

## Freedom Full Voltage Controls

2



## Product Description

Eaton's Freedom Series™ starters and contactors feature a compact, space-saving design, high strength, impact and temperature resistant insulating materials.

## Features

- C440 solid-state electronic overload providing reliable, accurate and value-driven protection, including communication capabilities, while reducing inventory carrying costs with wide FLA adjustment (5:1) and selectable trip class
- Adjustable bimetallic ambient compensated overload relays with interchangeable heater packs—available in three basic sizes, covering applications up to 900 hp
- Fixed heater overloads optional
- A full line of snap-on accessories—top and side mounted auxiliary contacts, solid-state and pneumatic timers, and so on
- 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—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
- Designed to meet or exceed UL, CSA®, IEC, VDE, BS and other international standards and listings

## Contents

| Description  | Page             |
|--|------------------|
| Freedom Full Voltage Controls                          |                  |
| Catalog Number Selection . . . . .                     | <b>V10-T2-4</b>  |
| Cover Control . . . . .                                | <b>V10-T2-6</b>  |
| Contactors   |                  |
| Non-Reversing Contactors . . . . .                     | <b>V10-T2-10</b> |
| Reversing Contactors . . . . .                         | <b>V10-T2-16</b> |
| Starters   |                  |
| Non-Combination Starters . . . . .                     | <b>V10-T2-18</b> |
| Combination Starters—Fusible and Non-Fusible . . . . . | <b>V10-T2-25</b> |
| Combination Starters—Circuit Breaker . . . . .         | <b>V10-T2-39</b> |
| Wiring Diagrams . . . . .                              | <b>V10-T2-50</b> |

## Standards and Certifications

**Note:** See **Tab 17** for additional information on standards and certifications that apply to all enclosed control products.

- UL Listed
- cUL® Listed (indicates appropriate CSA Standard investigation)
- ABS Type Approved
- OSHPD Certified (OSP-0015-10)

## Certified Type 2 Coordination

Eaton's Freedom Series NEMA starters are UL Certified to achieve IEC 947 Type 2 coordination against 100,000 A 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.

ISO 9001 Certification

When you turn to Eaton’s 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. The enclosed control is manufactured in our Fayetteville, NC plant, and this facility is registered ISO 9001. This commitment to quality results in increased product reliability and total customer satisfaction.

Freedom NEMA contactors and starters are extremely rugged products built for any application. Their long electrical/mechanical life is extended through easy maintainability.

- Meets and exceeds all UL and CSA standards
- Sized based on standard NEMA size classifications
- Designed and built for a variety of demanding applications
- Easy coil change and inspectable/replaceable contacts
- Available open and in Type 1, 3R, 4, 4X, 7/9 and 12 enclosures

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.

Additional Reference

|   |                 |
|---|-----------------|
| Other Magnet Coils . . . . .                | <b>V10-T2-4</b> |
| Cover Control . . . . .                     | <b>V10-T2-6</b> |
| Dimensions . . . . .                        | <b>Tab 14</b>   |
| Accessories and Modifications . . . . .     | <b>Tab 15</b>   |
| Renewal Parts . . . . .                     | <b>Tab 16</b>   |
| Technical Data and Specifications . . . . . | <b>Tab 17</b>   |

# 2.1

## NEMA Contactors and Starters

### Freedom Full Voltage Controls

#### Catalog Number Selection

##### NEMA Freedom Line Enclosed Control

2

EC N 22 2 1 A A F -

| Design           |
|------------------|
| N = Freedom NEMA |
| 2 = A200         |

| Modification/Overload Codes                          |
|--|
| All modification codes, see <b>Tab 15</b> .          |
| For solid-state overload codes, <b>Page V10-T2-5</b> |

| Class  | Page             |
|--|------------------|
| <b>01</b> = Non-reversing contactor—three-pole                                     | <b>V10-T2-10</b> |
| Non-reversing contactor—two-pole   | <b>V10-T2-12</b> |
| Non-reversing contactor—four-pole  | <b>V10-T2-14</b> |
| Non-reversing contactor—five-pole  | <b>V10-T2-15</b> |
| <b>02</b> = Reversing contactor—three-pole   | <b>V10-T2-16</b> |
| <b>05</b> = Non-combination non-reversing starter                                  | <b>V10-T2-18</b> |
| <b>05</b> = Non-combination single-phase non-reversing starter                     | <b>V10-T2-20</b> |
| <b>06</b> = Non-combination reversing starter                                      | <b>V10-T2-21</b> |
| <b>07</b> = Non-combination non-reversing starter with CPT                         | <b>V10-T2-23</b> |
| <b>16</b> = Combination non-reversing starter—fusible disconnect                   | <b>V10-T2-25</b> |
| Combination non-reversing starter—non-fusible disconnect                           | <b>V10-T2-27</b> |
| Special enclosure combination non-reversing starter—fusible/non-fusible disconnect | <b>V10-T2-29</b> |
| <b>17</b> = Combination reversing starter—fusible disconnect                       | <b>V10-T2-31</b> |
| Combination reversing starter—non-fusible disconnect                               | <b>V10-T2-33</b> |
| <b>18</b> = Combination non-reversing starter—fusible disconnect with CPT          | <b>V10-T2-35</b> |
| Combination non-reversing starter—non-fusible disconnect with CPT                  | <b>V10-T2-37</b> |
| <b>22</b> = Combination non-reversing starter—circuit breaker                      | <b>V10-T2-39</b> |
| Special enclosure combination non-reversing starter—circuit breaker                | <b>V10-T2-42</b> |
| <b>23</b> = Combination reversing starter—circuit breaker                          | <b>V10-T2-44</b> |
| <b>24</b> = Combination non-reversing starter—circuit breaker with CPT             | <b>V10-T2-47</b> |

| NEMA Size          |                   |                   |  |  |  |
|--------------------|-------------------|-------------------|--|--|--|
| <b>A</b> = Size 00 | <b>3</b> = Size 3 | <b>7</b> = Size 7 |  |  |  |
| <b>0</b> = Size 0  | <b>4</b> = Size 4 | <b>8</b> = Size 8 |  |  |  |
| <b>1</b> = Size 1  | <b>5</b> = Size 5 | <b>9</b> = Size 9 |  |  |  |
| <b>2</b> = Size 2  | <b>6</b> = Size 6 |                   |  |  |  |

| Disconnect Fuse Clip Ratings |                          |                           |
|------------------------------|--------------------------|---------------------------|
| <b>A</b> = None              | <b>G</b> = 100 A/600 V R | <b>N</b> = 600 A/600 V R  |
| <b>B</b> = 30 A/250 V R      | <b>H</b> = 200 A/250 V R | <b>P</b> = 800 A/600 V L  |
| <b>C</b> = 30 A/600 V R      | <b>J</b> = 200 A/600 V R | <b>Q</b> = 1200 A/600 V L |
| <b>D</b> = 60 A/250 V R      | <b>K</b> = 400 A/250 V R | <b>R</b> = 1600 A/600 V L |
| <b>E</b> = 60 A/600 V R      | <b>L</b> = 400 A/600 V R | <b>S</b> = 2000 A/600 V L |
| <b>F</b> = 100 A/250 V R     | <b>M</b> = 600 A/250 V R | <b>T</b> = By description |

| Circuit Breaker Ratings |                   |                           |
|-------------------------|-------------------|---------------------------|
| <b>A</b> = None         | <b>H</b> = 150 A  | <b>R</b> = 3000 A         |
| <b>B</b> = 3 A          | <b>J</b> = 250 A  | <b>T</b> = By description |
| <b>C</b> = 7 A          | <b>K</b> = 400 A  | <b>5</b> = 3 A ①          |
| <b>D</b> = 15 A         | <b>L</b> = 600 A  | <b>6</b> = 7 A ①          |
| <b>E</b> = 30 A         | <b>M</b> = 800 A  | <b>7</b> = 15 A ①         |
| <b>F</b> = 50 A         | <b>N</b> = 1000 A | <b>8</b> = 30 A ①         |
| <b>W</b> = 70 A         | <b>P</b> = 1200 A | <b>9</b> = 50 A ①         |
| <b>G</b> = 100 A        | <b>Q</b> = 2000 A | <b>I</b> = 100 A ①        |

| Cover Control   |
|---|
| Type 1 non-comb. (NEW BOX 1 only), <b>Page V10-T2-6</b> |
| Type 1 non-comb., <b>Page V10-T2-7</b>                  |
| All others, <b>Page V10-T2-8</b>                        |
| Contactors  |
| <b>3</b> = Three poles                                  |

| Coil Voltage and/or Control Transformers |
|--|
| See code tables below                    |

| Enclosure Type  |
|---|
| <b>1</b> = Type 1—General purpose                         |
| <b>2</b> = Type 3R—Rainproof                              |
| <b>3</b> = Type 4—Watertight (painted steel)              |
| <b>4</b> = Type 4X—Watertight (304-Grade stainless steel) |
| <b>5</b> = Type 4X—Corrosion (non-metallic)               |
| <b>6</b> = Type 7/9—Bolted hazardous location             |
| <b>7</b> = Type 7/9—Threaded hazardous location           |
| <b>8</b> = Type 12—Dust-tight                             |
| <b>9</b> = Type 4X—316-Grade stainless steel              |

#### Magnetic Coil Codes (System Voltage) ②

| Code     | Magnet Coil   | Code     | Magnet Coil | Code     | Magnet Coil    |
|----------|---------------|----------|-------------|----------|----------------|
| <b>A</b> | 120/60–110/50 | <b>K</b> | 240/50      | <b>U</b> | 24/50          |
| <b>B</b> | 240/60–220/50 | <b>L</b> | 380/50      | <b>V</b> | 32/50          |
| <b>C</b> | 460/60–440/50 | <b>M</b> | 415/50      | <b>W</b> | 48/60          |
| <b>D</b> | 575/60–550/50 | <b>P</b> | 12 Vdc      | <b>X</b> | 104–120/60     |
| <b>E</b> | 208/60        | <b>Q</b> | 24 Vdc      | <b>Y</b> | 48/50          |
| <b>G</b> | 550/50        | <b>R</b> | 48 Vdc      | <b>Z</b> | By description |
| <b>H</b> | 277/60        | <b>S</b> | 125 Vdc     |          |                |
| <b>J</b> | 208–240/60    | <b>T</b> | 24/60       |          |                |

#### Notes

① Use for 0–3, HMCP 600 V applications only.

② When control power transformer modification codes (**C1–C11**) are used or when starter class includes CPT (that is ECN07, 18) see the table at right for system voltage code.

#### Control Power Transformer Codes (System Voltage)

| Code     | Primary                         | Secondary     |
|----------|---------------------------------|---------------|
| <b>B</b> | 240/480–220/440 wired for 240 V | 120/60–110/50 |
| <b>C</b> | 240/480–220/440 wired for 480 V | 120/60–110/50 |
| <b>D</b> | 600/60–550/50                   | 120/60–110/50 |
| <b>E</b> | 208/60                          | 120/60        |
| <b>H</b> | 277/60                          | 120/60        |
| <b>L</b> | 380/50                          | 110/50        |
| <b>M</b> | 415/50                          | 110/50        |
| <b>Q</b> | 208/60                          | 24            |
| <b>R</b> | 240/480–220/440 wired for 240 V | 24            |
| <b>S</b> | 240/480–220/440 wired for 480 V | 24            |
| <b>T</b> | 600/60                          | 24            |
| <b>U</b> | 277/60                          | 24            |
| <b>V</b> | 380/50                          | 24            |
| <b>W</b> | 415/50                          | 24            |
| <b>X</b> | 240/480/600 wired for 480 V     | 120           |
| <b>Y</b> | 240/480/600 wired for 480 V     | 24            |
| <b>Z</b> | By description                  | —             |

## Starters

## Non-Combination Starters

2

## Features

- C440 Solid-State Overload or Bi-Metallic Overload offering available
- Three-phase or single-phase magnetic
- Three-pole non-reversing or three-pole reversing
- 600 V maximum

## Product Selection

## Class ECN05—Non-Combination Non-Reversing Starter

| NEMA Size | Motor Voltage | Maximum hp Rating <sup>①</sup> | Magnet Coil Voltage | Type 1 General Purpose<br>Catalog Number | Type 3R Rainproof<br>Catalog Number | Type 4X Watertight and Dust-Tight Stainless Steel <sup>②</sup><br>Catalog Number | Type 12 Dust-Tight Industrial External Reset<br>Catalog Number | Component Starter (Open)<br>Catalog Number |
|-----------|---------------|--------------------------------|---------------------|--|-------------------------------------|--|--|--|
| 00        | —             | —                              | 120                 | ECN05A1AAA                               | ECN05A2AAA                          | ECN05A4AAA   | ECN05A8AAA   | AN16AN0AC                                  |
|           | 200           | 1-1/2                          | 208                 | ECN05A1EAA                               | ECN05A2EAA                          | ECN05A4EAA   | ECN05A8EAA   | AN16AN0EC                                  |
|           | 230           | 1-1/2                          | 240                 | ECN05A1BAA                               | ECN05A2BAA                          | ECN05A4BAA   | ECN05A8BAA   | AN16AN0BC                                  |
|           | 460           | 2                              | 480                 | ECN05A1CAA                               | ECN05A2CAA                          | ECN05A4CAA   | ECN05A8CAA   | AN16AN0CC                                  |
|           | 575           | 2                              | 600                 | ECN05A1DAA                               | ECN05A2DAA                          | ECN05A4DAA   | ECN05A8DAA   | AN16AN0DC                                  |
| 0         | —             | —                              | 120                 | ECN0501AAA                               | ECN0502AAA                          | ECN0504AAA   | ECN0508AAA   | AN16BN0AC                                  |
|           | 200           | 3                              | 208                 | ECN0501EAA                               | ECN0502EAA                          | ECN0504EAA   | ECN0508EAA   | AN16BN0EC                                  |
|           | 230           | 3                              | 240                 | ECN0501BAA                               | ECN0502BAA                          | ECN0504BAA   | ECN0508BAA   | AN16BN0BC                                  |
|           | 460           | 5                              | 480                 | ECN0501CAA                               | ECN0502CAA                          | ECN0504CAA   | ECN0508CAA   | AN16BN0CC                                  |
|           | 575           | 5                              | 600                 | ECN0501DAA                               | ECN0502DAA                          | ECN0504DAA   | ECN0508DAA   | AN16BN0DC                                  |
| 1         | —             | —                              | 120                 | ECN0511AAA                               | ECN0512AAA                          | ECN0514AAA   | ECN0518AAA   | AN16DN0AB                                  |
|           | 200           | 7-1/2                          | 208                 | ECN0511EAA                               | ECN0512EAA                          | ECN0514EAA   | ECN0518EAA   | AN16DN0EB                                  |
|           | 230           | 7-1/2                          | 240                 | ECN0511BAA                               | ECN0512BAA                          | ECN0514BAA   | ECN0518BAA   | AN16DN0BB                                  |
|           | 460           | 10                             | 480                 | ECN0511CAA                               | ECN0512CAA                          | ECN0514CAA   | ECN0518CAA   | AN16DN0CB                                  |
|           | 575           | 10                             | 600                 | ECN0511DAA                               | ECN0512DAA                          | ECN0514DAA   | ECN0518DAA   | AN16DN0DB                                  |
| 2         | —             | —                              | 120                 | ECN0521AAA                               | ECN0522AAA                          | ECN0524AAA   | ECN0528AAA   | AN16GN0AB                                  |
|           | 200           | 10                             | 208                 | ECN0521EAA                               | ECN0522EAA                          | ECN0524EAA   | ECN0528EAA   | AN16GN0EB                                  |
|           | 230           | 15                             | 240                 | ECN0521BAA                               | ECN0522BAA                          | ECN0524BAA   | ECN0528BAA   | AN16GN0BB                                  |
|           | 460           | 25                             | 480                 | ECN0521CAA                               | ECN0522CAA                          | ECN0524CAA   | ECN0528CAA   | AN16GN0CB                                  |
|           | 575           | 25                             | 600                 | ECN0521DAA                               | ECN0522DAA                          | ECN0524DAA   | ECN0528DAA   | AN16GN0DB                                  |
| 3         | —             | —                              | 120                 | ECN0531AAA                               | ECN0532AAA                          | ECN0534AAA   | ECN0538AAA   | AN16KN0A                                   |
|           | 200           | 25                             | 208                 | ECN0531EAA                               | ECN0532EAA                          | ECN0534EAA   | ECN0538EAA   | AN16KN0E                                   |
|           | 230           | 30                             | 240                 | ECN0531BAA                               | ECN0532BAA                          | ECN0534BAA   | ECN0538BAA   | AN16KN0B                                   |
|           | 460           | 50                             | 480                 | ECN0531CAA                               | ECN0532CAA                          | ECN0534CAA   | ECN0538CAA   | AN16KN0C                                   |
|           | 575           | 50                             | 600                 | ECN0531DAA                               | ECN0532DAA                          | ECN0534DAA   | ECN0538DAA   | AN16KN0D                                   |

## Notes

**Starters do not include heater packs.** Select one carton of three heater packs. For heater pack selection, see **Tab 15**.

**Starters with electronic overload,** see Modification Codes in **Tab 15**, or solid-state overload codes on **Page V10-T2-5**.

Cover control is indicated by the ninth digit. For example, ECN0511AJA is a HOA switch with red run light.

See the cover control table on **V10-T2-6–V10-T2-8** for full offering.

<sup>①</sup> Maximum horsepower rating of contactors for 380 V 50 Hz applications.

| NEMA Size  | 00    | 0 | 1  | 2  | 3  | 4  | 5   | 6   |
|------------|-------|---|----|----|----|----|-----|-----|
| Horsepower | 1-1/2 | 5 | 10 | 25 | 50 | 75 | 150 | 300 |

<sup>②</sup> The catalog numbers listed in the Type 4X column are for Type 4X 304-Grade stainless steel, as indicated by the **seventh** digit.

Example: ECN0504AAA. To order Type 4X 316-Grade stainless steel, change that digit to **9**. To order Type 4 painted steel, change that digit to **3**.

To order non-metallic, change that digit to **5**. For details on these alternate enclosures, see **Tab 13**.