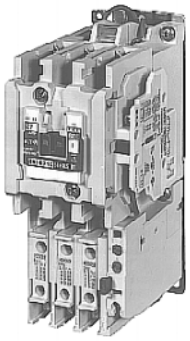
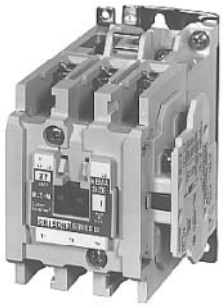


NEMA AN16DN0AB
NEMA Size 1 Starter



NEMA Size 1 Contactor

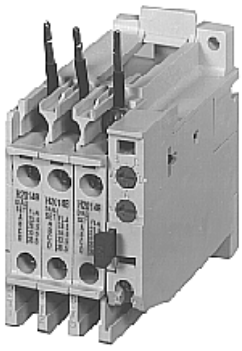
Product Description

Freedom Series starters and contactors 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 NEMA

- Adjustable Bimetallic Ambient Compensated Overload relays with interchangeable heater packs — available in three basic sizes, covering applications up to 900 hp — reducing the number of different contactor/overload relay combinations that have to be stocked. Fixed heater overloads are optional.
- Electronic Solid-State Overload Relay (C396) available as a stand-alone unit and assembled with Freedom Contactor.
- A full line of snap-on accessories common to both IEC and NEMA devices — 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 ± screws — reduced wiring time.
- Accessible terminals for easy wiring. Optional fingerproof shields available to prevent electrical shock.
- Top located coil terminals convenient and readily accessible. 45 mm contactor magnet coils have three terminals, permitting either top or diagonal wiring — easy to replace European or U.S. style starters or contactors without changing wiring layout.
- Encapsulated dual voltage/frequency magnet coils — permanently marked with voltage, frequency and part number. NEMA Sizes 00 – 0 have non-encapsulated coils as standard.
- Designed to meet or exceed NEMA, UL, CSA, VDE, BS and other international standards and listings.
- American engineering — built by Eaton, using the latest in statistical process control methods to produce high quality, reliable products.
- Sized based on standard NEMA classifications.
- Easy coil change and inspectable/replaceable contacts.
- Available in Open and NEMA Type 1, 3R, 4/4X and 12 enclosures.



Series B1 32A Overload

Standards and Certifications

- Standard: Designed to meet or exceed UL, NEMA, IEC, CSA, VDE and BS.
- UL listed: UL File #E1491, Guide #NLDX — Open and NEMA 1, 4, 12 Enclosed
- CSA Certified: CSA File #LR353, Class #321104 Open and NEMA 1 Enclosed

ISO 9000 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.

Short Circuit Protection

Fuses and **Inverse-Time Circuit Breakers** may be selected per Article 430, Part D of the National Electrical Code to protect motor branch circuits from fault conditions. If higher ratings or settings are required to start the motor, do **not** exceed the maximum as listed in Exception No. 2, Article 430-52.

C396 Electronic Overload

Catalog Number Selection

Table 33-89. Freedom Catalog Numbering System

A N 1 4 A N 0 A 3E 005

Device Type
A = Starter
C = Contactor

Standard
E = IEC
N = NEMA

Device Assembly Configuration
70 = Multi-Speed
1 = Non-reversing
5 = Reversing

OLR Type
4 = Starter w/C396 Electronic Overload
5 = Contactor only — no overload relay
6 = Starter w/C306 Bi-Metal OLR
7 = Starter w/C316 Bi-Metal OLR
8 = Starter w/***IT.*** SSOLR

Contactor Frame Size ①

NEMA Size	Continuous Amp Rating
A = 00	9
B = 0	18
D = 1	27
G = 2	45
K = 3	90
N = 4	135
S = 5	270
T = 6	540
U = 7	810
V = 8	1215

NEMA Enclosure
N = Open

For Starters

Starter Mounting Option
0 = Horizontal
V = Vertical

For Contactors Only
2 = 2-pole
3 = 3-pole
4 = 4-pole
5 = 5-pole

C396 Electronic Overload FLA Range (FNVR & FVR Only)

Frame A — NEMA Size 00 **P05** = 0.1 – 0.5A **002** = 0.4 – 2.0A **005** = 1.0 – 5.0A **008** = 1.6 – 8.0A	*Frame G — NEMA Size 2* **008** = 1.6 – 8.0A **045** = 9.0 – 45A
Frame B — NEMA Size 0 **P05** = 0.1 – 0.5A **002** = 0.4 – 2.0A **005** = 1.0 – 5.0A **008** = 1.6 – 8.0A **032** = 6.4 – 32A	*Frame K — NEMA Size 3* **110** = 22 – 110A
	Frame N — NEMA Size 4 **150** = 30 – 150A
	Frame S — NEMA Size 5 ② **300** = 60 – 300A
Frame D — NEMA Size 1 **P05** = 0.1 – 0.5A **002** = 0.4 – 2.0A **005** = 1.0 – 5.0A **008** = 1.6 – 8.0A **032** = 6.4 – 32A	*Frame T — NEMA Size 6* ② **600** = 120 – 600A
	Frame U — NEMA Size 7 ② **10C** = 200 – 1000A
	Frame V — NEMA Size 8 ② **15C** = 300 – 1500A

C396 Electronic OLR Designation (FVNR & FVR Only)
3E = Standard C396 OLR, SEL Reset, SEL Class

C306 Bi-Metallic OLR Designation

C =	NEMA Size 00, 0
B =	NEMA Size 1, 2
N/R =	NEMA Size 3, 4 ③
B =	NEMA Size 5
C =	NEMA Size 6
B =	NEMA Size 7, 8

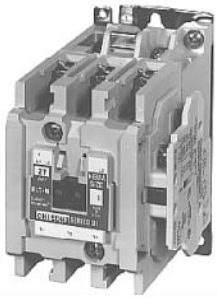
AC Coil Suffix

Suffix	Coil Volts and Hertz
A =	120/60 or 110/50
B =	240/60 or 220/50
C =	480/60 or 440/50
D =	600/60 or 550/50
E =	208/60
H =	277/60
J =	208 – 240/60 ④
K =	240/50
L =	380 – 415/50
N =	550/50
T =	24/60, 24/50 ⑤
U =	24/50
V =	32/50
W =	48/60
Y =	48/50

① For Contactor Only orders, add **B** to end of Catalog Number if NEMA Size 00 – 2, 6.
② Uses panel-mount CT with C396A2A005SELAX Overload.
③ Not required.
④ NEMA Sizes 00 and 0 only.
⑤ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

33

Contents

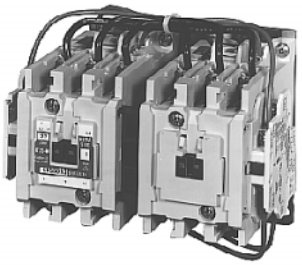


NEMA Size 1 — Cat. No. CN15DN3AB

Product Description

Non-reversing

Contactors are most commonly used to switch motor loads in applications where running overcurrent 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.



NEMA Size 1
Cat. No. CN55DN3AB

Reversing

Reversing contactors are used primarily for reversing single- or three-phase motors in applications where running overcurrent 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

- Designed specifically for use in applications requiring NEMA ratings. Contactors meet or exceed NEMA standards ICS 2-1993.
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion.
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V.
- Steel mounting plate standard on all open type contactors.

Non-reversing

- Holding circuit contact(s) supplied as standard:
  - Sizes 00 – 3 have NO auxiliary contact block mounted on right hand side (on Size 00, contact occupies 4th power pole position — no increase in width).
  - Sizes 4 – 5 have a NO contact block mounted on left side.
  - Sizes 6 – 7 have a 2NO/2NC contact block on top left.
  - Size 8 has a NO/NC contact block on top left back and a NO contact block on top right back.

Reversing

- One NO-NC side mounted interlock supplied as standard on each contactor for Sizes 00 – 8.

Technical Data

Table 33-90. Wire (75°C) Sizes — AWG or kcmil — Open and Enclosed

NEMA Size	Power Terminals Line or Load	Control Terminals Cu Only
00	12 – 16 stranded; 12 – 14 solid Cu	12 – 16 stranded 12 – 14 solid
0	8 – 16 stranded; 10 – 14 solid Cu	
1	8 – 14 stranded or solid Cu	
2	3 – 14 (upper) and/or 6 – 14 (lower) stranded or solid ① Cu	
3	1/0 – 14 Cu/Al	
4	250 mcm – 6	
5	750 kcmil – 2, or (2) 250 kcmil – 3/0 Cu/Al	
6	(2) 750 kcmil – 3/0 Cu/Al	
7	(3) 750 kcmil – 3/0 Cu/Al	
8	(4) 750 kcmil – 4/0 Cu/Al	

① Two compartment box lug.

Table 33-91. Plugging and Jogging Service Horsepower Ratings ②

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

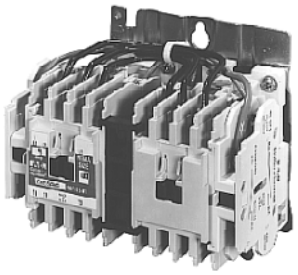
② Maximum horsepower where operation is interrupted more than 5 times per minute or more than 10 times in a 10 minute period. NEMA standard ICS 2-1993 table 2-4-3.

Kits and Accessories

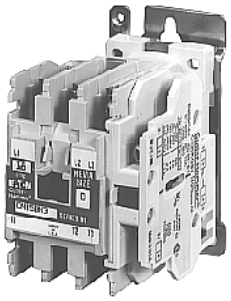
- Auxiliary Contacts, contactor mounted — **Pages 33-86** and **33-87**.
- Transient Suppressor, for magnet coil — **Pages 33-84.**
- Timers — Solid-State and Pneumatic, mount on contactor — **Page 33-83**.

Renewal Parts Publication Numbers

- See **Page 33-91.**



NEMA Size 00
3-Pole Contactor
Cat. No. CN55AN3AB



NEMA Size 0
3-Pole Contactor
Cat. No. CN15BN3AB

NEMA Size 3
3-Pole Contactor
Cat. No. CN15KN3A

Product Selection — 3-Pole Contactors

Table 33-92. Type CN15/CN55 NEMA Contactors — 3-Pole Non-reversing and Reversing

NEMA Size	Continuous Ampere Rating	Maximum UL Horsepower ①						3-Pole Non-reversing		3-Pole Reversing	
		1-Phase		3-Phase							
		115V	230V	208V	240V	480V	600V	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
00	9	1/3	1	1-1/2	1-1/2	2	2	**CN15AN3_B**		**CN55AN3_B**	
0	18	1	2	3	3	5	5	**CN15BN3_B**		**CN55BN3_B**	
1	27	2	3	7-1/2	7-1/2	10	10	**CN15DN3_B**		**CN55DN3_B**	
2	45	3	7-1/2	10	15	25	25	**CN15GN3_B**		**CN55GN3_B**	
3	90			25	30	50	50	**CN15KN3_**		**CN55KN3_**	
4	135			40	50	100	100	**CN15NN3_**		**CN55NN3_**	
5	270			75	100	200	200	**CN15SN3_**		**CN55SN3_**	
6	540			150	200	400	400	**CN15TN3_B**		**CN55TN3_B**	
7	810			200	300	600	600	**CN15UN3_**		**CN55UN3_**	
8 ②	1215			400	450	900	900	**CN15VN3_**		**CN55VN3_**	

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

② Common control. For separate 120V control, insert letter **D** in 7th position of listed Catalog Number. EXAMPLE: CN15VN**D**3C.

Magnet Coils — AC and DC

Contactor coils listed in this section also have a 50 Hz rating as shown in the adjacent table. Select required contactor by Catalog Number and replace the magnet coil alpha designation in the Catalog Number (_) with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2, the magnet coil alpha designation will be the next to the last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change CN15AN3_B to CN15AN3**L**B. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, **Pages 33-88 – 33-89**.

Table 33-93. AC Suffix Code

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 ③	**J**
240/50	**K**
380 – 415/50	**L**
550/50	**N**
24/60, 24/50 ④	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

③ NEMA Sizes 00 and 0 only.
④ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

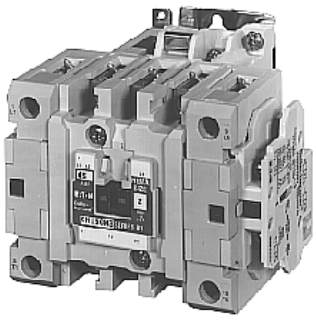
Technical Data..... **Pages 33-79 – 33-81**
Dimensions ..... **Pages 33-94 – 33-95**
Special Modifications ... **Page 33-90**
Accessories..... **Pages 33-82 – 33-90**
Discount Symbol..... **1CD1**

33

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

Table 33-94. Type CN15 NEMA Contactors — 2-, 4- and 5-Pole Non-reversing

NEMA Size	Continuous Ampere Rating	Maximum UL Horsepower						2-Pole Non-reversing		4-Pole Non-reversing		5-Pole Non-reversing	
		1-Phase (2-Pole)		3-Phase				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
		115V	230V	208V	240V	480V	600V						
00	9	1/3	1	1-1/2	1-1/2	2	2	**CN15AN2_B**		**CN15AN4_B**		—	
0	18	1	2	2	3	5	5	**CN15BN2_B**		—		—	
1	27	2	3	7-1/2	7-1/2	10	10	**CN15DN2_B**		**CN15DN4_B**		**CN15DN5_B**	
2	45	3	7-1/2	10	15	25	25	**CN15GN2_B**		**CN15GN4_B**		**CN15GN5_B**	
3	90			25	30	50	50	**CN15KN2_**		—		—	
4	135			40	50	100	100	**CN15NN2_**		—		—	
5	270			75	100	200	200	**CN15SN2_**		—		—	
6	540			150	200	400	400	**CN15TN2_B**		—		—	



NEMA Size 2
5-Pole Contactor
Cat. No. CN15GN5AB

Magnet Coils — AC or DC

Select required starter by Catalog Number and replace the magnet coil alpha designation in the Catalog Number (_) with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2, the magnet coil alpha designation will be the next to the last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change CN15BN3_B to CN15BN3**L**B. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, **Pages 33-88 – 33-89**.

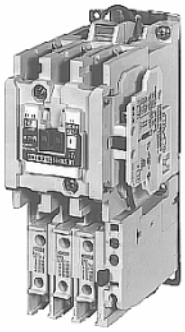
Table 33-95. AC Suffix Code

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**
24/60, 24/50 ②	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

① NEMA Sizes 00 and 0 only.
② NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

Technical Data ..... **Pages 33-79 – 33-81**
Dimensions ..... **Pages 33-94 – 33-95**
Special Modifications... **Page 33-90**
Accessories ..... **Pages 33-82 – 33-90**
Discount Symbol **1CD1**

Contents

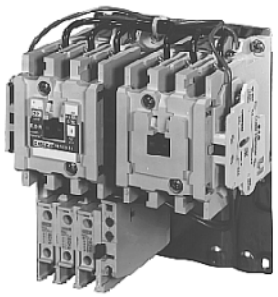


NEMA Size 1 — Cat. No. AN16DN0AB

Product Description

Non-reversing

Three-phase, full voltage magnetic starters are most commonly used to switch AC motor loads. Starters consist of a magnetically actuated switch (contactor) and an overload relay assembled together.



NEMA Size 1 — Cat. No. AN56DN0AB

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

- Bimetallic Ambient Compensated Overload relays — available in three basic sizes covering applications up to 900 hp — 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 ±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.
  - Load lugs built into relay base.
  - Single-phase protection, Class 20 or Class 10 trip time.
  - Overload trip indication.
  - Electrically isolated NO-NC contacts (pull RESET button to test).
- The C396 is a self-powered, robust electronic overload designed for integrate use with Freedom NEMA contactors.
  - Tiered feature set to provide coverage specific to your application.
  - Broad 5:1 FLA range for maximum flexibility.
  - Coverage from 0.05 – 1500 Amps to meet all your needs.
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion. Generously sized for low resistance and cool operation.
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V.
- Steel mounting plate standard on all open type starters.
- Wired for separate or common control.

Non-reversing

- Holding circuit contact(s) supplied as standard:
  - Sizes 00 – 3 have a NO auxiliary contact block mounted on right-hand side (on Size 00, contact occupies 4th power pole position — no increase in width).
  - Sizes 4 – 5 have a NO contact block mounted on left side.
  - Sizes 6 – 7 have a 2NO/2NC contact block on top left.
  - Size 8 has a NO/NC contact block on top left back and a NO on top right back.

Reversing

- Each contactor (Size 00 – 8) supplied with one NO-NC side mounted contact block as standard. NC contacts are wired as electrical interlocks.

Technical Data

Table 33-96. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 00 – 2 — Open and Enclosed

NEMA Size	Wire Size ② Cu Only
Power Terminals — Line	
00 0 1 2	12 – 16 AWG stranded, 12 – 14 AWG solid 8 – 16 AWG stranded, 10 – 14 AWG solid 8 – 14 AWG stranded or solid 3 – 14 AWG (upper) and/or 6 – 14 AWG (lower) stranded or solid ①
Power Terminals — Load — Cu Only (stranded or solid)	
00 – 0 1 – 2	14 – 6 AWG stranded or solid 14 – 2 AWG stranded or solid
Control Terminals — Cu Only	
12 – 16 AWG stranded, 12 – 14 AWG solid	

① Two compartment box lug.
② Minimum per NEC. Maximum wire size: Sizes 00 and 0 to 8 AWG and Sizes 1 – 2 to 2 AWG.

Table 33-97. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 3 – 8 — Open and Enclosed

NEMA Size	Wire Size ③
Power Terminals — Line and Load	
3	1/0 – 14 AWG Cu/Al
4	Open — 3/0 – 8 AWG Cu; Enclosed — 250 kcmil — 6 AWG Cu/Al
5 6 7 8	750 kcmil — 2 AWG; or (2) 250 kcmil — 3/0 AWG Cu/Al (2) 750 kcmil — 3/0 AWG Cu/Al (3) 750 kcmil — 3/0 AWG Cu/Al (4) 750 kcmil — 1/0 AWG Cu/Al
Control Terminals — Cu Only	
12 – 16 AWG stranded, 12 – 14 AWG solid	

③ Minimum per NEC. Maximum wire size: Sizes 00 and 0 to 8 AWG and Sizes 1 – 2 to 2 AWG.

Wiring Diagrams

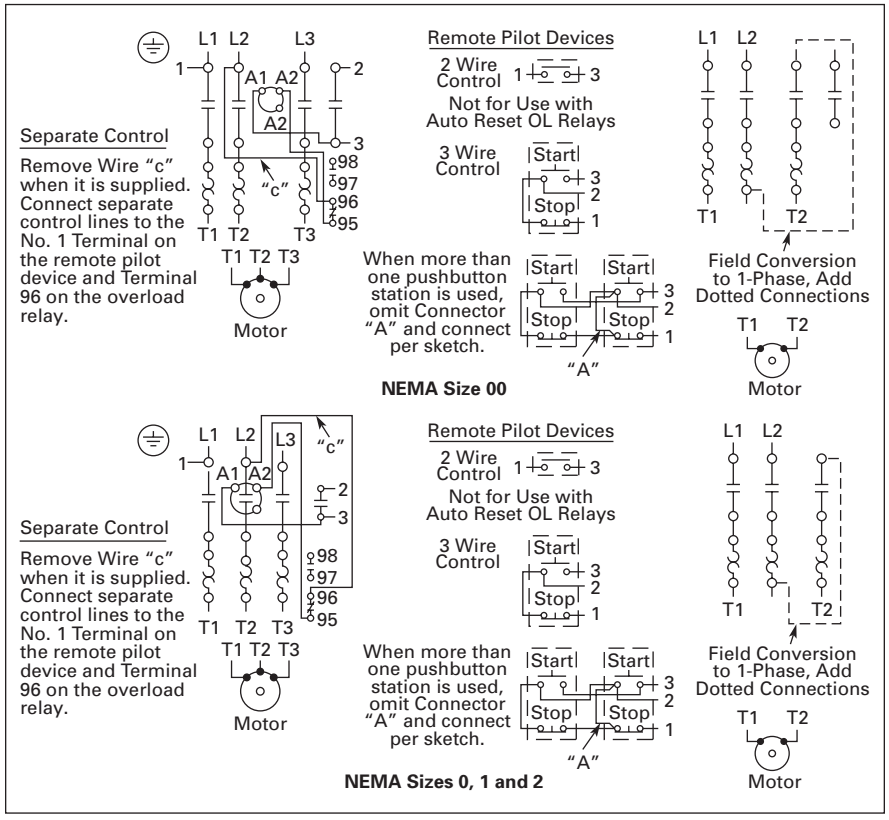


Figure 33-24. Typical Wiring Diagrams — Three-Phase and Single-Phase Applications

Table 33-98. Plugging and Jogging Service Horsepower Ratings ④

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

④ Maximum horsepower where operation is interrupted more than 5 times per minute, or more than 10 times in a 10 minute period. NEMA Standard ICS2-1993 table 2-4-3.

Kits and Accessories

- Auxiliary Contacts, contactor mounted — **Pages 33-86** – **33-87**.
- Transient Suppressor, for magnet coil — **Pages 33-84.**
- Timers — Solid-State and Pneumatic, mount on contactor — **Page 33-83**.

Renewal Parts Publication Numbers

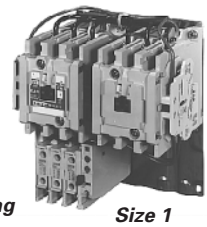
- See **Page 33-91.**

Product Selection

When Ordering Supply

- Catalog Number
- Heater pack number (see selection table, **Pages 33-107 – 33-108**) or full load current.

Size 0 Non-reversing Starter



Size 1 Reversing Starter

Size 3 Vertical Reversing Starter

Table 33-99. Type AN16/AN56 NEMA — Manual or Automatic Reset Overload Relay — Non-reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service-Limit Current Rating ③ (Amperes)	Maximum UL Horsepower ②						3-Pole Non-reversing ①		3-Pole Reversing ①	Vertical Reversing ①	Price U.S. $
			1-Phase		3-Phase								
			115V	230V	208V	240V	480V	600V	Catalog Number	Price U.S. $	Catalog Number	Catalog Number	
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN16AN0_C**		**AN56AN0_C**	—	
0	18	21	1	2	3	3	5	5	**AN16BN0_C**		**AN56BN0_C**	**AN56BNV0_**	
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN16DN0_B**		**AN56DN0_B**	**AN56DNV0_**	
2	45	52	3	7-1/2	10	15	25	25	**AN16GN0_B**		**AN56GN0_B**	**AN56GNV0_**	
3	90	104	—	—	25	30	50	50	**AN16KN0_**		**AN56KN0_**	**AN56KNV0_**	
4	135	156	—	—	40	50	100	100	**AN16NN0_**		**AN56NN0_**	**AN56NNV0_**	
5	270	311	—	—	75	100	200	200	**AN16SN0_B**		**AN56SN0_B**	—	
6	540	621	—	—	150	200	400	400	**AN16TN0_C**		**AN56TN0_C**	—	
7	810	932	—	—	200	300	600	600	**AN16UN0_B**		**AN56UN0_B**	—	
8 ④	1215	1400	—	—	400	450	900	900	**AN16VN0_B**		**AN56VN0_B**	—	

Note: Starter Catalog Numbers do not include heater packs. Select one carton of three heater packs. Heater pack selection, **Pages 33-107 – 33-108.**

① Underscore (_) indicates coil suffix required, see **Table 33-100**.

② Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

③ The service-limit current ratings represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.

④ Common control. For separate 120V control, insert letter **D** in 7th position of listed Catalog Number. EXAMPLE: AN56VN**D**0CB.

NEMA Size 0
Cat. No. AN56BN0AC

Magnet Coils — AC or DC

Starter coils listed in this section also have a 50 Hz rating as shown in the adjacent table. Select required starter by Catalog Number and replace the magnet coil alpha designation in the Catalog Number (_) with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2 and 5 – 8, the magnet coil alpha designation will be the next to last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change AN16BN0_C to AN16BN0**L**C. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, **Pages 33-88 – 33-89**.

Table 33-100. AC Suffix Code

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 ⑤	**J**
240/50	**K**
380 – 415/50	**L**
550/50	**N**
24/60, 24/50 ⑥	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

⑤ NEMA Sizes 00 and 0 only.

⑥ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

Technical Data..... **Pages 33-79 – 33-81**
Overload Relay ..... **Page 33-103**
Dimensions ..... **Pages 33-96 – 33-98**
Special Modifications ... **Page 33-90**
Accessories..... **Pages 33-82 – 33-90**
Heater Packs..... **Pages 33-107 – 33-108**
Discount Symbol..... **1CD1**

Catalog Number AN700BN0218
NEMA Size 0, Open Type
Two-Speed, Reconnectable
(One-Winding)

Catalog Number AN700DN0218
NEMA Size 1, Open Type
Two-Speed, Reconnectable Winding
(One-Winding)

Catalog Number AN700DN022
NEMA Size 1, Open Type
Two-Speed, Two-Winding
Separate Winding) Wye-Wye Motor

Product Selection

When Ordering Specify

For 2-Speed Selective Control:

- Catalog Number plus magnet coil Code Suffix. Example: Size 0 — AN700BN022**B.**
- Heater pack number or full load current for each speed.

For 2-Speed other than Selective Control:

- Catalog Number plus magnet coil Code Suffix and option required. Example: AN700BN022B except Compelling.
- Heater pack number or full load current for each speed.

Note: 2-speed starters are designed for starting and controlling both separate (2-winding) and reconnectable (1-winding) motors. Separate winding, WYE-WYE motors have a separate winding for each speed. Reconnectable, consequent pole motors use the same winding for both speeds. All standard starters are wired for selective control.

Table 33-101. Product Selection — 2-Speed — Selective Control — Separate Winding ①

Maximum Horsepower — 60/50 Hertz								NEMA Size	Open Type	
Constant or Variable Torque				Constant Horsepower					Catalog Number	Price U.S. $
115V	200V	230V	460V/575V	115V	200V	230V	460/575V			
1-1/2	3	3	5	1	2	2	3	0	**AN700BN022_**	
3	7-1/2	7-1/2	10	2	5	5	7-1/2	1	**AN700DN022_**	
—	10	15	25	—	7-1/2	10	20	2	**AN700GN022_**	
—	25	30	50	—	20	25	40	3	**AN700KN022_**	
—	40	50	100	—	30	40	75	4	**AN700NN022_**	
—	75	100	200	—	60	75	150	5	**AN700SN022_**	

Prices of starters do not include heater packs. Select 2 packs (2 overload relays, one for each speed). Heater pack selection, **Pages 33-107 – 33-108.**

① If branch circuit protective device is 45A or greater, C320FBR1 fuse kit(s) may be required for circuit protection per NEC 530-072.

Table 33-102. Product Selection — 2-Speed — Selective Control — Reconnectable Winding ②

Maximum Horsepower — 60/50 Hertz								NEMA Size	Open Type		
Constant or Variable Torque				Constant Horsepower					Constant or Variable Torque	Constant Horsepower	Price U.S. $
115V	200V	230V	460V/575V	115V	200V	230V	460/575V		Catalog Number	Catalog Number	
1-1/2	3	3	5	1	2	2	3	0	**AN700BN0218_**	**AN700BN0219_**	
3	7-1/2	7-1/2	10	2	5	5	7-1/2	1	**AN700DN0218_**	**AN700DN0219_**	
—	10	15	25	—	7-1/2	10	20	2	**AN700GN0218_**	**AN700GN0219_**	
—	25	30	50	—	20	25	40	3	**AN700KN0218_**	**AN700KN0219_**	
—	40	50	100	—	30	40	75	4	**AN700NN0218_**	**AN700NN0219_**	

Prices of starters do not include heater packs. Select 2 packs (2 overload relays, one for each speed). Heater pack selection, **Pages 33-107 – 33-108.**

② If branch circuit protective device is 45A or greater, C320FBR1 fuse kit(s) may be required for circuit protection per NEC 530-072.

Table 33-103. Magnetic Coils — AC or DC

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

③ NEMA Sizes 00 and 0 only. Sizes 1 – 5 are 24/60 only.

Dimensions . . . . . **Page 33-99**
Discount Symbol **1CD1**

NEMA Size 1 — Cat. No. BN16DN0AB

Product Description

Single-phase, full voltage magnetic starters connect the motor directly across the line, allowing it to draw full inrush current during start-up. These starters are most commonly used for control of self-starting single-phase motors up to 15 horsepower at 230V. They consist of a 2-pole electromagnetic contactor to make and break the motor power circuit and an overload relay to provide running overload protection. Starters listed in the table include:

- Two-pole Freedom Series contactor with long life twin break, silver cadmium oxide contacts. Generously sized for low resistance and cool operation. Designed to 3 million electrical operations at maximum hp and 30 million mechanical operations to Size 0, 10 million operations to Size 2 and 6 million operations to Size 3.
- Three-pole Freedom Series overload with poles 2 and 3 wired in series for motor overload protection. This overload is ambient compensated, selectable Manual or Automatic reset, interchangeable Class 10 or 20 heater packs, 1.0 or 1.15 service factor selectability, overload trip indication and electrically isolated NO-NC contacts (pull RESET button to test).
- Holding circuit NO auxiliary contact supplied as standard. On Size 00, the contact occupies the 4th power pole position. Sizes 0 – 3 have the NO auxiliary mounted on the right side of the contactor.
- Steel mounting plate as standard on all open type starters. Wired for separate or common control.

Wiring Diagrams

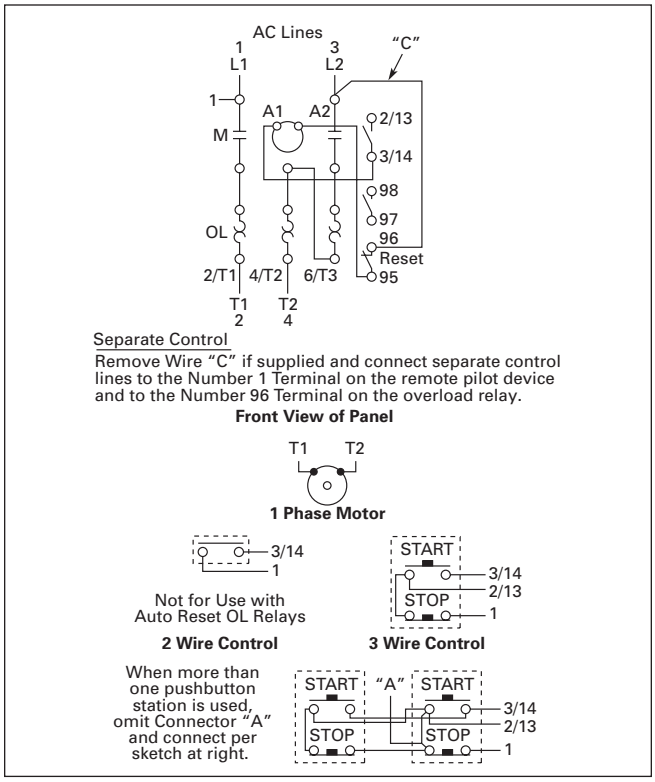


Figure 33-25. Typical Wiring Diagrams — Single-Phase Applications (Factory Wired)

Product Selection

When Ordering Specify

- Catalog Number
- Heater Pack Number (see selection table, **Pages 33-107 – 33-108**) or full load current.

Table 33-104. Type BN16 NEMA — Manual or Automatic Reset Overload Relay

NEMA Size	Maximum Horsepower		Magnet Coil Voltage (60 Hz)	Open Type 2-Pole	
	Motor Voltage	1-Phase		Catalog Number	Price U.S. $
00	115 230	1/3 1	120 ① 240	**BN16AN0AC** **BN16AN0BC**	
0	115 230	1 2	120 ① 240	**BN16BN0AC** **BN16BN0BC**	
1	115 230	2 3	120 ① 240	**BN16DN0AB** **BN16DN0BB**	
1P	115 230	3 5	120 ① 240	**BN16PN0AB** **BN16PN0BB**	
2	115 230	3 7-1/2	120 ① 240	**BN16GN0AB** **BN16GN0BB**	
3	115 230	7-1/2 15	120 ① 240	**BN16KN0A** **BN16KN0B**	

Note: Starter Catalog Numbers do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **Pages 33-107 – 33-108**.

① For separate 120V control circuit. For maximum hp at listed motor voltages, use the rating of other starters of same size.

Accessories . . . . . **Pages 33-82 – 33-90**
Discount Symbol **1CD1**

33

Product Selection

Catalog Number AN14GN0_ _ _

Table 33-105. Type AN14/AN54 NEMA — C396 Selectable Reset Electronic Overload Relay — Non-reversing and Reversing

NEMA Size	Cont. Amp Rating	Service-Limit Current Rating ⑥ (Amps)	Maximum UL Horsepower ⑤						3-Pole Non-reversing ①②③		3-Pole Reversing ①②③	Vertical Reversing ①②③	
			1-Phase		3-Phase								
			115V	230V	208V	240V	480V	600V	Catalog Number	Price U.S. $	Catalog Number	Catalog Number	Price U.S. $
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN14AN0_ _ _**		**AN54AN0_ _ _**	**—**	
0	18	21	1	2	3	3	5	5	**AN14BN0_ _ _**		**AN54BN0_ _ _**	**AN54BNV_ _ _**	
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN14DN0_ _ _**		**AN54DN0_ _ _**	**AN54DNV_ _ _**	
2	45	52	3	7-1/2	10	15	25	25	**AN14GN0_ _ _**		**AN54GN0_ _ _**	**AN54GNV_ _ _**	
3	90	104	—	—	25	30	50	50	**AN14KN0_ _ _**		**AN54KN0_ _ _**	**AN54KNV_ _ _**	
4 ④	135	156	—	—	40	50	100	100	**AN14NN0_ _ _**		**AN54NN0_ _ _**	**AN54NNV_ _ _**	
5	270	311	—	—	75	100	200	200	**AN14SN0_ _ _**		**AN54SN0_ _ _**	**—**	
6	540	621	—	—	150	200	400	400	**AN14TN0_ _ _**		**AN54TN0_ _ _**	**—**	
7	810	932	—	—	200	300	600	600	**AN14UN0_ _ _**		**AN54UN0_ _ _**	**—**	
8 ⑦	1215	1400	—	—	400	450	900	900	**AN14VN0_ _ _**		**AN54VN0_ _ _**	**—**	

① Underscore (_) indicates coil suffix required, see **Table 33-106**.
② Underscore (_) indicates OLR designation required, see **Table 33-107**.
③ Underscore (_) indicates FLA range, see **Table 33-108**.
④ Starter is shipped unassembled. Catalog Number includes overload relay and contactor. Not a direct dimensional replacement for Size 4 Starter with C306 bi-metallic overload.
⑤ Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

⑥ The service-limit current ratings represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.
⑦ Common control. For separate 120V control, insert letter **D** in 7th position of listed Catalog Number. EXAMPLE: AN54VN**D**_ _ _.

Table 33-106. AC Suffix Code

Coil Volts and Hertz	Code Suffix
120/60 or 110/50 240/60 or 220/50 480/60 or 440/50 600/60 or 550/50	**A** **B** **C** **D**
208/60 277/60 208 – 240/60 ⑧ 240/50	**E** **H** **J** **K**
380 – 415/50 550/50 24/60, 24/50 ⑨ 24/50	**L** **N** **T** **U**
32/50 48/60 48/50	**V** **W** **Y**

⑧ NEMA Sizes 00 and 0 only.
⑨ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

Table 33-107. OLR Designation

OLR
3E = Standard C396 OLR, SEL Reset, SEL Class

Table 33-108. C396 FLA Range (FNVR & FVR Only)

NEMA Size	FLA Range
00	**P05** = 0.1 – 0.5A **005** = 1.0 – 5.0A **002** = 0.4 – 2.0A **008** = 1.6 – 8.0A
0	**P05** = 0.1 – 0.5A **008** = 1.6 – 8.0A **002** = 0.4 – 2.0A **032** = 6.4 – 32A **005** = 1.0 – 5.0A
1	**P05** = 0.1 – 0.5A **008** = 1.6 – 8.0A **002** = 0.4 – 2.0A **032** = 6.4 – 32A **005** = 1.0 – 5.0A
2	**008** = 1.6 – 8.0A **045** = 9.0 – 45A
3	**110** = 22 – 110A
4	**150** = 30 – 150A
5 ⑩	**300** = 60 – 300A
6 ⑩	**600** = 120 – 600A
7 ⑩	**10C** = 200 – 1000A
8 ⑩	**15C** = 300 – 1500A

⑩ Uses panel-mount CT with C396A2A005SELAX Overload.

Technical Data – Contactors . . . . . **Pages 33-79 – 33-81**
Technical Data – Overload . . . . . **Page 33-113**
Overload Relay . . . . . **Page 33-108**
Dimensions . . . . . **Pages 33-96 – 33-98**
Special Modifications . . . . **Page 33-90**
Accessories . . . . . **Pages 33-82 – 33-90**
Discount Symbol **1CD1**