

## 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	V10-T2-4
Cover Control	V10-T2-6
Contactors	
Non-Reversing Contactors	V10-T2-10
Reversing Contactors	V10-T2-16
Starters	
Non-Combination Starters	V10-T2-18
Combination Starters—Fusible and Non-Fusible	V10-T2-25
Combination Starters—Circuit Breaker	V10-T2-39
Wiring Diagrams	V10-T2-50

### 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	—

## C440 Solid-State Overload Modifications

**Reliability and Improved Uptime**

- C440 provides the users with peace of mind knowing that their assets are protected with the highest level of motor protection and communication capability in its class
- Extends the life of plant assets with selectable motor protection features such as trip class, phase unbalance and ground fault
- Protects against unnecessary downtime by discovering changes in your system (line/load) with remote monitoring capabilities
- Status LED provides added assurance that valuable assets are protected by indicating the overload operational status

**Flexibility**

- Improves return on investment by reducing inventory carrying costs with wide FLA adjustment (5:1) and selectable trip class
- Design incorporates built-in ground fault protection thus eliminating the need for separate CTs and modules
- Flexible communication with optional I/O enables easy integration into plant management systems for remote monitoring and control

**Monitoring Capabilities**

- Individual phase currents RMS
- Average three-phase current RMS
- Thermal memory
- Fault indication (overload, phase loss, phase unbalance, ground fault)

**Safety**

- IP20 rated terminal blocks
- Available in Eaton's industry leading FlashGard MCCs
- Tested to the highest industry standards such as UL, CSA, CE and IEC
- RoHS compliant

For solid-state overload enclosed control, add R63 or R64 modification code after the base Catalog Number.  
(Example, ECN0501AAA-**R63/B**).

Modification	IEC Size	NEMA Size	Full Load Current Adjustment Range (A)	Three-Phase without Ground Fault Auto/Manual Reset Overload Selectable Class 10/20/30	Three-Phase with Ground Fault Auto/Manual Reset Overload Selectable Class 10/20/30
Solid-state electronic overload relay <sup>①</sup>	B and C	00	0.33–1.65 <sup>②</sup>	<b>R63/A</b>	<b>R64/A</b>
			1–5	<b>R63/B</b>	<b>R64/B</b>
			4–20	<b>R63/C</b>	<b>R64/C</b>
	C and D	0 and 1	0.33–1.65 <sup>②</sup>	<b>R63/A</b>	<b>R64/A</b>
			1–5	<b>R63/B</b>	<b>R64/B</b>
			4–20	<b>R63/C</b>	<b>R64/C</b>
			9–45	<b>R63/D</b>	<b>R64/D</b>
	D	2	9–45	<b>R63/D</b>	<b>R64/D</b>
	D, F and G	3	20–100	<b>R63/E</b>	<b>R64/E</b>
	G	4	28–140	<b>R63/F</b>	<b>R64/F</b>
	N/A	5	60–300	<b>R63/G</b>	<b>R64/G</b>
	N/A	6	120–600	<b>R63/H</b>	<b>R64/H</b>

**Notes**

<sup>①</sup> Features:

- Self-powered
- Phase loss protection
- Current adjustment knob
- ±1% repeat accuracy
- 1NO and 1NC isolated contacts

<sup>②</sup> Not UL Listed.

## Cover Control

## Product Selection

2

## Type 1 Non-Combination Cover Control (Box 1 Only)

- Cover control for non-combination starters uses M22 style devices as standard
- Pushbuttons are momentary type
- Field convertible selector switches from momentary to maintained operation and vice versa
- Cover control kits include hardware, M22 pushbuttons, bracket and pre-wired wire harnesses
- See Volume 7, Tab 1, for more details on M22 pushbuttons

## Type 1 Non-Combination Cover Control (Box 1 Only)

Box 1 offering includes FVNR contactor sizes 00–2, electronic FVNR starters size 00–2 and bi-metallic FVNR starters size 00–1.



Description	Factory Installed Flange Control Position 9 Cover Control Code	Field Installation Kits Catalog Number
<b>Non-Reversing</b>		
No cover mounted pilot devices	<b>A</b>	—
STOP/START oval pushbuttons	<b>B</b>	<b>C600M1</b>
With red RUN pilot light	<b>C</b>	<b>C600M101</b> <sup>①</sup>
With red RUN/green OFF lights	<b>D</b>	<b>C600M102</b> <sup>①</sup>
OFF/ON oval pushbuttons	<b>E</b>	<b>C600M2</b>
With red RUN pilot light	<b>F</b>	<b>C600M201</b> <sup>①</sup>
With red RUN/green OFF lights	<b>G</b>	<b>C600M202</b> <sup>①</sup>
STOP/START selector switch	<b>S</b>	<b>C600M13</b>
With red RUN pilot light	<b>T</b>	<b>C600M131</b> <sup>①</sup>
With red RUN/green OFF lights	<b>U</b>	<b>C600M132</b> <sup>①</sup>
OFF/ON selector switch	<b>V</b>	<b>C600M14</b>
With red RUN pilot light	<b>W</b>	<b>C600M141</b> <sup>①</sup>
With red RUN/green OFF lights	<b>X</b>	<b>C600M142</b> <sup>①</sup>
HAND/OFF/AUTO selector switch	<b>H</b>	<b>C600M12</b>
With red RUN pilot light	<b>J</b>	<b>C600M121</b> <sup>①</sup>
With red RUN/green OFF lights	<b>K</b>	<b>C600M122</b> <sup>①</sup>
Green START pushbutton	<b>L</b>	<b>C600M3</b>
Red STOP pushbutton	<b>Y</b>	<b>C600M7</b> <sup>①</sup>
Green ON pushbutton	<b>M</b>	<b>C600M4</b>
Red OFF pushbutton	<b>N</b>	<b>C600M5</b>
Red RUN pilot light	<b>P</b>	<b>C600M9</b> <sup>①</sup>
Green OFF pilot light	<b>Q</b>	<b>C600M10</b> <sup>①</sup>
Red RUN/green OFF lights	<b>R</b>	<b>C600M11</b> <sup>①</sup>
TEST/OFF/AUTO selector switch	—	<b>C600M8</b>

**Note**

① Add code letter from the table below to catalog number for voltage. Example: C600M101**A**.

Rating	Code Letter
85–264 Vac	<b>A</b>
480 Vac	<b>C</b>
12–30 Vac/Vdc	<b>T</b>

**Type 1 Non-Combination Cover Control (Box 2 and Larger Enclosures Only)**

- Cover control for combination starters uses 10250T style devices as standard
- Selector switches are maintained with lever operators
- Pushbuttons are momentary type with extended pushbutton
- The kit includes hardware and connecting wires (where possible)
- For factory installed control devices other than shown below, refer to modification codes, **Tab 15**

**Type 1 Cover Control****Type 1 Non-Combination Cover Control (Box 2 and Larger Enclosures Only)**

Box 2 and Larger Enclosure offering includes contactors size 3–5, electronic starters size 3–5 and bi-metallic starters size 2–5.

Description	Factory Installed Flange Control <sup>①</sup> Position 9 Cover Control Code	Field Installation Kits Catalog Number
<b>Non-Reversing</b>		
No cover mounted pilot devices	<b>A</b>	<b>C400GK0</b>
STOP/START pushbuttons	<b>B</b>	<b>C400GK1</b>
With red RUN pilot light	<b>C</b>	<b>C400GK12</b> <sup>②</sup>
With red RUN/green OFF lights	<b>D</b>	<b>C400GK16</b> <sup>②</sup>
HAND/OFF/AUTO selector switch	<b>H</b>	<b>C400GK3</b>
With red RUN pilot light	<b>J</b>	<b>C400GK32</b> <sup>②</sup>
With red RUN/green OFF lights	<b>K</b>	<b>C400GK36</b> <sup>②</sup>
Red RUN pilot light	<b>P</b>	<b>C400GK42</b> <sup>②</sup>
Green OFF	<b>Q</b>	<b>C400GK41</b> <sup>②</sup>
Red RUN/green OFF pilot lights	<b>R</b>	<b>C400GK46</b> <sup>②</sup>
<b>Reversing</b>		
No cover mounted pilot devices	<b>A</b>	<b>C400GK0</b>
FOR/REV/STOP pushbuttons	<b>B</b>	<b>C400GR1</b>
With two red pilot lights	<b>C</b>	<b>C400GR14</b> <sup>②</sup>
UP/STOP/DOWN pushbuttons	<b>E</b>	<b>C400GR2</b>
With two red pilot lights	<b>F</b>	<b>C400GR24</b> <sup>②</sup>
Two red pilot lights	<b>P</b>	<b>C400GK44</b> <sup>②</sup>
One green pilot light	<b>Q</b>	<b>C400GK41</b> <sup>②</sup>

**Notes**

<sup>①</sup> For more available factory installed flange control, see **Page V10-T2-8**.

<sup>②</sup> Add code letter from the table below to catalog number for voltage—kits only. Example: C400GK0B.

Rating	Code Letter	Rating	Code Letter	Rating	Code Letter
120 V 60 Hz	<b>A</b>	277 V 60 Hz	<b>H</b>	480 V 60 Hz	<b>C</b>
208 V 60 Hz	<b>E</b>	380 V 50 Hz	<b>L</b>	600 V 60 Hz	<b>D</b>
240 V 60 Hz	<b>B</b>				

**Type 1 Combination and All Type 3R, 4X and 12 Cover Control**

- Cover control for combination starters uses 10250T style devices as standard
- Selector switches are maintained with lever operators
- Pushbuttons are momentary type with extended pushbutton
- The kit includes hardware and connecting wires (where possible)
- For factory installed control devices other than shown below, refer to modification codes, **Tab 15**

**10250T Cover Control Kits****Type 1 Combination and All Type 3R, 4X and 12 Cover Control <sup>①</sup>**

Description	Factory Installed Flange Control Position 9 Cover Control Code	Field Installation Kits Catalog Number
<b>Non-Reversing</b>		
No cover mounted pilot devices	<b>A</b>	—
START/STOP pushbuttons	<b>B</b>	<b>C400T1</b>
With red RUN pilot light	<b>C</b>	—
With red RUN/green OFF lights	<b>D</b>	—
ON/OFF pushbuttons	<b>E</b>	<b>C400T2</b>
With red RUN pilot light	<b>F</b>	—
With red RUN/green OFF lights	<b>G</b>	—
HAND/OFF/AUTO selector switch	<b>H</b>	<b>C400T12</b>
With red RUN pilot light	<b>J</b>	—
With red RUN/green OFF lights	<b>K</b>	—
START pushbutton	<b>L</b>	<b>C400T3</b>
ON pushbutton	<b>M</b>	<b>C400T4</b>
OFF pushbutton	<b>N</b>	<b>C400T5</b>
Red RUN pilot light	<b>P</b>	<b>C400T9</b> <sup>②</sup>
Green OFF	<b>Q</b>	<b>C400T10</b> <sup>②</sup>
Red RUN/green OFF pilot lights	<b>R</b>	<b>C400T11</b> <sup>②</sup>
START/STOP selector switch	<b>S</b>	<b>C400T13</b>
With red RUN pilot light	<b>T</b>	—
With red RUN/green OFF lights	<b>U</b>	—
ON/OFF selector switch	<b>V</b>	<b>C400T14</b>
With red RUN pilot light	<b>W</b>	—
With red RUN/green OFF lights	<b>X</b>	—
<b>Reversing</b>		
No cover mounted pilot devices	<b>A</b>	—
FOR/REV/STOP pushbuttons	<b>B</b>	<b>C400T6</b>
With two red pilot lights	<b>C</b>	—
With two red/one green pilot lights	<b>D</b>	—
UP/STOP/DOWN pushbuttons	<b>E</b>	—
With two red pilot lights	<b>F</b>	—
FOR/OFF/REV selector switch	<b>H</b>	<b>C400T15</b>
With two red pilot lights	<b>J</b>	—
With two red/one green pilot lights	<b>K</b>	—
Two red pilot lights	<b>P</b>	<sup>③</sup>
One green pilot light	<b>Q</b>	<b>C400T10</b> <sup>②</sup>
Two red/one green pilot lights	<b>R</b>	—
OPEN/OFF/CLOSE selector switch	<b>V</b>	<b>C400T16</b>
With two red pilot lights	<b>W</b>	—
With two red/one green pilot lights	<b>X</b>	—

**Notes**

- <sup>①</sup> For Type 1 non-combination field installation kits, see **Page V10-T2-7**.  
<sup>②</sup> Add code letter from the table below to catalog number for voltage—kits only. Example: C400T9**B**.

Rating	Code Letter	Rating	Code Letter	Rating	Code Letter
120 V 60 Hz	<b>A</b>	277 V 60 Hz	<b>H</b>	480 V 60 Hz	<b>C</b>
208V 60 Hz	<b>E</b>	380 V 50 Hz	<b>L</b>	600 V 60 Hz	<b>D</b>
240 V 60 Hz	<b>B</b>				

- <sup>③</sup> Order quantity (2) of **C400T10**.

Type 1 Non-Combination Empty Enclosure (Box 1 Only)

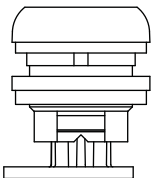
There is a universal empty enclosure for the non-metallic Type 1 Non-Combination Box 1 regardless of the starter or the contactor needed. The only difference is the length of the easily interchangeable reset rod. The reset rod kit provides everything needed to install the correct reset rod, including all the reset rod lengths, a protective shroud, a paddle and a reset button with nut.

Box 1 offering includes FVNR contactors size 00–2, FVR contactors size 00–0, FVNR electronic starters size 00–2, and FVNR bi-metallic starters size 00-1.

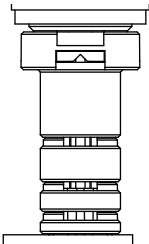
Empty Enclosure Stocking Needs	Catalog Number
Empty enclosure	C899B001
Reset rod kit	RESET001

The table below shows which reset rod is used with each starter or contactor.

Starter or Contactor	Reset Rod Length
NEMA FVNR Size 00–2, solid-state overload	0.43-inch reset
NEMA FVNR Size 00–1, bi-metallic overload	1.68-inch reset
All NEMA FVNR and FVR contactors	No reset needed



FVNR Solid State  
OL Reset—0.43 inches



FVNR Bi-Metallic  
OL Reset—1.68 inches



**Combination Starters—Circuit Breaker****Features**

- Three-phase magnetic
- Three-pole non-reversing or reversing
- Standard interchangeable heater OLR
- Optional electronic overload
- 600 V maximum
- 100,000 rms 480 V, 25,000 rms 600 V

**Product Selection****Class ECN22—Combination Non-Reversing Starter—Circuit Breaker**

NEMA Size	Motor Voltage	Maximum hp Rating	Magnet Coil Voltage ①	Circuit Breaker Size	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight and Dust-Tight Stainless Steel ②	Type 12 Dust-Tight Industrial External Reset ③④	Component Starter (Open)
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
00	200	1	120	7A	ECN22A1AAC	ECN22A2AAC	ECN22A4AAC	ECN22A8AAC	AN16AN0AC
		1-1/2		15A	ECN22A1AAD	ECN22A2AAD	ECN22A4AAD	ECN22A8AAD	
	230	1		7A	ECN22A1AAC	ECN22A2AAC	ECN22A4AAC	ECN22A8AAC	
		1-1/2		15A	ECN22A1AAD	ECN22A2AAD	ECN22A4AAD	ECN22A8AAD	
	460	1		3A	ECN22A1AAB	ECN22A2AAB	ECN22A4AAB	ECN22A8AAB	
		2		7A	ECN22A1AAC	ECN22A2AAC	ECN22A4AAC	ECN22A8AAC	
	575	1		3A	ECN22A1AAB	ECN22A2AAB	ECN22A4AAB	ECN22A8AAB	
		2		7A	ECN22A1AAC	ECN22A2AAC	ECN22A4AAC	ECN22A8AAC	
0	200	1	120	7A	ECN2201AAC	ECN2202AAC	ECN2204AAC	ECN2208AAC	AN16BN0AC
		3		15A	ECN2201AAD	ECN2202AAD	ECN2204AAD	ECN2208AAD	
	230	1		7A	ECN2201AAC	ECN2202AAC	ECN2204AAC	ECN2208AAC	
		3		15A	ECN2201AAD	ECN2202AAD	ECN2204AAD	ECN2208AAD	
	460	1		3A	ECN2201AAB	ECN2202AAB	ECN2204AAB	ECN2208AAB	
		3		7A	ECN2201AAC	ECN2202AAC	ECN2204AAC	ECN2208AAC	
		5		15A	ECN2201AAD	ECN2202AAD	ECN2204AAD	ECN2208AAD	
		575		1	3A	ECN2201AAB	ECN2202AAB	ECN2204AAB	
	3			15A	ECN2201AAD	ECN2202AAD	ECN2204AAD	ECN2208AAD	
				5	7A	ECN2201AAC	ECN2202AAC	ECN2204AAC	

**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**.

① For other magnet coil voltages substitute the eighth digit with appropriate digit based on modification table on **Page V10-T2-4**.

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

Example: ECN2204AAC. 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**.

③ All Type 12 enclosures are standardized with external reset. For internal reset, order modification code **R5**.

④ Type 12 enclosure is without safety door interlock. When safety door interlock is required, add modification **E11**.

## Standards and Certifications



### UL File Numbers

The enclosed control products from Eaton's electrical sector are covered by three UL file numbers. Where UL or UL 508 is listed under the Standards and Certifications headers in this catalog or labeled on the products, the following UL file numbers apply. For example: ECN0521AAA is covered by UL file number E19224, while ECS92S1EAF is covered by UL file number E175513.

- E19224—Non-Combination Motor Controllers
- E176513—Combination Motor Controllers
- E195239—Power Conversion Equipment



### ABS Type Approval

The Eaton enclosed control products have been tested and approved for American Bureau of Shipping standards. Both a Product Quality Assurance and Design Assessment approvals must be met in order to comply to ABS Type Approval. The following are Eaton's ABS file numbers for products:

- QA-1597-X—Product Quality Assurance
- 63-HS385744-PDA—Design Assessment



### cUL Label

The Eaton enclosed control products have been tested and approved for Canadian UL where cUL is listed in this catalog under the Standards and Certifications headers or labeled on the products. The cUL label also indicates that the appropriate **CSA Standard** has been investigated. The following numbers demonstrate cUL approval:

- E19224—Non-Combination Motor Controllers
- E176513—Combination Motor Controllers
- E195239—Power Conversion Equipment



### CE Label

Where the CE label is applied or certification is mentioned, Eaton has undergone the proper testing to meet or exceed CE requirements. As CE is a self-administered certification, no CE file number is available. However, several products have undergone KEMA KEUR testing, a third party CE-certification testing agency. KEMA reference numbers are available upon request.

Other standards and certifications may apply as noted in product literature. For additional reference information, refer to the Consulting Application Guide or your local Eaton distributor.

## Component Standards and Certifications

The standards and certifications described in this catalog are for enclosed control products from Eaton's electrical sector. Testing has been done on the complete enclosed assembly in order to achieve these certifications. For additional information on the standards and certifications for the components used in Eaton's enclosed control, please refer to the Eaton Control Products Catalog.

## Short-Circuit Testing

### Interrupting ratings—

All Eaton enclosed control products have been designed and tested for short-circuit interrupting capabilities.

### Interrupting Ratings

- **Fusible**—Sizes 1–5 suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical amperes. 600V maximum where a Class R fuse clip kit is properly installed and Class R fuses are used. If Class R fuses are not used, the switch should not be installed on circuits capable of delivering more than 10,000 rms symmetrical amperes. Size 6 is limited to 18,000 and Size 7 is limited to 30,000 rms symmetrical amperes
- **Circuit breaker HMCPE**—Sizes 1–3 controllers are suitable for use on circuits capable of delivering not more than 100,000 rms symmetrical amperes at 480V maximum; for 600V applications not more than 25,000 rms symmetrical amperes
- **HVAC panel and ECP irrigation pump panel**—suitable for use on circuits capable of delivering not more than 10,000 rms symmetrical amperes at 600V maximum

## Freedom Line

Furnish as indicated Eaton Class ECN combination starters manufactured by Eaton's electrical sector or approved equal. All starters

shall be UL listed and conform to the latest standards and the National Electric Code.

## Non-Reversing

Description	Catalog Number
Disconnect switch	ECN16
Disconnect switch with control power transformer	ECN18
Circuit breaker (HMCPE/HMCP)	ECN22
Circuit breaker with control power transformer	ECN24

## Reversing

Description	Catalog Number
Disconnect switch	ECN17
Circuit breaker (HMCPE/HMCP)	ECN23

## General

- All motor starters shall be NEMA Sizes 0–9. Each starter shall have one NO auxiliary contact, or as scheduled
- Overload relays shall be ambient compensated bimetallic type with interchangeable heaters, calibrated for 1.0 and 1.15 service factor motors. Electrically isolated NO and NC contacts shall be provided on the relay. Visual trip indication shall be standard. A test trip feature shall be provided for ease of troubleshooting and shall be conveniently operable without removing components or the motor starter
- Control circuit transformers, where specified, shall be encapsulated. Primary and secondary fusing shall be provided. Unless otherwise specified, the secondary shall be 120 Vac. 50 VA is minimum
- Pilot devices, where specified, shall be oiltight and mounted in the flange. Pilot lights shall be transformer type for longer lamp life. Pilot device legend plates shall be engraved aluminum

- Solid-state overloads (SSOL), when specified, shall be heaterless and be capable of selecting Class 10, 20 or 30 protection with manual or automatic reset options. Full-load current settings shall be dial-adjustable

## Enclosure

- Enclosures shall be Type 1, 3R, 4, 4X, 7/9 or 12, as scheduled
- The operating mechanism shall be mounted on the flange and shall have positive, non-teasing ON/OFF action. The handle shall be color-coded: red for ON and black for OFF
- The operating handle shall have a means to lock the handle in the OFF position with a minimum of three standard padlocks having 1/4 in diameter shackles
- The enclosure sub-panel shall be easily removed without disturbing the operating mechanism on Sizes 0–3
- Enclosures shall have means for locking the cover

## Short-Circuit Protective Device

### Disconnect Switch

- Where specified, a disconnect switch with double break, rotary blades and quick make/quick break action shall be provided
- A line shield with test probe holes for inspection shall be provided. The shield shall be removable
- The switch shall have readily visible blades in the open (OFF) position
- The fusible disconnect switch (through 100A) shall have built-in fuse pullers to make it easier to remove fuses

### Circuit Breaker

- Where specified, an adjustable instantaneous trip, magnetic only circuit breaker shall be provided
- A manual push-to-trip button shall be provided to exercise the trip unit

## Short-Circuit Rating

- Fusible disconnect switches shall be UL listed for 100,000 amperes available when Class R fuses are used
- Combination starters with adjustable instantaneous trip, magnetic only circuit breakers shall be UL listed for 100,000 amperes available through 480 Vac
- Note specific short-circuit ratings for the ECP irrigation pump panel and the HVAC panel on **Page V10-T17-2**