Vacuum Contactors & Starters

Contents

Size 4 Vacuum Contactor

Size 4 Vacuum Contactor

Product Description

Vacuum Contactors and Starters were designed for starting and controlling three-phase, 50/60 Hz, AC motors. Each contact is enclosed in a vacuum bottle to reduce and contain contact arcing. This design offers excellent performance for plugging and jogging applications.

Application Description

The Vacuum Contactors and Starters are offered in three classifications. They are NEMA rated devices up to 600V AC, Special Purpose rated devices up to 1500V AC and Mining rated devices rated up to 1500V AC. Each device is tested to different standards to serve their market.

Typical applications include full voltage control of three-phase squirrel cage motors, primary control of low voltage wound rotor motors and circuit switching for low voltage capacitors for power factor improvement.

A vacuum contactor is affected by atmospheric pressure on the bellows of the vacuum bottles. Up to an altitude of 6600 feet, the contactor is designed to tolerate normal variations in barometric pressure. If the contactor is to be operated above 6600 feet above sea level, consult your Eaton's Cutler-Hammer representative.

Features

- Rugged, compact and lightweight
- Quiet operation
- Electrical and mechanical interlocks available
- Long service life

Benefits

- Easy maintenance with front removable coil and auxiliaries
- Eliminate extra surge suppressors with the standard low chop interrupters
- Plan your preventative maintenance schedule by utilizing the contact wear indicator, standard on all vacuum bottles

Operation

The contact structure of the vacuum break contactor is located inside sealed ceramic tubes that have been evacuated of air. Any arc occurring across the contacts upon opening is automatically extinguished because ionized air is not available to sustain it — the arc breaks when the current passes through zero. The arc typically does not service beyond the first half cycle once the contacts begin to separate. The large arc chutes normally associated with contactors of this size are not required. The ceramic tube with the moving and stationary contacts is called a **vacuum interrupter** or **bottle**. There is one bottle for each pole on the contactor. A metal bellows (like a small, circular accordion) within the bottle allows the moving contact to be closed and pulled open from the outside without leaking air into the bottle. Both the bellow and the metal-to-ceramic seals of these state-of-the-art bottles have been refined to the point where the possibility of loss of vacuum has been virtually eliminated.

Standards and Certifications

- NEMA Devices
  - UL Listed File #E1491, Guide Number NLDX
  - CSA Approved
- Special Purpose Devices
  - IEC 947-4-1
  - CE Approved EN 60947-4-1
  - UL Listed File #E1491, Guide Number NLDX
  - CSA Approved

Product Selection

When Ordering Specify

- Catalog Number
- Heater Pack if ordering a Starter, order in quantities of three
- Any required Accessories

Table 36-1. NEMA Rated Product Selection

NEMA Size	Ampere Rating	Motor Voltage	Maximum Horsepower Rating	Magnet ② Coil Voltage	Contactor Non-reversing		Contactor Reversing		Starter Non-reversing ①	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
4	135	200 230 380 460 575	40 50 75 100 100	110/120	V201K4CJ		V211K4CJ		V200M4CJC	
				220/240	V201K4CK		V211K4CK		V200M4CK	
				440/480	V201K4CU		V211K4CU		V200M4CU	
5	270	200 230 380 460 575	75 100 150 200 200	110/120	V201K5CJZ1		V211K5CJZ1		V200M5CJC	
				220/240	V201K5CKZ1		V211K5CKZ1		V200M5CK	
				440/480	V201K5CUZ1		V211K5CUZ1		V200M5CU	
6	540	200 230 380 460 575	150 200 300 400 400	110/120	V201K6CJZ1		V211K6CJZ1		V200M6CJC	
				220/240	V201K6CKZ1		V211K6CKZ1		V200M6CK	
				440/480	V201K6CUZ1		—		V200M6CU	

① Starters use Type B overload relay. Refer to Heater Coil Selection Table, **Page 36-5**. Starters do not include Heater Packs.
② Coils are rated for 50/60 Hz applications.

Table 36-2. Special Purpose Product Selection

Ampere Rating	Motor Voltage	Maximum Horsepower Rating	Magnet ④ Coil Voltage	Contactor Non-reversing		Contactor Reversing		Starter Non-reversing ③		Starter Reversing ③	
				Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
160	200 230 380 460 575 800 1500	50 60 100 125 150 200 400	110/120	V201KRCJ		V211KRCJ		—		—	
			220/240	V201KRCK		V211KRCK		—		—	
			380/415	V201KRCH		V211KRCH		—		—	
			440/480	V201KRCU		V211KRCU		—		—	
320	200 230 380 460 575 795 1500	100 125 200 250 300 400 800	110/120	V201KTCJZ1		V211KTCJZ1		V200MTCJC		V210MTCJC	
			220/240	V201KTCKZ1		V211KTCKZ1		V200MTCK		V210MTCK	
			380/415	V201KTCHZ1		V211KTCHZ1		V200MTCH		V210MTCH	
			440/480	V201KTCUZ1		V211KTCUZ1		V200MTCU		V210MTCU	
540 ⑤	200 230 380 460 575 795 1500	150 200 300 400 500 700 1300	110/120	V201KVCJZ1		V211KVCJZ1		V200MVCJ		V210MVCJ	
			220/240	V201KVCKZ1		V211KVCKZ1		V200MVCK		V210MVCK	
			380/415	V201KVCHZ1		—		V200MVCH		—	
			440/480	V201KVCUZ1		—		V200MVCU		—	
610	200 230 380 460 575 795 1500	200 200 300 450 500 800 1600	110/120	V201KZCJZ1		V211KZCJZ1		—		—	
			220/240	V201KZCKZ1		V211KZCKZ1		—		—	
			380/415	V201KZCHZ1		—		—		—	
			440/480	V201KZCUZ1		—		—		—	

③ Starters use Type B overload relay. Refer to Heater Coil Selection Table, **Page 36-5**. Starters do not include Heater Packs.
④ Coils are rated for 50/60 Hz applications.
⑤ The 540A device does not carry CE or IEC ratings.

Discount Symbol **1CD1C**

Table 36-3. Mining Rated Product Selection

Ampere Rating	Motor Voltage	Maximum Horsepower Rating	Magnet Coil Voltage ①	Contactor Non-reversing	
				Catalog Number	Price U.S. $
160	200 230 380 460 575 800 1500	50 60 100 125 150 200 400	110/120	**VM160CJ**	
			220/240	**VM160CK**	
			440/480	**VM160CU**	
320	200 230 380 460 575 795 1500	100 125 200 250 300 400 800	110/120	**VM320CJZ1**	
			220/240	**VM320CKZ1**	
			440/480	**VM320CUZ1**	
610	200 230 380 460 575 795 1500	150 200 300 400 500 700 1300	110/120	**VM610CJZ1**	
			220/240	**VM610CKZ1**	
			440/480	**VM610CUZ1**	

① Coils are rated for 50/60 Hz applications.

Accessories

Lug Sizes

- Size 4 — 12 – 4/0
- NEMA Size 5 & 6 and 320A, 540A & 610A — Supplied without Line or Load Lugs.

Table 36-4. Lug Kits — Consist of 6 Lugs

Size	Description	Catalog Number	Price U.S. $
5 and 320A	1/0 – 500 kcmil	**C325KAL8**	
6, 540A and 610A	1/0 – 500 kcmil Dbl. Barrel	**C325KAL9**	
610A	1/0 – 600 kcmil Dbl. Barrel	**80-19825-2**	

Field Modification Kits

Auxiliary Electrical Contacts

Size 4 — Three Type J auxiliary contacts may be mounted on the top of Size 4 contactors to provide six auxiliary, isolated 600V, 10A contacts for use in control circuits.

Sizes 5 – 6 — Two Type J auxiliary contacts may be mounted on each side of Size 5 and 6 contactors to provide four auxiliary, isolated 600V,10A contacts for use in control circuits.

Table 36-5. Auxiliary Electrical Contacts

Contact Arrangement	Catalog Number	Price U.S. $
1NO, 1NC	**J11**	
2NO	**J20**	
2NC	**J02**	

Table 36-6. Horizontal Mechanical Interlock

Size	Catalog Number	Price U.S. $
4	**180C113G04**	
5	**180C113G16**	
6	**180C113G17**	

AEGIS Powerline Filters

Hardwired Surge Filler that Protects Critical Loads (3 and 5 Ampere Models)

Ideal for applications that utilize 120V AC or 240V AC control voltage and have the likelihood of harmonics or noise being present on the control signal. These are stand-alone devices, not mounted to the contactor.

AEGIS Powerline Filters Protect Against the Full Spectrum of Transient Disturbances

AEGIS filters the entire sine wave and is effective against both frequently occurring low energy and occasional high energy transients. High energy transients can create immediate damage, while low energy transients cause coil failure over time.

Table 36-7. AEGIS-HW (Hard Wire Application) Catalog Numbering System

AGSHW CH _ _ _ _ _ _ X _

Voltage Code	Current Capacity	Options
120N **230L**	**03** **05** **10** **15** ② **20**	**S** = Standard **C** = Form C contact for Remote Monitor

Note: 230V applies to 220V and 240V applications.

② Model tested at 15A UL/CSA = 16A CE.

Table 36-8. AEGIS Powerline Filters

Catalog Number③④	Price U.S. $
AGSHWCH120N03XC **AGSHWCH120N03XS** **AGSHWCH120N05XC** **AGSHWCH120N05XS**	
AGSHWCH230L03XC **AGSHWCH230L03XS** **AGSHWCH230L05XC** **AGSHWCH230L05XS**	

③ See AEGIS Powerline Filters in Tab 10 of Distribution Catalog.
④ Discount Symbol **22-CD**.

Discount Symbol **1CD1C**

Heater Coils

Table 36-9. Heater Coil Selection for Type B Overload Relay

Motor Full Load Current in Amperes for Use with 3 Heaters Only		
Open Starter **Ambient Compensated Overload Relay**	**Heater Catalog Number**①	**Price U.S. $**
Size 4 and 160A		
12.8 – 14.1	**FH68**	
14.2 – 15.5	**FH69**	
15.6 – 17.1	**FH70**	
17.2 – 18.9	**FH71**	
19.0 – 20.8	**FH72**	
20.9 – 22.9	**FH73**	
23.0 – 25.2	**FH74**	
25.3 – 27.8	**FH75**	
27.9 – 30.6	**FH76**	
30.7 – 33.5	**FH77**	
33.6 – 37.5	**FH78**	
37.6 – 41.5	**FH79**	
41.6 – 46.3	**FH80**	
46.4 – 50	**FH81**	
51 – 55	**FH82**	
56 – 61	**FH83**	
62 – 66	**FH84**	
67 – 73	**FH85**	
74 – 78	**FH86**	
79 – 84	**FH87**	
85 – 92	**FH88**	
93 – 101	**FH89**	
102 – 110	**FH90**	
111 – 122	**FH91**	
123 – 129	**FH92**	
130 – 133	**FH93**	
—	**FH94**	
Size 5 and 320A with 300/5 Current Transformers		
107 – 117	**FH23**	
118 – 129	**FH24**	
130 – 141	**FH25**	
142 – 155	**FH26**	
156 – 170	**FH27**	
171 – 187	**FH28**	
188 – 205	**FH29**	
206 – 224	**FH30**	
225 – 244	**FH31**	
245 – 263	**FH32**	
264 – 292	**FH33**	
293 – 318	**FH34**	
319 – 350	**FH35**	
Size 6 and 540A with 600/5 Current Transformers		
236 – 259	**FH24**	
260 – 283	**FH25**	
284 – 310	**FH26**	
311 – 340	**FH27**	
341 – 374	**FH28**	
375 – 411	**FH29**	
412 – 448	**FH30**	
449 – 489	**FH31**	
490 – 527	**FH32**	
528 – 585	**FH33**	
586 – 600	**FH34**	

① Three are required per overload relay.

Replacement Coils

Table 36-10. Vacuum Contactor — Replacement Coils

Description	Suffix	Part Number	Price U.S. $
Size 4			
110/120V AC, 50/60 Hz	**J**	**9085A57G01**	
220/240V AC, 50/60 Hz	**K**	**9085A57G02**	
380/415V AC, 50/60 Hz	**H**	**ID89221G07**	
440/480V AC, 50/60 Hz	**U**	**9085A57G03**	
Size 5			
110/120V AC, 50/60 Hz	**J**	**7874A09G01** ②	
220/240V AC, 50/60 Hz	**K**	**7874A09G04** ③	
380/415V AC, 50/60 Hz	**H**	**7874A09G10**	
440/480V AC, 50/60 Hz	**U**	**7874A09G05**	
Size 6			
110/120V AC, 50/60 Hz	**J**	**7874A24G01** ②	
220/240V AC, 50/60 Hz	**K**	**7874A24G02** ③	
380/415V AC, 50/60 Hz	**H**	**7874A24G07**	
440/480V AC, 50/60 Hz	**U**	**7874A24G03**	

② 125V DC can be directly applied to the Size 5 and 6 coil rated for 120V/60 Hz AC (cannot be applied to Size 4).

③ 250V DC can be directly applied to the Size 5 and 6 coil rated for 240V/60 Hz AC (cannot be applied to Size 4).

Discount Symbol **1CD1C**

Technical Data and Specifications

Table 36-11. Specifications

Description	NEMA			Special Purpose			
	Size 4	Size 5	Size 6	160A	320A	540A	610A
	V201K4_	V201K5_	V201K6_	V201KR_	V201KT_	V201KV_	V201KZ_
Poles	3	3	3	3	3	3	3
Maximum Voltage Rating	600V	600V	600V	1500V	1500V	1500V	1500V
Ampere Rating	135A	270A	540A	160A	320A	540A	610A
Frequency, Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Maximum Closing Current	1600A	3000A	6000A	1600A	3000A	6000A	6000A
Maximum Interrupting Current	1600A	3000A	6000A	1600A	3000A	6000A	6000A
Short Time Current: 1 Second	2400A RMS	4500A RMS	9000A RMS	2400A RMS	4500A RMS	9000A RMS	9000A RMS
2 Second	1600A RMS	3000A RMS	6000A RMS	1600A RMS	3000A RMS	6000A RMS	6000A RMS
Dielectric Strength	2200V AC	5375V AC	5375V AC	2200V AC	5375V AC	5375V AC	5375V AC
Maximum Allowable Interrupting	1200/Hr.	—	—	1200/Hr.	—	—	—
Impulse Voltage (1 x 40 mS)	15 kV	15 kV	15 kV	15 kV	15 kV	15 kV	15 kV
Maximum Motor Horsepower at:							
200V	40 hp	75 hp	150 hp	50 hp	100 hp	150 hp	200 hp
230V	50 hp	100 hp	200 hp	60 hp	125 hp	200 hp	200 hp
380V	75 hp	150 hp	300 hp	100 hp	200 hp	300 hp	300 hp
460V	100 hp	200 hp	400 hp	125 hp	250 hp	400 hp	450 hp
575V	100 hp	200 hp	400 hp	150 hp	300 hp	400 hp	500 hp
800V	—	—	—	200 hp	400 hp	—	800 hp
1000V	—	—	—	250 hp	—	—	1000 hp
1500V	—	—	—	400 hp	800 hp	1300 hp	1600 hp
3-Phase Capacitive Switching (kVAR)							
230V	40 kVAR	80 kVAR	160 kVAR	50 kVAR	80 kVAR	160 kVAR	176 kVAR
460V	80 kVAR	160 kVAR	320 kVAR	100 kVAR	160 kVAR	320 kVAR	356 kVAR
600V	100 kVAR	200 kVAR	400 kVAR	125 kVAR	200 kVAR	400 kVAR	400 kVAR
1500V	—	—	—	205 kVAR	500 kVAR	—	1000 kVAR
Transformer Switching (kVA) ①							
Single-Phase, 2-Pole:							
120V	6.8 kVA	14 kVA	27 kVA	8 kVA	14 kVA	27 kVA	27 kVA
240V	14 kVA	27 kVA	54 kVA	16 kVA	27 kVA	54 kVA	54 kVA
480V	27 kVA	54 kVA	108 kVA	32 kVA	54 kVA	108 kVA	108 kVA
600V	34 kVA	68 kVA	135 kVA	40 kVA	68 kVA	135 kVA	135 kVA
Three-Phase, 3-Pole:							
240V	23 kVA	47 kVA	94 kVA	27 kVA	47 kVA	94 kVA	94 kVA
480V	47 kVA	94 kVA	188 kVA	55 kVA	94 kVA	188 kVA	188 kVA
600V	59 kVA	117 kVA	234 kVA	70 kVA	117 kVA	234 kVA	234 kVA

① For transformers having inrush currents of not more than 20 times the rated full load current.

Table 36-12. Electrical Characteristics — Apply to Both NEMA and Special Purpose Types

Description	Size		
	4 (160A)	5 (320A)	6 (540A and 610A)
DC Coil Data — Burden:			
(AC Supply Rectified)			
Open VA	300 VA	500 VA	1450 VA
Closed VA	30 VA	25 VA	32 VA
Closed Watts	6W	20W	30W
Pick-Up Volts	70% of Rated Voil Volts		
Drop-Out Volts	50% of Rated Coil Volts		
Pick-Up Time in Hz	1.5 – 2 Hz		
Drop-Out Time in Hz	6 – 6.15 Hz		
Max. Voltage Rating	600V	600V	600V
Max. Closing Current	1600A	3000A	6000A
Max. Interrupting Current	1600A	3000A	6000A
Short Time Current:			
1 Second	2400A RMS	4500A RMS	9000A RMS
2 Second	1600A RMS	3000A RMS	6000A RMS

Table 36-13. Electrical Characteristics Coil Data (AC Supply Rectified)

Burden	Size 4 (160A)	Size 5 (320A)	Size 6 (540A and 610A)
Inrush VA	300	600	1700
Sealed VA	30	20	28
Sealed Watts	6	20	28
Pick-Up Volts	70% of Rated Coil Volts		
Drop-Out Volts	50% of Rated Coil Volts		
Pick-Up Time in Hz	1.5 – 2	1.5 – 2	1.5 – 2
Drop-Out Time in Hz	6 – 7.5	6 – 6.15	6 – 6.15

Wiring Diagrams

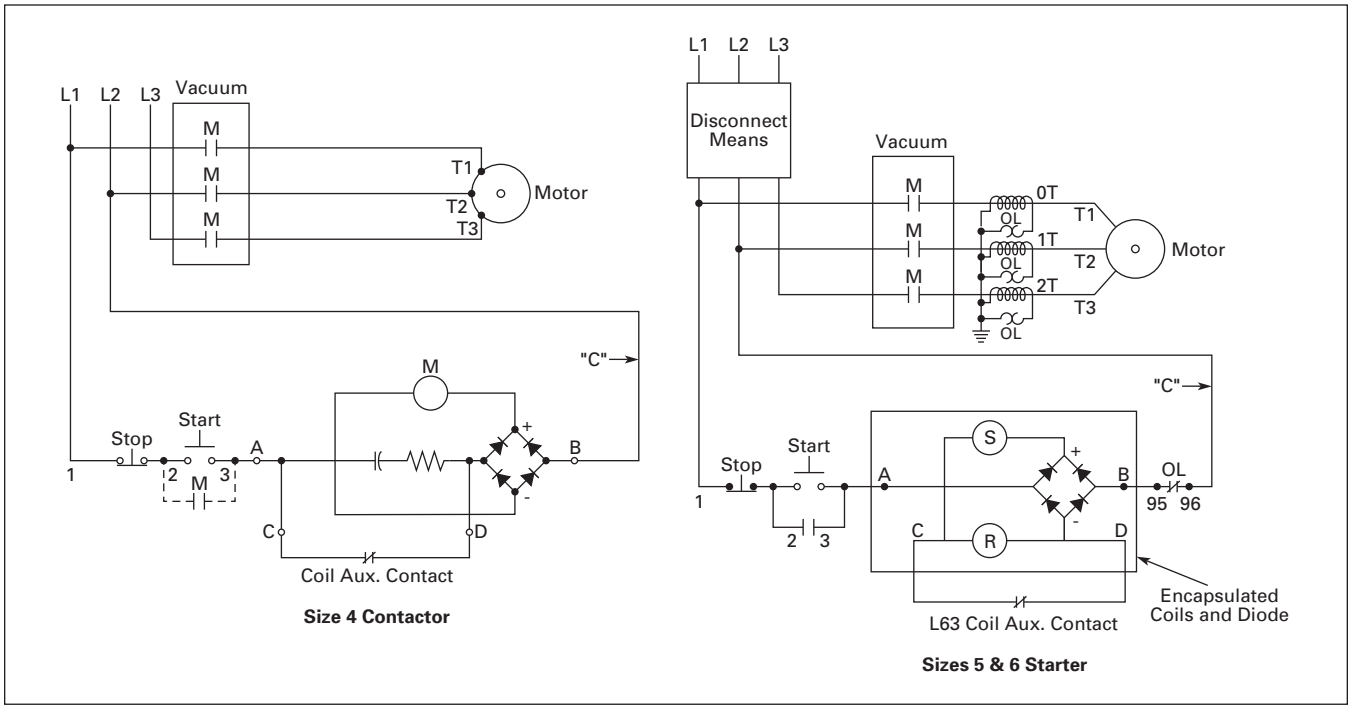


Figure 36-1. Typical Wiring Diagrams

Dimensions

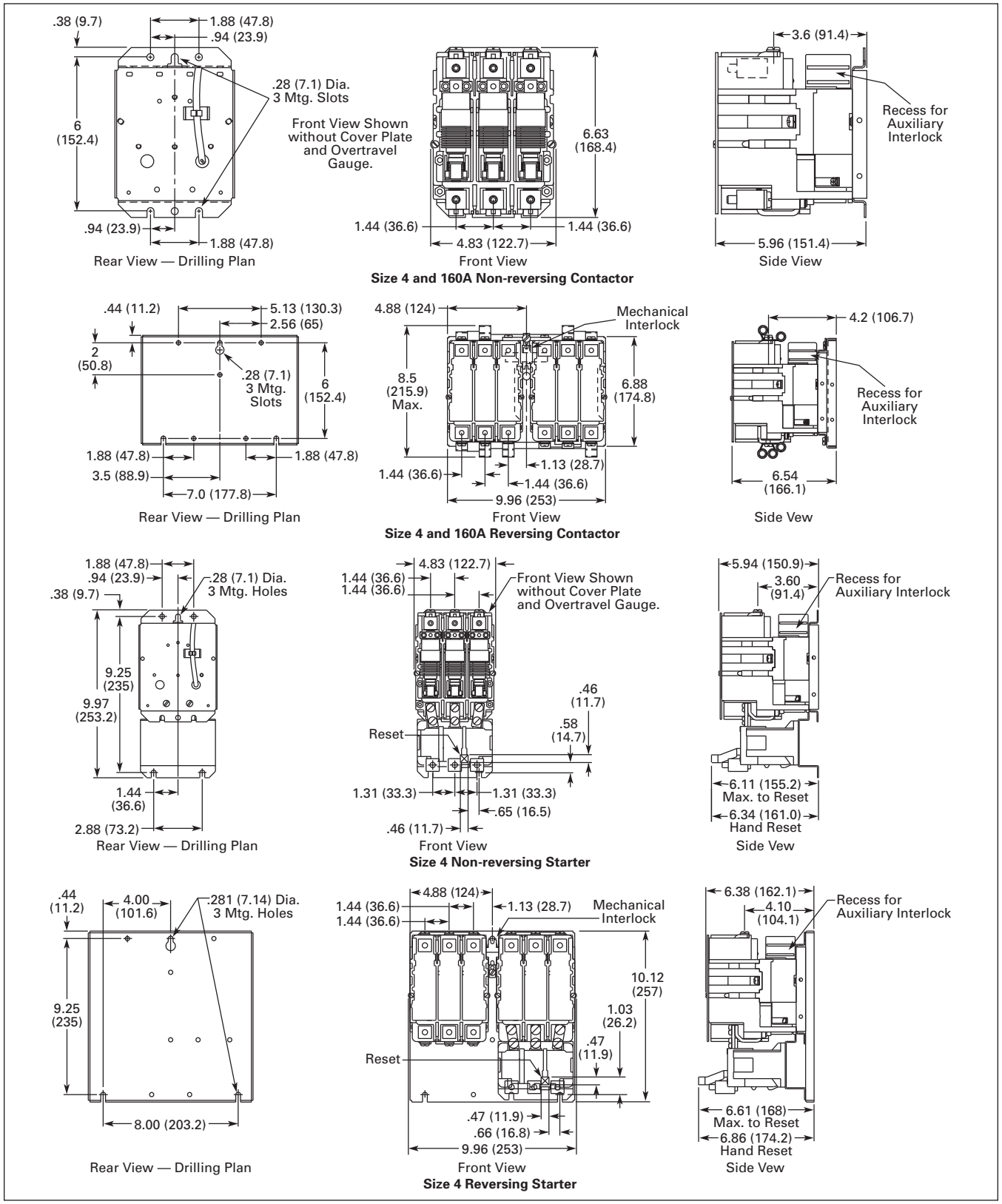


Figure 36-2. Open Type Contactors and Starters — Size 4 and 160A — Approximate Dimensions in Inches (mm)

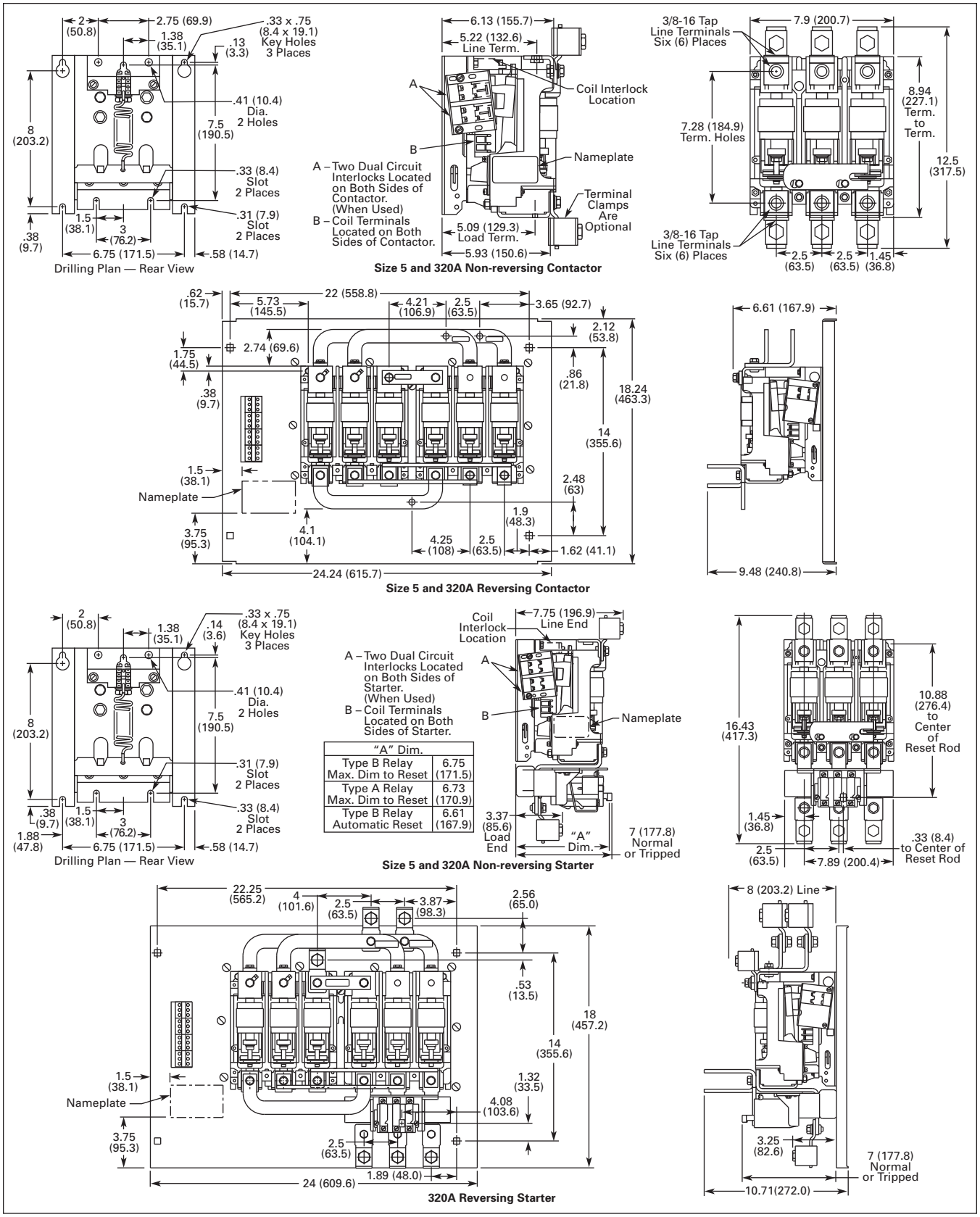


Figure 36-3. Open Type Contactors and Starters — Size 5 and 320A — Approximate Dimensions in Inches (mm)

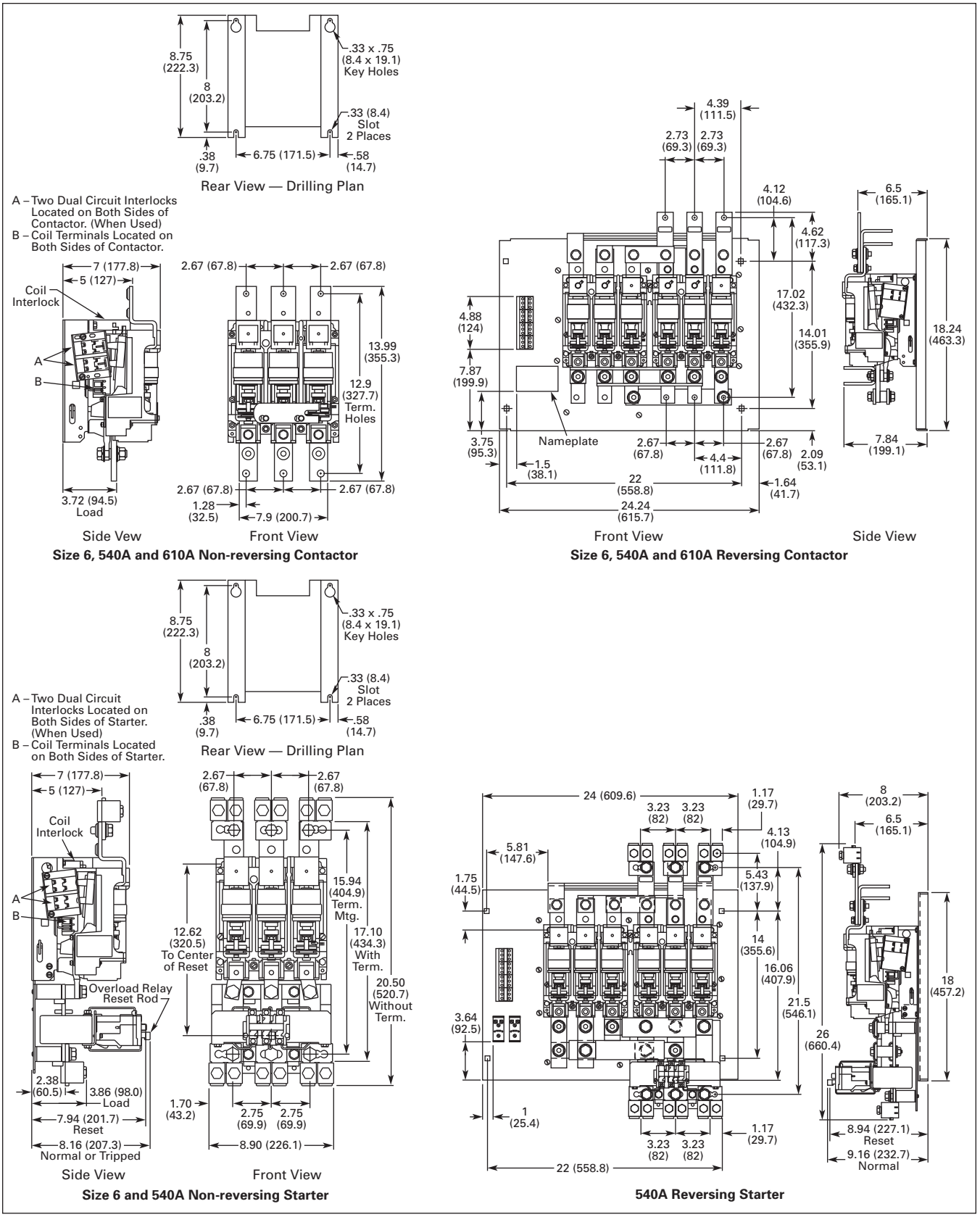
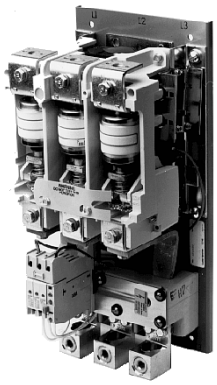


Figure 36-4. Open Type Contactors and Starters — Size 6, 540A and 610A — Approximate Dimensions in Inches (mm)



Cat. No. AV10GNOA or V200M5CJC
Vacuum Break Starter

Product Description

- 3-Phase Magnetic
- 3-Pole Full Voltage
- Non-reversing and Reversing
- 600 and 1500V AC Maximum
- Starters with Interchangeable Heater OLR

Application Description

Eaton's Cutler-Hammer Vacuum Contactors are designed for starting and controlling three-phase, 50/60 Hz, AC motors. Motor full load current should not exceed the contactor current rating. These contactors are built in several versions — the nameplate on a specific contactor states the authorized ratings.

Low voltage vacuum contactors can be applied to a wide range of voltages up to 1500V. These applications include full voltage control of three-phase squirrel cage motors, primary control of low voltage wound rotor motors and circuit switching for low voltage capacitors for power factor improvement.

Features/Benefits

- Rugged, compact, lightweight
- Quiet operation
- Front removable coil and auxiliaries
- Electrical and mechanical interlocking capability
- Low chop interrupters eliminate the need for surge suppressors
- Contact wear indication allows for planned maintenance program
- Long service life
- Manual push-to-reset button on Sizes 5 and 6
- Freedom overload
- SSOL

Operation

The contact structures of these vacuum break contactors are located inside sealed ceramic tubes which have been evacuated of air. Any arc occurring across the contacts upon opening is automatically extinguished because ionized air is not available to sustain it — the arc breaks when the current passes through zero. The arc typically does not survive beyond the first half cycle once the contacts begin to separate. The large arc chutes normally associated with starters of this size are not required. The ceramic tube with the moving and stationary contacts enclosed is called a **vacuum interrupter** or a **bottle**, and there is one bottle for each pole of the contactor. A metal bellows (like a small, circular accordion) within the bottle allows the moving contact to be closed and pulled open from the outside without leaking air into the bottle. Both the bellows and the metal-to-ceramic seals of these state-of-the-art bottles have been refined to the point where the possibility of loss of vacuum has been virtually eliminated.

Contact Force and Altitude

A vacuum contactor is affected by atmospheric pressure on the bellows of the vacuum bottles. Up to an altitude of 6600 feet, the contactor is designed to tolerate normal variations in barometric pressure. If the contactor is to be operated above 6600 feet above sea level, consult Eaton.

Standards and Certifications

Note: See Enclosed Control Product Guide PG0300001E for additional information on Standards and Certifications that apply to all Cutler-Hammer Enclosed Control products.

- UL listed
- cUL Listed (indicates appropriate CSA Standard investigation)
- CE Mark available
- ABS Type Approved

Catalog Number Selection

Table 36-14. NEMA Vacuum Break Catalog Numbering System

E C V 0 5 5 1 A A A -

Design
V = Vacuum

Modification Codes
(See **Page 36-25**)

Class	Table
01 = Non-reversing Contactor — 3-Pole	**36-18**
02 = Reversing Contactor — 3-Pole	**36-19**
05 = Non-combination Non-reversing Starters	**36-22**
06 = Non-combination Reversing Starters	**36-23**
07 = Non-combination Non-reversing Starters with CPT	**36-24**
16 = Combination Non-reversing Starters — Fusible and Non-fusible Disconnect	**36-25**
17 = Combination Reversing Starters — Fusible and Non-fusible Disconnect	**36-26**
18 = Combination Non-reversing Starters — Fusible and Non-fusible Disconnect with CPT	**36-27**
22 = Combination Non-reversing Starters — Circuit Breaker	**36-28**
23 = Combination Reversing Starters — Circuit Breaker	**36-29**
24 = Combination Non-reversing Starters — Circuit Breaker with CPT	**36-30**

Disconnect Fuse Clip Ratings	
A = None	**L** = 400A/600V R
H = 200A/250V R	**M** = 600A/250V R
J = 200A/600V R	**N** = 600A/600V R
K = 400A/250V R	
Breaker Ratings	
A = None	**K** = 400A
H = 150A	**L** = 600A
J = 250A	**M** = 800A

Cover Control
Non-rev. Starters see **Table 36-16** Rev. Starters see **Table 36-17**
Contactors
3 = 3 Poles

Coil Voltage or Motor Voltage	
A = 120V	**D** = 575V
B = 230V	**E** = 200V
C = 460V	**V** = 380V

NEMA Size
4
5
6

Enclosure Type
1 = 1 — General Purpose
2 = 3R — Rainproof
3 = 4 — Painted Steel
4 = 4X — 304-Grade Stainless Steel
8 = 12 — Dust-Tight
9 = 4X — 316-Grade Stainless Steel

Table 36-15. Alternate "Open" Catalog Numbers

Listed "Open" Catalog Number	Alternate "Open" Catalog Number
AV10FNOA	**V200M4CJC**
AV10GNOAB	**V200M5CJC**
AV10JNOAB	**V200M6CJC**
CV10FN3A	**V201K4CJ**
CV10GN3A	**V201K5CJZ1**
CV10JN3A	**V201K6CJZ1**

Note: Above are NEMA rated devices for applications up to 600V. For Special Purpose devices up to 1500V consult Eaton.

Cover Control

Non-Reversing

Flange Control Kits

For on-the-job conversion of Type 1, 3R, 4X and 12 enclosed starters. Knockouts are provided on the Type 1 flange. Type 3R, 4X and 12 have prepunched holes with removable hole plugs.

36

Factory Installed

To order factory installed pilot devices, change the 9th character of the Catalog Number to the alpha shown in the table to the right. Example: to order an **ECV0548AAA** with START/STOP push-buttons and a red pilot light, change the **A** to a **C**, i.e. ECV0548A**C**A.

Table 36-16. Non-reversing Cover Control Field Kits and Factory Installation

Description	Factory Installed Flange Control	Field Installation Kits	
	Position 9 Alpha	Type 1 Non-combination ②	All Others ③
		Catalog Number	Catalog Number
No Cover Mounted Pilot Devices	A	C400GK0	—
START/STOP Pushbuttons	B	C400GK1	C400T1
with Red RUN Pilot Light	C	C400GK12 ①	—
with Red RUN/Green OFF Lights	D	C400GK16 ①	—
ON/OFF Pushbuttons	E	—	C400T2
with Red RUN Pilot Light	F	—	—
with Red RUN/Green OFF Lights	G	—	—
HAND/OFF/AUTO Selector Switch	H	C400GK3	C400T12
with Red RUN Pilot Light	J	C400GK32 ①	—
with Red RUN/Green OFF Lights	K	C400GK36 ①	—
START Pushbutton	L	—	C400T3
ON Pushbutton	M	—	C400T4
OFF Pushbutton	N	—	C400T5
Red RUN Pilot Light	P	C400GK42 ①	C400T9 ①
Green OFF	Q	C400GK41 ①	C400T10 ①
Red RUN/Green OFF Pilot Lights	R	C400GK46 ①	C400T11 ①
START/STOP Selector Switch	S	—	C400T13
with Red RUN Pilot Light	T	—	—
with Red RUN/Green OFF Lights	U	—	—
ON/OFF Selector Switch	V	—	C400T14
with Red RUN Pilot Light	W	—	—
with Red RUN/Green OFF Lights	X	—	—

① Add Code Letter from table below to Catalog Number for voltage — Kits only. Example: C400T9**B**.

Rating	Code Letter	Rating	Code Letter	Rating	Code Letter
120V 60 Hz	A	240V 60 Hz	B	480V 60 Hz	C
208V 60 Hz	E	380V 50 Hz	L	600V 60 Hz	D

② Type 1 Non-combination, Size 4.

③ Type 1 Non-combination, Sizes 5 & 6; Type 3R, 4X, 12 Non-combination, all Sizes; All Combination Control.

Reversing

Flange Control Kits

For on-the-job conversion of Type1, 3R, 4X and 12 enclosed starters. Knockouts are provided on the Type1 flange. Type 3R, 4X and 12 have prepunched holes with removable hole plugs.

Factory Installed

To order factory installed pilot devices, change the 9th character of the Catalog Number to the alpha shown in the table to the right. Example: to order an **ECV1748AAH** with FOR/REV/STOP pushbuttons and 2 red pilot lights, change the **A** to a **C**, i.e. ECV1748A**C**H.

Table 36-17. Reversing Cover Control Field Kits and Factory Installation

Description	Factory Installed Flange Control	Field Installation Kits	
	Position 9 Alpha	Type 1 Non-combination ⑤	All Others ⑥
		Catalog Number	Catalog Number
No Cover Mounted Pilot Devices	A	C400GK0	—
FOR/REV/STOP Pushbuttons	B	C400GR1	C400T6
with 2 Red Pilot Lights	C	C400GR14 ④	—
with 2 Red/1 Green Pilot Lights	D	—	—
UP/STOP/DOWN Pushbuttons	E	C400GR2	—
with 2 Red Pilot Lights	F	C400GR24 ④	—
FOR/OFF/REV Selector Switch	H	—	C400T15
with 2 Red Pilot Lights	J	—	—
with 2 Red/1 Green Pilot Lights	K	—	—
Two Red Pilot Lights	P	C400GK44 ④	⑦
One Green Pilot Light	Q	C400GK41 ④	C400T10 ④
Two Red/One Green Pilot Lights	R	—	—
OPEN/OFF/CLOSE Selector Switch	V	—	C400T16
with 2 Red Pilot Lights	W	—	—
with 2 Red/1 Green Pilot Lights	X	—	—

④ Add Code Letter from table below to Catalog Number for voltage — Kits only. Example: C400T9**B**.

Rating	Code Letter	Rating	Code Letter	Rating	Code Letter
120V 60 Hz	A	240V 60 Hz	B	480V 60 Hz	C
208V 60 Hz	E	380V 50 Hz	L	600V 60 Hz	D

⑤ Type 1 Non-combination, Size 4.

⑥ Type 1 Non-combination, Sizes 5 & 6; Type 3R, 4X, 12 Non-combination, all Sizes; All Combination Control.

⑦ Order quantity 2 of **C400T9**④.

Product Selection

Table 36-18. Class ECV01 — Non-reversing Contactor — 3-Pole

NEMA Size	Enclosed Ampere Rating	Motor Voltage	Maximum hp Rating	Magnet Coil Voltage ①	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ②	Type 12 Dust-Tight Industrial	Component Contactor (Open) ③
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	135	— 200 230 380 460 575	— 40 50 75 100 100	110/120	**ECV0141A3A**	**ECV0142A3A**	**ECV0144A3A**	**ECV0148A3A**	**CV10FN3A**
5	270	— 200 230 380 460 575	— 75 100 150 200 200	110/120	**ECV0151A3A**	**ECV0152A3A**	**ECV0154A3A**	**ECV0158A3A**	**CV10GN3A**
6	540	— 200 230 380 460 575	— 150 200 300 400 400	110/120	**ECV0161A3A**	**ECV0162A3A**	**ECV0164A3A**	**ECV0168A3A**	**CV10JN3A**

① Wired for separate control.

② These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV0144A3A. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

③ Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

Table 36-19. Class ECV02 — Reversing Contactor — 3-Pole

NEMA Size	Enclosed Ampere Rating	Motor Voltage	Maximum hp Rating	Magnet Coil Voltage ④	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ⑤	Type 12 Dust-Tight Industrial	Component Contactor (Open) ⑥
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	135	— 200 230 380 460 575	— 40 50 75 100 100	110/120	**ECV0241A3A**	**ECV0242A3A**	**ECV0244A3A**	**ECV0248A3A**	**V211K4CJ**
5	270	— 200 230 380 460 575	— 75 100 150 200 200	110/120	**ECV0251A3A**	**ECV0252A3A**	**ECV0254A3A**	**ECV0258A3A**	**V211K5CJZ1**
6	540	— 200 230 380 460 575	— 150 200 300 400 400	110/120	**ECV0261A3A**	**ECV0262A3A**	**ECV0264A3A**	**ECV0268A3A**	**V211K6CJZ1**

④ Wired for separate control.

⑤ These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV0244A31. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

⑥ Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

Field Modification Kits

Auxiliary Electrical Contacts

Two Type J auxiliary contacts may be mounted on each side to provide four auxiliary, isolated 600V, 10A double break contacts for use in control circuits.

Table 36-20. Auxiliary Contacts

Contact Arrangement	Catalog Number
1NO-1NC	**J11**
2NO	**J20**
2NC	**J02**

Table 36-21. Horizontal Mechanical Interlock

Size	Catalog Number
4	**180C113G04**
5	**180C113G12**
6	**180C113G13**

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Product Selection

Table 36-22. Class ECV05 — Non-combination Non-reversing Starter

NEMA Size	Enclosed Ampere Rating	Motor Voltage	Maximum hp Rating	Magnet Coil Voltage ①	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ②	Type 12 Dust-Tight Industrial External Reset ④	Component Starter (Open) ③
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	135	— 200 230 380 460 575	— 40 50 75 100 100	110/120	**ECV0541AAA**	**ECV0542AAA**	**ECV0544AAA**	**ECV0548AAA**	**AV10FNOA**
5	270	— 200 230 380 460 575	— 75 100 150 200 200	110/120	**ECV0551AAA**	**ECV0552AAA**	**ECV0554AAA**	**ECV0558AAA**	**AV10GNOAB**
6	540	— 200 230 380 460 575	— 150 200 300 400 400	110/120	**ECV0561AAA**	**ECV0562AAA**	**ECV0564AAA**	**ECV0568AAA**	**AV10JNOAB**
Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**. **Starters with Electronic Overload**, see **Page 36-25** of Modification Codes.									

① Wired for separate control.

② These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV0544AAA. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

③ Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

④ All Type 12 enclosures are standardized with external reset. For internal reset, order Modification Code **R5**.

Table 36-23. Class ECV06 — Non-combination Reversing Starter

NEMA Size	Enclosed Ampere Rating	Motor Voltage	Maximum hp Rating	Magnet Coil Voltage ⑤	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ⑥	Type 12 Dust-Tight Industrial External Reset ⑦	Component Starter (Open)
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	135	— 200 230 380 460 575	— 40 50 75 100 100	110/120	**ECV0641AAA**	**ECV0642AAA**	**ECV0644AAA**	**ECV0648AAA**	**V210M4CJC**
5	270	— 200 230 380 460 575	— 75 100 150 200 200	110/120	**ECV0651AAA**	**ECV0652AAA**	**ECV0654AAA**	**ECV0658AAA**	**V210M5CJC**
6	540	— 200 230 380 460 575	— 150 200 300 400 400	110/120	**ECV0661AAA**	**ECV0662AAA**	**ECV0664AAA**	**ECV0668AAA**	**V210M6CJC**
Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**. **Starters with Electronic Overload**, see **Page 36-25** of Modification Codes.									

⑤ Wired for separate control.

⑥ These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV0644AAA. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

⑦ All Type 12 enclosures are standardized with external reset. For internal reset, order Modification Code **R5**.

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Table 36-24. Class ECV07 — Non-combination Non-reversing Starter with CPT

NEMA Size	Enclosed Ampere Rating	Motor Voltage	Maximum hp Rating	Magnet Coil Voltage	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ①	Type 12 Dust-Tight Industrial External Reset ③	Component Starter (Open) ②
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	135	200 230 380 460 575	40 50 75 100 100	110/120	**ECV0741EAA** **ECV0741BAA** **ECV0741VAA** **ECV0741CAA** **ECV0741DAA**	**ECV0742EAA** **ECV0742BAA** **ECV0742VAA** **ECV0742CAA** **ECV0742DAA**	**ECV0744EAA** **ECV0744BAA** **ECV0744VAA** **ECV0744CAA** **ECV0744DAA**	**ECV0748EAA** **ECV0748BAA** **ECV0748VAA** **ECV0748CAA** **ECV0748DAA**	**AV10FNOA**
5	270	200 230 380 460 575	75 100 150 200 200	110/120	**ECV0751EAA** **ECV0751BAA** **ECV0751VAA** **ECV0751CAA** **ECV0751DAA**	**ECV0752EAA** **ECV0752BAA** **ECV0752VAA** **ECV0752CAA** **ECV0752DAA**	**ECV0754EAA** **ECV0754BAA** **ECV0754VAA** **ECV0754CAA** **ECV0754DAA**	**ECV0758EAA** **ECV0758BAA** **ECV0758VAA** **ECV0758CAA** **ECV0758DAA**	**AV10GNOAB**
6	540	200 230 380 460 575	150 200 300 400 400	110/120	**ECV0761EAA** **ECV0761BAA** **ECV0761VAA** **ECV0761CAA** **ECV0761DAA**	**ECV0762EAA** **ECV0762BAA** **ECV0762VAA** **ECV0762CAA** **ECV0762DAA**	**ECV0764EAA** **ECV0764BAA** **ECV0764VAA** **ECV0764CAA** **ECV0764DAA**	**ECV0768EAA** **ECV0768BAA** **ECV0768VAA** **ECV0768CAA** **ECV0768DAA**	**AV10JNOAB**

Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**.
Starters with Electronic Overload, see **Page 36-25** of Modification Codes.

① These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV0744EAA. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

② Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

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

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Product Selection

Table 36-25. Class ECV16 — Combination Non-reversing Starter — Fusible and Non-fusible Disconnect

NEMA Size	Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage ①	Fuse Clip Amperes/ Disconnect Amperes	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ②	Type 12 Dust-Tight Industrial External Reset ④⑤	Component Starter (Open) ③
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Fusible									
4	200 230 380 460 575	40 50 75 100 100	110/120	200A	**ECV1641AAH** **ECV1641AAH** **ECV1641AAJ** **ECV1641AAJ** **ECV1641AAJ**	**ECV1642AAH** **ECV1642AAH** **ECV1642AAJ** **ECV1642AAJ** **ECV1642AAJ**	**ECV1644AAH** **ECV1644AAH** **ECV1644AAJ** **ECV1644AAJ** **ECV1644AAJ**	**ECV1648AAH** **ECV1648AAH** **ECV1648AAJ** **ECV1648AAJ** **ECV1648AAJ**	**AV10FNOA**
5	200 230 380 460 575	75 100 150 200 200	110/120	400A	**ECV1651AAK** **ECV1651AAK** **ECV1651AAL** **ECV1651AAL** **ECV1651AAL**	**ECV1652AAK** **ECV1652AAK** **ECV1652AAL** **ECV1652AAL** **ECV1652AAL**	**ECV1654AAK** **ECV1654AAK** **ECV1654AAL** **ECV1654AAL** **ECV1654AAL**	**ECV1658AAK** **ECV1658AAK** **ECV1658AAL** **ECV1658AAL** **ECV1658AAL**	**AV10GNOA**
6	200 230 380 460 575	150 200 300 400 400	110/120	600A	**ECV1661AAM** **ECV1661AAM** **ECV1661AAN** **ECV1661AAN** **ECV1661AAN**	**ECV1662AAM** **ECV1662AAM** **ECV1662AAN** **ECV1662AAN** **ECV1662AAN**	**ECV1664AAM** **ECV1664AAM** **ECV1664AAN** **ECV1664AAN** **ECV1664AAN**	**ECV1668AAM** **ECV1668AAM** **ECV1668AAN** **ECV1668AAN** **ECV1668AAN**	**AV10JNOA**
Non-fusible									
4	— 200 230 380 460 575	— 40 50 75 100 100	110/120	200A	**ECV1641AAA**	**ECV1642AAA**	**ECV1644AAA**	**ECV1648AAA**	**AV10FNOA**
5	— 200 230 380 460 575	— 75 100 150 200 200	110/120	400A	**ECV1651AAA**	**ECV1652AAA**	**ECV1654AAA**	**ECV1658AAA**	**AV10GNOA**
6	— 200 230 380 460 575	— 150 200 300 400 400	110/120	600A	**ECV1661AAA**	**ECV1662AAA**	**ECV1664AAA**	**ECV1668AAA**	**AV10JNOA**

Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**.
Starters with Electronic Overload, see **Page 36-25** of Modification Codes.

① Wired for separate control.

② These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV1644AAH. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

③ Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

④ All Type 12 enclosures are standardized with external reset. For internal reset, order Modification Code **R5**.

⑤ Type 12 enclosure is without safety door interlock. When safety door interlock is required, add Modification Code **E11**.

Type 12 Non-reversing Vacuum Starter with Fused Disconnect

Table 36-26. Class ECV17 — Combination Reversing Starter — Fusible and Non-fusible Disconnect

NEMA Size	Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage	Fuse Clip Amperes/ Disconnect Amperes	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ①	Type 12 Dust-Tight Industrial External Reset ②③	Component Starter (Open)
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Fusible									
4	200 230 380 460 575	40 50 75 100 100	110/120	200A	**ECV1741AAH** **ECV1741AAH** **ECV1741AAJ** **ECV1741AAJ** **ECV1741AAJ**	**ECV1742AAH** **ECV1742AAH** **ECV1742AAJ** **ECV1742AAJ** **ECV1742AAJ**	**ECV1744AAH** **ECV1744AAH** **ECV1744AAJ** **ECV1744AAJ** **ECV1744AAJ**	**ECV1748AAH** **ECV1748AAH** **ECV1748AAJ** **ECV1748AAJ** **ECV1748AAJ**	**V210M4CJC**
5	200 230 380 460 575	75 100 150 200 200	110/120	400A	**ECV1751AAK** **ECV1751AAK** **ECV1751AAL** **ECV1751AAL** **ECV1751AAL**	**ECV1752AAK** **ECV1752AAK** **ECV1752AAL** **ECV1752AAL** **ECV1752AAL**	**ECV1754AAK** **ECV1754AAK** **ECV1754AAL** **ECV1754AAL** **ECV1754AAL**	**ECV1758AAK** **ECV1758AAK** **ECV1758AAL** **ECV1758AAL** **ECV1758AAL**	**V210M5CJC**
6	200 230 380 460 575	150 200 300 400 400	110/120	600A	**ECV1761AAM** **ECV1761AAM** **ECV1761AAN** **ECV1761AAN** **ECV1761AAN**	**ECV1762AAM** **ECV1762AAM** **ECV1762AAN** **ECV1762AAN** **ECV1762AAN**	**ECV1764AAM** **ECV1764AAM** **ECV1764AAN** **ECV1764AAN** **ECV1764AAN**	**ECV1768AAM** **ECV1768AAM** **ECV1768AAN** **ECV1768AAN** **ECV1768AAN**	**V210M6CJC**
Non-fusible									
4	— 200 230 380 460 575	— 40 50 75 100 100	110/120	200A	**ECV1741AAA**	**ECV1742AAA**	**ECV1744AAA**	**ECV1748AAA**	**V210M4CJC**
5	— 200 230 380 460 575	— 75 100 150 200 200	110/120	400A	**ECV1751AAA**	**ECV1752AAA**	**ECV1754AAA**	**ECV1758AAA**	**V210M5CJC**
6	— 200 230 380 460 575	— 150 200 300 400 400	110/120	600A	**ECV1761AAA**	**ECV1762AAA**	**ECV1764AAA**	**ECV1768AAA**	**V210M6CJC**
Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**. **Starters with Electronic Overload**, see **Page 36-25** of Modification Codes.									

① These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV174**4**AAH. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

② All Type 12 enclosures are standardized with external reset. For internal reset, order Modification Code **R5**.

③ Type 12 enclosure is without safety door interlock. When safety door interlock is required, add Modification Code **E11**.

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Table 36-27. Class ECV18 — Combination Non-reversing Starter — Fusible and Non-fusible Disconnect with CPT

NEMA Size	Motor Voltage	Max. hp Rating Dual Element Fuses	Magnet Coil Voltage	Fuse Clip Amperes/ Disconnect Amperes	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ①	Type 12 Dust-Tight Industrial External Reset ③④	Component Starter (Open) ②
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Fusible									
4	200 230 380 460 575	40 50 75 100 100	110/120	200A	**ECV1841EAH** **ECV1841BAH** **ECV1841VAJ** **ECV1841CAJ** **ECV1841DAJ**	**ECV1842EAH** **ECV1842BAH** **ECV1842VAJ** **ECV1842CAJ** **ECV1842DAJ**	**ECV1844EAH** **ECV1844BAH** **ECV1844VAJ** **ECV1844CAJ** **ECV1844DAJ**	**ECV1848EAH** **ECV1848BAH** **ECV1848VAJ** **ECV1848CAJ** **ECV1848DAJ**	**AV10FNOA**
5	200 230 380 460 575	75 100 150 200 200	110/120	400A	**ECV1851EAK** **ECV1851BAK** **ECV1851VAL** **ECV1851CAL** **ECV1851DAL**	**ECV1852EAK** **ECV1852BAK** **ECV1852VAL** **ECV1852CAL** **ECV1852DAL**	**ECV1854EAK** **ECV1854BAK** **ECV1854VAL** **ECV1854CAL** **ECV1854DAL**	**ECV1858EAK** **ECV1858BAK** **ECV1858VAL** **ECV1858CAL** **ECV1858DAL**	**AV10GNOA**
6	200 230 380 460 575	150 200 300 400 400	110/120	600A	**ECV1861EAM** **ECV1861BAM** **ECV1861VAN** **ECV1861CAN** **ECV1861DAN**	**ECV1862EAM** **ECV1862BAM** **ECV1862VAN** **ECV1862CAN** **ECV1862DAN**	**ECV1864EAM** **ECV1864BAM** **ECV1864VAN** **ECV1864CAN** **ECV1864DAN**	**ECV1868EAM** **ECV1868BAM** **ECV1868VAN** **ECV1868CAN** **ECV1868DAN**	**AV10JNOA**
Non-fusible									
4	200 230 380 460 575	40 50 75 100 100	110/120	200A	**ECV1841EAA** **ECV1841BAA** **ECV1841VAA** **ECV1841CAA** **ECV1841DAA**	**ECV1842EAA** **ECV1842BAA** **ECV1842VAA** **ECV1842CAA** **ECV1842DAA**	**ECV1844EAA** **ECV1844BAA** **ECV1844VAA** **ECV1844CAA** **ECV1844DAA**	**ECV1848EAA** **ECV1848BAA** **ECV1848VAA** **ECV1848CAA** **ECV1848DAA**	**AV10FNOA**
5	200 230 380 460 575	75 100 150 200 200	110/120	400A	**ECV1851EAA** **ECV1851BAA** **ECV1851VAA** **ECV1851CAA** **ECV1851DAA**	**ECV1852EAA** **ECV1852BAA** **ECV1852VAA** **ECV1852CAA** **ECV1852DAA**	**ECV1854EAA** **ECV1854BAA** **ECV1854VAA** **ECV1854CAA** **ECV1854DAA**	**ECV1858EAA** **ECV1858BAA** **ECV1858VAA** **ECV1858CAA** **ECV1858DAA**	**AV10GNOA**
6	200 230 380 460 575	150 200 300 400 400	110/120	600A	**ECV1861EAA** **ECV1861BAA** **ECV1861VAA** **ECV1861CAA** **ECV1861DAA**	**ECV1862EAA** **ECV1862BAA** **ECV1862VAA** **ECV1862CAA** **ECV1862DAA**	**ECV1864EAA** **ECV1864BAA** **ECV1864VAA** **ECV1864CAA** **ECV1864DAA**	**ECV1868EAA** **ECV1868BAA** **ECV1868VAA** **ECV1868CAA** **ECV1868DAA**	**AV10JNOA**
Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**. **Starters with Electronic Overload**, see **Page 36-25** of Modification Codes.									

① These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV1844EAH. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

② Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

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 Code **E11**.

Type 12 Non-reversing Vacuum Starter with HMCP

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Table 36-28. Class ECV22 — Combination Non-reversing Starter — Circuit Breaker

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage ①	Circuit Breaker Type	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ②	Type 12 Dust-Tight Industrial External Reset ④⑤	Component Starter (Open) ③
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	200 230 380 460 575	40 50 75 100 100	110/120	HMCP 150A	**ECV2241AAH**	**ECV2242AAH**	**ECV2244AAH**	**ECV2248AAH**	**AV10FNOA**
5	200 230 460 575	60 75 150 200	110/120	HMCP 250A	**ECV2251AAJ**	**ECV2252AAJ**	**ECV2254AAJ**	**ECV2258AAJ**	**AV10GNOA**
	200 230 380 460	75 100 150 200	110/120	HMCP 400A	**ECV2251AAK**	**ECV2252AAK**	**ECV2254AAK**	**ECV2258AAK**	**AV10GNOA**
6	200 230 460 575	100 150 300 300	110/120	HMCP 600A	**ECV2261AAL**	**ECV2262AAL**	**ECV2264AAL**	**ECV2268AAL**	**AV10JNOA**
	230 460 575	200 400 400	110/120	MD 800A	**ECV2261AAM**	**ECV2262AAM**	**ECV2264AAM**	**ECV2268AAM**	**AV10JNOA**
Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**. **Starters with Electronic Overload**, see **Page 36-25** of Modification Codes.									

① Wired for separate control.
② These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV2244AAH. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.
③ Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.
④ All Type 12 enclosures are standardized with external reset. For internal reset, order Modification Code **R5**.
⑤ Type 12 enclosure is without safety door interlock. When safety door interlock is required, add Modification Code **E11**.

36

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Table 36-29. Class ECV23 — Combination Reversing Starter — Circuit Breaker

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage ①	Circuit Breaker Type	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & 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
4	200 230 380 460 575	40 50 75 100 100	110/120	HMCP 150A	**ECV2341AAH**	**ECV2342AAH**	**ECV2344AAH**	**ECV2348AAH**	**V210M4CJC**
5	200 230 460 575	60 75 150 200	110/120	HMCP 250A	**ECV2351AAJ**	**ECV2352AAJ**	**ECV2354AAJ**	**ECV2358AAJ**	**V210M5CJC**
	200 230 380 460	75 100 150 200	110/120	HMCP 400A	**ECV2351AAK**	**ECV2352AAK**	**ECV2354AAK**	**ECV2358AAK**	**V210M5CJC**
6	200 230 460 575	100 150 300 300	110/120	HMCP 600A	**ECV2361AAL**	**ECV2362AAL**	**ECV2364AAL**	**ECV2368AAL**	**V210M6CJC**
	230 460 575	200 400 400	110/120	MD 800A	**ECV2361AAM**	**ECV2362AAM**	**ECV2364AAM**	**ECV2368AAM**	**V210M6CJC**
Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**. **Starters with Electronic Overload**, see **Page 36-25** of Modification Codes.									

① Wired for separate control.

② These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV234**4**AAH. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

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 Code **E11**.

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

Table 36-30. Class ECV24 — Combination Non-reversing Starter — Circuit Breaker with CPT

NEMA Size	Motor Voltage	Max. hp Rating	Magnet Coil Voltage	Circuit Breaker Type	Type 1 General Purpose	Type 3R Rainproof	Type 4X Watertight & Dust-Tight Stainless Steel ①	Type 12 Dust-Tight Industrial External Reset ②④	Component Starter (Open) ③
					Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
4	200 230 380 460 575	40 50 75 100 100	110/120	HMCP 150A	**ECV2441EAH** **ECV2441BAH** **ECV2441VAH** **ECV2441CAH** **ECV2441DAH**	**ECV2442EAH** **ECV2442BAH** **ECV2442VAH** **ECV2442CAH** **ECV2442DAH**	**ECV2444EAH** **ECV2444BAH** **ECV2444VAH** **ECV2444CAH** **ECV2444DAH**	**ECV2448EAH** **ECV2448BAH** **ECV2448VAH** **ECV2448CAH** **ECV2448DAH**	**AV10FNOA**
5	200 230 460 575	60 75 150 200	110/120	HMCP 250A	**ECV2451EAJ** **ECV2451BAJ** **ECV2451CAJ** **ECV2451DAJ**	**ECV2452EAJ** **ECV2452BAJ** **ECV2452CAJ** **ECV2452DAJ**	**ECV2454EAJ** **ECV2454BAJ** **ECV2454CAJ** **ECV2454DAJ**	**ECV2458EAJ** **ECV2458BAJ** **ECV2458CAJ** **ECV2458DAJ**	**AV10GNOA**
	200 230 380 460	75 100 150 200	110/120	HMCP 400A	**ECV2451EAK** **ECV2451BAK** **ECV2451VAK** **ECV2451CAK**	**ECV2452EAK** **ECV2452BAK** **ECV2452VAK** **ECV2452CAK**	**ECV2454EAK** **ECV2454BAK** **ECV2454VAK** **ECV2454CAK**	**ECV2458EAK** **ECV2458BAK** **ECV2458VAK** **ECV2458CAK**	**AV10GNOA**
6	200 230 460 575	100 150 300 300	110/120	HMCP 600A	**ECV2461EAL** **ECV2461BAL** **ECV2461CAL** **ECV2461DAL**	**ECV2462EAL** **ECV2462BAL** **ECV2462CAL** **ECV2462DAL**	**ECV2464EAL** **ECV2464BAL** **ECV2464CAL** **ECV2464DAL**	**ECV2468EAL** **ECV2468BAL** **ECV2468CAL** **ECV2468DAL**	**AV10JNOA**
	230 460 575	200 400 400	110/120	MD 800A	**ECV2461BAM** **ECV2461CAM** **ECV2461DAM**	**ECV2462BAM** **ECV2462CAM** **ECV2462DAM**	**ECV2464BAM** **ECV2464CAM** **ECV2464DAM**	**ECV2468BAM** **ECV2468CAM** **ECV2468DAM**	**AV10JNOA**

Starters do not include heater packs. Select 1 carton of 3 heater packs. Heater pack selection, **PG03300001E**.
Starters with Electronic Overload, see **Page 36-25** of Modification Codes.

① These are the Catalog Numbers for Type 4X 304-Grade Stainless Steel, as indicated by the seventh digit **4**. Example: ECV2444EAH. 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 Nonmetallic, change that digit to **5**. For details on these Alternate Enclosures, see **PG03300001E**.

② All Type 12 enclosures are standardized with external reset. For internal reset, order Modification Code **R5**.

③ Alternate Catalog Numbers for those listed can be found in **Table 36-15** on **Page 36-13**.

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

36

Cover Control ..... **Page 36-14**
Wiring Diagrams ..... **Page 36-24**
Dimensions **PG03300001E**
Accessories, Kits **PG03300001E**
Modifications ..... **Page 36-25**
Technical Data **PG03300001E**

36

Wiring Diagrams

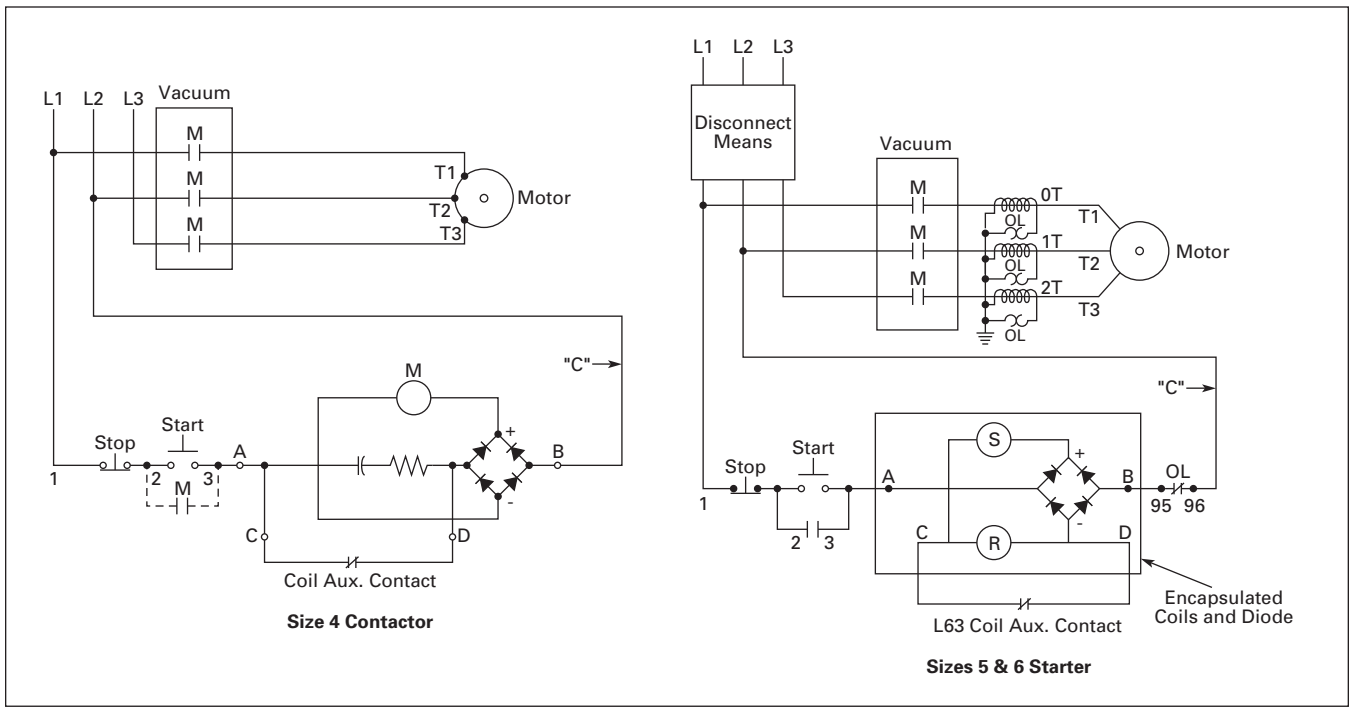


Figure 36-5. Typical Wiring Diagrams

Modification Codes

Table 36-31. A — Ammeters, Auxiliary Contacts, Accelerating Relays, Autotransformers

Modification	Catalog Number Suffix	Description
Ammeter ①	**A1**	Panel Type Wired to Current Transformer in Line 1, Type 1, 12
		Panel Type Wired to Current Transformer in Line 1, Type 3R, 4X
	A2	Panel Type, Selector Switch and 3 Current Transformers Wired to Ammeter via Switch, Type 1, 12
		Panel Type, Selector Switch and 3 Current Transformers Wired to Ammeter via Switch, Type 3R, 4X
	A3	Miniature (Single-Phase), Type 1, 12
	A4	Miniature with Selector Switch, Type 1, 12
	A5	Switchboard (Single-Phase), Type 1, 12
		Switchboard (Single-Phase), Type 3R, 4X
	A6	Switchboard with Selector Switch, Type 1, 12
		Switchboard with Selector Switch, Type 3R, 4X
	A7	3-Panel Type (Single-Phase), Type 1, 12
		3-Panel Type (Single-Phase), Type 3R, 4X
	A10	3 Miniature (Single-Phase), Type 1, 3R, 4X, 12
	A11	3 Switchboard Type (Single-Phase), Type 1, 12
		3 Switchboard Type (Single-Phase), Type 3R, 4X
	A12	Ammeter Order by Description, Type 1, 3R, 4X, 12
Auto-transformers	**A8**	hp Rating selection, see **PG03300001E**
	A9	Order by Description
Top Mounted Auxiliary Contacts ②③ (Unwired)	**A13**	1NO
	A14	1NC
	A15	1NO-1NC
	A16	2NO
NEMA Sizes 00 – 2 only (Unwired)	**A17**	2NC
	A18	2NO-1NC
	A19	1NO-2NC
	A20	3NO
IEC Sizes B – L Only (Unwired) ***XT*** Series	**A21**	3NC
	A22	3NO-1NC
	A23	2NO-2NC
	A24	1NO-3NC
	A25	4NO
	A26	4NC
Side Mounted Auxiliary Contacts ③④	**A27**	1NO
	A28	1NC
	A29	1NO-1NC
	A30	2NO
	A31	2NC
	A32	2NO-1NC
	A33	1NO-2NC
	A34	3NO

Table 36-31. A — Ammeters, Auxiliary Contacts, Accelerating Relays, Autotransformers (Continued)

Modification	Catalog Number Suffix	Description
Side Mounted Auxiliary Contacts, continued ③④	**A35**	3NC
	A36	3NO-1NC
	A37	2NO-2NC
	A38	1NO-3NC
	A39	4NO
	A40	4NC
Auxiliary Contacts ③	**A42**	Contacts Mounted on Operating Mechanism of Disconnect Switch, 1NO-1NC
	A43	Contacts Mounted on Operating Mechanism of Disconnect Switch, 2NO-2NC
	A44	With Auxiliary Contact Omitted
Accelerating Relay	**A46**	For 2-Speed
	A47	2NO/2NC 24V DC Auxiliary Relay — ***IT.*** Only

① Oversize enclosure will be provided for ***IT.*** Starters.
② Top mounted auxiliary contacts cannot be added to contactors in Box 1 (Type 1).
③ Not available for ***IT.*** Starters.
④ Available on ***XT*** Starters for 40A and greater only.

Table 36-32. B — Breaker Modifications, Backspin Timer, Undervoltage Release, Bell Alarm, Bus Choke

Modification	Catalog Number Suffix	Description
Breaker	**B1**	1NO-1NC Auxiliary Contact on Breaker
	B2	2NO-2NC Auxiliary Contacts on Breaker
	B3	Shunt Trip on Circuit Breaker — 48 – 127V AC or DC
	B4	Shunt Trip on Circuit Breaker — 9 – 24V AC or DC
	B5	Shunt Trip on Circuit Breaker — 208 – 380V AC
	B6	Shunt Trip on Circuit Breaker — 415 – 600V AC or 220 – 250V DC
	B8	Undervoltage Release for Breaker
	B9	Current Limiter Mounted to Breaker
	B10	Breaker — Order by Description
	B11	Thermal Magnetic Breaker
Backspin Timer	**B12**	180 Seconds
Undervoltage Release	**B13**	Undervoltage Release for Circuit Breaker — 208 – 240V AC
	B14	Undervoltage Release for Circuit Breaker — 380 – 480V AC
	B15	Undervoltage Release for Circuit Breaker — 525 – 600V AC
Bell Alarm	**B16**	Bell Alarm for Circuit Breaker
Bus Choke (MVX)	**B20**	DC Bus Choke, Open Core and Coil ⑤

⑤ A DC bus choke may be used in place of an AC line reactor for line harmonic current reduction and for power source exceeding 500 kVA. The DC bus choke will not provide any protection for line voltage unbalance or transients.

Table 36-33. C — Control Power Transformer, *IT.* Power Supplies, Control Relays, Cover Control (not elsewhere defined), Current Transformers, Compelling Relay, Control Wiring, Control Circuit Breaker, Separate Control, Customer-Supplied Components, Custom for Advantage, Contactors, Counter, E-Stop Relay, DC/AC Interface, Separate Source Disconnect, Bypass Contactors

Modification	Catalog Number Suffix	Description
Control Power Transformers Make sure 8th character specifies primary/ secondary voltage.	**C1**	Standard Size Control Transformer, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C2	Standard Size Control Transformer, 24V/60 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C42	50 VA Extra Capacity CPT 120V/60 Hz, 110V/50 Hz with 2 Primary and 1 Secondary
	C3	100 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C4	100 VA Extra Capacity CPT, 24V/60 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C5	200 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C6	200 VA Extra Capacity CPT, 24V/60 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C7	300 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C8	400 VA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C9	1 kVA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C10	2 kVA Extra Capacity CPT, 120V/60 Hz, 110V/50 Hz Secondary with 2 Primary and 1 Secondary Fuse
	C11	Control Transformer — Order by Description
	C34	CPT with Power Supply for ***IT.*** or ***XT***
Power Supplies (***IT.*** and ***XT*** Only)	**C27**	Separate Control 120V AC to 24V DC
	C28	Power Supply with Extra Capacity — Order by Description
Control Relays	**C12**	4-Pole Interposing Relay, 600V (2NO/2NC)
	C13	Run Relay, 24V DC (MVX)
	C14 ①	4-Pole, Unwired, A600 Rtg. — 2NO-2NC
	C15 ①	8-Pole, Unwired, A600 Rtg. — 4NO-4NC
	C16	Control Relay — Order by Description
	C18 ①②	3-Wire Control Module (C30 Lighting)
	C20 ①②	2-Wire Control Relay for Mechanical/ Magnetic Lighting Contactors
Cover Control	**C17** ①	Convert Position 7 to E30 Type Cover Control
	C19 ①	Lock-Off Attachment Added on Cover Control
	C29	Change to E22 (22 mm) Cover Controls

① Not available for ***IT.*** Starters.
② Not available for ***XT*** Starters.

Table 36-33. C — Control Power Transformer, *IT.* Power Supplies, Control Relays, Cover Control (not elsewhere defined), Current Transformers, Compelling Relay, Control Wiring, Control Circuit Breaker, Separate Control, Customer-Supplied Components, Custom for Advantage, Contactors, Counter, E-Stop Relay, DC/AC Interface, Separate Source Disconnect, Bypass Contactors (Continued)

Modification	Catalog Number Suffix	Description
Current Transformer(s)	**C21**	In Phase 1
	C22	In Phases 1 and 2
	C23	In 3 Phases
Compelling Relay	**C25** ③	—
Control Wiring	**C26**	Omit Control Wiring
	C30 ③	With Separate Control Wiring and Two 250V Fuses in Holder
	C31 ③	With Common Control Wiring and Two 600V (Class C) Fuses in Holder
	C33	Control Wiring Type — Order by Description
Control Circuit Breaker	**C32** ③	Order by Description
Separate Control	**C35**	Wired for Separate Control (Reduced Voltage)
Customer Supplied Components	**C36**	Customer Supplied Components to Be Installed
	C37	Customer Supplied Wiring Diagram to Use
Custom for Advantage	**C39**	Advantage+ Starter Supplied
Contactor/ Starter	**C40** ③	Contactor/Starter — Order by Description
Counter	**C41** ③	Operations Counter
E-Stop Relay	**C43** ③	E-Stop Relay (DeviceNet)
DC/AC Interface	**C44** ③⑤	DC/AC Interface Module
Separate Source Disconnect	**C45** ③	IEC Separate Source Disconnect for Control Circuitry
Bypass Contactors for ***IT.***/MVX Starters (MVX: 1/2 to 5 hp Only)	**C46/J1**	Isolation Contactor
	C46/J2	Output Contactor
	C46/J3	Bypass Contactor
	C46/J4	Isolation/Output/Bypass Contactor
	C46/J5	3-Contactor Bypass Pkg. for MVX ④

③ Not available for ***IT.*** Starters.
④ Includes CPT, Pilot Lights, Selector Switch, Auxiliary Contacts and Control Relay.
⑤ Not available for ***XT*** Starters.

Table 36-34. D — Device Labels, Deceleration Relay, Drain and Breather, Duplex Modifications

Modification	Catalog Number Suffix	Description
Device Labels	**D1**	(Each Label)
Decel. Relay ①	**D2**	2-Speed
Drain and Breather (Type 7/9 Enclosure) ①	**D5**	Drain and Breather
	D6	Drain Only
	D7	Breather Only
Duplex Modifications	**D12**	Alternator Omitted (Deduct Price)
	D14	START/STOP Pushbuttons — Supplied for Each Motor
	D15	HAND/OFF/AUTO Selector Switch — Supplied for Each Motor
	D16	No. 1 Lead - No. 2 Lead Selector Switch for Manual Selection of Lead Pump (Alternator is Omitted)
	D17	Red RUN Pilot Light — Supplied for Each Motor
	D18	Push-to-Test Red RUN Pilot Light — Supplied for Each Motor
	D19	TEST Pushbutton for Each Motor
	D20	CPT, 120V Secondary, 2 Pri. Fuses & 1 Sec. Fuse — Supplied for Ea. Motor
	D21	CPT w/100VA Extra Capacity, 120V Sec., 2 Pri. Fuses & 1 Sec. Fuse — Supplied for Each Motor
	D22	CPT w/200VA Extra Capacity, 120V Sec., 2 Pri. Fuses & 1 Sec. Fuse — Supplied for Each Motor
	D23	CPT for Duplex — Order by Description
	D24	Add 2 Relays to Modify Controller to Operate w/Single-Pole Pilot Devices
	D25	Add 3 Relays to Modify Controller to Operate w/Single-Pole Pilot Devices
	D26	Green — OFF for each starter
	D27	Green — Push-to-Test OFF for ea. starter

① Not available for ***IT.*** or ***XT*** Starters.

Table 36-35. E — Enclosure Modifications, Elapsed Time Meter, Duplex Outlet, Enclosure for Starter, Enclosure Clear Cover, Enclosure Material

Modification	Catalog Number Suffix	Description
Enclosure Modifications	**E3**	Oversize Enclosure
	E4	Enclosure — Order by Description
	E8	Service Entrance Rating w/Ground Bar
	E11	Safety Door Interlock
Elapsed Time Meter	**E9**	Wired Across Coil, Type 1, 12
		Wired Across Coil, Type 3R, 4X
	E10	Elapsed Time Meter — Order by Description
Duplex Outlet	**E12**	Convenience Duplex Outlet Mounted in Side of Enclosure
Enclosure for Starter ②	**E13**	Horizontal Combination Starter, Size 0 – 2
	E14	Narrow Combination Starter, Size 0 – 2
Enclosure Clear Cover for ***XT***	**E19**	Clear Cover for Halyester Enclosure Nonmetallic
Enclosure Material	**E20**	Convert to 316 Stainless Steel
	E21	Convert from Type 3R to Stainless Steel

② Not available for ***IT.*** or ***XT*** Starters.

Table 36-36. F — Fuse Clips, Fuse Blocks, Fungus Protection, Fingerproof Covers, EMI Filter

Modification	Catalog Number Suffix	Description
Fuse Clips ④	**F1**	Change Fuse Clips in Position 8 to Class J
	F2	Change Fuse Clips in Position 8 to Class H & K (30 & 60 Ampere Only)
Fuse Blocks	**F4**	Power Fuses Included — Order by Description
	F5	30 Ampere Control Circuit Fuseholder (KTK) Mounted on Panel (Unwired), Fuse Not Supplied
	F6	30 Ampere Control Circuit Fuseholder Mounted on Panel (Unwired), FNQR Fuse Supplied
	F7	3-Pole Power Fuseholder Mounted on Front Contactor
	F8	Separate Fusing of Control Power Supply — ***IT.***
	F10	Blown Fuse Indicator (Not for PFC)
	F21	Class CC Fuses
EMI Filter (MVX)	**F22**	3-Phase ③
	F23	1-Phase ③

③ The EMI filter is not necessary to meet the CE mark requirements for EMC when installing the MVX in an EC country.

④ Not available for ***XT*** Starters.

Table 36-37. G — Ground Fault Relay, Grounding

Modification	Catalog Number Suffix	Description
Ground Fault Relay	**G1**	Ground Fault Relay (Wired)
	G3	Ground Fault Relay (Unwired)
Grounding	**G5**	Special Grounding — Order by Description
	G6	Ground Fault Protection Omitted (Advantage)
	G7	Ground Fault Protection and Monitoring Panel

Table 36-38. H — Heater (Space), Heater Packs Installed

Modification	Catalog Number Suffix	Description	
Space Heater	**H1**	Space Heater and Thermostat	
	H2	Space Heater and NC Interlock	
Install Heater Packs (Freedom Series)	**H5**	**Class 20**	**Class 10**
		/D1 H2001B-3 /D2 H2002B-3 /D3 H2003B-3 /D4 H2004B-3 /D5 H2005B-3	/D25 H2101B-3 /D26 H2102B-3 /D27 H2103B-3 /D28 H2104B-3 /D29 H2105B-3
		/D6 H2006B-3 /D7 H2007B-3 /D8 H2008B-3 /D9 H2009B-3 /D10 H2010B-3	/D30 H2106B-3 /D31 H2107B-3 /D32 H2108B-3 /D33 H2109B-3 /D34 H2110B-3
		/D11 H2011B-3 /D12 H2012B-3 /D13 H2013B-3 /D14 H2014B-3 /D15 H2015B-3	/D35 H2111B-3 /D36 H2112B-3 /D37 H2113B-3 /D38 H2114B-3 /D39 H2115-3
		/D16 H2016B-3 /D17 H2017B-3 /D18 H2018-3 /D19 H2019-3 /D20 H2020-3	/D40 H2116-3 /D41 H2117-3
		/D21 H2021-3 /D22 H2022-3 /D23 H2023-3 /D24 H2024-3	

Table 36-39. K — MVX Keypad ①

Modification	Catalog Number Suffix	Description
Keypad (MVX)	**K1**	Door-Mounted AFD Keypad (Type 1 and 12)
	K2	Door-Mounted AFD Keypad (Type 3R)
	K3	AFD Copy Keypad (mounted on drive)
	K4	Door-Mounted AFD Copy Keypad (Type 1 and 12)
	K5	Door-Mounted AFD Copy Keypad (Type 3R)

① See **PG03300001E** for more MVX Modifications.

Table 36-40. L — Labels, Line and Load Reactors, Lighting Contactors

Modification	Catalog Number Suffix	Description
Carton Label	**L10**	Customer Marking — Specify
Line Reactors (MVX)	**L12**	3% Input Line Reactor, 3-Phase, Open Core and Coil ②
	L13	3% Input Line Reactor, 1-Phase, Open Core and Coil ②
	L14	5% Input Line Reactor, 3-Phase, Open Core and Coil ②
	L15	5% Input Line Reactor, 1-Phase, Open Core and Coil ②
	L16	Line Reactor — Order by Description
Load Reactors (MVX)	**L17**	Output Line DV/DT Filter, Open Core and Coil ③
	L18	Load Reactor — Order by Description
Lighting Contactors	**L21**	1 NC Pole
	L22	2 NC Pole
	L23	3 NC Pole
	L24	4 NC Pole
	L25	5 NC Pole
	L26	6 NC Pole
	L27	7 NC Pole
	L28	8 NC Pole
	L29A	3-Wire 120V AC
	L29B	3-Wire 240V AC
	L29C	3-Wire 24V AC
	L29D	3-Wire 24V DC
	L29E	2-Wire 120V AC
	L29F	2-Wire 240V AC
	L29G	2-Wire 24V AC

② If the power source exceeds 500 kVA, 3% line unbalance, or if transient voltages from power factor capacitor switching events are present, an input line reactor must be used. The input line reactor will also reduce line current harmonics.

③ The output line DV/DT filter is required when the distance from the drive to the motor exceeds 33 feet (10m). The total cable run should not exceed 165 feet (50m).

Table 36-41. N — Nameplates

Modification	Catalog Number Suffix	Description
Nameplates	**N1**	Enclosure Nameplates

Table 36-42. P — Pilot Lights, Pushbuttons, Phase Relays, Potential Transformers, Power Factor Correction Capacitors, Program Timer, Percentage Timer, Photocell

Modification	Catalog Number Suffix	Description
Push-to-Test Pilot Lights	**P1**	Push-to-Test Pilot Light (Red RUN) Wired to Coil
	P2	Push-to-Test Pilot Light (Green OFF) Wired in Series with Auxiliary Contact
	P3	Combination of **P1** and **P2** Above
	P4	Push-to-Test Pilot Light (Amber RUN) Wired to Coil
	P49	Push-to-Test Pilot Light (Green RUN)
	P54 ①	Push-to-Test Pilot Light — Red BYPASS (MVX)
	P56 ①	Push-to-Test Pilot Light — Amber INVERTER ENABLE (MVX)
	P57	Push-to-Test Pilot Light — Green STOP
Pushbuttons	**P5**	EMERGENCY STOP — Mushroom Head
	P6 ①	Pushbutton Omitted
	P7	START/STOP
	P8	ON/OFF
	P9	START
	P10	ON
	P11	OFF
	P12 ①	FORWARD/REVERSE/STOP
	P13 ①	FAST/SLOW/STOP
	P14 ①	FAST/OFF/SLOW
	P15 ①	HIGH/LOW/STOP
	P16 ①	HIGH/LOW
	P17 ①	SLOW/FAST
	P18 ①	Pushbutton with Legend Plate
	P52	UP/STOP/DOWN
	P53	OPEN/STOP/CLOSE
Pilot Lights	**P19**	With 1 Amber Pilot Light Marked POWER AVAILABLE Wired to Load Side of 2 Fuses or Circuit Breaker
	P20	Pilot Light (Amber RUN) Wired to Coil
	P21 ①	With 1 Red Pilot Light Marked RUN Wired thru NO Auxiliary Contact
	P22 ①	With 1 Push-to-Test Red Light Marked RUN Wired thru NO Auxiliary Contact
	P23	Pilot Light — Red RUN
	P24	Pilot Light — Red ON
	P25	Pilot Light — Green OFF
	P26	Pilot Light — Order by Description
	P29	Pilot Light — Red STOP

① Not available for ***IT.*** Starters.

Table 36-42. P — Pilot Lights, Pushbuttons, Phase Relays, Potential Transformers, Power Factor Correction Capacitors, Program Timer, Percentage Timer, Photocell (Continued)

Modification	Catalog Number Suffix	Description
Pilot Lights (Continued)	**P58**	Pilot Light — Red BYPASS (MVX)
	P59 ②	Pilot Light — Amber INVERTER ENABLE (MVX)
	P60 ②	Pilot Light — Red INVERTER RUNNING (MVX)
	P61	Pilot Light — Green STOP
	P62 ②	FORWARD/REVERSE Red Pilot Lights
	P63 ②	UP/DOWN Red Pilot Lights
	P64 ②	OPEN/CLOSE Red Pilot Lights
	P65 ②	HIGH/LOW Red Pilot Lights
	P66 ②	FAST/SLOW Red Pilot Lights
	P67	Green RUN Light
	P68	LED Bulbs
	P69	Blue OVERLOAD Light
Illuminated Pushbutton	**P27**	Illuminated Pushbutton — Order by Description
Phase Loss Relay	**P28**	Phase Loss Relay
	P36	Phase Loss Protection Omitted (Advantage)
	P37	Extended Phase Loss Trip Time (Advantage)
Phase Reversal Relay	**P30**	Phase Reversal Relay
Phase Unbalance Relay	**P32**	Phase Unbalance Relay
Phase Monitoring Relay	**P34**	Phase Monitoring Relay
Power Factor Correction Capacitors	**P38**	/F1 20 kVar /F2 25 kVar /F3 30 kVar /F4 35 kVar /F5 40 kVar /F6 45 kVar /F7 50 kVar /F8 60 kVar /F9 70 kVar /F10 75 kVar /F11 80 kVar /F12 90 kVar /F13 100 kVar /F14 125 kVar /F15 150 kVar /F16 175 kVar /F17 200 kVar /F18 225 kVar /F19 250 kVar /F20 300 kVar /F21 350 kVar /F22 400 kVar
Potential Transformers	**P39** ②	Potential Transformer — Wired L1 – L2
	P40 ②	Potential Transformer — Wired L1– L2 and L2 – L3
	P41 ②	Potential Transformer — 3 Phases
Pump Controller	**P42**	Pump Controller for ***IT.***
Program Timers	**P43**	15-Minute Program Timer
	P44	24-Hour Program Timer
	P45	7-Day Program Timer with Day Omission Feature
Percentage Timers	**P47**	15-Minute Percentage Timer
	P48	60-Minute Percentage Timer
Photocell	**P70** ②	Photoelectric Receptacle with Photocell

② Not available for ***IT.*** Starters.

Table 36-43. Q — IQ Products, DN50

Modification	Catalog Number Suffix	Description
IQ Products	**Q1**	IQ 500
	Q3	IQ 1000
	Q5	IQ 4000
	Q8	With Wponi (Advantage)
	Q9	With WCTLponi (Advantage)
IQ Data Metering Module	**Q12** ①	IQ Data Metering Module
	Q14	IQ 220 with Cable
DN50	**Q13** ①	DeviceNet Input/Output Module

① Not available for ***IT.*** Starters.

Table 36-44. R — Ramp, Relays, Solid-State Electronic Overload Relays, Resets, Overload Relay Modifications, Reversing, DeviceNet Interface

Modification	Catalog Number Suffix	Description	
Ramp	**R1**	Extended Ramp of ***IT.***	
Relay ②	**R2**	Overvoltage Relay	
Fixed Heater Overload Relay ③	**R8**	C316FNA3C	.25 – .40A
	R9	C316FNA3D	.40 – .63A
	R10	C316FNA3E	.63 – 1.00A
	R11	C316FNA3F	1.00 – 1.40A
	R12	C316FNA3G	1.30 – 1.80A
	R13	C316FNA3H	1.70 – 2.40A
	R14	C316FNA3J	2.20 – 3.10A
	R15	C316FNA3K	2.80 – 4.00A
	R16	C316FNA3L	3.50 – 5.00A
	R17	C316FNA3M	4.50 – 6.50A
	R18	C316FNA3N	6.00 – 8.50A
	R19	C316FNA3P	7.50 – 11.00A
	R20	C316FNA3Q	10.00 – 14.00A
	R21	C316FNA3R	13.00 – 19.00A
	R22	C316FNA3S	18.00 – 24.00A
	R23	C316FNA3T	24.00 – 32.00A
	R24	C316KNA3A	18.00 – 25.00A
	R25	C316KNA3B	22.00 – 32.00A
	R26	C316KNA3C	29.00 – 42.00A
	R27	C316KNA3D	36.00 – 52.00A
	R28	C316KNA3E	45.00 – 63.00A
	R29	C316KNA3F	60.00 – 80.00A
	R30	C316PNA3A	65.00 – 90.00A
	R31	C316PNA3B	80.00 – 100.00A
	R32	C316PNA3C	100.00 – 135.00A
	R33	C316PNA3D	110.00 – 150.00A
	R34	C316PNA3E	130.00 – 175.00A
	R35	C316PNA3F	150.00 – 200.00A
	R36	C316SNA3A	130.00 – 185.00A
	R37	C316SNA3B	165.00 – 235.00A
	R38	C316SNA3C	220.00 – 310.00A
	R39	C316SNA3D	285.00 – 400.00A
	R40	C316UNA3A	355.00 – 500.00A
	R41	C316UNA3B	465.00 – 650.00A
	R42	C316UNA3C	610.00 – 850.00A

② Not available for ***IT.*** Starters.
③ Not available for ***XT*** Starters.

Table 36-44. R — Ramp, Relays, Solid-State Electronic Overload Relays, Resets, Overload Relay Modifications, Reversing, DeviceNet Interface (Continued)

Modification	Catalog Number Suffix	Description		
Fixed Heater Overload Relay, continued ③	**R43**	Fixed Heater Overload Relay — Order by Description		
	R55	C316FNA3F w/Current Transformer		60.00 – 84.00 FLA
	R56	C316FNA3G w/Current Transformer		78.00 – 108.00 FLA
	R57	C316FNA3H w/Current Transformer		102.00 – 144.00 FLA
	R58	C316FNA3J w/Current Transformer		132.00 – 186.00 FLA
	R59	C316FNA3K w/Current Transformer		168.00 – 240.00 FLA
	R60	C316FNA3L w/Current Transformer		210.00 – 310.00 FLA
Solid-State Electronic Overload Relay ⑤	IEC Frame	NEMA Size	Full Load Current Adjustment Range (A)	3-Phase Automatic/ Manual Reset
				Class 5/10/20/30
	Catalog Number Suffix ➡ ⑥			**R61_**
	B & C	00	0.1 – 0.5 0.4 – 2.0 1.0 – 5.0 1.6 – 8.0	**A** **B** **C** **D**
	C & D	0 & 1	0.1 – 0.5 0.4 – 2.0 1.0 – 5.0 1.6 – 8.0 6.4 – 32	**A** **B** **C** **D** **E**
	D	2	9 – 45	**F**
		3	15 – 75	**G**
	F & G		22 – 110	**H**
	G	4	30 – 150	**J**
	N/A	5	96 – 300	**C**
	N/A	6	192 – 600	**C**
Resets ④	**R5**	Change External Reset to Internal Reset — Hole Covered with Plug		
	R6	Internal Reset — No Hole Plug		
	R44	Manual Reset Only on Overload Relay		
	R45	Auto Reset Only on Overload Relay		
	R47	Internal Trip Indicator — No External Reset		
	R48	External Reset with External Trip Indicator		
	R49	External Reset with Bell Alarm		
	R71	N3R Reset Boot Added (Type 1/12 Only)		
Reversing ④	**R54**	Reversing Contactor/Starter		
Overload Relay Mods	**R53**	Anti Plug-In		
	R61	C395 DNA DeviceNet Module		
	R62	C395 Bell Alarm		
	R63	C395 Load Module		
	R64	C395 Program Key		
DeviceNet Interface	**R69**	DeviceNet Interface		
	R65	Standard Reset for DeviceNet		
	R66	Lighted Reset for DeviceNet		
	R67	Trip Indicator for DeviceNet		
	R68	DeviceNet Communication Interface (MVX)		

④ Not available for ***IT.*** or ***XT*** Starters.
⑤ Features:
- Self-Powered
- Phase Loss Protection
- Current Adjustment Knob
- ± 1% Repeat Accuracy
- 1NO and 1NC Isolated Contacts

⑥ Complete Modification Code includes overload range. Example **R61/C**.

Table 36-45. S — System Voltage, Selector Switches, Suppressor, Incomplete Sequence Protection, Single-Phase Jumper, Surge Capacitor, Speed Potentiometer

Modification	Catalog Number Suffix	Description
System Voltage Selection	**S1**	System Voltage Selection for Internal Components
		/H1 208V 60 Hz /H2 240V 60 Hz /H3 277V 60 Hz, 1-Ph /H4 480V 60 Hz /H5 600V 60 Hz /H6 796V 60 Hz /H7 220V 50 Hz /H8 380V 50 Hz /H9 415V 50 Hz /H10 550V 50 Hz /H11 660V 50 Hz /H12 380V 60 Hz /H13 1500V 60 Hz
	S2	System Voltage Selection — Specify on Order
Selector Switches ①	**S3**	HAND/OFF/AUTO
	S4	HAND/AUTO
	S5	HAND/OFF/AUTO Selector Switch with 1 Red RUN Pilot Light
	S6	RUN/OFF/AUTO
	S7	AUTO/OFF/TEST
	S8	AUTO/OFF/TEST Selector Switch with 1 Red RUN Pilot Light
	S9	AUTO/OFF/TEST Selector Switch with 1 Red RUN Pilot Light and 1 Green Pilot Light
	S10	OFF/AUTO
	S11	START/STOP
	S12	OFF/ON
	S13 ②	HIGH/LOW
	S14 ②	FAST/OFF/SLOW
	S15 ②	SLOW/FAST
	S16 ②	FORWARD/REVERSE
	S17 ②	HIGH/OFF/LOW
	S18 ②	HIGH/LOW/OFF/AUTO
	S21	HAND/OFF/AUTO Spring Return from Left
	S38 ②	INVERTER/OFF/BYPASS (MVX)
	S41 ②	OPEN/OFF/CLOSE
	S42 ②	FORWARD/OFF/REVERSE
	S43 ②	FAST/OFF/SLOW/AUTO
	S19 ②	Selector Switch Omitted (Pump Panels Only)
	S40	Selector Switch — Order by Description
Suppressor	**S24** ②	Transient Suppressor Mounted on Magnet Coil
Surge Suppression	**S20**	MOV (***IT.***)
Sequence Timer	**S26** ②	Sequence Timer (Pump Panels)
Sequence Protection	**S27** ②	Incomplete Sequence Protection
Pump	**S28**	480V BP9000 Pump
Single Phase ②	**S29**	Convert Contactor or Starter from Three-Phase to Single-Phase — Install Jumper
	S30	Single-Phase Rev. 120V
	S31	Single-Phase Rev. 240V
Surge Capacitor	**S37** ②	Surge Capacitor Wired to Disconnect Line Side
Speed Potentiometer	**S39** ②	Speed Potentiometer (MVX)

① When using 3-position selector switch with magnetic lighting contactor, mod **C20** must also be used (ECL04, ECL13, ECL15).
② Not available for ***IT.*** Starters.

Table 36-46. T — Timers, Time Delay Relays, Terminal Blocks, Terminal Points, Ring Lug Connections

Modification	Catalog Number Suffix	Description
Timers	**T1** ③	Pneumatic Timer Installed on Contactor, Unwired, 30 Sec. Max.
	T2 ③	Pneumatic Timer Installed on Contactor, Unwired, 180 Sec. Max.
	T3	Pneumatic Timer Mounted in Enclosure, Unwired, 180 Sec. Max.
	T4	Solid-State ON Delay Timer (1 – 30 sec)
	T5	Solid-State ON Delay Timer (30 – 300 sec)
	T25	Timer — Order by Description
Time Delay Relays	**T6**	Time Delay Relay, 3 Minutes Maximum, Unwired, ON DELAY
	T7	Time Delay Relay, 3 Minutes Maximum, Unwired, OFF DELAY
	T8	Time Delay Low Voltage Release Relay
Terminal Blocks	**T9**	With 1 Single Circuit Terminal Block, Unwired
	T10	With 2 Single Circuit Terminal Block, Unwired
	T24 ③	Power Terminal Block for DeviceNet Overload
Terminal Points	**T11**	With 6 Terminal Points, Unwired
	T12	With 12 Terminal Points, Unwired
	T13	With 18 Terminal Points, Unwired
	T14	Terminal Point per Customer Specification, Unwired (Price Each)
	T15	Terminal Point per Customer Specification, Wired (Price Each)
	T21 ③	3 Terminals Mounted Between Contactor and Overload for Power Factor Capacitors — Sizes 0 – 2
	T22 ③	3 Terminals Mounted Between Contactor and Overload for Power Factor Capacitors — Sizes 3 – 4
	T23 ③	Quick-Connect Terminals Added to DP Contactor/Starter
Ring Lug Connections	**T16** ④	Ring Lug Connections on Power Wires
	T17 ③	Ring Lug Connections on Control Wires
IT./EM	**T30**	Reset Only
	T31	STOP with Reset
	T32	START/STOP with Reset
	T33A	HAND/OFF/AUTO with Reset 120V AC
	T33D	HAND/OFF/AUTO with Reset 24V DC
	T34	ON/OFF
	T40	Reset Only (DeviceNet)
	T41	STOP with Reset (DeviceNet)
	T42	START/STOP with Reset (DeviceNet)
	T43A	HAND/OFF/AUTO with Reset 120V AC (DeviceNet)
	T43D	HAND/OFF/AUTO with Reset 24V DC (DeviceNet)
	T44	ON/OFF
	T50	Reset Only
	T51	STOP with Reset
	T52	FORWARD/REVERSE/STOP with Reset
	T53A	FORWARD/REVERSE/STOP with Reset 120V AC
	T53D	FORWARD/REVERSE/STOP with Reset 24V DC
	T54	ON/OFF

③ Not available for ***IT.*** Starters.
④ Not available for ***XT*** Starters.

Table 36-46. T — Timers, Time Delay Relays, Terminal Blocks, Terminal Points, Ring Lug Connections (Continued)

Modification	Catalog Number Suffix	Description
IT./EM, continued	**T60**	Reset Only (DeviceNet)
	T61	STOP with Reset (DeviceNet)
	T62	FORWARD/REVERSE/STOP with Reset (DeviceNet)
	T63A	FORWARD/REVERSE/STOP with Reset 120V AC (DeviceNet)
	T63D	FORWARD/REVERSE/STOP with Reset 24V DC (DeviceNet)
	T64	ON/OFF
	T70	Reset Only
	T71	START/STOP with Reset
	T72	HAND/OFF/AUTO – START with Reset
	T73	FORWARD/REVERSE/STOP with Reset
	T74	HAND/OFF/AUTO – FORWARD/REVERSE with Reset
	T75	ON/OFF with Reset
	T76	FAST/SLOW/STOP with Reset
	T77	HAND/OFF/AUTO – FAST/SLOW with Reset

Table 36-47. U — Undervoltage Relay, Time Delay Undervoltage Relay

Modification	Catalog Number Suffix	Description
Undervoltage Relays	**U1**	Undervoltage Relay, Non-adjustable
	U2	Undervoltage Relay, Adjustable
Time Delay Undervoltage Relays	**U4** ①	Time Delay Undervoltage Relay, Non-adjustable
	U5	Time Delay Undervoltage Relay, Adjustable
Under- and Overvoltage Relay	**U7**	Under- and Overvoltage Relay

① Not available for ***IT.*** Starters.

Table 36-48. V — Voltmeter, Varmeter, Vacuum Starter

Modification	Catalog Number Suffix	Description
Voltmeters	**V1**	1 Panel Type Voltmeter Wired L1 – L2
	V2	Panel Type Voltmeter and Selector Switch Wired to Read Three Line Voltages
	V3 ②	Miniature Voltmeter Wired L1 – L2
	V4 ②	Miniature Voltmeter and Selector Switch Wired to Read Three Line Voltages
	V5	Switchboard Type Voltmeter Wired L1 – L2
	V6 ②	Switchboard Type Voltmeter and Selector Switch Wired to Read Three Line Voltage
	V7	3 Panel Type Voltmeters Wired in Each Phase
	V8 ②	3 Miniature Voltmeters Wired in Each Phase
	V9	3 Switchboard Type Voltmeters Wired in Each Phase
	V10	Voltmeter — Order by Description
Varmeter ③	**V11**	Varmeter
	V12	Varmeter — Order by Description
Vacuum Starter ③	**V13**	Vacuum Starter — 1500V Rating

② Type 1/12 only.
③ Not available for ***XT*** Starters.

Table 36-49. W — Wattmeter, Watt-Hour Meter, Wiremarkers, Wiring Diagram

Modification	Catalog Number Suffix	Description
Wattmeter ④	**W1**	Wattmeter
Watt-Hour Meter ④	**W3**	Watt-Hour Meter
	W5	Watt-Hour Meter with Demand Attachment
Wiremarkers	**W7**	Wiremarkers
	W8	Wiremarkers — Order per Customer Diagram or Specifications
	W9	Wiremarkers — Order by Description
WYE-Delta hp	**W10** ⑤	See **PG03300001E**
Windows in Enclosure	**W11**	Enclosure Windows (MVX)
Wiring Diagram	**W12**	Reduced Copy of Custom Wiring Diagram Laminated on Inside of Door

④ Type 1/12 only.
⑤ Not available for ***XT*** Starters.

Discount Symbol **1CD1C**