Size	Description	Catalog Number	Price U.S. $
00, 0	For Starters	**EMOCSB**	—
00, 0	For Reversing Contactors	**EMCCCB**	—
1	For Starters	**EMOCSC**	—
1	For Reversing Contactors	**EMCCCC**	—
2	For Starters	**EMOCSD**	—
2	For Contactors	**EMCCCD**	—
3, 4	For Starters	**EMOCSE**	—
3, 4	For Contactors	**EMCCCE**	—
5	For Starters	**EMOCSF**	—
5	For Contactors	**EMCCCF**	—

Non-reversing Contactors (Sizes 00 – 1)

Table 33-38. Approximate Dimensions in Inches (mm)

NEMA 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	K	P	Q	R
00, 0	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)
1	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)

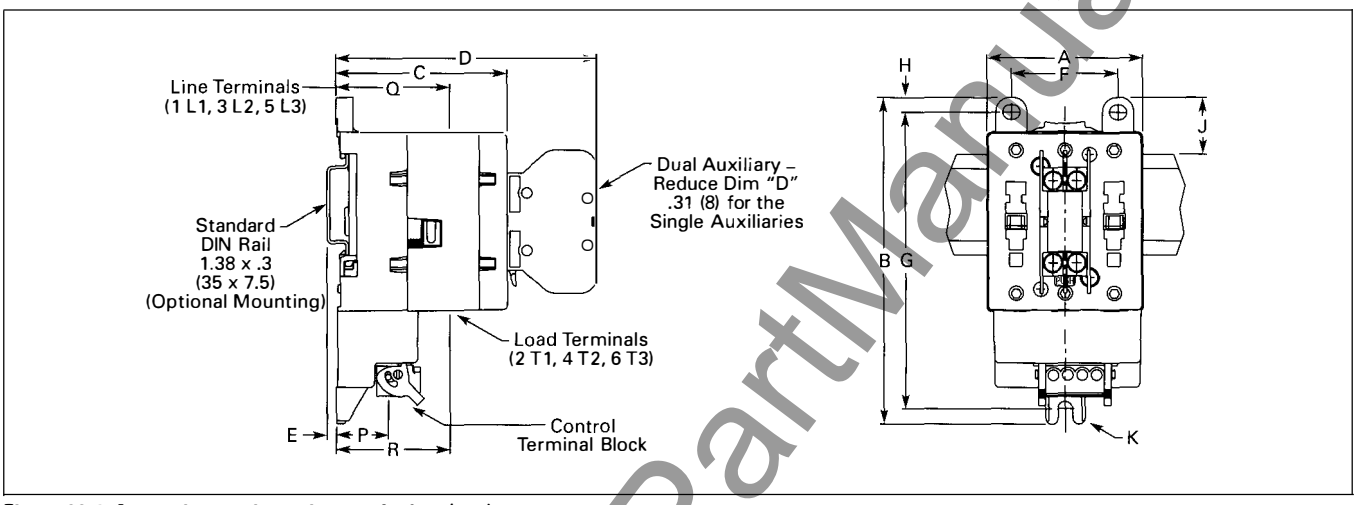


Figure 33-8. Approximate Dimensions — Inches (mm)

Non-reversing Contactors (Sizes 2 – 4) ①

Table 33-39. Approximate Dimensions in Inches (mm)

NEMA 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	K	P	Q	R
2	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)
3, 4	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)

① Sizes 5, consult factory.

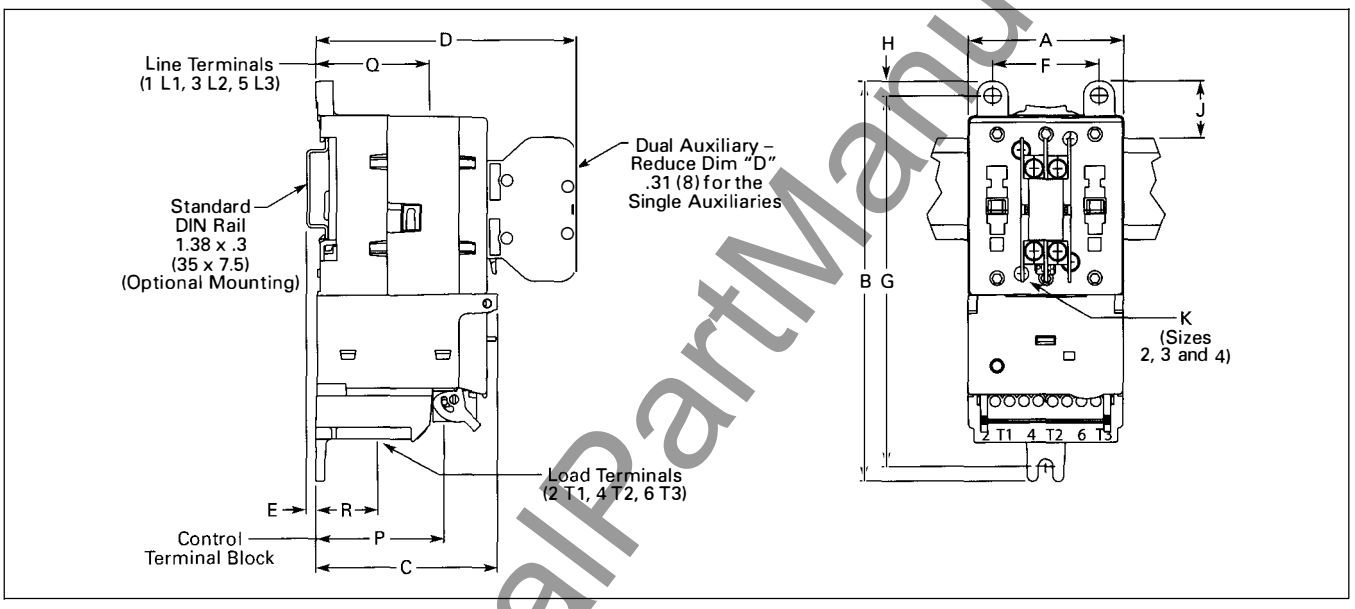


Figure 33-9. Approximate Dimensions — Inches (mm)

33

Reversing Contactors (Sizes 00 – 4) ①

Table 33-40. Approximate Dimensions in Inches (mm)

NEMA 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	K	P	Q	R
00, 0	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)
1	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)
2	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)
3, 4	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)

① Size 5, consult factory.

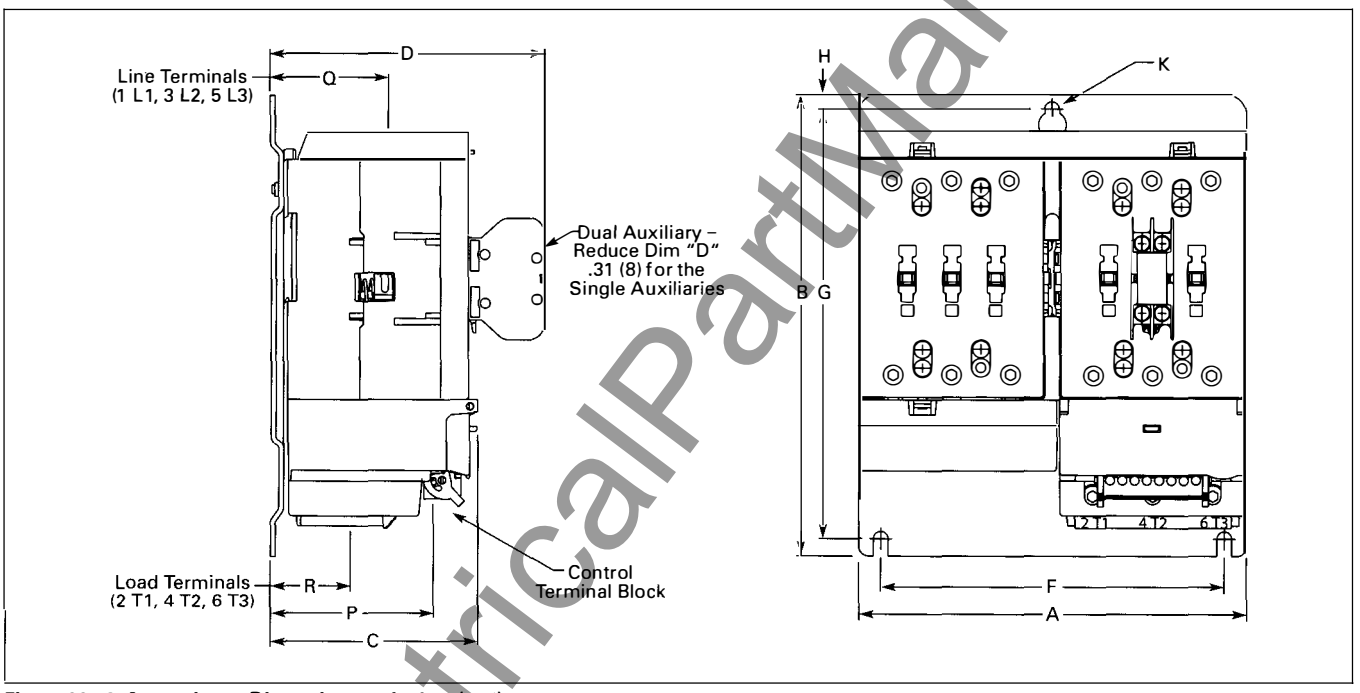


Figure 33-10. Approximate Dimensions — Inches (mm)

Non-reversing Starters (Sizes 00 – 4) ①

Table 33-41. Approximate Dimensions in Inches (mm)

NEMA 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
00, 0	1.8 (45)	5.0 (127)	2.5 (63)	3.6 (91)	.1 (3)	1.33 (33.8)	4.62 (117.3)	.2 (5)	.9 (23)	(3) #8 M4	.6 (14)	3.6 (91)	2.5 (63)	1.7 (44)	1.2 (30)	.6 (16)
1	2.1 (54)	5.4 (138)	2.5 (63)	3.6 (91)	.1 (3)	1.46 (37)	5.04 (128)	.2 (5)	.8 (20)	(3) #8 M4	.7 (17)	3.7 (93)	2.4 (62)	1.8 (45)	1.2 (30)	.3 (8)
2	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	.7 (17)	4.2 (106)	3.1 (78)	2.4 (60)	1.5 (37)	.6 (14)
3, 4	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	.7 (17)	5.7 (146)	3.5 (88)	2.8 (72)	1.7 (42)	.3 (8)

① Size 5, consult factory.

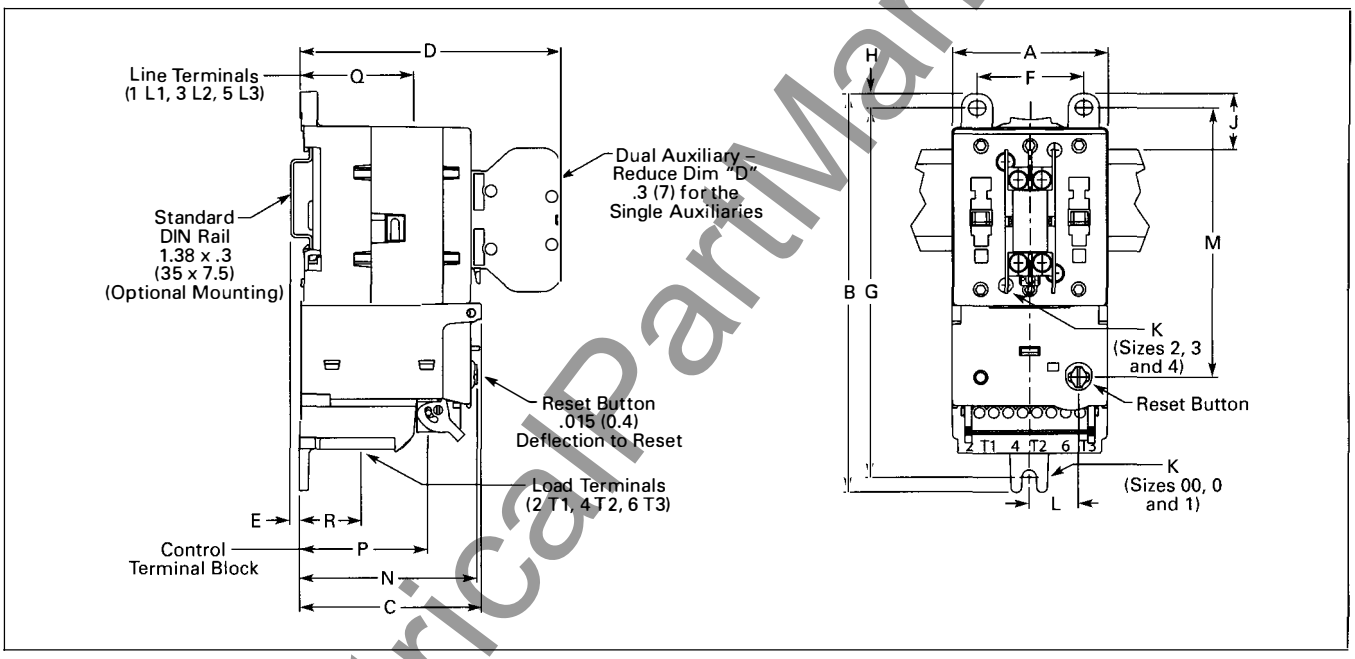


Figure 33-11. Approximate Dimensions — Inches (mm)

Reversing Starters (Sizes 00 – 4)①

Table 33-42. Approximate Dimensions in Inches (mm)

NEMA Size	Overall					Mounting Holes				Req. Mtg. Screws	Reset Button			Terminals		
	Width	Length	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
00, 0	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)
1	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)
2	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)
3, 4	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)

① Size 5, consult factory.

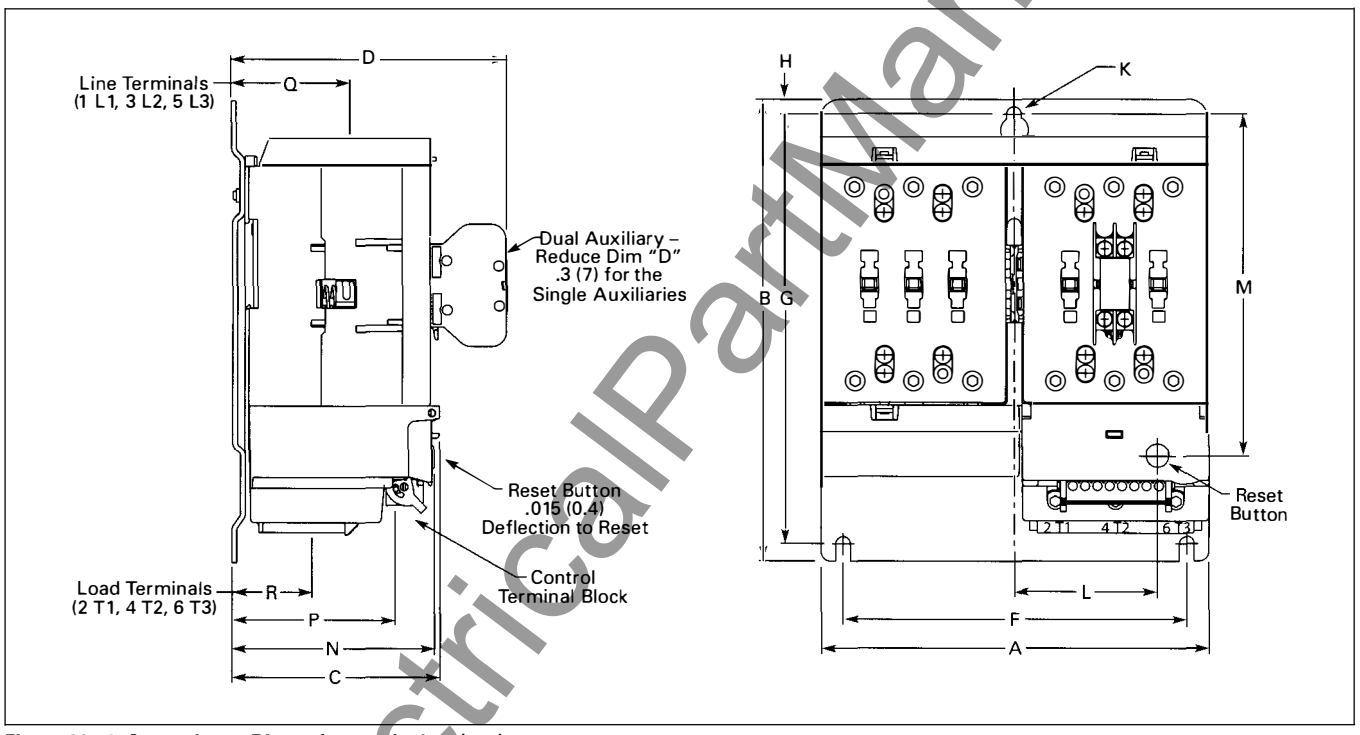


Figure 33-12. Approximate Dimensions — Inches (mm)

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