Electrical Sector Solutions



Volume 5: Motor Control and Protection

EATON

Powering Business Worldwide

Volume 1—Residential and Light Commercial 1

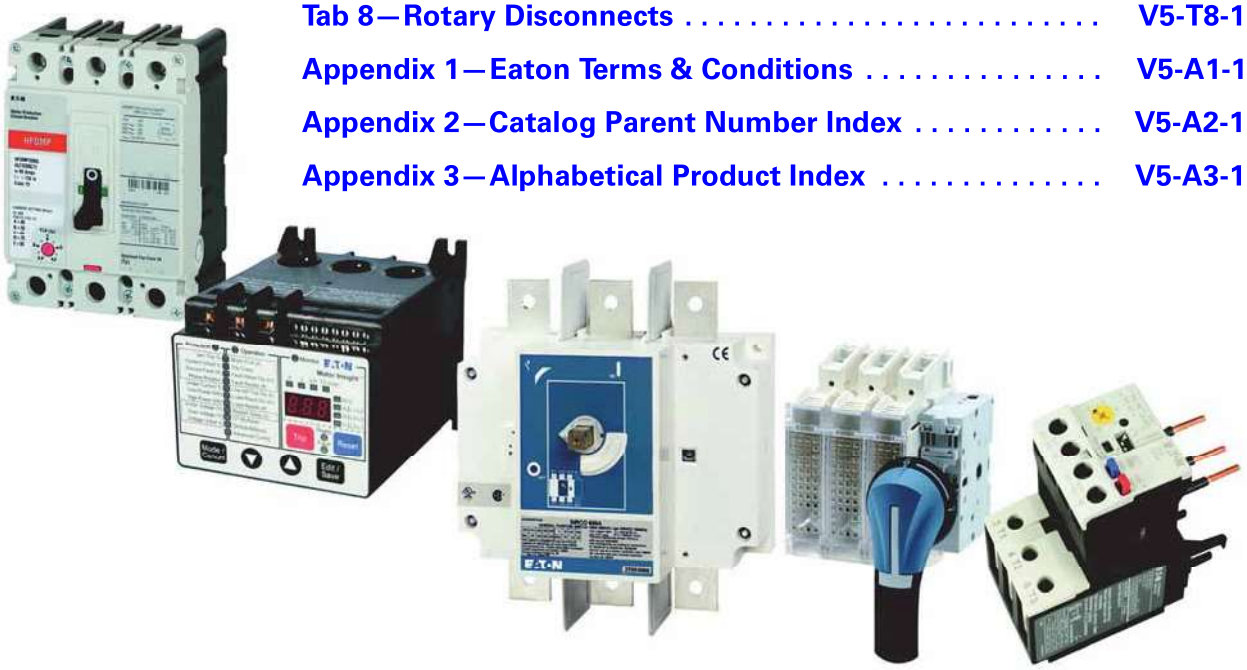
Volume 2—Commercial Distribution 2

Volume 3—Power Distribution and Control Assemblies 3

Volume 4—Circuit Protection 4

Volume 5—Motor Control and Protection 5

Tab 1—IEC Contactors and Starters V5-T1-1
Tab 2—NEMA Contactors and Starters V5-T2-1
Tab 3—NEMA Manual Starters V5-T3-1
Tab 4—Definite Purpose Contactors and Starters V5-T4-1
Tab 5—Motor Protection and Monitoring V5-T5-1
Tab 6—Lighting Contactors V5-T6-1
Tab 7—Vacuum Contactors and Starters V5-T7-1
Tab 8—Rotary Disconnects V5-T8-1
Appendix 1—Eaton Terms & Conditions V5-A1-1
Appendix 2—Catalog Parent Number Index V5-A2-1
Appendix 3—Alphabetical Product Index V5-A3-1



Volume 6—Solid-State Motor Control 6

Volume 7—Logic Control, Operator Interface and Connectivity Solutions 7

Copyright

Dimensions, Weights and Ratings

Dimensions, weights and ratings given in this catalog **are approximate and should not be used for construction purposes**. Drawings containing exact dimensions are available upon request. All listed product specifications and ratings are subject to change without notice. Photographs are representative of production units.

Terms and Conditions

All prices and discounts are subject to change without notice. When price changes occur, they are published in Eaton's *Price and Availability Digest* (PAD). All orders accepted by Eaton's Electrical Sector are subject to the general terms and conditions as set forth in Appendix 1—Eaton Terms & Conditions.

Technical and Descriptive Publications

This catalog contains brief technical data for proper selection of products. Further information is available in the form of technical information publications and illustrated brochures. If additional product information is required, contact your local Eaton Products Distributor, call **1-800-525-2000** or visit our website at **www.eaton.com**.

Compliance with Nuclear Regulation 10 CFR 21

Eaton products are sold as commercial grade products not intended for application in facilities or activities licensed by the United States Nuclear Regulatory Commission for atomic purposes, under 10 CFR 21. Further certification will be required for use of these products in a safety-related application in any nuclear facility licensed by the U.S. Nuclear Regulatory Commission.

WARNING

The installation and use of Eaton products should be in accordance with the provisions of the U.S. National Electrical Code® and/or other local codes or industry standards that are pertinent to the particular end use. Installation or use not in accordance with these codes and standards could be hazardous to personnel and/or equipment.

These catalog pages do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Eaton Products Distributor or Sales Office. The contents of this catalog shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Eaton's Electrical Sector. The warranty contained in the contract between the parties is the sole warranty of Eaton. Any statements contained herein do not create new warranties or modify the existing warranty.

Copyright ©2019 Eaton, All Rights Reserved.

Powering Business Worldwide

Eaton is a global leader in power distribution, power quality, control and automation, and monitoring products.

At Eaton, we believe a reliable, efficient and safe power system is the foundation of every successful enterprise. Through innovative technologies, cutting-edge products and our highly skilled services team, we empower businesses around the world to achieve a powerful advantage.

In addition, Eaton is committed to creating and maintaining powerful customer relationships built on a foundation of excellence. From the products we manufacture to our dedicated customer service and support, we know what's important to you.

Solutions

Eaton takes the complexity out of power systems management with a holistic and strategic approach, leveraging our industry-leading technology, solutions and services. We focus on the following three areas in all we do:

- Reliability—maintain the appropriate level of power continuity without disruption or unexpected downtime
- Efficiency—minimize energy usage, operating costs, equipment footprint and environmental impact
- Safety—identify and mitigate electrical hazards to protect what you value most

Using the Eaton Catalog Library

As we grow, it becomes increasingly difficult to include all products in one or two comprehensive catalogs. Knowing that each user has their specific needs, we have created a library of catalogs for our products that when complete, will contain 15 volumes. Since the volumes will continuously be a work in progress and updated, each volume will stand alone. Refer to our volume directory, MZ08100001E, for a quick glance of where to look for the products you need. The 15 volumes include:

- Volume 1—Residential and Light Commercial (CA08100002E)
- Volume 2—Commercial Distribution (CA08100003E)
- Volume 3—Power Distribution and Control Assemblies (CA08100004E)
- Volume 4—Circuit Protection (CA08100005E)
- Volume 5—Motor Control and Protection (CA08100006E)
- Volume 6—Solid-State Motor Control (CA08100007E)
- Volume 7—Logic Control, Operator Interface and Connectivity Solutions (CA08100008E)
- Volume 8—Sensing Solutions (CA08100010E)
- Volume 9—Original Equipment Manufacturer (CA08100011E)
- Volume 10—Enclosed Control (CA08100012E)
- Volume 11—Vehicle and Commercial Controls (CA08100013E)
- Volume 12—Aftermarket, Renewal Parts and Life Extension Solutions (CA08100014E)
- Volume 13—Counters, Timers and Tachometers (CA08100015E)—Available in electronic format only
- Volume 14—Fuses (CA08100016E)—Available in electronic format only
- Volume 15—Solar Inverters and Electrical Balance of System (CA08100018E)

These volumes are not all-inclusive of every product, but they are meant to be an overview of our product lines. For our full range of product solutions and additional product information, consult Eaton.com/electrical and other catalogs and product guides in our literature library. These references include:

- The Consulting Application Guide (CA08104001E)
- The Eaton Power Quality Product Guide (COR01FYA)

If you don't have the volume that contains the product or information that you are looking for, not to worry. You can access every volume of the catalog library at Eaton.com/electrical in the Literature Library.

By installing our Automatic Tab Updater (ATU), you can be sure you always have the most recent version of each volume and tab.

Icons

Green Leaf



Eaton Green Solutions are products, systems or solutions that represent Eaton benchmarks for environmental performance. The green leaf symbol is our promise that the solution has been reviewed and documented as offering exceptional, industry-leading environmental benefits to customers, consumers and our communities. Though all of Eaton's products and solutions are designed to meet or exceed applicable government standards related to protecting the environment, our products with the Green Leaf designation further provide "exceptional environmental benefit."

Learn Online



When you see the Learn Online icon, go to Eaton.com/electrical and search for the product or training page. There you will find 100-level training courses, podcasts, webcasts or games and puzzles to learn more.

Drawings Online



When you see the Drawings Online icon, go to Eaton.com/electrical and find the products page. There you will find a tab that includes helpful product drawings and illustrations.

Contact Us

If you need additional help, you can find contact information under the Customer Care heading of Eaton.com/electrical.







1.1 *XT* IEC Power Control

Product Overview V5-T1-2
Relays and Timers V5-T1-3
Miniature Controls V5-T1-18
Contactors and Starters V5-T1-35
XTSE Contactors V5-T1-128
Thermal Overload Relays V5-T1-130
C440/***XT*** Electronic Overload Relay V5-T1-143
Manual Motor Protectors V5-T1-159
Combination Motor Controllers V5-T1-193
XT Electronic Manual Motor Protector V5-T1-219
EMS—Electronic Motor Starter V5-T1-232
XT DC Contactors V5-T1-234
Reference Data V5-T1-236

1

XT IEC Power Control



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
Thermal Overload Relays	**V5-T1-130**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	**V5-T1-219**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

Product Overview

The ***XT*** line of IEC power control offers starting and protection solutions ideal for control panels.

Innovations in the design and development allow users to reduce material costs, reduce installation effort, and enhance panel safety and performance all in a compact design. Some of these key innovations include:

- Toolless assembly of manual motor controllers and reversing contactors
- Low coil consumption
- Front accessibility to coil terminations
- Built-in surge suppression on electronic coils
- Built-in auxiliary contact for contactors up to 32A in a 45 mm frame
- Finger-safe and back-of-hand proof ratings
- Direct PLC control on 185A–2000A contactors

The ***XT*** line includes a large offering of power control components and accessories that cover a broad range of applications and ratings:

- Three-pole contactors to 2000A
- Four-pole contactors to 200A
- Capacitor contactors to 680 kVAR
- Mini contactors to 9A
- Relays to 16A
- Thermal overload relays to 630A
- Electronic overload relays to 1500A
- Manual motor protectors to 65A
- Manual motor controllers and combination motor controllers to 65A

Relays and Timers



Contents

Description	*Page*
Relays and Timers	
Catalog Number Selection	**V5-T1-4**
Product Selection	**V5-T1-5**
Accessories	**V5-T1-6**
Technical Data and Specifications	**V5-T1-12**
Dimensions	**V5-T1-16**
An Eaton Green Solution	
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
Thermal Overload Relays	**V5-T1-130**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	**V5-T1-219**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

Relays and Timers

Product Description

Eaton's new line of ***XT*** relays and timers includes mini and standard frame control relays and auxiliary contacts, mini electronic on-delay and multi-function timers and an electronic star-delta (wye-delta) timer for use in star-delta (wye-delta) combinations. Because ***XT*** meets UL®, CSA® and CE standards, it is the perfect product solution for IEC applications all over the world. The compact, space saving and easy to install ***XT*** line of IEC contactors and starters is the efficient and effective solution for customer applications.

Features

- For use with mini and standard frame size contactors and starters
- Control relays
  - AC control from 12V to 550V 50 Hz, 600V 60 Hz
  - DC control from 12V to 220V
- On-delay and multi-function timers
  - 24–240 Vac/Vdc control
- Available with screw or spring cage terminals
- Four-pole configurations
- IP20 finger and back-of-hand proof
- Large ambient temperature range: –25° to 50°C [–13° to 122°F]
- The XTRE control relays have positively driven contacts between the relay and the auxiliary contact modules as well as within the auxiliary contact modules

Standards and Certifications

- IEC EN 60947
- CE approved
- UL
- CSA

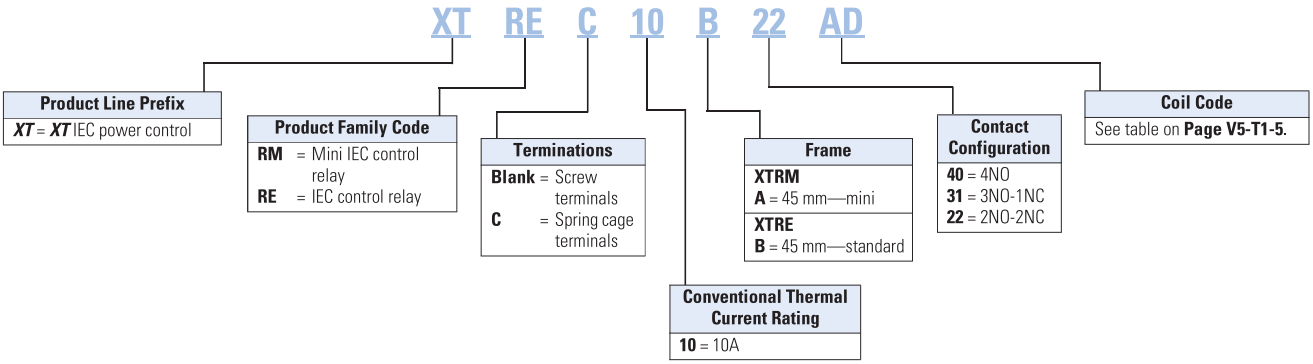
Instructional Leaflets

Pub51219	XTRM Mini Control Relays
Pub51210	XTRE Control Relays
Pub51244	XTTR Electronic Star-Delta (Wye-Delta) Timer
Pub51245	XTMT Mini Electronic On-Delay and Multi-Function Timers

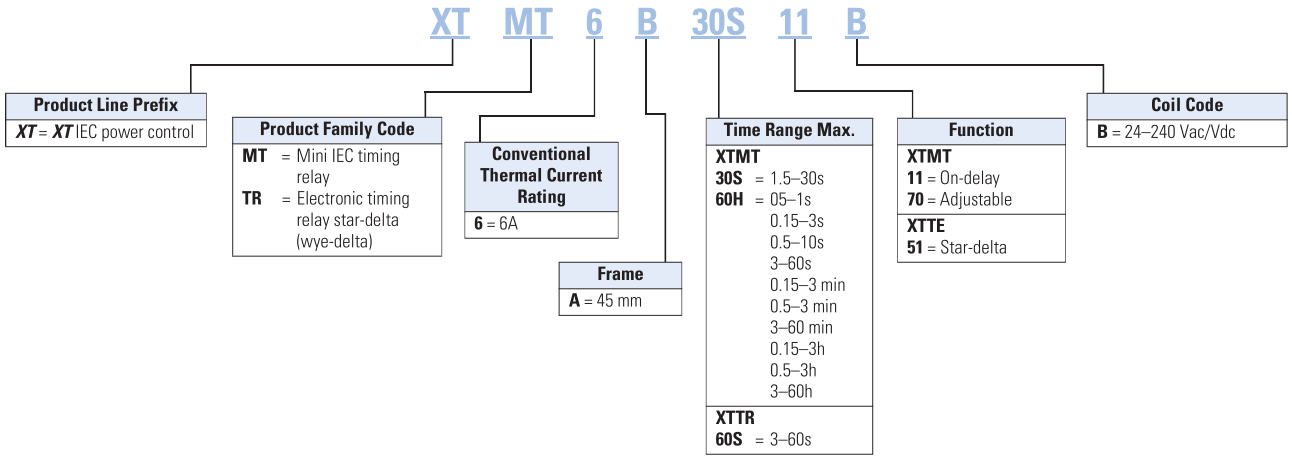
1

Catalog Number Selection

XT—Relays



XT—Timers



Product Selection

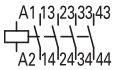
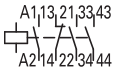
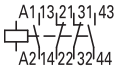
When Ordering

- Orders must be placed in multiples of the package quantity listed
- DC operated control relays have a built-in suppressor circuit
- Contact terminal numbers to EN50011
- Coil terminal numbers to EN50005

XTRM10A_



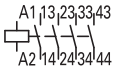
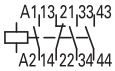
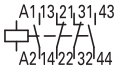
Mini Control Relays

Conventional Thermal Current I_{th} (A)	Contact Configuration	Rated Operational Current AC-15 I_e (A) 220–240V	380–415V	500V	Circuit Symbol	Screw Terminal Catalog Number ①
10	4NO	6	3	1.5		XTRM10A40_
10	3NO-1NC	6	3	1.5		XTRM10A31_
10	2NO-2NC	6	3	1.5		XTRM10A22_ ②

XTREC10_



Control Relays

Conventional Thermal Current Open at 60°C I_{th} (A)	Contact Configuration	Rated Operational Current AC-15 I_e (A) 220–240V	380–415V	500V	Circuit Symbol	Screw Terminal Catalog Number ①	Spring Cage Terminal Catalog Number ①
16	4NO	6	4	1.5		XTRE10B40_	XTREC10B40_
16	3NO-1NC	6	4	1.5		XTRE10B31_	XTREC10B31_
16	2NO-2NC	6	4	1.5		XTRE10B22_ ③	XTREC10B22_ ③

Coil Voltage Suffix

Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	A
220V 50 Hz, 240V 60 Hz	B
230V 50 Hz	F
24V 50/60 Hz	T
24 Vdc	TD

Coil Voltage	Suffix Code
415V 50 Hz, 480V 60 Hz	C
550V 50 Hz, 600V 60 Hz	D
208V 60 Hz	E
190V 50 Hz, 220V 60 Hz	G
240V 50 Hz, 277V 60 Hz	H

Coil Voltage	Suffix Code
380V 50 Hz, 440V 60 Hz	L
380V 60 Hz	P
12V 50/60 Hz	R
42V 50 Hz, 48V 60 Hz	W
48V 50 Hz	Y

Coil Voltage	Suffix Code
120 Vdc	AD
220 Vdc	BD
12 Vdc	RD
48 Vdc	WD

Notes

① Underscore (_) indicates magnet coil suffix required. See Coil Voltage Suffix table above.
② DC operated control relays XTRM(C)10A22_ cannot be used with front mount auxiliary contacts.
③ DC operated control relays XTRE(C)10B22_ can only be combined with two-pole auxiliary contacts.

1

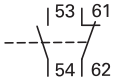
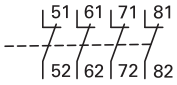
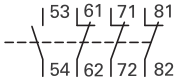
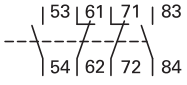
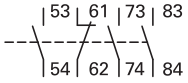
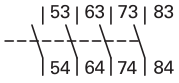
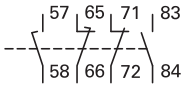
Accessories

Auxiliary Contacts

XTMCXF_



Front-Mount Auxiliary Contacts for Use with XTRM Mini Control Relays

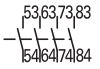
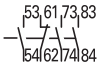
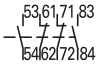
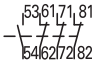
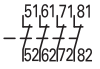
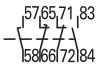
Conventional Thermal Current, I_{th} Open (A)	Rated Operational Current AC-15 I_e (A) 220V 230V 240V	380V 400V 415V	500V	Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
10	4	2	1.5	2NC		5	**XTMCXFA02**
10	4	2	1.5	1NO-1NC		5	**XTMCXFA11**
10	4	2	1.5	2NO		5	**XTMCXFA20**
10	4	2	1.5	4NC		5	**XTMCXFA04**
10	4	2	1.5	1NO-3NC		5	**XTMCXFA13**
10	4	2	1.5	2NO-2NC		5	**XTMCXFA22**
10	4	2	1.5	3NO-1NC		5	**XTMCXFA31**
10	4	2	1.5	4NO		5	**XTMCXFA40**
10	4	2	1.5	1NO-1NC $1NO_E$-$1NC_L$		5	**XTMCXFAL22** ②

Notes

① Orders must be placed in multiples of package quantity listed.

② One early-make contact (NO_E), one late-break contact (NC_L).

Front-Mount Auxiliary Contacts for Use with XTRE Control Relays ①

	Conventional Thermal Current, I_{th} (A), Open at 60°C	Poles	Rated Operational Current AC-15 I_e (A) 220V 230V 240V	380V 400V 415V	500V	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
Two-Pole 	16	2	6	3	1.5	2NO		5	**XTCEXFAC20**
	16	2	6	3	1.5	1NO-1NC		5	**XTCEXFAC11** ③
	16	2	6	3	1.5	2NC		5	**XTCEXFAC02**
	16	2	6	3	1.5	$1NO_E$-$1NC_L$		5	**XTCEXFALC11** ④
Four-Pole 	16	4	6	3	1.5	4NO		5	**XTCEXFAC40** ③
	16	4	6	3	1.5	3NO-1NC		5	**XTCEXFAC31** ③
	16	4	6	3	1.5	2NO-2NC		5	**XTCEXFAC22** ③
	16	4	6	3	1.5	1NO-3NC		5	**XTCEXFAC13**
	16	4	6	3	1.5	4NC		5	**XTCEXFAC04**
	16	4	6	3	1.5	1NO-1NC $1NO_E$-$1NC_L$		5	**XTCEXFCLC22** ④

Notes

① Interlocked opposing contacts, to IEC/EN 60947-5-1 Annex L (positively driven), within the auxiliary contact modules (not NO_E and NC_L contacts) and between the auxiliary contacts and built-in contacts of the XTRE control relays.

② Orders must be placed in multiples of package quantity listed.

③ Catalog number is shown with screw type terminal. For spring cage, add a "**C**" before the last 2 digits. For example, to order a spring cage version of the XTCEXFAC22, change the catalog number to XTCEXFAC**C**22.

④ One early-make contact (NO_E), one late-break contact (NC_L).

Suppressors

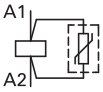
For AC operated contactors 50–60 Hz. On DC operated contactor relays and on XTRE10B, the suppressor circuit is built-in. Note dropout delay.

Varistor Suppressor ①②

XTCEXVSB_



Varistor Suppressor for XTRE

Voltage	For Use with…	Contact Sequence	Pkg. Qty. ③	Catalog Number
24–48	XTRE(C)10B		10	**XTCEXVSBW**
48–130			10	**XTCEXVSBA**
130–240			10	**XTCEXVSBB**
240–500			10	**XTCEXVSBC**

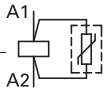
XTMCXVS_



XTRM Relay with Installed Suppressor



Varistor Suppressor for XTRM

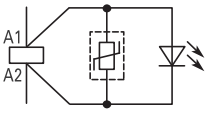
Voltage	For Use with…	Circuit Symbol	Pkg. Qty. ③	Catalog Number
24–48	XTRM6A_, XTRM9A_		10	**XTMCXVSW**
48–130	XTRM6A_, XTRM9A_		10	**XTMCXVSA**
110–250	XTRM6A_, XTRM9A_		10	**XTMCXVSB**
380–415	XTRM6A_, XTRM9A_		10	**XTMCXVSN**

Varistor Suppressor with Integrated LED ①②

XTCEXVSLB_



Varistor Suppressor for XTRE

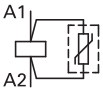
Voltage	For Use with…	Contact Sequence	Pkg. Qty. ③	Catalog Number
24–48	XTRE(C)10B		10	**XTCEXVSLBW**
130–240			10	**XTCEXVSLBB**

RC Suppressor ①②

XTCEXRSB_



RC Suppressor for XTRE

Voltage	For Use with…	Contact Sequence	Pkg. Qty. ③	Catalog Number
24–48	XTRE(C)10B		10	**XTCEXRSBW**
48–130			10	**XTCEXRSBA**
110–240			10	**XTCEXRSBB**
240–500			10	**XTCEXRSBC**

Notes

① Note dropout delay.
② For AC operated contactors, 50/60 Hz. DC operated contactors have an integrated suppressor.
③ Orders must be placed in multiples of package quantity listed.

RC Suppressor ①②

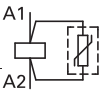
XTMCXRS_



XTRM Relay with Installed Suppressor



RC Suppressor for XTRM ③

Voltage	For Use with…	Circuit Symbol	Pkg. Qty. ④	Catalog Number
24–48	XTRM6A_, XTRM9A_		10	**XTMCXRSW**
48–130	XTRM6A_, XTRM9A_		10	**XTMCXRSA**
110–250	XTRM6A_, XTRM9A_		10	**XTMCXRSB**

Free-Wheel Diode Suppressor

In addition to the built-in suppressor circuit for DC actuated contactors. Prevents negative breaking voltage when contactors are used in combination with a safety PLC.

XTCEXVSLBB



Free-Wheel Diode Suppressor for XTRE

Voltage	For Use with…	Pkg. Qty. ④	Catalog Number
130–240	XTRE10B	10	**XTCEXVSLBB**

Connector ⑤

Connector

	For Use with…	Pkg. Qty. ④	Catalog Number
XTCEXCNC 	XTRE(C)10B	50	**XTCEXCNC**
XTMCXCN 	XTRM10A	50	**XTMCXCN**

Mechanical Interlock ⑥

Mechanical Interlock

	For Use with…	Pkg. Qty. ④	Catalog Number
XTCEXMLB 	XTRE10B_	5	**XTCEXMLB**
XTMCXML 	XTRM10A_	5	**XTMCXML**

Notes

① Note dropout delay.
② For AC operated contactors, 50/60 Hz. DC operated contactors have an integrated suppressor.
③ For AC operated contactors, 50/60 Hz. Note dropout delay.
④ Orders must be placed in multiples of package quantity listed.
⑤ For mechanically arranging contactors in combinations. Distance between contactors is 0 mm.
⑥ For two contactors with AC or DC operated magnet system that are horizontally or vertically mounted. For Frame B, mechanical lifespan is 2.5 x 10^6 operations and the distance between contactors is 0 mm.

1

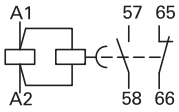
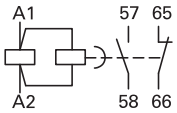
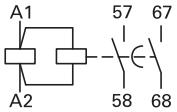
Electronic Timer Modules

Front- (top-) mounted timer modules for use with XTRE10B control relays. Can not be combined with top-mount auxiliary contacts, XTCEXF_.

XTCEXT_



Electronic Timer Modules for XTRE

Voltage	Contact Sequence	Timing Range	For Use with…	Pkg. Qty. ①	Catalog Number
On-Delay					
24 Vac/Vdc		0.05–1s 0.5–10s 15–100s	XTRE10B_	1	**XTCEXTEEC11T**
100–130 Vac					**XTCEXTEEC11A**
200–240 Vac					**XTCEXTEEC11B**
Off-Delay					
24 Vac/Vdc		0.05–1s	XTRE10B_	1	**XTCEXTED1C11T**
100–130 Vac					**XTCEXTED1C11A**
200–240 Vac					**XTCEXTED1C11B**
24 Vac/Vdc		0.5–10s	XTRE10B_	1	**XTCEXTED10C11T**
100–130 Vac					**XTCEXTED10C11A**
200–240 Vac					**XTCEXTED10C11B**
24 Vac/Vdc		5–100s	XTRE10B_	1	**XTCEXTED100C11T**
100–130 Vac					**XTCEXTED100C11A**
200–240 Vac					**XTCEXTED100C11B**
Star-Delta					
24 Vac/Vdc		1–30s	XTRE10B_	1	**XTCEXTEYC20T**
100–130 Vac					**XTCEXTEYC20A**
200–240 Vac					**XTCEXTEYC20B**
Sealable Shroud					
	Transparent sealable shroud used to protect electronic timer modules from unwanted access.		XTCEXTEE, XTCEXTED, XTCEXTEY	1	**XTCEXTESHRD**

Note

① Orders must be placed in multiples of package quantity listed.

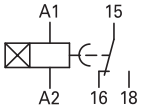
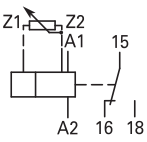
Mini Electronic Timers

XTMT6A_





Mini Electronic On-Delay Timers

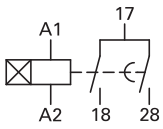
Conventional Thermal Current I_e (A)	Rated Operational Current I_e AC-11 Amps 220/230/240V	380/400/440V	Time Range	Function	Terminal Marking According to EN 50042	Catalog Number
6	3	3	1.5–30 sec	Fixed, on-delay		**XTMT6A30S11B**
6	3	3	0.05–1 sec 0.15–3 sec 0.5–10 sec 3–60 sec 0.15–3 min 0.5–10 min 3–60 min 0.15–3h 0.5–10h 3–60h	Adjustable: on-delay; fleeting contact on energization; flashing; pulse generating; ON-OFF		**XTMT6A60H70B**

Electronic Star-Delta (Wye-Delta) Timers

XTTR6A60S51



Electronic Star-Delta (Wye-Delta) Timers

Conventional Thermal Current I_e (A)	Rated Operational Current I_e AC-11 Amps 230V	400V	Time Range	Function	Terminal Marking According to EN 50042	Catalog Number
6	3	3	3–60 sec	Fixed, star-delta		**XTTR6A60S51B**

Actuating Voltage
24–240 50/60 Hz
24–240 Vdc

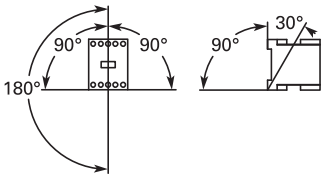
Admissible Cable Length
Cable unscreened, with cable cross-section 0.5–1.5 mm^2
Two-core cable
Two-core cable in the same cable duct with the main cable, 50/60 Hz

Connection to
Y1/Y2, Z1/Z2
M250
M50

1

Technical Data and Specifications

Relays and Timers

Description	XTRE	XTCEXFAC_	XTCEXTE_	XTRM	XTMCXFA_
General					
Standards	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	DIN EN 61812, IEC/EN 60947, VDE 060, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA
Lifespan, mechanical—operations					
AC operated	20,000,000	10,000,000	3,000,000	10,000,000	10,000,000
DC operated	20,000,000	10,000,000	3,000,000	20,000,000	20,000,000
Maximum operating frequency (ops/hr)	9000	9000	—	9000	9000
Climatic proofing	①	①	①	①	①
Ambient temperature					
Open (°C, min./max.)	–25/60	–25/60	–40/80	–25/50	–25/50
Enclosed (°C, min./max.)	–25/40	–25/40	–25–60	–25/40	–25/40
Ambient temperature for storage (°C, min./max.)	–40/80	–40/80	–25–40	—	—
Mounting position			As required, not suspended	As required, except vertically A1/A2 at the bottom	As required, except vertically A1/A2 at the bottom
Mechanical shock resistance (IEC/EN 60068-2-27) Half-sinusoidal shock 10 ms Base unit with auxiliary contact module					
Make contact	7g	7g	6g	10g	10g
Break contact	5g	5g	6g	8g	8g
Degree of protection	IP20	IP20	IP20	IP20	IP20
Protection against direct contact from the front when actuated by a perpendicular test finger (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Weight					
AC operated (kg)	0.23	0.05	0.08	0.17	—
DC operated (kg)	0.28	0.05	0.08	0.20	—
Terminal capacity					
Screw terminals					
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–1.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)
Solid or stranded (AWG)	18–14		18–14	18–14	
Terminal screw	M3.5	M3.5	M3.5	M3.5	M3.5
Pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2	Size 2
Standard screwdriver (mm)	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6
Max. tightening torque (Nm)	1.2	1.2	1.2	1.2	1.2
Spring cage terminals					
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	— —	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with or without ferrule DIN 46228 (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	— —	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	—	18–14	18–14
Standard screwdriver (mm)	0.6 x 3.5	0.6 x 3.5	—	0.6 x 3.5	0.6 x 3.5

Note

① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclical, to IEC 60068-2-30.

Relays and Timers, continued

Description	XTRE	XTCEXFAC_	XTCEXTE_	XTRM	XTMCXFA_
Contacts					
Interlocked opposing contacts to ZH 1/457, including auxiliary contact module	Yes	Yes	No	Yes	Yes
Rated impulse withstand voltage (U_{imp}) Vac	6000	6000	6000	6000	6000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3
Rated insulation voltage (U_i) Vac	690	690	600	690	690
Rated operational voltage (U_e) Vac	690	500	400	600	600
Safe isolation to VDE 0106 Part 101 and Part 101/A1					
Between coil and auxiliary contacts (Vac)	400	400	250	300	300
Between the auxiliary contacts (Vac)	400	400	250	300	300
Rated operational current					
AC-15 220/240V I_e	6	6	Please inquire	6	4
380/415V I_e	4	3	Please inquire	3	2
500V I_e	1.5	—	—	1.5	1.5
DC-13 ①					
DC13 L/R≤15 ms					
Contacts in series—voltage:					
1—24V	10	10	—	2.5	2.5
1—60V	6	6	—	—	—
2—60V	10	10	—	2.5	2.5
1—110V	3	3	—	—	—
3—110V	6	6	—	1.5	1.5
1—220V	1	1	—	—	—
3—220V	5	5	—	0.5	0.5
DC13 L/R≤50 ms					
Contacts in series—voltage:					
3—24V	4	—	—	—	—
3—60V	4	—	—	—	—
3—110V	2	—	—	—	—
3—220V	1	—	—	—	—
Control circuit reliability (at U_e = 24 Vdc, U_{min} = 17, I_{min} = 5.4 mA)	Failure rate = $<10^{-8}$, <1 failure in 100 million operations		—	Failure rate = $<10^{-8}$, <1 failure in 100 million operations	
Conventional thermal current (I_{th})	16	16	6	10	10
Short-circuit rating without welding					
Maximum overcurrent protective device					
220/240V–XTPR Frame B	4	—	—	4	4
380/415V–XTPR Frame B	4	—	—	4	4
Short-circuit protection, max. fuse					
500V (A gG/gL)	10	10	6	6	6
500V (A fast)	—	—	—	10	10
Current heat losses at load of I_{th}					
AC operated (W)	0.3	0.3	—	0.2	0.2
DC operated (W)	0.3	0.3	—	0.3	0.3

Note

① Making and breaking conditions to DC13, time constant as stated.

Relays and Timers, continued

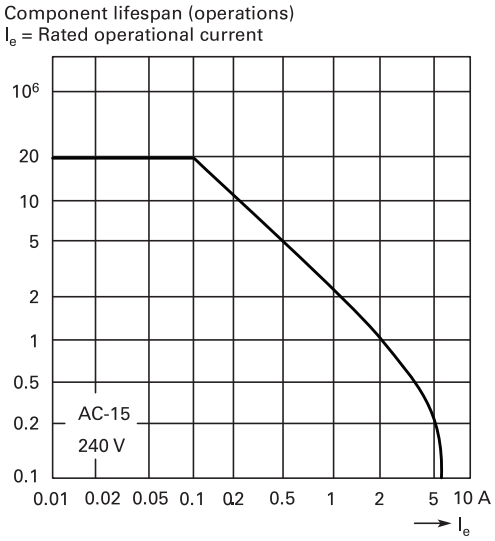
Description	XTRE	XTCEXFAC_	XTCEXTE_	XTRM	XTMCXFA_
Magnet Systems					
Pickup and dropout values					
AC operated					
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz (pickup x U_c)	0.8–1.1	—	0.85–11	0.8–1.1	—
Dual-frequency coil 50/60 Hz (pickup x U_c)	0.8–1.1	—	—	0.85–1.1	—
DC operated ①					
Pickup voltage (pickup x U_c)	0.8–1.1	—	0.7–1.2	0.85–1.3	—
At 24V: without auxiliary contact module (40°C) (pickup x U_c)	0.7–1.3	—	—	0.7–1.3	—
Power consumption					
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz					
Pickup VA	24	—	—	25	—
Pickup W	19	—	—	22	—
Sealing VA	3.4	—	2	4.6	—
Sealing W	1.2	—	1.8	1.3	—
Dual-frequency coil 50/60 Hz at 50 Hz					
Pickup VA	27	—	—	30	—
Pickup W	22	—	—	26	—
Sealing VA	4.2	—	—	5.4	—
Sealing W	1.4	—	—	1.6	—
Dual-frequency coil 50/60 Hz at 60 Hz					
Pickup VA	25	—	—	29	—
Pickup W	21	—	—	24	—
Sealing VA	3.3	—	—	3.9	—
Sealing W	1.2	—	—	1.2	—
DC operated					
Pull-in = sealing (W)	3	—	—	2.6	—
Duty factor (% DF)	100	—	100	100	—
Switching times at 100% U_c (approximate values)					
AC operated closing delay (ms)	≤21	—	—	14–21	—
AC operated NO contact opening delay (ms)	≤18	—	—	8–18	—
AC operated with auxiliary contact module, max. closing delay (ms)	—	—	—	45	45
DC operated closing delay (ms)	≤31	—	—	26–35	—
DC operated NO contact opening delay (ms)	≤12	—	—	15–25	—
DC operated with auxiliary contact module, max. closing delay (ms)	—	—	—	70	70

Note

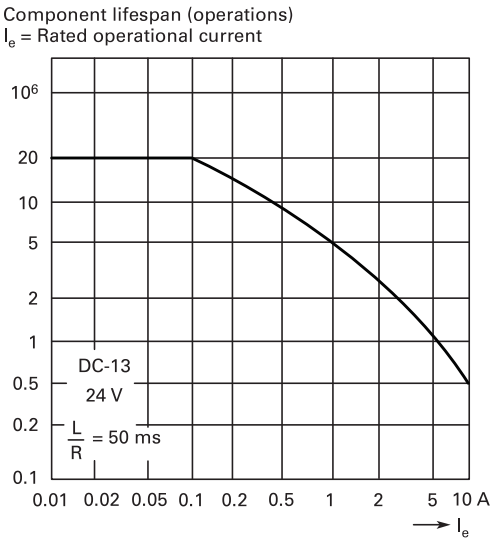
① Smoothed DC or three-phase bridge rectifier.

Control Relays—Characteristic Curves

XTRE (AC-15)



XTRE (DC-13) ①



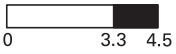
The diagrams show the closing and opening travel of the contact of the contactor relays and auxiliary contacts at no load. Tolerances are not taken into consideration.

Contact Travel Diagrams

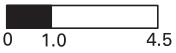
XTRE

XTRE_ — AC Operation

Normally open contact

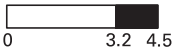


Normally closed contact

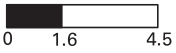


XTCEXFAC_ — AC Operation

Normally open contact



Normally closed contact



XTCEXFALC_ — AC Operation

Normally open contact (early make)

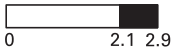


Normally closed contact (late make)

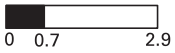


XTRE — DC Operation

Normally open contact

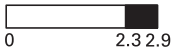


Normally closed contact

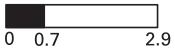


XTCEXFAC_ — DC Operation

Normally open contact



Normally closed contact



XTCEXFALC_ — DC Operation

Normally open contact (early make)



Normally closed contact (late make)



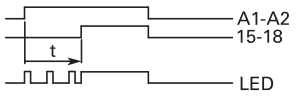
Note

① Making and breaking conditions to DC-13, time constant as stated.

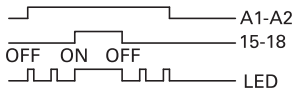
1

Flow Diagrams—Electronic Timers, XTMT Mini Timers

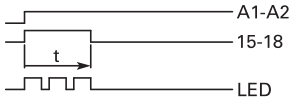
On-Delay



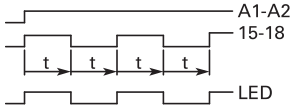
ON-OFF Function



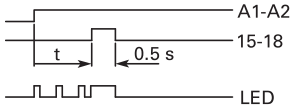
Fleeting Contact on Energization



Flashing, Pulse Initiating

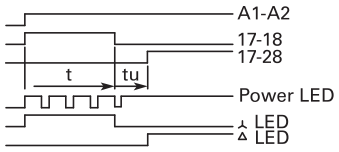


Pulse Generating



Star-Delta (Wye-Delta) Timer

Star-Delta



Rating Data

Rating Data for Approved Types

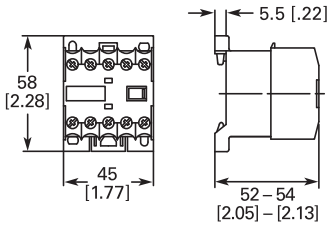
Pilot Duty	General Use
Control Relays—XTMR	
A600, P300	10A–600 Vac 0.5A–250 Vdc
Timers—XTMT, XTTR	
B300	6A–250 Vac

Dimensions

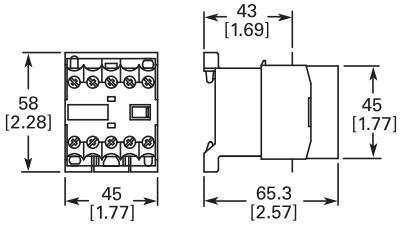
Approximate Dimensions in mm [in.]

Mini Contactor Relays

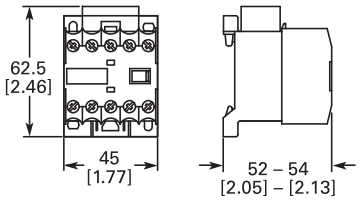
Mini Control Relay XTRM



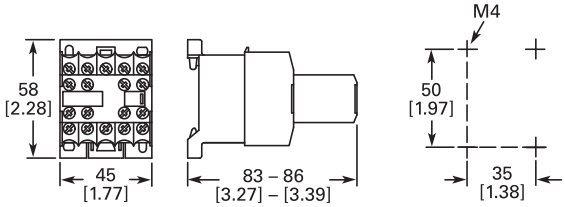
XTRM Mini Control Relay with IP40 XTMCX Shroud



XTRM Mini Control Relay with RC or Varistor Suppressor



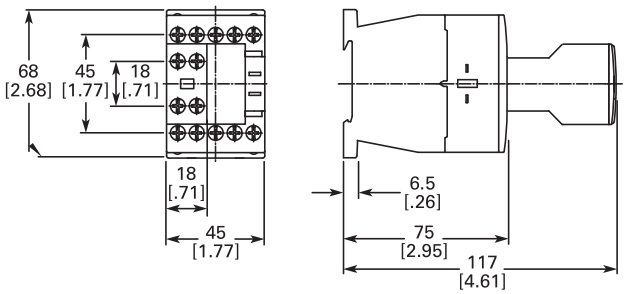
XTRM Mini Control Relay with XTMCXFA Auxiliary Contact



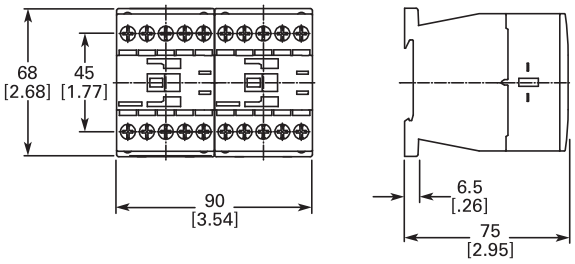
Approximate Dimensions in mm [in.]

Control Relays

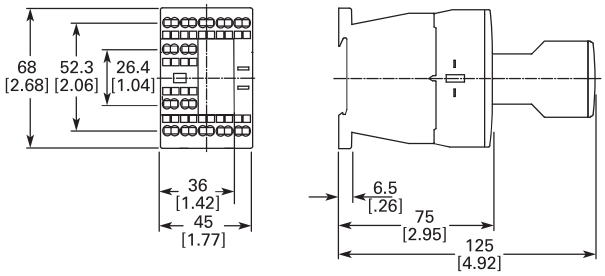
Control Relay XTRE with XTCEXFA Auxiliary Contact



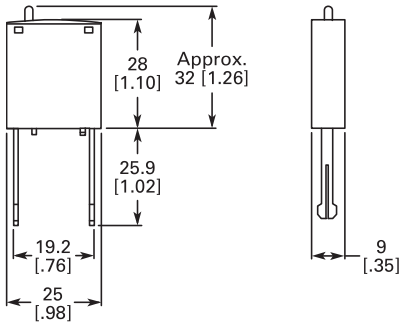
Control Relay XTRE with XTCEXMLB Mechanical Interlock



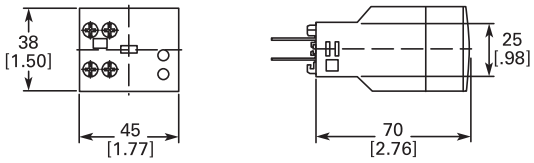
Control Relay with Spring Cage Terminals XTREC with XTCEXFA Auxiliary Contact



Coil Suppressors for Use with XTRE Control Relays



Electronic Timer Module XTCEXTE



1

XTMC Miniature Contactor



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	
Catalog Number Selection	**V5-T1-19**
Product Selection	**V5-T1-20**
Accessories	**V5-T1-24**
Technical Data and Specifications	**V5-T1-27**
Wiring Diagrams	**V5-T1-32**
Dimensions	**V5-T1-34**
An Eaton Green Solution	
Contactors and Starters	**V5-T1-35**
Thermal Overload Relays	**V5-T1-130**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	**V5-T1-219**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

Miniature Controls

Product Description

Eaton's new line of ***XT*** miniature controls includes non-reversing and reversing mini contactors, mini overload relays and snap-on accessories. A wide range of applications is possible, including small electrical motors from fractional to 5 hp (460 Vac) or up to 4 kW (400 Vac).

Application Description

Due to its compact size, the ***XT*** line of mini controls is best suited to be applied in light-duty loads, such as hoisting, packaging, material handling, heating, lighting and automation systems. ***XT*** mini contactors are a particularly compact, economic and environmentally friendly solution wherever control of small motors or loads is required.

Features

Mini Contactors—Types XTMC and XTMF, 6–9A

- AC control from 12V to 550V 50 Hz, 600V 60 Hz
- DC control from 12V to 220V
- Reversing or non-reversing
- Three- and four-pole configurations
  - Three-pole XTMC
  - Four-pole XTMF
- Panel or DIN rail mounting
- IP20 finger and back-of-hand proof
- Low noise operation
- High degree of climatic proofing
- Large ambient temperature range –25° to 50°C [–13° to 122°F]

Mini Overload Relays—Bimetallic Type XTOM

- Phase failure sensitivity
- Direct mount to XTMC and XTMF mini contactors
- Trip Class 10
- 11 settings to cover 0.1 to 12A
- Ambient temperature compensated –5° to 50°C [23° to 122°F]
- Manual and automatic reset by selector switch
- One make (NO) or one break (NC) auxiliary contact as standard
- Test/Off button
- Trip-free release

Standards and Certifications

- IEC EN 60947
- CE approved
- UL
- CSA
- CCC

Instructional Leaflets

Pub51219	XTMC, XTMF Mini Contactors, XTRM Mini Control Relay and Accessories
Pub51243	XTOM Mini Overload Relays
Pub51206	Mini Reversing Link Kits
MN03402002E	XTOM Mini Overload Relays Installation and User Manual

Catalog Number Selection

XT IEC Miniature Contactors

XT MC 6 A 10 A

Designation
XT = ***XT*** IEC power control

Type
MC = Three-pole FVNR mini IEC contactor
MF = Four-pole FVNR mini IEC contactor
MR = Three-pole FVR mini IEC contactor

Current Rating, AC-3
XTMC
6 = 6.6A
9 = 8.8A
XTMF
9 = 8.8A

Frame Size
A = 45 mm mini

Integral Auxiliary Contact
01 = 1NC
10 = 1NO

Coil Codes

A	= 110V 50 Hz, 120V 60 Hz	**L**	= 380V 50 Hz, 440V 60 Hz
B	= 220V 50 Hz, 240V 60 Hz	**N**	= 400V 50 Hz
F	= 230V 50 Hz	**P**	= 380V 60 Hz
T	= 24V 50/60 Hz	**R**	= 12V 50/60 Hz
TD	= 24 Vdc	**W**	= 42V 50 Hz, 48V 60 Hz
C	= 415V 50 Hz, 480V 60 Hz	**Y**	= 48V 50 Hz
D	= 550V 50 Hz, 600V 60 Hz	**AD**	= 120 Vdc
E	= 208V 60 Hz	**BD**	= 220 Vdc
G	= 190V 50 Hz, 220V 60 Hz	**RD**	= 12 Vdc
H	= 240V 50 Hz, 277V 60 Hz	**WD**	= 48 Vdc

XT IEC Miniature Overload Relays

XT OM P16 A C1

Designation
XT = ***XT*** IEC power control

Type
OM = Mini overload relay

Overload Release

P16	= 0.1–0.16A	**2P4**	= 1.6–2.4A
P24	= 0.16–0.24A	**004**	= 2.4–4A
P40	= 0.24–0.4A	**006**	= 4–6A
P60	= 0.4–0.6A	**009**	= 6–9A
001	= 0.6–1A	**012**	= 9–12A
1P6	= 1–1.6A		

Frame Size
A = 45 mm mini

Trip Class
C1 = Class 10A

1

Product Selection

Full Voltage Non-Reversing Miniature Contactors

XTMC_



Maximum UL Ratings—Single-Phase and Three-Phase

Horsepower Ratings									
Single-Phase			Three-Phase				Number of Power Poles	Auxiliary Contacts	Screw Terminal Catalog Number ①
115V	200V	230V	200V	230V	460V	575V			
1/4	3/4	1	1-1/2	2	3	3	3	1NO	**XTMC6A10_**
1/4	3/4	1	1-1/2	2	3	3	3	1NC	**XTMC6A01_**
1/2	1	1-1/2	2	3	5	5	3	1NO	**XTMC9A10_**
1/2	1	1-1/2	2	3	5	5	3	1NC	**XTMC9A01_**
1/2	1	1-1/2	2	3	5	5	4	—	**XTMF9A00_**

Maximum IEC Ratings AC-3

Operational Current AC-3 Amp Rating 380/400V	Conventional Free Air Thermal Current AC-1 at 50°C	Three-Phase Motors 50–60 Hz				Number of Power Poles	Auxiliary Contacts	Screw Terminal Catalog Number ①
		220–240V	380–400V	550V	660/690V			
6.6	20	1.5	3	3	3	3	1NO	**XTMC6A10_**
6.6	20	1.5	3	3	3	3	1NC	**XTMC6A01_**
8.8	20	2.2	4	4	4	3	1NO	**XTMC9A10_**
8.8	20	2.2	4	4	4	3	1NC	**XTMC9A01_**
8.8	20	2.2	4	4	4	4	—	**XTMF9A00_**

Magnet Coil Suffix

Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**	415V 50 Hz, 480V 60 Hz	**C**	380V 60 Hz	**P**	120 Vdc	**AD**
220V 50 Hz, 240V 60 Hz	**B**	550V 50 Hz, 600V 60 Hz	**D** ③	12V 50/60 Hz	**R** ③	220 Vdc	**BD**
230V 50 Hz	**F**	208V 60 Hz	**E**	42V 50 Hz, 48V 60 Hz	**W**	12 Vdc	**RD**
24V 50/60 Hz	**T**	190V 50 Hz, 220V 60 Hz	**G**	48V 50 Hz	**Y**	48 Vdc	**WD**
24 Vdc	**TD** ②	240V 50 Hz, 277V 60 Hz	**H**	—	—	—	—
—	—	380V 50 Hz, 440V 60 Hz	**L**	—	—	—	—

Notes

IEC Utilization Categories, see **Page V5-T1-249**.
AC-1: Non-inductive or slightly inductive loads.
AC-3: Squirrel cage motors—starting, switching of motors during running.
AC-4: Squirrel cage motors—starting, plugging, inching.

① Underscore (_) indicates magnetic coil suffix required.
② With DC operation: Integrated diode resistor combination, coil rating 2.6W.
③ XTMF four-pole contactor not available with "D" or "R" coil voltage suffix.

Full Voltage Reversing Miniature Contactors

1

XTMR_



Maximum UL Ratings—Single-Phase and Three-Phase

Horsepower Ratings

Single-Phase			Three-Phase				Spare Auxiliary Contacts		
115V	**200V**	**230V**	**200V**	**230V**	**460V**	**575V**	**K1M**	**K2M**	**Catalog Number** ①②
1/4	3/4	1	1-1/2	2	3	3	63 64	63 64	**XTMR6A21_**
1/2	1	1-1/2	2	3	5	5	63 64	63 64	**XTMR9A21_**

Maximum IEC Ratings AC-3

		Three-Phase Motors 50–60 Hz						
Operational Current AC-3 Amp Rating 380/400V	**Conventional Free Air Thermal Current AC-1 at 50°C**	**220/ 230/ 240V**	**380/ 400/ 440V**	**500V**	**660/ 690V**	**Spare Auxiliary Contacts K1M**	**K2M**	**Catalog Number** ①②
6.6	20	1.5	3	3	3	63 64	63 64	**XTMR6A21_**
8.8	20	2.2	4	4	4	63 64	63 64	**XTMR9A21_**

Magnet Coil Suffix

Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**	415V 50 Hz, 480V 60 Hz	**C**	380V 60 Hz	**P**	120 Vdc	**AD**
220V 50 Hz, 240V 60 Hz	**B**	550V 50 Hz, 600V 60 Hz	**D** ③	12V 50/60 Hz	**R** ③	220 Vdc	**BD**
230V 50 Hz	**F**	208V 60 Hz	**E**	42V 50 Hz, 48V 60 Hz	**W**	12 Vdc	**RD**
24V 50/60 Hz	**T**	190V 50 Hz, 220V 60 Hz	**G**	48V 50 Hz	**Y**	48 Vdc	**WD**
24 Vdc	**TD** ②	240V 50 Hz, 277V 60 Hz	**H**	—	—	—	—
—	—	380V 50 Hz, 440V 60 Hz	**L**	—	—	—	—

Notes

IEC Utilization Categories, see **Page V5-T1-249.**
AC-1: Non-inductive or slightly inductive loads.
AC-3: Squirrel cage motors—starting, switching of motors during running.
AC-4: Squirrel cage motors—starting, plugging, inching.

① Underscore (_) indicates magnetic coil suffix required. See Magnet Coil Suffix table above.

② The factory-installed reversing mini contactor includes (2) XTMC…01 contactors, (2) XTMCXFA20 2NO front-mount auxiliary contacts (1) XTMCXRL reversing link kit and (1) XTMCXML mechanical interlock.

③ XTMF four-pole contactor not available with "D" or "R" coil voltage suffix.

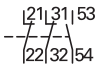
1

Star-Delta (Wye-Delta) Miniature Contactors

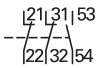
XTMC_



Maximum Current UL Ratings—Single-Phase and Three-Phase ①

Horsepower Ratings							Maximum Changeover Time (sec.)	Spare Auxiliary Contacts K1M	Component Description	Catalog Number ②
Single-Phase			Three-Phase							
115V	200V	230V	200V	230V	460V	575V				
1/2	1	1-1/2	2	3	5	7-1/2	30		K1M main contactor	**XTMC9A10_**
									K1M auxiliary contact	**XTMCXFC22**
									K5M delta contactor	**XTMC9A01_**
									K3M star contactor	**XTMC9A10_**
									K3M auxiliary contact	**XTMCXFC02**
									K1T timing relay	**XTTR6A60S51B**

Maximum IEC Ratings AC-3 ①

Horsepower Ratings			Maximum Changeover Time (sec.)	Spare Auxiliary Contacts K1M	Component Description	Catalog Number ②
Three-Phase Motors 50–60 Hz						
220/230/240V	380/400/440V	500V				
4	5.5	5.5	30		K1M main contactor	**XTMC9A10_**
					K1M auxiliary contact	**XTMCXFC22**
					K5M delta contactor	**XTMC9A01_**
					K3M star contactor	**XTMC9A10_**
					K3M auxiliary contact	**XTMCXFC02**
					K1T timing relay	**XTTR6A60S51B**

Mini Overload Relay Settings (A)

Setting	Starting
A: I_N x 0.58 Motor protection in the Y and delta configurations.	≤15 sec
B: I_N x 1 Only partial motor protection in star position	15–40 sec
C: I_N x 0.58 Motor not protected in star position.	>40 sec
Timing relay set to approximately 10 sec.	

Notes

Depending on the coordination type required (that is, Type 1 or Type 2) it must be established whether the fuse protection and the input wiring for the main and delta contactors are to be common or separate.

① Operating frequency: 30 starts/hour. See Magnet Coil Suffix table on following page.

② Underscore (_) indicates magnet coil suffix required.

Magnet Coil Suffix

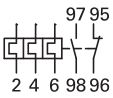
Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**	415V 50 Hz, 480V 60 Hz	**C**	400V 50 Hz	**N**	120 Vdc	**AD**
220V 50 Hz, 240V 60 Hz	**B**	550V 50 Hz, 600V 60 Hz	**D**	380V 60 Hz	**P**	220 Vdc	**BD**
230V 50 Hz	**F**	208V 60 Hz	**E**	12V 50/60 Hz	**R**	12 Vdc	**RD**
24V 50/60 Hz	**T**	190V 50 Hz, 220V 60 Hz	**G**	24V 50 Hz	**U**	48 Vdc	**WD**
24 Vdc	**TD** ①	240V 50 Hz, 277V 60 Hz	**H**	42V 50 Hz, 48V 60 Hz	**W**	—	—
—	—	380V 50 Hz, 440V 60 Hz	**L**	48V 50 Hz	**Y**	—	—

Mini Overload Relays

XTOM_



Mini Overload Relays ②③

Overload Release I_r	Trip Class	Contact Sequence	Contact Configuration	Short-Circuit Protection (A) Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Circuit Breaker	CEC/NEC Fuse	Catalog Number
0.1–0.16A	10A		1NO-1NC	20	0.5	15	—	**XTOMP16AC1**
0.16–0.24A	10A		1NO-1NC	20	1	15	—	**XTOMP24AC1**
0.24–0.4A	10A		1NO-1NC	20	2	15	—	**XTOMP40AC1**
0.4–0.6A	10A		1NO-1NC	20	2	15	—	**XTOMP60AC1**
0.6–1A	10A		1NO-1NC	20	4	15	3	**XTOM001AC1**
1–1.6A	10A		1NO-1NC	20	6	15	6	**XTOM1P6AC1**
1.6–2.4A	10A		1NO-1NC	20	6	15	6	**XTOM2P4AC1**
2.4–4A	10A		1NO-1NC	20		15	15	**XTOM004AC1**
4–6A	10A		1NO-1NC	20		15	20	**XTOM006AC1**
6–9A	10A		1NO-1NC	20		15	35	**XTOM009AC1**
9–12A	10A		1NO-1NC	—		—	45	**XTOM012AC1**

Notes

① With DC operation: Integrated diode resistor combination, coil rating 2.6W.

② Short-circuit protection: Observe the maximum permissible fuse of the contactor with direct device mounting. See MN03402002E for more information.

③ When fitted directly to the contactor, a clearance of at least 5 mm is required between the overload relays.

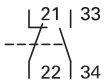
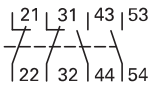
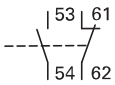
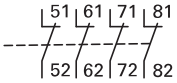
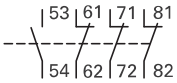
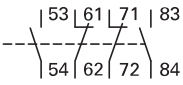
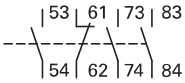
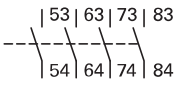
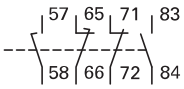
1

Accessories

Auxiliary Contacts

Front-mounted snap-on auxiliary contacts for mini contactors are available with screw terminals in a variety of contact configurations. Auxiliary contact modules are standard with interlocked opposing contacts, except in the case of early-make or late-break contacts.

Front-Mount Auxiliary Contacts for Use with Mini Contactors

Conventional Free Air Thermal Current, $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
10	2NC		5	**XTMCXFC02**
10	1NO-1NC		5	**XTMCXFD11**
10	2NO-2NC		5	**XTMCXFC22**
10	2NC		5	**XTMCXFA02**
10	1NO-1NC		5	**XTMCXFA11**
10	2NO		5	**XTMCXFA20**
10	4NC		5	**XTMCXFA04**
10	1NO-3NC		5	**XTMCXFA13**
10	2NO-2NC		5	**XTMCXFA22**
10	3NO-1NC		5	**XTMCXFA31**
10	4NO		5	**XTMCXFA40**
10	1NO-1NC $1NO_E$-$1NC_L$		5	**XTMCXFAL22** ②

Notes

① Orders must be placed in multiples of package quantity listed.

② One early-make contact (NO_E), one late-break contact (NC_L).

Suppressors

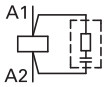
XTMCXR_



XTMC Relay with Installed Suppressor



RC Suppressor ①

Voltage	For Use with…	Circuit Symbol	Pkg. Qty. ②	Catalog Number
24–48	XTMC6A_, XTMC9A_		10	**XTMCXRSW**
48–130	XTMC6A_, XTMC9A_		10	**XTMCXRSA**
110–250	XTMC6A_, XTMC9A_		10	**XTMCXRSB**

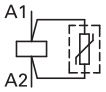
XTMCX_



XTMC Relay with Installed Suppressor



Varistor Suppressor ③

Voltage	For Use with…	Circuit Symbol	Pkg. Qty. ②	Catalog Number
24–48	XTMC6A_, XTMC9A_		10	**XTMCXVSW**
48–130	XTMC6A_, XTMC9A_		10	**XTMCXVSA**
110–250	XTMC6A_, XTMC9A_		10	**XTMCXVSB**
380–415	XTMC6A_, XTMC9A_		10	**XTMCXVSN**

Mechanical Interlock

XTMCXML



Mechanical Interlock

Description	Pkg. Qty. ②	Catalog Number
Mechanical interlock	5	**XTMCXML**

Notes

For two contactors with AC or DC operated magnet system that are horizontally or vertically mounted, the distance between contactors is 0 mm and the mechanical lifespan is 2.5 x 10^6 operations.

① For AC operated contactors, 50/60 Hz. Note dropout delay.

② Orders must be placed in multiples of package quantity listed.

③ For AC operated contactors, 50/60 Hz. DC operated contactors have integrated varistor suppressors.

1

Additional Accessories

XTMCXRL



Reversing Link Kit ①②

Description	Pkg. Qty. ③	Catalog Number
Main current wiring for reversing contactors and starters	1	**XTMCXRL**

XTMCXSDL



Star-Delta (Wye-Delta) Link Kit ④⑤

Description	Pkg. Qty. ③	Catalog Number
Main current wiring for star-delta (wye-delta) combinations. Includes the star-delta bridge	1	**XTMCXSDL**

XTMCXCN



Connector

Description	Pkg. Qty. ③	Catalog Number
For mechanically arranging contactors and timing relays in combinations	50	**XTMCXCN** ⑥

XTMCXSHROUD



IP40 Sealable Transparent Shroud

Description	Pkg. Qty. ③	Catalog Number
IP40 sealable transparent shroud, snap fitting on mini contactor	1	**XTMCXSHROUD**

Notes

① The following control cables are integrated as part of the electrical interlock: K1M: A1–K2M: 21; K1M: 21–K2M: A1
② Reversing link kit does not include mechanical interlock. See Mechanical Interlock.
③ Orders must be placed in multiples of package quantity listed.
④ The following control cables are integrated in addition to the electrical interlock: K3M: A1–K5M: 21; K3M: 21–K5M: A1; K3M: A2–K5M: A2
⑤ When combined with overload relay, use separate mounting.
⑥ 0 mm distance between contactors.

Technical Data and Specifications

XT Miniature Controls—General

Description	XTMC6A_ AC Coils	XTMC6A_ DC Coils	XTMC9A_ AC Coils	XTMC9A_ DC Coils	XTMF9A_ AC Coils	XTMF9A_ DC Coils
Physical and Electrical						
Standards	IEC/EN 60947, VDE 0660, CSA, UL, CCC	IEC/EN 60947, VDE 0660, CSA, UL, CCC	IEC/EN 60947, VDE 0660, CSA, UL, CCC	IEC/EN 60947, VDE 0660, CSA, UL, CCC	IEC/EN 60947, VDE 0660, CSA, UL, CCC	IEC/EN 60947, VDE 0660, CSA, UL, CCC
Weights in kg [lb]	0.2 [0.44]	0.17 [0.37]	0.2 [0.44]	0.17 [0.34]	0.2 [0.44]	0.17 [0.37]
Mechanical life—operations	10,000,000	20,000,000	10,000,000	20,000,000	10,000,000	10,000,000
Mechanical life—coil at 50 Hz	7	—	7	—	7	—
Maximum mechanical operating frequency (ops/hr)	9000	9000	9000	9000	9000	9000
Insulation voltage (U_i) Vac	690	690	690	690	690	690
Impulse withstand voltage (U_{imp}) Vac	6000	6000	6000	6000	6000	6000
Operational Voltage (U_e) Vac	690	690	690	690	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1						
Between coil and contacts (Vac)	300	300	300	300	300	300
Between contacts (Vac)	300	300	300	300	300	300
Making capacity (amps)	110	110	110	110	110	110
Breaking capacity (amps)						
220/230V	90	90	90	90	90	90
380/400V	90	90	90	90	90	90
500V	64	64	64	64	64	64
660/690V	54	54	54	54	54	54
Short-circuit protection rating maximum fuse (gL/gG)						
Type 2 coordination (A)	10	10	10	10	10	10
Type 1 coordination (A)	20	20	20	20	20	20
Degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Flexible with ferrule (mm^2)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14	18–14	18–14
Terminal screw	M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2	Size 2	Size 2
Standard screwdriver (mm)	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6
Max. tightening torque						
Nm	1.2	1.2	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6	10.6	10.6
Terminal capacity of spring cage main terminals						
Solid (mm^2)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)
Flexible with ferrule (mm^2)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)	1 x (1–2.5) 2 x (1–2.5)
Standard screwdriver (mm)	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5
Mounting position	①	①	①	①	①	①

Note

① As required, except vertical with terminals A1/A2 at the bottom.



XT Miniature Controls—General, continued

Description	XTMC6A_ AC Coils	XTMC6A_ DC Coils	XTMC9A_ AC Coils	XTMC9A_ DC Coils	XTMF9A_ AC Coils	XTMF9A_ DC Coils
Environmental						
Ambient temperature	–25° to 50°C [–13° to 122°F]	–25° to 50°C [–13° to 122°F]	–25° to 50°C [–13° to 122°F]	–25° to 50°C [–13° to 122°F]	–25° to 50°C [–13° to 122°F]	–25° to 50°C [–13° to 122°F]
Mechanical shock resistance (IEC/EN 60068-2-27)						
Half-sinusoidal shock 10 ms						
Contactor without auxiliary contact module						
Main contact—make contact	10g	10g	10g	10g	10g	10g
Main contact—break/make contact	10/8g	10/8g	10/8g	10/8g	—	—
Contactor with auxiliary contact module						
Main contact—make contact	10g	10g	10g	10g	10g	10g
Main contact—make/break contact	20/20g	20/20g	20/20g	20/20g	20/20g	20/20g
Climatic proofing	①	①	①	①	①	①
Pollution degree	III/3	III/3	III/3	III/3	III/3	III/3

Note

① Damp heat, constant, to IEC 60 068-2-78; damp heat, cyclic, to IEC 60 068-2-30.

XT Miniature Controls—Magnet Systems

Description	XTMC6A_ AC Coils	XTMC6A_ DC Coils	XTMC9A_ AC Coils	XTMC9A_ DC Coils	XTMF9A_ AC Coils	XTMF9A_ DC Coils
Voltage Tolerance						
Pickup (x U_c)						
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz	0.8–1.1	—	0.8–1.1	—	0.8–1.1	—
Dual frequency coil 50/60 Hz	0.85–1.1	—	0.85–1.1	—	0.85–1.1	—
DC operated ①	—	0.8–1.1	—	0.8–1.1	—	0.85–1.1
Power Consumption						
AC operation						
Pickup VA						
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz	25	—	25	—	25	—
Dual frequency coil 50/60 Hz at 50 Hz	30	—	30	—	30	—
Dual frequency coil 50/60 Hz at 60 Hz	29	—	29	—	29	—
Pickup W						
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz	22	—	22	—	22	—
Dual frequency coil 50/60 Hz at 50 Hz	26	—	26	—	26	—
Dual frequency coil 50/60 Hz at 60 Hz	24	—	24	—	24	—
Sealing VA						
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz	4.6	—	4.6	—	4.6	—
Dual frequency coil 50/60 Hz at 50 Hz	5.4	—	5.4	—	5.4	—
Dual frequency coil 50/60 Hz at 60 Hz	3.9	—	3.9	—	3.9	—
Sealing W						
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz	1.3	—	1.3	—	1.3	—
Dual frequency coil 50/60 Hz at 50 Hz	1.6	—	1.6	—	1.6	—
Dual frequency coil 50/60 Hz at 60 Hz	1.1	—	1.1	—	1.1	—
DC operated ①						
Power consumption pickup = sealing (VA/W)	—	2.6	—	2.6	—	2.6
Duty factor (%)	100	100	100	100	100	100
Switching Time at 100% U_c						
Make contact						
Closing delay min. (ms)	14	26	14	26	14	26
Closing delay max. (ms)	21	35	21	35	21	35
Opening delay min. (ms)	8	15	8	15	8	15
Opening delay max. (ms)	18	25	18	25	18	25
Closing delay with top-mounting auxiliary contact (ms)	Max. 45	Max. 70	Max. 45	Max. 70	Max. 45	Max. 70
Reversing Contactors						
Changeover time at 100% U_c						
Minimum (ms)	16	40	16	40	16	40
Maximum (ms)	21	50	21	50	21	50
Arcing time at 690 Vac (ms)	Max. 12	Max. 12	Max. 12	Max. 12	Max. 12	Max. 12

Note

① Smoothed DC or three-phase bridge rectifier.

1

XT Miniature Controls

Description	XTMC6A_ AC Coils	DC Coils	XTMC9A_ AC Coils	DC Coils	XTMF9A_ AC Coils	DC Coils
AC-1 Operation						
Conventional free air thermal current, three-pole, 50–60 Hz (A)						
at 40°C (I_{th})	22	22	22	22	22	22
at 50°C (I_{th})	20	20	20	20	20	20
at 55°C (I_{th})	19	19	19	19	19	19
Conventional free air thermal current, single-pole (I_{th})	50	50	50	50	60	60
AC-3 Operation						
Rated operational current, 50/60 Hz ① (I_e) in amperes (A)						
220/230V	6.6	6.6	9.0	9.0	9.0	9.0
240V	6.6	6.6	9.0	9.0	9.0	9.0
380/400V	6.6	6.6	9.0	9.0	9.0	9.0
415V	6.6	6.6	9.0	9.0	9.0	9.0
440V	6.6	6.6	9.0	9.0	9.0	9.0
500V	5.0	5.0	6.4	6.4	6.4	6.4
660/690V	3.5	3.5	4.8	4.8	4.8	4.8
Rated power (P) in kilowatts (kW)						
220/230V	1.5	1.5	2.2	2.2	2.2	2.2
240V	1.8	1.8	2.5	2.5	2.5	2.5
380/400V	3.0	3.0	4.0	4.0	4.0	4.0
415V	3.1	3.1	4.3	4.3	4.3	4.3
440V	3.3	3.3	4.6	4.6	4.6	4.6
500V	3.0	3.0	4.0	4.0	4.0	4.0
660/690V	3.0	3.0	4.0	4.0	4.0	4.0
AC-4 Operation						
Rated operational current, 50/60 Hz ① (I_e) in amperes (A)						
220/230V	5.0	5.0	6.6	6.6	6.6	6.6
240V	5.0	5.0	6.6	6.6	6.6	6.6
380/400V	5.0	5.0	6.6	6.6	6.6	6.6
415V	5.0	5.0	6.6	6.6	6.6	6.6
440V	5.0	5.0	6.6	6.6	6.6	6.6
500V	3.7	3.7	5.0	5.0	5.0	5.0
660/690V	2.9	2.9	3.4	3.4	3.4	3.4
Rated power (P) in kilowatts (kW)						
220/230V	1.1	1.1	1.5	1.5	1.5	1.5
240V	1.3	1.3	1.8	1.8	1.8	1.8
380/400V	2.2	2.2	3.0	3.0	3.0	3.0
415V	2.3	2.3	3.1	3.1	3.1	3.1
440V	2.4	2.4	3.3	3.3	3.3	3.3
500V	2.2	2.2	3.0	3.0	3.0	3.0
660/690V	2.2	2.2	3.0	3.0	3.0	3.0
DC-1 Operation ②						
12V	20	20	20	20	—	—
24V	20	20	20	20	—	—
60V	20	20	20	20	—	—
110V	20	20	20	20	—	—
220V	20	20	20	20	—	—

Notes

① At maximum permissible ambient temperature.

② Rated operation current (I_e) in amperes, at maximum permissible ambient temperature.

XT Miniature Controls, continued

Description	XTMC6A_ AC Coils	XTMC6A_ DC Coils	XTMC9A_ AC Coils	XTMC9A_ DC Coils	XTMF9A_ AC Coils	XTMF9A_ DC Coils
DC-3 Operation ①						
12V	6	6	8	8	—	—
24V	6	6	8	8	—	—
60V	3	3	4	4	—	—
110V	2	2	3	3	—	—
220V	—	—	—	—	1.0	1.0
DC-4 Operation ①						
12V	1.8	1.8	2.5	2.5	—	—
24V	1.8	1.8	2.5	2.5	—	—
60V	1.8	1.8	2.5	2.5	—	—
110V	1.1	1.1	1.5	1.5	2.5	2.5
220V	0.2	0.2	0.3	0.3	1.0	1.0
Current Heat Loss (Three- or Four-Pole) in Watts						
at I_{th}	2.0	3.5	2.0	3.5	2.7	4.7
at I_e to AC-3/400V	0.3	0.4	0.5	0.7	—	—

XT Miniature Controls—Auxiliary Contacts

Description	Built-In Auxiliary XTMC	Add-On Auxiliary XTMCXF_
Interlocked opposing contacts to ZH1/457, including auxiliary contact module	Yes	Yes
Rated impulse withstand voltage, U_{imp} (Vac)	6000	6000
Overvoltage category/pollution degree	III/3	III/3
Rated insulation voltage, U_i (Vac)	690	690
Rated operational voltage, U_e (Vac)	600	600
Safe isolation to VDE 0106 Part 101 and Part 101(A) in Vac		
Between coil and auxiliary contacts	300	300
Between the auxiliary contacts	300	300
Rated operational current		
AC-15, I_e		
220/240V	6A	4A
380/415V	3A	2A
500V	1.5A	1.5A
DC-13 (contacts in series)		
1: 24V	2.5A	2.5A
2: 60V	2.5A	2.5A
3: 100V	1.5A	1.5A
3: 220V	0.5A	0.5A
Conventional thermal current, I_{th}	10A	10A
Control circuit reliability (at U_e = 24 Vdc, U_{min} = 17V, I_{min} = 5.4 mA)	<10–8, <1 failure at 100 million operations	<10–8, <1 failure at 100 million operations
Component lifespan at U_e = 240V		
AC-15, operations x 10^6	0.2	0.2
DC-13 L/R = 50 ms: 2 contacts in series at I_e = 0.5A, operations x 10^6	0.15	0.15
Short-circuit rating without welding		
Short-circuit protection rating maximum fuse, 500V gG/gL	6A	6A
Short-circuit protection rating maximum fuse, 500V fast	10A	10A
Current heat loss at conventional free air thermal current I_{th} per contact, W	0.2	0.2

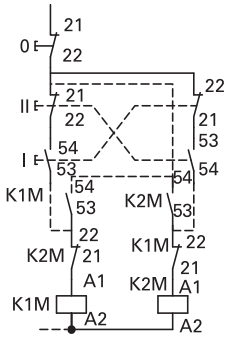
Note

① Rated operation current (I_e) in amperes, at maximum permissible ambient temperature.

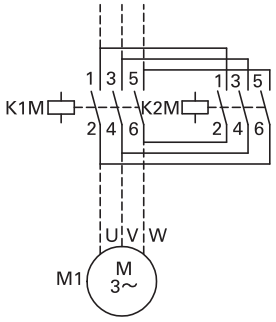
1

Wiring Diagrams

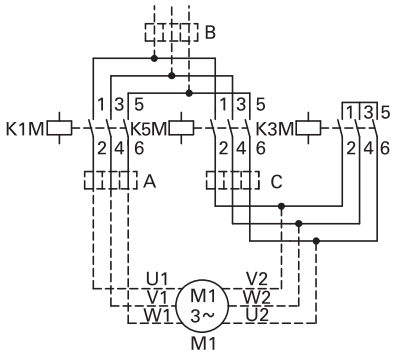
XTMR Reversing Contactor Control Circuit



XTMR Reversing Contactor Power Circuit

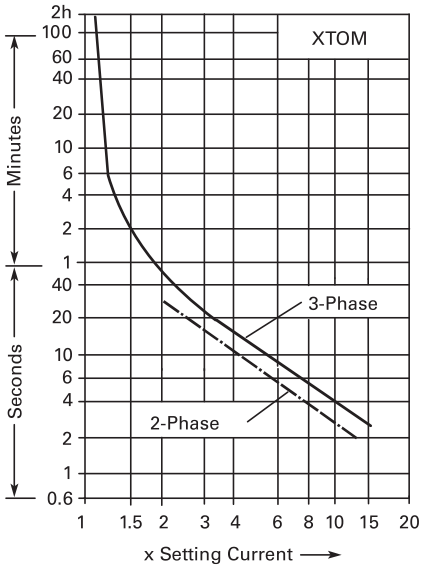


XT Mini Star-Delta (Wye-Delta) Contactor Power Circuit



Tripping Characteristics

Tripping Characteristics Chart



These tripping characteristics are mean values of the spread at 20°C ambient temperature in a cold state. Tripping time depends on response current. With devices at operating temperature, the tripping time of the overload relay reduces to approximately 25% of the read off value. Specific characteristics for each individual setting range can be found on **Page V5-T1-33**.

Electrical Switching Operation Charts

Squirrel cage motors

Operating characteristics
Starting: from rest
Stopping: after attaining a full running speed

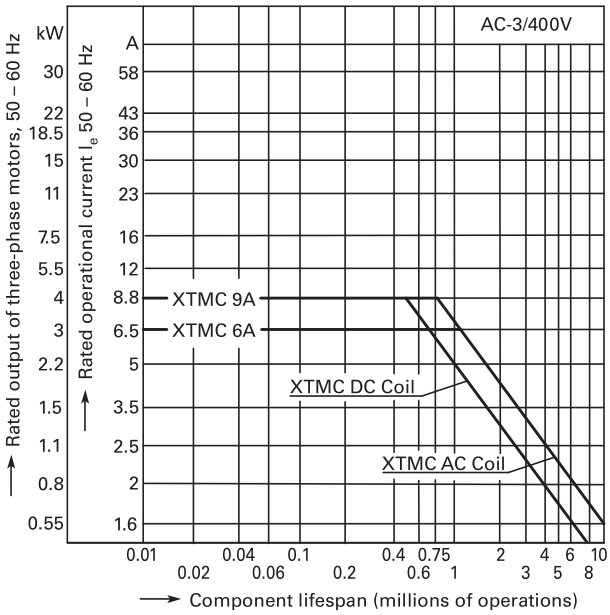
Electrical characteristics
Make (NO): Up to 6x rated motor current
Breaking (NC): 1x rated motor current

Squirrel cage motors

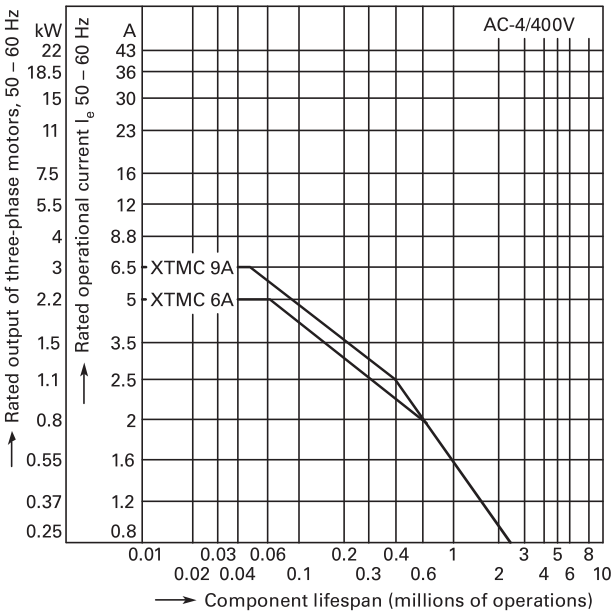
Operating characteristics
Jogging, plugging, reversing

Electrical characteristics
Make (NO): 6x rated motor current
Breaking (NC): 6x rated motor current

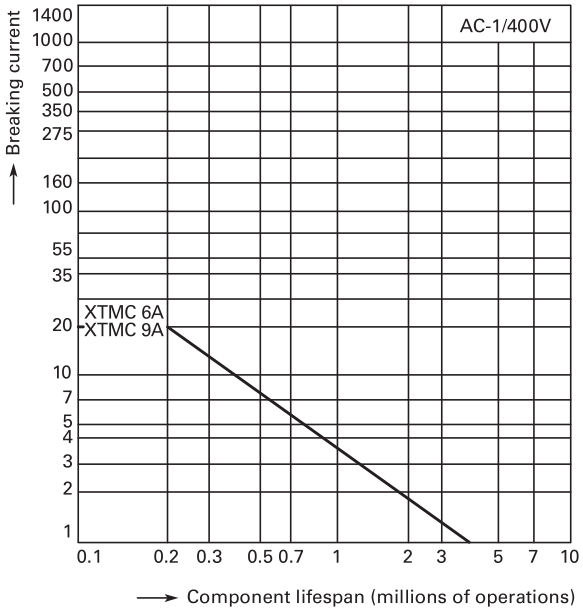
Normal Switching Duty—AC-3/400V



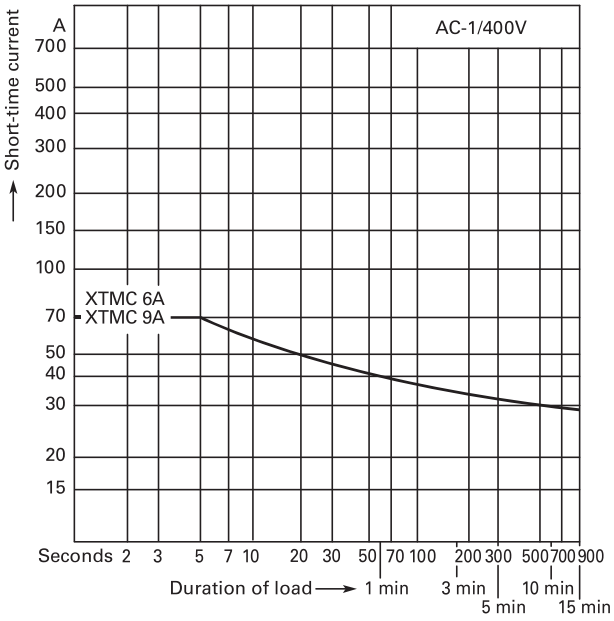
Extreme Switching Duty—AC-4/400V



Switching Duty for Non-Motor Loads, Three- and Four-Pole—AC-1/400V



Short Time Loading, Three-Pole—AC-1/400V (time interval between two loading cycles: 15 minutes)

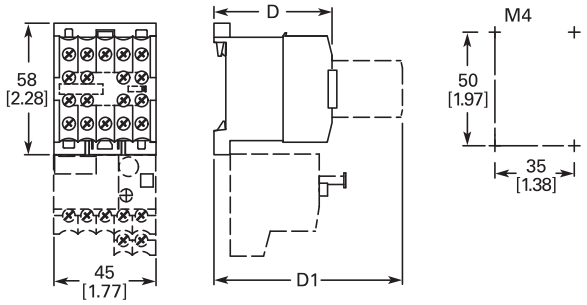


1

Dimensions

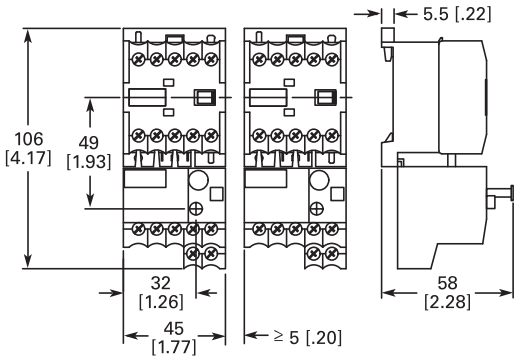
Approximate Dimensions in mm [in.]

Non-Reversing Mini Contactor

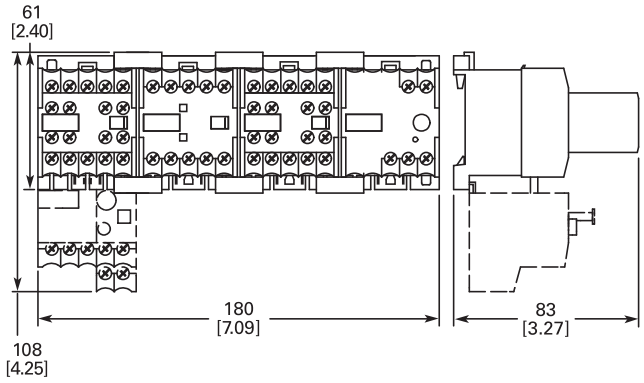


	XTMC	XTMCC
D	52 [2.05]	54 [2.13]
D1	83 [3.27]	86 [3.39]

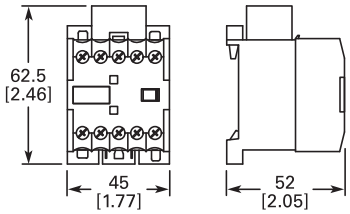
Non-Reversing Mini Contactor with Overload Relay



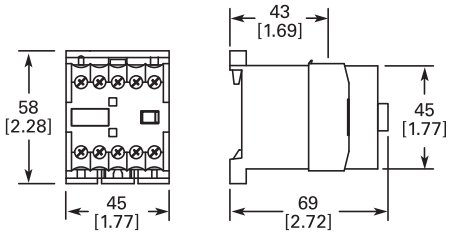
Star-Delta Starter Combinations



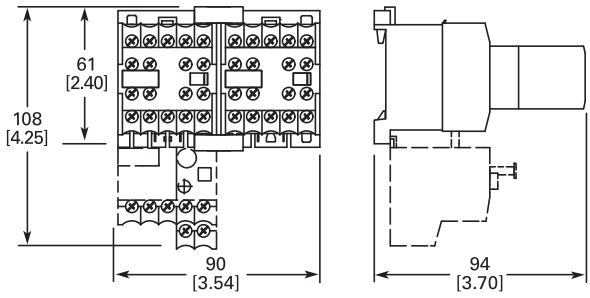
XTMCXRSA, XTMCXVSA Mini Suppressors



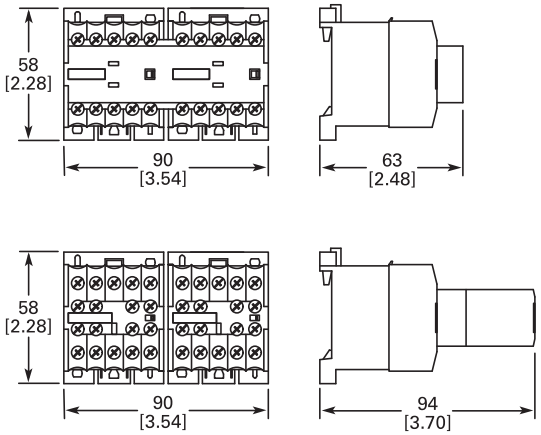
XTMCXTSA Mini Sealable Shroud



Reversing Mini Contactor



XTMCXML Mechanical Interlock



XT Family of Contactors



Contents

Description	*Page*
Relays and Timers	V5-T1-3
Miniature Controls	V5-T1-18
Contactors and Starters	
Product Identification	V5-T1-36
Catalog Number Selection	V5-T1-38
Product Selection	V5-T1-39
Accessories	V5-T1-65
Technical Data and Specifications	V5-T1-78
Wiring Diagrams	V5-T1-109
Dimensions	V5-T1-114
An Eaton Green Solution	
Thermal Overload Relays	V5-T1-130
C440/*XT* Electronic Overload Relay	V5-T1-143
Manual Motor Protectors	V5-T1-159
Combination Motor Controllers	V5-T1-193
XT Electronic Manual Motor Protector	V5-T1-219
EMS—Electronic Motor Starter	V5-T1-232
XT DC Contactors	V5-T1-234
Reference Data	V5-T1-236

Contactors and Starters

Product Description

The Eaton ***XT*** contactors and starters includes non-reversing and reversing contactors, overload relays and a variety of related accessories. Because ***XT*** meets IEC, UL®, CSA® and CE standards, it is the perfect product solution for IEC applications all over the world. The compact, space saving and easy to install ***XT*** line of IEC contactors and starters is the efficient and effective solution for customer applications from 7A to 2450A.

Application Description

The ***XT*** line of IEC power control was engineered to provide highly effective control and protection for a variety of loads, including motors, compressors, pumps, resistive, capacitor banks, isolation, and others. ***XT*** also includes IEC ratings for lighting applications as well.

XT contactors can be used in safety applications according to EN 954-1, EN ISO 13849-1 and IEC 62061 up to Category 4, PI e and SIL 3. Information concerning safety related characteristics (B10 and B10d values) is available online. The auxiliary contact modules and built-in auxiliary contacts meet IEC EN 60947-5-1 Annex L (positively driven) and IEC EN 60947-4-1 Annex F (mirror contacts).

Features and Benefits

- AC control from 12V to 600V 50/60 Hz
- DC control from 12V to 220V
- Available with screw or spring cage terminals
- Reversing or non-reversing contactors and starters
- AC-3 contactor ratings to 1000A and AC-1 contactor ratings to 2000A
- Non-reversing starters to 650A
- Panel or DIN rail mounting to 65A
- IP20 finger and back-of-hand proof
- Large ambient temperature range, –25 to 50°C [–13 to 122°F]
- AC and DC controlled contactors in the same compact frame
- Low power consumption AC and DC coils
- Built-in NO or NC auxiliary contacts to 32A
- Plug-in accessories for reduced installation time
- Coil replacement on Frames C–N (18–820A)
- Contact replacement on Frames D–N (40 –820A)
- Integrated suppressor 7–150A DC operated contactors and 185–2000A AC and DC operated contactors

Standards and Certifications

- IEC EN 60947
- CE approved
- UL
- CSA
- RoHS

Note: For Type 2 Coordination, see **Page V5-T1-237**.

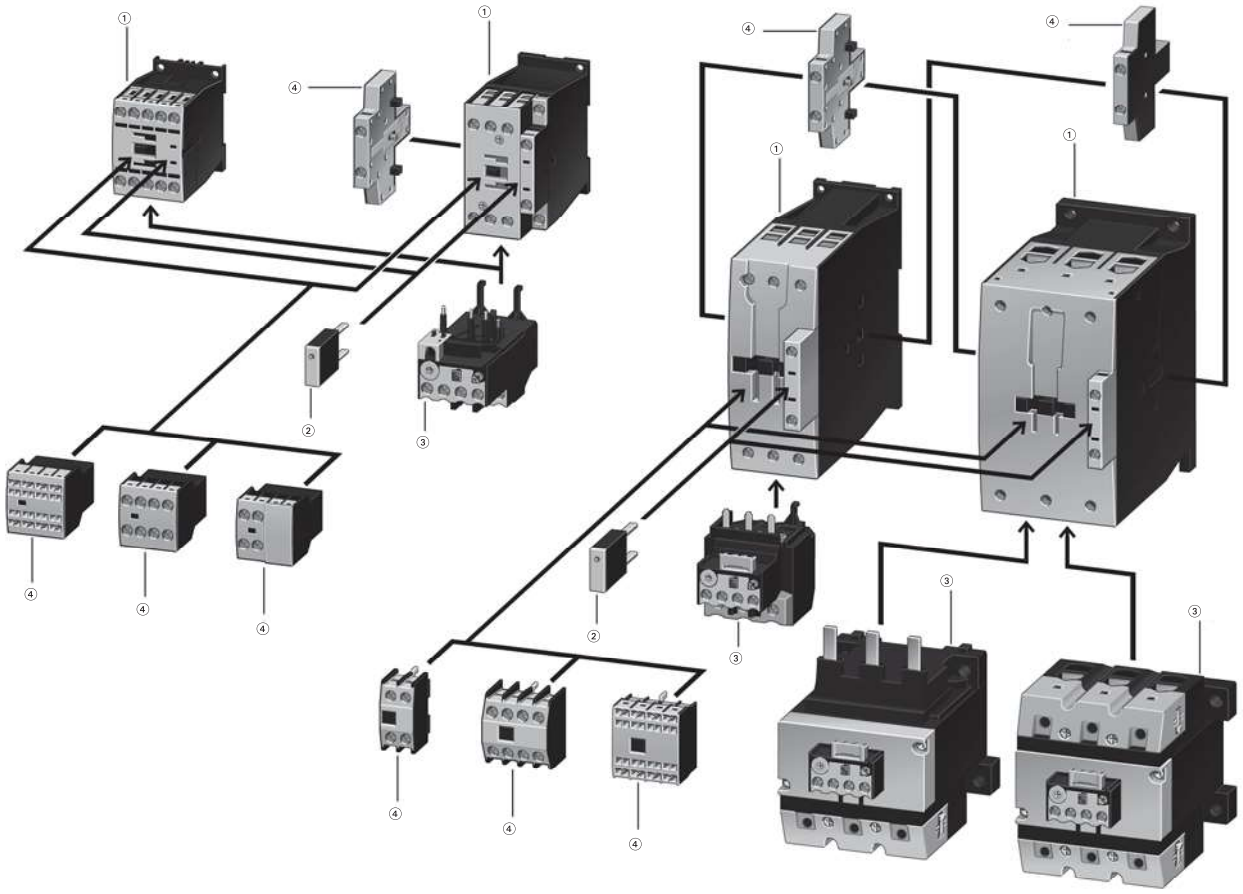
Reference

Refer to **Volume 10—Enclosed Control**, CA08100012E, Tab 3, section 3.1 for additional product information on IEC Non-Metallic Enclosed Contactors and Starters.

1

Product Identification

XTCE007B to XTCE170G (7 to 170A) Contactors



Notes

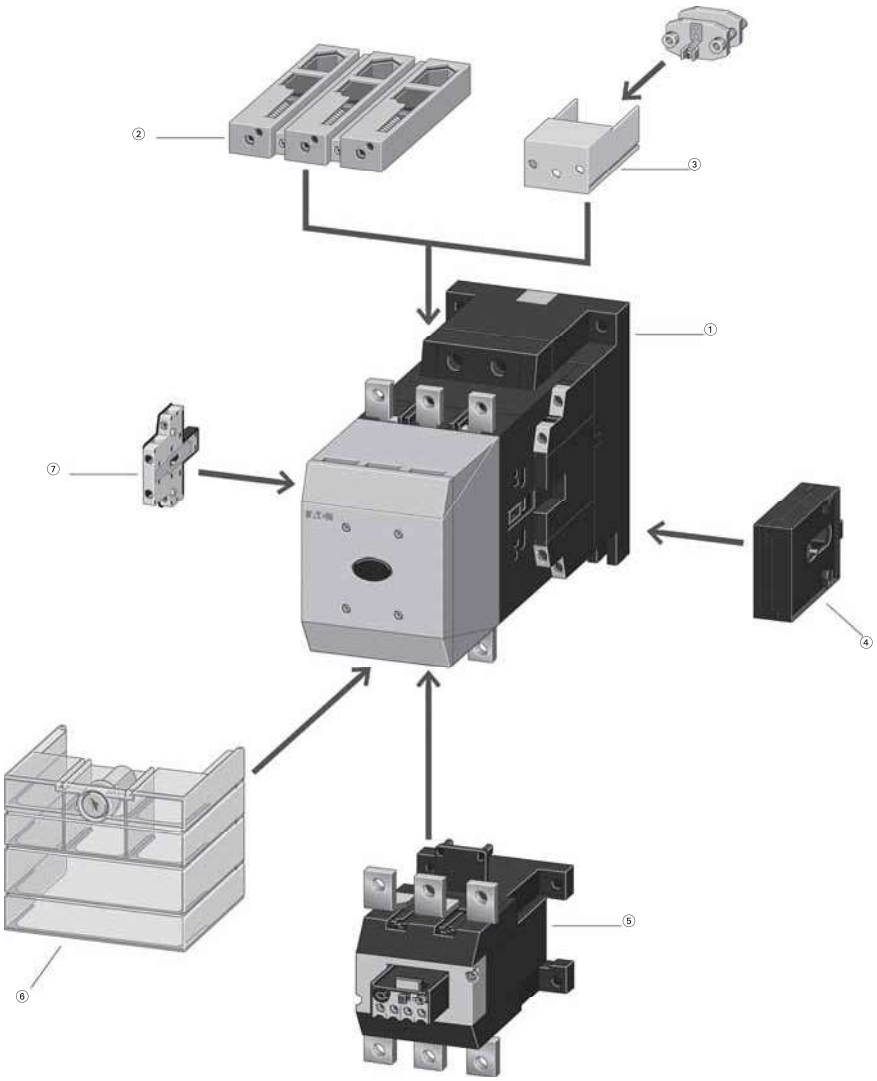
① **Contactor up to 170A AC-3** (see **Page V5-T1-39**)
AC: 12–600V, 50, 60, 50/60 Hz
0.8–1.1 x U_c)
DC: 12–250V
XTCE…B_ (7–15A): 0.8–1.1 x U_c
XTCE…C_–XTCE…G_(18–150A): 0.7–1.2 x U_c
24V: 0.7–1.3 x U_c at 40°C without additional auxiliary contacts
Coils for special voltages
"Safe Isolation" to IEC 536 between coil and contacts

② **Suppressors** (see **Page V5-T1-71**)
RC suppressor
Varistor suppressor
Free-wheel diode suppressor

③ **Overload Relays** (see **Page V5-T1-132**)
Can be mounted directly
Separate mounting, possible
Protection of EEx e-motors

④ **Auxiliary Contact Modules** (see **Page V5-T1-24**)
Two-pole, plug-in type
Four-pole, plug-in type
Overlapping contacts
Two-pole, side-mounting

XTCE185–XTCE20 Contactors



Notes

① **XTCE Contactors for 185–2000A**
(see **Page V5-T1-46**)
Multi-voltage coils:
24–48 Vdc
48–110 Vac/Vdc
110–250 Vac/Vdc
250–500 Vac
0.7–1.15 x U_c
Actuation options:
Directly
From the PLC
With low-consumption contact
XTCS Contactors for 185–570A AC-3
(see **Page V5-T1-42**)
Control voltages:
110–120V 50/60 Hz
220–240V 50/60 Hz
Conventional operation

② **Cable Terminal Block**
(see **Page V5-T1-97**)
One or two conductors per phase
Round and flat conductor connectable
Finger-proof

③ **Flat Strip Conductor Terminals**
(see **Page V5-T1-97**)
One or two strips per phase
Control circuit terminal
Cover for fingerproofing

④ **Mechanical Interlock**
(see **Page V5-T1-73**)
Fits between contactors

⑤ **Overload Relays**
(see **Page V5-T1-132**)
Can be mounted directly
Separate mounting, possible
Protection of EEx e-motors
PTB certificate

⑥ **Terminal Shroud**
(see **Page V5-T1-75**)
Finger-proof

⑦ **Auxiliary Contact Modules**
(see **Page V5-T1-24**)
Two-pole, side-mounting

1

Catalog Number Selection

XT IEC Contactors and Starters

XT CE C 007 B 01 AD P16

Designation
XT = ***XT*** line of IEC control

Type
CE = Three-pole FVNR IEC contactor
CS = Three-pole FVNR S Series IEC contactor
CF = Four-pole FVNR IEC contactor
CR = Three-pole FVR IEC contactor
CC = IEC capacitor contactor
AE = FVNR IEC starter
AS = FVNR S-Series IEC starter
AR = FVR IEC starter

Terminations	
Blank	= Screw terminals (6–65A); 5 mm (80–150A); no lugs (185–2000A)
C	= Spring cage terminals consult local sales office for availability

Coil Codes
See **Page V5-T1-53.**

Built-In Auxiliary Contact
01 = 1NC
10 = 1NO
00 = 0NO–0NC
S1 = 1NO–1NC side-mount auxiliary
11 = 1NO–1NC top-mount auxiliary
22 = 2NO–2NC

Current Ratings, AC-3		
007 = 7A	**080** = 80A	**570** = 570A
009 = 9A	**095** = 95A	**580** = 580A
012 = 12A	**115**= 115A	**650** = 650A
015 = 15A	**150** = 150A	**750** = 750A
018 = 18A	**170** = 170A	**820** = 820A
025 = 25A	**185** = 185A	**C10** = 1000A
032 = 32A	**225** = 225A	**C14** = 1400A, AC-1
040 = 40A	**250** = 250A	**C16** = 1600A, AC-3
050 = 50A	**300** = 300A	**C20** = 2000A, AC-1
065 = 65A	**400** = 400A	
072 = 72A	**500** = 500A	

Frame Size Designation			
B	= 45 mm	**L**	= 140 mm
C	= 45 mm	**M**	= 160 mm
D	= 55 mm	**N**	= 250 mm
F	= 90 mm	**P**	= 260 mm
G	= 90 mm	**R**	= 515 mm
H	= 140 mm		

XTAE, XTAS and XTAR Starters Only—Maximum Overload Relay

XTOB Maximum Overload Rating

Frame B	**Frame D**
P16 = 0.1–0.16A	**010** = 6–10A
P24 = 0.16–0.24A	**016** = 10–16A
P40 = 0.24–0.4A	**024** = 16–24A
P60 = 0.4–0.6A	**040** = 24–40A
001 = 0.6–1A	**057** = 40–57A
1P6 = 1.0–1.6A	**065** = 50–65A
2P4 = 1.6–2.4A	**075** = 65–75A
004 = 2.4–4A	
006 = 4–6A	**Frame F**
010 = 6–10A	**035** = 25–35A
012 = 9–12A	**050** = 35–50A
016 = 12–16A	**070** = 50–70A
	100 = 70–100A
Frame C	**Frame G**
P16 = 0.1–0.16A	**035** = 25–35A
P24 = 0.16–0.24A	**050** = 35–50A
P40 = 0.24–0.4A	**070** = 50–70A
P60 = 0.4–0.6A	**100** = 70–100A
001 = 0.6–1A	**125** = 95–125A
1P6 = 1.0–1.6A	**150** = 120–150A
2P4 = 1.6–2.4A	**175** = 145–175A
004 = 2.4–4A	
006 = 4–6A	**Frame L**
010 = 6–10A	**070** = 50–70A
016 = 10–16A	**100** = 70–100A
024 = 16–24A	**125** = 95–125A
032 = 24–32A	**160** = 120–160A
	220 = 160–220A
	250 = 200–250A

XTOE Maximum Overload Rating

	Standard Type Suffix	Ground Fault Type Suffix
Frame B		
0.33–1.65A	5E1P6	5G1P6
1–5A	5E005	5G005
4–20A	5E020	5G020
Frame C		
0.33–1.65A	5E1P6	5G1P6
1–5A	5E005	5G005
4–20A	5E020	5G020
9–45A	5E045	5G045
Frame D		
9–45A	5E045	5G045
20–100A	5E100	5G100
Frame F, G		
20–100A	5E100	5G100
Frame G, H		
35–175A	5E175	5G175

Product Selection

Full Voltage, Non-Reversing Contactors

Frame B



Three-Pole Contactors, Frame B—UL/CSA Ratings

UL General Purpose Ampere Rating	Single-Phase hp Ratings 115V	200V	230V	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
20	1/4	3/4	1	1-1/2	2	3	5	1NO	**XTCE007B10_**
20	1/4	3/4	1	1-1/2	2	3	5	1NC	**XTCE007B01_**
20	1/2	1	1-1/2	3	3	5	7-1/2	1NO	**XTCE009B10_**
20	1/2	1	1-1/2	3	3	5	7-1/2	1NC	**XTCE009B01_**
20	1	2	2	3	3	10 ③	10	1NO	**XTCE012B10_**
20	1	2	2	3	3	10 ③	10	1NC	**XTCE012B01_**
20	1	2	3	5	5	10 ③	10	1NO	**XTCE015B10_**
20	1	2	3	5	5	10 ③	10	1NC	**XTCE015B01_**

Three-Pole Contactors, Frame B—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
7	22	2.2	3	4	3.5	1NO	**XTCE007B10_**
7	22	2.2	3	4	3.5	1NC	**XTCE007B01_**
9	22	2.5	4	5.5	4.5	1NO	**XTCE009B10_**
9	22	2.5	4	5.5	4.5	1NC	**XTCE009B01_**
12	22	3.5	5.5	7	6.5	1NO	**XTCE012B10_**
12	22	3.5	5.5	7	6.5	1NC	**XTCE012B01_**
15.5	22	4	7.5	8	7	1NO	**XTCE015B10_**
15.5	22	4	7.5	8	7	1NC	**XTCE015B01_**

Notes

The 7–32A XTCE contactors have positively driven contacts between the integrated auxiliary contact and the auxiliary contact module as well as within the auxiliary contact modules.

DC operated contactors (Frames B–G, 7–150A) have a built-in suppressor circuit.

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

② For spring cage terminals, insert **C** after the fourth digit of the catalog number. Example: XTCE**C**007B10A.
For 7–12A XTCEC contactors, the power, auxiliary and coil terminals are spring cage.
For 18–32A XTCEC contactors, the auxiliary and coil terminals are spring cage.
For 40–150A XTCEC contactors, the coil terminals only are spring cage.

③ For electrical life contactor application data. See **Page V5-T1-45.**

Frame C



Three-Pole Contactors, Frame C—UL/CSA Ratings

UL General Purpose Ampere Rating	Single-Phase hp Ratings 115V	200V	230V	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
40	2	2	3	5	5	10	15	1NO	**XTCE018C10_**
40	2	2	3	5	5	10	15	1NC	**XTCE018C01_**
40	2	3	5	7-1/2	10	15	20	1NO	**XTCE025C10_**
40	2	3	5	7-1/2	10	15	20	1NC	**XTCE025C01_**
40	3	5	5	10	10	20	25	1NO	**XTCE032C10_**
40	3	5	5	10	10	20	25	1NC	**XTCE032C01_**
40	3	5	5	10	10	25	30	1NO	**XTCE038C10_**
40	3	5	5	10	10	25	30	1NC	**XTCE038C01_**

Three-Pole Contactors, Frame C—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
18	40	5	7.5	10	11	1NO	**XTCE018C10_**
18	40	5	7.5	10	11	1NC	**XTCE018C01_**
25	45	7.5	11	14.5	14	1NO	**XTCE025C10_**
25	45	7.5	11	14.5	14	1NC	**XTCE025C01_**
32	45	10	15	18	17	1NO	**XTCE032C10_**
32	45	10	15	18	17	1NC	**XTCE032C01_**
38	45	11	18.5	18.5	21	1NO	**XTCE038C10_**
38	45	11	18.5	18.5	21	1NC	**XTCE038C01_**

Frame D



Three-Pole Contactors, Frame D—UL/CSA Ratings

UL General Purpose Ampere Rating	Single-Phase hp Ratings 115V	200V	230V	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
63	3	5	7-1/2	10	15	30	40	—	**XTCE040D00_**
63	3	5	7-1/2	10	15	30	40	1NO-1NC	**XTCE040DS1_**
80	3	7-1/2	10	15	20	40	50	—	**XTCE050D00_**
80	3	7-1/2	10	15	20	40	50	1NO-1NC	**XTCE050DS1_**
88	5	10	15	20	25	50	60	—	**XTCE065D00_**
88	5	10	15	20	25	50	60	1NO-1NC	**XTCE065DS1_**
88	5	10	15	20	25	50	60	—	**XTCE072D00_**
88	5	10	15	20	25	50	60	1NO-1NC	**XTCE072DS1_**

Three-Pole Contactors, Frame D—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
40	60	12.5	18.5	24	23	—	**XTCE040D00_**
40	60	12.5	18.5	24	23	1NO-1NC	**XTCE040DS1_**
50	80	15.5	22	30	30	—	**XTCE050D00_**
50	80	15.5	22	30	30	1NO-1NC	**XTCE050DS1_**
65	98	20	30	39	35	—	**XTCE065D00_**
65	98	20	30	39	35	1NO-1NC	**XTCE065DS1_**
72	98	22	37	41	35	—	**XTCE072D00_**
72	98	22	37	41	35	1NO-1NC	**XTCE072DS1_**

Notes

The 7–32A XTCE contactors have positively driven contacts between the integrated auxiliary contact and the auxiliary contact module as well as within the auxiliary contact modules.

The 40–65A XTCE contactors have positively driven contacts within the auxiliary contact module. Six auxiliary contacts are possible with a combination of side-mounted and front-mount auxiliary contacts.

DC operated contactors (Frames B–G, 7–150A) have a built-in suppressor circuit.

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

② For spring cage terminals, insert **C** after the fourth digit of the catalog number. Example: XTCE**C**007B10A.
For 7–12A XTCEC contactors, the power, auxiliary and coil terminals are spring cage.
For 18–32A XTCEC contactors, the auxiliary and coil terminals are spring cage.
For 40–150A XTCEC contactors, the coil terminals only are spring cage.

Frame F



Three-Pole Contactors, Frame F—UL/CSA Ratings

UL General Purpose Ampere Rating	Single-Phase hp Ratings 115V	200V	230V	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
125	7-1/2	15	15	25	30	60	75	—	**XTCE080F00_**
125	7-1/2	15	15	25	30	60	75	1NO-1NC	**XTCE080FS1_**
125	7-1/2	15	15	25	40	75	100	—	**XTCE095F00_**
125	7-1/2	15	15	25	40	75	100	1NO-1NC	**XTCE095FS1_**

Three-Pole Contactors, Frame F—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
80	110	25	37	48	63	—	**XTCE080F00_**
80	110	25	37	48	63	1NO-1NC	**XTCE080FS1_**
95	130	30	45	57	75	—	**XTCE095F00_**
95	130	30	45	57	75	1NO-1NC	**XTCE095FS1_**

Frame G



Three-Pole Contactors, Frame G—UL/CSA Ratings

UL General Purpose Ampere Rating	Single-Phase hp Ratings 115V	200V	230V	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
160	10	25	25	40	50	100	100	—	**XTCE115G00_**
160	10	25	25	40	50	100	100	1NO-1NC	**XTCE115GS1_**
180	10	25	30	40	60	125	125	—	**XTCE150G00_**
180	10	25	30	40	60	125	125	1NO-1NC	**XTCE150GS1_**
180	10	25	30	40	60	125	125	—	**XTCE170G00_**
180	10	25	30	40	60	125	125	1NO-1NC	**XTCE170GS1_**

Three-Pole Contactors, Frame G—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V	Auxiliary Contacts	Screw Terminal Catalog Number ①②
115	160	37	55	70	90	—	**XTCE115G00_**
115	160	37	55	70	90	1NO-1NC	**XTCE115GS1_**
150	190	48	75	91	96	—	**XTCE150G00_**
150	190	48	75	91	96	1NO-1NC	**XTCE150GS1_**
170	225	52	90	100	96	—	**XTCE170G00_**
170	225	52	90	100	96	1NO-1NC	**XTCE170GS1_**

Notes

The 40–65A XTCE contactors have positively driven contacts within the auxiliary contact module.
Six auxiliary contacts are possible with a combination of side-mounted and front-mount auxiliary contacts.

DC operated contactors (Frames B–G, 7–150A) have a built-in suppressor circuit.

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

② For spring cage terminals, insert **C** after the fourth digit of the catalog number. Example: XTCE**C**007B10A.
For 7–12A XTCEC contactors, the power, auxiliary and coil terminals are spring cage.
For 18–32A XTCEC contactors, the auxiliary and coil terminals are spring cage.
For 40–150A XTCEC contactors, the coil terminals only are spring cage.

Frame H



Three-Pole Contactors, Frame H (Electronic Coil)—UL/CSA Ratings

UL General Purpose Ampere Rating	Three-Phase hp Ratings 200V	240V	480V	600V	Auxiliary Contacts	Catalog Number ①②③
250	50	60	125	150	2NO-2NC	**XTCE185H22_**
250	60	75	150	200	2NO-2NC	**XTCE225H22_**

Three-Pole Contactors, Frame H (Electronic Coil)—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	660/690V ④	1000V ④	Auxiliary Contacts	Catalog Number ①②③
185	337	55	90	140	108	2NO-2NC	**XTCE185H22_**
225	386	70	110	215	108	2NO-2NC	**XTCE225H22_**

Frame L



Three-Pole Contactors, Frame L—UL/CSA Ratings

UL General Purpose Ampere Rating	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Catalog Number ①②
Standard Coil (110/120V, 230/240 Vac Coil Only)						
300	75	100	200	250	2NO-2NC	**XTCS250L22_**
350	100	125	250	300	2NO-2NC	**XTCS300L22_**
Electronic Coil						
300	75	100	200	250	2NO-2NC	**XTCE250L22_**
350	100	125	250	300	2NO-2NC	**XTCE300L22_**

Three-Pole Contactors, Frame L—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	660/690V ④	1000V ④	Auxiliary Contacts	Catalog Number ①②
Standard Coil (110/120V, 230/240 Vac Coil Only)							
250	429	75	132	240	108	2NO-2NC	**XTCS250L22_**
300	490	90	160	195	132	2NO-2NC	**XTCS300L22_**
Electronic Coil							
250	429	75	132	240	108	2NO-2NC	**XTCE250L22_**
300	490	90	160	195	132	2NO-2NC	**XTCE300L22_**

Notes

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53**. Terminals not included. See **Page V5-T1-75** for terminal accessories.

② Does not include lugs.

③ Add "-S730" to the end of the catalog number after the coil voltage to configure as extended H frame model. Extended H frame will align with L frame contactor for interlocks and mounting height. Consult Vista/Eaton care for availability of extended base models

④ For 185–500A contactors at 660/690V or 1000V: Do not reverse directly.

Frame M



Three-Pole Contactors, Frame M—UL/CSA Ratings

UL General Purpose Ampere Rating	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Catalog Number ①②
Standard Coil (110/120V, 230/240 Vac Coil Only)						
450	125	150	300	400	2NO-2NC	**XTCS400M22_**
550	150	200	400	500	2NO-2NC	**XTCS500M22_**
Electronic Coil						
450	125	150	300	400	2NO-2NC	**XTCE400M22_**
550	150	200	400	500	2NO-2NC	**XTCE500M22_**

Three-Pole Contactors, Frame M—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V ③	1000V ③	Auxiliary Contacts	Catalog Number ①②
Standard Coil (110/120V, 230/240 Vac Coil Only)								
400	612	125	200	240	344	132	2NO-2NC	**XTCS400M22_**
500	800	155	250	300	344	132	2NO-2NC	**XTCS500M22_**
Electronic Coil								
400	612	125	200	240	344	132	2NO-2NC	**XTCE400M22_**
500	800	155	250	300	344	132	2NO-2NC	**XTCE500M22_**

Notes

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53**. Terminals not included. See **Page V5-T1-75** for terminal accessories.

② Does not include lugs.

③ For 185–500A contactors at 660/690V or 1000V: Do not reverse directly.

Frame N



Three-Pole Contactors, Frame N (Electronic Coil)—UL/CSA Ratings

UL General Purpose Ampere Rating	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Catalog Number ①②
630	200	200	400	600	2NO-2NC	**XTCE580N22_** ③
700	200	250	500	600	2NO-2NC	**XTCE650N22_** ③
800	250	300	600	700	2NO-2NC	**XTCE750N22_** ③
850	290	350	700	860	2NO-2NC	**XTCE820N22_** ③
1100	350	420	850	980	2NO-2NC	**XTCEC10N22_** ③

Three-Pole Contactors, Frame N (Electronic Coil)—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V ④	1000V ④	Auxiliary Contacts	Catalog Number ①②
580	980	185	315	348	560	600	2NO-2NC	**XTCE580N22_** ③
650	1041	205	355	390	630	600	2NO-2NC	**XTCE650N22_** ③
750	1102	240	400	455	720	800	2NO-2NC	**XTCE750N22_** ③
820	1225	260	450	500	750	800	2NO-2NC	**XTCE820N22_** ③
1000	1225	315	560	610	1000	1000	2NO-2NC	**XTCEC10N22_** ③

Frame P



Three-Pole Contactors, Frame P (Electronic Coil)—UL/CSA Ratings

UL General Purpose Ampere Rating	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Catalog Number ①②
1400	—	—	—	—	2NO-2NC	**XTCEC14P22_** ③

Three-Pole Contactors, Frame P (Electronic Coil)—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V ④	1000V ④	Auxiliary Contacts	Catalog Number ①②
—	1714	—	—	—	—	—	2NO-2NC	**XTCEC14P22_** ③

Frame R



Three-Pole Contactors, Frame R (Electronic Coil)—UL/CSA Ratings

UL General Purpose Ampere Rating	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Catalog Number ①②
1600	560	640	1200	1300	2NO-2NC	**XTCEC16R22_** ③
2000	—	—	—	—	2NO-2NC	**XTCEC20R22_** ③

Three-Pole Contactors, Frame R (Electronic Coil)—IEC Ratings

AC-3 I_e (A)	AC-1 (40°C) $I_e = I_{th}$ (A)	Maximum kW Ratings AC-3/Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	660/690V ④	1000V ④	Auxiliary Contacts	Catalog Number ①②
1600	2200	500	900	900	1600	1700	2NO-2NC	**XTCEC16R22_** ③
—	2450	—	—	—	—	—	2NO-2NC	**XTCEC20R22_** ③

Notes

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53**. Terminals not included. See **Page V5-T1-75** for terminal accessories.

② Does not include lugs.

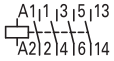
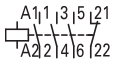
③ When operating the 580–2000A XTCE contactors with frequency inverters, the suppressor on the load side must be removed. The load side suppressor must also be removed when performing a high-voltage test—see Pub51204, Pub51209.

④ For 185–500A contactors at 660/690V or 1000V: do not reverse directly.

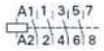
Contactor Application Data ①②

Catalog Prefix	Electrical Life (Operations) for 10 hp, 480V (14.2A) Applications
XTCE012B	1 million
XTCE015B	1.2 million
XTCE018C	2 million

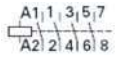
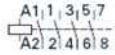
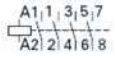
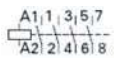
Full Voltage Non-Reversing Three-Pole Contactors—Contact Sequence (Circuit Symbols)—Standard Offering

Contactor Frame	Auxiliary Contacts	Contact Sequence
B–C	1NO	
B–C	1NC	
D–G	—	
L–R	2NO-2NC	

Four-Pole Contactors with Screw Terminals—Maximum UL/CSA Motor Ratings

Single-Phase hp Ratings 115V	230V	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Contact Sequence	Catalog Number ③
1	2	3	3	10	10	—		XTCF020B00_
—	—	7.5	7.5	10	15	1NO		XTCF032C10_
—	—	7.5	10	15	20	1NO		XTCF045C10_
—	—	10	15	30	40	—		XTCF063D00_
—	—	15	20	40	50	—		XTCF080D00_
—	—	25	30	60	75	—		XTCF125G00_
—	—	25	40	75	100	—		XTCF160G00_
—	—	40	50	100	125	—		XTCF200G00_

Four-Pole Contactors with Screw Terminals—Maximum IEC Ratings

AC-3 I_e(A)	AC-1 (40°C)	Three-Phase hp Ratings 200V	230V	460V	575V	Auxiliary Contacts	Contact Sequence	Catalog Number ③
12	22	3	3	10	10	—		XTCF020B00_
12	22	3.5	5.5	7	6.5	—		XTCF020B00_
18	32	5	7.5	10	11	1NO		XTCF032C10_
25	45	7.5	11	14.5	14	1NO		XTCF045C10_
40	63	12.5	18.5	24	23	—		XTCF063D00_
50	80	15.5	22	30	30	—		XTCF080D00_
80	125	25	37	48	63	—		XTCF125G00_
95	160	30	45	57	75	—		XTCF160G00_
115	200	37	55	70	90	—		XTCF200G00_

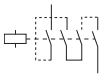
Notes

① See **Page V5-T1-111** for electrical life curves.

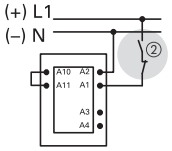
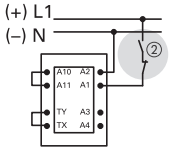
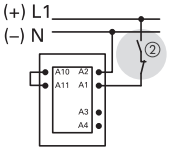
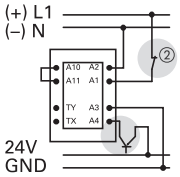
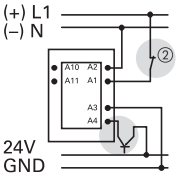
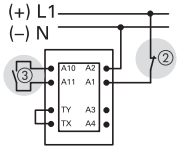
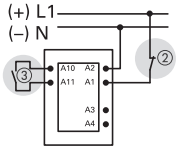
② AC and DC operated contactors have a built-in suppressor circuit (Frames L–R, 185–2000A).

③ Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

Switching of DC Currents ①

Description	Single-Pole	Two-Pole
XTCF020B–XTCF200G >60 Vdc		

Controlling XTCS and XTCE Contactors Frames L–R (185–2000A)

Description	XTCS250L–XTCS500M, XTCE_H	XTCEC16R, XTCEC20R	XTCE250L–XTCEC14P
Conventional A1/A2 are applied to voltage in the usual manner.			
Direct from the PLC A 24V output from the PLC can be connected directly to connections A3/A4. 	—		
From Low-Consumption Command Devices Command devices, which can only be subject to minimal loads such as circuit board relays, control circuit devices or position switches can be connected directly to A10/A11.	—		

Notes

① When necessary, cable to be supplied by customer.
② Standstill in an emergency (emergency-stop).
③ Command device connection.

Full Voltage, Reversing Contactors

Frame B



Contactors with Screw Terminals, Frame B—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				Spare Auxiliary Contacts		
115V	230V	200V	230V	460V	575V	K1M	K2M	Catalog Number ①
1/4	1	1-1/2	2	3	5	63 64	63 64	XTCR007B21_
1/2	1-1/2	3	3	5	7-1/2	63 64	63 64	XTCR009B21_
1/2	2	3	3	10	10	63 64	63 64	XTCR012B21_

Contactors with Screw Terminals, Frame B—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				Spare Auxiliary Contacts		
I_e (A)	220/230V	380/400V	415V	660/690V	K1M	K2M	Catalog Number ①
7	2.2	3	4	3.5	63 64	63 64	XTCR007B21_
9	2.5	4	5.5	4.5	63 64	63 64	XTCR009B21_
12	3.5	5.5	7	6.5	63 64	63 64	XTCR012B21_

Frame C



Contactors with Screw Terminals, Frame C—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				Spare Auxiliary Contacts		
115V	230V	200V	230V	460V	575V	K1M	K2M	Catalog Number ①
2	3	5	5	10	15	63 64	63 64	XTCR018C21_
2	5	7-1/2	10	15	20	63 64	63 64	XTCR025C21_
3	5	10	10	20	25	63 64	63 64	XTCR032C21_

Contactors with Screw Terminals, Frame C—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				Spare Auxiliary Contacts		
I_e (A)	220/230V	380/400V	415V	660/690V	K1M	K2M	Catalog Number ①
18	5	7.5	8	11	63 64	63 64	XTCR018C21_
25	7.5	11	14.5	14	63 64	63 64	XTCR025C21_
32	10	15	18	17	63 64	63 64	XTCR032C21_

Note

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53**.

Frame D



Contactors with Screw Terminals, Frame D—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				Spare Auxiliary Contacts		
115V	230V	200V	230V	460V	575V	K1M	K2M	Catalog Number ①
3	7-1/2	10	15	30	40	—	—	XTCR040D11_
3	10	15	20	40	50	—	—	XTCR050D11_
5	15	20	25	50	60	—	—	XTCR065D11_

Contactors with Screw Terminals, Frame D—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				Spare Auxiliary Contacts		
I_e(A)	220/230V	380/400V	415V	660/690V	K1M	K2M	Catalog Number ①
40	12.5	18.5	24	23	—	—	XTCR040D11_
50	15.5	22	30	30	—	—	XTCR050D11_
65	20	30	39	35	—	—	XTCR065D11_

Frame F



Contactors with Screw Terminals, Frame F—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				Spare Auxiliary Contacts		
115V	230V	200V	230V	460V	575V	K1M	K2M	Catalog Number ①
7-1/2	15	25	30	60	75	—	—	XTCR080F11_
7-1/2	15	25	40	75	100	—	—	XTCR095F11_

Contactors with Screw Terminals, Frame F—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				Spare Auxiliary Contacts		
I_e(A)	220/230V	380/400V	415V	660/690V	K1M	K2M	Catalog Number ①
80	25	37	48	63	—	—	XTCR080F11_
95	30	45	57	75	—	—	XTCR095F11_

Frame G



Contactors with Screw Terminals, Frame G—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				Spare Auxiliary Contacts		
115V	230V	200V	230V	460V	575V	K1M	K2M	Catalog Number ①
10	25	40	50	100	100	—	—	XTCR115G11_
15	30	40	60	100	100	—	—	XTCR150G11_

Contactors with Screw Terminals, Frame G—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				Spare Auxiliary Contacts		
I_e(A)	220/230V	380/400V	415V	660/690V	K1M	K2M	Catalog Number ①
115	37	55	70	90	—	—	XTCR115G11_
150	48	75	91	96	—	—	XTCR150G11_

Note

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

XTCR Reversing Contactor Components

Quantity	Frame	B	C	D	F	G
2	Contactor	XTCE…B01_	XTCE…C01_	XTCE…D00_	XTCE…F00_	XTCE…G00_
2	Auxiliary contact	XTCEXFAC20	XTCEXFAC20	XTCEXFBG11	XTCEXFBG11	XTCEXFBG11
1	Mechanical interlock	XTCEXMLB	XTCEXMLC	XTCEXMLD	XTCEXMLG	XTCEXMLG
1	Reversing link kit	XTCEXRLB	XTCEXRLC	XTCEXRLD	XTCEXRLG	XTCEXRLG

Magnet Coil Suffix

Coil Voltage	Suffix Code
Frames A–B	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24 Vdc	**TD**
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
120 Vdc	**AD**
220 Vdc	**BD**
12 Vdc	**RD**
48 Vdc	**WD**

Coil Voltage	Suffix Code
Frames C–F	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24–27 Vdc	**TD**
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
48–60 Vdc	**WD**

Coil Voltage	Suffix Code
Frame G	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
24V 50/60 Hz	**T**
24–27 Vdc	**TD**
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
42–48V 50/60 Hz	**W**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
48–60 Vdc	**WD**
Frame H	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
24V 50/60Hz	**T**
42–48V 50/60Hz	**W**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
24–27 Vdc	**TD**
48–60 Vdc	**WD**

Coil Voltage	Suffix Code
Frames L–N	
110–250 Vdc 40–60 Hz	**A**
250–500V 40–60 Hz	**C**
48–110 Vdc 40–60 Hz	**Y**
24–48 Vdc	**TD** ①
Frames L–M, S-Series	
110–120V 50/60 Hz	**A**
220–240V 50/60 Hz	**B**
Frames P–R	
230–250 Vdc 50–60 Hz	**B**

Note

① Frames L–M only.

Full Voltage, Non-Reversing Starters, with Bimetallic or Electronic Overload

Frame B



Three-Pole Starters, Frame B—Maximum UL/CSA Ratings ①

Single-Phase hp Ratings		Three-Phase hp Ratings				Auxiliary	
115V	230V	200V	230V	460V	575V	Contacts	Catalog Number ②③
1/4	1	1-1/2	2	3	5	1NO	**XTAE007B10_ _**
1/4	1	1-1/2	2	3	5	1NC	**XTAE007B01_ _**
1/2	1-1/2	3	3	5	7-1/2	1NO	**XTAE009B10_ _**
1/2	1-1/2	3	3	5	7-1/2	1NC	**XTAE009B01_ _**
1	2	3	3	10 ④	10	1NO	**XTAE012B10_ _**
1	2	3	3	10 ④	10	1NC	**XTAE012B01_ _**
1	3	5	5	10 ④	10	1NO	**XTAE015B10_ _**
1	3	5	5	10 ④	10	1NC	**XTAE015B01_ _**

Three-Pole Starters, Frame B—Maximum IEC Ratings ①

AC-3		Three-Phase Motors 50–60 Hz				Auxiliary	
I_e(A)	AC-1	220/230V	380/400V	415V	660/690V	Contacts	Catalog Number ②③
7	20	2.2	3	4	3.5	1NO	**XTAE007B10_ _**
7	20	2.2	3	4	3.5	1NC	**XTAE007B01_ _**
9	20	2.5	4	5.5	4.5	1NO	**XTAE009B10_ _**
9	20	2.5	4	5.5	4.5	1NC	**XTAE009B01_ _**
12	20	3.5	5.5	7	6.5	1NO	**XTAE012B10_ _**
12	20	3.5	5.5	7	6.5	1NC	**XTAE012B01_ _**
15.5	20	4	7.5	8	7	1NO	**XTAE015B10_ _**
15.5	20	4	7.5	8	7	1NC	**XTAE015B01_ _**

Frame C



Three-Pole Starters, Frame C—Maximum UL/CSA Ratings ①

Single-Phase hp Ratings		Three-Phase hp Ratings				Auxiliary	
115V	230V	200V	230V	460V	575V	Contacts	Catalog Number ②③
2	3	5	5	10 ④	15	1NO	**XTAE018C10_ _**
2	3	5	5	10 ④	15	1NC	**XTAE018C01_ _**
2	5	7-1/2	7-1/2	15	20	1NO	**XTAE025C10_ _**
2	5	7-1/2	7-1/2	15	20	1NC	**XTAE025C01_ _**
3	5	10	10	20	25	1NO	**XTAE032C10_ _**
3	5	10	10	20	25	1NC	**XTAE032C01_ _**

Three-Pole Starters, Frame C—Maximum IEC Ratings ①

AC-3		Three-Phase Motors 50–60 Hz				Auxiliary	
I_e(A)	AC-1	220/230V	380/400V	415V	660/690V	Contacts	Catalog Number ②③
18	35	5	7.5	10	11	1NO	**XTAE018C10_ _**
18	35	5	7.5	10	11	1NC	**XTAE018C01_ _**
25	40	7.5	11	14.5	14	1NO	**XTAE025C10_ _**
25	40	7.5	11	14.5	14	1NC	**XTAE025C01_ _**
32	40	10	15	18	17	1NO	**XTAE032C10_ _**
32	40	10	15	18	17	1NC	**XTAE032C01_ _**

Notes

① Products shown are with the bimetallic overload relay.

② Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

③ Underscore (_) indicates overload relay suffix required. See **Page V5-T1-54.**

④ For electrical life contactor application data. See **Page V5-T1-53.**

Frame D



Three-Pole Starters, Frame D—Maximum UL/CSA Ratings ①

Single-Phase hp Ratings		Three-Phase hp Ratings				Auxiliary Contacts	Catalog Number ②③
115V	230V	200V	230V	460V	575V		
3	7-1/2	10	15	30	40	—	XTAE040D00_ _
3	10	15	20	40	50	—	XTAE050D00_ _
5	15	20	25	50	60	—	XTAE065D00_ _

Three-Pole Starters, Frame D—Maximum IEC Ratings ①

AC-3		Three-Phase Motors 50–60 Hz				Auxiliary Contacts	Catalog Number ②③
I_e(A)	AC-1	220/230V	380/400V	415V	660/690V		
40	50	12.5	18.5	24	23	—	XTAE040D00_ _
50	60	15.5	22	30	30	—	XTAE050D00_ _
65	72	20	30	39	35	—	XTAE065D00_ _

Frame F



Three-Pole Starters, Frame F—Maximum UL/CSA Ratings ①

Single-Phase hp Ratings		Three-Phase hp Ratings				Auxiliary Contacts	Catalog Number ②③
115V	230V	200V	230V	460V	575V		
7-1/2	15	25	30	60	75	—	XTAE080F00_ _
7-1/2	15	25	40	75	100	—	XTAE095F00_ _

Three-Pole Starters, Frame F—Maximum IEC Ratings ①

AC-3		Three-Phase Motors 50–60 Hz				Auxiliary Contacts	Catalog Number ②③
I_e(A)	AC-1	220/230V	380/400V	415V	660/690V		
80	110	25	37	48	63	—	XTAE080F00_ _
95	110	30	45	57	75	—	XTAE095F00_ _

Frame G



Three-Pole Starters, Frame G—Maximum UL/CSA Ratings ①

Single-Phase hp Ratings		Three-Phase hp Ratings				Auxiliary Contacts	Catalog Number ②③
115V	230V	200V	230V	460V	575V		
10	25	40	50	100	125	—	XTAE115G00_ _
15	30	40	60	125	125	—	XTAE150G00_ _

Three-Pole Starters, Frame G—Maximum IEC Ratings ①

AC-3		Three-Phase Motors 50–60 Hz				Auxiliary Contacts	Catalog Number ②③
I_e(A)	AC-1	220/230V	380/400V	415V	660/690V		
115	160	37	55	70	105	—	XTAE115G00_ _
150	160	48	75	91	125	—	XTAE150G00_ _

Notes

① Products shown are with the bimetallic overload relay.

② Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53**.

③ Underscore (_) indicates overload relay suffix required. See **Page V5-T1-54**.

Full Voltage, Reversing Starters, with Bimetallic or Electronic Overload

Reversing Starters with Screw Terminals, Frame B—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				
115V	**230V**	**200V**	**230V**	**460V**	**575V**	**Catalog Number** ①②
1/4	1	1-1/2	2	3	5	**XTAR007B21_ _**
1/2	1-1/2	3	3	5	7-1/2	**XTAR009B21_ _**
1	2	3	3	10	10	**XTAR012B21_ _**

Reversing Starters with Screw Terminals, Frame B—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				
I_e (A)	**220/230V**	**380/400V**	**415V**	**660/690V**	**Catalog Number** ①②
7	2.2	3	4	3.5	**XTAR007B21_ _**
9	2.5	4	5.5	4.5	**XTAR009B21_ _**
12	3.5	5.5	7	6.5	**XTAR012B21_ _**

Reversing Starters with Screw Terminals, Frame C—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				
115V	**230V**	**200V**	**230V**	**460V**	**575V**	**Catalog Number** ①②
2	3	5	5	10	15	**XTAR018C21_ _**
2	5	7-1/2	7-1/2	15	20	**XTAR025C21_ _**
3	5	10	10	20	25	**XTAR032C21_ _**

Reversing Starters with Screw Terminals, Frame C—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				
I_e (A)	**220/230V**	**380/400V**	**415V**	**660/690V**	**Catalog Number** ①②
18	5	7.5	8	11	**XTAR018C21_ _**
25	7.5	11	14.5	14	**XTAR025C21_ _**
32	10	15	18	17	**XTAR032C21_ _**

Reversing Starters with Screw Terminals, Frame D—Maximum UL/CSA Ratings

Single-Phase hp Ratings		Three-Phase hp Ratings				
115V	**230V**	**200V**	**230V**	**460V**	**575V**	**Catalog Number** ①②
3	7-1/2	10	15	30	40	**XTAR040D11_ _**
3	10	15	20	40	50	**XTAR050D11_ _**
5	15	20	25	50	60	**XTAR065D11_ _**

Reversing Starters with Screw Terminals, Frame D—Maximum IEC Ratings

AC-3	Three-Phase Motors 50–60 Hz				
I_e (A)	**220/230V**	**380/400V**	**415V**	**660/690V**	**Catalog Number** ①②
40	12.5	18.5	24	23	**XTAR040D11_ _**
50	15.5	22	30	30	**XTAR050D11_ _**
65	20	30	39	35	**XTAR065D11_ _**

Notes

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-53.**

② Underscore (_) indicates overload relay suffix required. See **Page V5-T1-54.**

Starter Application Data ①

Catalog Prefix	AC-3	Electrical Life (Operations)
XTAE012B	12A	1 million
XTAE015B	15A	1.2 million
XTAE018C	18A	2 million

Magnet Coil Suffix

Coil Voltage	Suffix Code
Frames A–B	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24 Vdc	**TD**
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
120 Vdc	**AD**
220 Vdc	**BD**
12 Vdc	**RD**
48 Vdc	**WD**

Coil Voltage	Suffix Code
Frames C–F	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24–27 Vdc	**TD**
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
48–60 Vdc	**WD**

Coil Voltage	Suffix Code
Frame G	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
24V 50/60 Hz	**T**
24–27 Vdc	**TD**
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
42–48V 50/60 Hz	**W**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
48–60 Vdc	**WD**
Frame H	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
24V 50/60Hz	**T**
42–48V 50/60Hz	**W**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
24–27 Vdc	**TD**
48–60 Vdc	**WD**

Coil Voltage	Suffix Code
Frames L–N	
110–250 Vdc 40–60 Hz	**A**
250–500V 40–60 Hz	**C**
48–110 Vdc 40–60 Hz	**Y**
24–48 Vdc	**TD** ②
Frames L–M, S-Series	
110–120V 50/60 Hz	**A**
220–240V 50/60 Hz	**B**
Frames P–R	
230–250 Vdc 50–60 Hz	**B**

Notes

① See **Page V5-T1-111** for electrical life curves.

② Frames L–M only.

Bimetallic Overload Relay Suffix

Motor Full Load Amperes	Suffix Code	For Use with Contactor Ampere Range	Overload Relay Catalog Number
Frame B			
0.1–0.16	**P16**	7–15A	XTOBP16BC1
0.16–0.24	**P24**	7–15A	XTOBP24BC1
0.24–0.4	**P40**	7–15A	XTOBP40BC1
0.4–0.6	**P60**	7–15A	XTOBP60BC1
0.6–1	**001**	7–15A	XTOB001BC1
1–1.6	**1P6**	7–15A	XTOB1P6BC1
1.6–2.4	**2P4**	7–15A	XTOB2P4BC1
2.4–4	**004**	7–15A	XTOB004BC1
4–6	**006**	7–15A	XTOB006BC1
6–10	**010**	7–15A	XTOB010BC1
9–12	**012**	9–15A	XTOB012BC1
12–16	**016**	12–15A	XTOB016BC1
Frame C			
0.1–0.16	**P16**	18–32A	XTOBP16CC1
0.16–0.24	**P24**	18–32A	XTOBP24CC1
0.24–0.4	**P40**	18–32A	XTOBP40CC1
0.4–0.6	**P60**	18–32A	XTOBP60CC1
0.6–1	**001**	18–32A	XTOB001CC1
1–1.6	**1P6**	18–32A	XTOB1P6CC1
1.6–2.4	**2P4**	18–32A	XTOB2P4CC1
2.4–4	**004**	18–32A	XTOB004CC1
4–6	**006**	18–32A	XTOB006CC1
6–10	**010**	18–32A	XTOB010CC1
10–16	**016**	18–32A	XTOB016CC1
16–24	**024**	18–32A	XTOB024CC1
24–32	**032**	25–32A	XTOB032CC1

Motor Full Load Amperes	Suffix Code	For Use with Contactor Ampere Range	Overload Relay Catalog Number
Frame D			
6–10	**010**	40–72A	XTOB010DC1
10–16	**016**	40–72A	XTOB016DC1
16–24	**024**	40–72A	XTOB024DC1
24–40	**04**	40–72A	XTOB040DC1
40–57	**057**	50–72A	XTOB057DC1
50–65	**065**	65–72A	XTOB065DC1
65–75	**075**	65–72A	XTOB075DC1
Frame F			
25–35	**035**	80–95A	XTOB055GC1 ①
35–50	**050**	80–95A	XTOB050GC1 ①
50–70	**070**	80–95A	XTOB070GC1 ①
70–100	**100**	80–95A	XTOB100GC1 ①
Frame G			
25–35	**035**	115–170A	XTOB055GC1 ①
35–50	**050**	115–170A	XTOB050GC1 ①
50–70	**070**	115–170A	XTOB070GC1 ①
70–100	**100**	115–170A	XTOB100GC1 ①
95–125	**125**	115–170A	XTOB125GC1 ①
120–150	**150**	150–170A	XTOB150GC1 ①
145–175	**175**	150–170A	XTOB175GC1 ①

Electronic Overload Relay Suffix

XTOE Maximum Overload Rating	Standard Type Suffix	Ground Fault Type Suffix
Frame B		
0.33–1.65A	**5E1P6**	**5G1P6**
1–5A	**5E005**	**5G005**
4–20A	**5E020**	**5G020**
Frame C		
0.33–1.65A	**5E1P6**	**5G1P6**
1–5A	**5E005**	**5G005**
4–20A	**5E020**	**5G020**
9–45A	**5E045**	**5G045**
Frame D		
9–45A	**5E045**	**5G045**
20–100A	**5E100**	**5G100**
Frame F, G		
20–100A	**5E100**	**5G100**
Frame G		
35–175A	**5E175**	**5G175**

Note

① Catalog number refers to direct mount overload relay. Add an **S** to the end of the catalog number for separate mount.

Star-Delta (Wye-Delta) Starters

Frame B—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
3	3	2-1/2	10	<20	K1M main contactor	**XTCE007B10_**
					K5M delta contactor	**XTCE007B01_**
					K3M star contactor	**XTCE007B01_**
					Mechanical interlock	**XTCEXMLB**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…BC1**
					(3) auxiliary contacts	**XTCEXFAC20**
					Star-delta link kit	**XTCEXSDLB**
3	5	7-1/2	10	<20	K1M main contactor	**XTCE009B10_**
					K5M delta contactor	**XTCE009B01_**
					K3M star contactor	**XTCE009B01_**
					Mechanical interlock	**XTCEXMLB**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…BC1**
					(3) auxiliary contacts	**XTCEXFAC20**
					Star-delta link kit	**XTCEXSDLB**
5	5	10	15	<20	K1M main contactor	**XTCE012B10_**
					K5M delta contactor	**XTCE012B01_**
					K3M star contactor	**XTCE012B01_**
					Mechanical interlock	**XTCEXMLB**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…BC1**
					(3) auxiliary contacts	**XTCEXFAC20**
					Star-delta link kit	**XTCEXSDLB**

Frame B—Maximum IEC Ratings

AC-3 I_e(A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
12	3	5.5	7	5.5	5.5	—	<20	K1M main contactor	**XTCE007B10_**
								K5M delta contactor	**XTCE007B01_**
								K3M star contactor	**XTCE007B01_**
								Mechanical interlock	**XTCEXMLB**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…BC1**
								(3) auxiliary contacts	**XTCEXFAC20**
								Star-delta link kit	**XTCEXSDLB**
16	4	7.5	8	7.5	7.5	—	<20	K1M main contactor	**XTCE009B10_**
								K5M delta contactor	**XTCE009B01_**
								K3M star contactor	**XTCE009B01_**
								Mechanical interlock	**XTCEXMLB**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…BC1**
								(3) auxiliary contacts	**XTCEXFAC20**
								Star-delta link kit	**XTCEXSDLB**
22	5.5	11	14.5	11	11	—	<20	K1M main contactor	**XTCE012B10_**
								K5M delta contactor	**XTCE012B01_**
								K3M star contactor	**XTCE012B01_**
								Mechanical interlock	**XTCEXMLB**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…BC1**
								(3) auxiliary contacts	**XTCEXFAC20**
								Star-delta link kit	**XTCEXSDLB**

Note

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62.**

Frame C—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
7-1/2	7-1/2	15	20	<20	K1M main contactor	**XTCE018C10_**
					K5M delta contactor	**XTCE018C01_**
					K3M star contactor	**XTCE018C01_**
					Mechanical interlock	**XTCEXMLC**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…CC1**
					(3) auxiliary contacts	**XTCEXFAC20**
					Star-delta link kit	**XTCEXSDLC**
10	15	30	40	<20	K1M main contactor	**XTCE025C10_**
					K5M delta contactor	**XTCE025C01_**
					K3M star contactor	**XTCE025C01_**
					Mechanical interlock	**XTCEXMLC**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…CC1**
					(3) auxiliary contacts	**XTCEXFAC20**
					Star-delta link kit	**XTCEXSDLC**
15	20	40	50	<20	K1M main contactor	**XTCE032C10_**
					K5M delta contactor	**XTCE032C01_**
					K3M star contactor	**XTCE032C01_**
					Mechanical interlock	**XTCEXMLC**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…CC1**
					(3) auxiliary contacts	**XTCEXFAC20**
					Star-delta link kit	**XTCEXSDLC**

Frame C—Maximum IEC Ratings

AC-3 I_e (A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
30	7.5	15	19	18.5	18.5	—	<20	K1M main contactor	**XTCE018C10_**
								K5M delta contactor	**XTCE018C01_**
								K3M star contactor	**XTCE018C01_**
								Mechanical interlock	**XTCEXMLC**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…CC1**
								(3) auxiliary contacts	**XTCEXFAC20**
								Star-delta link kit	**XTCEXSDLC**
45	11	22	30	30	22	—	<20	K1M main contactor	**XTCE025C10_**
								K5M delta contactor	**XTCE025C01_**
								K3M star contactor	**XTCE025C01_**
								Mechanical interlock	**XTCEXMLC**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…CC1**
								(3) auxiliary contacts	**XTCEXFAC20**
								Star-delta link kit	**XTCEXSDLC**
55	15	30	39	37	30	—	<20	K1M main contactor	**XTCE032C10_**
								K5M delta contactor	**XTCE032C01_**
								K3M star contactor	**XTCE032C01_**
								Mechanical interlock	**XTCEXMLC**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…CC1**
								(3) auxiliary contacts	**XTCEXFAC20**
								Star-delta link kit	**XTCEXSDLC**

Note

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62**.

Frame D—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
20	25	50	60	<20	K1M main contactor	**XTCE040D00_**
					K5M delta contactor	**XTCE040D00_**
					K3M star contactor	**XTCE040D00_**
					Mechanical interlock	**XTCEXMLD**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…DC1**
					(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLD**
25	30	60	75	<20	K1M main contactor	**XTCE050D00_**
					K5M delta contactor	**XTCE050D00_**
					K3M star contactor	**XTCE040D00_**
					Mechanical interlock	**XTCEXMLD**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…DC1**
					(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLD**
40	50	100	125	<20	K1M main contactor	**XTCE065D00_**
					K5M delta contactor	**XTCE065D00_**
					K3M star contactor	**XTCE040D00_**
					Mechanical interlock	**XTCEXMLD**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…DC1**
					(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLD**

Frame D—Maximum IEC Ratings

AC-3 I_e(A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
70	18.5	37	37	45	37	—	<20	K1M main contactor	**XTCE040D00_**
								K5M delta contactor	**XTCE040D00_**
								K3M star contactor	**XTCE040D00_**
								Mechanical interlock	**XTCEXMLD**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…DC1**
								(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLD**
90	22	45	45	55	45	—	<20	K1M main contactor	**XTCE050D00_**
								K5M delta contactor	**XTCE050D00_**
								K3M star contactor	**XTCE040D00_**
								Mechanical interlock	**XTCEXMLD**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…DC1**
								(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLD**
115	30	55	55	75	55	—	<20	K1M main contactor	**XTCE065D00_**
								K5M delta contactor	**XTCE065D00_**
								K3M star contactor	**XTCE040D00_**
								Mechanical interlock	**XTCEXMLD**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…DC1**
								(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLD**

Note

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62**.

Frame F—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
40	60	125	150	<20	K1M main contactor	**XTCE080F00_**
					K5M delta contactor	**XTCE080F00_**
					K3M star contactor	**XTCE080F00_**
					Mechanical interlock ②	**XTCEXMLG**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…FC1**
					(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLF**
40	60	125	150	<20	K1M main contactor	**XTCE095F00_**
					K5M delta contactor	**XTCE095F00_**
					K3M star contactor	**XTCE080F00_**
					Mechanical interlock ②	**XTCEXMLG**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…FC1**
					(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLF**

Frame F—Maximum IEC Ratings

AC-3 I_e (A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
140	37	75	75	90	90	—	<20	K1M main contactor	**XTCE080F00_**
								K5M delta contactor	**XTCE080F00_**
								K3M star contactor	**XTCE080F00_**
								Mechanical interlock ②	**XTCEXMLG**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…FC1**
								(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLF**
165	45	90	110	110	132	—	<20	K1M main contactor	**XTCE095F00_**
								K5M delta contactor	**XTCE095F00_**
								K3M star contactor	**XTCE080F00_**
								Mechanical interlock ②	**XTCEXMLG**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…FC1**
								(2) auxiliary contacts (K1M, K3M)	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLF**

Notes

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62**.

② If mechanical interlock of star contactor is required, it must be the same frame size of the delta contactor or use the same mechanical interlock, see **Page V5-T1-73** for mechanical interlocks. (Example: XTCE…L22_ and XTCE…M22_ both use mechanical interlock XTCEXMLM.)

Frame G—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
50	60	125	150	<20	K1M main contactor	**XTCE115G00_**
					K5M delta contactor	**XTCE115G00_**
					K3M star contactor	**XTCE080F00_**
					Mechanical interlock	**XTCEXMLG**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…GC1**
					(2) auxiliary contacts	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLG**
75	100	200	250	<20	K1M main contactor	**XTCE150G00_**
					K5M delta contactor	**XTCE150G00_**
					K3M star contactor	**XTCE080F00_**
					Mechanical interlock	**XTCEXMLG**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…GC1**
					(2) auxiliary contacts	**XTCEXFBG11**
					(1) auxiliary contact (K5M)	**XTCEXFBG31**
					Star-delta link kit	**XTCEXSDLG**

Frame G—Maximum IEC Ratings

AC-3 I_e(A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
200	55	110	132	132	160	—	<20	K1M main contactor	**XTCE115G00_**
								K5M delta contactor	**XTCE115G00_**
								K3M star contactor	**XTCE080F00_**
								Mechanical interlock	**XTCEXMLG**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…GC1**
								(2) auxiliary contacts	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLG**
260	75	132	148	160	160	—	<20	K1M main contactor	**XTCE150G00_**
								K5M delta contactor	**XTCE150G00_**
								K3M star contactor	**XTCE080F00_**
								Mechanical interlock	**XTCEXMLG**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…GC1**
								(2) auxiliary contacts	**XTCEXFBG11**
								(1) auxiliary contact (K5M)	**XTCEXFBG31**
								Star-delta link kit	**XTCEXSDLG**

Note

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62.**

Frame L—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
125	150	300	400	<30	K1M main contactor	**XTCS250L22_**
					K5M delta contactor	**XTCS250L22_**
					K3M star contactor	**XTCS250L22_**
					Mechanical interlock	**XTCEXMLM**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOB…LC1**

Frame L—Maximum IEC Ratings

AC-3 I_e (A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
430	132	250	300	315	400	200	<30	K1M main contactor	**XTCS250L22_**
								K5M delta contactor	**XTCS250L22_**
								K3M star contactor	**XTCS250L22_**
								Mechanical interlock	**XTCEXMLM**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOB…LC1**

Frame M—Maximum UL/CSA Ratings

Three-Phase hp Ratings 200V	230V	460V	575V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
200	250	500	600	<20	K1M main contactor	**XTCS400M22_**
					K5M delta contactor	**XTCS400M22_**
					K3M star contactor	**XTCS250L22_**
					Mechanical interlock	**XTCEXMLM**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOT…C3S**
290	350	700	860	<30	K1M main contactor	**XTCS500M22_**
					K5M delta contactor	**XTCS500M22_**
					K3M star contactor	**XTCS300M22_**
					Mechanical interlock	**XTCEXMLM**
					K1T timing relay	**XTTR6A60S51B**
					Overload relay	**XTOT…C3S**

Frame M—Maximum IEC Ratings

AC-3 I_e (A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
685	200	355	390	450	560	220	<20	K1M main contactor	**XTCS400M22_**
								K5M delta contactor	**XTCS400M22_**
								K3M star contactor	**XTCS250L22_**
								Mechanical interlock	**XTCSXMLM**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOT…C3S**
860	250	450	500	560	600	220	<30	K1M main contactor	**XTCS500M22_**
								K5M delta contactor	**XTCS500M22_**
								K3M star contactor	**XTCS300M22_**
								Mechanical interlock	**XTCEXMLM**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOT…C3S**

Notes

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62.**

② If mechanical interlock of star contactor is required, it must be the same frame size of the delta contactor or use the same mechanical interlock, see **Page V5-T1-73** for mechanical interlocks. (Example: XTCE…L22_ and XTCE…M22_ both use mechanical interlock XTCEXMLM.)

Frame N—Maximum UL/CSA Ratings are not applicable.

Frame N—Maximum IEC Ratings

AC-3 I_e(A)	Three-Phase Motors 50–60 Hz 220/230V	380/400V	415V	500V	660/690V	1000V	Max. Changeover Time (sec)	Component Description	Catalog Number ①
1000	300	560	610	710	900	355	<30	K1M main contactor	**XTCE580N22_**
								K5M delta contactor	**XTCE580N22_**
								K3M star contactor	**XTCE580N22_**
								Mechanical interlock ②	**XTCEXMLN**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOT…C3S**
1120	350	630	680	750	950	355	<30	K1M main contactor	**XTCE650N22_**
								K5M delta contactor	**XTCE650N22_**
								K3M star contactor	**XTCE580N22_**
								Mechanical interlock ②	**XTCEXMLN**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOT…C3S**
1290	400	710	760	900	1200	1400	<30	K1M main contactor	**XTCE750N22_**
								K5M delta contactor	**XTCE750N22_**
								K3M star contactor	**XTCE580N22_**
								Mechanical interlock	**XTCEXMLN**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOT…C3S**
1400	450	800	850	950	1300	1400	<30	K1M main contactor	**XTCE820N22_**
								K5M delta contactor	**XTCE820N22_**
								K3M star contactor	**XTCE580N22_**
								Mechanical interlock	**XTCEXMLN**
								K1T timing relay	**XTTR6A60S51**
								Overload relay	**XTOT…C3S**
1700	560	1000	1050	1200	1700	1700	<20	K1M main contactor	**XTCEC10N22_**
								K5M delta contactor	**XTCEC10N22_**
								K3M star contactor	**XTCE650N22_**
								Mechanical interlock	**XTCEXMLN**
								K1T timing relay	**XTTR6A60S51B**
								Overload relay	**XTOT…C3S**

Notes

Main circuit: Depending on the coordination type required (that is, Type 1 or Type 2) it must be established whether the fuse protection and the input wiring for the main and delta contactors are to be common or separate.

Control circuit: If the combinations are used in the scope of the IEC/EN 60 204-1, VDE 0113 part 1, point 9.1.1 regarding the supply of control circuits is to be observed.

① Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-62**.

② If mechanical interlock of star contactor is required, it must be the same frame size of the delta contactor or use the same mechanical interlock, see **Page V5-T1-73** for mechanical interlocks. (Example: XTCE…L22_ and XTCE…M22_ both use mechanical interlock XTCEXMLM.)

1

Spare Auxiliary Contacts

AC-3	K1M	K3M	K5M
12–55			
90–260		—	—
315–1700			

Magnet Coil Suffix

Coil Voltage	Suffix Code
Frames A–B	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24 Vdc	**TD**
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
120 Vdc	**AD**
220 Vdc	**BD**
12 Vdc	**RD**
48 Vdc	**WD**

Coil Voltage	Suffix Code
Frames C–F	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24–27 Vdc	**TD**
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
48–60 Vdc	**WD**

Coil Voltage	Suffix Code
Frame G	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
24V 50/60 Hz	**T**
24–27 Vdc	**TD**
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
42–48V 50/60 Hz	**W**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
48–60 Vdc	**WD**
Frame H	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
24V 50/60Hz	**T**
42–48V 50/60Hz	**W**
110–130 Vdc	**AD**
200–240 Vdc	**BD**
24–27 Vdc	**TD**
48–60 Vdc	**WD**

Coil Voltage	Suffix Code
Frames L–N	
110–250 Vdc 40–60 Hz	**A**
250–500V 40–60 Hz	**C**
48–110 Vdc 40–60 Hz	**Y**
24–48 Vdc	**TD** ①
Frames L–M, S-Series	
110–120V 50/60 Hz	**A**
220–240V 50/60 Hz	**B**
Frames P–R	
230–250 Vdc 50–60 Hz	**B**

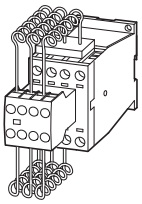
Overload Relay Settings (A)

Setting	Starting
A: I_N x 0.58 Motor protection in the star (wye) and delta configurations	≤15 sec
B: I_N x 1 Only partial motor protection in star position	15–40 sec
C: I_N x 0.58 Motor not protected in star (wye) position	>40 sec
Timing relay set to approximately 10 sec	

Note

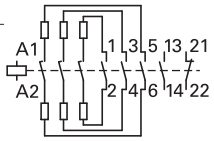
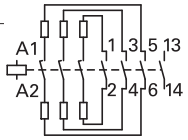
① Frames L–M only.

XTCC0_



XTCC Contactors for Three-Phase Capacitors

Three-Phase Capacitors, 50–60 Hz
Open kVAR Ratings ①

230V	400V	525V	690V	Contact Sequence	Catalog Number ②
11	20	25	33.3		**XTCC020C11_**
15	25	33.3	40		**XTCC025C11_**
20	33.3	40	55		**XTCC033D10_**
25	50	65	85		**XTCC050D10_**

Magnet Coil Suffix

Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz, 240V 60 Hz	**F**
400V 50 Hz, 440V 60 Hz	**N**
24V 50/60 Hz	**T**

Notes

Weld-resistant for capacitors with inrush current peaks up to 180 x I_N.

① With series resistors, without quick-discharge resistor.

② Underscore (_) indicates magnet coil suffix required.

Engineering Notes for XTCC and XTCE Contactors for Power Factor Correction

Individual Compensation, Open Version

Catalog Number	Switching Duty in kVAR			
	230V	400V, 420V, 440V	525V	690V
XTCE007B	1.5	3	3.5	5
XTCE009B	2	4	4.5	6
XTCE012B	2.5	4.5	5.5	7
XTCE015B	2.5	4.5	5.5	7
XTCE018C	6.5	12	14.5	19
XTCE025C	7	13.5	16	21
XTCE032C	7.5	14.5	17	22.5
XTCE040D	11	20.5	24.5	32
XTCE050D	11.5	22	26	34.5
XTCE065D	12.5	23.5	28	37
XTCE080F	16	30.5	36.5	48
XTCE095F	18	34	41	54
XTCE115G	24	46	54.5	72
XTCE150G	28	53	63.5	83.5
XTCE580N	175	300	400	300

Group Compensation, with Reactor, Open Version

Catalog Number	Switching Duty in kVAR			
	230V	400V, 420V, 440V	525V	690V
XTCE007B	4	7	7.5	12
XTCE009B	5	8	10	14
XTCE012B	5.5	1	12	16
XTCE015B	5.5	10	12	16
XTCE018C	7.5	16	20	28
XTCE025C	9	18	23	30
XTCE032C	10	20	24	32
XTCE040D	13	25	30	40
XTCE050D	16	30	36	48
XTCE065D	19	36	43	57
XTCE080F	30	58	68	90
XTCE095	34	6	7	10
XTCE115G	44	8	100	125
XTCE150	5	97	115	152
XTCE250L	110	190	260	340
XTCE400M	160	280	370	480
XTCE500M	220	390	500	680

Group Compensation, without Reactor, Open Version

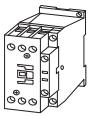
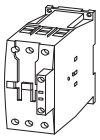
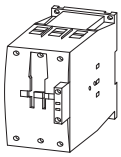
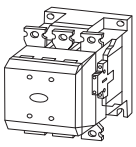
Catalog Number	Switching Duty in kVAR			
	230V	400V, 420V, 440V	525V	690V
XTCC020C	11	20	25	33.3
XTCC025C	15	25	33.3	40
XTCC033D	20	33.3	40	55
XTCC050D	25	50	65	85
XTCE580N	145	250	333	250

Accessories

Auxiliary Contacts

Front-mounted snap-on auxiliary contacts for ***XT*** contactors are available with screw or spring cage terminals in a variety of contact configurations.

Auxiliary Contacts Possible Combinations

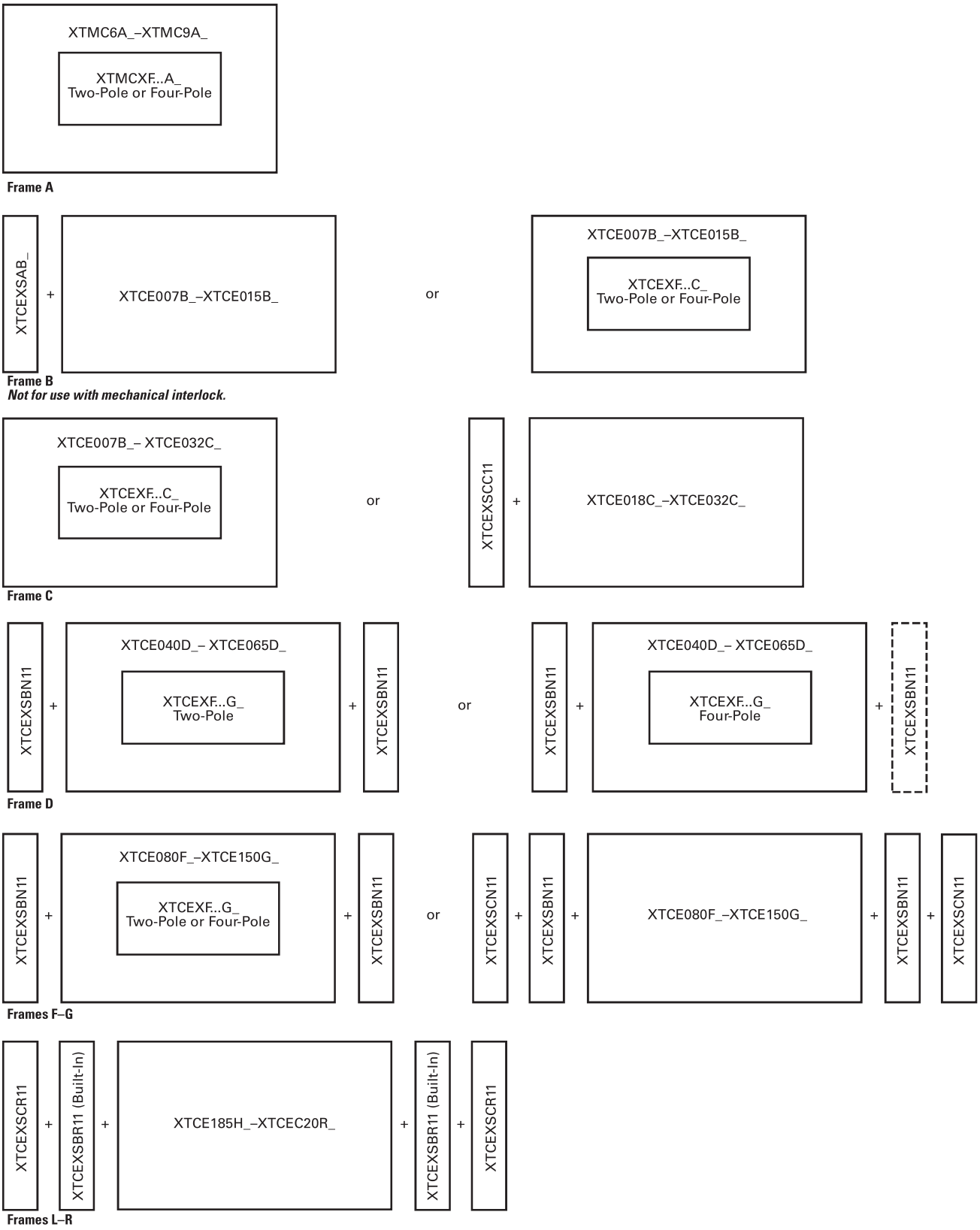
Frame Size	Catalog Number	Contactor	Built-In Auxiliary	Front (Top) Mount Two-Pole	Front (Top) Mount Four-Pole	Side-Mount Single-Pole	Side-Mount Two-Pole	Total Auxiliary Contacts Available
A	**XTMC6A_ – XTMC9A_**		1NO or 1NC	1	—	—	—	3
				—	1	—	—	5
						—	—	—
B	**XTCE007B_ – XTCE015B_**		1NO or 1NC	1	—	—	—	3
				—	1	—	—	5
				—	—	1	—	2
							—	—
C	**XTCE018C_ – XTCE032C_**		1NO or 1NC	1	—	—	—	3
				—	1	—	—	5
				—	—	—	1	3
						—		—
D	**XTCE040D00_ – XTCE065D00_**		—	1	—	—	2	6
				—	1	—	1	6
						—		—
F–G	**XTCE080F00_ – XTCE150G00_**		—	1	—	—	2	6
				—	1	—	2	8
				—	—	—	4	8
						—		—
L–R	**XTCE185H22_ – XTCEC20R22_**		2NO–2NC	—	—		2	8
				—	—			—

Notes

Forced operation contact to IEC/EN 60947-5-1 Appendix L (positively driven), inside the auxiliary contact unit (not early close and late opening).
Auxiliary normally closed contact can be used as mirror contact to IEC/EN 60947-4-1 Appendix F (not late opening).
No auxiliary contacts can be fitted between two contactors.

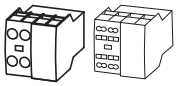
1

Auxiliary Contact Combinations



Auxiliary Contacts

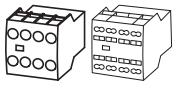
XTCEXF_



Frames B–C, Front (Top) Mount—Two-Pole

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	2NO	53 63 54 64	5	**XTCEXFAC20**
16	1NO-1NC	53 61 54 62	5	**XTCEXFAC11** ④
16	2NC	51 61 52 62	5	**XTCEXFAC02**
16	$1NO_E$-$1NC_L$	57 65 58 66	5	**XTCEXFALC11** ②
16	1NO-1NC		5	**XTCEXFDC11** ③
16	2NC	21 31 22 32	5	**XTCEXFCC02** ③

XTCEXF_



Frames B–C, Front (Top) Mount—Four-Pole

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	4NO	53 63 73 83 54 64 74 84	5	**XTCEXFAC40** ④
16	3NO-1NC	53 61 73 83 54 62 74 84	5	**XTCEXFAC31** ④
16	2NO-2NC	53 61 71 83 54 62 72 84	5	**XTCEXFAC22** ④
16	1NO-3NC	53 61 71 81 54 62 72 82	5	**XTCEXFAC13**
16	4NC	51 61 71 81 52 62 72 82	5	**XTCEXFAC04**
16	$1NO_E$-$1NC_L$	57 65 71 83 58 66 72 84	5	**XTCEXFCLC22** ②
16	2NO-2NC	21 31 43 53 22 32 44 54	5	**XTCEXFCC22** ③

Notes

① Orders must be placed in multiples of package quantity listed.

② 1 early-make contact ($1NO_E$), 1 late-break contact ($1NC_L$).

③ To avoid duplicate terminal numbers in contact sequence, these auxiliary contacts should only be used with contactors having a built-in 1NO contact (XTCE…B10_, XTCE…C10_).

④ Catalog number is shown with screw type terminal. For spring cage, add a "**C**" before the last 2 digits. For example, to order a spring cage version of the XTCEXFAC22, change the catalog number to XTCEXFAC**C**22.

XTCEXFATC_



Frames B–C, Front (Top) Mount—Tall Version Two-Pole ①

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
16	2NO		5	**XTCEXFATC20**
16	1NO-1NC		5	**XTCEXFATC11**
16	2NC		5	**XTCEXFATC02**

XTCEXFATC22



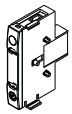
Frames B–C, Front (Top) Mount—Tall Version Four-Pole ①

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
16	2NO-2NC		5	**XTCEXFATC22**

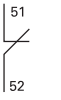
Frames B–C, Front (Top) Mount—Electronic Contacts, Two- and Four-Pole ①

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
1 mA–0.5A	2NO-2NC		1	**XTCEXFARC22** ③
1 mA–5A	1NO-1NC		1	**XTCEXFARC11** ③

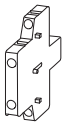
XTCEXSAB_



Frame B, Side-Mount—Single-Pole

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
16	1NO		1	**XTCEXSAB10** ④
16	1NC		1	**XTCEXSAB01** ④

XTCEXSCC11



Frame C, Side-Mount—Two-Pole

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
10	1NO-1NC		1	**XTCEXSCC11** ④

Notes

Interlocked opposing contacts, to IEC/EN 60947-5-1 Annex L (positively driven), within the auxiliary contact modules (not NO [early make] and NC [late break] contacts) and for the built-in auxiliary contacts of the XTCE007B_–XTCE032C_.

Auxiliary break contact can be used as mirror contact to IEC/EN 60947-4-1 Annex F (not NC [late break] contact).

No auxiliary contacts can be fitted between two contactors.

① Front (top) mount tall version is for use with Frame B electrical wire bridges and link kits (see **Page V5-T1-74**) and toolless plug combination connection kits: XTCEXRLB, XTCEXSDLB, XTPAXTPCB, XTPAXTPCRB, XTPAX.

② Orders must be placed in multiples of package quantity listed.

③ Low level inputs down to 1 mA (PLC communications). Ideal for functional safety applications.

④ Can be mounted to the left side of contactor only. Cannot be used in combination with front (top) mount auxiliary contacts or mechanical interlocks.

XTCEXF_



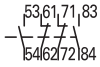
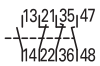
Frames D–G—Two-Pole

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	2NO		5	**XTCEXFBG20**
16	1NO-1NC		5	**XTCEXFAG11**
16	1NO-1NC		5	**XTCEXFBG11**
16	2NC		5	**XTCEXFBG02**

XTCEXF_




Frames D–G—Four-Pole

Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	4NO-0NC		5	**XTCEXFBG40**
16	3NO-1NC		5	**XTCEXFBG31**
16	2NO-2NC		5	**XTCEXFBG22**
16	2NO-2NC		5	**XTCEXFAG_22** ②
16	1NO-3NC		5	**XTCEXFBG13**
16	0NO-4NC		5	**XTCEXFBG04**
16	$1NO_E$-$1NC_L$		5	**XTCEXFBLG22** ③

Notes

Interlocked opposing contacts, to IEC/EN 60947-5-1 Annex L (positively driven), within the auxiliary contact modules (not NO (early make) and NC (late break) contacts) and for the built-in auxiliary contacts of the XTCE007B_–XTCE032C_.

Auxiliary break contact can be used as mirror contact to IEC/EN 60947-4-1 Annex F (not NC (late break) contact).

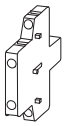
No auxiliary contacts can be fitted between two contactors.

① Orders must be placed in multiples of package quantity listed.

② A "_" denotes catalog numbers are incomplete. To complete the catalog number for ordering a spring cage terminal, insert a **C** in the "_" position or remove "_" for screw type terminal.

③ One early-make contact ($1NO_E$), one late-break contact ($1NC_L$).

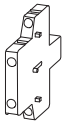
XTCEXS_



Frames D–H, Side Mount (Snap-On)—Two-Pole

Conventional Free Air Thermal Current, $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
10	1NO–1NC		1	**XTCEXSBN11**
10	$1NO_E$–$1NC_L$		1	**XTCEXSBLN11** ②
10	1NO–1NC		1	**XTCEXSCN11** ③

XTCEXS_



Frames L–R, Side Mount (Screw Mount)—Two-Pole

Conventional Free Air Thermal Current, $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
10	1NO–1NC		1	**XTCEXSBR11** ④
10	$1NO_E$–$1NC_L$		1	**XTCEXSBLR11**
10	1NO–1NC		1	**XTCEXSCR11**

Notes

① Orders must be placed in multiples of package quantity listed.

② 1 early-make contact ($1NO_E$), 1 late-break contact ($1NC_L$).

③ To avoid duplicate terminal numbers in contact sequence, the XTCEXSCN11 should be used with Frame D when a top mount auxiliary is also installed.

④ For replacement only. XTCEXSBR11 and XTCEXSBLR11 cannot be added onto side mount auxiliaries that come with the Frames L–R contactors as standard. To add auxiliaries onto the included side auxiliaries on Frames L–R contactors, use XTCEXSCR11.

Suppressors

The switching of contactor coils can generate voltage transients that may cause arching on switch contacts and/or damage electronics on the control line. Either an RC or varistor suppressor is recommended in these types of applications. All ***XT*** DC contactor coils have built-in suppression.

Varistor suppressors clamp the voltage transient above the maximum coil voltage and are recommended when the level of the transient is known to not exceed the coil voltage. RC suppressors slow and reduce the level of the voltage transient but do not clamp them at a specific level. The slowing of the transient can reduce electrical interference. These are recommended in applications where operating rates are high.

XTCEXRS_



Contact Sequence



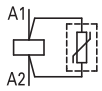
RC Suppressor ①②

Voltage	For Use with…	Pkg. Qty. ③	Catalog Number
24–48	XTCE007B–XTCE015B, XTCF020B	10	**XTCEXRSBW**
48–130		10	**XTCEXRSBA**
110–240		10	**XTCEXRSBB**
240–500		10	**XTCEXRSBC**
24–48	XTCE018C–XTCE032C	10	**XTCEXRSCW**
110–130		10	**XTCEXRSCA**
130–240		10	**XTCEXRSCB**
240–500		10	**XTCEXRSCC**
24–48	XTCE040D–XTCE095F	10	**XTCEXRSFW**
110–130		10	**XTCEXRSFA**
130–240		10	**XTCEXRSFB**
240–500		10	**XTCEXRSFC**

XTCEXVS_



Contact Sequence



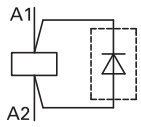
Varistor Suppressor ①②

Voltage	For Use with…	Pkg. Qty. ③	Catalog Number
24–48	XTCE007B–XTCE015B, XTCF020B	10	**XTCEXVSBW**
48–130		10	**XTCEXVSBA**
130–240		10	**XTCEXVSBB**
240–500		10	**XTCEXVSBC**
24–48	XTCE018C–XTCE032C	10	**XTCEXVSCW**
48–130		10	**XTCEXVSCA**
130–240		10	**XTCEXVSCB**
240–500		10	**XTCEXVSCC**
24–48	XTCE040D–XTCE095F	10	**XTCEXVSFW**
48–130		10	**XTCEXVSFA**
130–240		10	**XTCEXVSFB**
240–500		10	**XTCEXVSFC**

XTCEXDSB



Contact Sequence



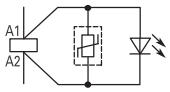
Free-Wheel Diode Suppressor ④

Voltage DC	For Use with…	Pkg. Qty. ③	Catalog Number
12–250	XTCE007B–XTCE015B, XTCF020B	10	**XTCEXDSB**

XTCEXVSL_



Contact Sequence



Varistor Suppressor with Integrated LED ①②

Voltage AC	For Use with…	Pkg. Qty. ③	Catalog Number
24–48	XTCE007B–XTCE015B	10	**XTCEXVSLBW**
130–240		10	**XTCEXVSLBB**
24–48	XTCE018C–XTCE032C	10	**XTCEXVSLCW**
130–240		10	**XTCEXVSLCB**
24–48	XTCE040D–XTCE095F	10	**XTCEXVSLFW**
130–240		10	**XTCEXVSLFB**

Notes

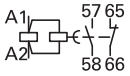
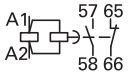
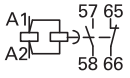
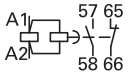
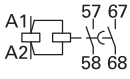
① Note dropout delay.
② For AC operated contactors, 50–60 Hz. DC operated contactors and XTCE115G_ to XTCE170G_ have a built-in suppressor circuit.
③ Orders must be placed in multiples of package quantity listed.
④ In addition to the built-in suppressor circuit for DC actuated contactors. Prevents negative breaking voltage when contactors are used in combination with a safety PLC.

Electronic Timer Modules

Frames B–C Contactors (7–32A) ①

XTCEXTE_



Voltage	Contact Sequence	Timing Range	For Use with…	Pkg. Qty. ②	Catalog Number
On-Delay					
24 Vac/Vdc		0.05s–1s 0.5s–10s 5s–100s	XTCE…B_ XTCE…C_	1	**XTCEXTEEC11T**
100–130 Vac				1	**XTCEXTEEC11A**
200–240 Vac				1	**XTCEXTEEC11B**
Off-Delay					
24 Vac/Vdc		0.05s–1s	XTCE…B_ XTCE…C_	1	**XTCEXTED1C11T**
100–130 Vac				1	**XTCEXTED1C11A**
200–230 Vac				1	**XTCEXTED1C11B**
24 Vac/Vdc		0.5s–10s	XTCE…B_ XTCE…C_	1	**XTCEXTED10C11T**
100–130 Vac				1	**XTCEXTED10C11A**
200–240 Vac				1	**XTCEXTED10C11B**
24 Vac/Vdc		5s–100s	XTCE…B_ XTCE…C_	1	**XTCEXTED100C11T**
100–130 Vac				1	**XTCEXTED100C11A**
200–240 Vac				1	**XTCEXTED100C11B**
Star-Delta					
24 Vac/Vdc		1s–30s	XTCE…B_ XTCE…C_	1	**XTCEXTEYC20T**
100–130 Vac				1	**XTCEXTEYC20A**
200–240 Vac				1	**XTCEXTEYC20B**

XTCEXTESHRD



Sealable Shroud					
—	Transparent sealable shroud used to protect electronic timer modules from unwanted access		XTCEXTEE, XTCEXTED, XTCEXTEY	1	**XTCEXTESHRD**

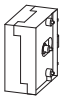
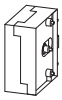
Notes

① Front (top) mounted timer modules for use with XTCE…B and XTCE…C contactors. Cannot be combined with top-mount auxiliary contacts, XTCEXF…C_.

② Orders must be placed in multiples of package quantity listed.

Additional Accessories

Mechanical Interlock ①

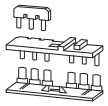
	For Use with…	Pkg. Qty. ②	Catalog Number
XTCEXMLB 	XTCE007B–XTCE015B, XTCF020B	5	**XTCEXMLB**
XTCEXML_ 	XTCE018C–XTCE032C, XTCF032C–XTCF045C	1	**XTCEXMLC**
	XTCE040D–XTCE072D, XTCF063D–XTCF080D	1	**XTCEXMLD**
	XTCE080F–XTCE170G, XTCF125G–XTCF200G	1	**XTCEXMLG** ③
XTCEXMLM 	XTCE185H–XTCE570M	1	**XTCEXMLM**
XTCEXMLN 	XTCE580N–XTCEC10N	1	**XTCEXMLN** ③

Reversing Link Kits

	For Use with…	Pkg. Qty. ②	Catalog Number
XTCEXRLB 	XTCE007B–XTCE015B	1	**XTCEXRLB** ④
XTCEXRL_ 	XTCE018C–XTCE032C	1	**XTCEXRLC**
	XTCE040D–XTCE065D	1	**XTCEXRLD**
	XTCE080F–XTCE150G	1	**XTCEXRLG**

Main current wiring for reversing combinations. Includes paralleling bridge and reversing bridge. Does not include mechanical interlock, see table on this page.

Star-Delta (Wye-Delta) Link Kits

	For Use with…	Pkg. Qty. ②	Catalog Number
XTCEXSDLB 	XTCE007B–XTCE015B	1	**XTCEXSDLB** ③
XTCEXSDL_ 	XTCE018C–XTCE032C	1	**XTCEXSDLC**
	XTCE040D–XTCE072D	1	**XTCEXSDLD**
	XTCE080F–XTCE095F	1	**XTCEXSDLF**
	XTCE115G–XTCE150G	1	**XTCEXSDLG**

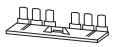
Main current wiring for star-delta (wye-delta) combinations. includes paralleling bridge, reversing bridge and star-delta bridge. Does not include mechanical interlock, see table on this page.

Paralleling Bridge

	For Use with…	Pkg. Qty. ②	Catalog Number
XTCEXPBB 	XTCE007B–XTCE015B	20	**XTCEXPBB**
XTCEXPBC 	XTCE018C–XTCE032C	20	**XTCEXPBC**

Component part of reversing link kit (XTCEXRL_). Parallels the phases on the line-side of two contactors.

Reversing Bridge

	For Use with…	Pkg. Qty. ②	Catalog Number
XTCEXRBB 	XTCE007B–XTCE015B	20	**XTCEXRBB**
XTCEXRB_ 	XTCE018C–XTCE032C	20	**XTCEXRBC**
	XTCE040D–XTCE065D	10	**XTCEXRBD**

Component part of reversing link kit (XTCEXRL_). Reverses the phases on the load-side of two contactors.

Notes

① For two contactors with AC or DC operated magnet system which are horizontally or vertically mounted. For Frames B–G, mechanical lifespan is 2.5 x 10^6 operations and the distance between contactors is 0 mm. For Frames L–N, mechanical lifespan is 5 x 10^6 operations and no auxiliary contact can be mounted between the mechanical interlock and the contactor—the distance between contactors is 15 mm.

② Orders must be placed in multiples of package quantity listed.

③ XTCEXMLG and XTCEXMLN consist of an interlock element and mounting plate.

④ Also includes interlocking bridge (XTCEXLBB). The following control cables are integrated for electrical interlock: K1M: A1–K2M: 21; K1M: 21–K2M: A1; K1M: A2–K2M: A2.

Electrical Interlocking Bridge

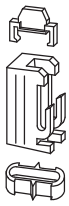
For Use with…	Pkg. Qty. ①	Catalog Number
XTCE007B–XTCE015B	20	**XTCEXLBB**

Star-Delta (Wye-Delta) Bridge

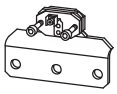
	For Use with…	Pkg. Qty. ①	Catalog Number
XTCEXSDB 	XTCE007B–XTCE015B	20	**XTCEXSDBB** ②
XTCEXSDB_ 	XTCE080F–XTCE170G	1	**XTCEXSDBG**
	XTCE185L–XTCE400M	1	**XTCEXSDB400**
	XTCE500M	1	**XTCEXSDB500**

Component part of star-delta link kit (XTCEXSDL_). Commons the three phases on the line side of shorting contactor.

Connector

	For Use with…	Pkg. Qty. ①	Catalog Number
XTCEXCNC 	XTCE007B–XTCE032C	50	**XTCEXCNC**
XTCEXCNG 	XTCE040D–XTCE170G	10	**XTCEXCNG**

Parallel Link ④⑤⑥

	For Use with…	Pkg. Qty. ①	Catalog Number
XTCEXPLKB 	XTCE007B –XTCE015B	5	**XTCEXPLKB**
XTCEXPLK_ 	XTCE018C –XTCE032C	5	**XTCEXPLKC**
	XTCE040D –XTCE072D	1	**XTCEXPLKD**
	XTCE080F–XTCE170G	1	**XTCEXPLKG**
XTCEXPLKL185 	XTCE185L	1	**XTCEXPLKL185**

For using one contactor per phase. Each package comes with two links for line: load.

Contactor Labels

	For Use with…	Pkg. Qty.	Catalog Number
XGKE-GE 	XTC…	25	**XGKE-GE** ⑦

Notes

① Orders must be placed in multiples of package quantity listed.
② Frame B is toolless connection type.
③ For mechanically arranging contactors in combinations. Distance between contactors is 0 mm.
④ Fourth pole can be broken off: four-pole: I_{th} = 60A; three-pole: I_{th} = 50A.
⑤ AC-1 current carrying capacity of the contactor increases by a factor of 2.5. For XTCEXPLKL185, one shroud is included for protection against accidental contact.
⑥ Protected against accidental contact in accordance with IEC 536.
⑦ Quantity 1 equals one sheet. One sheet contains 240 labels.

CI-K Basic Enclosures



CI-K Basic Enclosures ①②

Dimensions in Inches (mm)

Width	Height	External Depth	Internal Depth	Internal Mounting Type	Pkg. Qty.	Catalog Number
3.94 (100.0)	6.30 (160.0)	3.94 (100.0)	2.87 (73.0)	With mounting rail	1	**CI-K2X-100-TS-NA** ③
			3.11 (79.0)	With mounting plate		**CI-K2X-100-M-NA** ③
		5.71 (145.0)	4.65 (118.0)	With mounting rail		**CI-K2X-145-TS-NA** ③
			4.88 (124.0)	With mounting plate		**CI-K2X-145-M-NA** ③
4.72 (120.0)	7.87 (200.0)	4.92 (125.0)	3.66 (93.0)	With mounting rail	1	**CI-K3X-125-TS-NA** ④
			3.86 (98.0)	With mounting plate		**CI-K3X-125-M-NA** ④
		6.30 (160.0)	5.04 (128.0)	With mounting rail		**CI-K3X-160-TS-NA** ④
			5.24 (133.0)	With mounting plate		**CI-K3X-160-M-NA** ④
6.30 (160.0)	9.45 (240.0)	6.30 (160.0)	5.04 (128.0)	With mounting rail	1	**CI-K4X-160-TS-NA** ④
			5.24 (133.0)	With mounting plate		**CI-K4X-160-M-NA** ④
7.87 (200.0)	11.02 (280.0)	6.30 (160.0)	5.04 (128.0)	With mounting rail	1	**CI-K5X-160-TS-NA** ④
			5.24 (133.0)	With mounting plate		**CI-K5X-160-M-NA** ④

XTCEXCN_



Terminal Lug Kit—Set of Three Lugs

For Use with…	Description	Pkg. Qty. ⑤	Catalog Number
XTCE500M, XTCE570M	#4-500 kcmil two-phase Cu/Al 500A Also for use with XTCS series	1	**XTCEXTL500**

XTCEXTFB6_



Terminal Flat Bar ⑥

For Use with…	Pkg. Qty. ⑤	Catalog Number
XTCE500M–XTCE570M	1	**XTCEXTFB650**
XTCE750N–XTCE820N	1	**XTCEXTFB820**

For connection of a flat strip conductor. Comes with control circuit terminal (consisting of three flat strip conductor terminals). Also for use with XTCS series.

XTCEXTS_



Terminal Shroud

For Use with…	Pkg. Qty. ⑤	Catalog Number
XTCE185H–XTCE225H	1	**XTCEXTS225**
XTCE250L–XTCE400M	1	**XTCEXTS400**
XTCE500M–XTCE570M	1	**XTCEXTS500**
XTCE580N–XTCE650N	1	**XTCEXTS650**
XTCE750N–XTCEC10N	1	**XTCEXTS820**

Protection against direct contact with connection lugs when touched vertically from the front. Also for use with XTCS series.

XTCEXTLA400



Terminal Lug Assembly

For Use with…	Pkg. Qty. ⑤	Catalog Number
XTCE185–XTCE225H	1	**XTCEXTLA225A**
XTCS250L–XTCS400M, XTCE250L_–XTCE400M_	1	**XTCEXTLA400**

For connection of: round conductor, flexible and stranded, flat strip conductor, with control circuit terminal. See **Page V5-T1-97** for terminal capacities. Consists of 3 integrated lugs for line or load side. Also for use with XTCS series.

Notes

① Enclosure base RAL 9005, black/enclosure top only RAL 7035. light gray.
② Degree of protection—IEC: IP65; UL/CSA: Type 1, 3R, 4X, 12, 13—indoor and outdoor use.
③ CI-K2X_: 4 x 1/2 inch knockouts.
④ CI-K3X_, CI-K4X_, CI-K5X_: Smooth overall with sharp corners.
⑤ Orders must be placed in multiples of package quantity listed.
⑥ Not UL listed.

1

Renewal Parts

XTCERENC_





Replacement Coil—Frame C

Voltage	Coil Suffix	Catalog Number
110/50 120/60	A	XTCERENCOILCA
110–130 Vdc	AD	XTCERENCOILCAD
220/50 240/60	B	XTCERENCOILCB
200–240 Vdc	BD	XTCERENCOILCBD
415/50 480/60	C	XTCERENCOILCC
600/60	D	XTCERENCOILCD
208/60	E	XTCERENCOILCE
230/50	F	XTCERENCOILCF
190/50 220/60	G	XTCERENCOILCG
240/50 277/60	H	XTCERENCOILCH
380/50 440/60	L	XTCERENCOILCL
400/50	N	XTCERENCOILCN
380/60	P	XTCERENCOILCP
12/50 12/60	R	XTCERENCOILCR
12–14 Vdc	RD	XTCERENCOILCRD
24/50 24/60	T	XTCERENCOILCT
24–27 Vdc	TD	XTCERENCOILCTD
42/50 48/60	W	XTCERENCOILCW
48–60 Vdc	WD	XTCERENCOILCWD
48/50	Y	XTCERENCOILCY

Replacement Coil—Frame D

Voltage	Coil Suffix	Catalog Number
110/50 120/60	A	XTCERENCOILDA
110–130 Vdc	AD	XTCERENCOILDAD
220/50 240/60	B	XTCERENCOILDB
200–240 Vdc	BD	XTCERENCOILDBD
415/50 480/60	C	XTCERENCOILDC
600/60	D	XTCERENCOILDD
208/60	E	XTCERENCOILDE
230/50	F	XTCERENCOILDF
190/50 220/60	G	XTCERENCOILDG
240/50 277/60	H	XTCERENCOILDH
380/50 440/60	L	XTCERENCOILDL
400/50	N	XTCERENCOILDN
380/60	P	XTCERENCOILDP
12/50 12/60	R	XTCERENCOILDR
12–14 Vdc	RD	XTCERENCOILDRD
24/50 24/60	T	XTCERENCOILDT
24–27 Vdc	TD	XTCERENCOILDTD
42/50 48/60	W	XTCERENCOILDW
48–60 Vdc	WD	XTCERENCOILDWD
48/50	Y	XTCERENCOILDY

Replacement Coil—Frame F ①

Voltage	Coil Suffix	Catalog Number
110/50 120/60	A	XTCERENCOILFA
110–130 Vdc	AD	XTCERENCOILFAD
220/50 240/60	B	XTCERENCOILFB
200–240 Vdc	BD	XTCERENCOILFBD
415/50 480/60	C	XTCERENCOILFC
600/60	D	XTCERENCOILFD
208/60	E	XTCERENCOILFE
230/50	F	XTCERENCOILFF
190/50 220/60	G	XTCERENCOILFG
240/50 277/60	H	XTCERENCOILFH
380/50 440/60	L	XTCERENCOILFL
400/50	N	XTCERENCOILFN
380/60	P	XTCERENCOILFP
12/50 12/60	R	XTCERENCOILFR
24/50 24/60	T	XTCERENCOILFT
24–27 Vdc	TD	XTCERENCOILFTD
42/50 48/60	W	XTCERENCOILFW
48–60 Vdc	WD	XTCERENCOILFWD
48/50	Y	XTCERENCOILFY

Replacement Coil—Frame G ②

Voltage	Coil Suffix	Catalog Number
100–120V 50/60	A	XTCERENCOILGA
110–130 Vdc	AD	XTCERENCOILGAD
190–240V 50/60	B	XTCERENCOILGB
200–240 Vdc	BD	XTCERENCOILGBD
480–500V 50/60	C	XTCERENCOILGC
380–440V 50/60	L	XTCERENCOILGL
4/50 24/60	T	XTCERENCOILGT
24–27 Vdc	TD	XTCERENCOILGTD
42–48V 50/60	W	XTCERENCOILGW
48–60 Vdc	WD	XTCERENCOILGWD

Notes

① Frame F replacement coils can only be used with contactors having the following date codes: DC coils, 2706 or later; AC coils, 4706 or later.

② Frame G replacement coils can only be used with contactors having date codes of 2706 or later.

Replacement Coil—Frame H

Voltage	Coil Suffix	Catalog Number
100–120V 50/60 Hz	A	XTCERENCOILHA
190–240V 50/60 Hz	B	XTCERENCOILHB
480–500V 50/60 Hz	C	XTCERENCOILHC
380–440V 50/60 Hz	L	XTCERENCOILHL
24V 50/60Hz	T	XTCERENCOILHT
42–48V 50/60Hz	W	XTCERENCOILHW
110–130 Vdc	AD	XTCERENCOILHAD
200–240 Vdc	BD	XTCERENCOILHBD
24–27 Vdc	TD	XTCERENCOILHTD
48–60 Vdc	WD	XTCERENCOILHWD

Replacement Coil—Frame L ①

Voltage	Coil Suffix	Catalog Number
110–250 Vac/Vdc	A	XTCERENCOILLA
250–500V 40–60	C	XTCERENCOILLC
24–48 Vdc	TD	XTCERENCOILLTD
48–110 Vac/Vdc	Y	XTCERENCOILLY

Replacement Coil—Frame L, S-Series

Voltage	Coil Suffix	Catalog Number
110–120V 50/60 Hz	A	XTCSRENCOILLA
220–240V 50/60 Hz	B	XTCSRENCOILLB

Replacement Coil—Frame M ①

Voltage	Coil Suffix	Catalog Number
110–250 Vac/Vdc	A	XTCERENCOILMA
250–500V 40–60	C	XTCERENCOILMC
24–48 Vdc	TD	XTCERENCOILMTD
48–110 Vac/Vdc	Y	XTCERENCOILMY

Replacement Coil—Frame M, S-Series

Voltage	Coil Suffix	Catalog Number
110–120V 50/60 Hz	A	XTCSRENCOILMA
220–240V 50/60 Hz	B	XTCSRENCOILMB

Replacement Coil—Frame N ①

Voltage	Coil Suffix	Catalog Number
110–250 Vac/Vdc	A	XTCERENCOILNA
250–500V 40–60	C	XTCERENCOILNC
48–110 Vac/Vdc	Y	XTCERENCOILNY

Replacement Contact Kit

For Use with…	Catalog Number
XTCE040D–XTCE065D	XTCERENCONTACTD
XTCE085F–XTCE095F	XTCERENCONTACTF
XTCE115G–XTCE150G	XTCERENCONTACTG
XTCE185H–XTCE225H	XTCERENCONTACTH
XTCE250L–XTCE300L	XTCERENCONTACTL
XTCE300M	XTCERENCONTACTM300
XTCE400M	XTCERENCONTACTM400
XTCE500M	XTCERENCONTACTM500

Replacement Vacuum Tube Assembly

For Use with…	Catalog Number
XTCE580N	XTCERENVACT580
XTCE650N	XTCERENVACT650
XTCE750N	XTCERENVACT750
XTCE820N	XTCERENVACT820

Replacement Arc Chamber

For Use with…	Catalog Number
XTCE250L	XTCERENARC250
XTCE300M	XTCERENARC300
XTCE400M	XTCERENARC400
XTCE500M–XTCE570M	XTCERENARC500

Note

① Electronic modules including coils.

1

Technical Data and Specifications

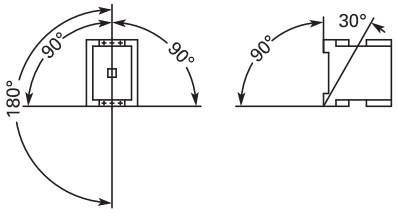
XT Contactors—Frame B

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B
General				
Standards	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS
Weights in kg [lb]				
AC operated	0.23 [0.51]	0.23 [0.51]	0.23 [0.51]	0.23 [0.51]
DC operated	0.28 [0.62]	0.28 [0.62]	0.28 [0.62]	0.28 [0.62]
Mechanical life—operations	10,000,000	10,000,000	10,000,000	10,000,000
Mechanical operating frequency (ops/hr)				
AC operated	9000	9000	9000	5000
DC operated	9000	9000	9000	5000
Electrical life	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**
Electrical operating frequency (ops/hr)—see Curves, **Page V5-T1-111**				
AC-1; 400V I_e	800	800	800	800
AC-3; 400V I_e	1000	1000	1000	1000
AC-4; 400V I_e	300	300	300	300
Climatic proofing	③	③	③	③
Insulation voltage (U_i) Vac	690	690	690	690
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000	8000
Operational voltage (U_e) Vac	690	690	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1				
Between coil and contacts (Vac)	400	400	400	400
Between contacts (Vac)	400	400	400	400
Making capacity up to 690V (amps) ①	112	112	144	155
Breaking capacity (amps)				
220/230V	70	90	120	124
380/400V	70	90	120	124
500V	50	70	100	100
660/690V	40	50	70	70
Short-circuit protection rating maximum fuse				
Type 2 coordination ②				
400V; gG/gL 500V	20	20	20	20
690V; gG/gL 690V	16	16	20	20
Type 1 coordination ②				
400V; gG/gL 500V	35	35	35	63
690V; gG/gL 690V	20	20	20	50
Degree of protection	IP20	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Terminal capacity main cable—screw terminals				
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14
Terminal capacity control circuit cable—screw terminals				
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)

Notes

① Rated operational current: Making and breaking conditions to DC-13, L/R constant as stated.
② IEC 60947 Standard.
③ Damp heat, constant, to IEC 60068-2-78; damp heat, cyclical, to IEC 60068-2-30.

XT Contactors—Frame B, continued

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B
General, continued				
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14
Main cable and control circuit cable connection screw/bolt	M3.5	M3.5	M3.5	M3.5
Tightening torque				
Nm	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6
Tools				
Main and control circuit cable—screw terminals	Size 2	Size 2	Size 2	Size 2
Pozidriv screwdriver	0.8 x 5.5	0.8 x 5.5	0.8 x 5.	0.8 x 5.5
Standard screwdriver	1 x 6	1 x 6	1 x 6	1 x 6
Terminal capacity main circuit cable—spring cage terminals				
Solid (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Flexible (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14
Terminal capacity control circuit cable—spring cage terminals				
Solid (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Flexible (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)	1 x (0.75–2.5) 1 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14
Tools				
Main and control circuit cable—spring cage terminals				
Stripping length (mm)	10	10	10	10
Screwdriver blade width (mm)	3.5	3.5	3.5	3.5
Mounting position, AC and DC operated				
Ambient temperature				
Open	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Enclosed	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental				
Mechanical shock resistance (IEC/EN 60068-2-27)				
Half-sinusoidal shock 10 ms				
Main contact—NO contact	10g	10g	10g	10g
Auxiliary contact—NO contact	7g	7g	7g	7g
Auxiliary contact—NC contact	5g	5g	5g	5g
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3

1

XT Contactors—Frames C–D

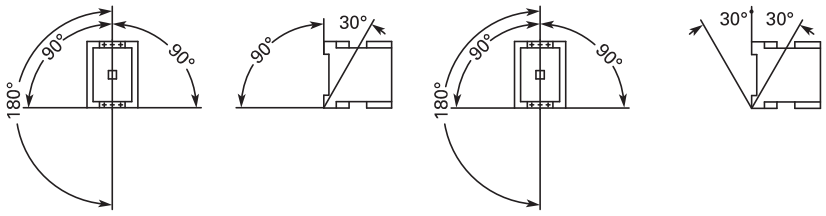
Description	XTCE018C	XTCE025C	XTCE032C	XTCE040D	XTCE050D	XTCE065D, XTCE072D
General						
Standards	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS
Weights in kg [lb]						
AC operated	0.42 [0.93]	0.42 [0.93]	0.42 [0.93]	0.9 [2.0]	0.9 [2.0]	0.9 [2.0]
DC operated	0.48 [1.06]	0.48 [1.06]	0.48 [1.06]	1.1 [2.4]	1.1 [2.4]	1.1 [2.4]
Mechanical life—operations	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
Mechanical operating frequency (ops/hr)						
AC operated	5000	5000	5000	5000	5000	5000
DC operated	5000	5000	5000	5000	5000	5000
Electrical mechanical operating frequency (ops/hr)—see Curves, **Page V5-T1-111**						
AC-1; 400V I_e	800	800	800	800	800	800
AC-3; 400V I_e	800	800	800	800	800	800
AC-4; 400V I_e	300	300	300	300	300	300
Climatic proofing	②	②	②	②	②	②
Insulation voltage (U_i) Vac	690	690	690	690	690	690
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000	8000	8000	8000
Operating voltage (U_e) Vac	690	690	690	690	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1						
Between coil and contacts (Vac)	440	440	440	440	440	440
Between contacts (Vac)	238	440	440	440	440	440
Making capacity (amps)	238	350	384	560	700	910
Breaking capacity (amps)						
220/230V	170	250	320	400	500	650
380/400V	170	250	320	400	500	650
500V	170	250	320	400	500	650
660/690V	120	150	180	250	320	370
Short-circuit protection rating maximum fuse (amps)						
Type 2 coordination ①						
400V; gG/gL 500V	25	35	63	63	80	125
690V; gG/gL 690V	25	35	35	50	63	80
Type 1 coordination ①						
400V; gG/gL 500V	63	100	125	125	160	250
690V; gG/gL 690V	50	50	63	80	80	100
Degree of protection	IP00	IP00	IP00	IP00	IP00	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Terminal capacity main cable—screw terminals						
Solid (mm^2)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)
Flexible with ferrule (mm^2)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (2.5–35) 2 x (2.5–25)	1 x (2.5–35) 2 x (2.5–25)	1 x (2.5–35) 2 x (2.5–25)
Stranded (mm^2)	1 x 16	1 x 16	1 x 16	1 x (16–50) 2 x (16–35)	1 x (16–50) 2 x (16–35)	1 x (16–50) 2 x (16–35)
Solid or stranded (AWG)	14–8	14–8	14–8	14–1	14–1	14–1
Flat conductor (number of segments x width x thickness) (mm)	—	—	—	2 x (6 x 9 x 0.8)	2 x (6 x 9 x 0.8)	2 x (6 x 9 x 0.8)

Notes

① IEC 60947 Standard.

② Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.

XT Contactors—Frames C–D, continued

Description	XTCE018C	XTCE025C	XTCE032C	XTCE040D	XTCE050D	XTCE065D, XTCE072D
General, continued						
Main cable connection screw/bolt	M5	M5	M5	M6	M6	M6
Tightening torque						
Nm	3	3	3	3.3	3.3	3.3
Lb-in	26.6	26.6	26.6	29.2	29.2	29.2
Terminal capacity control circuit cable—screw terminals						
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14	18–14	18–14
Control circuit cable connection screw/bolt	M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Tightening torque						
Nm	1.2	1.2	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6	10.6	10.6
Tools						
Main and control circuit cable—screw terminals	Size 2	Size 2	Size 2	Size 2	Size 2	Size 2
Pozidriv screwdriver	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5
Standard screwdriver	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6
Terminal capacity control circuit cable—spring cage terminals						
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14	18–14	18–14
Tools						
Main and control circuit cable—spring cage terminals						
Stripping length (mm)	10	10	10	10	10	10
Screwdriver blade width (mm)	3.5	3.5	3.5	3.5	3.5	3.5
Mounting position, AC and DC operated						
Ambient temperature						
Open	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Enclosed	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental						
Mechanical shock resistance (IEC/EN 60068-2-27)						
Main contact—NO Contact	10	10	10	10	1	1
Auxiliary contact—NO Contact	7	7	7	7	7	7
Auxiliary contact—NC Contact	5	5	5	5	5	5
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3	III/3

1

XT Contactors—Frames F–G

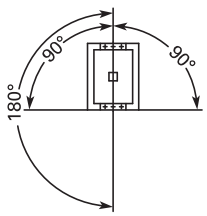
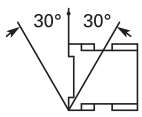
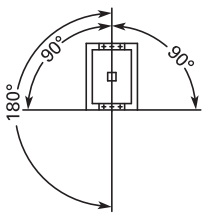
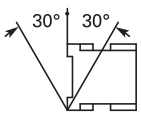
Description	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
General					
Standards	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS
Weights in kg [lb]					
AC operated	2 [4.41]	2 [4.41]	2 [4.41]	2 [4.41]	2 [4.41]
DC operated	2.1 [4.63]	2.1 [4.63]	2.1 [4.63]	2.1 [4.63]	2.1 [4.63]
Mechanical life—operations	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
Mechanical operating frequency (ops/hr)					
AC operated	3600	3600	3600	3600	3600
DC operated	3600	3600	3600	3600	3600
Electrical mechanical operating frequency (ops/hr)— see Curves, **Page V5-T1-111**					
AC-1; 400V I_e	800	800	800	800	800
AC-3; 400V I_e	800	800	800	800	800
AC-4; 400V I_e	300	300	300	300	300
Climatic proofing	②	②	②	②	②
Insulation voltage (U_i) Vac	690	690	690	690	690
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000	8000	8000
Operational voltage (U_e) Vac	690	690	690	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1					
Between coil and contacts (Vac)	690	690	690	690	690
Between contacts (Vac)	690	690	690	690	690
Making capacity (amps)	1120	1330	1610	2100	2100
Breaking capacity (amps)					
220/230V	800	950	1150	1500	1500
380/400V	800	950	1150	1500	1500
500V	800	950	1150	1500	1500
660/690V	650	800	1100	1200	1320
1000V	—	—	—	—	—
Short-circuit protection rating maximum fuse					
Type 2 coordination ①					
400V; gG/gL 500V	160	160	250	25	400
690V; gG/gL 690V	160	160	25	250	25
Type 1 coordination ①					
400V; gG/gL 500V	250	25	250	250	400
690V; gG/gL 690V	200	200	250	250	250
Degree of protection	IP00	IP00	IP00	IP00	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Terminal capacity main cable—screw terminals					
Solid (mm^2)	—	—	—	—	—
Flexible with ferrule (mm^2)	1 x (10–95) 2 x (10–70)	1 x (10–95) 2 x (10–70)	1 x (10–95) 2 x (10–70)	1 x (10–95) 2 x (10–70)	1 x (10–95) 2 x (10–70)
Stranded (mm^2)	1 x (16–95) 2 x (16–70)	1 x (16–95) 2 x (16–70)	1 x (16–95) 2 x (16–70)	1 x (16–95) 2 x (16–70)	1 x (16–95) 2 x (16–70)
Flat conductor (number of segments x width x thickness) (mm)	2 x (6 x 16 x 0.8)	2 x (6 x 16 x 0.8)	2 x (6 x 16 x 0.8)	2 x (6 x 16 x 0.8)	2 x (6 x 16 x 0.8)
Solid or stranded (AWG)	8–3/0	8–3/0	8–3/0	8–3/0	8–3/0
Main cable connection screw/bolt	M10	M10	M10	M10	M10
Tightening torque					
Nm	14	14	14	14	14
Lb-in	123.9	123.9	123.9	123.9	123.9

Notes

① IEC 60947 Standard.

② Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.

XT Contactors—Frames F–G, continued

Description	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
General, continued					
Terminal capacity control circuit cable—screw terminals					
Solid (mm^2)	1 x (0.75–4) 1 x (0.75–4)	1 x (0.75–4) 1 x (0.75–4)	1 x (0.75–4) 1 x (0.75–4)	1 x (0.75–4) 1 x (0.75–4)	1 x (0.75–4) 1 x (0.75–4)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14	18–14
Control circuit cable connection screw/bolt	M3.5	M3.5	M3.5	M3.5	M3.5
Tightening torque					
Nm	1.2	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6	10.6
Tools					
Main circuit cable—screw terminals					
Hexagon socket-head spanner (mm)	5	5	5	5	5
Control circuit cable—screw terminals					
Pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2	Size 2
Standard screwdriver	1 x 6, 0.8 x 5.5	1 x 6, 0.8 x 5.5	1 x 6, 0.8 x 5.5	1 x 6, 0.8 x 5.5	1 x 6, 0.8 x 5.5
Terminal capacity control circuit cable—spring cage terminals					
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14	18–14
Tools					
Control circuit cable—spring cage terminals					
Stripping length (mm)	10	10	10	10	10
Screwdriver blade width (mm)	3.5	3.5	3.5	3.5	3.5
Mounting position, AC and DC operated					
Ambient temperature					
Open	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Enclosed	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental					
Mechanical shock resistance (IEC/EN 60068-2-27)					
Half-sinusoidal shock 10 ms					
Main contact—NO contact	10g	10g	10g	10g	10g
Auxiliary contact—NO contact	7g	7g	7g	7g	7g
Auxiliary contact—NC contact	5g	5g	5g	5g	5g
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3

1

XT Contactors—Frames H–M

Description	XTCE185H	XTCE225H	XTCE250L, XTCS250L	XTCE300L, XTCS300L	XTCE400M XTCS400M	XTCE500M, XTCS500M	XTCE570M XTCS570M
General							
Standards	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA
Weights in kg [lb]	3.2 [7.1]	3.2 [7.1]	6.5 [14.3]	6.5 [14.3]	8 [18]	8 [18]	8 [18]
Mechanical life—operations	10,000,000	10,000,000	10,000,000	10,000,000	7,000,000	7,000,000	7,000,000
Mechanical operating frequency (ops/hr)							
AC operated	3000	3000	3000	3000	2000	2000	2000
DC operated	3000	3000	3000	3000	2000	2000	2000
Mechanical operating frequency (ops/hr)				See **Page V5-T1-93**			
Climatic proofing	②	②	②	②	②	②	②
Insulation voltage (U_i) Vac	1000	1000	1000	1000	1000	1000	1000
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000	8000	8000	8000	8000
Operating voltage (U_e) Vac	1000	1000	1000	1000	1000	1000	1000
Safe isolation to VDE 0106 Part 101 and Part 101/A1							
Between coil and contacts (Vac)	500	500	500	500	500	500	500
Between contacts (Vac)	500	500	500	500	500	500	500
Making capacity (amps)	2700	2700	3000	3600	5500	5500	5500
Breaking capacity (amps)							
Between coil and contacts (Vac)							
220/230V	2250	2250	2500	3000	5000	5000	5000
380/400V	2250	2250	2500	3000	5000	5000	5000
500V	2250	2250	2500	3000	5000	5000	5000
660/690V	2250	2250	2500	3000	5000	5000	5000
1000V	760	760	760	950	950	950	950
Short-circuit protection rating maximum fuse							
Type 2 coordination ①							
400V; gG/gL 500V	315	315	315	315	500	500	500
690V; gG/gL 690V	250	250	315	315	500	500	500
1000V; gG/gL 1000V	160	160	160	160	200	200	200
Degree of protection	IP00	IP00	IP00	IP00	IP00	IP00	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof with terminal shroud or terminal block						
Main cable cross-section							
Flexible with cable lug (mm^2)	50–185	50–185	50–240	50–240	50–240	50–240	50–240
Stranded with cable lug (mm^2)	50–185	70–185	70–240	70–240	70–240	70–240	70–240
Solid or stranded (AWG)	1/0–350 kcmil	2/0–250 kcmil	1/0–250 kcmil	2/0–500 kcmil	1/0–250 kcmil	1/0–250 kcmil	1/0–250 kcmil
Flat conductor (mm)	③	③	③	③	③	③	③
Busbar—width in mm	32	32	25	25	25	30	30
Main cable connection screw/bolt	M10	M10	M10	M10	M10	M10	M10
Tightening torque							
Nm	24	24	24	24	2	2	2
Lb-in	213	213	213	213	213	213	213

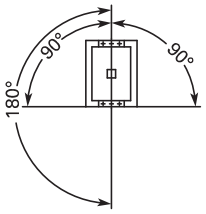
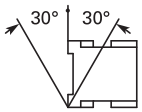
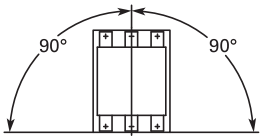
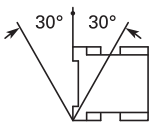
Notes

① IEC 60947 Standard.

② Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.

③ Screw tightening with flat cable terminal or cable terminal blocks. See terminal capacity for cable terminal blocks.

XT Contactors—Frames H–M, continued

Description	XTCE185H	XTCE225H	XTCE250L, XTCS250L	XTCE300L, XTCS300L	XTCE400M XTCS400M	XTCE500M, XTCS500M	XTCE570M XTCS570M
General, continued							
Control circuit cable cross-sections							
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)
Control circuit cable connection screw/bolt	M3.5	M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Tightening torque							
Nm	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6	10.6	10.6	10.6
Tools							
Main cable wrench	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm	16 mm
Control circuit cable pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2	Size 2	Size 2	Size 2
Mounting position, AC and DC operated							
Ambient temperature	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental							
Mechanical shock Resistance (IEC/EN 60068-2-27)							
Half-sinusoidal shock 10 ms							
Main contact—NO contact	10g	10g	10g	10g	10g	10g	10g
Auxiliary contact—NO contact	10g	10g	10g	10g	10g	10g	10g
Auxiliary contact—NC contact	8g	8g	8g	8g	8g	8g	8g
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3	III/3	III/3
Switching capacity, kVAR ①							
Individual compensation							
230V	—	—	—	—	—	—	—
400/420/440V	—	—	—	—	—	—	—
525V	220	220	—	307	—	—	—
690V	133	133	—	177	—	—	—
Group compensation, with choke							
230V	—	—	100	—	160	160	160
400/420/440V	—	—	190	—	280	280	280
525V	—	—	260	—	370	370	370
690V	—	—	340	—	480	480	480

Note

① When using contactors for group compensation, a minimum inductance of approx. 6 uh per capacitor must be available to limit the high inrush current peaks. This corresponds to an air-cored coil with five windings and a coil diameter of approximately 140 mm. The conductor cross-section must be selected according to the rated current per phase.

XT Contactors—Frames N–R

Description	XTCE580N	XTCE650N	XTCE750N, XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R, XTCEC20R
General						
Standards	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA
Weights in kg [lb]	15 [33]	15 [33]	15 [33]	15 [33]	15, [33]	32 [70]
Mechanical life—operations	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
Mechanical operating frequency (ops/hr)						
AC operated	1000	1000	1000	1000	1000	1000
DC operated	1000	1000	1000	1000	1000	1000
Maximum operating frequency (ops/hr)			See **Page V5-T1-113**			
Climatic proofing	②	②	②	②	②	②
Insulation voltage (U_i) Vac	1000	1000	1000	1000	1000	1000
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000	8000	8000	8000
Operating voltage (U_e) Vac	1000	1000	1000	1000	1000	1000
Safe isolation to VDE 0106 Part 101 and Part 101/A1						
Between coil and contacts (Vac)	500	500	500	500	500	500
Between contacts (Vac)	500	500	500	500	500	500
Making capacity (amps)	7800	7800	9840	9840	9840	19000, 9840
Breaking capacity (amps)						
220/230V	6500	6500	8200	8200	8200	16000, 8200
380/400V	6500	6500	8200	8200	8200	16000, 8200
500V	6500	6500	8200	8200	8200	16000, 8200
660/690V	6500	6500	8200	8200	8200	16000, 8200
1000V	4350	4350	5800	5800	5800	5800
Short-circuit protection rating maximum fuse						
Type 2 coordination ①						
400V; gG/gL 500V	630	630	630	630	—	—
690V; gG/gL 690V	630	630	630	630	—	—
1000V; gG/gL 1000V	500	500	630	630	—	—
Type 1 coordination ①						
400V; gG/gL 500V	1000	1000	1200	1200	—	—
690V; gG/gL 690V	1000	1000	1200	1200	—	—
1000V; gG/gL 1000V	630	630	800	800	—	—
Degree of protection	IP00	IP00	IP00	IP00	IP00	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof with terminal shroud or terminal block	Finger and back-of-hand proof with terminal shroud or terminal block	Finger and back-of-hand proof with terminal shroud or terminal block	Finger and back-of-hand proof with terminal shroud or terminal block	Finger and back-of-hand proof with terminal shroud or terminal block	Finger and back-of-hand proof with terminal shroud or terminal block
Main cable cross-section						
Flexible with cable lug (mm^2)	50-240	50-240	50-240	50-240	50-240	50-240
Stranded with cable lug (mm^2)	70-240	70-240	70-240	70-240	70-240	70-240
Solid or stranded (AWG)	2/0–500 kcmil	2/0–500 kcmil	2/0–500 kcmil	2/0–500 kcmil	2/0–500 kcmil	2/0–500 kcmil
Flat conductor (mm)	③	③	③	③	③	③
Busbar—width in mm	50	50	50	50	50	50
Main cable connection screw/bolt	M10	M10	M12	M12	M12	M1
Tightening torque						
Nm	24	24	35	35	35	35
Lb-in	213	213	311	311	311	311

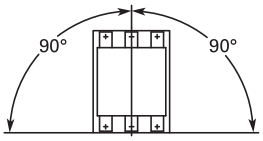
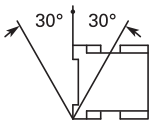
Notes

① IEC 60947 Standard.

② Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.

③ Screw tightening with flat cable terminal or cable terminal blocks. See terminal capacity for cable terminal blocks.

XT Contactors—Frames N–R, continued

Description	XTCE580N	XTCE650N	XTCE750N, XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R, XTCEC20R
General, continued						
Control circuit cable cross-sections						
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)
Control circuit cable connection screw/bolt	M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Tightening torque						
Nm	1.2	1.2	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6	10.6	10.6
Tools						
Main cable wrench	16 mm	16 mm	18 mm	18 mm	18 mm	18 mm
Control circuit cable pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2	Size 2	Size 2
Mounting position, AC and DC operated						
Ambient temperature	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental						
Mechanical shock resistance (IEC/EN 60068-2-27)						
Half-sinusoidal shock 10 ms (g)						
Main contact—NO contact	10	10	10	10	10	10
Auxiliary contact—NO contact	10	10	10	10	10	10
Auxiliary contact—NC contact	8	8	8	8	8	8
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3	III/3
Switching capacity, kVAR ①						
Individual compensation						
230V	175	—	—	—	—	—
400/420/440V	300	—	—	—	—	—
525V	400	—	—	—	—	—
690V	300	—	—	—	—	—

Note

① When using contactors for group compensation, a minimum inductance of approx. 6 uh per capacitor must be available to limit the high inrush current peaks. This corresponds to an air-cored coil with five windings and a coil diameter of approximately 140 mm. The conductor cross-section must be selected according to the rated current per phase.

Coil Data—Frames B–D

Description	XTCE007B	XTCE009B	XTCE012B, XTCF020B	XTCE015B	XTCE018C	XTCE025C	XTCE032C	XTCE040D	XTCE050D	XTCE065D, XTCE072D
Voltage Tolerance										
Pickup (x U_c)										
AC operated	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1
DC operated	0.8–1.1 ①	0.8–1.1 ①	0.8–1.1 ①	0.8–1.1 ①	0.7–1.2 ②	0.7–1.2 ②	0.7–1.2 ②	0.7–1.2 ②	0.7–1.2 ②	0.7–1.2 ②
Dropout (x U_c)										
AC operated	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6	0.3–0.6
DC operated	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6
Power Consumption of the Coil at Cold State and 1.0 x U_c										
AC operated Single-voltage coil 50 Hz										
Pickup VA	24	24	24	24	52	52	52	149	149	149
Pickup W	19	19	19	19	40	40	40	80	80	80
Sealing VA	3.4	3.4	3.4	3.4	7.1	7.1	7.1	16	16	16
Sealing W	1.2	1.2	1.2	1.2	2.1	2.1	2.1	4.3	4.3	4.3
Single-voltage coil 60 Hz										
Pickup VA	30	30	30	30	67	67	67	178	178	178
Pickup W	23	23	23	23	50	50	50	117	117	117
Sealing VA	4.4	4.4	4.4	4.4	8.7	8.7	8.7	19	19	19
Sealing W	1.4	1.4	1.4	1.4	2.6	2.6	2.6	5.3	5.3	5.3
50/60 Hz										
Pickup VA	27 25	27 25	27 25	27 25	62 58	62 58	62 58	168 154	168 154	168 154
Pickup W	22 21	22 21	22 21	22 21	48 43	48 43	48 43	120 43	120 43	120 43
Sealing VA	4.2 3.3	4.2 3.3	4.2 3.3	4.2 3.3	9.1 6.5	9.1 6.5	9.1 6.5	22 14	22 14	22 14
Sealing W	1.4 1.2	1.4 1.2	1.4 1.2	1.4 1.2	2.5 2	2.5 2	2.5 2	5.3 4.3	5.3 4.3	5.3 4.3
DC operated										
Pickup W	3	3	4.5	4.5	12 at 24V	12 at 24V	12 at 24V	24 at 24V	24 at 24V	24 at 24V
Sealing W	3	3	4.5	4.5	0.5 at 24V	0.5 at 24V	0.5 at 24V	0.5 at 24V	0.5 at 24V	0.5 at 24V
Duty factor (%DF)	100	100	100	100	100	100	100	100	100	100
Switching Time at 100% U_c (Approximate Values)										
Main contact										
AC operated										
Closing delay (ms)	<21	<21	<21	<21	<22	<22	<22	<18	<18	<18
Opening delay (ms)	<18	<18	<18	<18	<14	<14	<14	<13	<13	<13
DC operated										
Closing delay (ms)	<31	<31	<31	<31	<47	<47	<47	<54	<54	<54
Opening delay (ms)	<12	<12	<12	<12	<30	<30	<30	<24	<24	<24
Arcing time (ms)	10	10	10	10	10	10	10	10	10	10
Electromagnetic Compatibility (EMC)										
Emitted interference	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1
Noise immunity	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1	To EN-60947-1

Notes

① 0.7–1.3 without additional auxiliary contact modules and ambient temperature +40°C [104°F].

② Coil Suffix TD: U_{min} 24 Vdc/U_{max} 27 Vdc.
Coil Suffix WD: U_{min} 48 Vdc/U_{max} 60 Vdc.
Coil Suffix AD: U_{min} 110 Vdc/U_{max} 130 Vdc.
Coil Suffix BD: U_{min} 200 Vdc/U_{max} 240 Vdc.
Example:
U_c = 0.7 x U_{min}—1.2 x U_{max}
U_c = 0.7 x 24V—1.2 x 27 Vdc

Coil Data—Frames F–G

Description	XTCE80F	XTCE95F	XTCE115G	XTCE150G	XTCE170G
Voltage Tolerance					
Pickup (x U_c)					
AC operated	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1
DC operated	0.7–1.2 ①	0.7–1.2 ①	0.7–1.2 ①	0.7–1.2 ①	0.7–1.2 ①
Dropout (x U_c)					
AC operated	0.3–0.6	0.3–0.6	0.25–0.6	0.25–0.6	0.25–0.6
DC operated	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6	0.15–0.6
Power Consumption of the Coil at Cold State and 1.0 x U_c					
AC operated Single-voltage coil 50 Hz					
Pickup VA	310	310	180	180	180
Pickup W	165	165	130	130	130
Sealing VA	26	26	3.1	3.1	3.1
Sealing W	5.8	5.8	2.1	2.1	2.1
Single-voltage coil 60 Hz					
Pickup VA	345	345	170	170	170
Pickup W	190	190	130	130	130
Sealing VA	30	30	3.1	3.1	3.1
Sealing W	7.1	7.1	2.1	2.1	2.1
50/60 Hz					
Pickup VA	372	328	170	170	170
Pickup W	190	190	130	130	130
Sealing VA	37.1	22.6	3.1	3.1	3.1
Sealing W	7.5	6.1	2.1	2.1	2.1
DC operated					
Pickup W	90 at 24V	90 at 24V	149 at 24V	149 at 24V	149 at 24V
Sealing W	1.3 at 24V	1.3 at 24V	2.1 at 24V	2.1 at 24V	2.1 at 24V
Duty factor (%DF)	100	100	100	100	100
Switching Time at 100% U_c (Approximate Values)					
Main contact					
AC operated					
Closing delay (ms)	<20	<20	<33	<33	<33
Opening delay (ms)	<14	<14	<41	<41	<41
DC operated					
Closing delay (ms)	<45	<45	<35	<35	<35
Opening delay (ms)	<34	<34	<30	<30	<30
Arcing time (ms)	15	15	15	15	15
Permissible residual current with actuation of A1–A2 by the electronics (with 0 signal) (mA)	≤1	≤1	≤1	≤1	≤1
Electromagnetic Compatibility (EMC)					
Emitted interference	To EN60947-1	To EN60947-1	To EN60947-1	To EN60947-1	To EN60947-1
Noise immunity	To EN60947-1	To EN60947-1	To EN60947-1	To EN60947-1	To EN60947-1

Note

① At 24V: 0.7–1.3 without additional auxiliary contact modules and ambient temperature +40°C [104°F].

Coil Data—Frames H–R

Description	XTCE185H, XTCE225H	XTCE250L, XTCS250L	XTCE300L, XTCS300L	XTCE400M, XTCS400M, XTCE500M, XTCS500M, XTCE570M, XTCS570M
Voltage Tolerance				
Pickup (x U_c)				
XTCE185H–XTCEC20R	0.8 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}
XTCS250L–XTCS500M	—	0.85 x U_{cmin}–1.1 x U_{cmax}	0.85 x U_{cmin}–1.1 x U_{cmax}	0.85 x U_{cmin}–1.1 x U_{cmax}
Dropout (x U_c)				
XTCE185H–XTCEC20R	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}
XTCS250L–XTCS500M	—	0.2 x U_{cmin}–0.4 x U_{cmax}	0.2 x U_{cmin}–0.4 x U_{cmax}	0.2 x U_{cmin}–0.4 x U_{cmax}
Power Consumption of the Coil at Cold State and 1.0 x U_c				
XTCE185H–XTCEC20R				
Pickup VA	210 ①	250 ①	380 ①	450 ①
Pickup W	180	200	250	350
Sealing VA	2.6	4.3	4.3	4.3
Sealing W	2.1	3.3	3.3	3.3
XTCS250L–XTCS500M				
Pickup VA	—	360	360	715
Pickup W	—	325	625	645
Sealing VA	—	4.3	4.3	4.3
Sealing W	—	3.3	3.3	3.3
Duty factor (%DF)	—	100	100	100
Switching Time at 100% Main Contact U_c (Approximate Values)				
XTCE185H–XTCEC20R				
Closing delay (ms)	<60	<100	<80	<80
Opening delay (ms)	<40	<80	<110	<80
XTCS250L–XTCS500M				
Closing delay (ms)	—	<50	<55	<50
Opening delay (ms)	—	<40	<40	<40
Reaction in Threshold and Sealing State Transition Range (XTCE185H–XTCEC20R)				
Voltage interruptions				
(0–0.2 x U_{cmin}) ≤10 ms	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully
(0–0.2 x U_{cmin}) >10 ms	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor
Voltage dips				
(0.2–0.6 x U_{cmin}) ≤12 ms	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully
(0.2–0.6 x U_{cmin}) >12 ms	Contactor remains switched on	Contactor remains switched on	Dropout of the contactor	Contactor remains switched on
(0.6–0.7 x U_{cmin})	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on
Excess voltage				
(1.15–1.3 x U_{cmax})	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on
(>1.3 x U_{cmax}) ≤3s	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on
(>1.3 x U_{cmax}) >3s	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor
Pickup phase				
(0–0.7 x U_{cmin})	Contactor does not switch on	Contactor does not switch on	Contactor does not switch on	Contactor does not switch on
(0.7 x U_{cmin} –1.15 x U_{cmax})	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty
(>1.15 x U_{cmax})	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty

Note

① Control transformer with U_k ≤6%.

Coil Data—Frames H–R, continued

Description	XTCE185H, XTCE225H	XTCE250L, XTCS250L	XTCE300L, XTCS300L	XTCE400M, XTCS400M, XTCE500M, XTCS500M, XTCE570M, XTCS570M
Reaction in Threshold and Sealing State Transition Range (XTCE185H–XTCEC20R), continued				
Permissible contact resistance (of the external command device with actuation of A11), ohms	—	≤500	≤500	≤500
Permissible residual current (with actuation of A11 by the electronics with 0 signal)	—	≤1	≤1	≤1
SPS signal level (A3–A4) to IEC/EN 61131-2 (Type 2)				
High	15V	15V	15V	15V
Low	5V	5V	5V	5V
Electromagnetic compatibility (EMC)	This product is designed for operation in industrial environments (environment 2). The use in residential environments (environment 1) could cause electrical interference so that addition suppression must be planned.			

Coil Data—Frames N–R

Description	XTCE580N	XTCE750N, XTCE820N	XTCEC10N	XTCEC14P	XTCE16R, XTCEC20R
Voltage Tolerance					
Pickup (x U_c)					
XTCE185L–XTCEC20R	0.7 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}	0.7 x U_{cmin}–1.15 x U_{cmax}
XTCS185L–XTCS500M	0.85 x U_{cmin}–1.1 x U_{cmax}	0.85 x U_{cmin}–1.1 x U_{cmax}	0.85 x U_{cmin}–1.1 x U_{cmax}	0.85 x U_{cmin}–1.1 x U_{cmax}	0.85 x U_{cmin}–1.1 x U_{cmax}
Dropout (x U_c)					
XTCE185L–XTCEC20R	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}	0.2 x U_{cmin}–0.6 x U_{cmax}
XTCS185L–XTCS500M	0.2 x U_{cmin}–0.4 x U_{cmax}	0.2 x U_{cmin}–0.4 x U_{cmax}	0.2 x U_{cmin}–0.4 x U_{cmax}	0.2 x U_{cmin}–0.4 x U_{cmax}	0.2 x U_{cmin}–0.4 x U_{cmax}
Power Consumption of the Coil at Cold State and 1.0 x U_c					
XTCE185L–XTCEC20R					
Pickup VA	800 ①	800 ①	800 ①	800 ①	1600 ①
Pickup W	700	700	700	700	1400
Sealing VA	7.5	7.5	7.5	7.5	15
Sealing W	6.5	6.5	6.5	6.5	13
XTCS185L–XTCS500M					
Pickup VA	—	—	—	—	—
Pickup W	—	—	—	—	—
Sealing VA	—	—	—	—	—
Sealing W	—	—	—	—	—
Duty factor (%DF)	100	100	100	100	100
Switching Time at 100% Main Contact U_c (Approximate Values)					
XTCE185L–XTCEC20R					
Closing delay (ms)	<70	<70	<70	<70	<70
Opening delay (ms)	<70	<70	<70	<40	<40
XTCS185L–XTCS500M					
Closing delay (ms)	—	—	—	—	—
Opening delay (ms)	—	—	—	—	—

Note

① Control transformer with U_k ≤7%.

Coil Data—Frames N–R, continued

Description	XTCE580N	XTCE750N, XTCE820N	XTCEC10N	XTCEC14P	XTCE16R, XTCEC20R
Reaction in Threshold and Sealing State Transition Range (XTCE185L–XTCEC20R)					
Voltage interruptions					
(0–0.2 x U_{cmin}) ≤10 ms	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully
(0–0.2 x U_{cmin}) >10 ms	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor
Voltage dips					
(0.2–0.6 x U_{cmin}) ≤12 ms	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully	Time is bridged successfully
(0.2–0.6 x U_{cmin}) >12 ms	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor
(0.6–0.7 x U_{cmin})	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on
Excess voltage					
(1.15–1.3 x U_{cmax})	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on
(>1.3 x U_{cmax}) ≤3s	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on	Contactor remains switched on
(>1.3 x U_{cmax}) >3s	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor	Dropout of the contactor
Pickup phase					
(0–0.7 x U_{cmin})	Contactor does not switch on	Contactor does not switch on	Contactor does not switch on	Contactor does not switch on	Contactor does not switch on
(0.7 x U_{cmin} –1.15 x U_{cmax})	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty
(>1.15 x U_{cmax})	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty	Contactor switches on with certainty
Permissible contact resistance (of the external command device with actuation of A11), ohms	≤500	≤500	≤500	≤500	≤500
Permissible residual current (with actuation of A11 by the electronics with 0 signal)	≤1	≤1	≤1	≤1	≤1
SPS signal level (A3–A4) to IEC/EN 61131-2 (Type 2)					
High	15V	15V	15V	15V	15V
Low	5V	5V	5V	5V	5V
Electromagnetic compatibility (EMC)	①	①	①	①	①

Note

① This product is designed for operation in industrial environments. Usage in domestic areas can cause radio frequency interference (RFI). Noise suppression measures must be provided for the additional interference.

XT Contactors—Four-Pole

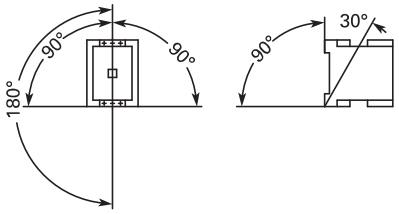
Description	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
General								
Standards	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA
Weights in kg [lb]								
AC operated	0.22 [0.49]	0.49 [1.1]	0.49 [1.1]	1.0 [2.3]	1.0 [2.3]	2.8 [6.2]	2.8 [6.2]	2.8 [6.2]
DC operated	0.29 [0.64]	0.49 [1.1]	0.49 [1.1]	1.0 [2.3]	1.0 [2.3]	2.8 [6.2]	2.8 [6.2]	2.8 [6.2]
Mechanical life—operations	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
Mechanical operating frequency (ops/hr)								
AC operated	5000	5000	5000	5000	5000	3600	3600	3600
DC operated	5000	5000	5000	5000	5000	3600	3600	3600
Electrical life	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**	See Curves, **Page V5-T1-111**
Electrical operating frequency (ops/hr)	600	600	600	600	600	600	600	600
Climatic proofing	①	①	①	①	①	①	①	①
	②	②	②	②	②	②	②	②
Insulation voltage (U_i) Vac	690	690	690	690	690	690	690	690
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000	8000	8000	8000	8000	8000
Operation voltage (U_e) Vac	690	690	690	690	690	690	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1								
Between coil and contacts (Vac)	400	440	440	440	440	440	440	440
Between contacts (Vac)	400	440	440	440	440	440	440	440
Making capacity up to 690V (amps)	144	238	350	560	700	1120	1330	1800
Breaking capacity (amps)								
220/230V	120	180	250	00	00	800	950	1150
380/400V	120	180	250	400	500	800	950	1150
500V	100	180	250	400	500	800	950	1150
660/690V	70	120	144	250	296	650	750	800
Short-circuit protection rating maximum fuse								
Type 2 coordination								
400V; gG/gL 500V	20	35	35	63	80	160	160	250
690V; gG/gL 690V	2	35	35	50	63	160	160	200
Type 1 coordination								
400V; gG/gL 500V	35	6	100	125	160	250	250	250
690V; gG/gL 690V	25	50	50	80	80	200	200	200
Degree of protection with accessories	IP20	IP00	IP00	IP00	IP00	IP00	IP00	IP00
	—	—	—	IP20	IP20	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof

Notes

① Damp heat, constant, to IEC 60068-2-3.

② Damp heat, cyclical, to IEC 60068-2-30.

XT Contactors—Four-Pole, continued

Description	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
General, continued								
Terminal capacity main cable—screw terminals								
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–16) 2 x (0.75 –10)	1 x (0.75–16) 2 x (0.75 –10)	1 x (2.5 –16) 2 x (2.5 –16)	1 x (2.5 –16) 2 x (2.5 –16)	—	—	—
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (2.5–35) 2 x (2.5–25)	1 x (2.5–35) 2 x (2.5–25)	1 x (10 –95) 2 x (10–70)	1 x (10 –95) 2 x (10–70)	1 x (10 –95) 2 x (10–70)
Solid or stranded (AWG)	18–14	18–6	18–6	12–2	12–2	8–250 kcmil	8–250 kcmil	8–250 kcmil
Terminal capacity control circuit cable—screw terminals								
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14	18–14	18–14	18–14	18–14	18–14
Main cable connection screw/bolt								
Tightening torque								
Nm	1.2	3	3	3.3	3.3	14	14	14
Lb-in	10.6	26.6	26.6	29.2	29.2	123.9	123.9	123.9
Control circuit cable connection screw/bolt								
Tightening torque								
Nm	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
Tools								
Main and control circuit cable—								
Screw terminals	2	2	2	2	2	—	—	—
Pozidriv screwdriver	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	—	—	—
Standard screwdriver	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6	—	—	—
Mounting position, AC and DC operated								
Ambient temperature								
Open	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)	–25 to 60°C (–13 to 140°F)
Enclosed	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)	–25 to 40°C (–13 to 104°F)
Ambient storage temperature	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)	–40 to 80°C (–40 to 176°F)

XT Contactors—Four-Pole, continued

Description	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
Environmental								
Mechanical shock resistance (IEC/EN 60068-2-27)								
Half-sinusoidal shock 10 ms								
Main contact—NO contact	10g	10g	10g	10g	10g	10g	10g	10g
Auxiliary contact—NO contact	7g	7g	7g	7g	7g	7g	7g	7g
Auxiliary contact—NC contact	5g	5g	5g	5g	5g	5g	5g	5g
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3	III/3	III/3	III/3
Coil Data Voltage Tolerance								
Pickup (x U_c)								
AC operated	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1	0.8–1.1
DC operated	0.8–1.1	0.7–1.2	0.7–1.2	0.7–1.2	0.7–1.2	0.7–1.2	0.7–1.2	0.7–1.2
Dropout (x U_c)								
AC operated	0.4–0.6	0.4–0.6	0.4–0.6	0.4–0.6	0.4–0.6	0.4–0.6	0.4–0.6	0.4–0.6
DC operated	0.2–0.6	0.2–0.6	0.2–0.6	0.2–0.6	0.2–0.6	0.2–0.6	0.2–0.6	0.2–0.6
Power Consumption of the Coil at Cold State and 1.0 x U_c								
AC operated 50/50Hz								
Pickup VA	24	50	50	150	150	180	180	180
Pickup W	19	40	40	95	95	150	150	150
Sealing VA	4	8	8	16	16	3.1	3.1	3.1
Sealing W	1.2	2.4	2.4	4	4	2.1	2.1	2.1
DC operated								
Pickup W	4.5	12	12	24	24	149	149	149
Sealing W	4.5	0.5	0.5	0.5	0.5	2.1	2.1	2.1
Duty factor (%DF)	100	100	100	100	100	100	100	100
Switching Time at 100% U_c (Approximate Values)								
Main contact								
AC operated								
Closing delay (ms)	15 to 21	6 to 22	6 to 22	12 to 18	12 to 18	28 to 33	28 to 33	28 to 33
Opening delay (ms)	9 to 18	8 to 14	8 to 14	8 to 13	8 to 13	35 to 41	35 to 41	35 to 41
DC operated								
Closing delay (ms)	31	47	47	54	54	35	35	35
Opening delay (ms)	12	30	30	24	24	30	30	30
Arcing time (ms)	10	10	10	10	10	15	15	15

1

Auxiliary Contacts

Description	XTCE007B_– XTCE032C	XTCEXFAC_ XTCEXFATC_	XTCEXFCC_ XTCEXSCC_	XTCEXFAG_	XTCEXSBLN_ XTCEXSBN_ XTCEXSBNC_ XTCEXSCN_ XTCEXSCNC_
Interlocked opposing contacts with an auxiliary contact module (to IEC 60947-5 -1 Annex L)	—	Yes	Yes	Yes	Yes
Break contact (not late-break contact) suitable as a mirror contact (to IEC/EN 60947-4 -1 Annex F)	XTCE007B_– XTCE032C	XTCE007B_–XTCE032C	XTCE007B_–XTCE032C	XTCE040D_–XTCE065D_	XTCE040D_–XTCE065D_ XTCE185L_–XTCEC10N_
Rated impulse withstand voltage, (U_{imp}) Vac	6000	6000	6000	6000	6000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3
Rated insulation voltage, (U_i) Vac	690	690	690	690	690
Rated operational voltage, (U_e) Vac	500	500	500	500	500
Safe isolation to VDE 0106 Part 101 and Part 101(A) in Vac					
Between coil and auxiliary contacts	400	400	400	440	440
Between the auxiliary contacts	400	400	400	440	440
Rated operational current, I_e					
AC-15					
230V	6A	6A	6A	6A	6A
380/415V	4A	3A	4A	4A	4A
500V	1.5A	—	1.5A	1.5A	1.5A
DC-3 L/R ≤5 ms ①					
24V	10A	10A	10A	10A	10A
60V	6A	6A	6A	6A	6A
110V	3A	3A	3A	3A	3A
220V	1A	1A	1A	1A	1A
Conventional thermal current, I_{th}	16A	16A	16A ③	10A	10A
Control circuit reliability (at U_e = 24 Vdc, U_{min} = 17 V, I_{min} = 5.4 mA)	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations
Component lifespan, operations x 10^6 at U_e = 230V, AC-15, 3A	1.3	1.3	1.3	1.3	1.3
Short-circuit rating without welding ②					
Maximum fuse, gG/gL	10A	10A	10A	16A	16A

Notes

① Making and breaking conditions to DC-13, time L/R contact as stated.
② See fuses overlay for time/current characteristic (on request).
③ Conventional thermal current (I_{th}) of XTCEXSCC_ is 10A.

Parallel Link

Description	XTCEXPLKB	XTECXPLKC	XTCEXPLKD	XTCEXPLKG	XTCEXPLK185
Terminal capacity					
Solid (mm^2)	1–16	16	16	—	—
Flexible with ferrule (mm^2)	1 x (0.5–25) 2 x (0.5–16)	1 x (16–35)	1 x (16–120)	—	—
Stranded (mm^2)	1 x (0.5–25) 2 x (0.5–16)	1 x (16–50)	1 x (16–120)	1 x (35–300) 2 x (35–120)	—
Flat conductor—number of segments x width x thickness (mm)	6 x 9 x 0.8	—	—	2 x (11 x 21 x 1)	1 x (6 x 16 x 0.8) 2 x (20 x 32 x 0.5) 2 x (11 x 21 x 1)
Tightening torque (Nm)	4	4	14	—	—
Tools					
Pozidriv screwdriver	Size 2	Size 2	—	—	—
Hexagon socket head spanner—SW (mm)	—	—	5	6	—
Conventional thermal current					
Three-pole (I_{th}) A	50	100	180	400	—
Four-pole (I_{th}) A	60	—	—	—	—

Cable Terminal Block, Flat Cable Terminal

Description	XTCEXTLA225A	XTCEXTLA400	XTCEXPLK185	XTCEXTFB650	XTCEXTFB820
Terminal capacity					
Stranded (mm^2)	1 x (16–185) 2 x (16–150)	1 x (120–300) 2 x (70–240)	—	—	—
Stranded (AWG)	1 x (6–350 kcmil) 2 x (6–350 kcmil)	1 x (250–600 kcmil) 2 x (2/0–500 kcmil)	—	—	—
Flat conductor—number of segments x width x thickness (mm)	—	—	1 x (6 x 16 x 0.8) 2 x (20 x 32 x 0.5) 2 x (11 x 21 x 1)	1 x (6 x 16 x 0.8) 2 x (20 x 32 x 0.5) 2 x (11 x 21 x 1)	1 x (6 x 16 x 0.8) 2 x (10 x 40 x 1) 2 x (20 x 40 x 0.5)

AC Ratings—AC-1 Operation

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C
Conventional free air thermal current, three-pole, 50–60 Hz							
Open							
at 40°C (I_{th})	22A	22A	22A	22A	40A	45A	45A
at 50°C (I_{th})	21A	21A	21A	21A	38A	43A	43A
at 55°C (I_{th})	21A	21A	21A	21A	37A	42A	42A
at 60°C (I_{th})	20A	20A	20A	20A	35A	40A	40A
Enclosed	18A	18A	18A	18A	32A	36A	36A
Conventional free air thermal current, single-pole (I_{th})							
Open	50A	50A	50A	50A	88A	100A	100A
Enclosed	45A	45A	45A	45A	80A	90A	90A

AC Ratings—AC-3 Operation

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C
Rated operational current, 50/60 Hz ① (I_e) in amperes							
220/230V	7	9	12	15.5	18	25	32
240V	7	9	12	15.5	18	25	32
380/400V	7	9	12	15.5	18	25	32
415V	7	9	12	15.5	18	25	32
440V	7	9	12	15.5	18	25	32
500V	5	7	10	12.5	18	25	32
660/690V	4	5	7	9	12	15	18
1000V	—	—	—	—	—	—	—
Rated power (P) in kilowatts							
220/230V	2.2	2.5	3.5	4	5	7.5	10
240V	2.2	3	4	4.6	5.5	8.5	11
380/400V	3	4	5.5	7.5	7.5	11	15
415V	4	5.5	7	8	10	14.5	19
440V	4.5	5.5	7.5	8.4	10.5	15.5	20
500V	3.5	4.5	7	7.5	12	17.5	23
660/690V	3.5	4.5	6.5	7	11	14	17
1000V	—	—	—	—	—	—	—

AC Ratings—AC-4 Operation

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C
Rated operational current, 50/60 Hz ② (I_e) in amperes							
220/230V	5	6	7	7	10	13	15
240V	5	6	7	7	10	13	15
380/400V	5	6	7	7	10	13	15
415V	5	6	7	7	10	13	15
440V	5	6	7	7	10	13	15
500V	4.5	5	6	6	1	13	1
660/690V	4	4.5	5	5	8	10	12
1000V	—	—	—	—	—	—	—
Rated power (P) in kilowatts							
220/230V	1	1.5	2	2	2.5	3.5	4
240V	1.5	1.6	2.2	2.2	3	4	4.5
380/400V	2.2	2.5	3	3	4.5	6	7
415V	2.3	2.8	3.4	3.4	5	6.5	7.5
440V	2.4	3	3.6	3.6	5.5	7	8
500V	2.5	2.8	3.5	3.5	6	8	9
660/690V	2.9	3.6	4.4	4.4	6.5	8.5	10
1000V	—	—	—	—	—	—	—

Notes

① At maximum permissible ambient temperature.

② Example—
The transformer has a nominal current of 10A with an inrush current of 18 times the nominal current. So, the contactor must have an AC-3 current of 18/6 x 10A = 30A. Using an XTCE032C (32A AC-3) contactor is recommended.

AC Ratings—AC-6A Operation

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C
Transformer loads	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific
Calculation is I_e AC-3 = X / 6 * I_e transformer where X is the inrush current of the transformer and I_e transformer is the nominal current. ①							

AC Ratings—AC-6B Operation

Description	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C
Capacitor loads Individual compensation rated operational current I_e of three-phase capacitors in amperes							
Up to 525V	See **Page V5-T1-63** for capacitor ratings						
690V	See **Page V5-T1-63** for capacitor ratings						
Maximum inrush current peak (x I_e)	30	30	30	30	30	30	30
Component lifesaving (operations)	—	—	—	—	—	—	—
Maximum operating frequency (ops/hr)	—	—	—	—	—	—	—

AC Ratings—AC-1 Operation

Description	XTCE040D	XTCE050D	XTCE065D	XTCE072D	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
Conventional free air thermal current, three-pole, 50–60 Hz									
Open									
at 40°C (I_{th})	60A	80A	98A	98A	110A	130A	160A	190A	275A ②
at 50°C (I_{th})	57A	71A	88A	88A	98A	125A	142A	180A	200A
at 55°C (I_{th})	55A	68A	83A	83A	94A	115A	135A	170A	190A
at 60°C (I_{th})	50A	65A	80A	80A	90A	110A	130A	160A	185A
Enclosed	45A	58A	72A	72A	80A	100A	115A	144A	166A
Conventional free air thermal current, single-pole (I_{th})									
Open	125A	162A	200A	200A	225A	275A	325A	400A	460A
Enclosed	112A	145A	180A	180A	200A	250A	285A	360A	415A

Notes

① Example—
The transformer has a nominal current of 10A with an inrush current of 18 times the nominal current. So, the contactor must have an AC-3 current of 18/6 x 10A = 30A. Using an XTCE032C (32A AC-3) contactor is recommended.

② For 225–275A, use 2X 70 mm^2 wire.

③ At maximum permissible ambient temperature.

AC Ratings—AC-3 Operation

Description	XTCE040D	XTCE050D	XTCE065D	XTCE072D	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
Rated operational current, 50/60 Hz ① (I_e) in amperes									
220/230V	40	50	65	72	80	95	115	150	170
240V	40	50	65	72	80	95	115	150	170
380/400V	40	50	65	7	80	95	115	150	170
415V	40	50	65	72	80	95	115	150	170
440V	40	50	65	72	80	95	115	15	170
500V	40	50	65	72	80	95	115	150	170
660/690	25	32	37	37	65	80	93	100	150
1000V	—	—	—	—	—	—	—	—	—
Rated power (P) in kilowatts									
220/230V	12.5	15.5	20	22	25	30	37	48	52
240V	13.5	17	22	35	27.5	34	40	52	57
380/400V	18.5	22	30	37	37	45	55	75	90
415V	24	30	39	41	43	57	70	91	100
440V	25	32	41	44	51	60	75	95	105
500V	28	36	47	45	58	70	85	110	120
660/690V	23	30	35	35	63	75	90	96	140
1000V	—	—	—	—	—	—	—	—	—

AC Ratings—AC-4 Operation

Description	XTCE040D	XTCE050D	XTCE065D	XTCE072D	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
Rated operational current, 50/60 Hz ① (I_e) in amperes									
220/230V	18	21	25	25	40	50	55	65	65
240V	18	21	25	25	40	50	55	65	65
380/400V	18	21	25	25	40	50	55	65	65
415V	18	21	25	25	40	50	55	65	65
440V	18	21	25	25	40	50	55	65	65
500V	18	21	25	25	40	50	55	65	65
660/690V	14	17	20	20	40	50	45	50	50
1000V	—	—	—	—	—	—	—	—	—
Rated power (P) in kilowatts									
220/230V	5	6	7	7	12	16	17	20	20
240V	5.5	6.5	7.5	7.5	13	17	19	22	22
380/400V	9	10	12	12	20	26	28	33	33
415V	9.5	11	13	13	24	30	33	39	39
440V	10	12	14	14	25	32	35	41	41
500V	11	13	16	16	29	36	40	47	47
660/690V	12	14	17	17	26	35	43	48	48
1000V	—	—	—	—	—	—	—	—	—

Note

① At maximum permissible ambient temperature.

AC Ratings—AC6-A Operation

Description	XTCE040D	XTCE050D	XTCE065D	XTCE072D	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
Transformer loads	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific
	Calculation is I_e AC-3 = X / 6 * I_e transformer where X is the inrush current of the transformer and I_e transformer is the nominal current. ①								

AC Ratings—AC6-B Operation

Description	XTCE040D	XTCE050D	XTCE065D	XTCE072D	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
Capacitor loads Individual compensation rated operational current I_e of three-phase capacitors in amperes									
Up to 525V				See **Page V5-T1-63** for capacitor ratings					
690V				See **Page V5-T1-63** for capacitor ratings					
Maximum inrush current peak (x I_e)	30	30	30	30	30	30	30	30	30
Component lifesaving (operations)	—	—	—	—	—	—	—	—	—
Maximum operating frequency (ops/hr)	—	—	—	—	—	—	—	—	—

AC Ratings—AC-1 Operation

Description	XTCE185H	XTCE225L	XTCE250L	XTCE300L	XTCE400M	XTCE500M	XTCE570M	XTCE580N
Conventional free air thermal current, three-pole, 50–60 Hz								
at 40°C (I_{th})	337	356	429	490	612	857	857	980
at 50°C (I_{th})	301	310	383	438	548	767	767	876
at 55°C (I_{th})	287	295	366	418	522	731	731	836
at 60°C (I_{th})	275	285	350	400	500	700	700	800
Conventional free air thermal current, single-pole (I_{th})	245	275	875	315	1250	1750	1750	2000

Note

① Example—The transformer has a nominal current of 10A with an inrush current of 18 times the nominal current. So, the contactor must have an AC-3 current of 18/6 x 10A = 30A. Using an XTCE032C (32A AC-3) contactor is recommended.

1

AC Ratings—AC-3 Operation

Description	XTCE185H	XTCE225L	XTCE250L	XTCE300L	XTCE400M	XTCE500M	XTCE570M	XTCE580N
Rated operational current, 50/60 Hz ① (I_e) in amperes								
220/230V	185	225	250	300	400	500	580	580
240V	185	225	250	300	400	500	580	580
380/400V	185	225	250	300	400	500	580	580
415V	185	225	250	300	400	500	580	580
440V	185	225	250	300	400	500	580	580
500V	185	225	250	300	400	500	580	580
660/690V	150	160	250	210	400	500	580	580
1000V	76	76	76	95	95	95	95	435
Rated power (P) in kilowatts								
220/230V	55	70	75	90	125	155	185	185
240V	62	75	85	100	132	170	200	200
380/400V	90	110	132	160	200	250	315	315
415V	110	132	148	180	240	300	348	348
440V	115	138	157	185	255	345	370	370
500V	132	160	180	215	290	360	420	420
660/690V	140	150	240	195	344	344	344	560
1000V	108	108	108	132	132	132	132	600

AC Ratings—AC-4 Operation

Description	XTCE185H	XTCE225L	XTCE250L	XTCE300L	XTCE400M	XTCE500M	XTCE570M	XTCE580N
Rated operational current, 50/60 Hz ① (I_e) in amperes								
220/230V	136	164	200	200	296	360	360	456
240V	136	164	200	200	296	360	360	456
380/400V	136	164	200	200	296	360	360	456
415V	136	164	200	200	296	360	360	456
440V	136	164	200	200	296	360	360	456
500V	136	164	200	200	296	360	360	456
660/690V	110	120	200	200	296	360	360	456
1000V	55	55	76	76	95	95	95	348
Rated power (P) in kilowatts								
220/230V	41	51	62	75	92	112	112	143
240V	45	54	68	82	101	122	122	156
380/400V	75	90	110	132	160	200	200	250
415V	80	96	117	142	176	216	216	274
440V	85	102	125	150	186	229	229	290
500V	96	116	143	172	214	260	260	330
660/690V	102	110	189	160	283	344	344	440
1000V	77	77	108	109	132	132	132	509

Note

① At maximum permissible ambient temperature.

AC Ratings—AC-1 Operation

Description	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R	XTCEC20R
Conventional free air thermal current, three-pole, 50–60 Hz							
at 40°C (I_{th})	1041	1102	1225	1225	1714 ①	2200	2450 ①
at 50°C (I_{th})	931	986	1095	1095	1533 ①	1970	2190 ①
at 55°C (I_{th})	888	940	1044	1044	1462 ①	1800	2089 ①
at 60°C (I_{th})	850	900	1000	1000	1400 ①	1800	2000 ①
Conventional free air thermal current, single-pole (I_{th})	2125	2250	2500	2500	3500	4500	5000

AC Ratings—AC-3 Operation

Description	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R	XTCEC20R
Rated operational current, 50/60 Hz ② (I_e) in amperes							
220/230V	650	750	820	1000	—	1600	—
240V	650	750	820	1000	—	1600	—
380/400V	650	750	820	1000	—	1600	—
415V	650	750	820	1000	—	1600	—
440V	650	750	820	1000	—	1600	—
500V	650	750	820	1000	—	1600	—
660/690V	650	750	820	1000	—	1600	—
1000V	435	580	580	700	—	—	—
Rated power (P) in kilowatts							
220/230V	205	240	260	315	—	500	—
240V	225	260	285	340	—	550	—
380/400V	355	400	450	560	—	900	—
415V	390	455	500	610	—	930	—
440V	420	480	525	650	—	1000	—
500V	470	550	600	730	—	1180	—
660/690V	630	720	750	1000	—	1600	—
1000V	600	800	800	1000	—	—	—

Notes

① Up to 690V.

② At maximum permissible ambient temperature.

1

AC Ratings—AC-4 Operation

Description	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R	XTCEC20R
Rated operational current, 50/60 Hz ① (I_e) in amperes							
220/230V	512	576	656	800	—	1280	—
240V	512	576	656	800	—	1280	—
380/400V	512	576	656	800	—	1280	—
415V	512	576	656	800	—	1280	—
440V	512	576	656	800	—	1280	—
500V	512	576	656	800	—	1280	—
660/690V	512	576	656	800	—	1280	—
1000V	348	464	464	700	—	—	—
Rated power (P) in kilowatts							
220/230V	161	181	209	260	—	30	—
240V	176	200	228	280	—	450	—
380/400V	280	315	355	450	—	750	—
415V	307	346	394	490	—	770	—
440V	32	367	41	520	—	830	—
500V	370	417	474	590	—	940	—
660/690V	494	556	633	780	—	1300	—
1000V	509	678	678	1000	—	—	—

AC Ratings—AC-6A Operation

Description	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R	XTCEC20R
Transformer loads	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific	Values are application specific
	Calculation is I_e AC-3 = X / 6 * I_e transformer where X is the inrush current of the transformer and I_e transformer is the nominal current. ②						

Notes

① At maximum permissible ambient temperature.

② Example—The transformer has a nominal current of 10A with an inrush current of 18 times the nominal current. So, the contactor must have an AC-3 current of 18/6 x 10A = 30A. Using an XTCE032C (32A AC-3) contactor is recommended.

AC Ratings—AC-6B Operation

Description	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC16R	XTCEC20R
Capacitor loads Individual compensation rated operational current I_e of three-phase capacitors in amperes							
Up to 525V	463	463	463	463	—	—	—
690V	265	265	265	265	—	—	—
Maximum inrush current peak (x I_e)	30	30	30	30	—	—	—
Component lifesaving (operations)	100,000	100,000	100,000	100,000	—	—	—
Maximum operating frequency (ops/hr)	200	200	200	200	—	—	—

AC Ratings—Four-Pole—AC-1 Operation

Description	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
Conventional free air thermal current, three-pole, 50-60 Hz								
Open (amps)								
at 40°C (I_{th})	22	32	45	3	80	125	160	200
at 50°C (I_{th})	21	30	41	60	76	116	15	188
at 60°C (I_{th})	20	28	39	54	69	108	138	172
Enclosed (amps)	18	27	36	50	64	100	128	160
Conventional free air thermal current, single-pole								
Open (amps)	60	84	117	162	207	325	415	516
Enclosed (amps)	54	76	105	146	186	292	373	464

AC Ratings—Four-Pole—AC-3 Operation

Description	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
Rated operational current, 50/60 Hz (I_e) in amperes								
220/230V	12	18	25	40	50	80	95	115
240V	12	18	25	40	50	80	95	115
380/400V	12	18	25	40	50	80	95	115
415V	12	18	25	40	50	80	95	115
440V	12	18	25	40	50	80	95	115
500V	10	18	25	40	50	80	95	115
660/690V	7	12	15	25	32	65	80	93
Rated power, (P) in kilowatts								
220/230V	3.5	5	7.5	2.5	15.5	25	30	37
240V	4	5.5	8.5	13.5	17	27.5	33	40
380/400V	5.5	7.5	11	18.5	22	37	45	55
415V	7	10	14.5	24	30	48	57	70
440V	7.5	10.5	15.5	25	32	51	60	75
500V	47	12	17.5	28	36	58	70	85
660/690V	6.5	11	14	23	30	63	75	90

DC Ratings—DC-1

Description Rated Operation Current {1} (I_e) in Amperes	XTCE007B	XTCE009B	XTCE012B, XTCF020B	XTCE015B	XTCE018C	XTCE025C	XTCE032C	XTCE040D	XTCE050D	XTCE065D
60V	20	20	20	20	35	40	40	50	60	72
110V	20	20	20	20	35	40	40	50	50	72
220V	15	15	15	15	3	4	40	45	45	65
440V	1	1.3	1.3	1.3	2.9	2.9	2.9	2.9	2.9	2.9

	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE185H	XTCE225H	XTCE250L	XTCE300L	XTCE400M	XTCE500M
60V	110	110	160	160	300	300	300	300	400	400
110V	110	110	16	160	300	300	300	300	400	400
220V	70	70	90	90	300	300	300	300	400	400
440V	4.5	4.5	4.5	4.5	11	11	11	11	11	11

	XTCE580N	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC20R	XTCEC16R
60V	—	—	—	—	—	—	—	—
110V	—	—	—	—	—	—	—	—
220V	—	—	—	—	—	—	—	—
440V	—	—	—	—	—	—	—	—

DC Ratings—DC-3

Description Rated Operation Current {1} (I_e) in Amperes	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C	XTCE040D	XTCE050D	XTCE065D
60V	20	20	20	20	35	35	40	50	60	72
110V	20	20	20	20	35	35	40	50	50	72
220V	1.5	1.5	1.5	1.5	10	10	25	25	25	35
440V	0.2	0.2	0.2	0.2	0.6	0.6	0.6	0.6	0.6	0.6

	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE185H	XTCE225H	XTCE250L	XTCE300L	XTCE400M	XTCE500M
60V	110	110	160	160	300	300	300	300	400	400
110V	110	110	160	160	300	300	300	300	400	400
220V	35	35	40	40	300	300	300	300	400	400
440V	1	1	1	1	—	—	—	—	—	—

	XTCE580N	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC20R	XTCEC16R
60V	—	—	—	—	—	—	—	—
110V	—	—	—	—	—	—	—	—
220V	—	—	—	—	—	—	—	—
440V	—	—	—	—	—	—	—	—

DC Ratings—DC-5

Description Rated Operation Current {1} (I_e) in Amperes	XTCE007B	XTCE009B	XTCE012B	XTCE015B	XTCE018C	XTCE025C	XTCE032C	XTCE040D	XTCE050D	XTCE065D
60V	20	20	20	20	35	35	40	50	60	72
110V	20	20	20	20	35	35	40	50	50	72
220V	1.5	1.5	1.5	1.5	10	10	25	25	25	35
440V	0.2	0.2	0.2	0.2	0.6	0.6	0.6	0.6	0.6	0.6

	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE185H	XTCE225H	XTCE250L	XTCE300L	XTCE400M	XTCE500M
60V	110	110	160	160	300	300	300	300	400	400
110V	110	110	160	160	300	300	300	300	400	400
220V	35	35	40	40	300	300	300	300	400	400
440V	1	1	1	1	—	—	—	—	—	—

	XTCE580N	XTCE650N	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC20R
60V	—	—	—	—	—	—	—
110V	—	—	—	—	—	—	—
220V	—	—	—	—	—	—	—
440V	—	—	—	—	—	—	—

DC Ratings—Four-Pole—DC-1 Operation

Description Rated Operation Current {1} (I_e) in Amperes	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
60V	22	32	45	63	80	125	160	200
110V	22	32	45	6	80	125	160	200
220V	6	32	45	63	80	125	160	200
440V	1.3	3	3	5	5	100	125	150

DC Ratings—Four-Pole—DC-3 Operation

Description Rated Operation Current {1} (I_e) in Amperes	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
60V	20	32	45	63	80	125	160	200
110V	20	32	45	63	80	125	160	200
220V	1.5	32	45	63	80	125	160	200
440V	0.2	6	6	8	8	75	95	115

DC Ratings—Four-Pole—DC-5 Operation

Description Rated Operation Current {1} (I_e) in Amperes	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
60V	20	32	45	63	80	125	160	200
110V	20	25	32	508	80	125	160	200
220V	1.5	15	22	38	70	100	125	150
440V	0.2	4	4	8	8	60	75	90

Current Heat Loss (Three-Pole) in Watts

Description	XTCE007B	XTCE009B	XTCE012B, XTCF020B	XTCE015B	XTCE018C	XTCE025C	XTCE032C	XTCE040D
Current heat loss (three-pole) in watts								
at I_{th}	3	3	3	3	7.3	9.6	12.1	11.3
at I_e to AC-3/400V	0.37	0.6	1.1	1.8	1.9	3.8	6.1	7.2
Impedance per pole, megohms	2.5	2.5	2.5	2.5	2	2	2	1.5

	XTCE050D	XTCE065D	XTCE072D	XTCE080F	XTCE095F	XTCE115G	XTCE150G	XTCE170G
Current heat loss (three-pole) in watts								
at I_{th}	19	28.8	28.8	12.2	18.2	20.3	30.7	41.1
at I_e to AC-3/400V	11.3	19	23	9.6	13.5	15.9	27.0	34.7
Impedance per pole, megohms	1.5	1.5	1.5	0.5	0.5	0.4	0.4	0.4

	XTCE185H	XTCE225H	XTCE250L	XTCE300L	XTCE400M	XTCE500M	XTCE580N	XTCE650N
Current heat loss (three-pole) in watts								
at I_{th}	34	45	55	37	58	113	61	69
at I_e to AC-3/400V	16	23	28	21	37	58	32	41
Impedance per pole, megohms	—	—	—	—	—	—	—	—

	XTCE750N	XTCE820N	XTCEC10N	XTCEC14P	XTCEC20R	XTCEC16R
Current heat loss (three-pole) in watts						
at I_{th}	78	96	96	188	192	155
at I_e to AC-3/400V	54	65	96	—	—	123
Impedance per pole, megohms	—	—	—	—	—	—

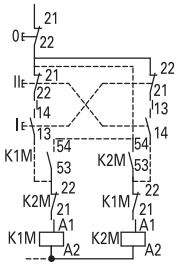
Current Heat Loss (Four-Pole) in Watts

Description	XTCF020B	XTCF032C	XTCF045C	XTCF063D	XTCF080D	XTCF125G	XTCF160G	XTCF200G
Current heat loss (four-pole) in watts								
at I_{th}	4.7	8.2	12	16	23	29	46	60
Impedance per pole, megohms	2.5	2	1.5	1	0.7	0.6	0.6	0.5

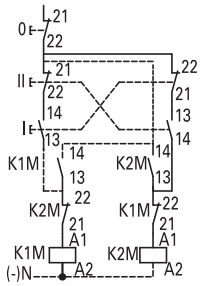
Wiring Diagrams

7–150A XTCR Reversing Contactors

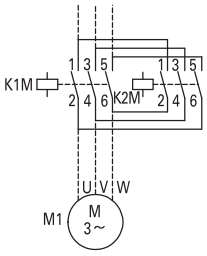
Control Circuit—7–32A



Control Circuit—40–170A

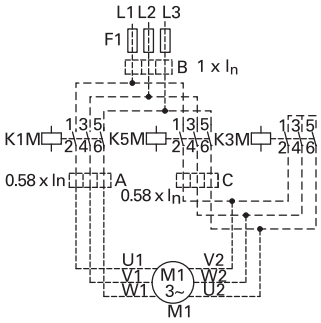


Power Circuit—7–150A with Mechanical Interlock 80–150A on Mounting Plate

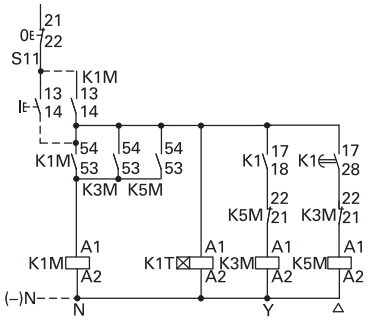


Star-Delta (Wye-Delta) Starters

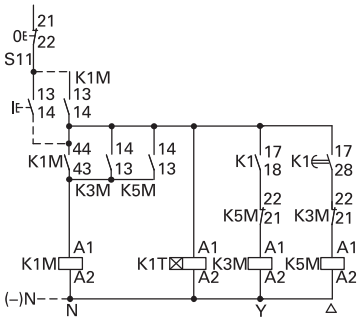
Power Circuit—12–385A AC-3



Control Circuit—12–55A AC-3

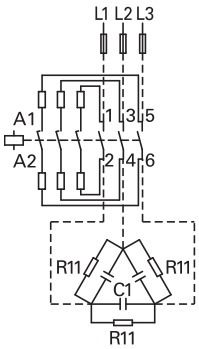


Control Circuit—70–1700A AC-3



XTCC Contactors for Three-Phase Capacitors

Power Circuit—11–85 kVAR



In the case of group compensation, multi-stage capacitor banks are connected to the mains, as required. In the process, transient currents of up to 180 x I_e can flow between the capacitors. The capacitors are pre-charged via the early-make auxiliary contacts and the fitted wire resistors, thereby reducing the inrush current. The main contacts then close after a time lag and carry the uninterrupted current. The contactors for capacitors are weld-resistant with inrush current peaks up to 180 x 1 I_e due to their special contacts. For switching reactive-power compensation equipment with chokes, observe design notes.

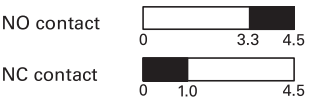
For switching of power factor connection with reactors, please observe engineering notes, **Page V5-T1-64**. Use of the contactors XTCE without series resistor for centralized power factor correction—when using contactors for group compensation, a minimum inductance of approximately 6 µH per capacitor must be available to limit the high inrush current peaks. This corresponds to an air-cored coil with 5 windings and a coil diameter of approximately 140 mm diameter. The conductor cross-section must be selected according to the rated current per phase.

1

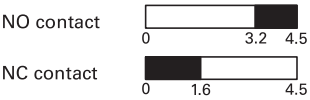
Contactor Contact Travel Diagrams

Frame B

XTCE 7–15A, XTC—AC



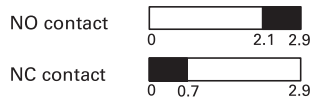
XTCEXSAC11



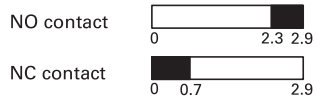
XTCEXF..LC_



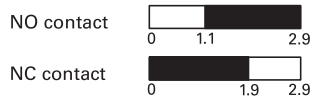
XTCE 7–9A—DC



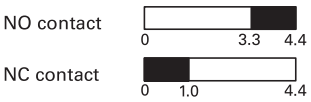
XTCEXSAC11



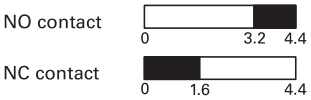
XTCEXF..LC_



XTCE 12–15A, XTCF—DC



XTCEXSAC11

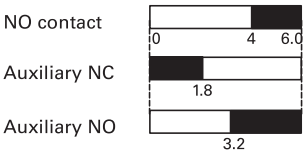


XTCEXF..LC_

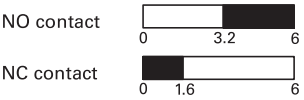


Frame C

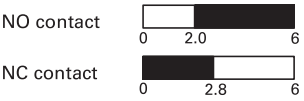
XTCE 15–32A



XTCEXSAC11, XTCEXF..C_



XTCEXF..LC_



Frame D

XTCE 40–72A



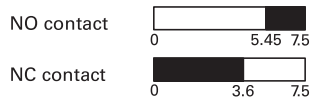
XTCEXF..G_



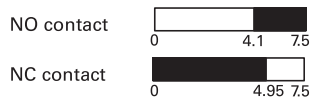
XTCEXF..LG_



XTCEXS...N_



XTCEXSBLN11



Frames F and G

XTCE 80–170A



XTCEXF..G_



XTCEXF..LG_



XTCEXS...N_



XTCEXSBLN11

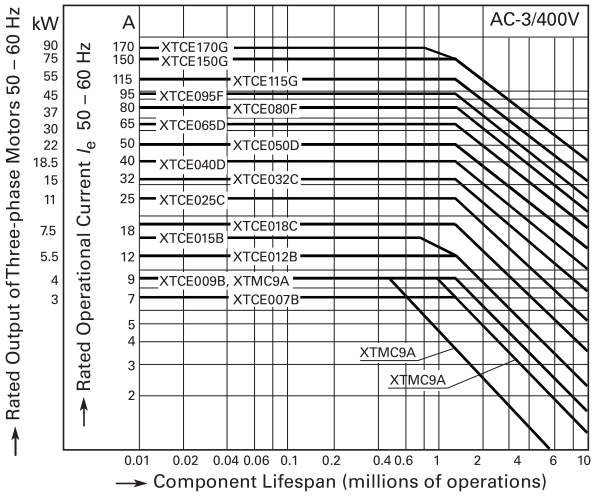


Note: The diagrams indicate the closing and travel of the contacts of the contactors and auxiliary contacts at no-load. Tolerances are not taken into consideration.

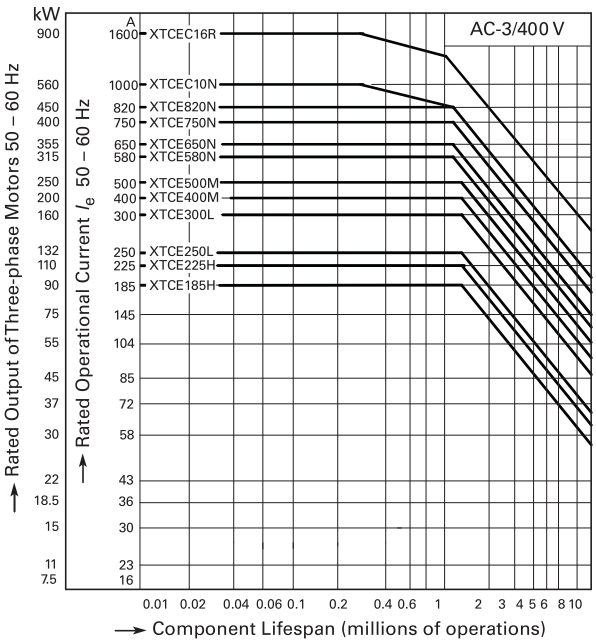
Electrical Life Curves

Normal Switching Duty

XTCE007B–XTCE170G

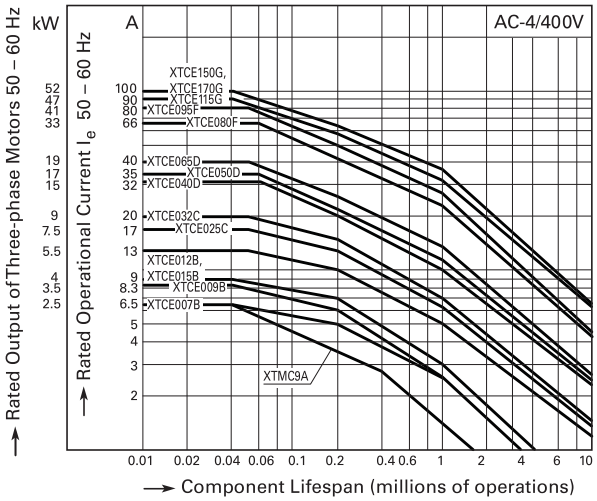


XTCE185H–XTCEC16R

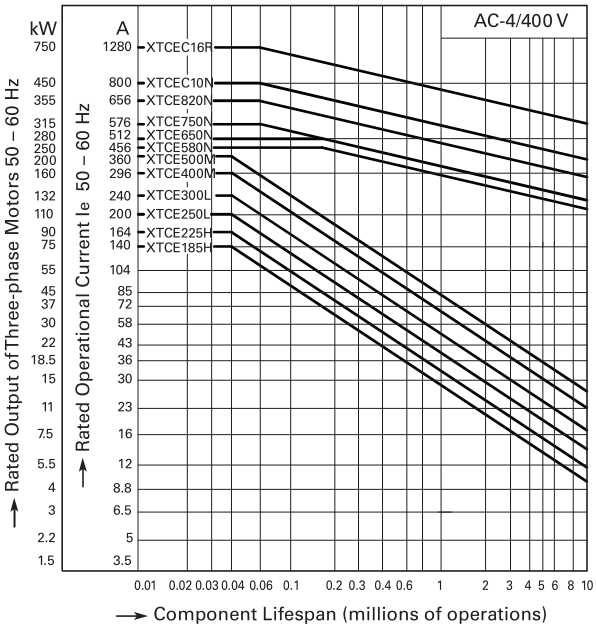


Extreme Switching Duty

XTCE007B–XTCE170G

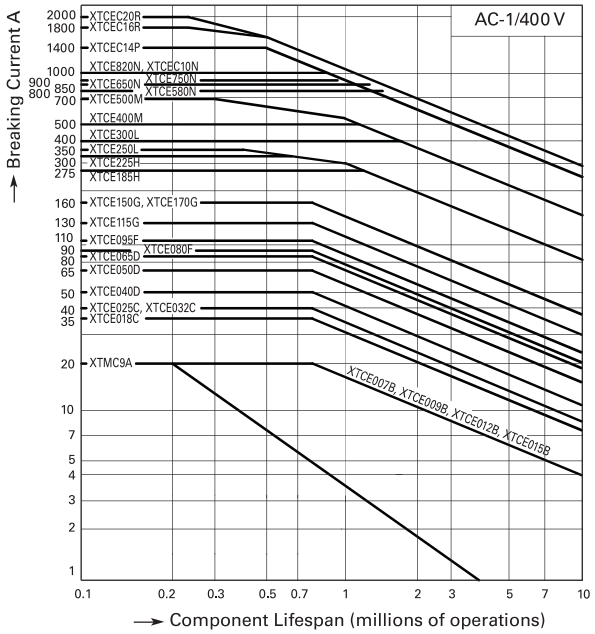


XTCE185H–XTCEC16R

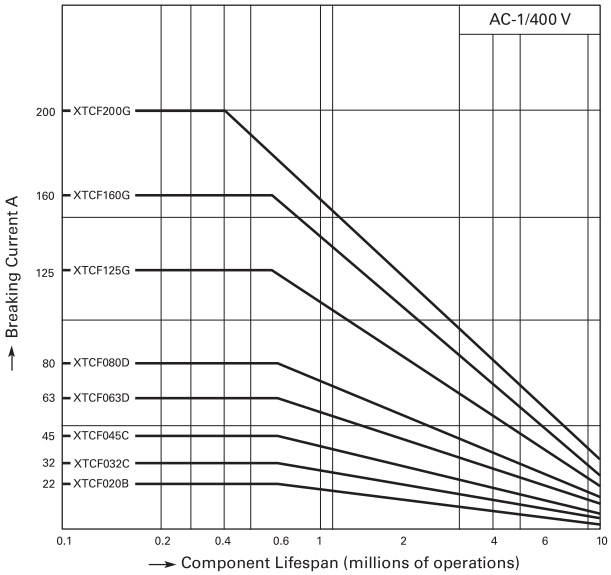


Switching Duty for Non-Motor Loads

Three-Pole—XTCE007B–XTCEC20R



Four-Pole—XTCF020B–XTCF200G



Operating characteristics:
- Non-inductive and slightly inductive loads

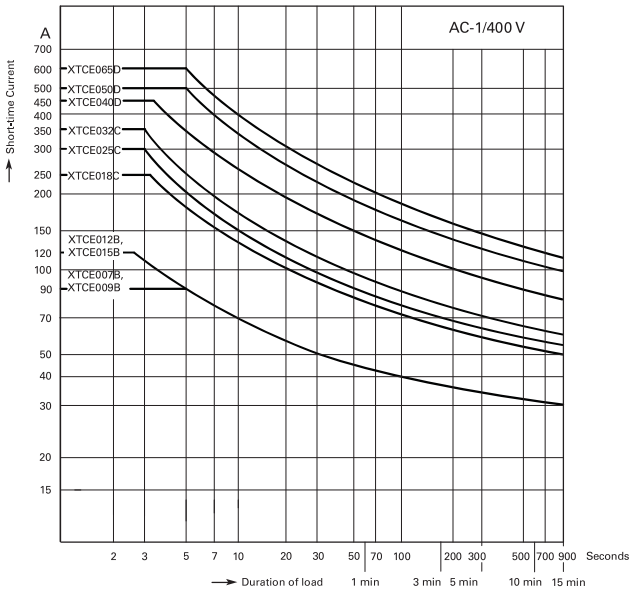
Electrical characteristics:
- Switch on: 1 x Rated current
- Switch off: 1 x Rated current

Utilization category:
- 100% AC-1

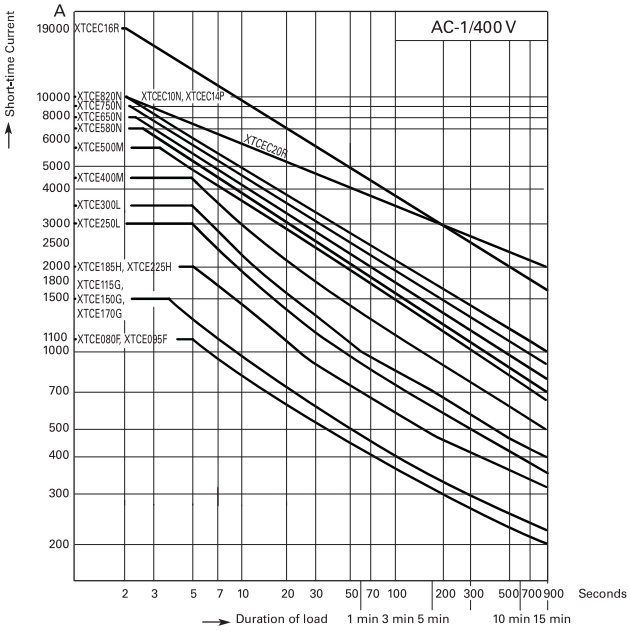
Typical applications:
- Electrical heating

Short-Time Loading

Three-Pole—XTCE007B–XTCEC20R

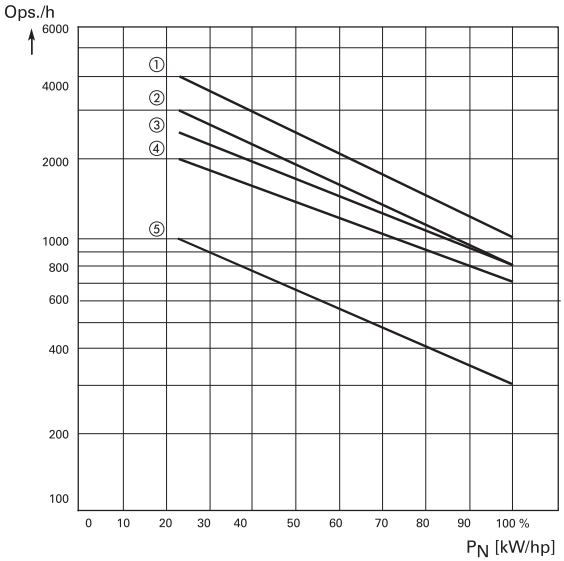


Three-Pole—XTCE080F–XTCEC16R

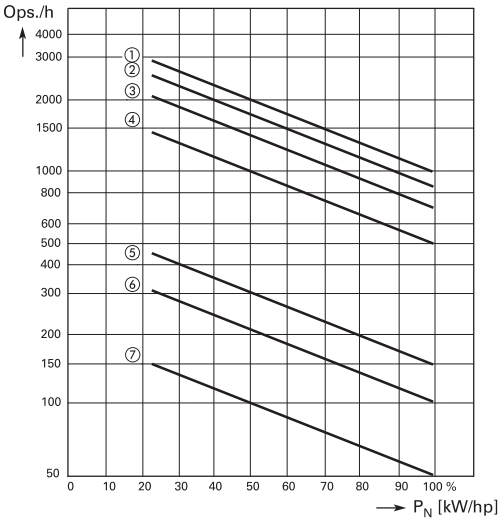


Maximum Operating Frequency—Related to Rating and Utilization Category (400V)

7 to 150 hp



185 to 820 hp



Utilization Category ①

Type	Characteristic Curve Above		
	AC-1	AC-3	AC-2, AC-4
XTCE007B–XTCE015B	3	1	5
XTCE018C–XTCE032C	3	2	5
XTCE040D–XTCE065D	3	2	5
XTCE080F–XTCE150G	3	4	5

Utilization Category ①

Type	Characteristic Curve Above		
	AC-1	AC-3	AC-2, AC-4
XTCE185H	2	1	6
XTCE225H	2	1	6
XTCE250L	2	1	6
XTCE300L	3	2	7
XTCE400M	3	2	7
XTCE500M	3	2	7
XTCE580N	3	4	5
XTCE650N	3	4	5
XTCE750N	3	4	5
XTCE820N	3	4	5

Note

① P_N = max. motor rating (kW/hp) of the relevant contactor.
ops./h = max. number of operations per hour.

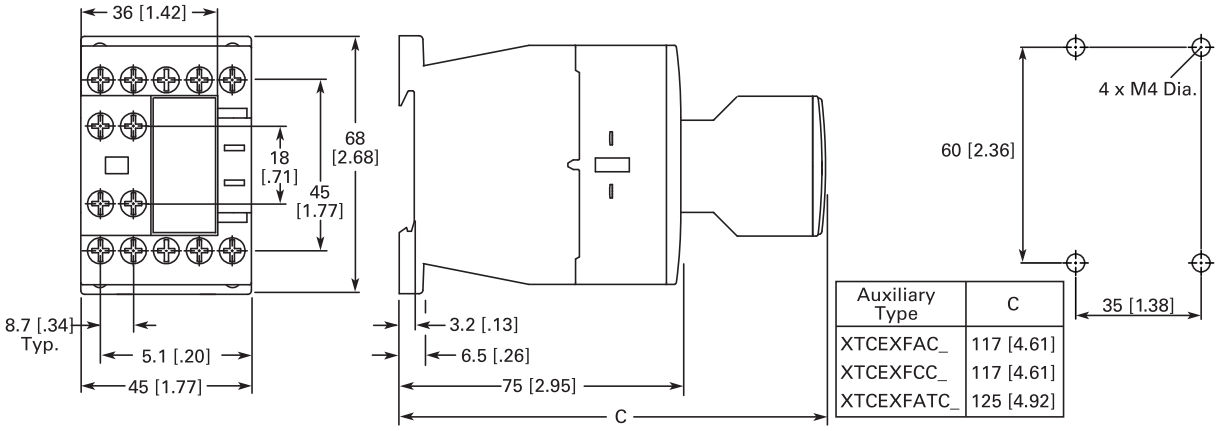
1

Dimensions

Approximate Dimensions in mm [in]

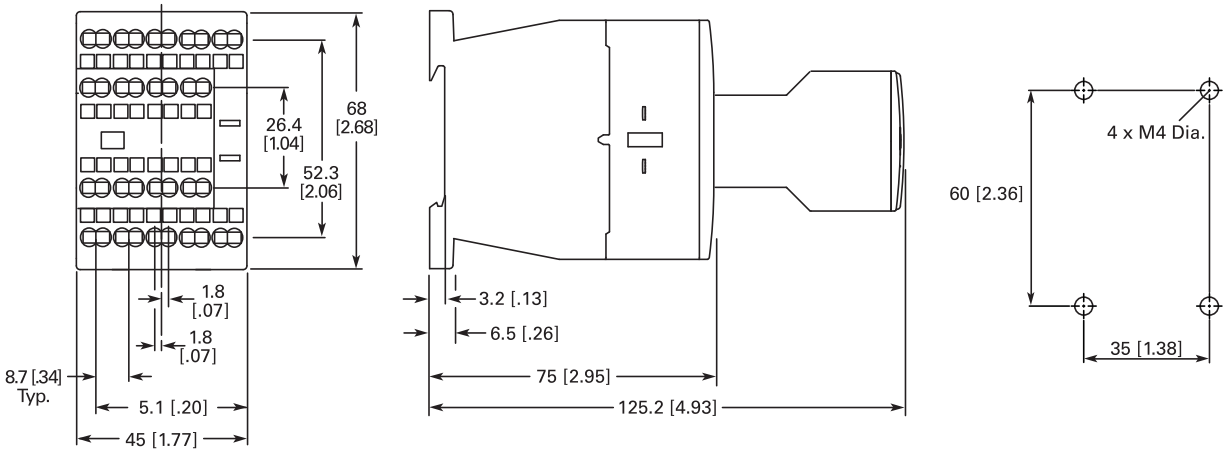
XTCE Contactors (Three-Pole)

Frame B, XTCE007B and XTCE015B Contactors with Screw Terminals (7–15A) XTCF020B



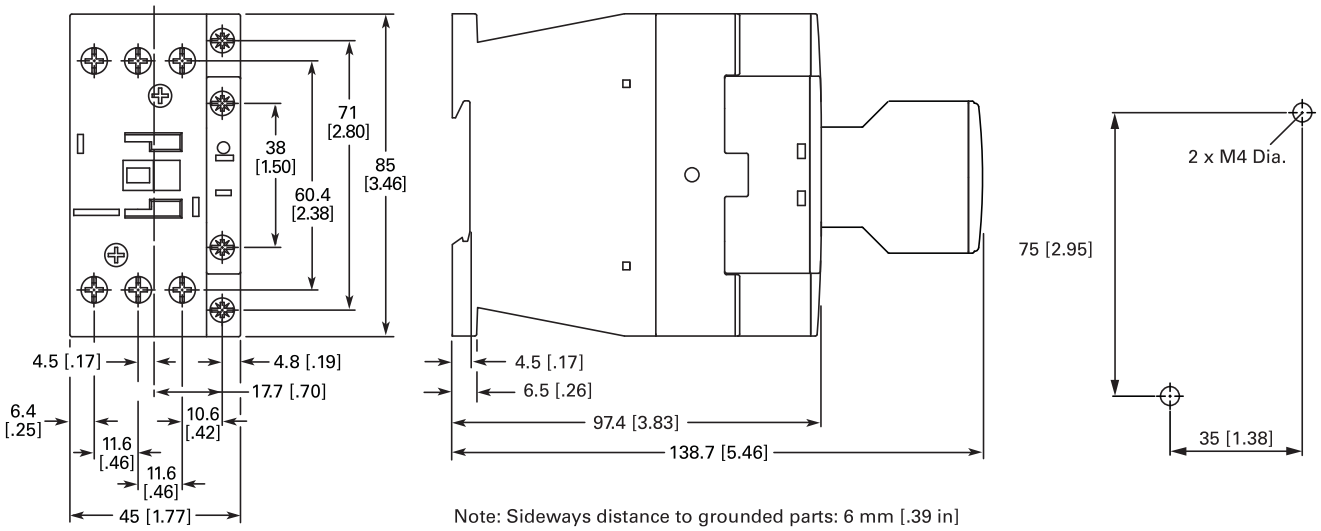
Auxiliary Type	C
XTCEXFAC_	117 [4.61]
XTCEXFCC_	117 [4.61]
XTCEXFATC_	125 [4.92]

Frame B, XTCEC007B–XTCEC012B Contactors with Spring Cage Terminals (7–12A)



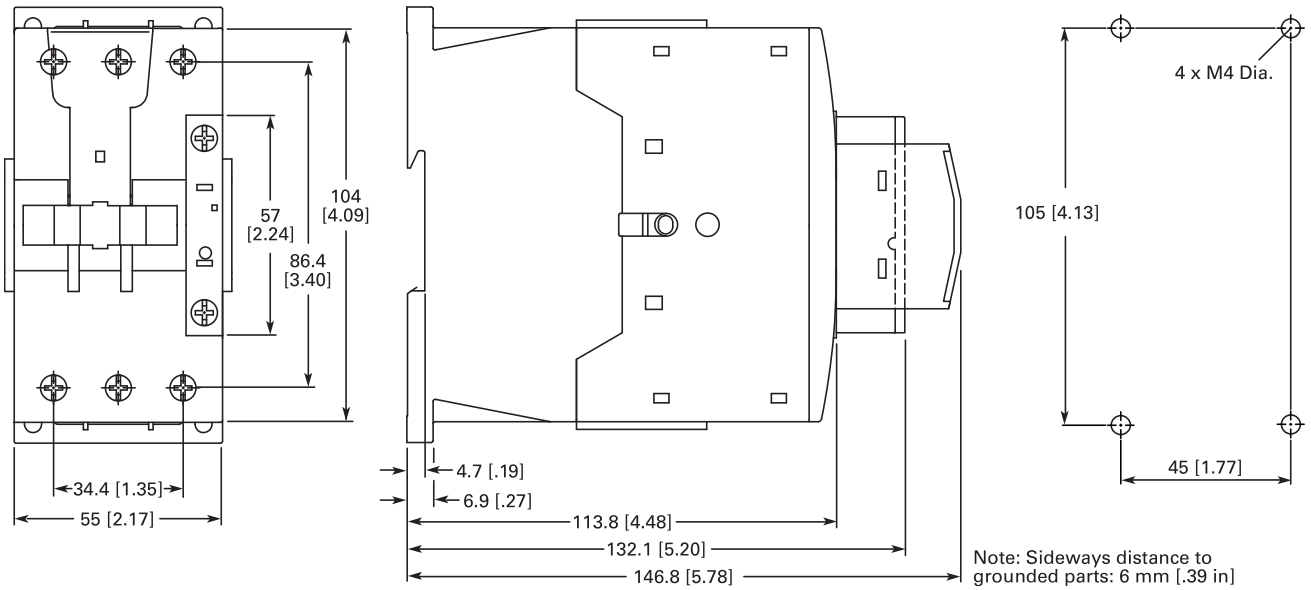
Approximate Dimensions in mm [in]

Frame C, XTCE018C–XTCE032C Contactors (18–32A)



Note: Sideways distance to grounded parts: 6 mm [.39 in]

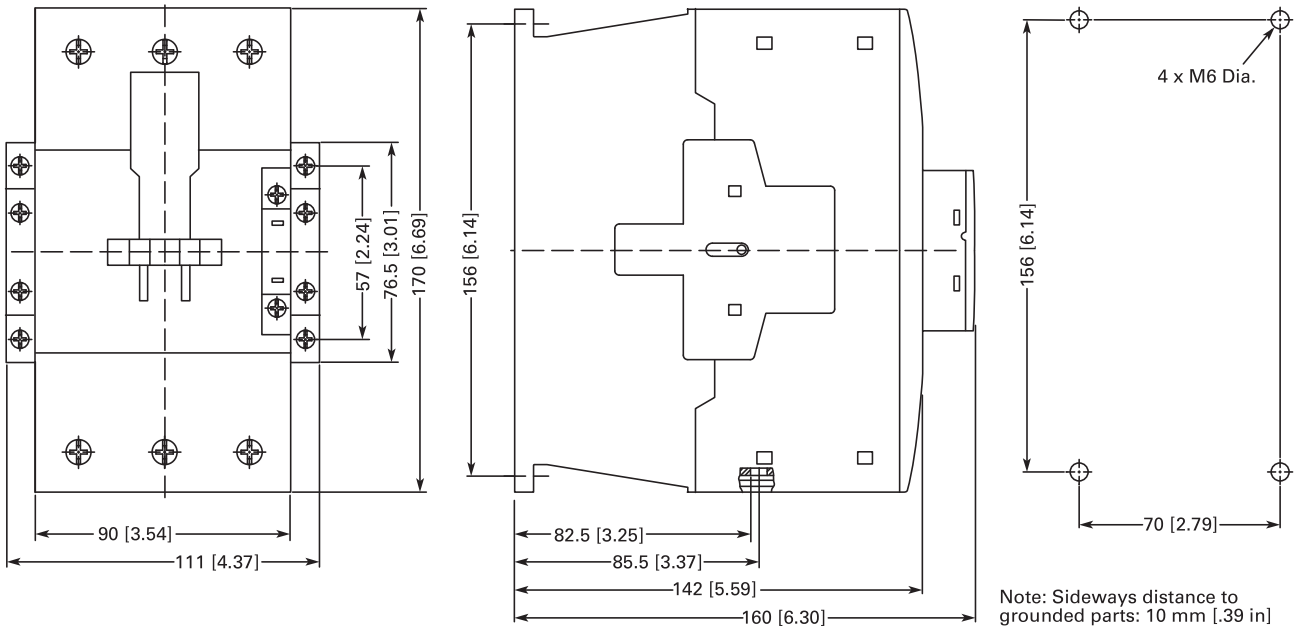
Frame D, XTCE040D–XTCE072D Contactors (72A)



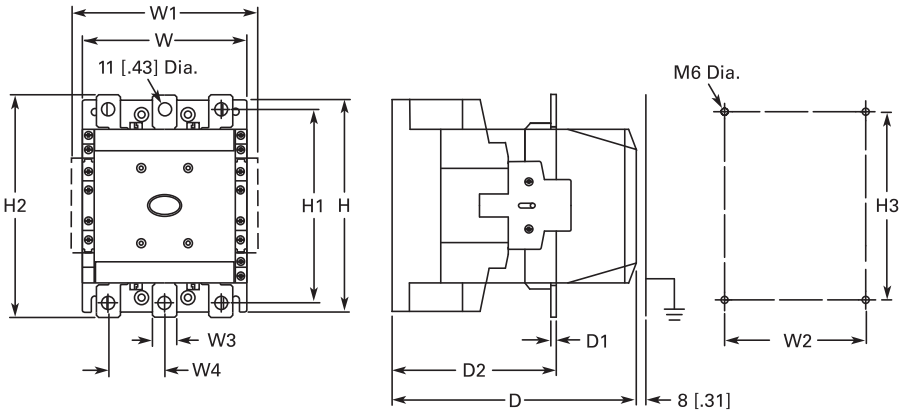
Note: Sideways distance to grounded parts: 6 mm [.39 in]

Approximate Dimensions in mm [in]

Frames F–G, XTCE080F–XTCE170G Contactors (80–170A)



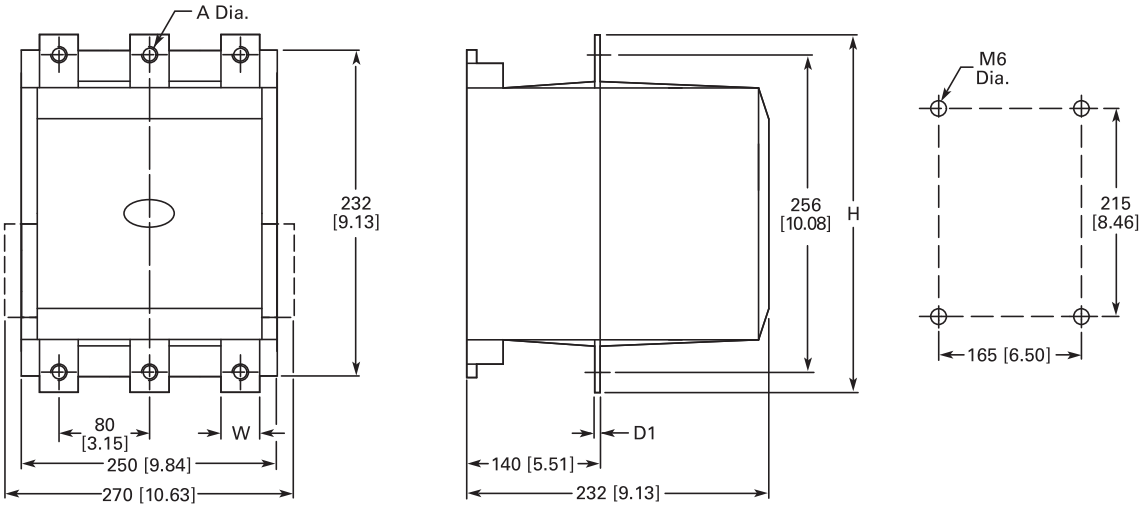
Frames H–M, XTCE185H–XTCE570M Contactors (185–580A)



	W	W1	W2	W3	W4	H	H1	H2	H3	D	D1	D2
Frame H	140 [5.51]	160 [6.30]	120 [4.72]	20 [.79]	41 [1.61]	180 [7.09]	165 [6.50]	190 [7.48]	160 [6.30]	158 [6.22]	4 [.16]	83 [3.27]
Frame L	140 [5.51]	160 [6.30]	120 [4.72]	20 [.79]	48 [1.89]	180 [7.09]	164 [6.46]	189 [7.44]	160 [6.30]	208 [8.19]	5 [.20]	140 [5.51]
Frame M	160 [6.30]	180 [7.09]	130 [5.12]	25 [.98]	48 [1.89]	200 [7.87]	184 [7.24]	209 [8.23]	180 [7.09]	216 [8.50]	6 [.24]	140 [5.51]
	160 [6.30]	180 [7.09]	130 [5.12]	38 [1.50]	57 [2.24]	200 [7.87]	189 [7.44]	219 [8.62]	180 [7.09]	216 [8.50]	6 [.24]	140 [5.51]

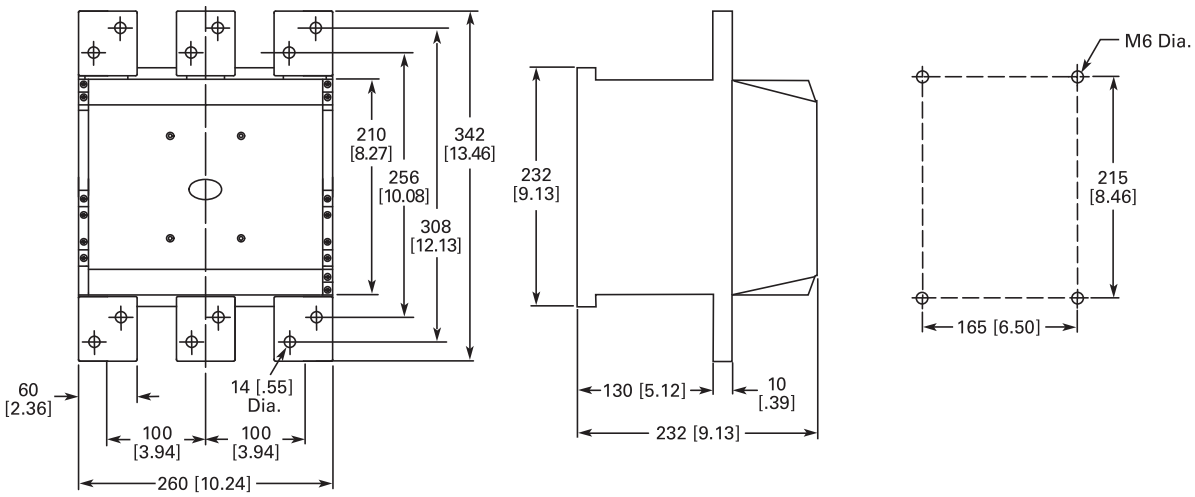
Approximate Dimensions in mm [in]

Frame N, XTCE580N–XTCEC10N Contactors (580–1000A)



	W	H	D1	A (Dia.)
XTCE580N	45 [1.77]	296 [11.65]	6 [.24]	13.5 [.53]
XTCE650N	45 [1.77]	296 [11.65]	6 [.24]	13.5 [.53]
XTCE750N	45 [1.77]	296 [11.65]	6 [.24]	13.5 [.53]
XTCE820N	45 [1.77]	296 [11.65]	6 [.24]	13.5 [.53]
XTCEC10N	45 [1.77]	296 [11.65]	10 [.40]	13.5 [.53]

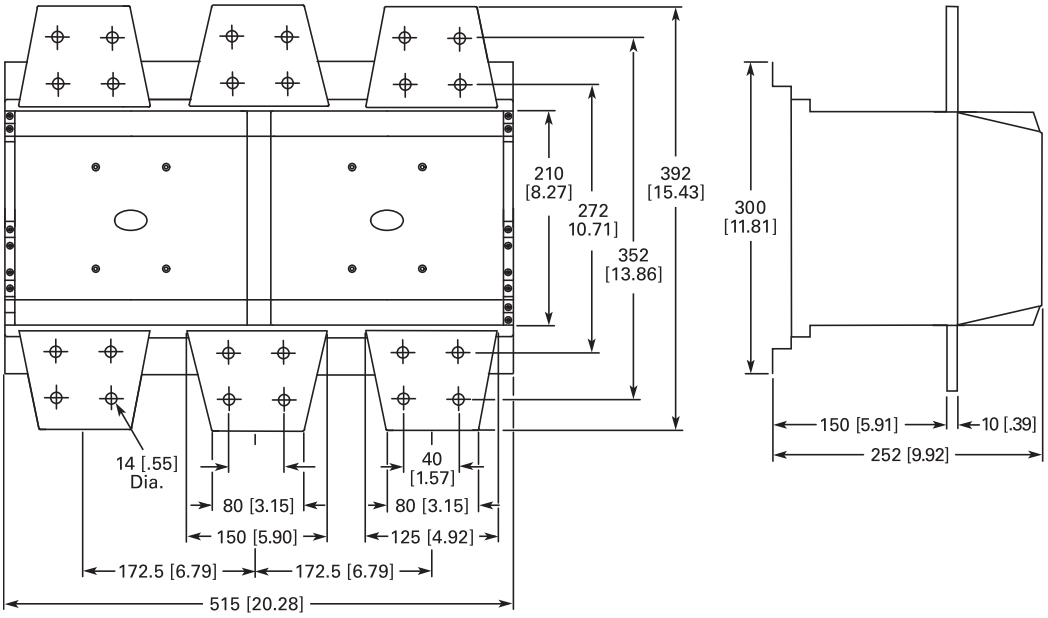
Frame P, XTCEC14P Contactor (1400A, AC-1)

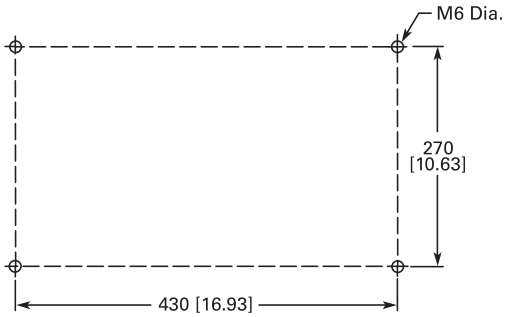


1

Approximate Dimensions in mm [in]

Frame R, XTCEC16R, XTCEC20R Contactors

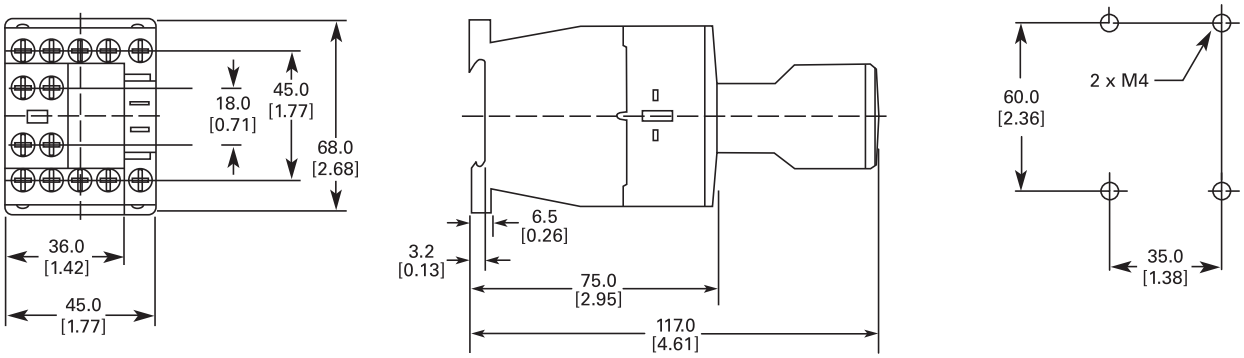




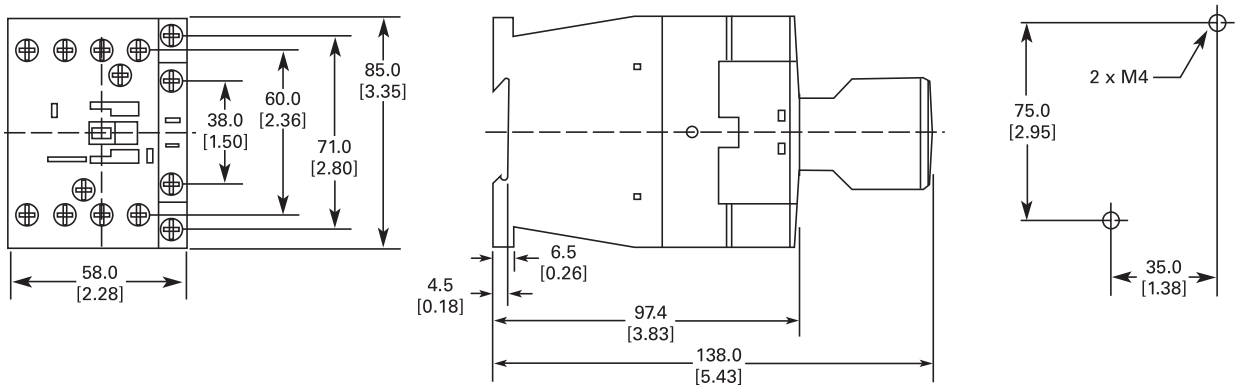
Approximate Dimensions in mm [in]

XTCF Contactors (Four-Pole)

Frame B, XTCF020B Contactors



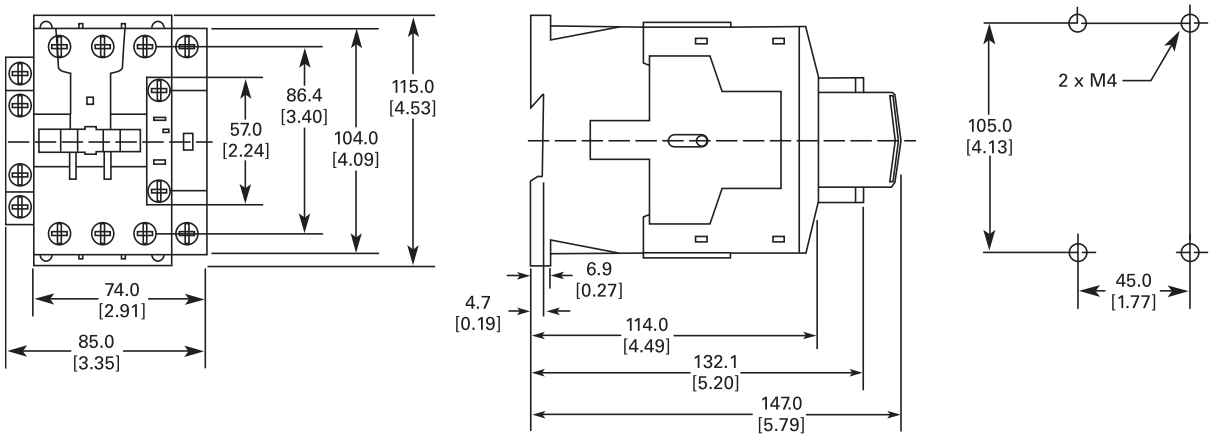
Frame C, XTCF032C–XTCF045C Contactors



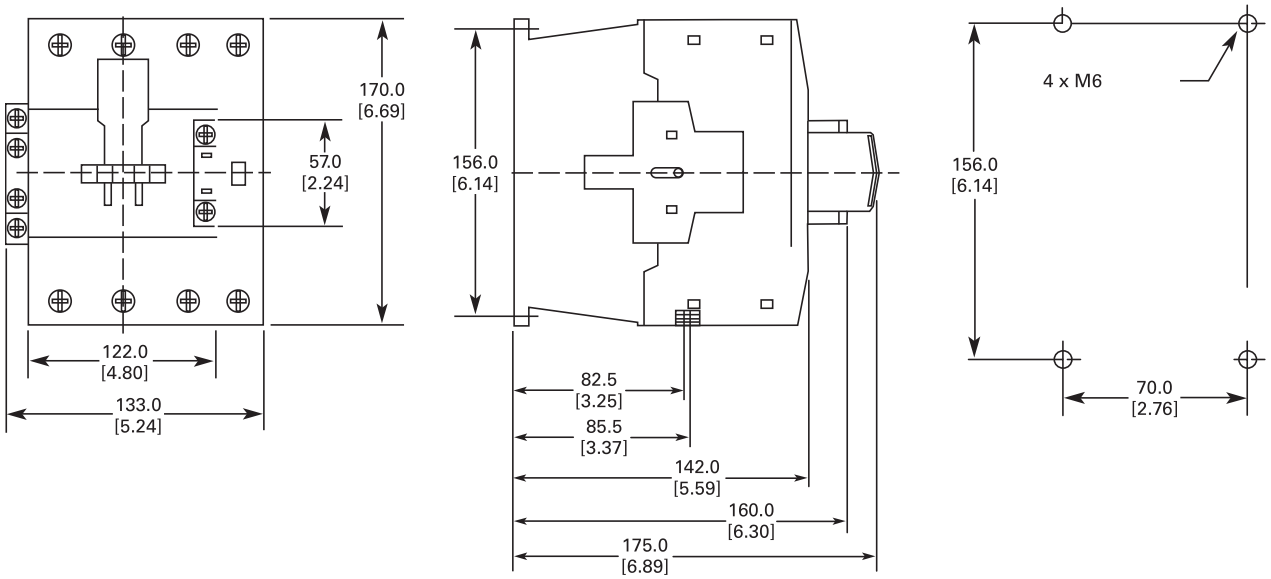
1

Approximate Dimensions in mm [in]

Frame D, XTCF063D–XTCF080D Contactors



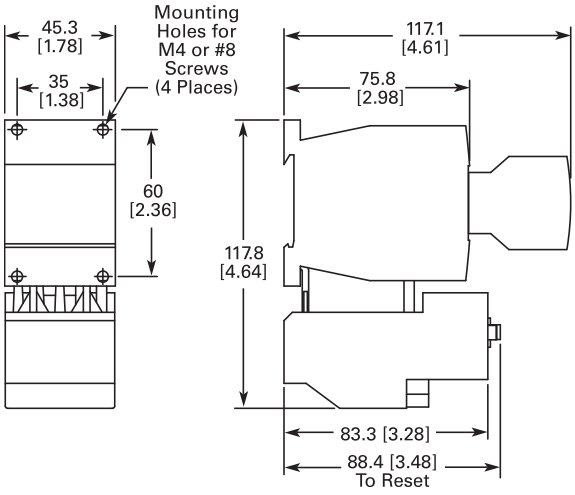
Frame G, XTCF125G–XTCF200G Contactors



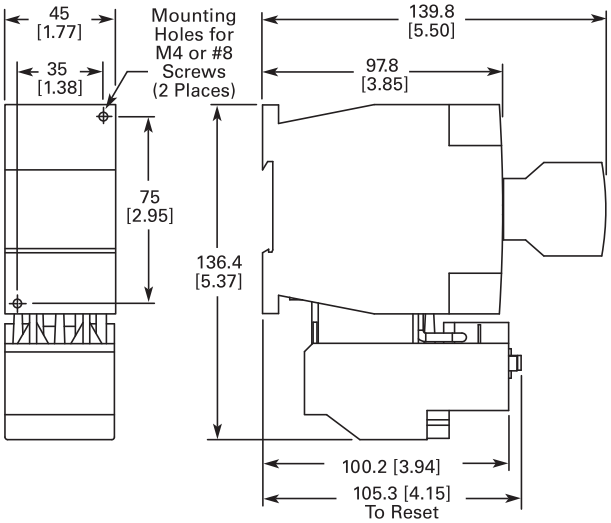
Approximate Dimensions in mm [in]

XTAE Starters with XTOB Overload Relay

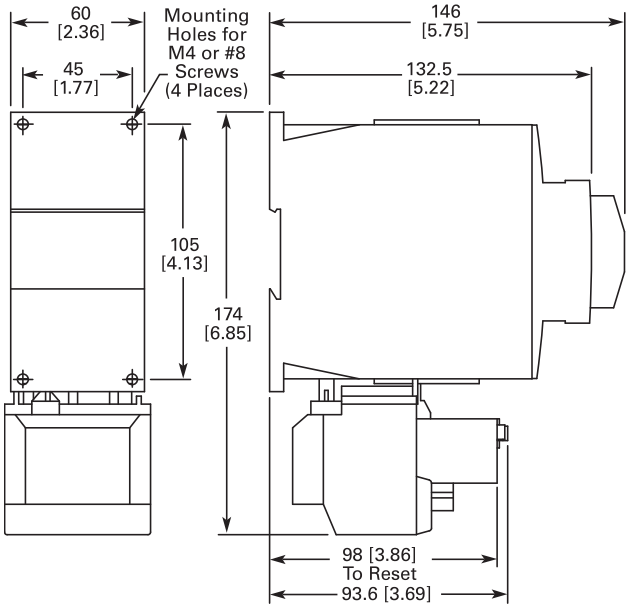
Frame B, XTAE007B–XTAE015B Starters with XTOB (7–12A)



Frame C, XTAE018C–XTAE032C Starters with XTOB (18–32A)



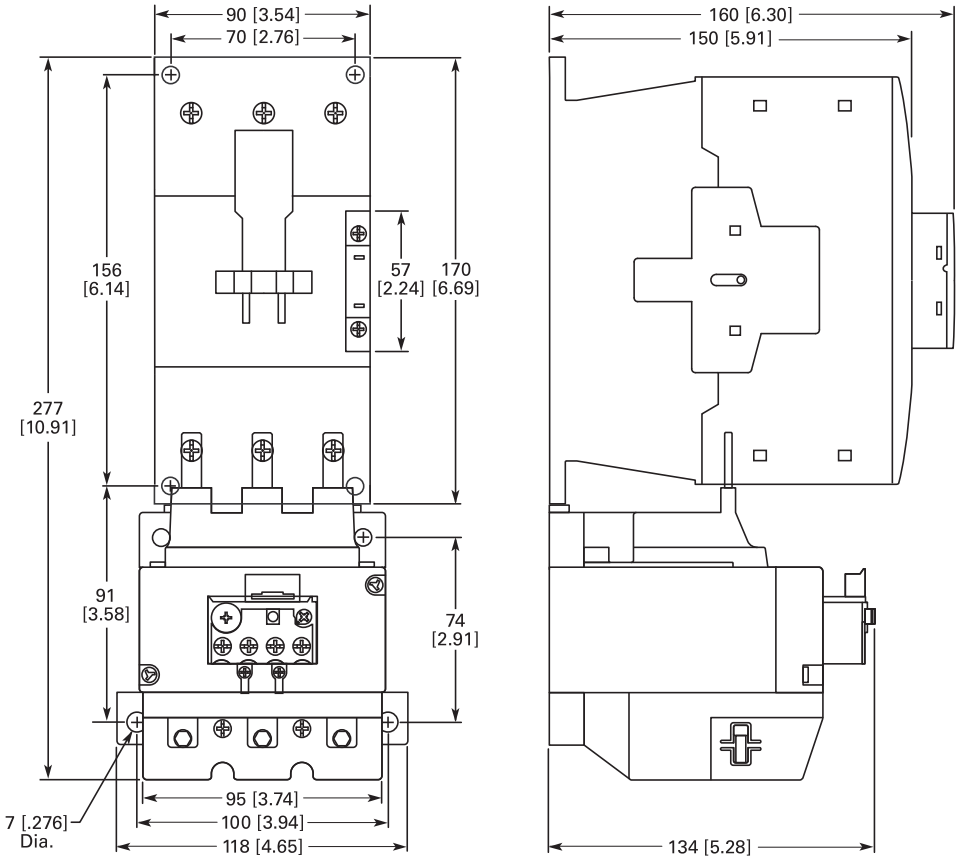
Frame D, XTAE040D–XTAE065D Starters with XTOB (40–65A)



1

Approximate Dimensions in mm [in]

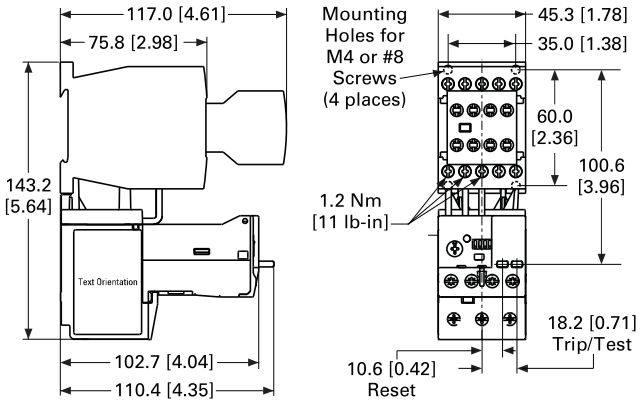
Frames F–G, XTAE080F–XTAE150G Starters with XTOB (80–150A)



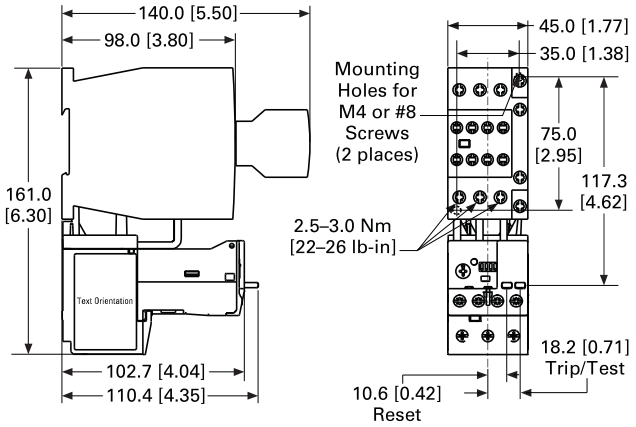
Approximate Dimensions in mm [in]

XTAE Starters with XTOE Overload Relay

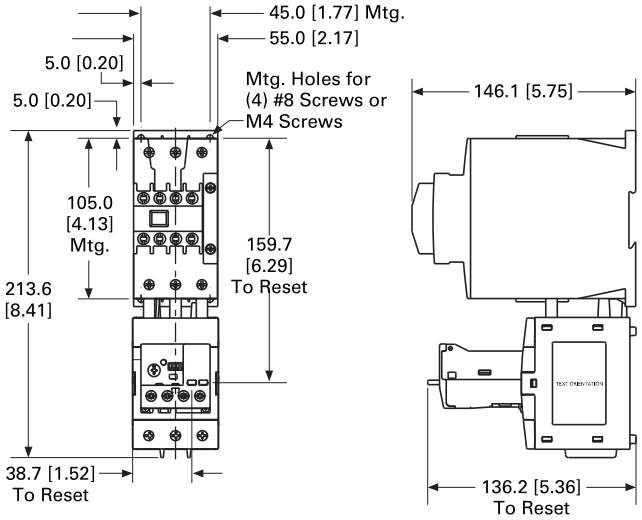
Frame B, XTAE007B–XTAE012B Starters with XTOE (0.35–20A)



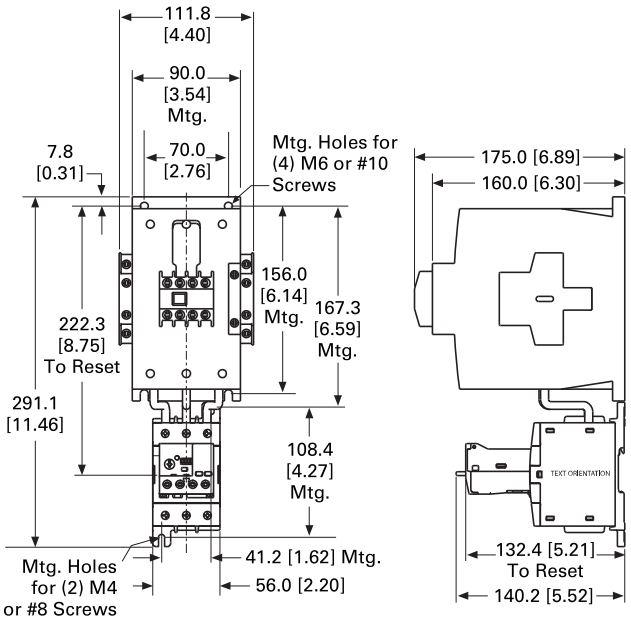
Frame C, XTAE018C–XTAE032C Starters with XTOE (0.35–45A)



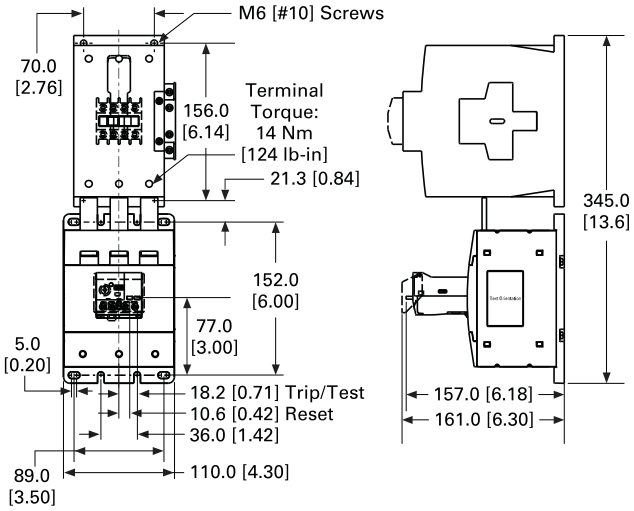
Frame D, XTAE040D–XTAE065D Starters with XTOE (20–100A)



Frames F–G, XTAE080F–XTAE115G Starters with XTOE (20–100A)



Frame G, XTAE115G–XTAE150G Starters with XTOE (100–175A)

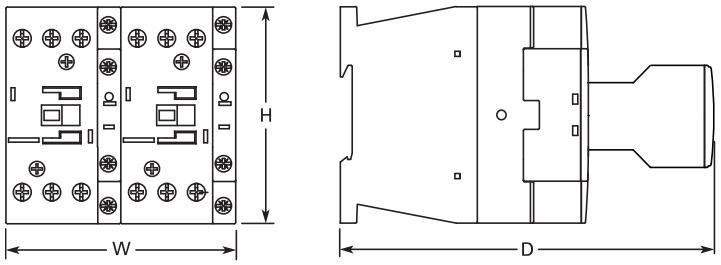


1

Approximate Dimensions in mm [in]

XTCR Reversing Combination

Frames B–D



Frame B (7–15A)

W	H	D
90 [3.54]	68 [2.68]	117 [4.61]

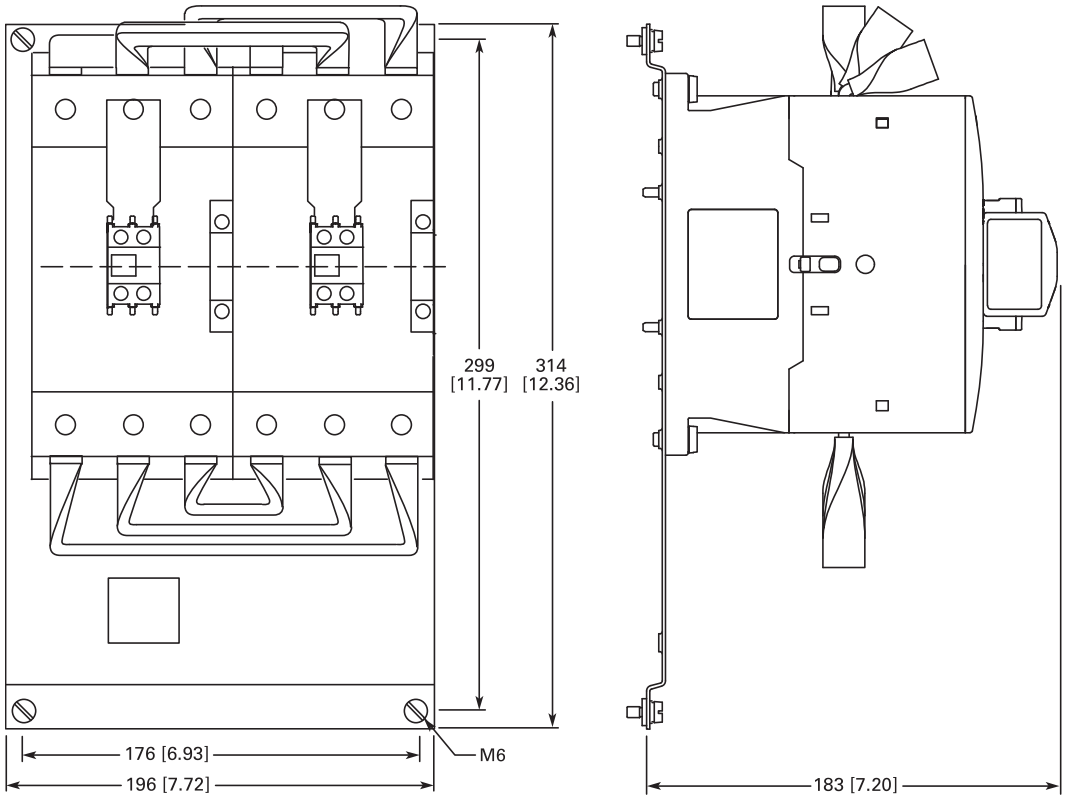
Frame C (18–32A)

W	H	D
90 [3.54]	85 [3.34]	138 [5.43]

Frame D (40–65A)

W	H	D
110 [4.33]	115 [4.53]	146.8 [5.78]

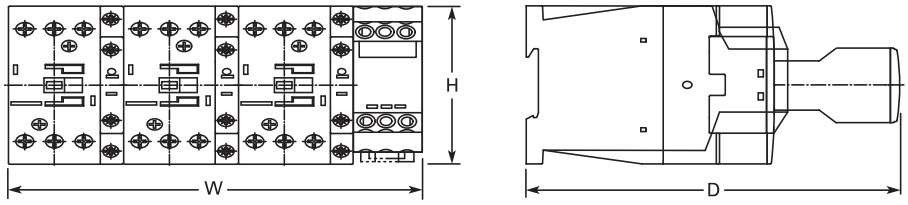
Frames F–G



Approximate Dimensions in mm [in]

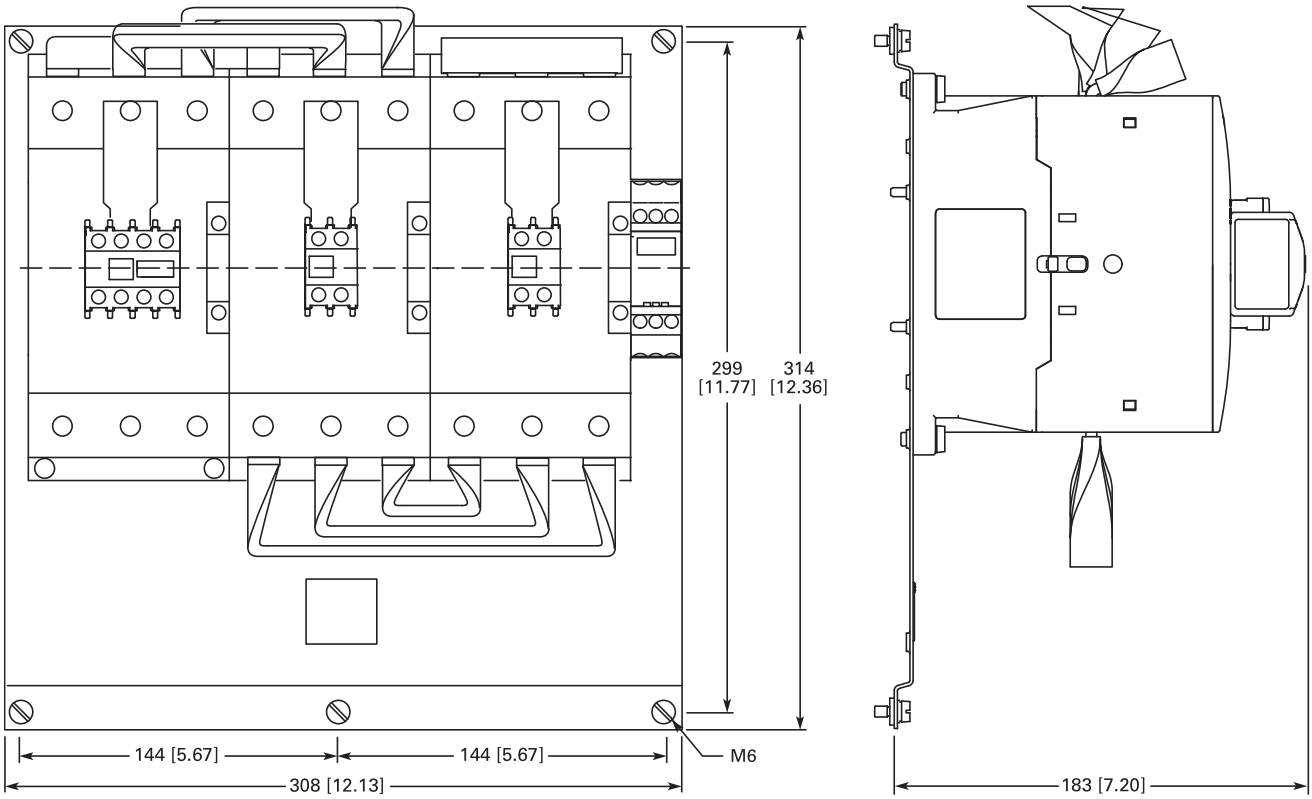
Star-Delta Combination

Frames B–D



Frame B			Frame C			Frame D		
W	**H**	**D**	**W**	**H**	**D**	**W**	**H**	**D**
158 [6.22]	68 [2.68]	117 [4.61]	158 [6.22]	85 [3.34]	138 [5.43]	188 [7.40]	115 [4.53]	146.8 [5.78]

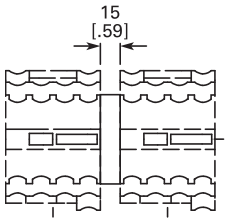
Frames F–G



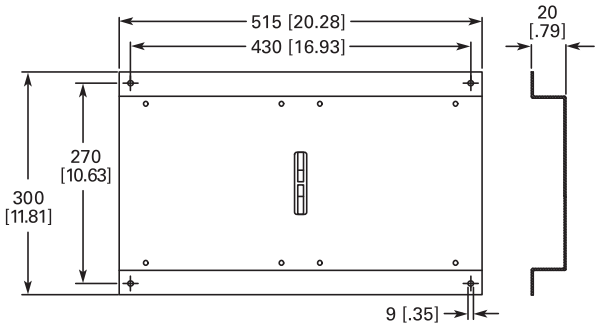
Approximate Dimensions in mm [in]

Mechanical Interlock

Frames H–M—XTCEXMLM

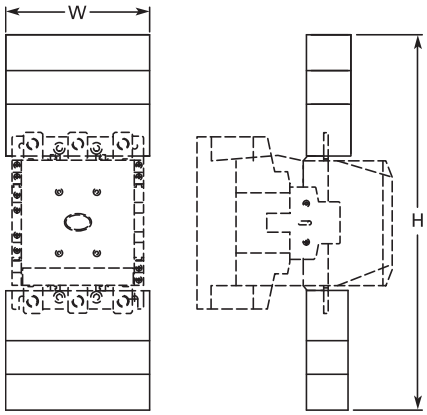


XTCEXMLN



Contactor with Terminal Shroud

Frames L–N Contactors, XTCE250L–XTCEC10N, with Terminal Shroud XTLEXTS

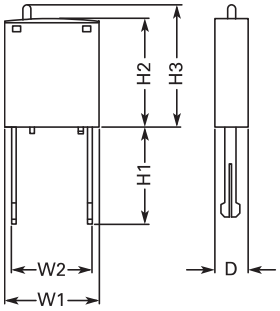


XTCE250L		XTCE400M		XTCE500M, XTCE570M		XTCE580N, XTCE650N, XTCE750N, XTCE820N, XTCEC10N	
W	**H**	**W**	**H**	**W**	**H**	**W**	**H**
150 [5.91]	384 [15.12]	150 [5.91]	404 [15.91]	174 [6.85]	426 [16.77]	236 [9.29]	506 [19.92]

Approximate Dimensions in mm [in]

Suppressor

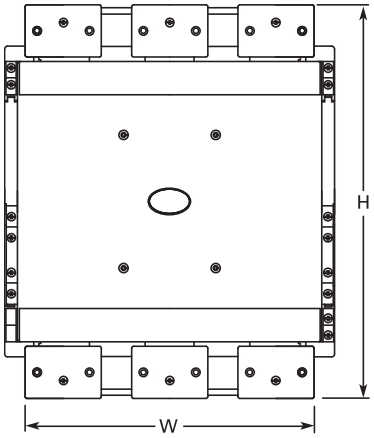
XTCE_ Suppressor



	W1	W2	H1	H2	H3	D
XTCEXRSB_ **XTCEXVSB_** **XTCEXVSLB_** **XTCEXDSB_**	25 [.98]	9.2 [.36]	25.9 [1.02]	28 [1.10]	32 [1.26]	9 [.35]
XTCEXRSC_ **XTCEXVSC_** **XTCEXVSLC_**	25 [.98]	9.2 [.36]	16 [.63]	28 [1.10]	32 [1.26]	9 [.35]
XTCEXRSF_ **XTCEXVSF_** **XTCEXVSLF_**	25 [.98]	20 [.79]	18.5 [.73]	28 [1.10]	32 [1.26]	9 [.35]

Flat Strip Conductor Terminals

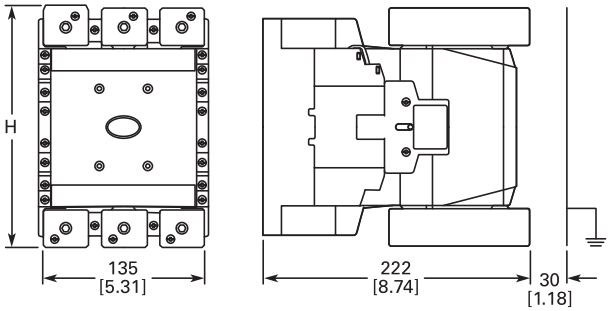
XTCEXTFB



	W	H
XTCE500M–XTCE570M	171 [6.73]	232 [9.13]
XTCE750N–XTCE820N	231 [9.09]	310 [12.20]

Cable Terminal Block

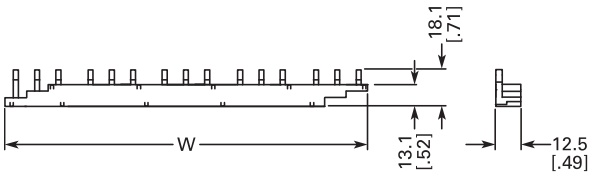
XTCEXTLA



	H
XTCE250L	198 [7.80]
XTCE400M	218 [8.58]

Three-Phase Commoning Link

Frame B



	W
XTCEXCLK3B	112 [4.41]
XTCEXCLK4B	157 [6.18]
XTCBXCLK5B	202 [7.95]

1

XTSE Contactor



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
XTSE Contactors	
Catalog Number Selection	**V5-T1-129**
Product Selection	**V5-T1-129**
Thermal Overload Relays	**V5-T1-130**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	**V5-T1-219**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

XTSE Contactors

Product Description

Eaton XTSE safety contactors are designed with the OEM and end customer in mind.

Providing enhanced levels of safety, XTSE contactors integrate to applications to not only achieve the highest safety circuits, but provide additional levels of protection that reinforce end-user safety.

Application Description

With offerings up to 150 A and 125 hp, XTSE contactors were engineered to provide highly effective control and protection for motors, compressors and pumps, etc. XTSE contactors can be used in safety applications according to EN 954-1, EN ISO 13849-1 and IEC 62061 up to Category 4, PI e and SIL 3. Information concerning safety-related characteristics (B10 and B10d values) is available online. The auxiliary contact modules and built-in auxiliary contacts meet IEC EN 60947-5-1 Annex L (positively driven) and IEC EN 60947-4-1 Annex F (mirror contacts).

Features and Benefits

Clear Inspection Window

- The clear inspection window located on top of the auxiliary contact prevents the contactor from being manually activated and also allows for safe status monitoring for the user

Rated for Highest Safety Characteristics

- XTSE contactors are able to integrate to safety circuits for up to category 4, PI e and SIL 3 applications
- SUVA Certified

Safety Agency Approval

- Integrated front-mounted auxiliary contacts
- XTSE contactors utilize a new enhanced latching mechanism to prevent removal of the auxiliary contact

Standards and Certifications

- CE Approved
- UL Listed
- IEC/EN 60947-4-1, 60947-5-1
- CSA Listed

Catalog Number Selection

XTSE Contactors

XT SE 007 B 22 TD

Designation
XT = *XT* line of IEC control

Type
SE = Three-pole FVNR IEC safety contactor
SRE = Auxiliary IEC safety contactor relay

Current Ratings, AC-3			
007	= 7 A	050	= 50 A
009	= 9 A	065	= 65 A
012	= 12 A	080	= 80 A
018	= 18 A	095	= 95 A
025	= 25 A	115	= 115 A
032	= 32 A	150	= 150 A
040	= 40 A		

Frame Size Designation
B = 45 mm
C = 45 mm
D = 55 mm
F = 90 mm
G = 90 mm
BE = 45 mm electronic compatible auxiliary contact
CE = 45 mm electronic compatible auxiliary contact

Built-In Auxiliary Contact
22 = 2NO–2NC
23 = 2NO–3NC
44 = 4NO–4NC

Coil Codes
A = 110 V, 50 Hz; 120 V, 60 Hz
TD = 24 Vdc

Product Selection

XTSE Safety Relay

XTSRE10B_



Conventional Thermal Current I_{th} (A)	Rated Operational Current AC-15 I_e (A) 220–240 V	380–415 V	500 V	Auxiliary Contacts	Coil Voltage 110 V, 50 Hz; 120 V, 60 Hz Catalog Number	24 Vdc Catalog Number
16	6	4	1.5	4NO, 4NC	XTSRE10B44A	XTSRE10B44TD
16	6	4	1.5	3NO, 3NC+1NO, 1NC ①	XTSRE10BE44A	XTSRE10BE44TD

XTSE Safety Contactor

Horsepower Rating (hp), Three-Phase 200/208 V	230/240 V	460/480 V	575/600 V	Auxiliary Contacts	Coil Voltage 110 V, 50 Hz; 120 V, 60 Hz Catalog Number	24 Vdc Catalog Number
XTSE_B_						
1-1/2	2	3	5	2NO, 3NC	XTSE007B23A	XTSE007B23TD
3	3	5	7-1/2	2NO, 3NC	XTSE009B23A	XTSE009B23TD
3	3	10	10	2NO, 3NC	XTSE012B23A	XTSE012B23TD
1-1/2	2	3	5	1NO, 2NC+1NO, 1NC ①	XTSE007BE23A	XTSE007BE23TD
3	3	5	7-1/2	1NO, 2NC+1NO, 1NC ①	XTSE009BE23A	XTSE009BE23TD
3	3	10	10	1NO, 2NC+1NO, 1NC ①	XTSE012BE23A	XTSE012BE23TD
XTSE_C_						
5	7-1/2	10	15	2NO, 3NC	XTSE018C23A	XTSE018C23TD
7-1/2	7-1/2	15	20	2NO, 3NC	XTSE025C23A	XTSE025C23TD
10	10	20	25	2NO, 3NC	XTSE032C23A	XTSE032C23TD
5	7-1/2	10	15	1NO, 2NC+1NO, 1NC ①	XTSE018CE23A	XTSE018CE23TD
7-1/2	7-1/2	15	20	1NO, 2NC+1NO, 1NC ①	XTSE025CE23A	XTSE025CE23TD
10	10	20	25	1NO, 2NC+1NO, 1NC ①	XTSE032CE23A	XTSE032CE23TD
XTSE_D_						
10	15	30	40	2NO, 2NC	XTSE040D22A	XTSE040D22TD
15	20	40	50	2NO, 2NC	XTSE050D22A	XTSE050D22TD
20	25	40	60	2NO, 2NC	XTSE065D22A	XTSE065D22TD
XTSE_F_						
25	30	60	75	2NO, 2NC	XTSE080F22A	XTSE080F22TD
25	40	75	100	2NO, 2NC	XTSE095F22A	XTSE095F22TD
40	50	100	125	2NO, 2NC	XTSE115G22A	XTSE115G22TD
40	60	125	125	2NO, 2NC	XTSE150G22A	XTSE150G22TD









Note

① 1NO and 1NC electronic compatible.

1

XTOB, XTOT Overload Relays



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
XTSE Contactors	**V5-T1-128**
Thermal Overload Relays	
Catalog Number Selection	**V5-T1-131**
Product Selection	**V5-T1-132**
Accessories	**V5-T1-135**
Technical Data and Specifications	**V5-T1-138**
Dimensions	**V5-T1-140**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	**V5-T1-219**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

Thermal Overload Relays

Product Description

The *XT* line of IEC motor thermal overload relays provides an efficient motor protection solution, available up to 630A. XTOB units can be directly mounted to the contactor or mounted separately.

Features and Benefits

- Direct connect up to 250A
- Stand alone and CT type up to 630A
- Large thermal overcurrent range
- Test button
- Manual/automatic selectable reset
- NO-NC auxiliary as standard
- Class 10A (to 250A)
- Class 30 (CT type)

Standards and Certifications

- IEC EN 60947
- CE approved
- UL
- CSA
- ATEX
- RoHS

Notes

Short-circuit protection: Observe the maximum permissible fuse of the contactor with direct device mounting. See MN03402001E for more information on overload relays for Frames B–G.

Trip Class: 10A

Suitable for protection of EEx e-motors. EC prototype test certificate available upon request.

See manuals MN03402001E and MN03407001E, **Page V5-T1-135.**

Instructional Leaflets

Pub51221	XTOB, D Frame overload relays (inside of packaging)
Pub51222	XTOB, B–C Frame overload relays (inside of packaging)

Catalog Number Selection

XT IEC Overload Relays

XT OB P16 B C1 S

Device Type
XT = ***XT*** line of IEC control

Type
OB = Bimetallic overload relay
OT = Current transformer overload relay

Overload Release	
Frame B	**Frame G**
P16 = 0.1–0.16A	**035** = 25–35A
P24 = 0.16–0.24A	**050** = 35–50A
P40 = 0.24–0.4A	**070** = 50–70A
P60 = 0.4–0.6A	**100** = 70–100A
001 = 0.6–1A	**125** = 95–125A
1P6 = 1.0–1.6A	**150** = 120–150A
2P4 = 1.6–2.4A	**175** = 145–175A
004 = 2.4–4A	
006 = 4–6A	**Frame H**
010 = 6–10A	**070** = 50–70A
012 = 9–12A	**100** = 70–100A
016 = 12–16A	**125** = 95–125A
	160 = 120–160A
Frame C	**220** = 160–220A
P16 = 0.1–0.16A	**250** = 200–250A
P24 = 0.16–0.24A	
P40 = 0.24–0.4A	**Frame L**
P60 = 0.4–0.6A	**070** = 50–70A
001 = 0.6–1A	**100** = 70–100A
1P6 = 1.0–1.6A	**125** = 95–125A
2P4 = 1.6–2.4A	**160** = 120–160A
004 = 2.4–4A	**220** = 160–220A
006 = 4–6A	**250** = 200–250A
010 = 6–10A	**300** = 200–300A
016 = 12–16A	
024 = 16–24A	**Frame M**
032 = 24–32A	**063** = 42–63A
	090 = 60–90A
Frame D	**125** = 85–125A
010 = 6–10A	**160** = 110–160A
016 = 12–16A	**240** = 160–240A
024 = 16–24A	**290** = 190–290A
040 = 24–40A	**400** = 170–400A
057 = 40–57A	**540** = 360–540A
065 = 50–65A	
075 = 65–75A	**Frame N**
	063 = 42–63A
Frame F	**090** = 60–90A
035 = 25–35A	**125** = 85–125A
050 = 35–50A	**160** = 110–160A
070 = 50–70A	**240** = 160–240A
100 = 70–100A	**290** = 190–290A
	400 = 170–400A
	540 = 360–540A
	630 = 420–630A

Frame Size Designation
B = 45 mm
C = 45 mm
D = 55 mm
G = 90 mm
L = 140 mm
Blank = XTOT only

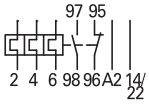
Trip Class
C1 = Class 10A (XTOB)
C3 = Class 30 (XTOT)

Mounting
Blank = Direct to contactor
S = Separate mount

Frame B



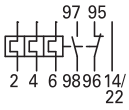
Overload Relay, Direct Mount—Frame B

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
0.1–0.16		1NO-1NC	7–15A	25	0.5	25	3	**XTOBP16BC1**
0.16–0.24		1NO-1NC	7–15A	25	1	25	3	**XTOBP24BC1**
0.24–0.4		1NO-1NC	7–15A	25	2	25	3	**XTOBP40BC1**
0.4–0.6		1NO-1NC	7–15A	25	4	25	3	**XTOBP60BC1**
0.6–1		1NO-1NC	7–15A	25	4	25	3	**XTOB001BC1**
1–1.6		1NO-1NC	7–15A	25	6	25	6	**XTOB1P6BC1**
1.6–2.4		1NO-1NC	7–15A	25	10	25	6	**XTOB2P4BC1**
2.4–4		1NO-1NC	7–15A	25	16	25	15	**XTOB004BC1**
4–6		1NO-1NC	7–15A	25	20	25	20	**XTOB006BC1**
6–10		1NO-1NC	7–15A	50	25	25	35	**XTOB010BC1**
9–12		1NO-1NC	9–15A	50	25	25	45	**XTOB012BC1**
12–16		1NO-1NC	12–15A	50	25	30	45	**XTOB016BC1**

Frame C



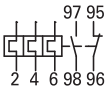
Overload Relay, Direct Mount—Frame C

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
0.1–0.16		1NO-1NC	18–32A	25	0.5	25	3	**XTOBP16CC1**
0.16–0.24		1NO-1NC	18–32A	25	1	25	3	**XTOBP24CC1**
0.24–0.4		1NO-1NC	18–32A	25	2	25	3	**XTOBP40CC1**
0.4–0.6		1NO-1NC	18–32A	25	4	25	3	**XTOBP60CC1**
0.6–1		1NO-1NC	18–32A	25	4	25	3	**XTOB001CC1**
1–1.6		1NO-1NC	18–32A	25	6	25	6	**XTOB1P6CC1**
1.6–2.4		1NO-1NC	18–32A	25	10	25	6	**XTOB2P4CC1**
2.4–4		1NO-1NC	18–32A	25	16	25	15	**XTOB004CC1**
4–6		1NO-1NC	18–32A	25	20	25	20	**XTOB006CC1**
6–10		1NO-1NC	18–32A	50	25	25	25	**XTOB010CC1**
10–16		1NO-1NC	18–32A	63	35	30	25	**XTOB016CC1**
16–24		1NO-1NC	18–32A	100	35	30	25	**XTOB024CC1**
24–32		1NO-1NC	25–32A	125	63	30	25	**XTOB032CC1**
32–38		1NO-1NC	32–38A	125	63	30	25	**XTOB032CC1**

Frame D



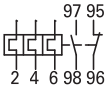
Overload Relay, Direct Mount—Frame D

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
6–10		1NO-1NC	40–72A	50	25	25	25	**XTOB010DC1**
10–16		1NO-1NC	40–72A	63	35	25	25	**XTOB016DC1**
16–24		1NO-1NC	40–72A	63	50	30	25	**XTOB024DC1**
24–40		1NO-1NC	40–72A	125	63	125	125	**XTOB040DC1**
40–57		1NO-1NC	50–72A	160	80	150	150	**XTOB057DC1**
50–65		1NO-1NC	65–72A	160	100	150	200	**XTOB065DC1**
65–75		1NO-1NC	72A	200	125	150	200	**XTOB075DC1**

Frames F–G



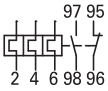
Overload Relay, Direct Mount—Frames F–G

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
25–35		1NO-1NC	80–170A	125	100	125	125	**XTOB035GC1**
35–50		1NO-1NC	80–170A	160	125	150	200	**XTOB050GC1**
50–70		1NO-1NC	80–170A	250	160	150	200	**XTOB070GC1**
70–100		1NO-1NC	80–170A	315	200	400	400	**XTOB100GC1**
95–125		1NO-1NC	80–170A	315	200	500	400	**XTOB125GC1**
120–150		1NO-1NC	80–170A	315	200	600	600	**XTOB150GC1**
145–175		1NO-1NC	150–170A	315	200	600	600	**XTOB175GC1**

Frames F–G



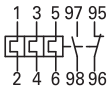
Overload Relay, Separate Mount—Frames F–G

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
25–35		1NO-1NC	80–170A	125	100	125	125	**XTOB035GC1S**
35–50		1NO-1NC	80–170A	160	125	150	200	**XTOB050GC1S**
50–70		1NO-1NC	80–170A	250	160	150	200	**XTOB070GC1S**
70–100		1NO-1NC	80–170A	315	200	400	400	**XTOB100GC1S**
95–125		1NO-1NC	80–170A	315	250	500	400	**XTOB125GC1S**
120–150		1NO-1NC	80–170A	315	250	600	600	**XTOB150GC1S**
145–175		1NO-1NC	150–170A	315	250	600	600	**XTOB175GC1S**

Frame H



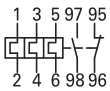
Overload Relay, Separate Mount—Frame H

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Fuse Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
50–70		1NO-1NC	185–250A	250	160	150	200	**XTOB070HC1**
70–100		1NO-1NC	185–250A	315	200	400	400	**XTOB100HC1**
95–125		1NO-1NC	185–250A	315	250	500	400	**XTOB125HC1**
120–160		1NO-1NC	185–250A	400	250	600	600	**XTOB160HC1**
160–220		1NO-1NC	185–250A	400 ①	315 ①	600	800	**XTOB220HC1**
200–250		1NO-1NC	225–250A	400 ①	315 ①	600	700	**XTOB250HC1**

Frame L



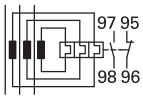
Overload Relay, Separate Mount—Frame L

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Fuse Type 1 Coordination, gG/gL	Fuse Type 2 Coordination, gG/gL	Maximum Circuit Breaker	CEC/NEC Fuse	Catalog Number
50–70		1NO-1NC	185–250A	250	160	150	200	**XTOB070LC1**
70–100		1NO-1NC	185–250A	315	200	400	400	**XTOB100LC1**
95–125		1NO-1NC	185–250A	315	250	500	400	**XTOB125LC1**
120–160		1NO-1NC	185–250A	400	250	600	600	**XTOB160LC1**
160–220		1NO-1NC	185–250A	400 ①	315 ①	600	800	**XTOB220LC1**
200–250		1NO-1NC	225–250A	400 ①	315 ①	600	700	**XTOB250LC1**
200–300		1NO-1NC	225–300A	630 ①	630 ①	600	700	**XTOB300LC1**

Frames M-N



Current Transformer Operated Overload Relays, Separate Mount—Frames M–N ②

Overload Releases, I_r	Contact Sequence	Contact Configuration	For Use with Contactor Amp Range	Short-Circuit Protection (A) Type 1 Coordination, gG/gL	Type 2 Coordination, gG/gL	Circuit Breaker	CEC/NEC Fuse	Catalog Number
42–63		1NO-1NC	300–500A	—	—	150	200	**XTOT063C3S**
60–90		1NO-1NC	300–500A	—	—	250	250	**XTOT090C3S**
85–125		1NO-1NC	300–500A	—	—	500	400	**XTOT125C3S**
110–160		1NO-1NC	300–500A	—	—	600	600	**XTOT160C3S**
160–240		1NO-1NC	300–500A	—	—	600	700	**XTOT240C3S**
190–290		1NO-1NC	300–500A	—	—	600	700	**XTOT290C3S**
270–400		1NO-1NC	300–500A	—	—	1000	1000	**XTOT400C3S**
360–540		1NO-1NC	500A	—	—	600	1000	**XTOT540C3S**
420–630 ③		1NO-1NC	630A	—	—	600	1000	**XTOT630C3S**

Notes

① For separate mounting, short-circuit Type 1 rating is 500A and short-circuit Type 2 rating is 400A.

② The main current parameters are defined by the main current wiring that is used.

③ Recommend busbar solution at 600A, 1.06 diameter CT openings.

Accessories

XTOBXDIN_



DIN Rail or Panel Mount Adapter, Frames C–D ①

For Use with…	Pkg. Qty. ②	Catalog Number
XTOB…CC1	5	**XTOBXDINC**
XTOB…DC1	2	**XTOBXDIND**

XTOBXTSL



Terminal Shroud

For Use with…	Catalog Number
XTOB…LC1	**XTOBXTSL**
XTOB…HC1	**XTOBXTSCH**

XTOBXTSCL



For Use with…	Catalog Number
XTOB…LC1 to XTCE250L or XTCE300L	**XTOBXTSCL**

Terminal Lug Kit—Set of Three Lugs

Description	For Use with…	Pkg. Qty. ②	Catalog Number
#6 AWG-350 kcmil	XTOB…LC1	1	**XTOBXTLL**

Documentation—Manuals for Overload Monitoring of EEX e-motors

Publication Number	For Use with…
MN03402001E	XTOB…BC1 XTOB…CC1
MN03407001E	XTOB…DC1 XTOB…GC1

Notes

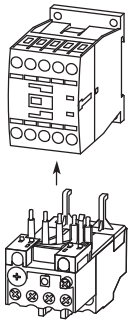
① Can be snap fitted on a top hat rail (DIN rail) to IEC/EN 60715 or can be screw fitted.

② Orders must be placed in multiples of package quantity listed.

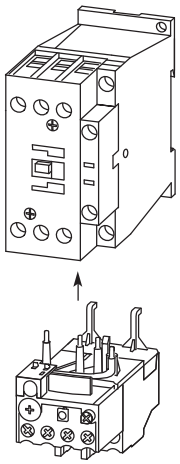
1

Overload Fitted Directly to the Contactor

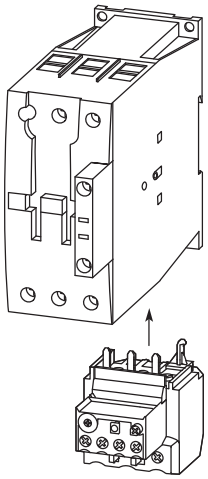
Frame B (7–15A)



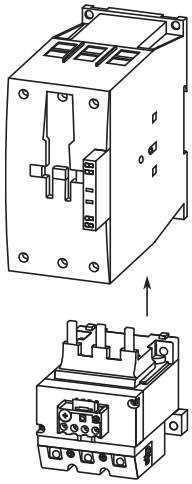
Frame C (18–32A)



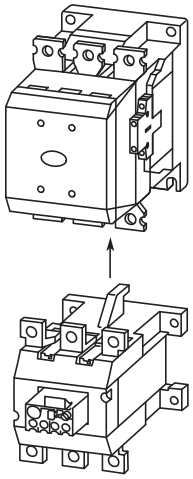
Frame D (40–72A)



Frames F–G (80–170A)

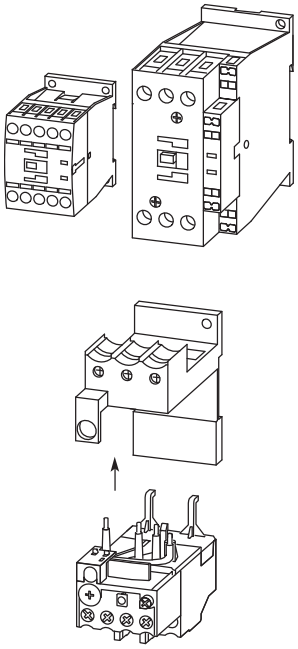


Frames H–L (185–250A)

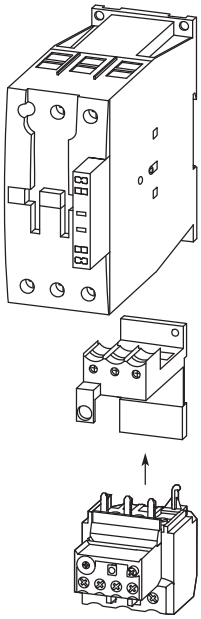


Overload Mounted Separately from the Contactor

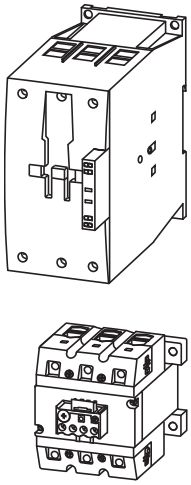
Frame C (18–32A)



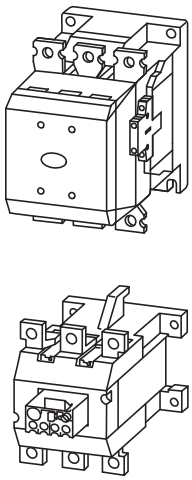
Frame D (40–72A)



Frames F–G (80–170A)



Frames H–L (185–250A)



1

Technical Data and Specifications

XTOB Overload Relay—General

Description	XTOB…BC1, XTOB…CC1	XTOB…DC1	XTOB…GC1, XTOB…GC1S	XTOB…HC1, XTOB…LC1
Standards	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA
Climate proofing	①	①	①	①
Ambient temperature ②	–25°C to 55°C [–13°F to 131°F]	–25°C to 55°C [–13°F to 131°F]	–25°C to 55°C [–13°F to 131°F]	–25°C to 50°C [–13°F to 122°F]
Temperature compensation	Continuous	Continuous	Continuous	Continuous
Mechanical shock resistance (IEC/EN 60068-2-27) half-sinusoidal shock 10 ms	10g	10g	10g	10g
Degree of protection	IP20	IP20	IP20	P00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Insulation voltage (U_i) Vac	690	690	690	1000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3
Impulse withstand voltage (Uimp) Vac	6000	6000	6000	8000
Operational voltage (U_e) Vac	690	690	690	1000
Safe isolation to VDE 0106 Part 101 and part 101/A1				
between auxiliary contacts and main contacts (Vac)	440	440	440	500
between main contacts (Vac)	440	440	440	500
Overload release setting range	0.1–32A	6–75A	25–150A	50–300A
Short-circuit protection maximum fuse	See overload relay tables starting on **Page V5-T1-146**.			
Temperature compensation residual error >40°C	<0.25	<0.25	<0.25	<0.25
Current heat loss (three conductors)				
Lower value of setting range, W	2.5	3	16	16
Upper value of setting range	6	7.5	28	28
Terminal capacity				
Solid, mm^2	2 x (1–6)	2 x (1–16)	2 x (4–16)	—
Flexible with ferrule, mm^2	2 x (1–4) 2 x (1–6) ③	1 x 25 2 x (1–10) ④	1 x (4–70) 2 x (4–50)	— —
Flexible with cable lug, mm^2	—	—	—	50–240
Stranded with cable lug, mm^2	—	—	—	50–240
Solid or stranded, AWG	14 - 8	14 - 2	3 / 0	250 kcmil
Flat conductor (number of segments x width x thickness, mm^2)	—	—	—	6 x 16 x 0.8
Busbar—width (mm)	—	—	—	25
Terminal screw	M4	M6	M10	M10 x 35
Tightening torque				
Nm	1.8	3.5	10	18
Lb-in	16	31	88.5	159.31
Tools				
Pozidriv screwdriver	Size 2	Size 2	—	—
Standard screwdriver	1 x 6	1 x 6	—	—
Hexagon socket head spanner (SW)	—	—	5 mm	16 mm

Notes

① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60068-2-30.
② Ambient temperature operating range to IEC/EN 60947, PTB: –5°C to 50°C.
③ 6 mm^2 flexible with ferrules to DIN 46228.
④ Main contact terminal capacity, solid and stranded conductors with ferrules: When using two conductors use identical cross-section.

XTOB Overload Relay—Auxiliary and Control Circuit Connections

Description	XTOB…BC1, XTOB…CC1	XTOB…DC1	XTOB…GC1, XTOB…GC1S	XTOB…HC1, XTOB…LC1
Impulse withstand voltage (U_{imp}) Vac	6000	6000	6000	4000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3
Terminal capacity				
Solid, mm^2	2 x (0.75–4)	2 x (0.75–4)	2 x (0.75–4)	2 x (0.75–4)
Flexible with ferrule, mm^2	2 x (0.75–2.5)	2 x (0.75–2.5)	2 x (0.75–2.5)	2 x (0.75–2.5)
Solid or stranded (AWG)	2 x (18–12)	2 x (18–12)	2 x (18–12)	2 x (18–12)
Terminal screw	M3.5	M3.5	M3.5	M3.5
Tightening torque				
Nm	0.8–1.2	0.8–1.2	0.8–1.2	0.8–1.2
Lb-in	7–10.6	7–10.6	7–10.6	7–10.6
Tools				
Pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2
Standard screwdriver	1 x 6	1 x 6	1 x 6	1 x 6
Rated insulated voltage (U_i) Vac	500	500	500	500
Rated operational voltage	500	500	500	500
Safe isolation to VDE 0106 Part 101 and part 101/A1 between auxiliary contacts	240	240	240	240
Conventional thermal current, I_{th}	6	6	6	6
Rated operational current—AC-15				
Make contact				
120V	1.5	1.5	1.5	1.5
240V	1.5	1.5	1.5	1.5
415V	0.5	0.5	0.5	0.5
500V	0.5	0.5	0.5	0.5
Break contact				
120V	1.5	1.5	1.5	1.5
240V	1.5	1.5	1.5	1.5
415V	0.9	0.9	0.9	0.9
500V	0.8	0.8	0.8	0.8
Rated operational current—DC-13 L/R ≤15 ms ①				
24V	0.9	0.9	0.9	0.9
60V	0.75	0.75	0.75	0.75
110V	0.4	0.4	0.4	0.4
220V	0.2	0.2	0.2	0.2
Short-circuit rating without welding maximum fuse, A gG/gl	6	6	6	6

Note

① Rated operational current: Making and breaking conditions to DC-13, L/R constant as stated.

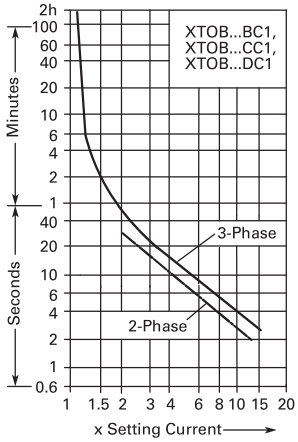
1

Tripping Characteristics

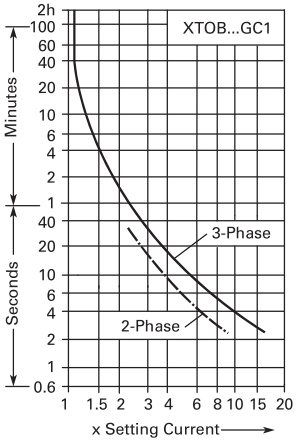
These tripping characteristics are the mean values of the spread at 20°C ambient temperature in a cold state.

Tripping time depends on response current. With devices at operating temperature, the tripping time of the overload relay reduces to approximately 25% of the read off value. Specific characteristics for each individual setting range can be found in MN03402001E.

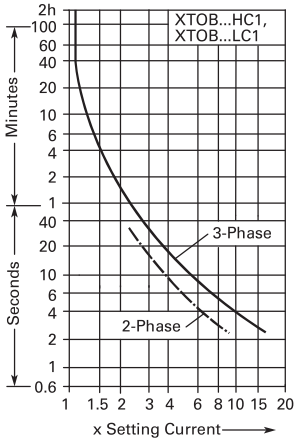
XTOB...BC1, XTOB...CC1, XTOB...DC1



XTOB...GC1



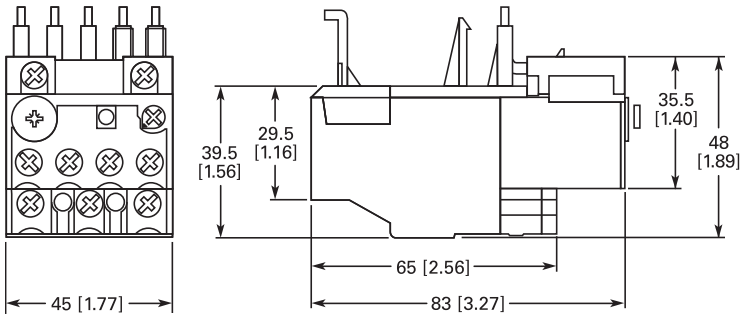
XTOB...HC1, XTOB...LC1



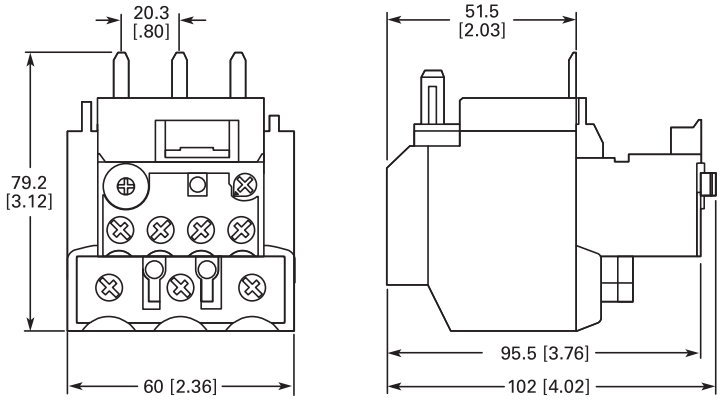
Dimensions

Approximate Dimensions in mm [in]

Frames B–C, XTOB...BC1 and XTOB...CC1 Overload Relays

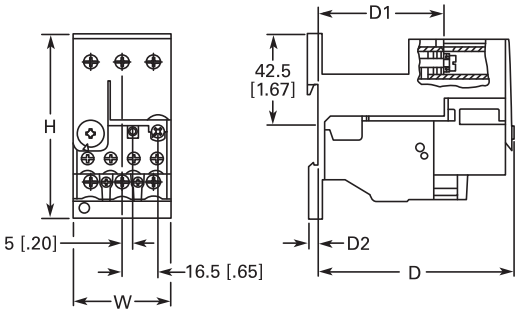


Frame D, XTOB...DC1 Overload Relay

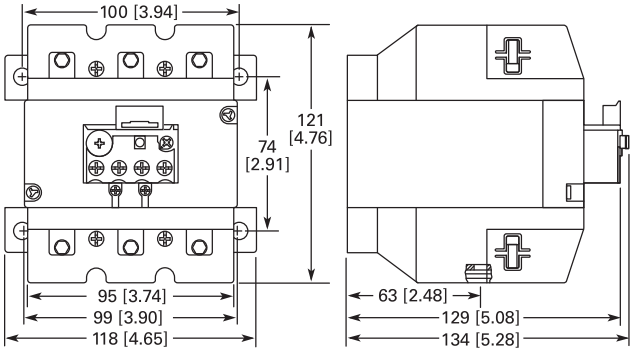


Approximate Dimensions in mm [in]

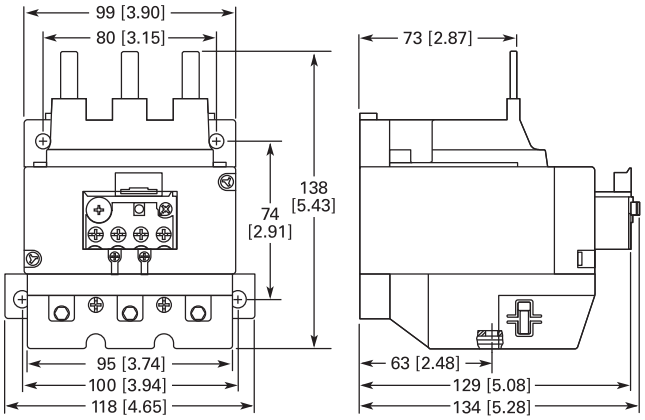
Frame C, XTOBXDINC DIN Rail or Panel Mount Adapter and Frame D, XTOBXDIND DIN Rail or Panel Mount Adapter



	H	W	D	D1	D2
XTOB...CC1	85 [3.46]	45 [1.77]	90.5 [3.56]	58.3 [2.30]	3.8 [.15]
XTOB...DC1	86 [3.39]	60 [2.36]	112 [4.41]	80.5 [3.17]	4.7 [.19]



Frames F–G, XTOB...GC1 Overload Relay

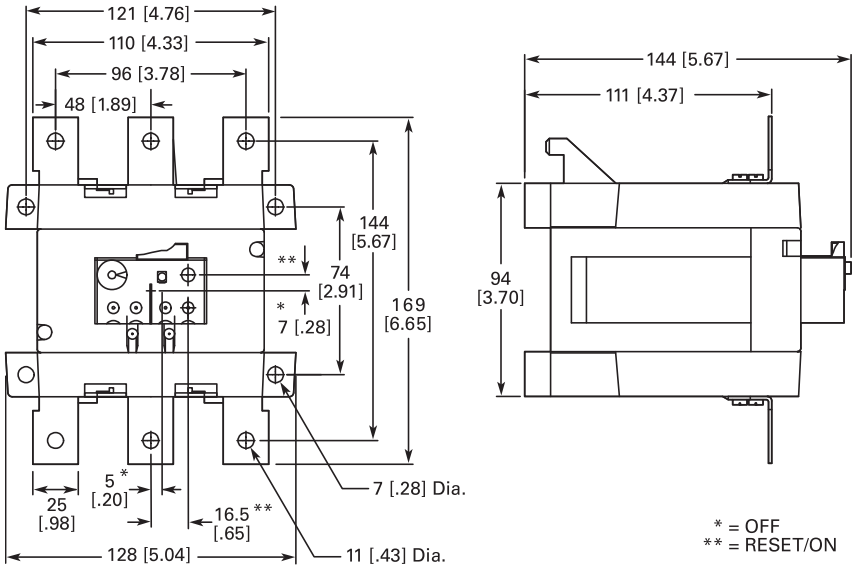


Frames F–G, XTOB...G1CS Overload Relay

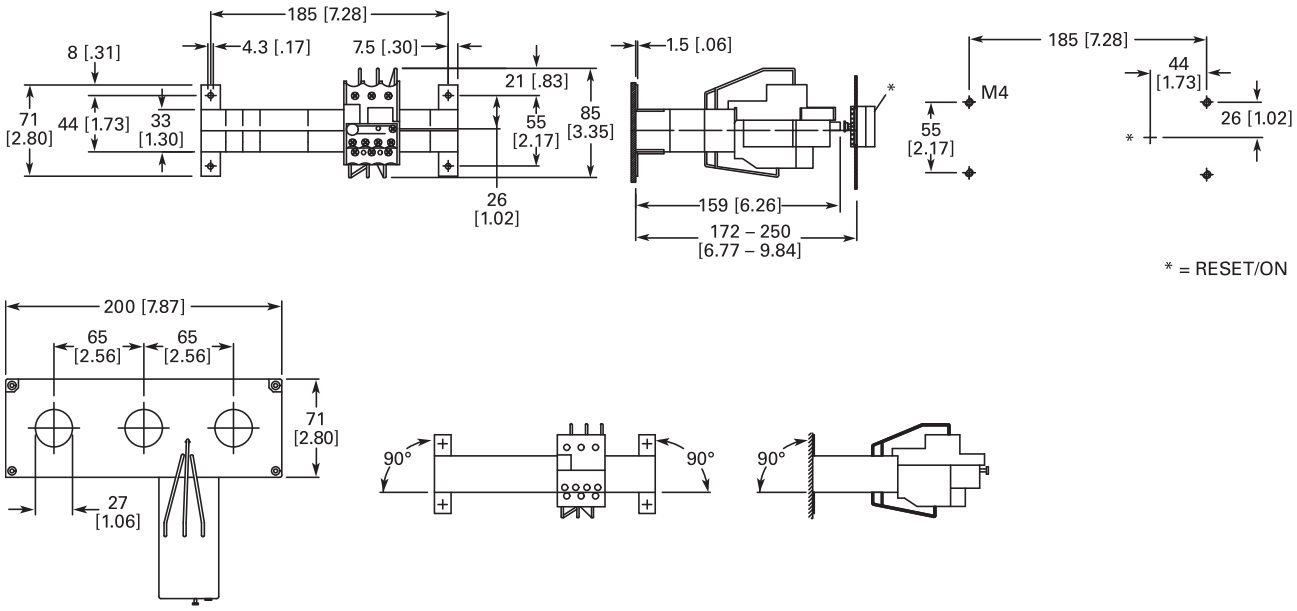
1

Approximate Dimensions in mm [in]

Frames L and H, XTOB...LC1, HC1 Overload Relay



XTOT...C3S Current Transformer Operated Overload Relay



C440/*XT* Electronic Overload Relay



Contents

Description	*Page*
Relays and Timers	V5-T1-3
Miniature Controls	V5-T1-18
Contactors and Starters	V5-T1-35
XTSE Contactors	V5-T1-128
Thermal Overload Relays	V5-T1-130
C440/*XT* Electronic Overload Relay	
Standards and Certifications	V5-T1-144
Catalog Number Selection	V5-T1-145
Product Selection	V5-T1-146
Accessories	V5-T1-148
Technical Data and Specifications	V5-T1-151
Dimensions	V5-T1-157
An Eaton Green Solution	
Manual Motor Protectors	V5-T1-159
Combination Motor Controllers	V5-T1-193
XT Electronic Manual Motor Protector	V5-T1-219
EMS—Electronic Motor Starter	V5-T1-232
XT DC Contactors	V5-T1-234
Reference Data	V5-T1-236

C440/*XT* Electronic Overload Relay

Product Description

Eaton's new electronic overload relay (EOL) is the most compact, high-featured, economical product in its class. Designed on a global platform, the new EOL covers the entire power control spectrum including NEMA, IEC and DP contactors. The NEMA and DP versions are offered with the *C440* designation while the IEC offering has the ***XT*** designation. The electronic design provides reliable, accurate and value driven protection and communications capabilities in a single compact device. It is the flexible choice for any application requiring easy-to-use, reliable protection.

Eaton has a long history of innovations and product development in motor control and protection, including both traditional NEMA, as well as IEC control. It was from this experience that the C440 was developed, delivering new solutions to meet today's demands.

C440 is a self-powered electronic overload relay available up to 175A as a self contained unit. With external CTs, C440 can protect motor up to 1500 FLA. Available add-on accessories include remote reset capability and communication modules with I/O for DeviceNet, PROFIBUS, and Modbus.

Features and Benefits

Features

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Compact size
- Flexible, intelligent design
- Global product offering—available with NEMA, IEC and DP power control

Size/Range

- Broad FLA range (0.33–1500A)
- Selectable trip class (10A, 10, 20, 30)
- Direct mounting to NEMA, IEC and DP contactors
- Most compact electronic overload in its class

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase unbalance
- Selectable (ON/OFF) ground fault

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase unbalance and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
  - 120 Vac
  - 24 Vac
  - 24 Vdc
- Tamper-proof cover
- Communications modules
  - Modbus RTU RS-485
  - DeviceNet with I/O
  - PROFIBUS with I/O
  - Modbus RTU with I/O
  - Ethernet IP with I/O
  - Modbus TCP with I/O

1

Benefits

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

- Available with NEMA, IEC and DP contactors
- 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
- Available as an open component and in enclosed control and motor control center assemblies

Monitoring Capabilities

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

Safety

- IP 20 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

Standards and Certifications

- UL
- CSA
- CE
- NEMA
- IEC/EN 60947 VDE 0660
- ISO 13849-1 (EN954-1)
- RoHS
- ATEX 2014/34/EU
- ATEX Mark

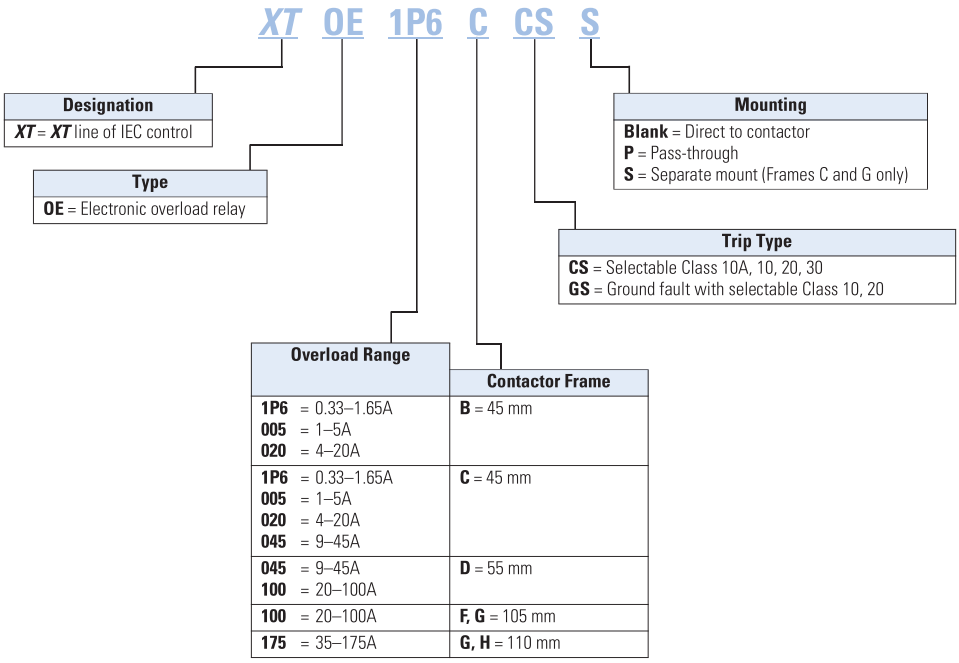
II (2)GD
[Ex d] [Ex e] [Ex tb]

Electronic Overload Education

Description	Definition	Cause	Effect if not Protected	C440/*XT* Protection
Motor Protection				
Thermal overload	Overload is a condition in which current draw exceeds 115% of the full load amperage rating for an inductive motor.	• An increase in the load or torque that is being driven by the motor. • A low voltage supply to the motor causes the current to go high to maintain the power needed. • A poor power factor causing above normal current draw.	• Increase in current draw leads to heat and insulation breakdown, which can cause system failure. • Increase in current can increase power consumption and waste valuable energy.	• Thermal trip behavior is defined by UL, CSA and IEC standards. • Trip class is settable from 10A, 10, 20, 30
Ground fault	A line to ground fault.	A current leakage path to ground.	An undetected ground fault can burn through multiple insulation windings, ultimately leading to motor failure, not to mention risk to equipment or personnel	Fixed protective setting that takes the starter offline if ground fault current exceeds 50% of the FLA dial setting, that is, if the FLA dial is set to 12A, the overload relay will trip if the ground current exceeds 6A.
Unbalanced phases (voltage and current)	Uneven voltage or current between phases in a three-phase system.	When a three-phase load is powered with a poor quality line, the voltage per phase may be unbalanced.	Unbalanced voltage causes large unbalanced currents and as a result this can lead to motor stator windings being overloaded, causing excessive heating, reduced motor efficiency and reduced insulation life.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.
Phase loss—current (single-phasing)	One of the three-phase voltages is not present.	Multiple causes, loose wire, improper wiring, grounded phase, open fuse, etc.	Single-phasing can lead to unwanted motor vibrations in addition to the results of unbalanced phases as listed above.	Fixed protective setting that takes the starter offline if a phase is lost.

Catalog Number Selection

XT Electronic Overload Relay—IEC ①



Note

① See **Page V5-T1-146** for Product Selection.

1

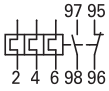
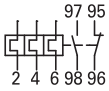
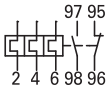
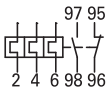
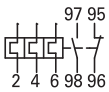
Product Selection

XT Electronic Overload Relays

45 mm *XT* for Direct Mount



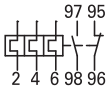
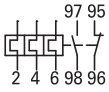
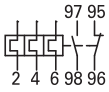
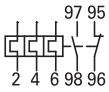
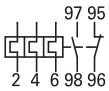
XT Electronic Overload Relays for Direct Mount to *XT* Contactors

For Use with *XT* Contactor Frame	For Use with Contactor	Overload Range (Amps)	Contact Sequence	Frame Size	Auxiliary Contact Configuration	Type	Catalog Number
B	XTCE007B…, XTCE009B…, XTCE012B…, XTCE015B…	0.33–1.65		45 mm	NO-NC	ZEB12-1,65	**XTOE1P6BCS**
		1–5				ZEB12-5	**XTOE005BCS**
		4–20				ZEB12-20	**XTOE020BCS**
C	XTCE018C…, XTCE025C…, XTCE032C	0.33–1.65		45 mm	NO-NC	ZEB32-1,65	**XTOE1P6CCS**
		1–5				ZEB32-5	**XTOE005CCS**
		4–20				ZEB32-20	**XTOE020CCS**
		9–45				ZEB32-45	**XTOE045CCS**
D	XTCE040D…, XTCE050D…, XTCE065D…, XTCE072D…	9–45		45 mm	NO-NC	ZEB65-45	**XTOE045DCS**
		20–100		55 mm		ZEB65-100	**XTOE100DCS**
F	XTCE080F…, XTCE095F…	20–100		55 mm	NO-NC	ZEB150-100	**XTOE100GCS**
G	XTCE115G…, XTCE150G…, XTCE170G…	20–100		55 mm	NO-NC	ZEB150-100	**XTOE100GCS**
		35–175		110 mm		ZEB150-175	**XTOE175GCS**
H	XTCE185H…	35–175		110 mm	NO-NC	ZEB225-175	**XTOE175HCS**

45 mm *XT* for Direct Mount with Ground Fault



XT Electronic Overload Relays with Ground Fault for Direct Mount to *XT* Contactors

For Use with *XT* Contactor Frame	For Use with Contactor	Overload Range (Amps)	Contact Sequence	Frame Size	Auxiliary Contact Configuration	Type	Catalog Number
B	XTCE007B…, XTCE009B…, XTCE012B…, XTCE015B…	0.33–1.65		45 mm	NO-NC	ZEB12-1,65-GF	**XTOE1P6BGS**
		1–5				ZEB12-5-GF	**XTOE005BGS**
		4–20				ZEB12-20-GF	**XTOE020BGS**
C	XTCE018C…, XTCE025C…, XTCE032C	0.33–1.65		45 mm	NO-NC	ZEB32-1,65-GF	**XTOE1P6CGS**
		1–5				ZEB32-5-GF	**XTOE005CGS**
		4–20				ZEB32-20-GF	**XTOE020CGS**
		9–45				ZEB32-45-GF	**XTOE045CGS**
D	XTCE040D…, XTCE050D…, XTCE065D…, XTCE072D…	9–45		45 mm	NO-NC	ZEB65-45-GF	**XTOE045DGS**
		20–100		55 mm		ZEB65-100-GF	**XTOE100DGS**
F	XTCE080F…, XTCE095F…	20–100		55 mm	NO-NC	ZEB150-100-GF	**XTOE100GGS**
G	XTCE115G…, XTCE150G…, XTCE170G…	20–100		55 mm	NO-NC	ZEB150-100-GF	**XTOE100GGS**
		35–175		110 mm		ZEB150-175-GF	**XTOE175GGS**
H	XTCE185H…	35–175		110 mm	NO-NC	ZEB225-175-GF	**XTOE175HGS**

1–5A OL with CTs



XT Electronic Overload Relays for use with Large Frame *XT* Contactors (L–R)

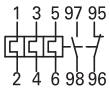
Use CTs and 1-5A ***XT*** overload relay. CT kit does not include overload relay (order separately).

XT Contactor Frame	For Use with IEC Contactor Amp Range (AC-3)	CT Range (Amps)	Description	CT Kit Catalog Number	Terminal Size	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
L, M	185–500A	60-300	300: 5 panel-mount CT kit with integrated lugs	**ZEB-XCT300**	750 kcmil (2) 250 kcmil 3/0 Cu/Al	**XTOE005CCSS**	**XTOE005CGSS**
M, N	300–820A	120-600	600: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT600**	(2) 750 kcmil 3/0 Cu/Al	**XTOE005CCSS**	**XTOE005CGSS**
N	580–1000A	200-1000	1000: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1000**	(3) 750 kcmil 3/0 Cu/Al	**XTOE005CCSS**	**XTOE005CGSS**
R	1600A	300-1500	1500: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1500**	(4) 750 kcmil 1/0 Cu/Al	**XTOE005CCSS**	**XTOE005CGSS**

45 mm *XT* for Separate Mount

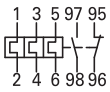


XT Electronic Overload Relays for Separate Mount

Overload Range (Amps)	Frame Size	Contact Sequence	Type	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
Overload Relay					
0.33–1.65	45 mm		ZEB32-1,65/KK	**XTOE1P6CCSS**	**XTOE1P6CGSS**
1–5			ZEB32-5/KK	**XTOE005CCSS**	**XTOE005CGSS**
4–20			ZEB32-20/KK	**XTOE020CCSS**	**XTOE020CGSS**
9–45			ZEB32-45/KK	**XTOE045CCSS**	**XTOE045CGSS**
20–100	55 mm		ZEB150-100/KK	**XTOE100GCSS**	**XTOE100GGSS**
35–175	110 mm		ZEB150-175/KK	**XTOE175GCSS**	**XTOE175GGSS**

XT Electronic Overload Relay for Pass-Through Design

Pass-through design does not include any lugs to land wires.
Terminate motor leads directly on contactor.

Overload Range (Amps)	Frame Size	Contact Sequence	Type	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
35–175	110 mm		ZEB150-175/PT	**XTOE175GCSP**	**XTOE175GGSP**

1

Accessories

CT Kits

Accessories

Description	Catalog Number
Safety Cover	
Safety Cover	
Clear Lexan cover that mounts on top of the FLA dial and DIP switches when closed.	**ZEB-XSC**
Reset Bar	
Reset Bar	
Assembles to the top of the overload to provide a larger target area for door mounted reset operators.	**ZEB-XRB**
Remote Reset	
Remote Reset	
Remote reset module (24 Vdc) ①	**C440-XCOM**
Remote reset module (120 Vac) ①	**ZEB-XRR-120**
Remote reset module (24 Vac) ①	**ZEB-XRR-24**

Safety Cover



Reset Bar



Remote Reset



Communication

The C440 is provided with two levels of communication capability.

Basic Communication via Expansion Module—Monitoring Only

Basic communication on the C440 is accomplished using an expansion module. The expansion module plugs into the expansion bay on the C440 overload relay, enabling communications with the overload via their Modbus RTU (RS-485) network. No additional parts are required. See figure below.



Basic Communication—Modbus

Advanced Communication—Monitoring and Control

C440 also has the ability to communicate on industrial protocols such as DeviceNet, PROFIBUS, Modbus RTU and Modbus TCP, and Ethernet (planned) while providing control capability using I/O.

An expansion module (mentioned earlier) combined with a communication adapter and a communication module allows easy integration onto the customer's network. See figure below.



Advanced Communication—Communication Adapter with Communication Module

Advanced Communication—Communication Module

The communication adapter comes standard with four inputs and two outputs (24 Vdc or 120 Vac) while providing the customer with flexible mounting options (DIN rail or panel). See figure below.

Note

① Customer can wire remote mounted button to reset module (that is, 22 mm pushbutton, catalog number M22-D-B-GB14-K10).

The following information can be viewed using the communication option:

- Motor status—running, stopped, tripped or resetting
- Individual rms phase currents (A, B, C)
- Average of three-phase rms current
- Percent thermal capacity
- Fault codes (only available prior to reset)
- Percent phase unbalance
- Ground fault current and percent
- Overload relay settings—trip class, DIP switch selections, reset selections
- Modbus address (can be set over the network)

Communication Accessories

	Description	Catalog Number
Expansion Module 	Expansion module (Remote Reset/Modbus RTU, RS-485 Communication)	**C440-XCOM**
Communication Adapter 	Communication adapter kit (DIN C Panel mounted adapter, required for advance communication option)	**C440-COM-ADP**
	DeviceNet communication module kit—120V I/O (consists of C440-XCOM + C441K + C440-COM-ADP)	**C440-DN-120**
	DeviceNet communication module kit—24 Vdc I/O (consists of C440-XCOM + C441L + C440-COM-ADP)	**C440-DN-24**
	PROFIBUS communication module kit—120V I/O (consists of C440-XCOM + C441S + C440-COM-ADP)	**C440-DP-120**
	PROFIBUS communication module kit—24V I/O (consists of C440-XCOM + C441Q + C440-COM-ADP)	**C440-DP-24**
	Modbus communication module kit—120V I/O (consists of C440-XCOM + C441N + C440-COM-ADP)	**C440-MOD-120**
	Modbus communication module kit—24 Vdc I/O (consists of C440-XCOM + C441P + C440-COM-ADP)	**C440-MOD-24**
	Modbus TCP/Ethernet IP communication module kit—120V I/O (consists of C440-XCOM + C441U)	**C440-ET-120**
	Modbus TCP/Ethernet IP communication module kit—24V I/O (consists of C440-XCOM + C441V)	**C440-ET-24**

1

Modbus Communication Module

The Modbus module combined with an expansion module and a communication adapter provide Modbus communication capability to the C440 electronic overload relay.



Modbus Communication Module

Features and Benefits

- The Modbus communication module is capable of baud rates up to 115K
- The Modbus address and baud rate configuration can be easily changed using the HMi user interface
- Modbus address and baud rate are set via convenient DIP switches; LEDs are provided to display Modbus traffic
- Configuration with common Modbus configuration tools
- Terminals
  - Unique locking mechanism provides for easy removal of the terminal block with the field wiring installed
  - Each terminal is marked for ease of wiring and troubleshooting
- Selectable I/O assemblies
  - 4IN/2OUT
  - Signal types include 24 Vdc I/O and 120 Vac I/O
- Each I/O module is optically isolated between the field I/O and the network adapter to protect the I/O and communication circuits from possible damage due to transients and ground loops
- Input Module features a user-definable input debounce, which limits the effects of transients and electrical noise
- Output Module supports a user-definable safe state for loss of communication; hold last state, ON or OFF

DeviceNet Communication Modules

The DeviceNet Communication Module provides monitoring and control for the C440 overload relay from a single DeviceNet node. These modules also offer convenient I/O in two voltage options, 24 Vdc and 120 Vac.



DeviceNet Communication Module

Features and Benefits

- Communication to DeviceNet uses only one DeviceNet MAC ID
- Configuration
  - DeviceNet MAC ID and Baud rate are set via convenient DIP switches with an option to set from the network
  - Advanced configuration available using common DeviceNet tools
- Terminals
  - Unique locking mechanism provides for easy removal of the terminal block with the field wiring installed
  - Each terminal is marked for ease of wiring and troubleshooting
- Selectable I/O assemblies
  - 4IN/2OUT
  - Signal types include 24 Vdc I/O and 120 Vac I/O
- Each I/O module is optically isolated between the field I/O and the network adapter to protect the I/O and communication circuits from possible damage due to transients and ground loops
- Input Module features a user-definable input debounce, which limits the effects of transients and electrical noise
- Output Module supports a user-definable safe state for loss of communication; hold last state, ON or OFF
- Combined status LED

PROFIBUS Communication Modules

The PROFIBUS module combined with an expansion module and a communication adapter provide Modbus communication capability to the C440 electronic overload relay.



PROFIBUS Communication Module

Features and Benefits

- The PROFIBUS communication module is capable of baud rates up to 12 Mb
- PROFIBUS address is set via convenient DIP switches; LEDs are provided to display PROFIBUS status
- Intuitive configuration with common PROFIBUS configuration tools
- Terminals
  - Unique locking mechanism provides for easy removal of the terminal block with the field wiring installed
  - Each terminal is marked for ease of wiring and troubleshooting
- Selectable I/O assemblies
  - 4IN/2OUT
  - Signal types include 24 Vdc I/O and 120 Vac I/O
- Each I/O module is optically isolated between the field I/O and the network adapter to protect the I/O and communication circuits from possible damage due to transients and ground loops
- Input Module features a user-definable input debounce, which limits the effects of transients and electrical noise
- Output Module supports a user-definable safe state for loss of communication; hold last state, ON or OFF

Technical Data and Specifications

Electronic Overload Relays up to 1500A

Description	Specification 45 mm	55 mm	110 mm
Electrical Ratings	**Range**	**Range**	**Range**
Operating voltage (three-phase) and frequency	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)
FLA Range			
	0.33–1.65A 1–5A 4–20A 9–45A	20–100A	28–140A (NEMA) 35–175A (IEC)
Use with Contactors			
XT IEC frames	B, C, D	F, G	G, H
Freedom NEMA sizes	00, 0, 1, 2	3	4
Trip Class			
	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable
Motor Protection			
Thermal overload setting	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip
Feature	**Range**	**Range**	**Range**
Phase loss	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Phase unbalance (selectable: enable/disable)	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Ground fault (selectable: enable/disable)	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec
Reset	Manual/automatic	Manual/automatic	Manual/automatic
Indicators			
Trip status	Orange flag	Orange flag	Orange flag
Mode LED	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip
Options			
Remote reset	Yes	Yes	Yes
Reset bar	Yes	Yes	Yes
Communication expansion module	Yes	Yes	Yes
Communication adapter	Yes	Yes	Yes
Capacity			
Load terminals			
Terminal capacity	12–10 AWG (4–6 mm^2) 8–6 AWG (6–16 mm^2)	6–1 AWG (16–50 mm^2)	8–4/0 AWG (10–95 mm^2)
Tightening torque	20–25 lb-in (2.3–2.8 Nm) 25–30 lb-in (2.8–3.4 Nm)	25–30 lb-in (2.8–3.4 Nm)	124 lb-in (14 Nm)
Input, auxiliary contact and remote reset terminals			
Terminal capacity	2 x (18–12) AWG	2 x (18–12) AWG	2 x (18–12) AWG
Tightening torque	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)
Voltages			
Insulation voltage U_i (three-phase)	690 Vac	690 Vac	690 Vac
Insulation voltage U_i (control)	500 Vac	500 Vac	500 Vac
Rated impulse withstand voltage	6000 Vac	6000 Vac	6000 Vac
Overvoltage category/pollution degree	III/3	III/3	III/3

1

Electronic Overload Relays up to 1500A, continued

Description	Specification 45 mm	55 mm	110 mm
Auxiliary and Control Circuit Ratings			
Conventional thermal continuous current	5A	5A	5A
Rated operational current—IEC AC-15			
Make contact (1800 VA)			
120V	15A	15A	15A
240V	15A	15A	15A
415V	0.5A	0.5A	0.5A
500V	0.5A	0.5A	0.5A
Break contact (180 VA)			
120V	1.5A	1.5A	1.5A
240V	1.5A	1.5A	1.5A
415V	0.9A	0.9A	0.9A
500V	0.8A	0.8A	0.8A
IEC DC-13 (L/R F 15 ms1)			
0–250V	1.0A	1.0A	1.0A
Rated operational current—UL B600			
Make contact (3600 VA)			
120V	30A	30A	30A
240V	15A	15A	15A
480V	7.5A	7.5A	7.5A
600V	6A	6A	6A
Break contact (360 VA)			
120V	3A	3A	3A
240V	1.5A	1.5A	1.5A
480V	0.75A	0.75A	0.75A
600V	0.6A	0.6A	0.6A
R300—Vdc ratings (28 VA)			
0–120V	0.22A	0.22A	0.22A
250V	0.11A	0.11A	0.11A
Short-Circuit Rating without Welding			
Maximum fuse	6A gG/gL	6A gG/gL	6A gG/gL
Environmental Ratings			
Ambient temperature (operating)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity UL 991 (H3)	5% to 95% non-condensing	5% to 95% non-condensing	5% to 95% non-condensing
Altitude (no derating) NEMA ICS1	2000m	2000m	2000m
Shock (IEC 600068-2-27)	15g any direction	15g any direction	15g any direction
Vibration (IEC 60068-2-6)	3g any direction	3g any direction	3g any direction
Pollution degree per IEC 60947-4-1	3 for product (2 for pcb)	3 for product (2 for pcb)	3 for product (2 for pcb)
Ingress protection	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Mounting position	Any	Any	Any
Climatic proofing	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30

Electronic Overload Relays up to 1500A, continued

Description	Specification 45 mm	55 mm	110 mm
Electrical/EMC			
Radiated emissions IEC 60947-4-1-Table 15 EN 55011 (CISPIR 11) Group 1, Class A, ISM	30 mHz to 1000 mHz	30 mHz to 1000 mHz	30 mHz to 1000 mHz
Conducted emissions IEC 60947-4-1-Table 14 EN 55011 (CISPIR 11) Group 1; Class ISM	0.15 mHz to 30 mHz	0.15 mHz to 30 mHz	0.15 mHz to 30 mHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact
Radiated immunity IEC 60947-4-1 IEC 61000-4-3	10 V/m 80 mHz–1000 mHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 mHz–1000 mHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 mHz–1000 mHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1, IEC 61000-4-6	140 dub (10V rms) 150 kHz–100 mHz	140 dub (10V rms) 150 kHz–100 mHz	140 dub (10V rms) 150 kHz–100 mHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 a Class 4	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)
Power freq. magnetic field immunity IEC 60947-4-1, IEC 61000-4-8	30 A/m, 50 Hz	30 A/m, 50 Hz	30 A/m, 50 Hz
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m	10 V/m	10 V/m
Distortion IEEE 519	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.
Electrostatic discharge (ESD) IEC 61000-4-2, EN 61131-2	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge
Electrical fast transient (EFT) IEC 61000-4-4, EN 61131-2	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 61000-4-5, EN 61131-2	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)

1

Communication Modules

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
Electrical/EMC				
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 mHz	30–1000 mHz	30–1000 mHz	30–1000 mHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 mHz	0.15–30 mHz	0.15–30 mHz	0.15–30 mHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10V rms) 150 kHz–80 mHz	140 dBuV (10V rms) 150 kHz–80 mHz	140 dBuV (10V rms) 150 kHz–80 mHz	140 dBuV (10V rms) 150 kHz–80 mHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 6100-4-4	±2 kV using direct method	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 3	User IO and communication lines ①: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)
Electromagnetic field ① IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m	10 V/m	10 V/m	10 V/m
Environmental Ratings				
Ambient temperature (operating)	–4° to 122°F (–20° to 50°C)	–13° to 122°F (–25° to 50°C)	–13° to 122°F (–25° to 50°C)	–13° to 122°F (–25° to 50°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing
Altitude (no derating)	2000m	2000m	2000m	2000m
Shock (IEC 600068-2-27)	15G any direction	15G any direction	15G any direction	15G any direction
Vibration (IEC 60068-2-6)	3G any direction	3G any direction	3G any direction	3G any direction
Pollution degree per IEC 60947-1	3	3	3	3
Degree of protection	IP20	IP20	IP20	IP20
Overvoltage category per UL 508	III	III	III	III
DeviceNet				
DeviceNet connections	—	Group 2, polling, bit strobe, explicit, no UCMM	—	Group 2, polling, bit strobe, explicit, no UCMM
DeviceNet baud rate	—	125K, 250K, 500K	—	125K, 250K, 500K
Ethernet				
Ethernet connections	—	—	—	Integrated two-port switch with dual RJ45 Ethernet connections
Ethernet type	—	—	—	Ethernet 10/100 Mbs, AutoMDX, Auto Negotiation
PROFIBUS				
PROFIBUS connections	—	—	Group 2, polling, bit strobe, explicit, no UCMM	—
PROFIBUS baud rate	—	—	9.6K, 19.2K, 45.45K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M	—

Note

① Relates to C441M only.

Communication Modules, continued

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
C441_ 24 Vdc Input				
Nominal input voltage	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Operating voltage	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
Number of inputs	4	4	4	4
Signal delay	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)
OFF-state voltage	<6 Vdc	<6 Vdc	<6 Vdc	<6 Vdc
ON-state voltage	>18 Vdc	>18 Vdc	>10 Vdc	>18 Vdc
Nominal input current	5 mA	5 mA	5 mA	5 mA
Isolation	1500V	1500V	1500V	1500V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
24V source current	50 mA	50 mA	50 mA	50 mA
Operating Voltage Range—DC Input Modules				
OFF state	0–6 Vdc	0–6 Vdc	0–6 Vdc	0–6 Vdc
Transition region	6–18 Vdc	6–18 Vdc	6–18 Vdc	6–18 Vdc
ON state	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
C441_ 120 Vac Input				
Nominal input voltage	120 Vac	120 Vac	120 Vac	120 Vac
Operating voltage	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Number of inputs	4	4	4	4
OFF-state voltage	<30 Vac	<30 Vac	<20 Vac	<30 Vac
ON-state voltage	>80 Vac	>80 Vac	>70 Vac	>80 Vac
Nominal input current	15 mA	15 mA	15 mA	15 mA
Signal delay	1/2 cycle	1/2 cycle	1/2 cycle	1/2 cycle
Isolation	1500V	1500V	1500V	1500V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
Operating Voltage Range—AC Input Modules				
OFF state	0–30 Vac	0–30 Vac	0–30 Vac	0–30 Vac
Transition region	30–80 Vac	30–80 Vac	30–80 Vac	30–80 Vac
ON state	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Output Modules				
Nominal voltage	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc
Number of outputs	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C
Relay OFF time	3 ms	3 ms	3 ms	3 ms
Relay ON time	7 ms	7 ms	7 ms	7 ms
Max. current per point ①	5A (B300 rated)	5A (B300 rated)	5A (B300 rated)	5A (B300 rated)
Electrical life	100,000 cycles	100,000 cycles	100,000 cycles	100,000 cycles
Mechanical life	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles

Note

① Relates to C441M only.

1

Short Circuit Ratings (North America CSA, cUL)

Changes to UL 508A and NEC in recent years have brought a focus to control panel safety with regard to short-circuit current ratings (SCCR). Eaton's C440 electronic overload relays combined with ***XT*** series IEC and Freedom Series NEMA contactors provide a wide variety of SCCR solutions needed for a variety of applications. The SCCR data in this document reflects the latest information as of April 2010.

C440/*XT* Standalone Overload Relays (*XT*, C440)

		Standard-Fault Short Circuit Data			High-Fault Short Circuit Data					
					Fuses (RK5, J, CC)			Thermal-Magnetic Circuit Breakers		
Overload FLA Range	Maximum Operating Voltage	600V (kA)	Maximum Fuse Size (A) (RK5)	Maximum Breaker Size (A)	480V (kA)	600V (kA)	Maximum Fuse Size	480V (kA)	600V (kA)	Maximum Breaker Size
0.33–1.65A	600 Vac	1	6	15	—	—	—	—	—	—
1–5A	600 Vac	5	20	20	100	100	30	100	35	20
4–20A	600 Vac	5	80	80	100	100	100	100	35	80
9–45A	600 Vac	5	175	175	100	100	100	100	35	100/175 (480/600)
20–100A	600 Vac	10	400	400	100	100	200	150	35	250/400 (480/600)
28–140A	600 Vac	10	450	500	100	100	400	100	65	400
35–175A	690 Vac	10	500 (gG)	350 (690 Vac) 320 (415 Vac)	100	100	500 (gG)	100 (415 Vac)	—	350 (LGC3350) 320 (NZMH3)

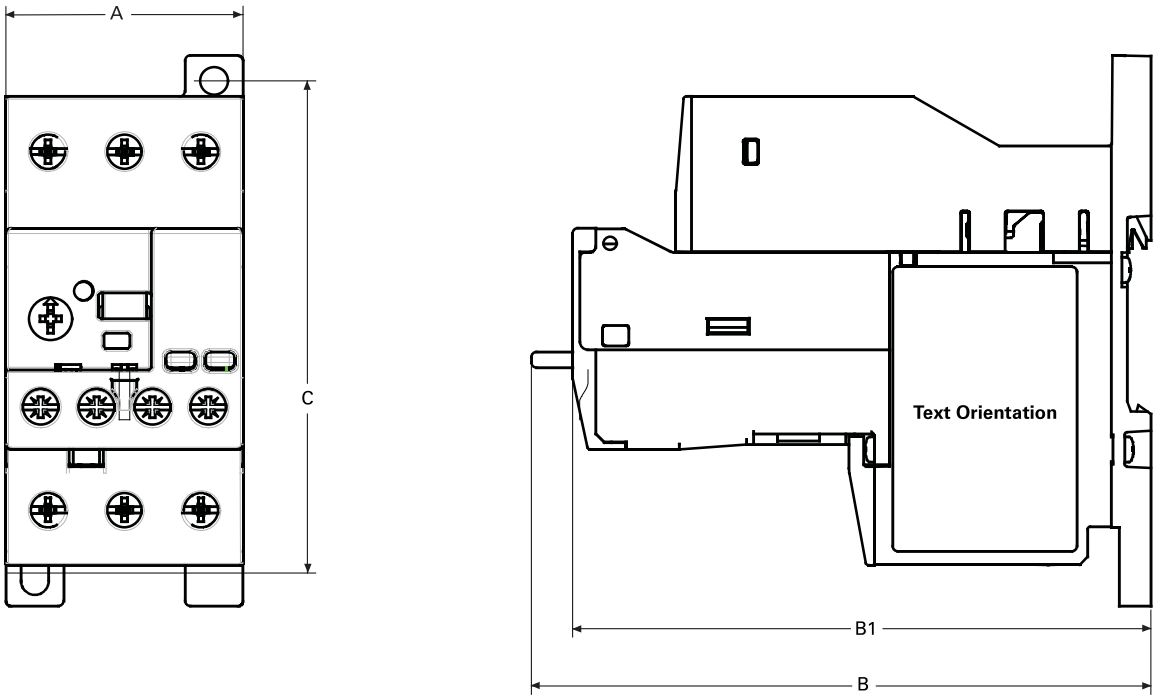
IEC *XT* Starters with *XT* Electronic Overload Relays

		High-Fault Short Circuit Data			Thermal-Magnetic Circuit Breakers		
		Fuses (RK5, J, CC)					
Contactor Frame Size	Maximum Operating Voltage	480V	600V	Maximum Fuse Size	480V	600V	Maximum Breaker Size
B	1–5A	100	100	30	—	—	—
	4–20A	100	100	30	—	—	—
C	1–5A	100	100	60	—	—	—
	4–20A	100	100	60	—	—	—
	9–45A	100	100	60	—	—	—
D	9–45A	100	100	200	65	35	175
	20–100A	100	100	200	65	35	175
F	20–100A	100	100	200	65	65	350
G	20–100A	100	100	200	65	65	350
	35–175A	100	100	400	65	30	250 (480 Vac) 350 (600 Vac)
H	35–175A	100	100	400	65	30	400

Dimensions

Approximate Dimensions in Inches (mm)

45 mm C440/*XT* Electronic Overload Relays

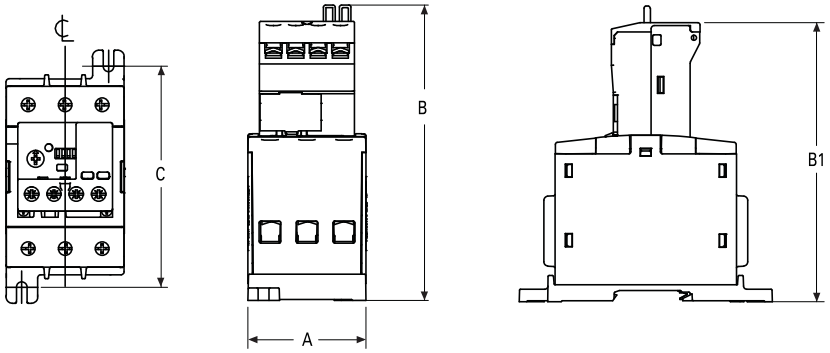


	Width A	Depth B1	B	Mounting Holes (Height) C
NEMA Starter Size				
00–2	1.80 (45.7)	4.32 (109.7)	4.63 (117.5)	3.68 (93.5)
***XT* IEC Frame Size**				
B, C, D	1.80 (45.7)	4.00 (101.6)	4.30 (109.2)	3.68 (93.5)
Standalone				
0.35–45A	1.80 (45.7)	4.30 (109.2)	4.60 (116.8)	3.68 (93.5)

1

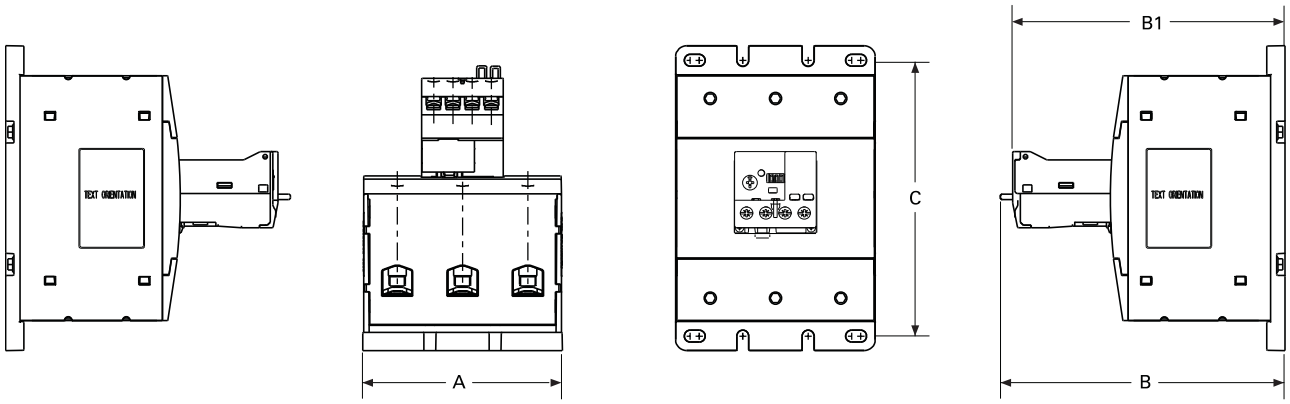
Approximate Dimensions in Inches (mm)

55 mm C440/*XT* Electronic Overload Relays



	Width A	Height To Reset B	B1	Mounting Depth C
NEMA Starter Size				
3	2.21 (56.0)	5.52 (140.2)	5.21 (132.4)	4.13 (104.8)
***XT* IEC Frame Size**				
D, F, G	2.21 (56.0)	5.52 (140.2)	5.21 (132.4)	4.13 (104.8)
Standalone				
20–100A	2.21 (56.0)	5.52 (140.2)	5.21 (132.4)	4.13 (104.8)

110 mm C440/*XT* Electronic Overload Relays



	Width A	Height To Reset B	B1	Mounting Depth C
NEMA Starter Size				
4	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
***XT* IEC Frame Size**				
G	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
H	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
Standalone				
	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
Pass-Through				
	4.33 (110.0)	5.90 (149.0)	5.60 (142.0)	4.00 (102.0)



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
XTSE Contactors	**V5-T1-128**
Thermal Overload Relays	**V5-T1-130**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	
Features and Benefits	**V5-T1-160**
Product Identification	**V5-T1-161**
Catalog Number Selection	**V5-T1-162**
Product Selection	**V5-T1-163**
Accessories	**V5-T1-166**
Technical Data and Specifications	**V5-T1-176**
Dimensions	**V5-T1-185**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	**V5-T1-219**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

Manual Motor Protectors

Product Description

Eaton's new ***XT*** family of manual motor protectors (MMPs) features a pushbutton or rotary ON/OFF manual disconnect, Class 10 adjustable bimetallic overload relay and fixed magnetic short-circuit trip capability in one compact unit. Two frame sizes are available: Frame B (45 mm) for motors with FLA ratings up to 32A and Frame D (55 mm) covers motor FLA ratings up to 65A.

Application Description

The XTPB and XTPR MMPs can be used in the following applications.

Motor Protective Circuit Breaker

In many countries outside of the United States and Canada, especially Europe, the MMPs are tested and classified as thermal-magnetic circuit breakers for use in motor branch circuits. This can be an important consideration for all companies who export their equipment and machines internationally. Both the XTPB and XTPR conform to IEC/EN 60947 and have the CE Mark.

Manual Motor Protectors

The XTPB and XTPR MMPs are UL listed under UL 508 as manual motor protectors. They provide an economical solution for applications requiring simple manual starting and stopping of motors. When used as a manual starter, they are typically installed in an enclosure. Many enclosures are offered as accessories for the MMPs. Separate short-circuit protective devices, such as circuit breakers or fuses, are wired ahead of the MMPs. The short-circuit protective device should be sized per the NEC and should not exceed 400% of the maximum FLA dial setting of the MMP.

Group Motor Installations

A group motor installation can be defined as more than one motor circuit protected by a single set of fuses or circuit breaker on a motor branch circuit. This eliminates the need for individual fuses or circuit breakers for each motor circuit. Substantial component cost savings, panel space savings and reduced wiring installation time can be achieved in group motor installations.

The MMPs are tested and listed for group installation. If remote operation is required, a magnetic contactor can be wired in series with the MMP.

Article 430.53 of the NEC contains the rules and requirements for group motor installations. Refer to application note AP03402001E for NEC requirement for group motor installation.

Individual Branch Motor Applications

A UL 508 Type E self-protected manual combination starter/motor controller consists of a single device possessing four essential elements: disconnect, short circuit protection, motor controller, and motor overload protection. Some MMPs require use of a lineside adapter for this type of approval. When tested as an official combination by UL, this device takes the place of a fuse-starter or breaker-starter, ***XT*** Type E MMPs are self-protected, meaning they do not need additional short circuit protection of a fuse or breaker. Type E devices can also be used with a contactor or other types of UL approved controllers. If tested with a contactor, the combination motor controller becomes a Type F device. See **Page V5-T1-199** for XTFC Type F devices.

1

Features and Benefits

- ON/OFF rotary handle with lockout provision
- Visible trip indication
- Class 10 overload protection
- Phase loss sensitivity
- Ambient temperature compensation to IEC/EN 60947, VDE 0660
- Fixed short-circuit trip—14 times maximum setting of overload FLA dial
- Type 2 coordination per IEC 947
- Identification markers standard on starter faceplate
- Motor applications from 0.1A to 65A
- Built-in heater and magnetic trip elements to protect the motor
- Adjustment dial for setting motor FLA
- DIN rail mount
- Terminal types available:
  - Screw terminals
  - Screw (line) and spring cage (load) terminals
  - Spring cage terminals
- Accessories include:
  - Front and side auxiliary contacts
  - Trip indicating contacts
  - Tamperproof cover for OLR dial
  - Undervoltage release
  - Shunt trip
  - Through-the-door operators
  - Enclosures
  - Three-phase line side connecting links

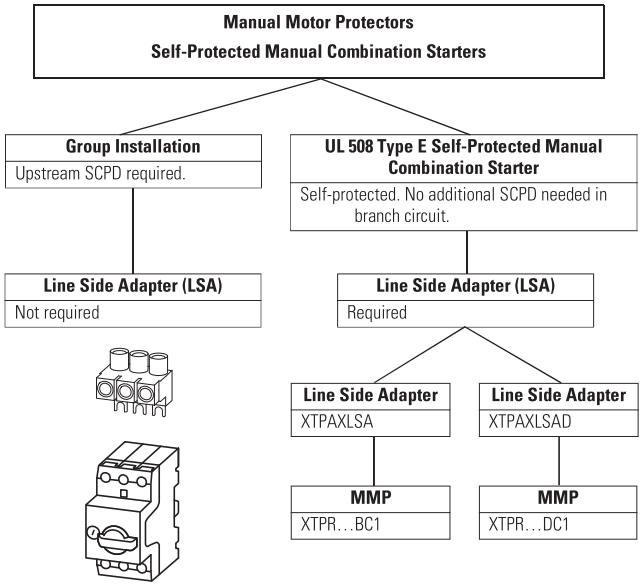
Standards and Certifications

- ATEX
- CE approved
- UL listed File No. E36332
- UL listed File No. E123500
- UL 508 group motor and Type E compliant
- IEC/EN 60947
- CSA File 229767, Class 3211-05
- DIN VDE 0660 Part 100, Part 101 and Part 102

Note: For Type 2 Coordination of MMCs, see **Page V5-T1-237**.

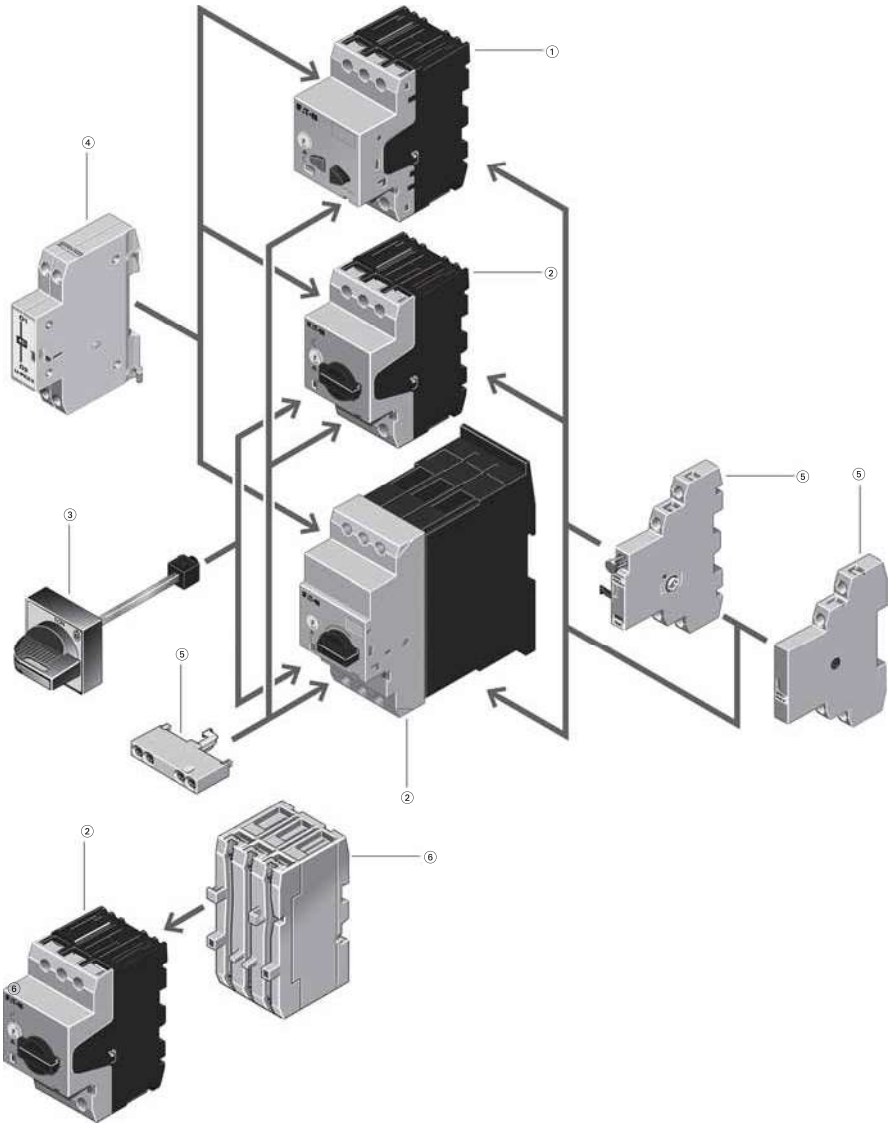
Line Side Adapters—When to Use Them

Note: Line side adapters are not required for non-US applications. Most countries outside of the US classify the MMP as a thermal magnetic circuit breaker.



Manual Motor Protector and Line Side Adapter

Product Identification



Notes

Basic Units

① XTPB pushbutton manual motor protectors (see **Page V5-T1-163**)
- Rated operational current up to 25A
- Switching capacity 50 kA/415V
- Short-circuit release, adjustable 0.6–1 x I_u
- Single-phasing sensitive

② XTPR rotary manual motor protectors (see **Page V5-T1-164**)
- Rated operational current up to 32A, 65A
- Switching capacity 150/50 kA/415V
- Short-circuit release, fixed setting to 14 x I_u
- Overload release, adjustable 0.6–1 x I_u
- Single-phasing sensitive
- With screws or spring-loaded terminals

Mounting Accessories

③ Rotary handle mechanism (see **Page V5-T1-169**)
- ON/OFF/tripped switch position indication
- Lockable door/cover interlock
- Extendable y plug fit extension shaft
- Handle latched in switch positions
- Optionally also without locking and door interlock function

Insulated enclosures (see **Page V5-T1-172**)
- Surface mounting, enclosures, IP40, IP55 and IP40 and IP55 front flush mounting enclosure

Mounting/wiring (see **Page V5-T1-169**)
- Component adapter for busbar mounting
- Three-phase commoning link for side-by-side-mounting
- Mounting kits for rapid mounting of direct-on-line, reversing and star-delta starters

Add-On Functions

④ Voltage releases (see **Page V5-T1-168**)
- Undervoltage release
- Shunt releases
- With screws or spring-loaded terminals

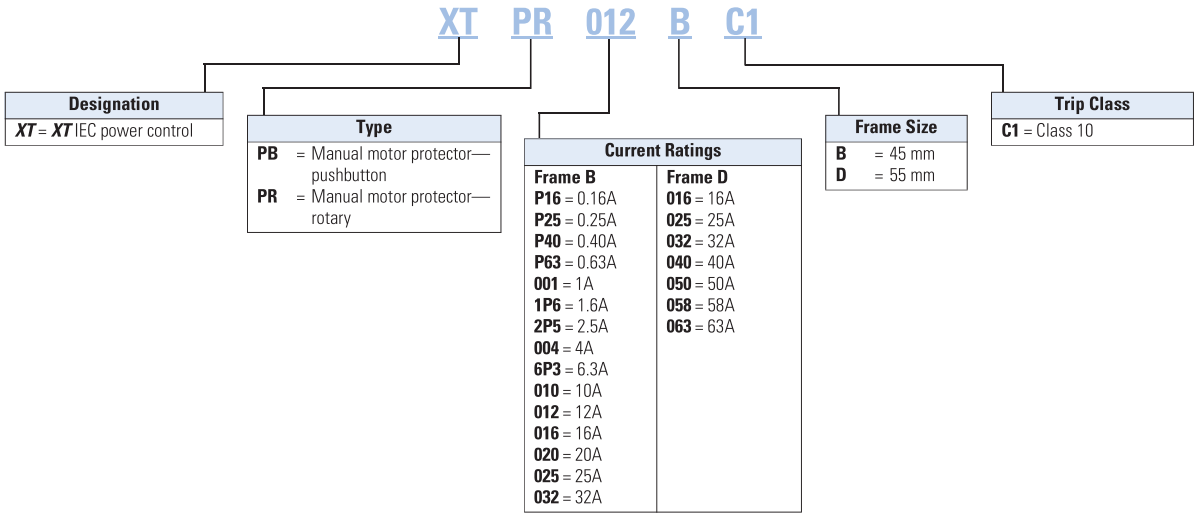
⑤ Standard auxiliary contacts (see **Page V5-T1-166**)
- ON/OFF indication
- Differential fault indication overload/short-circuit release
- ON/OFF for (high capacity) contact module
- ON/OFF for starter combination
- With early-make contacts
- With screws or spring-loaded terminals

⑥ Current limiter (see **Page V5-T1-168**)
- Increases the switching capacity of the 10–25A manual motor protectors to 100 kA/440V
- Can be used for individual group protection

1

Catalog Number Selection

XT Manual Motor Protectors



Product Selection

Product Selection for Manual Motor Starter Applications

When ordering, specify catalog numbers according to the following stipulations:

XT manual motor protectors are selected based on the overload current range required for a given motor. This current range is determined from the motor full load ampere rating and motor service factor usually found on the motor nameplate.

For motors with service factors less than 1.15, multiply the motor FLA by 0.90 to select appropriate MMP.

Example: For motor having FLA of 6.4A and service factor of 1.0 (6.4A x 0.90 = 5.76A) select catalog number XTPB6P3B01.

See Application Note—AP03402001E.

For motor with service factor of 1.15 or greater, use motor nameplate full load amperes to select the appropriate MMP.

Example: For motor having FLA of 11A and service factor of 1.15, select catalog number XTPR012BC1.

Frame B



XTPB Pushbutton Manual Motor Protectors—Global and North American Ratings—Frame B

Type 1 and Type 2 Coordination Motor Protective Device with Thermal and Magnetic Trip

Rated Uninterrupted Current— $I_u = I_e$ (Amps)	FLA Adjustment Range/ Overload Release— I_r (Amps)	Short Circuit Release— I_{rm} (Amps)	Maximum Motor Ratings ① Maximum kW Rating AC-3—P (kW) Three-Phase					Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Screw Terminal Catalog Number
			220–240V	380–415V	440V	500V	660–690V	200V	240V	480V	600V	
0.16	0.1–0.16	2.2	—	—	—	—	0.06	②	②	②	②	**XTPBP16BC1**
0.25	0.16–0.25	3.5	—	0.06	0.06	0.06	0.12	②	②	②	②	**XTPBP25BC1**
0.4	0.25–0.4	5.6	0.06	0.09	0.12	0.12	0.18	②	②	②	②	**XTPBP40BC1**
0.63	0.4–0.63	8.8	0.09	0.12	0.18	0.25	0.25	②	②	②	②	**XTPBP63BC1**
1	0.63–1	14	0.12	0.25	0.25	0.37	0.55	②	②	2	1/2	**XTPB001BC1**
1.6	1–1.6	22	0.25	0.55	0.55	0.75	1.1	②	②	3/4	3/4	**XTPB1P6BC1**
2.5	1.6–2.5	35	0.37	0.75	1.1	1.1	1.5	1/2	1/2	1	1-1/2	**XTPB2P5BC1**
4	2.5–4	56	0.75	1.5	1.5	2.2	3	3/4	3/4	2	3	**XTPB004BC1**
6.3	4–6.3	88	1.1	2.2	3	3	4	1	1-1/2	3	5	**XTPB6P3BC1**
10	6.3–10	140	2.2	4	4	4	7.5	3	3	7-1/2	10	**XTPB010BC1**
12	8–12	168	3	5.5	5.5	5.5	11	3	3	7-1/2	10	**XTPB012BC1**
16	10–16	224	4	7.5	9	9	12.5	3	5	10	10	**XTPB016BC1**
20	16–20	280	5.5	9	11	12.5	15	5	—	—	15	**XTPB020BC1**
25	20–25	350	5.5	12.5	12.5	15	22	—	7-1/2	15	20	**XTPB025BC1**

Notes

Single-phasing sensitivity to IEC/EN 60947-4-1, VDE 0660 Part 102.

Can be snap-fit to IEC/EN 60715 top-hat (DIN) with 7.5 or 15 mm height.

Service Factor (SF)—Setting I_r of current scale in dependence of load factor:
SF = 1.15 → $I_r = 1 \times I_{n\ mot}$
SF = 1 → $I_r = 0.9 \times I_{n\ mot}$

For manual motor protective circuit breaker switching capacity, see **Page V5-T1-181.**

① Select manual motor protectors by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

Frame B



XTPR Rotary Manual Motor Protectors with Screw Terminals—Global Ratings and North American Ratings—Frame B

Type 1 and Type 2 Coordination Motor Protective Device with Thermal and Magnetic Trip

Rated Uninterrupted Current—$I_u = I_e$ (Amps)	FLA Adjustment Range/ Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps) I>	Maximum Motor Ratings ① Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	440V	500V	660–690V	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase 200V	240V	480V	600V	Screw Terminal Catalog Number
0.16	0.1–0.16	2.2	—	—	—	—	0.06	②	②	②	②	**XTPRP16BC1**
0.25	0.16–0.25	3.5	—	0.06	0.06	0.06	0.12	②	②	②	②	**XTPRP25BC1**
0.4	0.25–0.4	5.6	0.06	0.09	0.12	0.12	0.18	②	②	②	②	**XTPRP40BC1**
0.63	0.4–0.63	8.8	0.09	0.12	0.18	0.25	0.25	②	②	②	②	**XTPRP63BC1**
1	0.63–1	14	0.12	0.25	0.25	0.37	0.55	②	②	②	②	**XTPR001BC1**
1.6	1–1.6	22	0.25	0.55	0.55	0.75	1.1	②	②	3/4	3/4	**XTPR1P6BC1**
2.5	1.6–2.5	35	0.37	0.75	1.1	1.1	1.5	1/2	1/2	1	1-1/2	**XTPR2P5BC1**
4	2.5–4	56	0.75	1.5	1.5	2.2	3	3/4	3/4	2	3	**XTPR004BC1**
6.3	4–6.3	88	1.1	2.2	3	3	4	1	1-1/2	3	5	**XTPR6P3BC1**
10	6.3–10	140	2.2	4	4	4	7.5	3	3	7-1/2	10	**XTPR010BC1**
12	8–12	168	3	5.5	5.5	5.5	11	3	3	7-1/2	10	**XTPR012BC1**
16	10–16	224	4	7.5	9	9	12.5	3	5	10	10	**XTPR016BC1**
20	16–20	280	5.5	9	11	12.5	15	5	—	—	15	**XTPR020BC1**
25	20–25	350	5.5	12.5	12.5	15	22	—	7-1/2	15	20	**XTPR025BC1**
32	25–32	448	7.5	15	15	22	30	7-1/2	10	20	25	**XTPR032BC1**

Frame D



XTPR Rotary Manual Motor Protectors with Screw Terminals—Global Ratings and North American Ratings—Frame D

Type 1 and Type 2 Coordination Motor Protective Device with Thermal and Magnetic Trip

Rated Uninterrupted Current—$I_u = I_e$ (Amps)	FLA Adjustment Range/ Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps) I>	Maximum Motor Ratings ① Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	440V	500V	660–690V	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase 200V	240V	480V	600V	Screw Terminal Catalog Number
16	10–16	224	4	7.5	9	9	12.5	3	5	10	15	**XTPR016DC1**
25	16–25	350	5.5	12.5	12.5	15	22	7-1/2	7-1/2	15	20	**XTPR025DC1**
32	25–32	448	7.5	15	17.5	22	22	10	10	20	30	**XTPR032DC1**
40	32–40	560	11	20	22	24	30	10	15	30	30	**XTPR040DC1**
50	40–50	700	14	25	30	30	45	10	15	30	40	**XTPR050DC1**
58	50–58	812	17	30	37	37	55	15	15	40	50	**XTPR058DC1**
65	55–65	882	18.5	34	37	45	55	15	15	40	50	**XTPR063DC1**

Notes

Single-phasing sensitivity to IEC/EN 60947-4-1, VDE 0660 Part 102.

Can be snap-fit to IEC/EN 60715 top-hat (DIN) with 7.5 or 15 mm height.

Service Factor (SF)—Setting I_r of current scale in dependence of load factor:

SF = 1.15 → $I_r = 1 \times I_{n\ mot}$

SF = 1 → $I_r = 0.9 \times I_{n\ mot}$

For manual motor protective circuit breaker switching capacity, see **Page V5-T1-181.**

① Select manual motor protectors by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

Frame B



XTPR Manual Self-Protected Motor Starters—North American Ratings, UL 508 Type E—Frame B [1]

Motor Protective Device with Thermal and Magnetic Trip

Rated Uninterrupted Current—I_u (Amps)	FLA Adjustment Range/ Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings [2] Maximum hp Rating—P (hp) Three-Phase 200V	240V	480V/ 277V	600V/ 247V	Rated Short-Circuit Breaking Capacity (kA) 480/ 277V	600/ 347V	Line Side Adapter [1] Catalog Number	Manual Motor Protector—Screw Terminal Catalog Number
0.16	0.1–0.16	2.2	[3]	[3]	1/2	1/2	50	50	**XTPAXLSA**	**XTPRP16BC1**
0.25	0.16–0.25	3.4	[3]	[3]	1/2	1/2	50	50	**XTPAXLSA**	**XTPRP25BC1**
0.4	0.25–0.4	5.6	[3]	[3]	1/2	1/2	50	50	**XTPAXLSA**	**XTPRP40BC1**
0.63	0.4–0.63	8.8	[3]	[3]	1/2	1/2	50	50	**XTPAXLSA**	**XTPRP63BC1**
1	0.63–1	14	[3]	[3]	1/2	1/2	50	50	**XTPAXLSA**	**XTPR001BC1**
1.6	1–1.6	22	[3]	[3]	3/4	3/4	50	50	**XTPAXLSA**	**XTPR1P6BC1**
2.5	1.6–2.5	35	1/2	1/2	1	1-1/2	50	50	**XTPAXLSA**	**XTPR2P5BC1**
4	2.5–4	56	3/4	1	2	3	50	50	**XTPAXLSA**	**XTPR004BC1**
6.3	4–6.3	88	1	1-1/2	3	5	65	50	**XTPAXLSA**	**XTPR6P3BC1**
10	6.3–11	140	3	3	7-1/2	10	65	50	**XTPAXLSA**	**XTPR010BC1**
12	8–12	168	3	3	7-1/2	—	65	—	**XTPAXLSA**	**XTPR012BC1**
16	10–16	224	3	5	10	—	42	—	**XTPAXLSA**	**XTPR016BC1**
20	16–20	280	5	5	—	—	18	—	**XTPAXLSA**	**XTPR020BC1**
25	20–25	350	5	7-1/2	15	—	18	—	**XTPAXLSA**	**XTPR025BC1**
32	25–32	448	7-1/2	10	25	—	18	—	**XTPAXLSA**	**XTPR032BC1**

Frame D



XTPR Circuit Breaker According to UL 489—Frame D

Rated Uninterrupted Current—I_u (Amps)	FLA Adjustment Range/ Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings [2] Maximum hp Rating—P (hp) Three-Phase 200V	240V	480V/ 277V	600V/ 247V	Rated Short-Circuit Breaking Capacity (kA) 240V	480/ 277V	600/ 347V	Manual Motor Protector—Screw Terminal Catalog Number
16	10–16	224	3	5	10	10	65	65	25	**XTPR016DCB**
25	16–25	350	7-1/2	7-1/2	20	25	65	65	25	**XTPR025DCB**
32	24–32	448	10	10	25	30	65	65	25	**XTPR032DCB**

Frame D



XTPR Manual Self-Protected Motor Starters—North American Ratings, UL 508 Type E—Frame D [1]

Motor Protective Device with Thermal and Magnetic Trip

Rated Uninterrupted Current—I_u (Amps)	FLA Adjustment Range/ Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings [2] Maximum hp Rating—P (hp) Three-Phase 200V	240V	480V/ 277V	600V/ 247V	Rated Short-Circuit Breaking Capacity (kA) 240V	480/ 277V	600/ 347V	Line Side Adapter [1] Catalog Number	Manual Motor Protector—Screw Terminal Catalog Number
16	10–16	224	3	5	10	10	65	65	25	**XTPAXLSAD**	**XTPR016DC1**
25	16–25	350	7-1/2	7-1/2	20	25	65	65	25	**XTPAXLSAD**	**XTPR025DC1**
32	25–32	448	10	10	25	30	65	65	25	**XTPAXLSAD**	**XTPR032DC1**
40	32–40	560	10	—	30	30	65	65	25	**XTPAXLSAD**	**XTPR040DC1**
50	40–50	700	—	15	30	—	65	65	—	**XTPAXLSAD**	**XTPR050DC1**
58	50–58	812	—	—	40	—	65	65	—	**XTPAXLSAD**	**XTPR058DC1**
65	55–65	882	—	—	40	—	65	65	—	**XTPAXLSAD**	**XTPR063DC1**

Notes

A UL 508 Type E self-protected manual combination starter (XTPR) consists of a manual motor protector (XTPR) and a UL Listed line side adapter (for example, XTPAXLSA). The Type E self-protected manual combination starter alone is a legitimate short-circuit protective device and disconnect means for the downstream motor, while the contactor has been added to provide remote operation of the motor circuit. Conductor size for XTPAXLSA is 14–6 AWG, XTPAXLSAD is 8 AWG–1/0.

[1] UL 508 Type E starters are assembled from a standard XTPR and a special incoming terminal line side adapter (XTPAXLSA or XTPAXLSAD).

[2] Select manual motor protectors by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

[3] In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

1

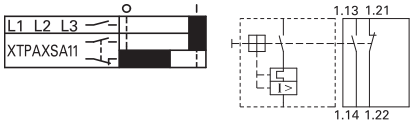
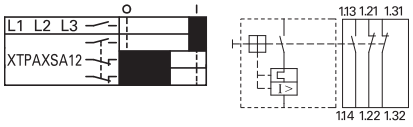
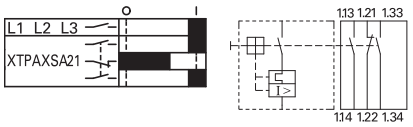
Accessories

Auxiliary Contacts

XTPAXSA_



Side-Mount Auxiliary Contacts

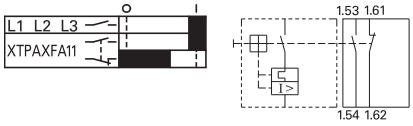
Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
1NO-1NC		5	**XTPAXSA11**
1NO-2NC		5	**XTPAXSA12**
2NO-1NC		5	**XTPAXSA21**

Can be fitted on the right side of manual motor protectors (XTPB, XTPR, XTPM) and manual transformer protectors (XTPT) and can be combined with XTPAXSATR_ and XTPAXFA_ trip indicating auxiliary contact.

XTPAXFA11



Front-Mount Auxiliary Contacts

Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
1NO-1NC		5	**XTPAXFA11**

Can be fitted to manual motor protectors (XTPB, XTPR, XTPM) and manual transformer protectors (XTPT). 45 mm (XTPR…B and XTPB) or 55 mm (XTPR…D) widths of manual motor protectors remain unchanged.

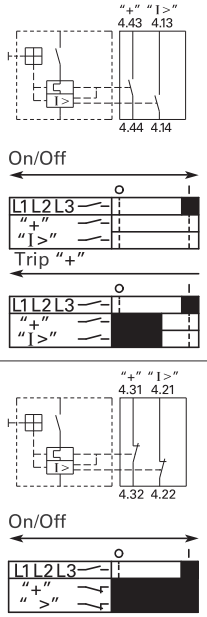
Note

① Orders must be placed in multiples of package quantity listed.

Side-Mount Trip Indicating Auxiliary Contacts

XTPAXSATR_



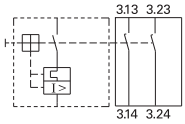
Contact Configuration	Contact Sequence	Pkg. Qty. ①	For Use with…	Catalog Number
2 x 1NO		2	XTPB, XTPR, XTPM, XTPT	**XTPAXSATR20**
2 x 1NC		2	XTPB, XTPR, XTPM, XTPT	**XTPAXSATR02**

Can be fitted on the right side of manual motor protectors. Can be combined with standard auxiliary contacts. Trip indication: A. General trip indication (overload) B. Short-circuit trip. Local short-circuit indication by red indicator, manually resettable.

Early-Make Front-Mount Auxiliary Contacts

XTPBXFAEM20



Contact Configuration	Contact Sequence	Pkg. Qty. ①	For Use with…	Catalog Number
2NO		5	XTPB	**XTPBXFAEM20**

XTPAXFAEM20



2NO		2	XTPR… NL, PKZM	**XTPAXFAEM20** ②③

For use with XTPB_, Frame B XTPR and XTPT. Can be fitted to the front of a manual motor protector. 45 mm width of manual motor protector remains unchanged. For early energization of undervoltage release, for example, in emergency-stop circuits to EN 60204.

Notes

① Orders must be placed in multiples of package quantity listed.

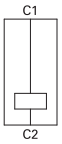
② Not for use with rotary handle mechanism.

③ Not compatible with XTPR lockable handle, order PKZM0 or XTPR… NL. NL is the non-lockable handle version.

XTPAXSR_



Contact Sequence



Shunt Release

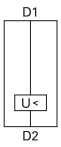
Pkg. Qty. ①	Screw Terminal Catalog Number
2	**XTPAXSR24V50H**
2	**XTPAXSR48V50H**
2	**XTPAXSR110V50H**
2	**XTPAXSR120V60H**
2	**XTPAXSR208V60H**
2	**XTPAXSR220V50H**
2	**XTPAXSR230V50H**
2	**XTPAXSR240V50H**
2	**XTPAXSR240V60H**
2	**XTPAXSR380V50H**
2	**XTPAXSR400V50H**
2	**XTPAXSR415V50H**
2	**XTPAXSR440V60H**
2	**XTPAXSR480V60H**
2	**XTPAXSR24VDC**
2	**XTPAXSR48VDC**
2	**XTPAXSR60VDC**
2	**XTPAXSR110VDC**
2	**XTPAXSR125VDC**
2	**XTPAXSR220VDC**
2	**XTPAXSR250VDC**

Can be used to trip the manual motor protector from a remote location. Can be fitted on the left side of manual motor protectors. Cannot be combined with the XTPAXUVR. DC: Intermittent operation 5 sec.

XTPAXUVR_



Contact Sequence



Undervoltage Release

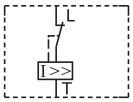
Pkg. Qty. ①	Screw Terminal Catalog Number
2	**XTPAXUVR24V50H**
2	**XTPAXUVR24V60H**
2	**XTPAXUVR48V50H**
2	**XTPAXUVR60V50H**
2	**XTPAXUVR110V50H**
2	**XTPAXUVR120V60H**
2	**XTPAXUVR208V60H**
2	**XTPAXUVR220V50H**
2	**XTPAXUVR230V50H**
2	**XTPAXUVR240V50H**
2	**XTPAXUVR240V60H**
2	**XTPAXUVR380V50H**
2	**XTPAXUVR400V50H**
2	**XTPAXUVR415V50H**
2	**XTPAXUVR440V60H**
2	**XTPAXUVR480V60H**
2	**XTPAXUVR600V60H**

Can be used to trip the manual motor protector from a remote location. Can be fitted on left side manual motor protectors. Cannot be combined with XTPAXSR. When combined with a circuit breaker, it can be used as emergency-stop device to IEC/EN 60204.

XTPAXCL



Current Limiter ②

Description	Contact Sequence	Pkg. Qty. ①	Catalog Number
To enhance the switching capacity of non-inherently safe 10–25A manual motor protectors to 150 kA/440V		1	**XTPAXCL**

The XTPAXCL enhances the switching capacity of the XT manual motor protectors. It can be used with the XTPB, XTPR…BC1, XTPR…DC1 for individual or group protections. The rated uninterrupted current is 63A for IEC and 25A for UL/CSA. It can be mounted next to or behind the manual motor protector. See **Page V5-T1-181** for ratings when using the current limiter.

Notes

① Orders must be placed in multiples of package quantity listed.

② Max. rated operation voltage U_e = 690V, rated uninterrupted current I_u = 63A. Can be used for individual and group protection. For group protection and in combination with the XTPR…D order additional XTPAXIT incoming terminal if required. Mounting next to or behind the manual motor protector. 16–63A XTPR…D: 100 kA/400V, 10 kA/690V.

IP65 Rotary Handle Mechanism ①②③④

XTPAXRHM_



Description	Enclosure Rating	Pkg. Qty. ⑤	Catalog Number
Complete Kits—Includes Handle, Shaft and Required Hardware			
Rotary handle mechanism—black ⑥	IP65 NEMA 12 UL/CSA 4X	1	**XTPAXRHMB**
Rotary handle mechanism—red/yellow ⑦		1	**XTPAXRHMRY**
Rotary handle mechanism—black—rotated 90° from vertical ⑥		1	**XTPAXRHM90B**
Rotary handle mechanism—red/yellow—rotated 90° from vertical ⑦		1	**XTPAXRHM90RY**

XTPAXRHMSFT



Separate Parts			
Shaft only—includes shaft to mount to XTPR, 175 mm length	—	10	**XTPAXRHMSFT**
MMP shaft support, metal, D-frame MMP only	—	20	**XTPAXMBM**
Replacement lockable handle for XTPR	—	1	**XTPAXLRH**

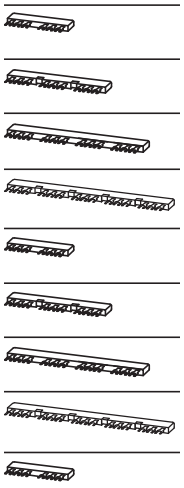
Sealing Facility

XTPAXSW



Description	Pkg. Qty. ⑤	Catalog Number
To prevent tampering with the overload release and the test function. It can be sealed using industry standard sealing wire. For use with XTPR manual motor protectors.	5	**XTPAXSW**

Three-Phase Commoning Links ⑧



For Use with…	Qty. MMP	MMP Frame Size	Pkg. Qty. ⑤	Catalog Number
MMP with no side-mounted auxiliaries or voltage releases	2	B	10	**XTPAXCLKA2**
		D	1	**XTPAXCLKA2D**
	3	B	10	**XTPAXCLKA3**
		D	1	**XTPAXCLKA3D**
	4	B	10	**XTPAXCLKA4**
		D	1	**XTPAXCLKA4D**
	5	B	10	**XTPAXCLKA5**
Each MMP with one auxiliary contact or trip-indicating auxiliary contact fitted on the right	2	B	10	**XTPAXCLKB2**
		D	1	**XTPAXCLKB2D**
	3	B	10	**XTPAXCLKB3**
		D	1	**XTPAXCLKB3D**
	4	B	10	**XTPAXCLKB4**
		D	1	**XTPAXCLKB4D**
	5	B	10	**XTPAXCLKB5**
Each MMP with an auxiliary contact and trip-indicating auxiliary contact mounted on the right or a voltage release mounted on the left.	2	B	10	**XTPAXCLKC2**
	4	D	1	**XTPAXCLKC4D**

For parallel power feed to several manual motor protectors on terminals 1, 3 and 5.

Notes

① Plug-in connection shafts, XTPAXRHMSFT_ can be cut to desired length for mounting depths of 100–240 mm. Carrier with extension shaft included.
② With ON/OFF switch position and "+" (tripped), lockable with 3 padlocks, 4–8 mm hasp. Can be locked in the OFF position, if required.
③ Rotary handle mechanisms ship with door interlock disabled. See instruction publication with product for how to enable door interlock.
④ Not for use with XTPAXFAEM20 early-make front-mount auxiliary contact.
⑤ Orders must be placed in multiples of package quantity listed.
⑥ For use on main switches to IEC/EN 60204.
⑦ For use on main switches with emergency-stop function to IEC/EN 60204.
⑧ Protected against accidental contact. Frame B short-circuit proof U_e = 690V, I_u = 63A. Frame B links can be combined by rotating mounting.

Shroud for Unused Terminals of Three-Phase Commoning Links

XTPAXUTS



For Use with…	Description	Pkg. Qty. ①	Catalog Number
Frame B XTPR	To cover unused terminals on three-phase commoning link. Protected against direct contact.	20	**XTPAXUTS**

Incoming Terminals for Three-Phase Commoning Link ②

XTPAXIT



For Use with…	Pkg. Qty. ①	Catalog Number
Frame B XTPR, XTPB	5	**XTPAXIT**

Line-Side Adapters ③

XTPAXLSA



XTPAXIP2X



For Use with…	Catalog Number
Frame B XTPR to create a UL 508 Type E/F manual combination starter	**XTPAXLSA**
Reduced size Frame D XTPR to create a UL 508 Type E/F manual combination starter (not to be used with 3-phase commoning links)	**XTPAXIP2X**

XTPAXLSAD

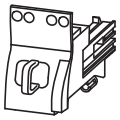


For Use with…	Catalog Number
Frame D XTPR to create a UL 508 Type E/F manual combination starter	**XTPAXLSAD** ④

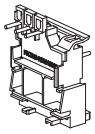
Combination Connection Kits

Non-Reversing Starters

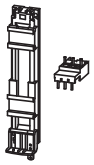
XTPAXTPCB



XTPAXEMC_



XTPAXTPCD



For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPR…B + XTCE…B	Mechanical connection element for XTPR…B and contactor	1	**XTPAXTPCB**
	Main current wiring between XTPR…B and contactor in toolless plug connection	1	
	Use contactor auxiliary switch XTCEXFAT_. Control cable guidance: max. six cables up to 2.5 mm^2 external diameter or four cables up to 3.5 mm^2 external diameter.		
XTPR…B + XTCE…B	Mechanical and electrical connection for XTPR…B and contactor	5	**XTPAXEMCB**
XTPR…B + XTCE…C		5	**XTPAXEMCC**
XTPR…D + XTCE…D	DIN rail adapter plate Main current wiring between XTPR and contactor	1	**XTPAXTPCD**

Notes

① Orders must be placed in multiples of package quantity listed.

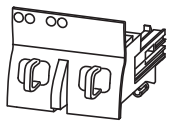
② For three-phase commoning link, protected against accidental contact, U_e = 690V, I_u = 63A;
For conductor cross-sections: 2.5–25 mm^2 stranded; 2.5–16 mm^2 flexible with ferrules, AWG 14-6.

③ XTPAXLSA is for three-phase commoning link, finger and back-of-hand proof,
U_e = 690V, I_u = 60A for conductor cross sections: 2.5–25 mm^2 stranded,
2.5–16 mm^2 flexible with ferrule, AWG 14-6.

④ XTPAXLSAD cannot be combined with three-phase commoning links. Conductor size 8 AWG–1/0.

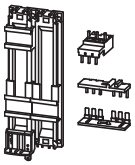
Reversing Starters

XTPAXTPCRB



For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPR…B + XTCE…B01_	Mechanical connection element for XTPR…B and contactor	1	**XTPAXTPCRB**
	Reversing starter main current wiring in toolless plug connection	1	
	Control cables for electrical interlocking in toolless plug connection: – K1M: A1–K2M: 21 – K1M: 21–K2M: A1 – K1M: A2–K2M: A2	1	
	Cable guidance	1	
	Use contactor auxiliary switch XTCEXFAT_. Control cable guidance: max. six cables up to 2.5 mm^2 external diameter or four cables up to 3.5 mm^2 external diameter.		

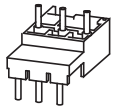
XTPAXTPCRC



XTPR…B + XTCE…C	DIN rail adapter plate	1	**XTPAXTPCRC**
	Reversing starter main current wiring	1	

Electrical Connection Module

XTPAXECM_



For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPR…B + XTCE…C	Main current wiring between XTPR…B and contactor	5	**XTPAXECMC**
XTPR…D + XTCE…D	Main current wiring between XTPR…D and contactor	5	**XTPAXECMD**

DIN Rail Adapter Plates

XTPAXTPCPB



For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPAXTPCB XTPAXTPCRB	45 mm wide adapter plate with one DIN rail	4	**XTPAXTPCPB**
	Connection element for side-by-side positioning of further plates		

XTPAXTPCPD



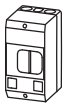
XTPAXECMD XTPR…D + XTCE…C XTPR…D + XTCE…D	55 mm wide adapter plate with two DIN rails	4	**XTPAXTPCPD**
	Connection cams for further plates		
	For use with reversing and star-delta starters		

Note

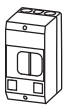
① Orders must be placed in multiples of package quantity listed.

Pushbutton MMP Enclosures

Insulated Enclosures for Surface Mounting of XTPB Pushbutton Motor-Protective Circuit Breakers—Global Usage ①

	Degree of Protection	For Use with…	Description	Catalog Number
	IP40 NEMA 1	XTPB MMP only or with: XTPAXFA_, XTPBXFAEM20, XTPAXSA_, XTPAXUVR_, XTPAXSR_	—	**XTPBXENCS40**
	IP65 NEMA 3R, 4X, 12, 13		With actuation membrane.	**XTPBXENCS65**
	IP65 NEMA 3R, 4X, 12, 13	XTPB MMP only or with: XTPAXFA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	Lockable in OFF position.	**XTPBXENCSLO65**
	IP65 NEMA 3R, 4X, 12, 13	XTPB MMP only or with: XTPAXFA_, XTPBXFAEM20, XTPAXUVR_, XTPAXSR_, XTPAXCL	Lockable in OFF position in combination with XTPBXFAEM20 early-make front-mount auxiliary contact	**XTPBXENCSLE65**
	IP65 NEMA 3R, 4X, 12, 13		With emergency-stop (e-stop) pushbutton actuator, red-yellow	**XTPBXENCSES65**
	IP65 NEMA 3R, 4X, 12, 13		With emergency-stop (e-stop) pushbutton actuator, red-yellow key release	**XTPBXENCSEK65**

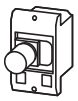
Insulated Enclosures for Surface Mounting of XTPB Pushbutton Manual Motor Protectors—North American Usage ②③

	Degree of Protection	For Use with…	Description	Catalog Number
	IP41 NEMA 1	XTPB MMP only or with: XTPAXFA_, XTPBXFAEM20, XTPAXSA_, XTPAXUVR_, XTPAXSR_	—	**XTPBXENAS41**
	IP65 NEMA 3R, 4X, 12, 13		With actuating diaphragm	**XTPBXENAS65**
	IP65 NEMA 3R, 4X, 12, 13	XTPB MMP only or with: XTPAXFA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	Lockable in OFF position	**XTPBXENASLO65**
	IP65 NEMA 3R, 4X, 12, 13	XTPB MMP only or with: XTPAXFA_, XTPBXFAEM20, XTPAXUVR_, XTPAXSR_, XTPAXCL	Lockable in OFF position in combination with XTPBXFAEM20 early-make front-mount auxiliary contact	**XTPBXENASLE65**
	IP65 NEMA 3R, 4X, 12, 13		With emergency-stop (e-stop) pushbutton actuator, red-yellow	**XTPBXENASES65**
	IP65 NEMA 3R, 4X, 12, 13		With emergency-stop (e-stop) pushbutton actuator, red-yellow key release	**XTPBXENASEK65**

Notes

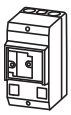
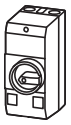
① Integrated terminal for PE(N) connection, two M25 cable entry knockouts at top and at bottom.
② Built-in terminal for PE(N).
③ North American enclosures come with conduit adapters for use with 1/2 in NPT.

Insulated Enclosures for Surface Mounting of XTPB Pushbutton Manual Motor Protectors—North American Usage ①

	Degree of Protection	For Use with…	Description	Catalog Number
	Front IP40 NEMA 1	XTPB MMP only or with: XTPAXFA_, XTPBXFAEM20, XTPAXSA_, XTPAXUVR_, XTPAXSR_	—	**XTPBXENCF40**
	Front IP65 NEMA 3R, 4X, 12, 13		With actuating diaphragm	**XTPBXENCF55**
	Front IP65 NEMA 3R, 4X, 12, 13	XTPB MMP only or with: XTPAXFA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	Lockable in OFF position	**XTPBXENCFLO55**
	Front IP65 NEMA 3R, 4X, 12, 13	XTPB MMP only or with: XTPAXFA_, XTPBXFAEM20, XTPAXUVR_, XTPAXSR_, XTPAXCL	Lockable in OFF position in combination with XTPBXFAEM20 early-make front-mount auxiliary contact	**XTPBXENCFLE55**
	Front IP65 NEMA 3R, 4X, 12, 13		With emergency-stop (e-stop) pushbutton actuator, red-yellow	**XTPBXENCFES55**
	Front IP65 NEMA 3R, 4X, 12, 13		With emergency-stop (e-stop) pushbutton actuator, red-yellow key release	**XTPBXENCFEK55**

Rotary MMP Enclosures

Insulated Enclosures for Surface Mounting of Frame B (0.1–32A) XTPR Motor-Protective Circuit Breakers—Global Usage

	Degree of Protection	For Use with…	Description	Catalog Number
	IP41 with vertical mounting	Frame B XTPR only or with: XTPAXFA_, XTPAXSA_, XTPAXSATR_, XTPAXUVR_, XTPAXSR_, XTPAXCL	Cover with aperture dimensioned to accommodate front of MMP. IP40, when mounted turned through 90° to left/right	**XTPAXENCS41** ①
	IP65		With black/grey rotary handle	**XTPAXENCS65B** ①
	IP65		With red/yellow rotary handle for use as emergency-stop switches to IEC/EN 60204	**XTPAXENCS65RY** ①
	IP40	Frame B XTPR only or with: XTPAXSA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	Cover with aperture dimensioned to accommodate front of MMP	**XTPAXENCS40** ②
	IP55	Frame B XTPR only or with: XTPAXFA_, XTPAXSA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	With black/gray rotary handle	**XTPAXENCS55B** ②
	IP55		With red/yellow rotary handle for use as emergency-stop switches to IEC/EN 60204	**XTPAXENCS55RY** ②

Note

① Integrated terminal for PE(N) connection.

Insulated Enclosures for Surface Mounting of Frame B (0.1–32A) XTPR Rotary Manual Motor Protectors—North American Usage ③



Degree of Protection	For Use with…	Description	Catalog Number
IP55 NEMA 1, 12, 3R	Frame B XTPR only or with: XTPAXSA_ and XTPAXFA_, XTPAXUVR_ and XTPAXFA_, XTPAXSR_ and XTPAXFA_, XTPAXCL	With black/gray rotary handle	**XTPAXENAS55B**
		With red/yellow rotary handle for use as emergency-stop switch to VDE 0113	**XTPAXENAS55RY**

Insulated Enclosures for Surface Mounting of Frame B XTPR (0.1–32A) Rotary Motor-Protective Circuit Breakers with XTPAXFAEM20 Early-Make Front-Mount Auxiliary Contact—Global Usage





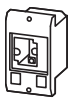
Degree of Protection	For Use with…	Description	Catalog Number
IP65	Frame B XTPR and XTPAXFAEM20 only or with: XTPAXFA_, XTPAXSA_, XTPAXSATR_, XTPAXUVR_, XTPAXSR_, XTPAXCL	With black/gray rotary handle	**XTPAXENCSEM65B**
IP65		With red/yellow rotary handle for use as emergency-stop switches to IEC/EN 60204	**XTPAXENCSEM65RY**
IP55	Frame B XTPR and XTPAXFAEM20 only or with: XTPAXFA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	With black/gray rotary handle	**XTPAXENCSEM55B**
IP55		With red/yellow rotary handle for use as emergency-stop switches to IEC/EN 60204	**XTPAXENCSEM55RY**

Insulated Enclosures for Surface Mounting of Frame B XTPR (0.1–32A) Rotary Manual Motor Protectors with XTPAXFAEM20 Early-Make Front-Mount Auxiliary Contact—North American Usage ④



Degree of Protection	For Use with…	Description	Catalog Number
IP55 NEMA 1, 12, 3R	Frame B XTPR only or with: XTPAXSA_, XTPAXUVR_, XTPAXCL	With black/grey rotary handle	**XTPAXENASEM55B**
		With red/yellow rotary handle for use as emergency-stop switch to VDE 0113	**XTPAXENASEM55RY**

Insulated Enclosures for Flush Mounting of Frame B (0.1–32A) XTPR Rotary Manual Motor Protectors—Global Usage ⑤





Degree of Protection	For Use with…	Description	Catalog Number
Front IP40	Frame B XTPR only or with: XTPAXSA_, XTPAXUVR_, XTPAXSR_, XTPAXCL	Cover with aperture dimensioned to accommodate front of MMP	**XTPAXENCF40**
Front IP55	Frame B XTPR only or with: XTPAXSA_, XTPAXUVR_, XTPAXSR_, XTPAXFA_, XTPAXCL	With black/gray rotary handle	**XTPAXENCF55B**
		With red/yellow rotary handle for use as emergency-stop switches to IEC/EN 60204	**XTPAXENCF55RY**

Insulated Enclosures for Surface Mounting of Frame D (10–65A) Rotary Motor-Protective Circuit Breakers



Degree of Protection	For Use with…	Description	Catalog Number
IP65 NEMA 1, 12, 3R, 4X	Frame D XTPR only or with: XTPAXFA_, XTPAXFAEM20, XTPAXSA_, XTPAXSATR_, XTPAXUVR_, XTPAXSR_, XTPAXCL	With black/gray rotary handle	**XTPAXENCSD65B**
IP65 NEMA 1, 12, 3R, 4X		With red/yellow rotary handle for use as emergency-stop switches to IEC/EN 60204	**XTPAXENCSD65RY**

Notes

① M25 metric cable entry knock-out, top and bottom. Cable push-through membrane, top and bottom, in the back plate and as a control line entry. Includes N and PE terminals.

② Integrated terminal for PE(N) connection, two M25 cable entry knockouts at the top and bottom.

③ Built-in N and PE terminal, lower part without knockouts.

④ Built-in N and PE terminal, lower part without knockouts.

⑤ Integrated terminal for PE(N) connection.

MMP Enclosure Accessories

XTPAXPL_



XTPR Manual Motor Protector Enclosure Padlock Attachment

For Use with…	Description	Pkg. Qty. ①	Catalog Number
XTPAXENCS65B, XTPAXENCS65RY, XTPAXENCSEM65B, XTPAXENCSEM65RY, XTPAXENCS55B, XTPAXENCS55RY, XTPAXENCSEM55B, XTPAXENCSEM55RY	Padlocking feature. Up to three padlocks with 3–6 mm hasp thickness. For use as main switch to IEC/EN 60204	3	**XTPAXPL1** ②
XTPAXENCSD65B, XTPAXENCSD65RY		1	**XTPAXPL2** ②
XTPAXENCF55B, XTPAXENCF55RY		3	**XTPAXPL3** ③

XTPAXNT



Neutral Terminal for Use with XTPB and Frame B XTPR Flush-Mount Enclosures

For Use with…	Description	Pkg. Qty. ①	Catalog Number
XTPBXENCF40, XTPBXENCF55, XTPAXENCF40, XTPAXENCF55B, XTPAXENCF55RY	For connection of a fifth conductor	20	**XTPAXNT**

XTPAXIL_



Indicating Lights with Neon Bulb ④

Color	Description—Indicating Light	Pkg. Qty. ①	Catalog Number
White	110–230V	10	**XTPAXILWB**
	230–400V	10	**XTPAXILWN**
	415–500V	10	**XTPAXILWC**
Green	110–230V	10	**XTPAXILGB**
	230–400V	10	**XTPAXILGN**
	415–500V	10	**XTPAXILGC**
Red	110–230V	10	**XTPAXILRB**
	230–400V	10	**XTPAXILRN**

For use with XTPR and XTPB enclosures.

Lights do not carry individual IP or NEMA rating. All enclosure ratings remain valid when using indicating lights.

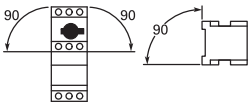
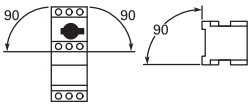
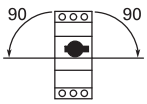
Notes

① Orders must be placed in multiples of package quantity listed.
② Lockable in the 0-position of the XTPR manual motor protector.
③ Lockable in the OFF position of the Frame B XTPR manual motor protector.
④ Product is not UL Listed/Registered.

1

Technical Data and Specifications

XT Manual Motor Protectors

Description	XTPBP16B– XTPB025B	XTPRP16B– XTPR032B	XTPR016D– XTPR063D
General			
Standards	IEC/EN 60947, VDE 0660, UL 508, CSA C22.2 No. 14	IEC/EN 60947, VDE 0660, UL 508, CSA C22.2 No. 14	IEC/EN 60947, VDE 0660, UL 508, CSA C22.2 No. 14
Climatic proofing	①	①	①
Ambient temperature, °C			
Storage	–25/80	–25/80	–25/70
Open	–25/55	–25/55	–25/55
Enclosed	–25/40	–25/40	–25/40
Mounting position			
Direction of incoming supply	As required	As required	As required
Degree of protection			
Device	IP20	IP20	IP20
Terminals	IP00	IP00	IP00
Protection against direct contact	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Shock resistance half-sinusoidal shock 10 ms to IEC 60068-2-27 (g)	25	25	15
Altitude (m), maximum	2000	2000	2000
Terminal capacity			
Solid (mm^2)	1 x (1–6) 2 x (1–6)	1 x (1–6) 2 x (1–6)	1 x (1–50) 2 x (1–35)
Flexible with ferrule to DIN 46228, (mm^2)	1 x (1–6) 2 x (1–6)	1 x (1–6) 2 x (1–6)	1 x (1–35) 2 x (1–35)
Solid or stranded (AWG)	18–10	18–10	14–2
Terminal screw tightening torque			
Main cable, Nm	1.7	1.	3
Main cable, lb-in	15.0	15.0	26.6
Control circuit cable, Nm	1	1	1
Control circuit cable, lb-in	8.9	8.9	8.9
Main Contacts			
Rated impulse withstand voltage (U_{imp}), Vac	6000	6000	6000
Overvoltage category/pollution degree	III/3	III/3	III/3
Rated operational voltage (U_e), Vac	690	690	690
Rated uninterrupted current = rated operational current ($I_u = I_e$) in amperes	25 or current setting of the overcurrent release	25 or current setting of the overcurrent release	25 or current setting of the overcurrent release
Rated frequency, Hz	40–60	40–60	40–60
Current heat loss (three-pole at operating temperature), W	6	6	22
Lifespan, mechanical (ops)	50,000	100,000	30,000
Lifespan, electrical (AC-3 at 400V) (ops)	50,000	100,000	30,000
Maximum operating frequency, operations/hr	25	40	40
Short-circuit rating			
AC	See **Page V5-T1-181**	See **Page V5-T1-181**	See **Page V5-T1-181**
DC (kA)	60	60 (up to XTPR016B) 40 (XTPR020B–XTPR032B)	60
Motor switching capacity			
AC-3 (up to 690V) in amperes	25	32	65
DC-5 (up to 250V) in amperes	25	25 (3 contacts in series)	63 (3 contacts in series)

Note

① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60068-2-30.

XT Manual Motor Protectors, continued

Description	XTPBP16B– XTPB025B	XTPRP16B– XTPR032B	XTPR016D– XTPR063D
Releases			
Overload release setting range (x I_u)	0.6–1.0	0.6–1.0	0.6–1.0
Fixed short-circuit release (x I_u)	14	14	14
Short-circuit release tolerance	± 20%	± 20%	± 20%
Phase-failure sensitivity	IEC/EN 60947-1-1, VDE 0660 Part 102	IEC/EN 60947-1-1, VDE 0660 Part 102	IEC/EN 60947-1-1, VDE 0660 Part 102
Temperature compensation			
to IEC/EN 60947, VDE 0660, °C	–5/40	–5/40	–5/40
operating range, °C	–25/55	–25/55	–25/55
Temperature compensation residual error for T >20°C, %/K	≤0.25	≤0.25	≤0.25

Auxiliary Contacts

Description	XTPAXSA_ _	XTPAXFA_ _	XTPA(B)XFAEM_ _	XTPAXSATR_ _
Rated impulse withstand voltage, U_{imp} (Vac)	6000	4000	4000	6000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3
Rated operational voltage				
U_e (Vac)	500	440	440	500
U_e (Vdc)	250	250	250	250
Safe isolation to VDE 0106 Part 101 and Part 101/A1 between auxiliary contacts and main contacts (Vac)	690	690	690	690
Rated operational current				
AC-15				
220–240 V, I_e (A)	3.5	1	1	3.5
380–415 V, I_e (A)	2	—	—	2
440–500 V, I_e (A)	1	—	—	1
DC-13 L/R <100 ms				
24 V, I_e (A)	2	2	2	2
60 V, I_e (A)	1.5	—	—	1.5
110 V, I_e (A)	1	—	—	1
220 V, I_e (A)	0.25	—	—	0.25
Lifespan				
Mechanical, operations (x 10^6)	0.1	0.1	0.1	0.01
Electrical, operations (x 10^6)	0.05	0.1	0.1	0.005
Contact reliability (at U_e = 24 Vdc, U_{min}–17V, I_{min} = 5.4 mA, fault probability	$<10^{-8}$ <1 fault at 1 x 10^8 operations	$<10^{-8}$ <1 fault at 1 x 10^8 operations	$<10^{-8}$ <1 fault at 1 x 10^8 operations	$<10^{-8}$ <1 fault at 1 x 10^8 operations
Positively driven contacts to ZH 1/457	Yes	—	—	—
Short-Circuit Rating without Welding				
Fuseless	FAZ-B4/1-HI	—	—	FAZ-B4/1-HI
Fuse (A gG/gL)	10	10	10	10
Terminal Capacity				
Solid or flexible conductor with ferrule (mm^2)	0.75–2.5	0.75–1.5	0.75–1.5	0.75–2.5
Solid or stranded (AWG)	18–14	18–16	18–16	18–14

1

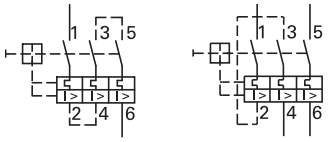
Undervoltage Release

Description	XTPAXUVR_
Cross-Section	
Solid or flexible conductor with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	1 x (18–14) 2 x (18–14)
Main Contact	
Rated operational voltage, U_e (Vac)	42–480
Rated operational voltage, U_e (Vdc)	24–250
Pickup voltage, x U_s	0.85–1.1
Dropout voltage, x U_s	0.7–0.35
Power Consumption	
Pickup AC (VA)	5
Sealing AC (VA)	3

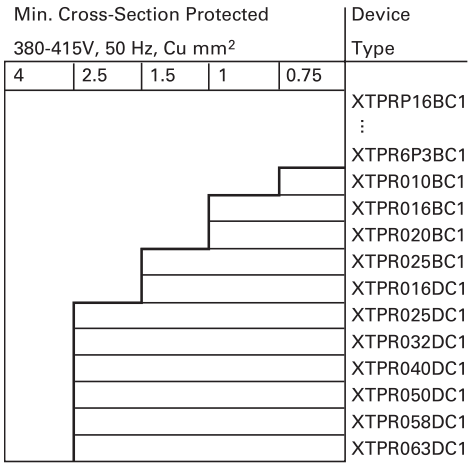
Current Limiter

Description	XTPAXCL
Rated impulse withstand voltage (U_{imp}), Vac	6000
Overvoltage category/pollution degree	III/3
Rated operational voltage, U_e (Vac)	690
Rated interrupted current = Rated operational current ($I_u = I_e$) in amperes	63

XTPB, XTPR Single- and Two-Pole Circuits with DC and AC Current



Protection of PVC Insulated Cables Against Thermal Overload at Short-Circuit



The chart above indicates which minimum cable cross-sections are protected by XTPR motor protective circuit breakers up to their rated conditional short-circuit current I_q.

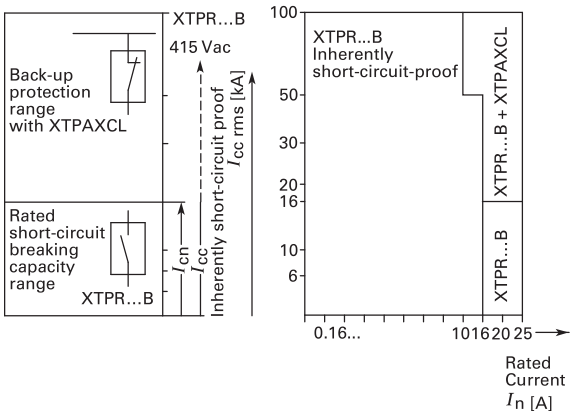
Shunt Release

Description	XTPAXSR __
Cross-Section	
Solid or flexible conductor with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	1 x (18–14) 2 x (18–14)
Main Contact	
Rated operational voltage, U_e (Vac)	42–480
Rated operational voltage, U_e (Vdc)	24–250
AC operating range, x U_s	0.7–1.1
DC operating range, x U_s (intermittent operation 5s)	0.7–1.1
Power Consumption	
Pickup AC (VA)	5
Sealing AC (VA)	3
Pickup DC (VA)	3
Sealing DC (VA)	3

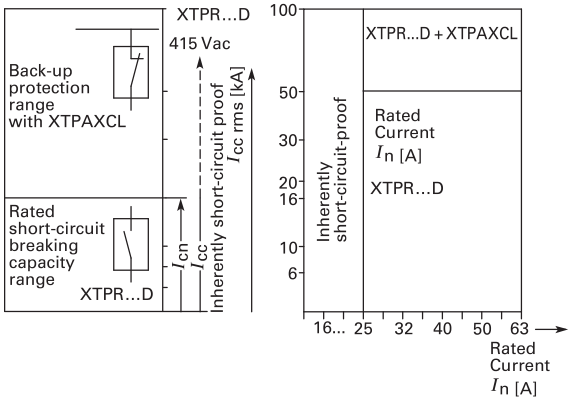
Wiring Diagrams

Fuseless Installation with XTPR

Backup Protection Diagram—XTPR...B



Backup Protection Diagram—XTPR...D



Time/Current Curves

Characteristics

The time/current characteristic, the current limiting characteristics and the I^2t characteristics were determined in accordance with DIN VDE 0660 and IEC 60 947.

The tripping characteristic of the **inverse-time delayed overload releases** (thermal overload releases or "a" releases) for DC and AC with a frequency of 0 to 400 Hz also apply to the time/current characteristic.

The characteristics apply to the cold state. At operating temperature, the tripping times of the thermal releases are reduced to approximately 25%.

Under normal operating conditions, all three-poles of the device must be loaded. The three main conducting paths must be connected in series in order to protect single-phase or DC loads.

With three-pole loading, the maximum deviation in the tripping time for 3 times the setting current and upwards is ±20% and thus in accordance with DIN VDE 0165.

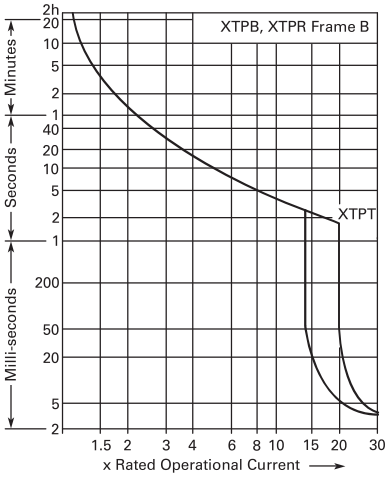
The tripping characteristics for the instantaneous, electromagnetic overcurrent releases (short-circuit releases or "n" releases) are based on the rated current I_n, which is also the maximum value of the setting range for circuit breakers with adjustable overload releases. If the current is set to a lower value, the tripping current of the "n" release is increased by a corresponding factor.

The characteristics of the electromagnetic overcurrent releases apply to frequencies of 50/60 Hz. Appropriate correction factors must be used for lower frequencies up to 16-2/3 Hz, for higher frequencies up to 400 Hz and for DC.

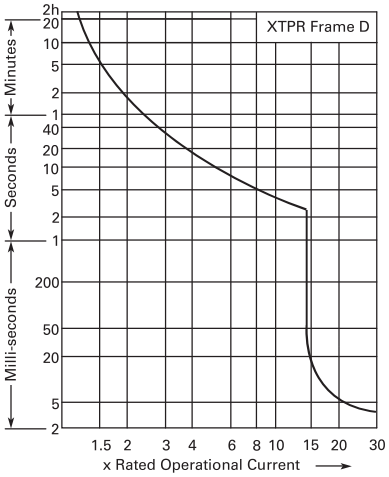
Time/current characteristics, current limiting characteristics and I^2t characteristics are available on request.

MMP Tripping Characteristics

XTPB, XTPR Frame B



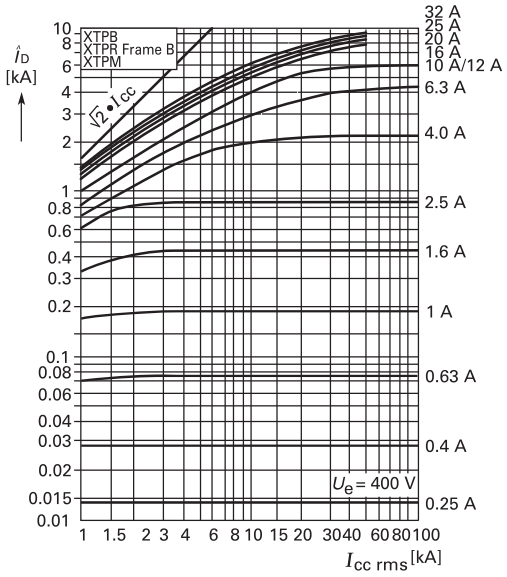
XTPR Frame D



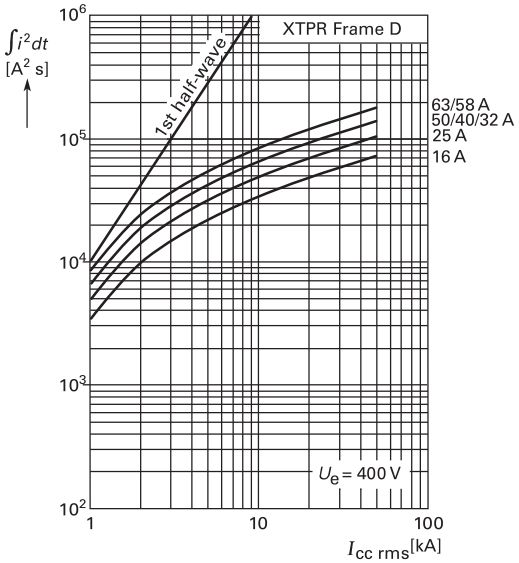
1

MMP Let-Through Tripping Characteristics

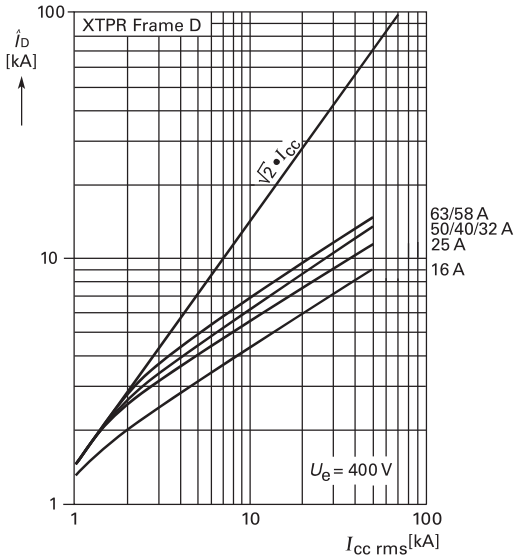
XTPB, XTPR Frame B



XTPR Frame D



XTPR Frame D



Manual Motor Protector Short-Circuit Ratings

Rated uninterrupted current I_u = Rated operational current I_e.
Rated conditional short-circuit current I_q—IEC/EN 60947-4-1.
Rated ultimate short-circuit breaking capacity I_{cu} — IEC/EN 60947-2.
Rated operational short-circuit breaking capacity I_{cs} — IEC/EN 60947-2.

Global Use, IEC/EN 60947—XTPB with Classification Type "1" and Type "2"

	230V				400V				440V				500V				690V			
I_u	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②
A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A
0.16–1	50	50	50	50	50	50	50	50	50	50	50	50	—	—	—	—	—	—	—	—
1.6	50	50	50	50	50	50	50	50	50	50	50	50	—	—	—	—	—	—	—	—
2.5	50	50	50	50	50	50	50	50	50	50	50	50	—	—	—	—	—	—	—	—
4	50	50	50	50	50	50	50	50	50	50	50	50	—	—	—	—	—	—	—	—
6.3	50	50	50	50	50	50	50	50	50	50	50	50	—	—	—	—	—	—	—	—
10	50	50	50	50	50	50	50	50	42	42	10	50	—	—	—	—	—	—	—	—
12	50	50	10	50	50	50	10	50	15	15	10	50	—	—	—	—	—	—	—	—
16	50	50	10	50	50	50	10	50	15	15	10	50	—	—	—	—	—	—	—	—
20	50	50	10	50	50	50	10	50	10	10	10	50	—	—	—	—	—	—	—	—
25	50	50	10	50	50	50	10	50	10	10	10	50	—	—	—	—	—	—	—	—

Global Use, IEC/EN 60947—XTPR…BC1 with Classification Type "1" and Type "2"

	230V				400V				440V				500V				690V			
I_u	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②
A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A
0.16–1	150 ③	150 ③	150 ③	N	150 ③	150 ③	150 ③	N	③	③	③	N	③	③	③	N	③	③	③	N
1.6	150 ③	150 ③	150 ③	N	150 ③	150 ③	150 ③	N	③	③	③	N	③	③	③	N	③	③	③	N
2.5	150 ③	150 ③	150 ③	N	150 ③	150 ③	150 ③	N	③	③	③	N	③	③	③	N	5	5	5	50
4	150 ③	150 ③	150 ③	N	150 ③	150 ③	150 ③	N	③	③	③	N	③	③	③	N	3	3	3	50
6.3	150 ③	150 ③	150 ③	N	150 ③	150 ③	150 ③	N	③	③	③	N	42	42	6	50	3	3	2	50
10	150 ③	150 ③	150 ③	N	150 ③	150 ③	150 ③	N	42	42	10	50	42	42	6	50	3	3	2	50
12	50	50	10	50	50	50	10	50	15	15	10	50	15	15	6	50	3	3	2	50
16	50	50	10	50	50	50	10	50	15	15	10	50	15	15	6	50	3	3	2	50
20	50	50	10	50	50	50	10	50	15	15	10	50	6	6	6	50	3	3	2	50
25	50	50	10	50	50	50	10	50	10	10	10	50	6	6	6	50	3	3	2	50
32	50	50	10	50	50	50	10	50	10	10	10	50	6	6	6	50	3	3	2	50

Notes

① N = Not required.

② XTPR…BC1, XTPT, XTPM—Required back-up fuse if the short-circuit current exceeds the rated conditional short-circuit current ($I_{cc} > I_q$); XTPB, XTPR…DC1—Fuse (A gG/gL) for enhancing the switching capacity of the motor protective circuit breaker to 100 kA.

③ No upstream protective device required, as it is the auto-protected range (100/150 kA—Frame B, 150 kA—Frame D).

1

Global Use, IEC/EN 60947—XTPR…DC1 with Classification Type "1" and Type "2"

	230V				400V				440V				500V				690V			
I_u	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②	I_q	I_{cu}	I_{cs}	Fuse ①②
A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A	kA	kA	kA	A
16	150 ③	150 ③	25	N	150 ③	150 ③	25	N	45	45	25	100	15	15		100	8	8	2.5	100
25	150 ③	150 ③	25	N	150 ③	150 ③	25	N	45	45	25	100	15	15		100	8	8	2.5	100
32	50	50	25	100	50	50	25	100	45	45	25	100	15	15		100	5	5	2.5	100
40	50	50	25	100	50	50	25	100	45	45	25	100	15	15		100	5	5	2.5	100
50	50	50	25	100	50	50	25	100	45	45	25	100	15	15		100	5	5	2.5	100
58	50	50	25	160	50	50	25	160	45	45	25	160	15	15		160	5	5	2.5	160
63	50	50	25	160	50	50	25	160	45	45	25	160	15	15		160	5	5	2.5	160

Ratings for Group Motor Applications

UL 508/CSA C22.2 No. 14—XTPB—Frame B, Manual Motor Protector with Thermal and Magnetic Trip

Catalog Number	Rated Uninterrupted Current—I_u (Amps)	FLA Adjustment Range/Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	Maximum Protective Device for UL/CSA Group Protection					
				Maximum rms Sym Current—480V (kA)	w/Current Limiter—XTPAXCL	Maximum Fuse Rating (A)	w/Current Limiter—XTPAXCL	Circuit Breaker Maximum (A)	w/Current Limiter—XTPAXCL
XTPBP16BC1	0.16	0.1–0.16	2.2	50	—	600	—	600	—
XTPBP25BC1	0.25	0.16–0.25	3.5	50	—	600	—	600	—
XTPBP40BC1	0.4	0.25–0.4	5.6	50	—	600	—	600	—
XTPBP63BC1	0.63	0.4–0.63	8.8	50	—	600	—	600	—
XTPB001BC1	1	0.63–1	14	50	—	600	—	600	—
XTPB1P6BC1	1.6	1–1.6	22	50	—	600	—	600	—
XTPB2P5BC1	2.5	1.6–2.5	35	50	—	600	—	600	—
XTPB004BC1	4	2.5–4	56	50	—	600	—	600	—
XTPB6P3BC1	6.3	4–6.3	88	50	—	600	—	600	—
XTPB010BC1	10	6.3–10	140	30	50	600	600	600	600
XTPB012BC1	12	8–12	168	10	50	150	600	125 ⑤	600
XTPB016BC1	16	10–16	224	10	50	150	600	125 ⑤	600
XTPB020BC1 ④	20	16–20	280	10	18	150	600	125	600
XTPB025BC1 ④	25	20–25	350	10	18	150	600	125	600

Notes

① N = Not required.

② XTPR…BC1, XTPT, XTPM—Required back-up fuse if the short-circuit current exceeds the rated conditional short-circuit current ($I_{cc} > I_q$); XTPB, XTPR…DC1—Fuse (A gG/gL) for enhancing the switching capacity of the motor protective circuit breaker to 100 kA.

③ No upstream protective device required, as it is the auto-protected range (100/150 kA—Frame B, 150 kA—Frame D).

④ IEC/EN 60947-4-1.

⑤ 22 kA 600 Vac.

UL 508/CSA C22.2 No. 14—XTPR—Frame B (all Screw and Spring Cage Terminal Options), Manual Motor Protector with Thermal and Magnetic Trip

Catalog Number	Rated Uninterrupted Current—I_u (Amps)	FLA Adjustment Range/Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	Maximum Protective Device for UL/CSA Group Protection					
				Maximum rms Sym Current—480V (kA)	w/Current Limiter—XTPAXCL	Maximum Fuse Rating (A)	w/Current Limiter—XTPAXCL	Circuit Breaker Maximum (A)	w/Current Limiter—XTPAXCL
XTPRP16BC1	0.16	0.1–0.16	2.2	50	—	600	—	600	—
XTPRP25BC1	0.25	0.16–0.25	3.5	50	—	600	—	600	—
XTPRP40BC1	0.4	0.25–0.4	5.6	50	—	600	—	600	—
XTPRP63BC1	0.63	0.4–0.63	8.8	50	—	600	—	600	—
XTPR001BC1	1	0.63–1	14	50	—	600	—	600	—
XTPR1P6BC1	1.6	1–1.6	22	50	—	600	—	600	—
XTPR2P5BC1	2.5	1.6–2.5	35	50	—	600	—	600	—
XTPR004BC1	4	2.5–4	56	50	—	600	—	600	—
XTPR6P3BC1	6.3	4–6.3	88	50	—	600	—	600	—
XTPR010BC1	10	6.3–10	140	30	50	600	600	600	600
XTPR012BC1	12	8–12	168	10	50	150	600	125	600
XTPR016BC1	16	10–16	224	10	50	150	600	125 ①	600
XTPR032BC1	32	25–32	448	10	18	150	600	125	600
XTPR025BC1	25	20–25	350	10	18	150	600	125	600
XTPR032BC1	32	25–32	448	10	18	150	600	125	600

UL 508/CSA C22.2 No. 14—XTPR—Frame D, Manual Motor Protector with Thermal and Magnetic Trip

Catalog Number	Rated Uninterrupted Current—I_u (Amps)	FLA Adjustment Range/Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	Maximum Protective Device for UL/CSA Group Protection					
				Maximum rms Sym Current—480V (kA)	w/Current Limiter—XTPAXCL	Maximum Fuse Rating (A)	w/Current Limiter—XTPAXCL	Circuit Breaker Maximum (A)	w/Current Limiter—XTPAXCL
XTPR016DC1	16	10–16	224	65	—	600	—	600	—
XTPR025DC1	25	16–25	350	65	—	600	—	600	—
XTPR032DC1	32	25–32	448	65	—	600	—	600	—
XTPR040DC1	40	32–40	560	65	—	600	—	600	—
XTPR050DC1	50	40–50	700	65	—	600	—	600	—
XTPR058DC1	58	50–58	812	65	—	600	—	600	—
XTPR063DC1	65	55–63	882	65	—	600	—	600	—

Note

① 22 kA 600 Vac.

UL 508 Type E Ratings—XTPR Frame B + XTPAXLSA

Manual Motor Protector—Screw Terminal Catalog Number	Line Side Adapter Catalog Number	FLA Adjustment Range/Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	UL 508 Type E Application Maximum rms Symmetrical Short-Circuit Ratings (kA) 480/277V	600/347V	Maximum Upstream Protective Device (A) ① Maximum Fuse 600V	Maximum Circuit Breaker 600V
XTPRP16BB1	**XTPAXLSA**	0.1–0.16	2.2	50	50	Not required	Not required
XTPRP25BC1	**XTPAXLSA**	0.16–0.25	3.5	50	50	Not required	Not required
XTPRP40BC1	**XTPAXLSA**	0.25–0.4	5.6	50	50	Not required	Not required
XTPRP63BC1	**XTPAXLSA**	0.4–0.63	8.82	50	50	Not required	Not required
XTPR001BC1	**XTPAXLSA**	0.63–1	14	50	50	Not required	Not required
XTPR1P6BC1	**XTPAXLSA**	1–1.6	22.4	50	50	Not required	Not required
XTPR2P5BC1	**XTPAXLSA**	1.6–2.5	35	50	50	Not required	Not required
XTPR004BC1	**XTPAXLSA**	2.5–4	56	50	50	Not required	Not required
XTPR6P3BC1	**XTPAXLSA**	4–6.3	88.2	65	50	Not required	Not required
XTPR010BC1	**XTPAXLSA**	6.3–10	140	65	50	Not required	Not required
XTPR012BC1	**XTPAXLSA**	8–12	168	65	—	Not required	Not required
XTPR016BC1	**XTPAXLSA**	10–16	224	42	—	Not required	Not required
XTPR020BC1	**XTPAXLSA**	16–20	280	18	—	Not required	Not required
XTPR025BC1	**XTPAXLSA**	20–25	350	18	—	Not required	Not required
XTPR032BC1	**XTPAXLSA**	25–32	448	18	—	Not required	Not required

UL 508 Type E Ratings—XTPR Frame D + XTPAXLSAD

Manual Motor Protector—Screw Terminal Catalog Number	Line Side Adapter Catalog Number	FLA Adjustment Range/Overload Release—I_r (Amps)	Short Circuit Release—I_{rm} (Amps)	UL 508 Type E Application Maximum rms Symmetrical Short-Circuit Ratings (kA) 240V	480/277V	600/347V	Maximum Upstream Protective Device (A) ① Maximum Fuse 600V	Maximum Circuit Breaker 600V
XTPR016DC1	**XTPAXLSAD**	10–16	224	65	65	25	Not required	Not required
XTPR025DC1	**XTPAXLSAD**	16–25	350	65	65	25	Not required	Not required
XTPR032DC1	**XTPAXLSAD**	25–32	448	65	65	25	Not required	Not required
XTPR040DC1	**XTPAXLSAD**	32–40	560	65	65	25	Not required	Not required
XTPR050DC1	**XTPAXLSAD**	40–50	700	65	65	—	Not required	Not required
XTPR058DC1	**XTPAXLSAD**	50–58	812	65	65	—	Not required	Not required
XTPR063DC1	**XTPAXLSAD**	55–65	882	65	65	—	Not required	Not required

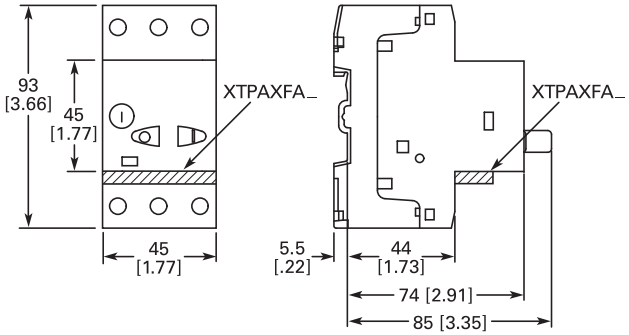
Note

① For UL 508 Type E applications, the manual motor protector assembly does not require a dedicated upstream protective device in the panel, thus a maximum rating is not required.

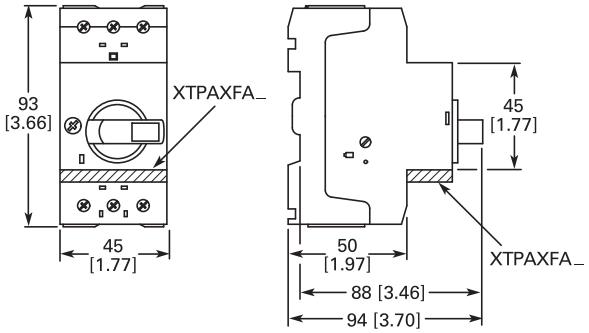
Dimensions

Approximate Dimensions in mm [in]

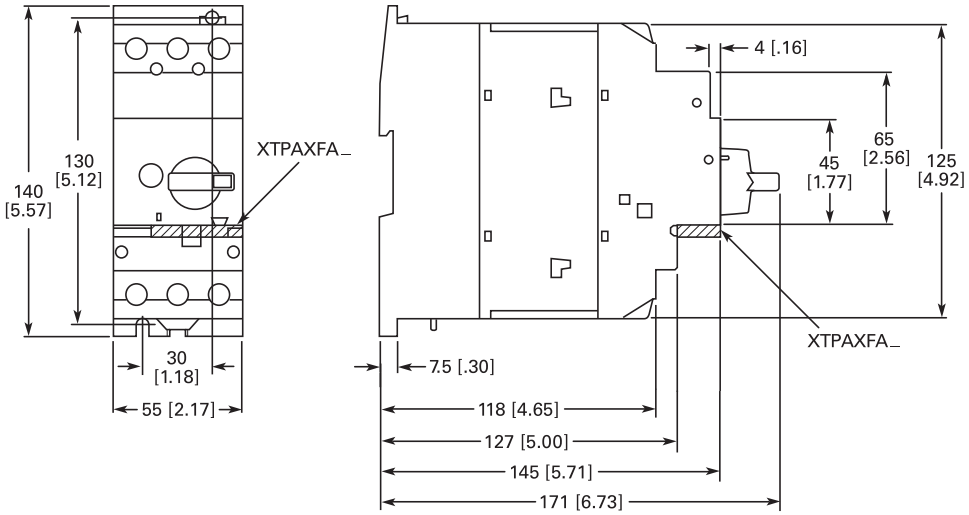
Manual Motor Protectors—XTPB



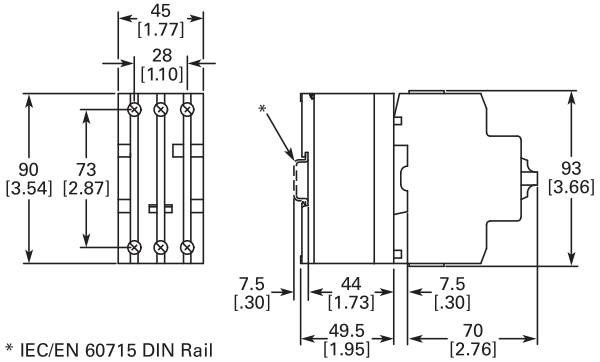
Manual Motor Protectors, Manual Transformer Protectors—XTPR...B



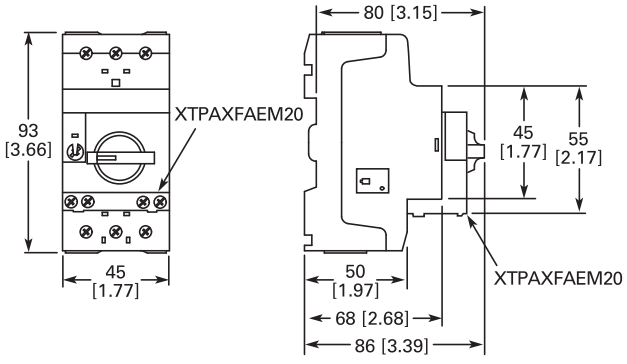
Manual Motor Protector—XTPR...DC1



Current Limiter—XTPAXCL

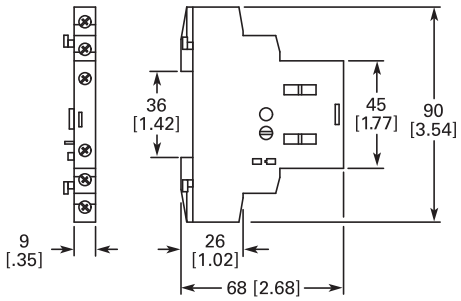


MMPs with Early-Make Auxiliary Contacts—XTPR...BC1 + XTPAXFAEM20

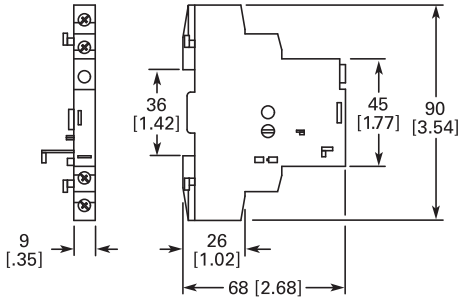


Approximate Dimensions in mm [in]

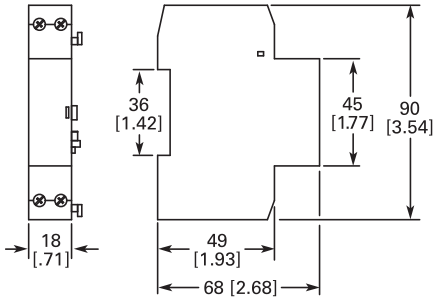
Standard Auxiliary Contact—XTPAXSA_



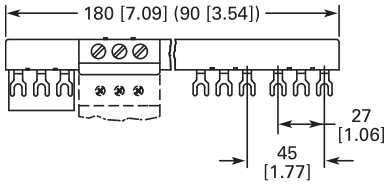
Trip Indicating Auxiliary Contact—XTPAXSATR_



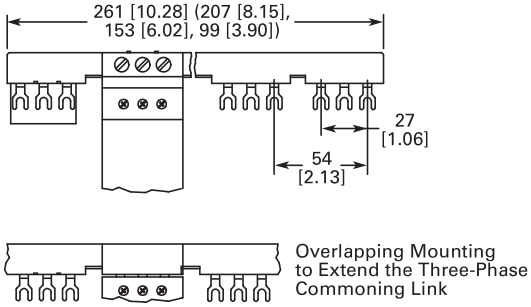
Undervoltage/Shunt Release—XTPAXUVR_, XTPAXSR_



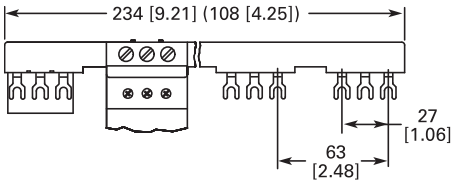
Three-Phase Commoning Link—XTPAXCLKA4, XTPAXCLKA2



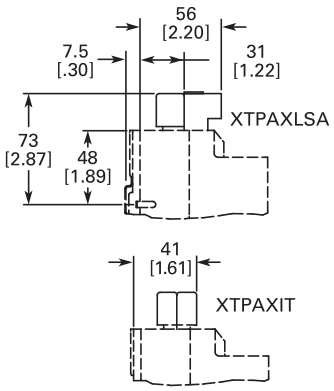
Three-Phase Commoning Link—XTPAXCLKB5, XTPAXCLKB4, XTPAXCLKB3 and XTPAXCLKB2



Three-Phase Commoning Link—XTPAXCLKC4, XTPAXCLKC2



Incoming Terminal, Line Side Adapter—XTPAXIT, XTPAXLSA

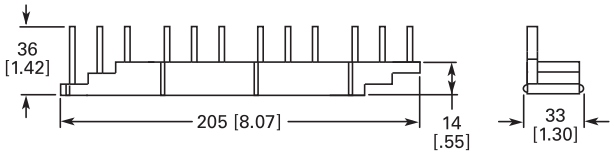


Approximate Dimensions in mm [in]

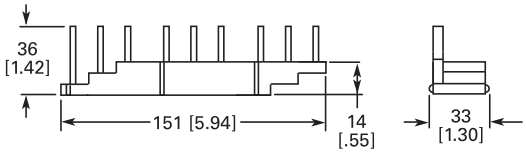
Three-Phase Commoning Link

XTPAXCLKA4D, XTPAXCLKA3D and XTPAXCLKA2D

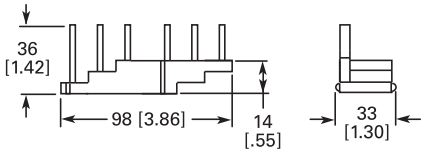
XTPAXCLKA4D



XTPAXCLKA3D

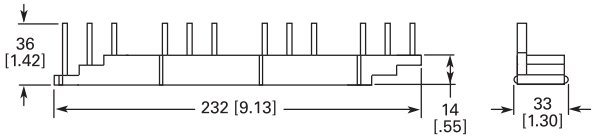


XTPAXCLKA2D

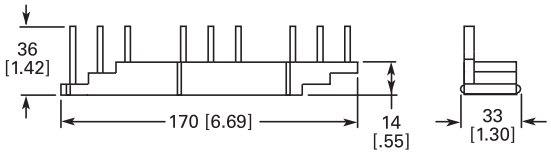


XTPAXCLKB4D, XTPAXCLKB3D and XTPAXCLKB2D

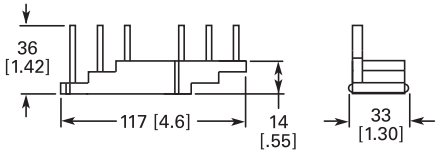
XTPAXCLKB4D



XTPAXCLKB3D

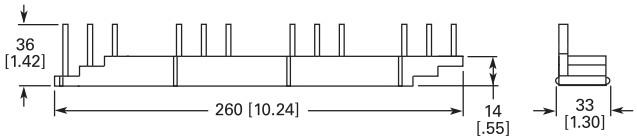


XTPAXCLKB2D

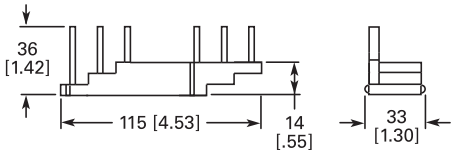


XTPAXCLKC4D and XTPAXCLKC2D

XTPAXCLKC4D

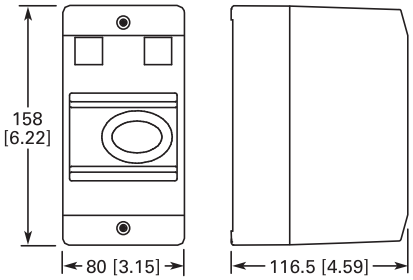


XTPAXCLKC2D

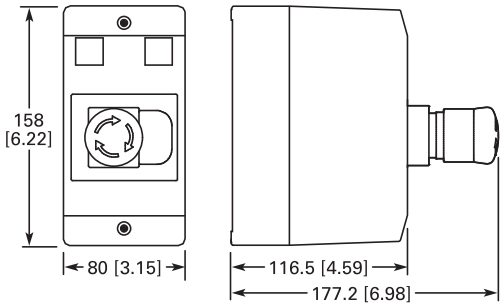


Approximate Dimensions in mm [in]

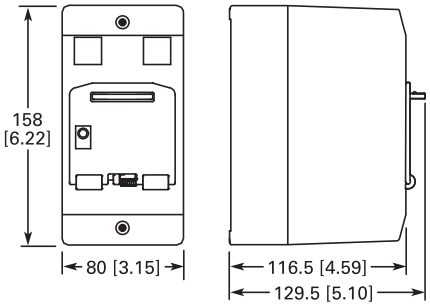
Insulated Enclosures for Surface Mounting of XTPB Manual Motor Protectors



XTPBXENCS40, XTPBXENCS65, XTPBXENAS41, XTPBXENAS65

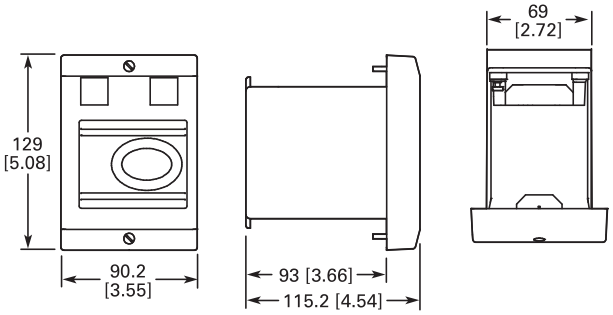


XTPBXENCSEK65, XTPBXENCSES65, XTPBXENASEK65, XTPBXENASES65

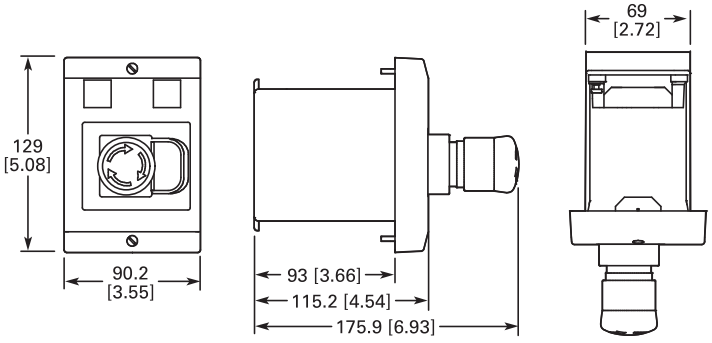


XTPBXENCSLE65, XTPBXENCSLO65, XTPBXENASLE65, XTPBXENASO065

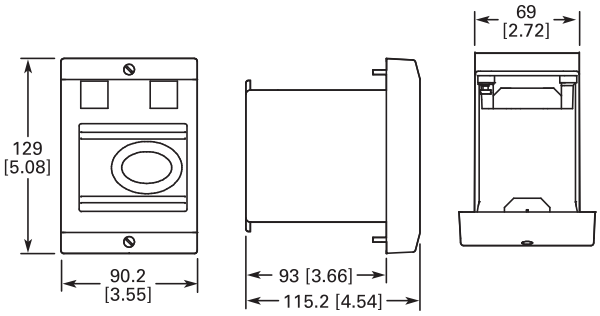
Insulated Enclosures for Flush Mounting of XTPB Manual Motor Protectors



XTPBXENCF40, XTPBXENCF55



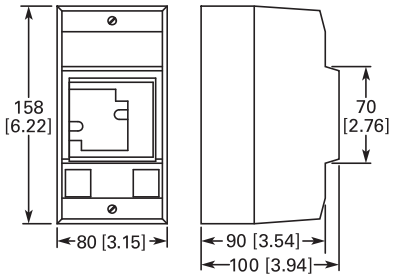
XTPBXENCFEK55, XTPBXENCFES55



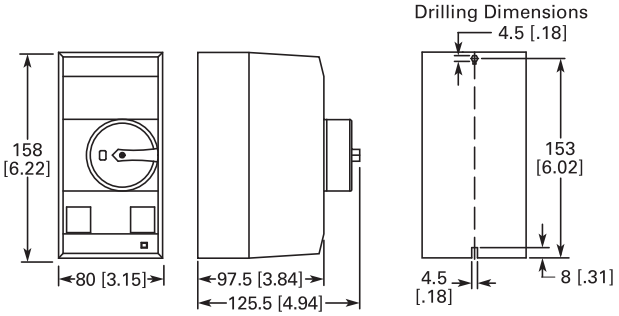
XTPBXENCFLE55, XTPBXENCFLO55

Approximate Dimensions in mm [in]

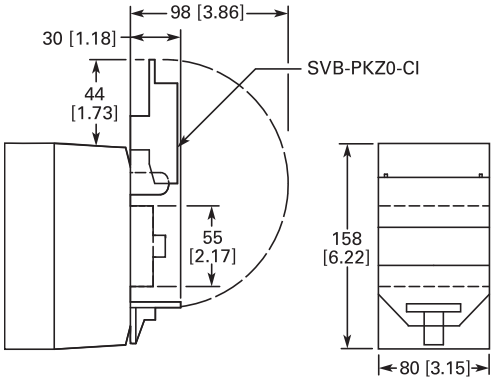
Insulated Enclosures for Surface Mounting of XTPR…B Manual Motor Protectors

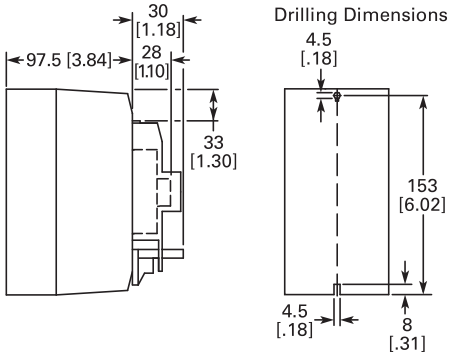


XTPAXENCS40

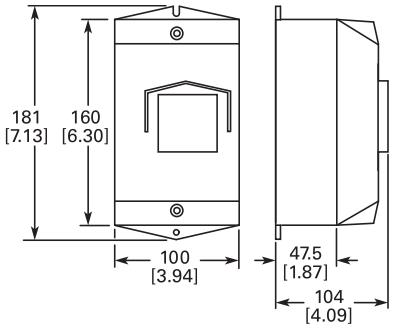


XTPAXENCS55B, XTPAXENCS55RY, XTPAXENCSEM55B, XTPAXENCSEM55RY

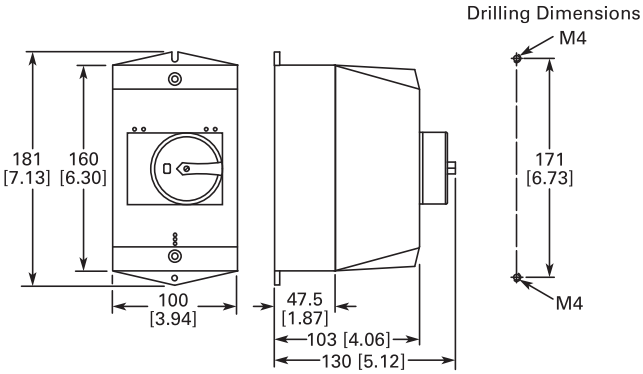




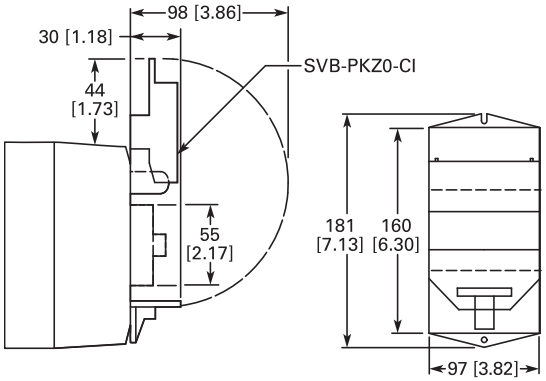
XTPAXENCS55_ + XTPAXPL1, XTPAXENCSEM55_ + XTPAXPL1

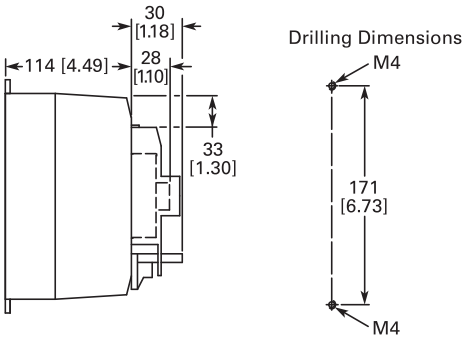


XTPAXENCSH41, XTPAXENCS41, XTPAXENAS41



XTPAXENCS65B, XTPAXENCS65RY, XTPAXENCSEM65B, XTPAXENCSEM65RY, XTPAXENAS55B, XTPAXENAS55RY, XTPAXENASEM55B, XTPAXENASEM55RY, XTPAXENCSH65B, XTPAXENCSH65RY, XTPAXENCSEMH65B, XTPAXENCSEMH65RY



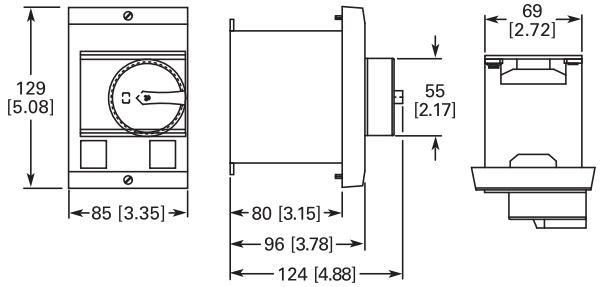


XTPAXENCS65_ + XTPAXPL1, XTPAXENCSEM65_ + XTPAXPL1

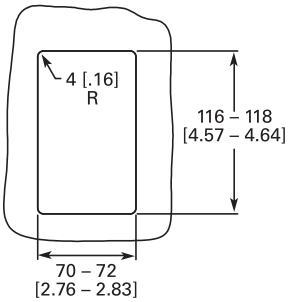
1

Approximate Dimensions in mm [in]

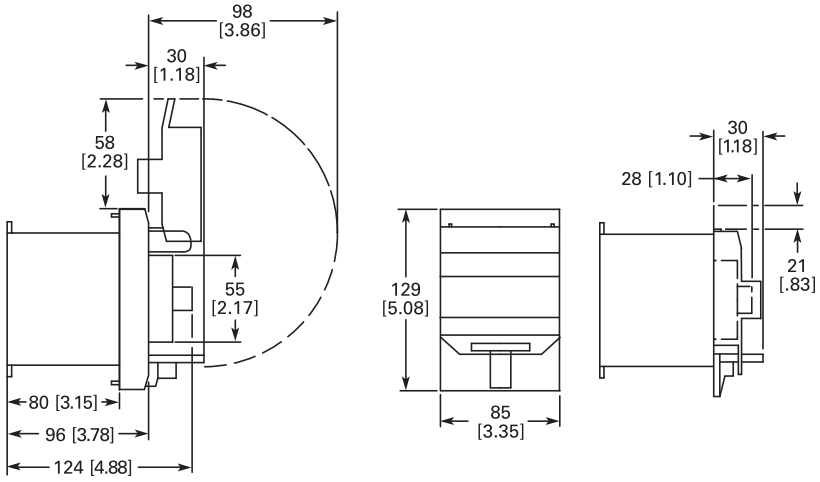
Insulated Enclosures for Flush Mounting of XTPR...B Manual Motor Protectors



XTPAXENCF40, XTPAXENCF55B, XTPAXENCF55RY



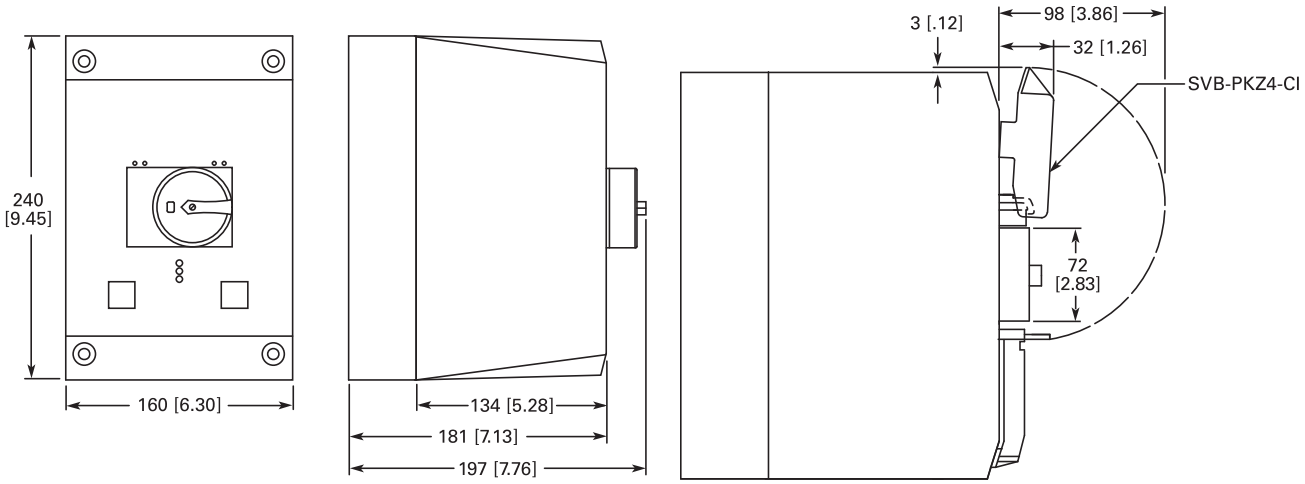
Mounting Cutout XTPAXENCF_



XTPAXENCF55_ + XTPAXPL3

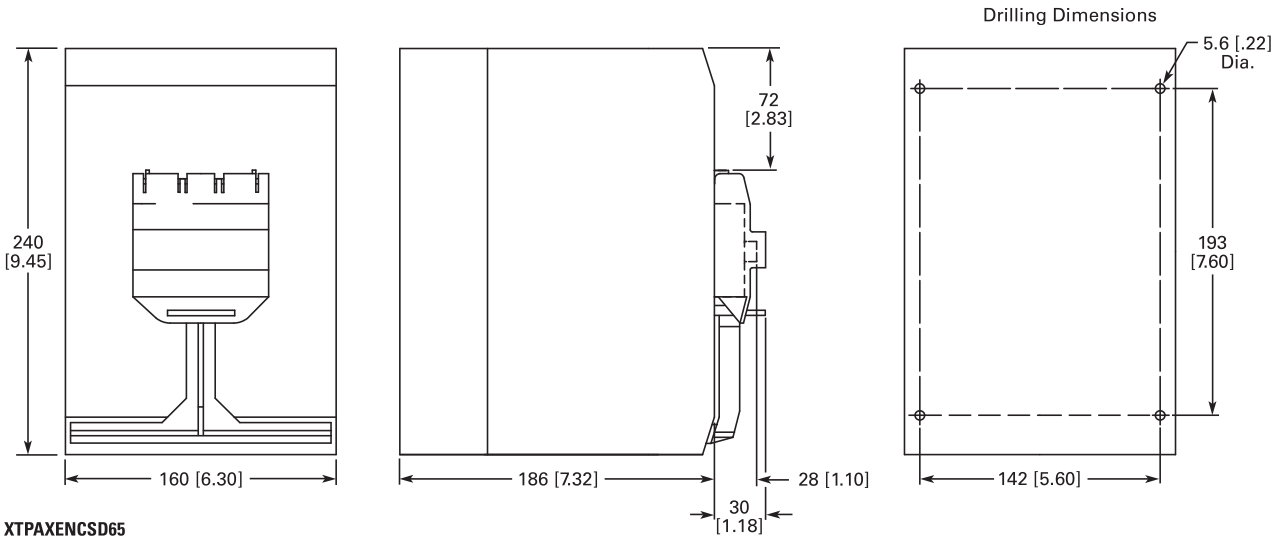
Approximate Dimensions in mm [in]

Insulated Enclosures for Surface Mounting of XTPR...D Manual Motor Protectors



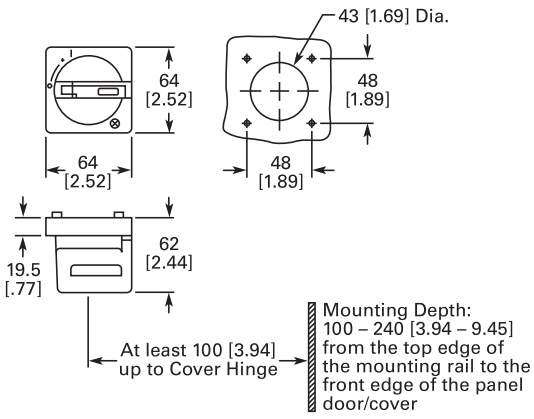
XTPAXENCSD65B, XTPAXENCSD65RY

XTPAXENCSD65_ + XTPAXPL2



XTPAXENCSD65

Rotary Handle Mechanism—XTPAXRHM_



Approximate Dimensions in mm [in]

Pushbutton MMP Enclosures

Insulated Enclosures for Surface Mounting

XTPB Pushbutton Motor-Protective Circuit Breakers

Catalog Number	H x W x D
Global Usage	
XTPBXENCS40	158 x 80 x 116.5 [6.22 x 3.15 x 4.59]
XTPBXENCS65	158 x 80 x 116.5 [6.22 x 3.15 x 4.59]
XTPBXENCSLO65	158 x 80 x 129.5 [6.22 x 3.15 x 5.10]
XTPBXENCSLE65	158 x 80 x 129.5 [6.22 x 3.15 x 5.10]
XTPBXENCSES65	158 x 80 x 177.2 [6.22 x 3.15 x 6.98]
XTPBXENCSEK65	158 x 80 x 177.2 [6.22 x 3.15 x 6.98]

XTPB Pushbutton Manual Motor Protectors

Catalog Number	H x W x D
North American Usage	
XTPBXENAS41	158 x 80 x 116.5 [6.22 x 3.15 x 4.59]
XTPBXENAS65	158 x 80 x 116.5 [6.22 x 3.15 x 4.59]
XTPBXENASLO65	158 x 80 x 129.5 [6.22 x 3.15 x 5.10]
XTPBXENASLE65	158 x 80 x 129.5 [6.22 x 3.15 x 5.10]
XTPBXENASES65	158 x 80 x 177.2 [6.22 x 3.15 x 6.98]
XTPBXENASEK65	158 x 80 x 177.2 [6.22 x 3.15 x 6.98]

Frame B (0.1–32A) XTPR Motor-Protective Circuit Breakers

Catalog Number	H x W x D
Global Usage	
XTPAXENCS41	160 x 100 x 104 [6.30 x 3.94 x 4.09]
XTPAXENCS65B	160 x 100 x 130 [6.30 x 3.94 x 5.12]
XTPAXENCS65RY	160 x 100 x 130 [6.30 x 3.94 x 5.12]
XTPAXENCS40	158 x 80 x 100 [6.22 x 3.15 x 3.94]
XTPAXENCS55B	158 x 80 x 125.5 [6.22 x 3.15 x 4.94]
XTPAXENCS55RY	158 x 80 x 125.5 [6.22 x 3.15 x 4.94]

Frame B (0.1–32A) XTPR Rotary Manual Motor Protectors

Catalog Number	H x W x D
North American Usage	
XTPAXENAS55B	160 x 100 x 130 [6.30 x 3.94 x 5.12]
XTPAXENAS55RY	160 x 100 x 130 [6.30 x 3.94 x 5.12]

Frame B XTPR (0.1–32A) Rotary Motor-Protective Circuit Breakers with XTPAXFAEM20 Early-Make Front-Mount Auxiliary Contact

Catalog Number	H x W x D
Global Usage	
XTPAXENCSEM65B	160 x 100 x 130 [6.30 x 3.94 x 5.12]
XTPAXENCSEM65RY	160 x 100 x 130 [6.30 x 3.94 x 5.12]
XTPAXENCSEM55B	158 x 80 x 100 [6.22 x 3.15 x 3.94]
XTPAXENCSEM55RY	158 x 80 x 100 [6.22 x 3.15 x 3.94]

Frame B XTPR (0.1–32A) Rotary Manual Motor Protectors with XTPAXFAEM20 Early-Make Front-Mount Auxiliary Contact

Catalog Number	H x W x D
North American Usage	
XTPAXENCSEM55B	160 x 100 x 130 [6.30 x 3.94 x 5.12]
XTPAXENCSEM55RY	160 x 100 x 130 [6.30 x 3.94 x 5.12]

Frame D (10–65A) Rotary Motor-Protective Circuit Breakers

Catalog Number	H x W x D
Global and North American Usage	
XTPAXENCSD65B	240 x 160 x 197 [9.45 x 6.30 x 7.76]
XTPAXENCSD65RY	240 x 160 x 197 [9.45 x 6.30 x 7.76]

Insulated Enclosures for Flush Mounting

XTPB Pushbutton Manual Motor Protectors

Catalog Number	H x W x D
Global and North American Usage	
XTPBXENCF40	129 x 90.2 x 115.2 [5.08 x 3.55 x 4.54]
XTPBXENCF55	129 x 90.2 x 115.2 [5.08 x 3.55 x 4.54]
XTPBXENCFLO55	129 x 90.2 x 115.2 [5.08 x 3.55 x 4.54]
XTPBXENCFLE55	129 x 90.2 x 115.2 [5.08 x 3.55 x 4.54]
XTPBXENCFES55	129 x 90.2 x 175.9 [5.08 x 3.55 x 6.93]
XTPBXENCFEK55	129 x 90.2 x 175.9 [5.08 x 3.55 x 6.93]

Frame B (0.1–32A) XTPR Rotary Manual Motor Protectors

Catalog Number	H x W x D
Global Usage	
XTPAXENCF40	129 x 85 x 96 [5.08 x 3.35 x 3.78]
XTPAXENCF55B	129 x 85 x 124 [5.08 x 3.35 x 4.88]
XTPAXENCF55RY	129 x 85 x 124 [5.08 x 3.35 x 4.88]

Combination Motor Controllers



Contents

Description	*Page*
Relays and Timers	V5-T1-3
Miniature Controls	V5-T1-18
Contactors and Starters	V5-T1-35
XTSE Contactors	V5-T1-128
Thermal Overload Relays	V5-T1-130
C440/*XT* Electronic Overload Relay	V5-T1-143
Manual Motor Protectors	V5-T1-159
Combination Motor Controllers	
Features	V5-T1-194
Catalog Number Selection	V5-T1-195
Product Selection	V5-T1-195
Accessories	V5-T1-205
Technical Data and Specifications	V5-T1-207
Dimensions	V5-T1-214
An Eaton Green Solution	
XT Electronic Manual Motor Protector	V5-T1-219
EMS—Electronic Motor Starter	V5-T1-232
XT DC Contactors	V5-T1-234
Reference Data	V5-T1-236

Combination Motor Controllers

Product Description

Eaton's ***XT*** IEC open non-reversing and reversing manual motor controllers combine a manual motor protector with an IEC contactor(s) to provide a complete motor protection solution by combining motor disconnect function, thermal overload protection, magnetic short-circuit protection and remote control operation in one compact, assembled unit. these assembled manual motor controllers cover motors with FLA ratings from 0.10A to 65A.

The UL 508 Type F or Type E labeled combination motor controller (CMC) includes a line side adapter (LSA). These assembled combination motor controllers cover motors with FLA ratings from 0.10A to 65A.

Application Description

The ***XT*** IEC non-reversing and reversing manual and combination motor controllers can be used in the following applications:

Group Motor Control

Manual motor controllers (MMCs) are ideal for group motor applications where an upstream breaker or fuse provides protection for two or more motors. ***XT*** manual motor controllers (MMC) combine a manual motor protector, a wiring connector link and IEC contactor.

Individual Branch Circuit for Motor Loads

Combination motor controller (CMC), consisting of a line side adapter, manual motor protector, wiring connector link and IEC contactor, provide an efficient means to build an entire branch circuit. The ***XT*** CMC is UL 508 Type F and Type E approved, meaning it is "self-protected" and doesn't require the use of an additional fuse or breaker for short circuit protection. This approval means CMC's can be used in place of a traditional fuse-starter and breaker-starter motor circuit.

Based around two key functional components (MMP and contactor), the CMC is a very cost effective means to build a branch circuit. Fuses and breakers must be oversized to prevent tripping during motor start up, and thus these oversized devices can no longer protect the motor. To compensate for this, a motor overload relay is necessary to protect the motor.

The manual motor protector was invented in Germany by Moeller to correct this inefficiency. The MMP operates similarly to a circuit breaker, except the inrush (magnetic) protection is set to 14 times the running current, thus accounting for motor start-up current without the necessity to oversize. A overcurrent dial was added to the face of the MMP to serve as the motor overload protection. This "motor protective circuit breaker", as it is referred to in Europe, now accomplishes all four key functions of a motor branch circuit: disconnect, short circuit, motor controller and motor overload protection. With the addition of a contactor, users have the ability to remotely control the starter device.

Whether a single motor application or a multiple motor application, CMC's are an ideal solution for machinery OEMs and panel builders.

1

Features

- ON/OFF rotary handle with lockout provision
- Visible trip indication
- Test trip function
- Motor applications from 0.10A to 65A
- Class 10 overload protection
- Built-in heater and magnetic trip elements to protect the motor
- Phase loss sensitivity
- Type 2 coordination
- Ambient compensated up to 55°C [140°F]
- Control inputs located at front of starter for easy access and wiring
- Wide range of coils
- DIN rail mount—XTSC…BB_
- Mounting plates—XTSC…BC_, XTSC…D motor controllers
- Adjustment dial for setting motor FLA
- Short-circuit trip at 14 times the maximum setting of the FLA adjustment dial
- UL 508 Type F and Type E CMC high fault short-circuit ratings
- 1NO-1NC auxiliary contact as standard on manual motor controller and combination motor controller

Standards and Certifications

UL 508 Type F combination motor controller

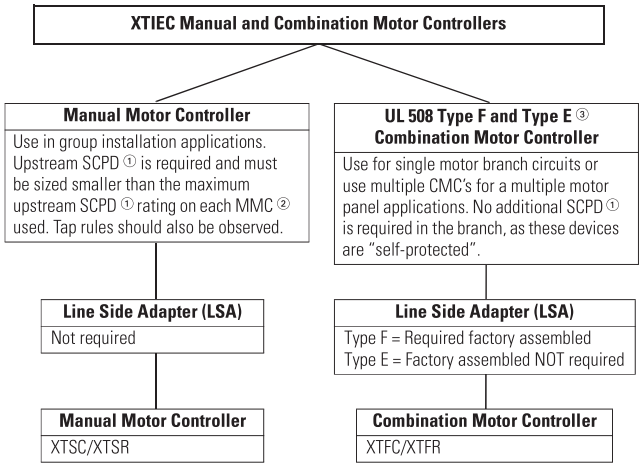
- IEC Type 2 Approved per IEC 60947-4-1
- UL Listed File No. E245398
- CE Mark

Note: For Type 2 Coordination of MMCs, see **Page V5-T1-237**. Protection in different controller types

UL 508 Type E self-protected combination motor controller

- UL Listed File No. E123500

MMC and CMC Applications



Notes

Technical Paper AP03402001E.

Line side adapters are not required for non-U.S. applications. Most countries outside of the U.S. classify the MMP as a motor-protective circuit breaker.

① SCPD = Short-circuit protective device (circuit breaker, fuses).
② MMC = Manual motor controller
③ Type E self-protected combination controller is the combination of a Type E self-protected device with a contactor.

Catalog Number Selection

Combination Motor Controllers

XT SC 012 B B M A

Designation
XT = ***XT*** IEC power control

Type	
SC	= Manual motor controller—FVNR
SR	= Manual motor controller—FVR
FC	= Combination motor controller, UL 508 Type F and Type E—FVNR
FR	= Combination motor controller, UL 508 Type F and Type E—FVR

Rated Current of MMP	
Frame B	**Frame D**
P16 = 0.16A	**016** = 16A
P25 = 0.25A	**025** = 25A
P40 = 0.40A	**032** = 32A
P63 = 0.63A	**040** = 40A
001 = 1A	**050** = 50A
1P6 = 1.6A	**058** = 58A
2P5 = 2.5A	**063** = 63A
004 = 4A	
6P3 = 6.3A	
010 = 10A	
012 = 12A	
016 = 16A	
020 = 20A	
025 = 25A	
032 = 32A	

Frame Size—Contactor
B = 45 mm, 7 to 15A
C = 45 mm, 18 to 32A
D = 55 mm, 40 to 65A

Frame Size—MMP
B = 45 mm, 0.1 to 32A
D = 55 mm, 16 to 63A

Connector Type
Blank = XTPAXTPCB
M = XTPAXEMCB (only non-reversing)

Coil Voltage	
A	= 110V 50 Hz, 120V 60 Hz
B	= 220V 50 Hz, 240V 60 Hz
C	= 415V 50 Hz, 480V 60 Hz
D	= 600V 60 Hz
E	= 208V 50 Hz
F	= 230V 50 Hz
G	= 190V 50 Hz, 220V 60 Hz
H	= 240V 50 Hz, 277V 60 Hz
L	= 380V 50 Hz, 440V 60 Hz
N	= 400V 50 Hz
P	= 380V 60 Hz
R	= 12V 50/60 Hz
T	= 24V 50/60 Hz
W	= 42V 50 Hz, 48V 60 Hz
Y	= 48V 50 Hz
AD	= 120 Vdc
BD	= 220 Vdc
RD	= 12 Vdc
TD	= 24 Vdc
WD	= 48 Vdc

Product Selection

XTSC and XTSR Manual Motor Controllers (MMC)/Starter Combinations

Frame B MMP + Frame B Contactor





Factory-Assembled Manual Motor Controller—Frame B MMP + Frame B Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number ③	Reversing Catalog Number
0.1–0.16	3.2	—	—	—	0.06	**XTSCP16BB_**	**XTSRP16BB_**
0.16–0.25	3.5	—	0.06	0.06	0.12	**XTSCP25BB_**	**XTSRP25BB_**
0.25–0.4	5.6	0.06	0.09	0.12	0.18	**XTSCP40BB_**	**XTSRP40BB_**
0.4–0.63	8.82	0.09	0.18	0.25	0.25	**XTSCP63BB_**	**XTSRP63BB_**
0.63–1	14	0.12	0.25	0.37	0.55	**XTSC001BB_**	**XTSR001BB_**
1–1.6	22.4	0.25	0.55	0.75	1.1	**XTSC1P6BB_**	**XTSR1P6BB_**
1.6–2.5	35	0.37	0.75	1.1	1.5	**XTSC2P5BB_**	**XTSR2P5BB_**
2.5–4	56	0.75	1.5	2.2	3	**XTSC004BB_**	**XTSR004BB_**
4–6.3	88.2	1.1	2.2	3	4	**XTSC6P3BB_**	**XTSR6P3BB_**
6.3–10	140	2.2	4	4	7.5	**XTSC010BB_**	**XTSR010BB_**
8–12	168	3	5.5	5.5	11	**XTSC012BB_**	**XTSR012BB_**
10–16	224	4	7.5	9	12.5	**XTSC016BB_**	—

Notes

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

③ "M" prior to (_) coil suffix will be assembled with standard connector XTPAXEMCB, non-reversing only.

Frame B MMP + Frame B Contactor



Factory-Assembled Motor Protective Device with Thermal and Magnetic Trip + Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	500V	660–690V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
0.1–0.16	3.2	③	③	1/2	1/2	**XTSCP16BB_**	**XTSRP16BB_**
0.16–0.25	3.5	③	③	1/2	1/2	**XTSCP25BB_**	**XTSRP25BB_**
0.25–0.4	5.6	③	③	1/2	1/2	**XTSCP40BB_**	**XTSRP40BB_**
0.4–0.63	8.82	③	③	1/2	1/2	**XTSCP63BB_**	**XTSRP63BB_**
0.63–1	14	③	③	1/2	1/2	**XTSC001BB_**	**XTSR001BB_**
1–1.6	22.4	③	③	3/4	1	**XTSC1P6BB_**	**XTSR1P6BB_**
1.6–2.5	35	1/2	1/2	1	1-1/2	**XTSC2P5BB_**	**XTSR2P5BB_**
2.5–4	56	1	1	2	3	**XTSC004BB_**	**XTSR004BB_**
4–6.3	88.2	1-1/2	1-1/2	3	5	**XTSC6P3BB_**	**XTSR6P3BB_**
6.3–10	140	3	3	7-1/2	7.5	**XTSC010BB_**	**XTSR010BB_**
8–12	168	3	3	7-1/2	7.5	**XTSC012BB_**	**XTSR012BB_**
10–16	224	3	3	10	7.5	**XTSC016BB_**	—

Frame B MMP + Frame C Contactor



Factory-Assembled Manual Motor Controller—Frame B MMP + Frame C Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase 200V	240V	480V	600V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	3	3	10	10	**XTSC016BC_**	**XTSR016BC_**
16–20	280	5	5	10	15	**XTSC020BC_**	**XTSR020BC_**
20–25	350	5	7-1/2	15	20	**XTSC025BC_**	**XTSR025BC_**
25–32	448	7-1/2	10	20	25	**XTSC032BC_**	**XTSR032BC_**

Frame B MMP + Frame C Contactor



Factory-Assembled Manual Motor Controller—Frame B MMP + Frame C Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	500V	660–690V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	4	7.5	9	12.5	**XTSC016BC_**	**XTSR016BC_**
16–20	280	5.5	9	12.5	15	**XTSC020BC_**	**XTSR020BC_**
20–25	350	5.5	11	15	22	**XTSC025BC_**	**XTSR025BC_**
25–32	448	7.5	15	22	30	**XTSC032BC_**	**XTSR032BC_**

Notes

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

③ In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

Frame D MMP + Frame C Contactor



Factory-Assembled Manual Motor Controller—Frame D MMP + Frame C Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	3	5	10	15	**XTSC016DC_**	**XTSR016DC_**
16–25	350	5	7-1/2	15	20	**XTSC025DC_**	**XTSR025DC_**
25–32	448	7-1/2	10	20	30	**XTSC032DC_**	**XTSR032DC_**

Frame D MMP + Frame C Contactor



Factory-Assembled Manual Motor Controller—Frame D MMP + Frame C Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase				Assembled Manual Motor Controller ②	
		220–240V	380–415V	500V	660–690V	Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	4	7.5	9	12.5	**XTSC016DC_**	**XTSR016DC_**
16–25	350	5.5	12.5	12.5	22	**XTSC025DC_**	**XTSR025DC_**
25–32	448	7.5	15	17.5	22	**XTSC032DC_**	**XTSR032DC_**

Frame D MMP + Frame D Contactor



Factory-Assembled Manual Motor Controller—Frame D MMP + Frame D Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number	Reversing Catalog Number
32–40	560	10	15	30	30	**XTSC040DD_**	**XTSR040DD_**
40–50	700	15	15	30	—	**XTSC050DD_**	**XTSR050DD_**
50–58	812	15	15	40	—	**XTSC058DD_**	**XTSR058DD_**
55–65	882	15	15	40	—	**XTSC063DD_**	**XTSR063DD_**

Notes

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

Frame D MMP + Frame D Contactor



Factory-Assembled Manual Motor Controller—Frame D MMP + Frame D Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase 220–240V	380–415V	500V	660–690V	Assembled Manual Motor Controller ② Non-Reversing Catalog Number	Reversing Catalog Number
32–40	560	11	20	22	30	**XTSC040DD_**	**XTSR040DD_**
40–50	700	14	25	30	45	**XTSC050DD_**	**XTSR050DD_**
50–58	812	17	30	37	55	**XTSC058DD_**	**XTSR058DD_**
55–65	882	18.5	34	37	55	**XTSC063DD_**	**XTSR063DD_**

AC and DC Coil Suffixes

Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
Frame B Contactors				**Frame C and D Contactors**			
110V 50 Hz, 120V 60 Hz	**A**	380V 50 Hz, 440V 60 Hz	**L**	110V 50 Hz, 120V 60 Hz	**A**	380V 50 Hz, 440V 60 Hz	**L**
220V 50 Hz, 240V 60 Hz	**B**	400V 50 Hz	**N**	220V 50 Hz, 240V 60 Hz	**B**	400V 50 Hz	**N**
230V 50 Hz	**F**	380V 60 Hz	**P**	230V 50 Hz	**F**	380V 60 Hz	**P**
24V 50/60 Hz	**T**	12V 50/60 Hz	**R**	24V 50/60 Hz	**T**	12V 50/60 Hz	**R**
24 Vdc	**TD** ③	42V 50 Hz, 48V 60 Hz	**W**	24–27 Vdc	**TD** ③	42V 50 Hz, 48V 60 Hz	**W**
415V 50 Hz, 480V 60 Hz	**C**	48V 50 Hz	**Y**	415V 50 Hz, 480V 60 Hz	**C**	48V 50 Hz	**Y**
600V 60 Hz	**D**	120 Vdc	**AD** ③	550V 50 Hz, 600V 60 Hz	**D**	110–130 Vdc	**AD** ③
208V 60 Hz	**E**	220 Vdc	**BD** ③	208V 60 Hz	**E**	200–240 Vdc	**BD** ③
190V 50 Hz, 220V 60 Hz	**G**	12 Vdc	**RD** ③	190V 50 Hz, 220V 60 Hz	**G**	12–14 Vdc	**RD** ③
240V 50 Hz, 277V 60 Hz	**H**	48 Vdc	**WD** ③	240V 50 Hz, 277V 60 Hz	**H**	48–60 Vdc	**WD** ③

Notes

The assembled manual motor controller (MMC) consists of an XTPR manual motor protector (MMP) and an XTCE contactor. For Frame B MMP + Frame B contactor assemblies, the XTSC and XTSR can be mounted directly on DIN rail without an adapter. The contactors are supported mechanically with a mechanical connection element (included in XTPAXTPCB, XTPAXRPCRB). For MMCs using a Frame C or Frame D contactor, the assembly is mounted via a DIN rail adapter plate (XTPAXTPCPC, XTPAXTPCPD) and the electrical connection is made with electrical contact modules (XTPAXECMC, XTPAXECMD), both included in XTPAXTPCC and XTPAXTPCD.

Service Factor (SF)—Setting Ir of current scale in dependence of load factor:

SF = 1.15 → $I_r = 1 \times I_{n\ mot}$

SF = 1 → $I_r = 0.9 \times I_{n\ mot}$

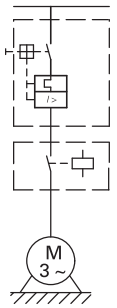
Single-phasing sensitivity to IEC/EN 60947-4-1, VDE 0660 Part 102.

① Select manual motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

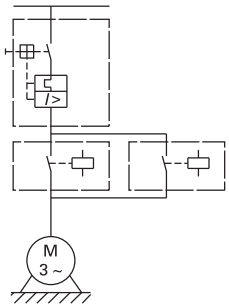
② Underscore (_) indicates magnetic coil suffix required. See AC and DC coil suffixes above.

③ With DC operation: Integrated diode-resistor combination, coil rating 2.6W.

Non-Reversing Manual Motor Controller Power Circuit



Reversing Manual Motor Controller Power Circuit



XTFC and XTFR Combination Motor Controllers (CMC), UL 508 Type F

1

Frame B MMP + Two Frame B Contactors



Factory-Assembled Type F Combination Motor Controller—Frame B MMP + Frame B Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number	Reversing Catalog Number
0.16–0.25	3.5	③	③	1/2	1/2	**XTFCP25BB_**	**XTFRP25BB_**
0.25–0.4	5.6	③	③	1/2	1/2	**XTFCP40BB_**	**XTFRP40BB_**
0.4–0.63	8.82	③	③	1/2	1/2	**XTFCP63BB_**	**XTFRP63BB_**
0.63–1	14	③	③	1/2	1/2	**XTFC001BB_**	**XTFR001BB_**
1–1.6	22.4	③	③	3/4	1	**XTFC1P6BB_**	**XTFR1P6BB_**
1.6–2.5	35	1/2	1/2	1	1-1/2	**XTFC2P5BB_**	**XTFR2P5BB_**
2.5–4	56	1	1	2	3	**XTFC004BB_**	**XTFR004BB_**
4–6.3	88.2	1-1/2	1-1/2	3	5	**XTFC6P3BB_**	**XTFR6P3BB_**
6.3–10	140	3	3	7-1/2	7.5	**XTFC010BB_**	**XTFR010BB_**
8–12	168	3	3	7-1/2	—	**XTFC012BB_**	**XTFR012BB_**
10–16	224	3	5	10	—	**XTFC016BB_**	—

Factory-Assembled Type F Combination Motor Controller—Frame B MMP + Frame B Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase				Assembled Manual Motor Controller ②	
		220–240V	380–415V	500V	660–690V	Non-Reversing Catalog Number	Reversing Catalog Number
0.1–0.16	2.2	—	—	—	0.06	**XTFCP16BB_**	**XTFRP16BB_**
0.16–0.25	3.5	—	0.06	0.06	0.12	**XTFCP25BB_**	**XTFRP25BB_**
0.25–0.4	5.6	0.06	0.09	0.12	0.18	**XTFCP40BB_**	**XTFRP40BB_**
0.4–0.63	8.82	0.09	0.18	0.25	0.25	**XTFCP63BB_**	**XTFRP63BB_**
0.63–1	14	0.12	0.25	0.37	0.55	**XTFC001BB_**	**XTFR001BB_**
1–1.6	22.4	0.25	0.55	0.75	1.1	**XTFC1P6BB_**	**XTFR1P6BB_**
1.6–2.5	35	0.37	0.75	1.1	1.5	**XTFC2P5BB_**	**XTFR2P5BB_**
2.5–4	56	0.75	1.5	2.2	3	**XTFC004BB_**	**XTFR004BB_**
4–6.3	88.2	1.1	2.2	3	4	**XTFC6P3BB_**	**XTFR6P3BB_**
6.3–10	140	2.2	4	4	7.5	**XTFC010BB_**	**XTFR010BB_**
8–12	168	3	5.5	5.5	11	**XTFC012BB_**	**XTFR012BB_**
10–16	224	4	7.5	9	12.5	**XTFC016BB_**	—

Notes

① Select combination motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

③ In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

Factory-Assembled Type F Combination Motor Controller—Frame B MMP + Frame C Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number ③	Reversing Catalog Number
10–16	224	3	5	10	—	XTFC016BC_	XTFR016BC_
16–20	280	5	5	—	—	XTFC020BC_	XTFR020BC_
20–25	350	5	7-1/2	15	—	XTFC025BC_	XTFR025BC_
25–32	448	7-1/2	10	20	—	XTFC032BC_	XTFR032BC_

Factory-Assembled Type F Combination Motor Controller—Frame B MMP + Frame C Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase				Assembled Manual Motor Controller ②	
		220–240V	380–415V	500V	660–690V	Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	4	7.5	9	12.5	XTFC016BC_	XTFR016BC_
16–20	280	5.5	9	12.5	15	XTFC020BC_	XTFR020BC_
20–25	350	5.5	11	15	22	XTFC025BC_	XTFR025BC_
25–32	448	7.5	15	22	30	XTFC032BC_	XTFR032BC_

Factory-Assembled Type F Combination Motor Controller—Frame D MMP + Frame C Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number ③	Reversing Catalog Number
10–16	224	3	5	10	10	XTFC016DC_	XTFR016DC_
16–25	350	5	7-1/2	15	20	XTFC025DC_	XTFR025DC_
25–32	448	7-1/2	10	25	30	XTFC032DC_	XTFR032DC_

Factory-Assembled Type F Combination Motor Controller—Frame D MMP + Frame C Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase				Assembled Manual Motor Controller ②	
		220–240V	380–415V	500V	660–690V	Non-Reversing Catalog Number	Reversing Catalog Number
10–16	224	4	7.5	9	12.5	XTFC016DC_	XTFR016DC_
16–25	350	5.5	12.5	12.5	22	XTFC025DC_	XTFR025DC_
25–32	448	7.5	15	17.5	22	XTFC032DC_	XTFR032DC_

Notes

① Select combination motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

Factory-Assembled Type F Combination Motor Controller—Frame D MMP + Frame D Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number ③	Reversing Catalog Number
32–40	560	10	15	30	30	**XTFC040DD_**	**XTFR040DD_**
40–50	700	10	15	30	—	**XTFC050DD_**	**XTFR050DD_**
50–58	812	15	15	40	—	**XTFC058DD_**	**XTFR058DD_**
55–65	882	15	15	40	—	**XTFC063DD_**	**XTFR063DD_**

Factory-Assembled Type F Combination Motor Controller—Frame D MMP + Frame D Contactor Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase				Assembled Manual Motor Controller ②	
		220–240V	380–415V	500V	660–690V	Non-Reversing Catalog Number	Reversing Catalog Number
32–40	560	11	20	22	30	**XTFC040DD_**	**XTFR040DD_**
40–50	700	14	25	30	45	**XTFC050DD_**	**XTFR050DD_**
50–58	812	17	30	37	55	**XTFC058DD_**	**XTFR058DD_**
55–65	882	18.5	34	37	55	**XTFC063DD_**	**XTFR063DD_**

Notes

① Select combination motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

XTFC and XTFR Combination Motor Controllers (CMC), UL 508 Type E

Frame B MMP + Two Frame B Contactors



Factory-Assembled Type E Combination Motor Controller—Frame B MMP + Frame B Contactor—Maximum UL Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum hp Rating—P (hp) UL 508/CSA C22.2 No. 14 Three-Phase				Assembled Manual Motor Controller ②	
		200V	240V	480V	600V	Non-Reversing Catalog Number	Reversing Catalog Number
0.16–0.25	3.5	③	③	1/2	1/2	**XTFCP25BB_**	**XTFRP25BB_**
0.25–0.4	5.6	③	③	1/2	1/2	**XTFCP40BB_**	**XTFRP40BB_**
0.4–0.63	8.82	③	③	1/2	1/2	**XTFCP63BB_**	**XTFRP63BB_**
0.63–1	14	③	③	1/2	1/2	**XTFC001BB_**	**XTFR001BB_**
1–1.6	22.4	③	③	3/4	1	**XTFC1P6BB_**	**XTFR1P6BB_**
1.6–2.5	35	1/2	1/2	1	1-1/2	**XTFC2P5BB_**	**XTFR2P5BB_**
2.5–4	56	1	1	2	3	**XTFC004BB_**	**XTFR004BB_**

Factory-Assembled Type E Combination Motor Controller—Frame B MMP + Frame B Contactor—Maximum IEC Ratings ①

FLA Adjustment Range/Overload Release—I_r (Amps)	Short-Circuit Release—I_{rm} (Amps)	Maximum Motor Ratings Maximum kW Rating AC-3—P (kW) Three-Phase				Assembled Manual Motor Controller ②	
		220–240V	380–415V	500V	660–690V	Non-Reversing Catalog Number	Reversing Catalog Number
0.1–0.16	2.2	—	—	—	0.06	**XTFCP16BB_**	**XTFRP16BB_**
0.16–0.25	3.5	—	0.06	0.06	0.12	**XTFCP25BB_**	**XTFRP25BB_**
0.25–0.4	5.6	0.06	0.09	0.12	0.18	**XTFCP40BB_**	**XTFRP40BB_**
0.4–0.63	8.82	0.09	0.18	0.25	0.25	**XTFCP63BB_**	**XTFRP63BB_**
0.63–1	14	0.12	0.25	0.37	0.55	**XTFC001BB_**	**XTFR001BB_**
1–1.6	22.4	0.25	0.55	0.75	1.1	**XTFC1P6BB_**	**XTFR1P6BB_**
1.6–2.5	35	0.37	0.75	1.1	1.5	**XTFC2P5BB_**	**XTFR2P5BB_**
2.5–4	56	0.75	1.5	2.2	3	**XTFC004BB_**	**XTFR004BB_**

Notes

① Select combination motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198**.

Factory-Assembled Type E Combination Motor Controller—Frame B MMP + Frame C Contactor—Maximum UL Ratings ①

FLA Adjustment	Short-Circuit Release—I_{rm} (Amps)	Max. Motor hp Rating ① 200V	230V	460V	575V	Compact 2 Component Combination Motor Controller Catalog Number ②	Catalog Number ②
4–6.3	88.2	1.5	1.5	3.0	50	**XTFC6P3BC_**	**XTFR6P3BC_**
6.3–10	140	3.0	3.0	7.5	7.5	**XTFC010BC_**	**XTFR010BC_**
8–12	168	3.0	3.0	7.5	—	**XTFC012BC_**	**XTFR012BC_**
10–16	224	3.0	5.0	10.0	—	**XTFC016BC_**	**XTFR016BC_**

Factory-Assembled Type E Combination Motor Controller—Frame B MMP + Frame C Contactor—Maximum IEC Ratings ①

FLA Adjustment	Short-Circuit Release—I_{rm} (Amps)	Max. Motor kW Rating ① 200V	230V	460V	575V	Compact 2 Component Combination Motor Controller Catalog Number ②	Catalog Number ②
4–6.3	88.2	1.1	2.2	3.0	4.0	**XTFC6P3BC_**	**XTFR6P3BC_**
6.3–10	140	2.2	4.0	4.0	7.5	**XTFC010BC_**	**XTFR010BC_**
8–12	168	3.0	5.5	5.5	11.0	**XTFC012BC_**	**XTFR012BC_**
10–16	224	4.0	7.5	9.0	12.5	**XTFC016BC_**	**XTFR016BC_**

Factory-Assembled Type E Combination Motor Controller—Frame D MMP + Frame D Contactor—Maximum UL Ratings ①

FLA Adjustment	Short-Circuit Release—I_{rm} (Amps)	Max. Motor hp Rating ① 200V	230V	460V	575V	Compact 2 Component Combination Motor Controller Catalog Number ②	Catalog Number ②
10–16	224	3.0	5.0	10.0	10.0	**XTFC016DD_**	**XTFR016DD_**
16–25	350	5.0	7.5	15.0	20.0	**XTFC025DD_**	**XTFR025DD_**
25–32	448	7.5	10.0	25.0	20.0	**XTFC032DD_**	**XTFR032DD_**
32–40	560	11.0	20.0	22.0	30.0	**XTFC040DD_**	**XTFR040DD_**
40–50	700	14.0	25.0	30.0	45.0	**XTFC050DD_**	**XTFR050DD_**
50–58	812	17.0	30.0	37.0	55.0	**XTFC058DD_**	**XTFR058DD_**

Factory-Assembled Type E Combination Motor Controller—Frame D MMP + Frame D Contactor—Maximum IEC Ratings ①

FLA Adjustment	Short-Circuit Release—I_{rm} (Amps)	Max. Motor kW Rating ① 200V	230V	460V	575V	Compact 2 Component Combination Motor Controller Catalog Number ②	Catalog Number ②
10–16	224	4.0	7.5	9.0	12.5	**XTFC016DD_**	**XTFR016DD_**
16–25	350	5.5	12.5	12.5	22.0	**XTFC025DD_**	**XTFR025DD_**
25–32	448	7.5	15.0	17.5	22.0	**XTFC032DD_**	**XTFR032DD_**
32–40	560	10.0	15.0	30.0	30.0	**XTFC040DD_**	**XTFR040DD_**
40–50	700	10.0	15.0	30.0	—	**XTFC050DD_**	**XTFR050DD_**
50–58	812	15.0	15.0	40.0	—	**XTFC058DD_**	**XTFR058DD_**

Notes

① Select combination motor controllers by full load amperes. Maximum motor ratings (kW, hp) are for reference only.

② Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

③ In this range, calculate motor rating according to rated current. Specified values to NEC 430.6(A)(1).

1

AC and DC Coil Suffixes

Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
Frame B Contactors				**Frame C and D Contactors**			
110V 50 Hz, 120V 60 Hz	**A**	380V 50 Hz, 440V 60 Hz	**L**	110V 50 Hz, 120V 60 Hz	**A**	380V 50 Hz, 440V 60 Hz	**L**
220V 50 Hz, 240V 60 Hz	**B**	400V 50 Hz	**N**	220V 50 Hz, 240V 60 Hz	**B**	400V 50 Hz	**N**
230V 50 Hz	**F**	380V 60 Hz	**P**	230V 50 Hz	**F**	380V 60 Hz	**P**
24V 50/60 Hz	**T**	12V 50/60 Hz	**R**	24V 50/60 Hz	**T**	12V 50/60 Hz	**R**
24 Vdc	**TD** ①	42V 50 Hz, 48V 60 Hz	**W**	24–27 Vdc	**TD** ①	42V 50 Hz, 48V 60 Hz	**W**
415V 50 Hz, 480V 60 Hz	**C**	48V 50 Hz	**Y**	415V 50 Hz, 480V 60 Hz	**C**	48V 50 Hz	**Y**
600V 60 Hz	**D**	120 Vdc	**AD** ①	550V 50 Hz, 600V 60 Hz	**D**	110–130 Vdc	**AD** ①
208V 60 Hz	**E**	220 Vdc	**BD** ①	208V 60 Hz	**E**	200–240 Vdc	**BD** ①
190V 50 Hz, 220V 60 Hz	**G**	12 Vdc	**RD** ①	190V 50 Hz, 220V 60 Hz	**G**	12–14 Vdc	**RD** ①
240V 50 Hz, 277V 60 Hz	**H**	48 Vdc	**WD** ①	240V 50 Hz, 277V 60 Hz	**H**	48–60 Vdc	**WD** ①

Notes

The assembled manual motor controller (MMC) consists of an XTPR manual motor protector (MMP) and an XTCE contactor. For Frame B MMP + Frame B contactor assemblies, the XTSC and XTSR can be mounted directly on DIN rail without an adapter. The contactors are supported mechanically with a mechanical connection element (included in XTPAXTPCB, XTPAXRPCRB). For 16A and above, the assembly is mounted via a DIN rail adapter plate (XTPAXTPCPC, XTPAXTPCPD) and the electrical connection is made with electrical contact modules (XTPAXECMC, XTPAXECMD), both included in XTPAXTPCC and XTPAXTPCD.

Service Factor (SF)—Setting I_r of current scale in dependence of load factor:

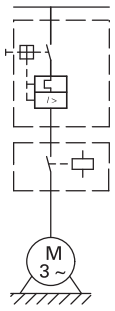
SF = 1.15 → $I_r = 1 \times I_{n\ mot}$

SF = 1 → $I_r = 0.9 \times I_{n\ mot}$

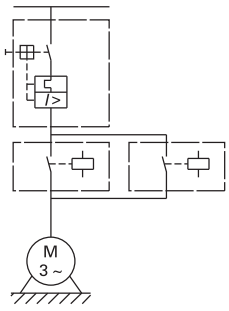
Single-phasing sensitivity to IEC/EN 60947-4-1, VDE 0660 Part 102.

① With DC operation: Integrated diode-resistor combination, coil rating 2.6W.

XTFC Manual Motor Controller



XTFR Manual Motor Controller



Accessories

Line Side Adapters

Line side adapters are required for use with XTPR MMPs only when used as Type E self-protected manual combination starters or as part of XTFC or XTFR Type F combination motor controllers. Not required for group installation.

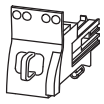
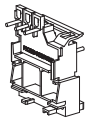
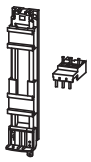
Line-Side Adapters ②

	For Use with…	Catalog Number
XTPAXLSA 	Frame B XTPR to create a UL 508 Type E/F manual combination starter	**XTPAXLSA**
XTPAXIP2X 	Reduced size Frame D XTPR to create a UL 508 Type E/F manual combination starter (not to be used with 3-phase commoning links)	**XTPAXIP2X**
XTPAXLSAD 	Frame D XTPR to create a UL 508 Type E/F manual combination starter	**XTPAXLSAD** ④

Combination Connection Kits

Combination connection kits include the necessary components to field assemble a manual motor controller with an MMP (XTPR) and contactor (XTCE).

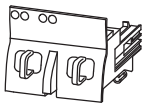
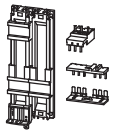
Non-Reversing Starters

	For Use with …	Description/Composed of …	Std. Pack ①	Catalog Number
XTPAXTPCB 	XTPR…B + XTCE…B	Mechanical connection element for XTPR…B and contactor	1	**XTPAXTPCB**
		Main current wiring between XTPR…B and contactor in toolless plug connection	1	
		Cable guidance	1	
		Use as contactor auxiliary switch XTCEXFAT_. Control cable guidance: max. six cables up to 2.5 mm^2 external diameter or four cables up to 3.5 mm^2 external diameter		
XTPAXEMC_ 	XTPR…B + XTCE…B	Mechanical and electrical connection for XTPR…B and contactor	5	**XTPAXEMCB**
	XTPR…B + XTCE…C		5	**XTPAXEMCC**
XTPAXTPCD 	XTPR…D + XTCE…D	DIN rail adapter plate Main current wiring between XTPR and contactor	1	**XTPAXTPCD**

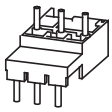
Note

① Orders must be placed in multiples of package quantity listed.

Reversing Starters

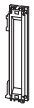
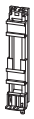
For Use with …	Description/Composed of …	Std. Pack ①	Catalog Number
XTPAXTPCRB 			
XTPR…B + XTCE…B01_	Mechanical connection element for XTPR…B and contactor	1	**XTPAXTPCRB**
	Reversing starter main current wiring in toolless plug connection	1	
	Control cables for electrical interlocking in toolless plug connection— K1M: A1–K2M: 21, K1M: 21–K2M: A1, K1M: A2–K2M: A2	1	
	Cable guidance	1	
	Use as contactor auxiliary switch XTCEXFAT_. Control cable guidance: max. six cables up to 2.5 mm^2 external diameter or four cables up to 3.5 mm^2 external diameter.		
XTPAXTPCRC 			
XTPR…B + XTCE…C	DIN rail adapter plate	1	**XTPAXTPCRC**
	Reversing starter main current wiring	1	

Electric Contact Module

XTPAXEC_ 

For Use with …	Description/Composed of …	Std. Pack ①	Catalog Number
XTPR…B + XTCE…C	Main current wiring between XTPR…B and contactor	5	**XTPAXECMC**
	Use only in combination with busbar adapter		
XTPR…D + XTCE…D	Main current wiring between XTPR…D and contactor	5	**XTPAXECMD**
	Use only in combination with busbar adapter		

DIN Rail Adapter Plates

For Use with …	Description/Composed of …	Std. Pack ①	Catalog Number
XTPAXTPCPB 			
XTPAXTPCB XTPAXTPCRB	45 mm wide adapter plate with one DIN rail	4	**XTPAXTPCPB**
	Connection element for side-by-side positioning of further plates		
XTPAXTPCRPB 			
XTPR…B + XTCE…C XTPAXECMC	45 mm wide adapter plate with one DIN rail	4	**XTPAXTPCRPB**
	Connection element for side-by-side positioning of further plates		
XTPAXTPCPD 			
XTPAXECMD XTPR…D + XTCE…C XTPR…D + XTCE…D	55 mm wide adapter plate with two DIN rails	4	**XTPAXTPCPD**
	Connection cams for further plates	4	
	For use with reversing and star-delta starters		

Lateral Module

For Use with …	Description/Composed of …	Std. Pack ①	Catalog Number
—	Can be grouped on the DIN rail adapter	10	**XTPAXLM**
	Expansion of the mounting width by 9 mm		

Connection Element

For Use with …	Description/Composed of …	Std. Pack ①	Catalog Number
—	For connection of several DIN rail adapters	50	**XTPAXCNE**

Note

① Orders must be placed in multiples of package quantity listed.

Technical Data and Specifications

XTSC Non-Reversing Manual Motor Controllers (MMC)—Component Bill of Material

Factory Assembled Manual Motor Protector + Contactor

Assembled Manual Motor Controller ①	FLA Adjustment Range/Overload Release—I_r (Amps)	Component Catalog Numbers			
		Manual Motor Protector	Combination Connection Kit	Contactor ①	Manual Motor Protector Auxiliary Contact
XTSC Frame B MMP + Frame B Contactor					
XTSCP16BB_	0.1–0.16	XTPRP16BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSCP25BB_	0.16–0.25	XTPRP25BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSCP40BB_	0.25–0.4	XTPRP40BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSCP63BB_	0.4–0.63	XTPRP63BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSC001BB_	0.63–1	XTPR001BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSC1P6BB_	1–1.6	XTPR1P6BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSC2P5BB_	1.6–2.5	XTPR2P5BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSC004BB_	2.5–4	XTPR004BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSC6P3BB_	4–6.3	XTPR6P3BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTSC010BB_	6.3–10	XTPR010BC1	XTPAXTPCB	XTCE009B10_	XTPAXFA11
XTSC012BB_	8–12	XTPR012BC1	XTPAXTPCB	XTCE012B10_	XTPAXFA11
XTSC016BB_	10–16	XTPR016BC1	XTPAXTPCB	XTCE015B10_	XTPAXFA11
XTSC Frame B MMP + Frame C Contactor					
XTSC020BC_	16–20	XTPR020BC1	XTPAXTPCC	XTCE025C10_	XTPAXFA11
XTSC025BC_	20–25	XTPR025BC1	XTPAXTPCC	XTCE025C10_	XTPAXFA11
XTSC032BC_	25–32	XTPR032BC1	XTPAXTPCC	XTCE032C10_	XTPAXFA11
XTSC Frame D MMP + Frame C Contactor					
XTSC016DC_	10–16	XTPR016DC1	②	XTCE018C10_	XTPAXFA1
XTSC025DC_	16–25	XTPR025DC1	②	XTCE025C10_	XTPAXFA11
XTSC032DC_	25–32	XTPR032DC1	②	XTCE032C10_	XTPAXFA11
XTSC Frame D MMP + Frame D Contactor					
XTSC040DD_	32–40	XTPR040DC1	XTPAXTPCD ③	XTCE040D00_	XTPAXFA11
XTSC050DD_	40–50	XTPR050DC1	XTPAXTPCD ③	XTCE050D00_	XTPAXFA11
XTSC058DD_	50–58	XTPR058DC1	XTPAXTPCD ③	XTCE065D00_	XTPAXFA11
XTSC063DD_	55–65	XTPR063DC1	XTPAXTPCD ③	XTCE065D00_	XTPAXFA11

Notes

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

② The connection between the XTPR…DC1 and the XTCE…C_ contactor will be made with flexible wire and mounted to the DIN rail adapter plate (XTPAXTPCPD).

③ The reversing connection between the XTPR…DC1 and the (2) XTCE…C_ contactors will be accomplished by using the non-reversing combination connection kit (XTPAXTPCD), Frame D reversing link kit (XTCEXRLD), additional DIN rail adapter plate (XTPAXTPCPD) and DIN adapter connection element (XTPAXCNE).

1

XTSR Reversing Manual Motor Controllers (MMC)—Component Bill of Material

Factory Assembled Manual Motor Protector + Contactor

Assembled Manual Motor Controller ①	FLA Adjustment Range/Overload Release—I_r (Amps)	Component Catalog Numbers			
		Manual Motor Protector	Combination Connection Kit	Contactor ①	Manual Motor Protector Auxiliary Contact
XTSR Frame B MMP + Frame B Contactor					
XTSRP16BB_	0.1–0.16	XTPRP16BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSRP25BB_	0.16–0.25	XTPRP25BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSRP40BB_	0.25–0.4	XTPRP40BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSRP63BB_	0.4–0.63	XTPRP63BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSR001BB_	0.63–1	XTPR001BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSR1P6BB_	1–1.6	XTPR1P6BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSR2P5BB_	1.6–2.5	XTPR2P5BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSR004BB_	2.5–4	XTPR004BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSR6P3BB_	4–6.3	XTPR6P3BC1	XTPAXTPCRB	(2) XTCE007B01_	XTPAXFA11
XTSR010BB_	6.3–10	XTPR010BC1	XTPAXTPCRB	(2) XTCE009B01_	XTPAXFA11
XTSR012BB_	8–12	XTPR012BC1	XTPAXTPCRB	(2) XTCE012B01_	XTPAXFA11
XTSR Frame B MMP + Frame C Contactor					
XTSR016BC_	10–16	XTPR016BC1	XTPAXTPCRC	(2) XTCE018C01	XTPAXFA11
XTSR020BC_	16–20	XTPR020BC1	XTPAXTPCRC	(2) XTCE025C01_	XTPAXFA11
XTSR025BC_	20–25	XTPR025BC1	XTPAXTPCRC	(2) XTCE025C01_	XTPAXFA11
XTSR032BC_	25–32	XTPR032BC1	XTPAXTPCRC	(2) XTCE032C01_	XTPAXFA11
XTSR Frame D MMP + Frame C Contactor					
XTSR016DC_	10–16	XTPR016DC1	②	(2) XTCE018C01	XTPAXFA11
XTSR025DC_	16–25	XTPR025DC1	②	(2) XTCE025C01_	XTPAXFA11
XTSR032DC_	25–32	XTPR032DC1	②	(2) XTCE032C01_	XTPAXFA11
XTSR Frame D MMP + Frame D Contactor					
XTSR040DD_	32–40	XTPR040DC1	③	(2) XTCE040D00_	XTPAXFA11
XTSR050DD_	40–50	XTPR050DC1	③	(2) XTCE050D00_	XTPAXFA11
XTSR058DD_	50–58	XTPR058DC1	③	(2) XTCE065D00_	XTPAXFA11
XTSR063DD_	55–65	XTPR063DC1	③	(2) XTCE065D00_	XTPAXFA11

Notes

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

② The connection between the XTPR…DC1 and the XTCE…C_ contactor will be made with flexible wire and mounted to the DIN rail adapter plate (XTPAXTPCPD).

③ The reversing connection between the XTPR…DC1 and the (2) XTCE…C_ contactors will be accomplished by using the non-reversing combination connection kit (XTPAXTPCD), Frame D reversing link kit (XTCEXRLD), additional DIN rail adapter plate (XTPAXTPCPD) and DIN adapter connection element (XTPAXCNE).

XTFC Non-Reversing Combination Motor Controllers—Component Bill of Material

Factory Assembled Manual Motor Protector + Contactor + Line Side Adapter

Assembled Combination Motor Controller ①	FLA Adjustment Range/ Overload Release—I_r (Amps)	Component Catalog Numbers				
		Line Side Adapter	Manual Motor Protector	Combination Connection Kit	Contactor ①	Manual Motor Protector Auxiliary Contact
XTFC Frame B MMP + Frame B Contactor						
XTFCP16BB_ ②	0.1–0.16	XTPAXLSA	XTPRP16BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFCP25BB_ ②	0.16–0.25	XTPAXLSA	XTPRP25BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFCP40BB_ ②	0.25–0.4	XTPAXLSA	XTPRP40BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFCP63BB_ ②	0.4–0.63	XTPAXLSA	XTPRP63BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFC001BB_ ②	0.63–1	XTPAXLS	XTPR001BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFC1P6BB_ ②	1–1.6	XTPAXLSA	XTPR1P6BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFC2P5BB_ ②	1.6–2.5	XTPAXLSA	XTPR2P5BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFC004BB_ ②	2.5–4	XTPAXLSA	XTPR004BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFC6P3BB_	4–6.3	XTPAXLSA	XTPR6P3BC1	XTPAXTPCB	XTCE007B10_	XTPAXFA11
XTFC010BB_	6.3–10	XTPAXLSA	XTPR010BC1	XTPAXTPCB	XTCE009B10_	XTPAXFA11
XTFC012BB_	8–12	XTPAXLSA	XTPR012BC1	XTPAXTPCB	XTCE012B10_	XTPAXFA11
XTFC016BB_	10–16	XTPAXLSA	XTPR016BC1	XTPAXTPCB	XTCE015B10_	XTPAXFA11
XTFC Frame B MMP + Frame C Contactor						
XTFC6P3BC_ ②	4–6.3	XTPAXLSA	XTPR6P3BC1	XTPAXTPCC	XTCE018C10_	XTPAXFA11
XTFC010BC_ ②	6.3–10	XTPAXLSA	XTPR010BC1	XTPAXTPCC	XTCE018C10_	XTPAXFA11
XTFC012BC_ ②	8–12	XTPAXLSA	XTPR012BC1	XTPAXTPCC	XTCE018C10_	XTPAXFA11
XTFC016BC_ ②	10–16	XTPAXLSA	XTPR016BC1	XTPAXTPCC	XTCE018C10_	XTPAXFA11
XTFC020BC_	16–20	XTPAXLSA	XTPR020BC1	XTPAXTPCC	XTCE025C10_	XTPAXFA11
XTFC025BC_	20–25	XTPAXLSA	XTPR025BC1	XTPAXTPCC	XTCE025C10_	XTPAXFA11
XTFC032BC_	25–32	XTPAXLSA	XTPR032BC1	XTPAXTPCC	XTCE032C10_	XTPAXFA11
XTFC Frame D MMP + Frame C Contactor						
XTFC016DC_	10–16	XTPAXLSAD	XTPR016DC1	③	XTCE018C10_	XTPAXFA11
XTFC025DC_	16–25	XTPAXLSAD	XTPR025DC1	③	XTCE025C10_	XTPAXFA11
XTFC032DC_	25–32	XTPAXLSAD	XTPR032DC1	③	XTCE032C10_	XTPAXFA11
XTFC Frame D MMP + Frame D Contactor						
XTFC016DD_ ②	10–16	XTPAXLSAD	XTPR016DC1	XTPAXTPCD	XTCE040D00_	XTPAXFA11
XTFC025DD_ ②	16–20	XTPAXLSAD	XTPR025DC1	XTPAXTPCD	XTCE040D00_	XTPAXFA11
XTFC032DD_ ②	20–25	XTPAXLSAD	XTPR032DC1	XTPAXTPCD	XTCE040D00_	XTPAXFA11
XTFC040DD_ ②	32–40	XTPAXLSAD	XTPR040DC1	XTPAXTPCD ④	XTCE040D00_	XTPAXFA11
XTFC050DD_ ②	40–50	XTPAXLSAD	XTPR050DC1	XTPAXTPCD ④	XTCE050D00_	XTPAXFA11
XTFC058DD_ ②	50–58	XTPAXLSAD	XTPR058DC1	XTPAXTPCD ④	XTCE065D00_	XTPAXFA11
XTFC063DD_	55–65	XTPAXLSAD	XTPR063DC1	XTPAXTPCD ④	XTCE065D00_	XTPAXFA11

Notes

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

② Indicates Type E with contactor UL 508 combination. Not all XTFC part numbers feature UL 508 Type E with contactor combinations.

③ The connection between the XTPR…DC1 and the XTCE…C_ contactor will be made with flexible wire and mounted to the DIN rail adapter plate (XTPAXTPCPD).

④ The reversing connection between the XTPR…DC1 and the (2) XTCE…C_ contactors will be accomplished by using the non-reversing combination connection kit (XTPAXTPCD), Frame D reversing link kit (XTCEXRLD), additional DIN rail adapter plate (XTPAXTPCPD) and DIN adapter connection element (XTPAXCNE).

Note: Type E UL 508 combinations can be assembled in the field and DO NOT require the manual motor protector auxiliary contact XTPAXFA11. The connection can also be wired and does not require use of the XT connector.

1

XTFR Reversing Combination Motor Controllers—Component Bill of Material

Factory Assembled Manual Motor Protector + Contactor + Line Side Adapter

Assembled Combination Motor Controller ①	FLA Adjustment Range/ Overload Release—I_r (Amps)	Component Catalog Numbers				
		Line Side Adapter	Manual Motor Protector	Combination Connection Kit	Contactor ①	Manual Motor Protector Auxiliary Contact
XTFR Frame B MMP + Frame B Contactor						
XTFRP16BB_ ②	0.1–0.16	XTPAXLSA	XTPRP16BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFRP25BB_ ②	0.16–0.25	XTPAXLSA	XTPRP25BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFRP40BB_ ②	0.25–0.4	XTPAXLSA	XTPRP40BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFRP63BB_ ②	0.4–0.63	XTPAXLSA	XTPRP63BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFR001BB_ ②	0.63–1	XTPAXLSA	XTPR001BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFR1P6BB_ ②	1–1.6	XTPAXLSA	XTPR1P6BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFR2P5BB_ ②	1.6–2.5	XTPAXLSA	XTPR2P5BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFR004BB_ ②	2.5–4	XTPAXLSA	XTPR004BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFR6P3BB_	4–6.3	XTPAXLSA	XTPR6P3BC1	XTPAXTPCRB	XTCE007B01_ ③	XTPAXFA11
XTFR010BB_	6.3–10	XTPAXLSA	XTPR010BC	XTPAXTPCRB	XTCE009B01_ ③	XTPAXFA11
XTFR012BB_	8–12	XTPAXLSA	XTPR012BC1	XTPAXTPCRB	XTCE012B01_ ③	XTPAXFA11
XTFR Frame B MMP + Frame C Contactor						
XTFR6P3BC_ ②	4–6.3	XTPAXLSA	XTPR6P3BC1	XTPAXTPCRC	XTCE018C10_ ③	XTPAXFA11
XTFR010BC_ ②	6.3–10	XTPAXLSA	XTPR103BC1	XTPAXTPCRC	XTCE018C10_ ③	XTPAXFA11
XTFR012BC_ ②	8–12	XTPAXLSA	XTPR123BC1	XTPAXTPCRC	XTCE018C10_ ③	XTPAXFA11
XTFR016BC_ ②	10–16	XTPAXLSA	XTPR016BC1	XTPAXTPCRC	XTCE018C01_ ③	XTPAXFA11
XTFR020BC_	16–20	XTPAXLSA	XTPR020BC1	XTPAXTPCRC	XTCE025C01_ ③	XTPAXFA11
XTFR025BC_	20–25	XTPAXLSA	XTPR025BC1	XTPAXTPCRC	XTCE025C01_ ③	XTPAXFA11
XTFR032BC_	25–32	XTPAXLSA	XTPR032BC1	XTPAXTPCRC	XTCE032C01_ ③	XTPAXFA11
XTFR Frame D MMP + Frame C Contactor						
XTFR016DC_	10–16	XTPAXLSAD	XTPR016DC1	③	XTCE018C01_ ③	XTPAXFA11
XTFR025DC_	16–25	XTPAXLSAD	XTPR025DC1	③	XTCE025C01_ ③	XTPAXFA11
XTFR032DC_	25–32	XTPAXLSAD	XTPR032DC1	③	XTCE032C01_ ③	XTPAXFA11
XTFR Frame D MMP + Frame D Contactor						
XTFR016DD_ ②	10–16	XTPAXLSAD	XTPR016DC1	③	XTCE040D00_ ③	XTPAXFA11
XTFR025DD_ ②	16–25	XTPAXLSAD	XTPR025DC1	③	XTCE040D00_ ③	XTPAXFA11
XTFR026DD_ ②	25–32	XTPAXLSAD	XTPR032DC1	③	XTCE040D00_ ③	XTPAXFA11
XTFR040DD_ ②	32–40	XTPAXLSAD	XTPR040DC1	④	XTCE040D00_ ③	XTPAXFA11
XTFR050DD_ ②	40–50	XTPAXLSAD	XTPR050DC1	④	XTCE050D00_ ③	XTPAXFA11
XTFR058DD_ ②	50–58	XTPAXLSAD	XTPR058DC1	④	XTCE065D00_ ③	XTPAXFA11
XTFR063DD_	55–65	XTPAXLSAD	XTPR063DC1	④	XTCE065D00_ ③	XTPAXFA11

Notes

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

② Indicates Type E with contactor UL 508 combination. Not all XTFR part numbers feature UL 508 Type E with contactor combinations.

③ The connection between the XTPR…DC1 and the XTCE…C_ contactor will be made with flexible wire and mounted to the DIN rail adapter plate (XTPAXTPCPD).

④ The reversing connection between the XTPR…DC1 and the (2) XTCE…C_ contactors will be accomplished by using the non-reversing combination connection kit (XTPAXTPCD), Frame D reversing link kit (XTCEXRLD), additional DIN rail adapter plate (XTPAXTPCPD) and DIN adapter connection element (XTPAXCNE).

Note: Type E UL 508 combinations can be assembled in the field and DO NOT require the manual motor protector auxiliary contact XTPAXFA11. The connection can also be wired and does not require use of the XT connector.

Manual Motor Controllers Short-Circuit Ratings for UL/CSA Group Installations

XTSC and XTSR Manual Motor Controllers (MMC)

Assembled Controller ①		FLA Adjustment Range/Overload Release— I_r (Amps)	Short-Circuit Release— I_{rm} (Amps)	Group Installation, UL/CSA Max. rms Symmetrical Short-Circuit Ratings (kA/kA with Current Limiter)			Maximum Upstream Protective Device (A/A with Current Limiter)	
Non-Reversing	Reversing			240V	480Y/277V	600Y/347V	Maximum Fuse 600V	Maximum Circuit Breaker 600V
XTSC and XTSR Frame B MMP + Frame B Contactor								
XTSCP16BB_	XTSRP16BB_	0.1–0.16	2.2	65	65	50	600	600
XTSCP25BB_	XTSRP25BB_	0.16–0.25	3.5	65	65	50	600	600
XTSCP40BB_	XTSRP40BB_	0.25–0.4	5.6	65	65	50	600	600
XTSCP63BB_	XTSRP63BB_	0.4–0.36	8.82	65	65	50	600	600
XTSC001BB_	XTSR001BB_	0.36–1	14.0	65	65	50	600	600
XTSC1P6BB_	XTSR1P6BB_	1–1.6	22.4	65	65	50	600	600
XTSC2P5BB_	XTSR2P5BB_	1.6–2.	5	35	65	65	50	600
XTSC004BB_	XTSR004BB_	2.5–4	56	65	65	50	600	600
XTSC6P3BB_	XTSR6P3BB_	4–6.3	88.2	65	65	50	600	600
XTSC010BB_	XTSR010BB_	6.3–10	140	65	65	22	10/600	15/600
XTSC012BB_	XTSR012BB_	8–12	168	65	65	22	10/600	15/600
XTSC and XTSR Frame B MMP + Frame C Contactor								
XTSC016BC_	XTSR016BC_	10–16	224	42	42	50	10/600	15/600
XTSC020BC_	XTSR020BC_	16–20	280	18	18	18	10/600	15/600
XTSC025BC_	XTSR025BC_	20–25	350	18	18	18	10/600	15/600
XTSC032BC_	XTSR032BC_	25–32	448	18	18	18	10/600	15/600
XTSC and XTSR Frame D MMP + Frame C Contactor								
XTSC016DC_	XTSR016DC_	10–16	224	65	65	22	600	600
XTSC025DC_	XTSR025DC_	16–25	350	65	65	22	600	600
XTSC032DC_	XTSR032DC_	25–32	448	65	65	22	600	600
XTSC and XTSR Frame D MMP + Frame D Contactor								
XTSC040DD_	XTSR040DD_	32–40	560	65	65	22	600	600
XTSC050DD_	XTSR050DD_	40–50	700	65	65	22	600	600
XTSC058DD_	XTSR058DD_	50–58	812	65	65	22	—	—
XTSC063DD_	XTSR063DD_	58–63	882	65	65	—	—	—

Note

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

1

Combination Motor Controllers (Line Side Adapter + Manual Motor Protector + Contactor) UL 508 Type F Self-Protected

XTFC and XTFR Combination Motor Controllers (CMC), UL 508 Type F

Assembled Controller ①				UL 508 Type F Application ②				
				Max. rms Symmetrical Short-Circuit Ratings (kA)			Maximum Upstream Protective Device (A) ②	
Non-Reversing	Reversing	FLA Adjustment Range/Overload Release— I_r (Amps)	Short-Circuit Release— I_{rm} (Amps)	240V	480Y/277V	600Y/347V	Maximum Fuse 600V	Maximum Circuit Breaker 600V
XTFC and XTFR Frame B MMP + Frame B Contactor								
XTFCP16BB_	**XTFRP16BB_**	0.1–0.16	2.2	65	65	18	Not required	Not required
XTFCP25BB_	**XTFRP25BB_**	0.16–0.25	3.5	65	65	18	Not required	Not required
XTFCP40BB_	**XTFRP40BB_**	0.25–0.4	5.6	65	65	18	Not required	Not required
XTFCP63BB_	**XTFRP40BB_**	0.4–0.63	8.82	65	65	18	Not required	Not required
XTFC001BB_	**XTFRP63BB_**	0.63–1	14	65	65	18	Not required	Not required
XTFC1P6BB_	**XTFR1P6BB_**	1–1.6	22.4	65	65	18	Not required	Not required
XTFC2P5BB_	**XTFR2P5BB_**	1.6–2.5	35	65	65	18	Not required	Not required
XTFC001BB_	**XTFR004BB_**	2.5–4.0	56	65	65	18	Not required	Not required
XTFC6P3BB_	**XTFR6P3BB_**	4.0–6.3	88.2	65	65	18	Not required	Not required
XTFC010BB_	**XTFR010BB_**	6.3–10	140	65	65	18	Not required	Not required
XTFC012BB_	**XTFR012BB_**	8–12	168	65	65	18	Not required	Not required
XTFC016BB_	—	10–16	224	18	18	—	Not required	Not required
XTFC and XTFR Frame B MMP + Frame C Contactor								
XTFC016BC_ ③	**XTFR016BC_** ③	10–16	224	18	18	—	Not required	Not required
XTFC020BC_	**XTFR020BC_**	16–20	280	18	18	—	Not required	Not required
XTFC025BC_	**XTFR025BC_**	20–25	350	18	18	—	Not required	Not required
XTFC032BC_	**XTFR032BC_**	25–32	448	18	18	—	Not required	Not required
XTFC and XTFR Frame D MMP + Frame C Contactor								
XTFC016DC_	**XTFR016DC_**	10–16	224	65	65	30	Not required	Not required
XTFC025DC_	**XTFR025DC_**	16–25	350	65	65	30	Not required	Not required
XTFC032DC_	**XTFR032DC_**	25–32	448	65	65	50	Not required	Not required
XTFC and XTFR Frame D MMP + Frame D Contactor								
XTFC040DD_	**XTFR040DD_**	32–40	560	65	65	50	Not required	Not required
XTFC050DD_	**XTFR050DD_**	40–50	700	65	65	—	Not required	Not required
XTFC058DD_	**XTFR058DD_**	50–58	812	65	65	—	Not required	Not required
XTFC063DD_	**XTFR063DD_**	55–65	882	65	65	—	Not required	Not required

Notes

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

② For UL 508 Type F applications, the combination motor controller assembly does not require a dedicated upstream protective device in the panel, thus a maximum rating is not required.

③ For 65 kA UL rating, use Type E rating with contactor.

Note: A **Type F** combination motor controller consists of a Type E manual self-protected motor controller and a magnetic motor controller.

Combination Motor Controllers Short-Circuit Ratings for UL 508 Type E Application

XTFC and XTFR Combination Motor Controllers (CMC), UL 508 Type F/Type E

Assembled Controller ①		FLA Adjustment Range/Overload Release— I_r (Amps)	Short-Circuit Release— I_{rm} (Amps)	UL 508 Type F Application Max. rms Symmetrical Short-Circuit Ratings (kA)			Maximum Upstream Protective Device (A) ②	
Non-Reversing	Reversing			240V	480Y/277V	600Y/347V	Maximum Fuse 600V	Maximum Circuit Breaker 600V
XTFC and XTFR Frame B MMP + Frame B Contactor								
XTFCP16BB_	XTFRP16BB_	0.1–0.16	2.2	65	65	—	Not required	Not required
XTFCP25BB_	XTFRP25BB_	0.16–0.25	3.5	65	65	—	Not required	Not required
XTFCP40BB_	XTFRP40BB_	0.25–0.4	5.6	65	65	—	Not required	Not required
XTFCP63BB_	XTFRP63BB_	0.4–0.63	8.82	65	65	—	Not required	Not required
XTFC001BB_	XTFR001BB_	0.63–1	14	65	65	—	Not required	Not required
XTFC1P6BB_	XTFR1P6BB_	1–1.6	22.4	65	65	—	Not required	Not required
XTFC2P5BB_	XTFR2P5BB_	1.6–2.5	35	65	65	—	Not required	Not required
XTFC004BB_	XTFR004BB_	2.5–4	56	65	65	—	Not required	Not required
XTFC and XTFR Frame B MMP + Frame C Contactor								
XTFC6P3BC_	XTFR6P3BC_	4–6.3	88.2	65	65	—	Not required	Not required
XTFC010BC_	XTFR010BC_	6.3–10	140	65	65	—	Not required	Not required
XTFC012BC_	XTFR012BC_	8–12	168	65	65	—	Not required	Not required
XTFC016BC_	XTFR016BC_	10–16	224	65	65	—	Not required	Not required
XTFC and XTFR Frame D MMP + Frame D Contactor								
XTFC016DD_	XTFR016DD_	10–16	224	65	65	—	Not required	Not required
XTFC025DD_	XTFR025DD_	16–25	350	65	65	—	Not required	Not required
XTFC032DD_	XTFR032DD_	25–32	448	65	65	—	Not required	Not required
XTFC040DD_	XTFR040DD_	32–40	560	65	65	—	Not required	Not required
XTFC050DD_	XTFR050DD_	40–50	700	65	65	—	Not required	Not required
XTFC058DD_	XTFR058DD_	50–58	812	65	65	—	Not required	Not required
XTFC063DD_	XTFR063DD_	55–65	882	65	65	—	Not required	Not required

Notes

① Underscore (_) indicates magnetic coil suffix required. See **Page V5-T1-198.**

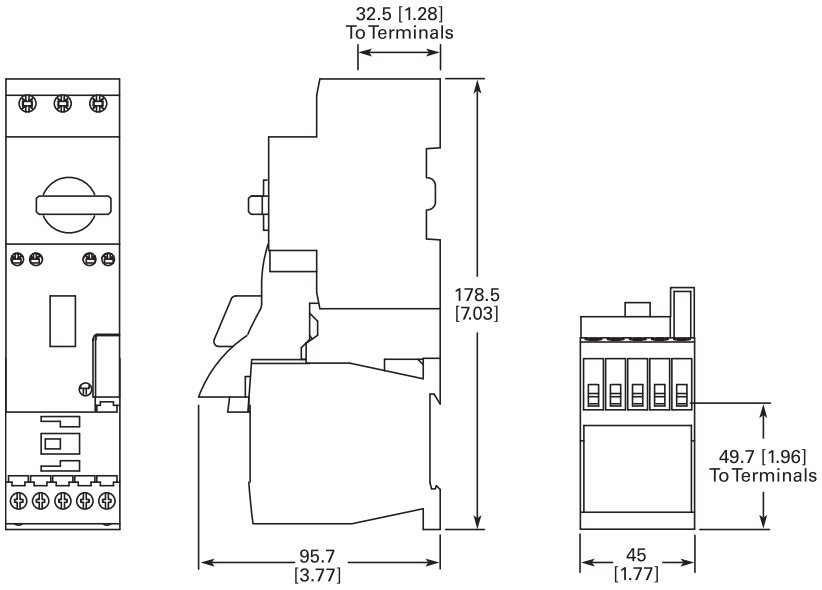
② For UL 508 Type E applications, the assembly does not require a dedicated upstream protective device in the panel, thus a maximum rating is not required.

1

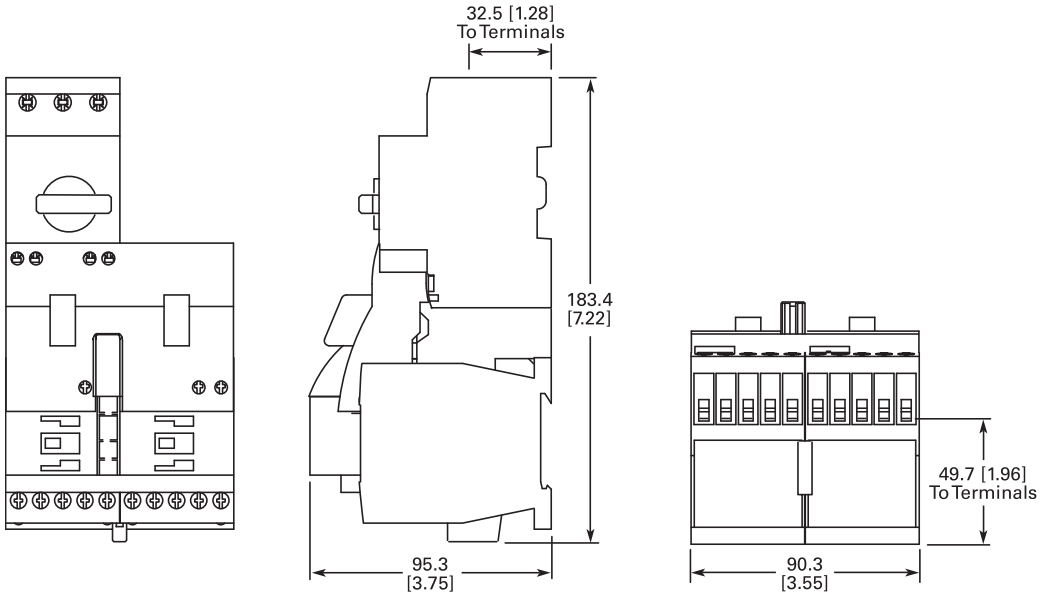
Dimensions

Approximate Dimensions in mm [in]

XTSC...BB_

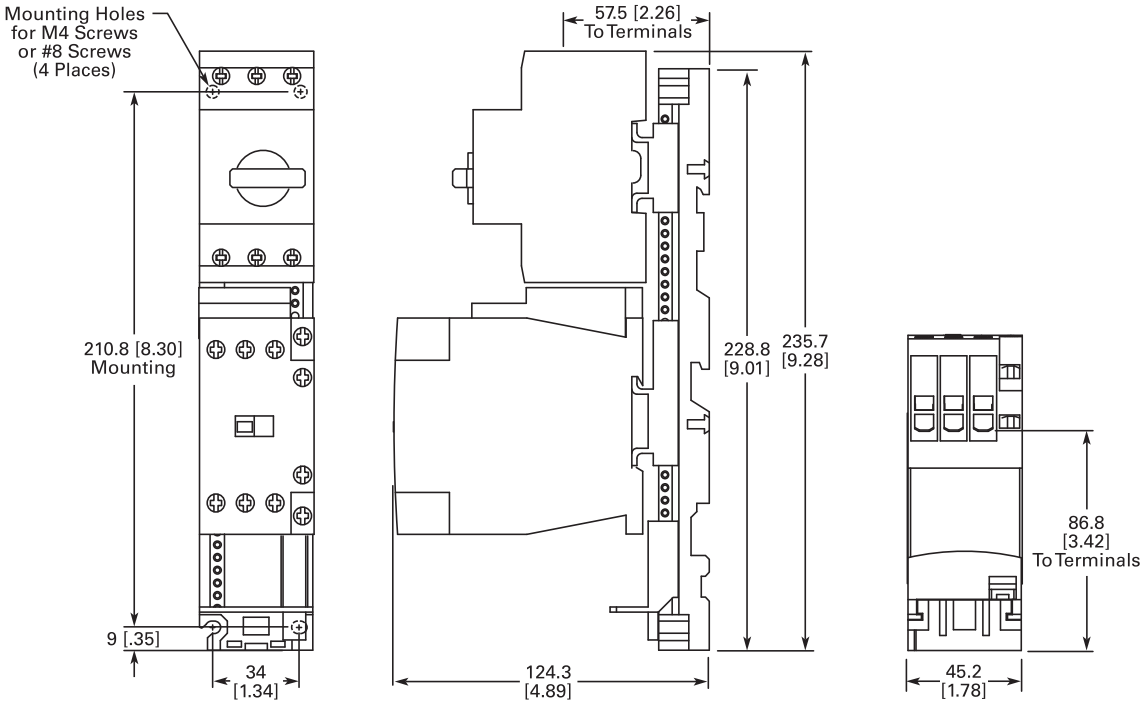


XTSR...BB_

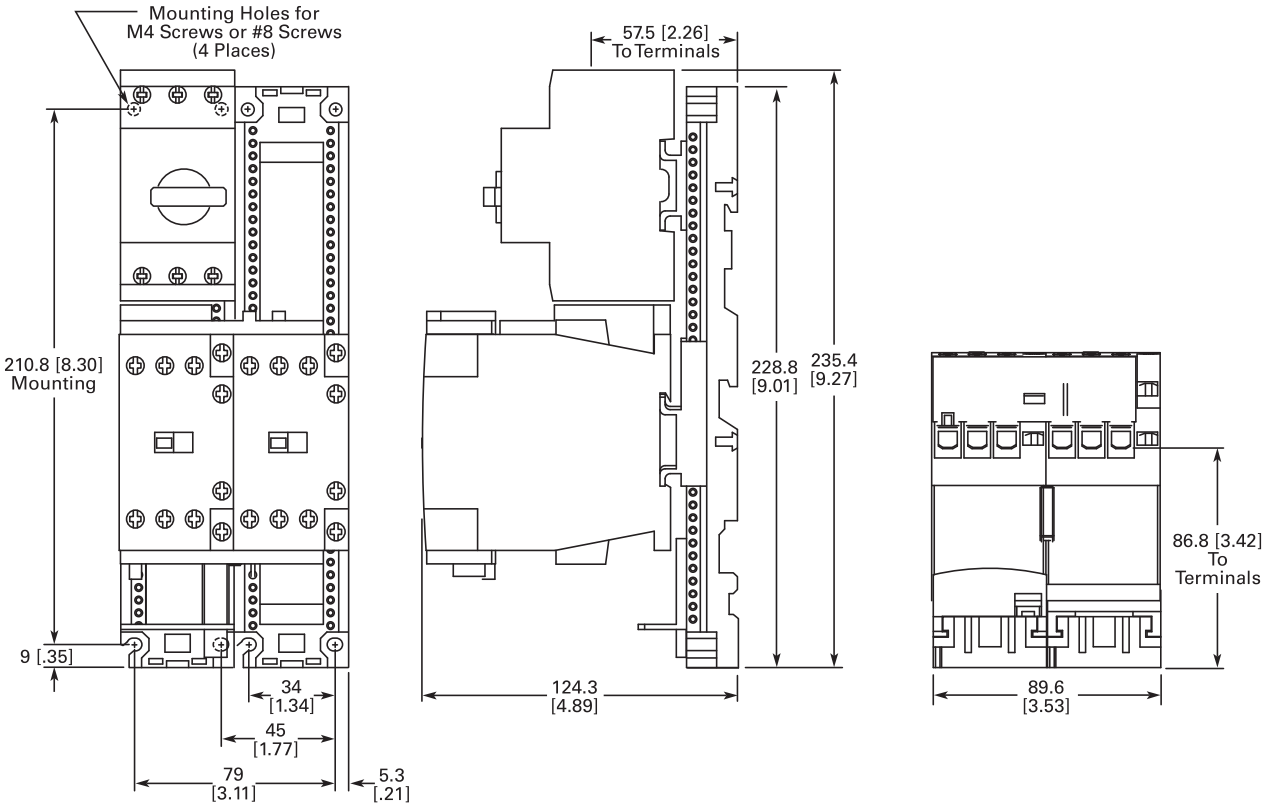


Approximate Dimensions in mm [in]

XTSC...BC_



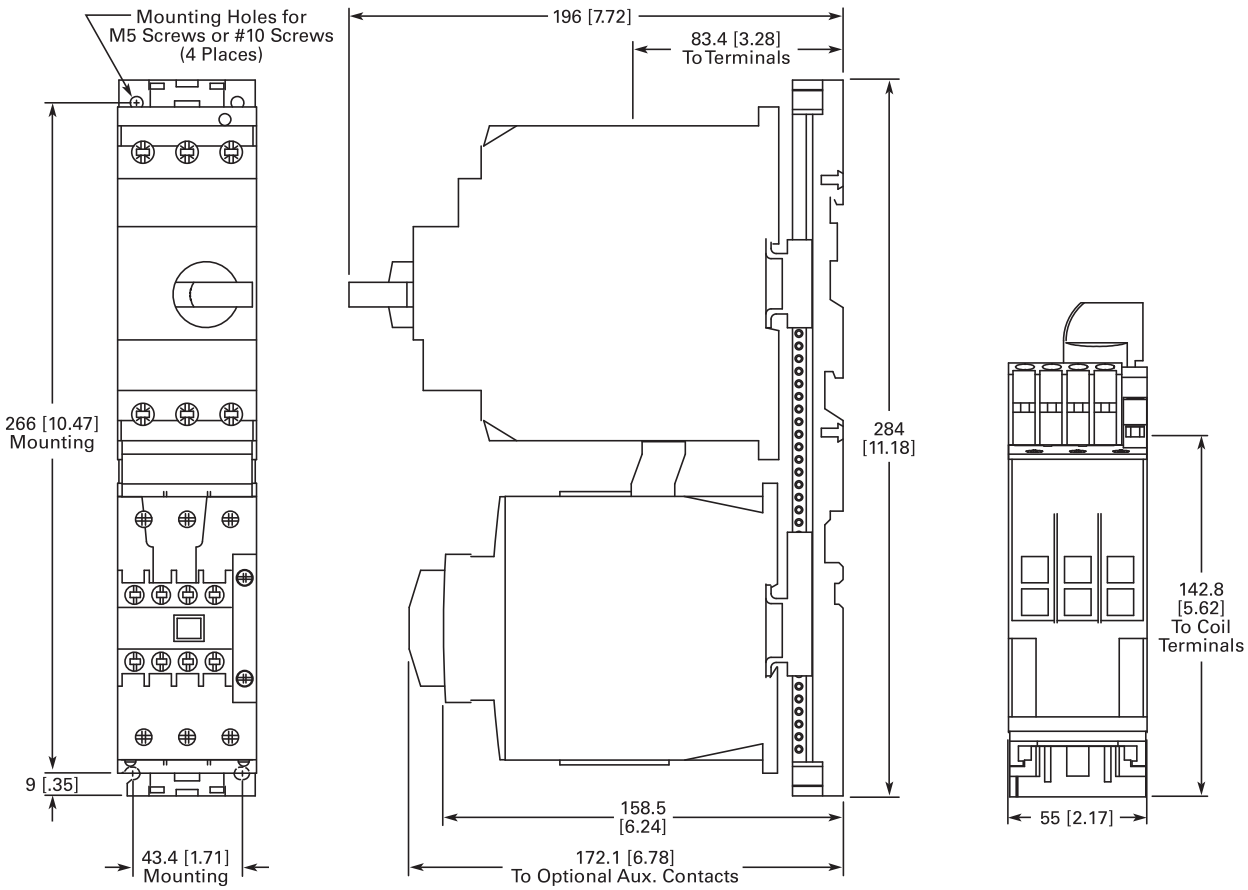
XTSR...BC_



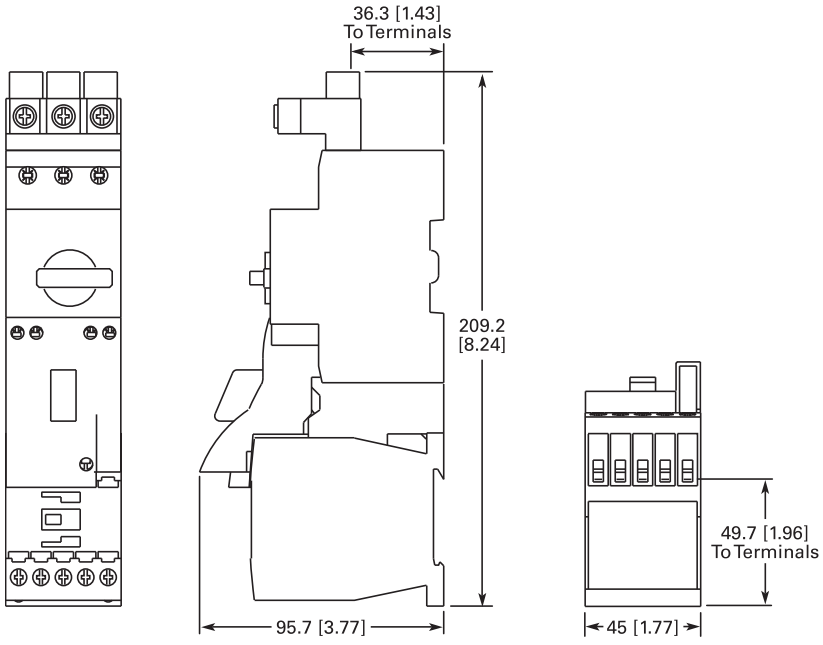
1

Approximate Dimensions in mm [in]

XTSC...DD_

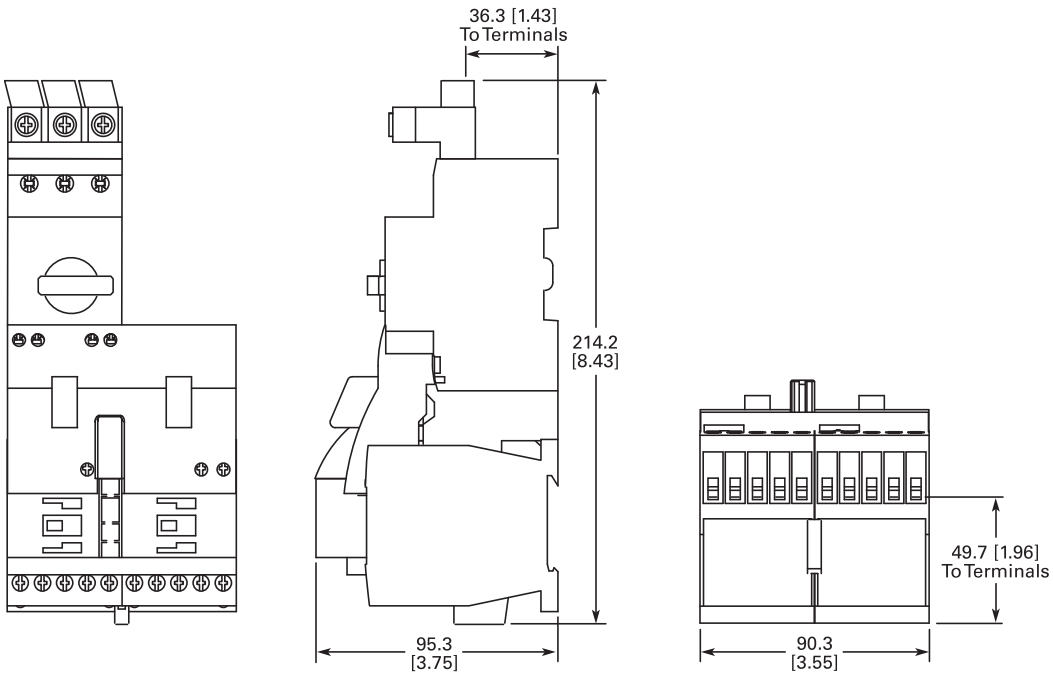


XTFC...BB_

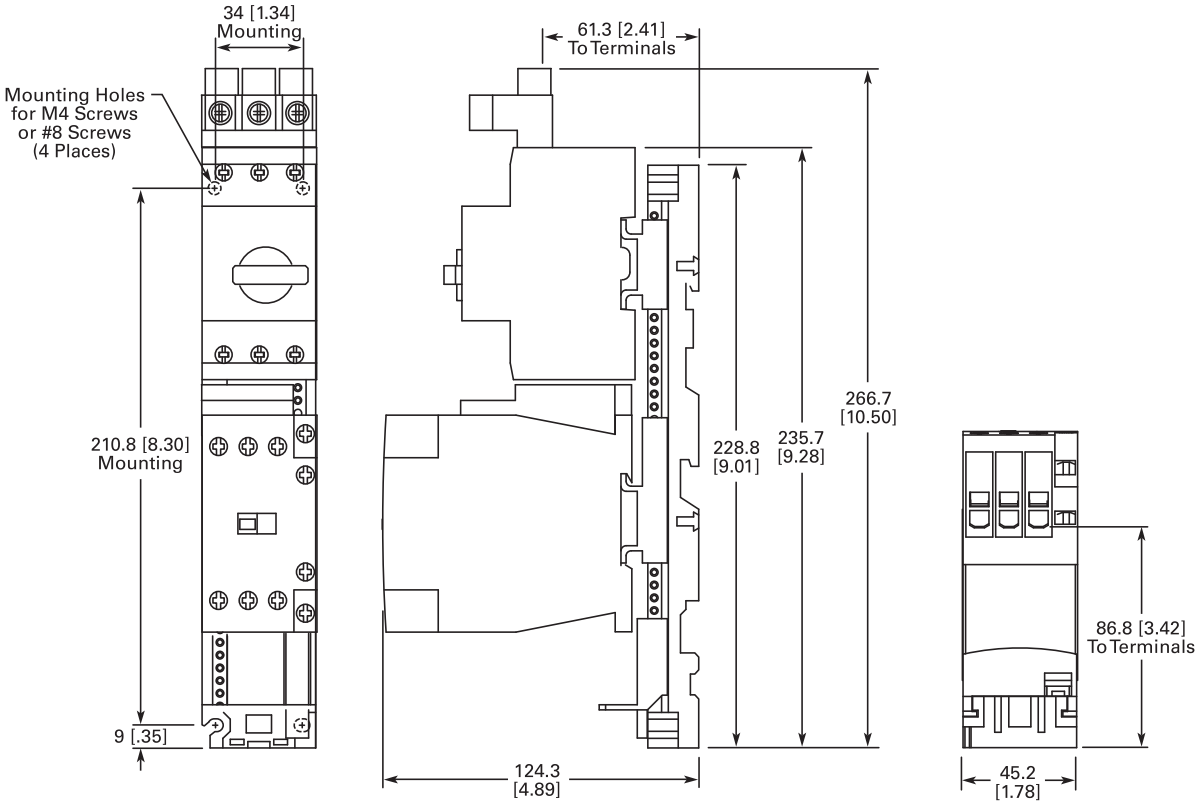


Approximate Dimensions in mm [in]

XTFR...BB_



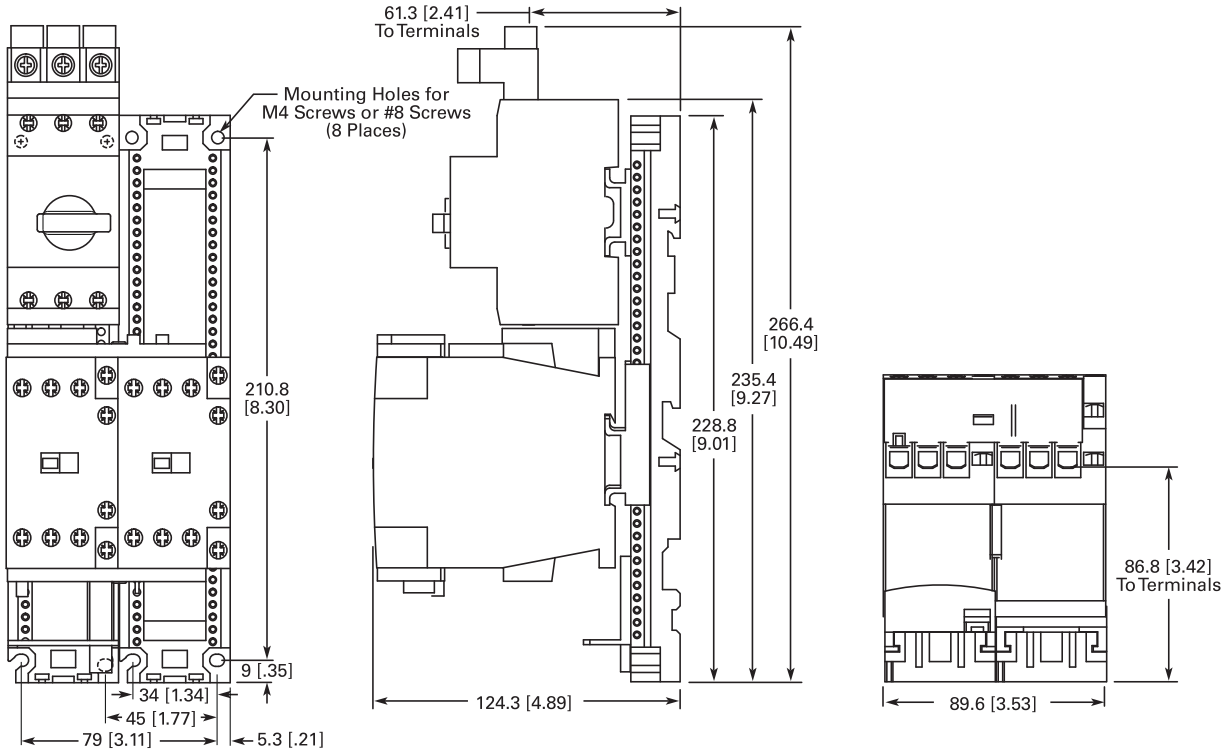
XTFC...BC_



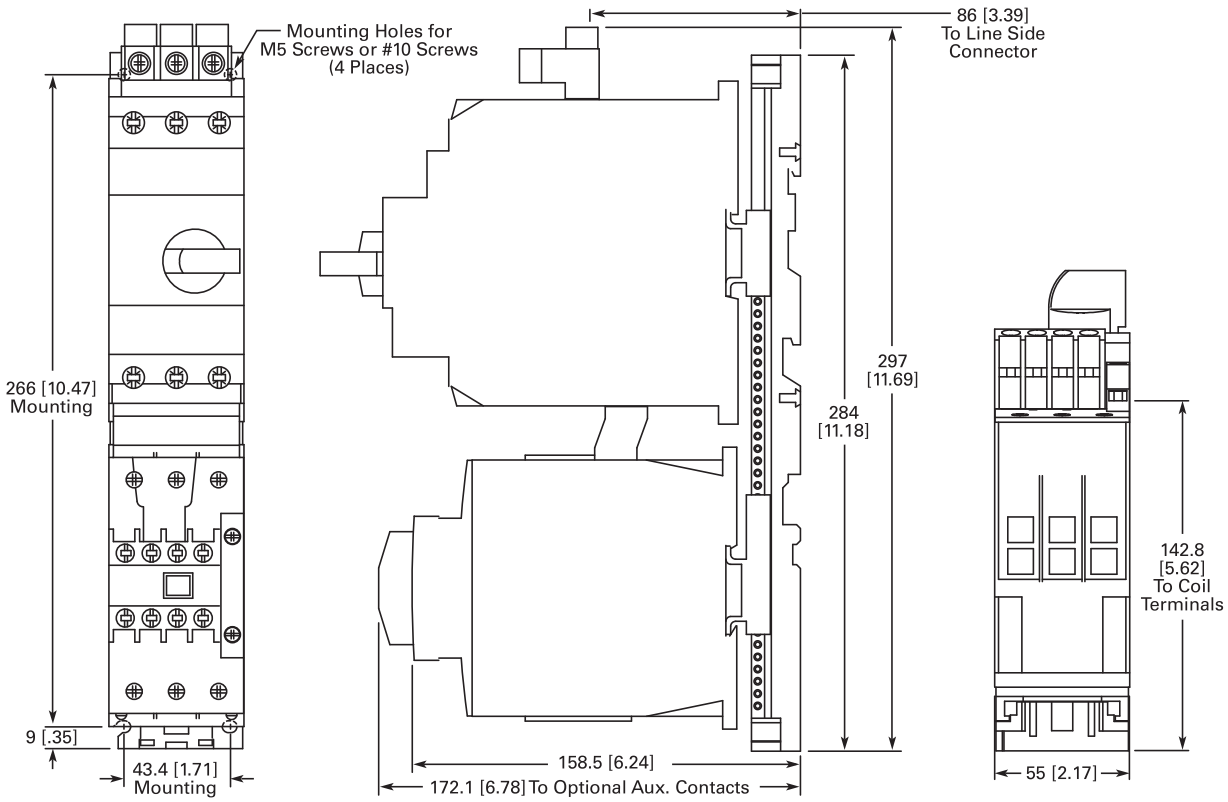
1

Approximate Dimensions in mm [in]

XTFR...BC_



XTFC...DD_



XT **Electronic Manual Motor Protector**



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
Thermal Overload Relays	**V5-T1-130**
C440/***XT*** Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	
Catalog Number Selection	**V5-T1-220**
Product Selection	**V5-T1-221**
Accessories	**V5-T1-223**
Technical Data and Specifications	**V5-T1-229**
Dimensions	**V5-T1-231**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

XT Electronic Manual Motor Protector

Product Description

The ***XT*** Electronic Manual Motor Protector provides the same functionality as the ***XT*** thermal manual motor protector, but with an added level of flexibility and selectability. The XTPE incorporates electronic control technology to enable more options and larger dial setting ranges. The trip units are interchangeable, allowing users to exchange as needed using the same base. The reduced number of part numbers decreases bill of material complexity while reducing inventory demands. The XTPE electronic manual motor protector includes the following features:

- 4:1 max to min overcurrent dial setting range
- Selectable trip class (5, 10, 15, 20)
- Interchangeable trip units
- Three base units (12, 32 and 65A)
- Common accessories with the XTPR

Features and Benefits

Advanced Trip Unit



In addition to the selectability, the XTPE is also available with an advanced trip unit that can communicate system data and protector data thru SmartWire-DT. SmartWire-DT is an innovative cost effective connection technology that enables quick installation of control wiring to the starter through a single green cable. When on SmartWire-DT, the XTPE can communicate the following:

- Current Values
  - Maximum phase current
  - Overload warning
- Diagnostics Data
  - Overload fault
  - Cause of trip (overcurrent or short circuit)
  - Phase loss
  - Trip via TEST
- Status Messages
  - Control unit type
  - Overload setting
  - Time-lag
  - Switching status

XTPE Electronic MMP



The XTPE Electronic MMP provides the selectability, control, and insight options that give panel builders and OEMs the solutions necessary to enhance motor control designs while reducing total costs.

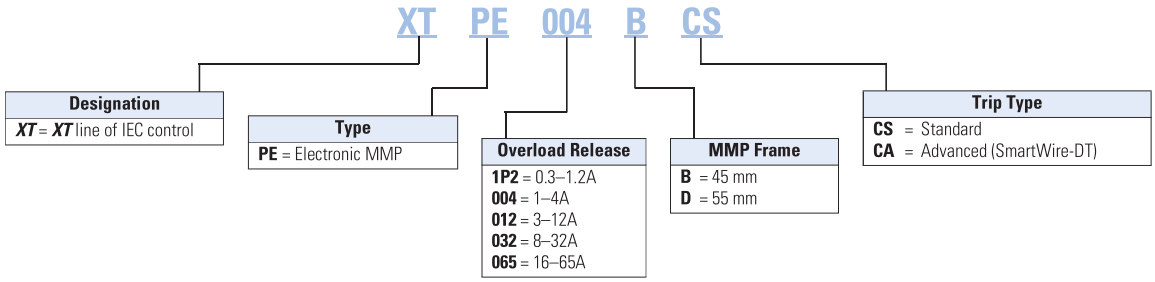
Standards and Certifications

- CE approved
- UL Listed File No. E36332
- UL 508 group motor and Type E
- IEC/EN 60947
- CSA File 012528, Class 3211-05

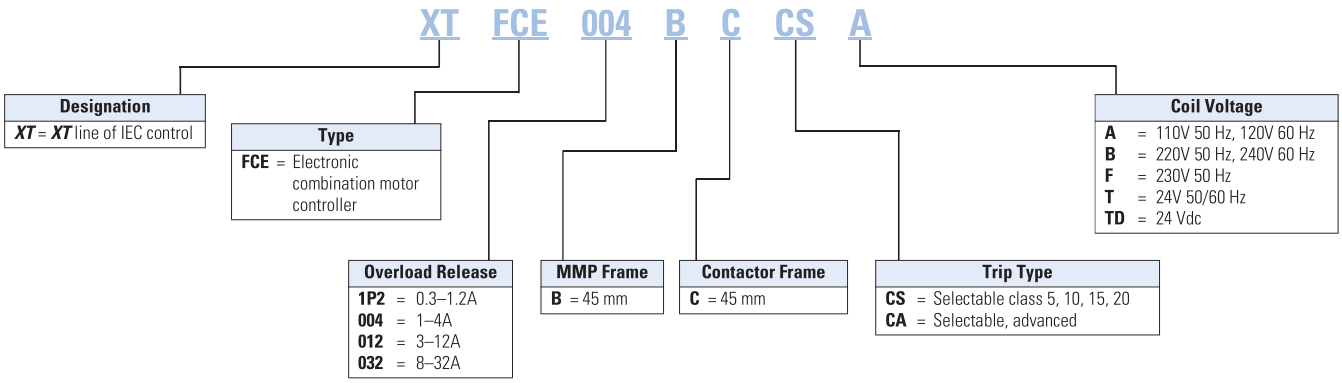
1

Catalog Number Selection

XT—Manual Motor Protector



XT—Combinations



Product Selection

XT Electronic Manual Motor Protector

B Frame



MMP Base

Maximum Amperage	UL/CSA Maximum Three-Phase hp Ratings 200V	240V	480V	600V	IEC Maximum Motor kW Ratings 220V 230V 240V	380V 400V 415V	440V	500V	600V 690V	Base Unit Type Number	Catalog Number
12	3	3	7.5	10	3	5.5	5.5	5.5	7.5	PKE12	**XTPE012B**
32	5	7.5	15	20	7.5	15	15	18.5	30	PKE32	**XTPE032B**
65	15	15	40	40	18.5	30	37	45	55	PKE65	**XTPE065D**

B Frame



MMP Trip Units

Overload Release Setting Amp Range	For Use with Base Catalog Number	UL/CSA Maximum Three-Phase hp Ratings 200V	240V	480V	600V	IEC Maximum Motor kW Ratings 220V 230V 240V	380V 400V 415V	440V	500V	600V 690V	Trip Unit Type Number	Catalog Number
0.3–1.2	XTPE012B	①	①	0.5	0.5	0.18	0.37	0.37	0.37	0.75	PKE-XTU-1,2	**XTPEXT1P2B**
1–4	XTPE012B	0.75	0.75	2	3	0.75	1.5	1.5	2.2	3	PKE-XTU-4	**XTPEXT004B**
3–12	XTPE012B XTPE032B	3	3	7.5	10	3	5.5	5.5	5.5	7.5	PKE-XTU-12	**XTPEXT012B**
8–32	XTPE032B	5	7.5	15	20	7.5	15	15	18.5	30	PKE-XTU-32	**XTPEXT032B**
8–32	XTPE065D	7.5	7.5	20	25	7.5	15	15	18.5	30	PKE-XTUW-32	**XTPEXT032D**
16–65	XTPE065D	15	15	40	40	18.5	30	37	45	55	PKE-XTU-65	**XTPEXT065D**

B Frame



MMP Advanced Trip Units Used with SmartWire-DT

Overload Release Setting Amp Range	For Use with Base Catalog Number	UL/CSA Maximum Three-Phase hp Ratings 200V	240V	480V	600V	IEC Maximum Motor kW Ratings 220V 230V 240V	380V 400V 415V	440V	500V	600V 690V	Trip Unit Type Number	Catalog Number
0.3–1.2	XTPE012B	①	①	0.5	0.5	0.18	0.37	0.37	0.37	0.75	PKE-XTUA-1,2	**XTPEXTA1P2B**
1–4	XTPE012B	0.75	0.75	2	3	0.75	1.5	1.5	2.2	3	PKE-XTUA-4	**XTPEXTA004B**
3–12	XTPE012B XTPE032B	3	3	7.5	10	3	5.5	5.5	5.5	7.5	PKE-XTUA-12	**XTPEXTA012B**
8–32	XTPE032B	5	7.5	15	20	7.5	15	15	18.5	30	PKE-XTUA-32	**XTPEXTA032B**
8–32	XTPE065D	7.5	7.5	20	25	7.5	15	15	18.5	30	PKE-XTUWA-32	**XTPEXTA032D**
16–65	XTPE065D	15	15	40	40	18.5	30	37	45	55	PKE-XTUA-65	**XTPEXTA065D**

D Frame



MMP Complete Assembly

Overload Release Setting Amp Range	UL/CSA Maximum Three-Phase hp Ratings 200V	240V	480V	600V	IEC Maximum Motor kW Ratings 220V 230V 240V	380V 400V 415V	440V	500V	600V 690V	Complete Manual Motor Protector Type Number	Catalog Number
0.3–1.2	①	①	0.5	0.5	0.18	0.37	0.37	0.37	0.75	PKE12/XTU-1,2	**XTPE1P2BCS**
1–4	0.75	0.75	2	3	0.75	1.5	1.5	2.2	3	PKE12/XTU-4	**XTPE004BCS**
3–12	3	3	7.5	10	3	5.5	5.5	5.5	7.5	PKE12/XTU-12	**XTPE012BCS**
8–32	5	7.5	15	20	7.5	15	15	18.5	30	PKE32/XTU-32	**XTPE032BCS**
8–32	7.5	7.5	20	25	7.5	15	15	18.5	30	PKE65/XTUW-32	**XTPE032DCS**
16–65	15	15	40	40	18.5	30	37	45	55	PKE65/XTU-65	**XTPE065DCS**

Note

① In this range, calculate motor rating according to rated current. Specified values to NEC 430.6 (A) (1).

B Frame



MMP Used with SmartWire-DT—Complete Assembly

Overload Release Setting Amp Range	UL/CSA Maximum Motor hp Ratings 200V	230V	460V	575V	IEC Maximum Motor kW Ratings 220V 230V 240V	380V 400V 415V	440V	500V	600V 690V	Complete Manual Motor Protector Type Number	Catalog Number
0.3–1.2	①	①	0.5	0.5	0.18	0.37	0.37	0.37	0.75	PKE12/XTUA-1,2	**XTPE1P2BCA**
1–4	0.75	0.75	2	3	0.75	1.5	1.5	2.2	3	PKE12/XTUA-4	**XTPE004BCA**
3–12	3	3	7.5	10	3	5.5	5.5	5.5	7.5	PKE12/XTUA-12	**XTPE012BCA**
8–32	5	7.5	15	20	7.5	15	15	18.5	30	PKE32/XTUA-32	**XTPE032BCA**

UL 508 Type E XT Electronic Combination Motor Controllers—Complete Assembly Including Trip Unit

B Frame



B Frame Electronic MMP with C Frame Contactor

Overload Release Setting Amp Range	UL/CSA Maximum Three-Phase hp Ratings 200V	240V	380Y/ 415V	480Y/ 277V	600Y/ 347V	Maximum Single-Phase hp Ratings 115V	200V	240V	Catalog Number Standard	Catalog Number With SmartWire-DT
0.3–1.2	①	①	①	①	0.5	①	①	①	**XTFCE1P2BCCS_** ③	**XTFCE1P2BCCATD** ③
1–4	0.75	0.75	1.5	2	—	0.125	0.25	0.33	**XTFCE004BCCS_** ④	**XTFCE004BCCATD** ④
3–12	3	3	5	7.5	—	0.5	1	1.5	**XTFCE012BCCS_** ④	**XTFCE012BCCATD** ④
8–32	5	5	10	15	—	1.5	3	3	**XTFCE032BCCS_** ④	**XTFCE032BCCATD** ④

Notes

① In this range, calculate motor rating according to rated current. Specified values to NEC 430.6 (A) (1).
② Complete the catalog number by replacing the underscore (_) with the coil suffix from **Page V5-T1-245**.
③ SCCR: 14 kA, 600 Vac
④ SCCR: 18 kA, 480 Vac

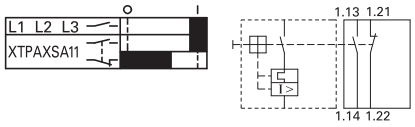
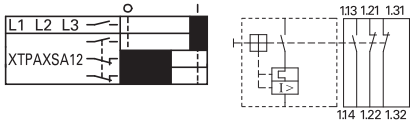
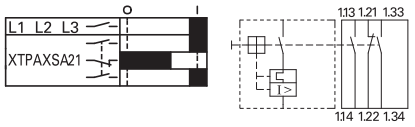
Accessories

Auxiliary Contacts

XTPAXSA_



Side-Mount Auxiliary Contacts

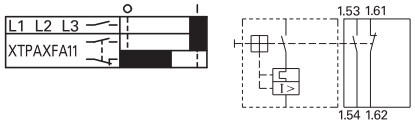
Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
1NO-1NC		5	**XTPAXSA11**
1NO-2NC		5	**XTPAXSA12**
2NO-1NC		5	**XTPAXSA21**

Can be fitted on the right side of manual motor protectors (XTPB, XTPR, XTPM) and manual transformer protectors (XTPT) and can be combined with XTPAXSATR_ and XTPAXFA_ trip indicating auxiliary contact.

XTPAXFA11



Front-Mount Auxiliary Contacts

Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
1NO-1NC		5	**XTPAXFA11**

Can be fitted to manual motor protectors (XTPB, XTPR, XTPM) and manual transformer protectors (XTPT). 45 mm (XTPR…B and XTPB) or 55 mm (XTPR…D) widths of manual motor protectors remain unchanged.

Note

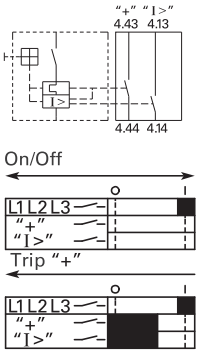
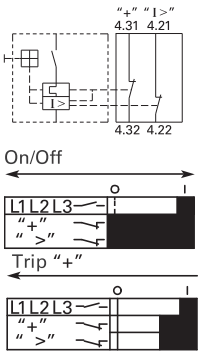
① Orders must be placed in multiples of package quantity listed.

1

XTPAXSATR_



Side-Mount Trip Indicating Auxiliary Contacts

Contact Configuration	Contact Sequence	Pkg. Qty. ①	For Use with…	Catalog Number
2 x 1NO		2	XTPE	**XTPAXSATR20**
2 x 1NC		2	XTPE	**XTPAXSATR02**

Can be fitted on the right side of manual motor protectors. Can be combined with standard auxiliary contacts. Trip indication: A. General trip indication (overload) B. Short-circuit trip. Local short-circuit indication by red indicator, manually resettable.

Note

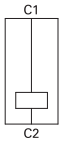
① Orders must be placed in multiples of package quantity listed.

Additional Accessories

XTPAXSR_



Contact Sequence



Shunt Release

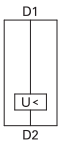
Pkg. Qty. ①	Screw Terminal Catalog Number
2	**XTPAXSR24V50H**
2	**XTPAXSR48V50H**
2	**XTPAXSR110V50H**
2	**XTPAXSR120V60H**
2	**XTPAXSR208V60H**
2	**XTPAXSR220V50H**
2	**XTPAXSR230V50H**
2	**XTPAXSR240V50H**
2	**XTPAXSR240V60H**
2	**XTPAXSR380V50H**
2	**XTPAXSR400V50H**
2	**XTPAXSR415V50H**
2	**XTPAXSR440V60H**
2	**XTPAXSR480V60H**
2	**XTPAXSR24VDC**
2	**XTPAXSR48VDC**
2	**XTPAXSR60VDC**
2	**XTPAXSR110VDC**
2	**XTPAXSR125VDC**
2	**XTPAXSR220VDC**
2	**XTPAXSR250VDC**

Can be used to trip the manual motor protector from a remote location. Can be fitted on the left side of manual motor protectors. Cannot be combined with the XTPAXUVR. DC: Intermittent operation 5 sec.

XTPAXUVR_



Contact Sequence



Undervoltage Release

Pkg. Qty. ①	Screw Terminal Catalog Number
2	**XTPAXUVR24V50H**
2	**XTPAXUVR24V60H**
2	**XTPAXUVR48V50H**
2	**XTPAXUVR60V50H**
2	**XTPAXUVR110V50H**
2	**XTPAXUVR120V60H**
2	**XTPAXUVR208V60H**
2	**XTPAXUVR220V50H**
2	**XTPAXUVR230V50H**
2	**XTPAXUVR240V50H**
2	**XTPAXUVR240V60H**
2	**XTPAXUVR380V50H**
2	**XTPAXUVR400V50H**
2	**XTPAXUVR415V50H**
2	**XTPAXUVR440V60H**
2	**XTPAXUVR480V60H**
2	**XTPAXUVR600V60H**

Can be used to trip the manual motor protector from a remote location. Can be fitted on left side manual motor protectors. Cannot be combined with XTPAXSR. When combined with a circuit breaker, it can be used as emergency-stop device to IEC/EN 60204.

Note

① Orders must be placed in multiples of package quantity listed.

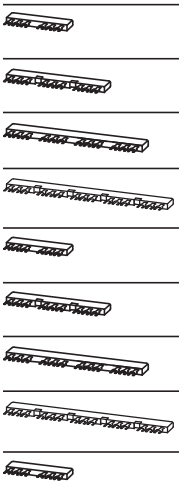
IP65 Rotary Handle Mechanism ①②③

XTPAXRHM_



Description	Enclosure Rating	Pkg. Qty. ④	Catalog Number
Complete Kits—Includes Handle, Shaft and Required Hardware			
Rotary handle mechanism—black ⑤	IP65 NEMA 12 UL/CSA 4X	1	**XTPEXRHMB**
Rotary handle mechanism—red/yellow ⑥		1	**XTPEXRHMRY**
Rotary handle mechanism—black—rotated 90° from vertical ⑤		1	**XTPEXRHM90B**
Rotary handle mechanism—red/yellow—rotated 90° from vertical ⑥		1	**XTPEXRHM90RY**

Three-Phase Commoning Links ⑦



For Use with…	Qty. MMP	Length of Link (mm)	Unit Width (mm)	Pkg. Qty. ④	Catalog Number
MMP with no side-mounted auxiliaries or voltage releases	2	90	45	10	**XTPAXCLKA2**
	3	135	45	10	**XTPAXCLKA3**
	4	180	45	10	**XTPAXCLKA4**
	5	225	45	10	**XTPAXCLKA5**
Each MMP with one auxiliary contact or trip-indicating auxiliary contact fitted on the right	2	99	45 + 9	10	**XTPAXCLKB2**
	3	153	45 + 9	10	**XTPAXCLKB3**
	4	207	45 + 9	10	**XTPAXCLKB4**
	5	261	45 + 9	10	**XTPAXCLKB5**
Each MMP with an auxiliary contact and trip-indicating auxiliary contact mounted on the right or a voltage release mounted on the left.	2	108	45 + 18	10	**XTPAXCLKC2**

For parallel power feed to several manual motor protectors on terminals 1, 3 and 5.

XTPAXUTS



Shroud for Unused Terminals of Three-Phase Commoning Links

For Use with…	Description	Pkg. Qty. ④	Catalog Number
Frame B XTPE	To cover unused terminals on three-phase commoning link. Protected against direct contact.	20	**XTPAXUTS**

XTPAXIT



Incoming Terminals for Three-Phase Commoning Link ⑧

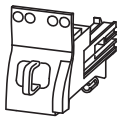
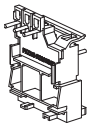
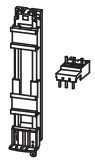
For Use with…	Pkg. Qty. ④	Catalog Number
Frame B XTPE	5	**XTPAXIT**

Notes

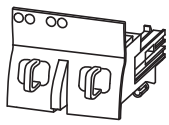
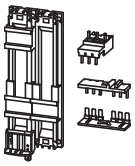
① Plug-in connection shafts, XTPAXRHMSFT_ can be cut to desired length for mounting depths of 100–240 mm. Carrier with extension shaft included.
② With ON/OFF switch position and "+" (tripped), lockable with 3 padlocks, 4–8 mm hasp. Can be locked in the OFF position, if required.
③ Rotary handle mechanisms ship with door interlock disabled. See instruction publication with product for how to enable door interlock.
④ Orders must be placed in multiples of package quantity listed.
⑤ For use on main switches to IEC/EN 60204.
⑥ For use on main switches with emergency-stop function to IEC/EN 60204.
⑦ Protected against accidental contact. Frame B short-circuit proof U_e = 690V, I_u = 63A. Frame B links can be combined by rotating mounting.
⑧ For three-phase commoning link, protected against accidental contact, U_e = 690V, I_u = 63A;
For conductor cross-sections: 2.5–25 mm² stranded; 2.5–16 mm² flexible with ferrules, AWG 14-6.

Combination Connection Kits

Non-Reversing Starters

	For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPAXTPCB 	XTPR…B + XTCE…B	Mechanical connection element for XTPR…B and contactor	1	**XTPAXTPCB**
		Main current wiring between XTPR…B and contactor in toolless plug connection	1	
		Use contactor auxiliary switch XTCEXFAT_. Control cable guidance: max. six cables up to 2.5 mm^2 external diameter or four cables up to 3.5 mm^2 external diameter.		
XTPAXEMC_ 	XTPR…B + XTCE…B	Mechanical and electrical connection for XTPR…B and contactor	5	**XTPAXEMCB**
	XTPR…B + XTCE…C		5	**XTPAXEMCC**
XTPAXTPCD 	XTPR…D + XTCE…D	DIN rail adapter plate Main current wiring between XTPR and contactor	1	**XTPAXTPCD**

Reversing Starters

	For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPAXTPCRB 	XTPE…B + XTCE…B01_	Mechanical connection element for XTPR…B and contactor	1	**XTPAXTPCRB**
		Reversing starter main current wiring in toolless plug connection	1	
		Control cables for electrical interlocking in toolless plug connection: – K1M: A1–K2M: 21 – K1M: 21–K2M: A1 – K1M: A2–K2M: A2	1	
		Cable guidance	1	
		Use contactor auxiliary switch XTCEXFAT_. Control cable guidance: max. six cables up to 2.5 mm^2 external diameter or four cables up to 3.5 mm^2 external diameter.		
XTPAXTPCRC 	XTPE…B + XTCE…C	DIN rail adapter plate	1	**XTPAXTPCRC**
		Reversing starter main current wiring	1	

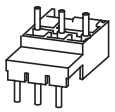
Note

① Orders must be placed in multiples of package quantity listed.

1

Electrical Connection Module

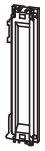
XTPAXECM_



For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPE…B + XTCE…C	Main current wiring between XTPR…B and contactor	5	**XTPAXECMC**

DIN Rail Adapter Plates

XTPAXTPCPB



For Use with…	Description/Comprised of …	Std. Pack ①	Catalog Number
XTPAXTPCB XTPAXTPCRB	45 mm wide adapter plate with one DIN rail Connection element for side-by-side positioning of further plates	4	**XTPAXTPCPB**

PKE-SWD-32



XTPE…B + XTCE…B or C	SmartWire-DT communication link	1	**PKE-SWD-32**

Note

① Orders must be placed in multiples of package quantity listed.

Technical Data and Specifications

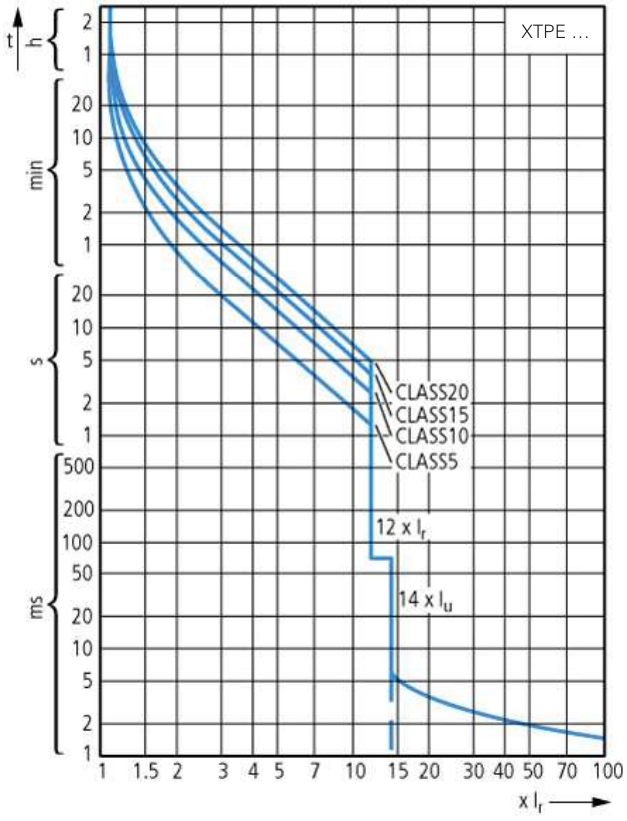
XT Electronic Manual Motor Controllers

Description	Specification	XTPE012B	XTPE032B	XTPE065D
General				
Standards and regulations		IEC/EN 60947-4-1, VDE 0600, UL 508, CSA C 22.2 No. 14		
Climatic proofing		Damp heat, constant, to IEC 60068-2-78		
		Damp heat, cyclic, to IEC 60068-2-30		
Ambient temperature				
Storage		–40° to 80°C	–40° to 80°C	–40° to 80°C
Open		–25° to 55°C	–25° to 55°C	–25° to 55°C
Enclosed		–25° to 40°C	–25° to 40°C	–25° to 40°C
Direction of incoming supply		Any	Any	Any
Degree of protection	Device	IP20	IP20	IP20
	Terminals	IP00	IP00	IP00
Touch protection				
Mechanical shock resistance half-sinusoidal shock, 10 ms to IEC 60068-2-27		25g	25g	25g
Altitude		Max. 2000m	Max. 2000m	Max. 2000m
Conductor Cross-Sections				
Screw terminals	Solid	1 x (1–6) mm^2	1 x (1–6) mm^2	1 x (0.75–16) mm^2
		2 x (1–6) mm^2	2 x (1–6) mm^2	2 x (0.75–16) mm^2
	Stranded with ferrule to DIN 46228	1 x (1–6) mm^2	1 x (1–6) mm^2	1 x (0.75–35) mm^2
		2 x (1–6) mm^2	2 x (1–6) mm^2	2 x (0.75–25) mm^2
	Solid or stranded	18–10 AWG	18–10 AWG	14–2 AWG
Screw Terminal Tightening Torque				
Main conductor		1.7 Nm	1.7 Nm	3.3 Nm
Auxiliary conductor		1 Nm	1 Nm	1 Nm
Main Circuit				
Rated impulse withstand voltage	U_{mp}	6,000 Vac	6,000 Vac	6,000 Vac
Overvoltage category/pollution degree		III/3	III/3	III/3
Rated operational voltage	U_e	690V	690V	690V
Rated uninterrupted current = rated output current	$I_u = I_e$	12A	32A	65A
Rated frequency		40–60 Hz	40–60 Hz	40–60 Hz
Current heating losses (three-pole at operating temperature)		6W	6W	6W
Lifespan, mechanical	Operations	0.05 x 10^6	0.05 x 10^6	0.05 x 10^6
Lifespan, electrical (AC-3 at 400V)	Operations	0.05 x 10^6	0.05 x 10^6	0.05 x 10^6
Maximum operating frequency	Operations/h	60	60	60
Short-Circuit Rating				
Motor switching capacity AC	AC-3 up to 690V	12A	32A	65A
Trip Unit				
Temperature compensation to IEC/EN 60947, VDE 0660		–5° to 40°C	–5° to 40°C	–5° to 40°C
Operating range		–25° to 55°C	–25° to 55°C	–25° to 55°C
Temperature compensation residual error for T >40°C		≤0.1%/K	≤0.1%/K	≤0.1%/K
Overload release setting range		0.25–1 xI_u	0.25–1 xI_u	0.25–1 xI_u
Fixed short-circuit trip setting		12 x I_r (trip unit),14 x I_u (base)	12 x I_r (trip unit),14 x I_u (base)	12 x I_r (trip unit),14 x I_u (base)
Short circuit release tolerance		±20%	±20%	±20%
Phase failure sensitivity		Yes	Yes	Yes

1

Trip Characteristics

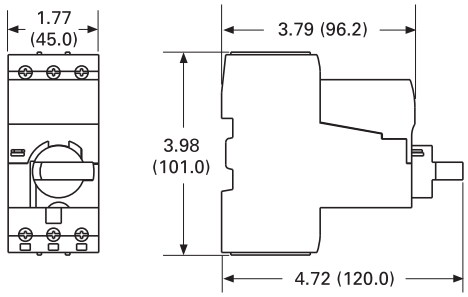
XT Electronic Manual Motor Controllers



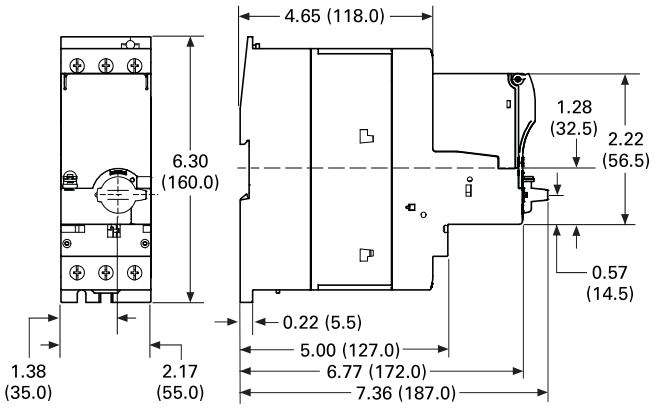
Dimensions

Approximate Dimensions in Inches (mm)

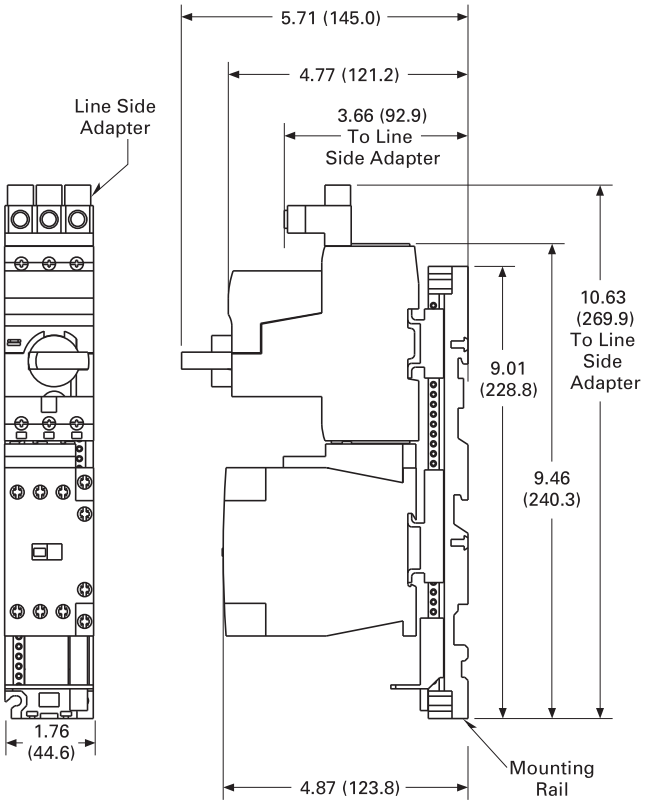
XT Electronic MMP—B Frame



XT Electronic MMP—D Frame



XT Electronic CMC With C Frame Contactor



1

EMS—Electronic Motor Starter



Contents

Description	*Page*
Relays and Timers	**V5-T1-3**
Miniature Controls	**V5-T1-18**
Contactors and Starters	**V5-T1-35**
Thermal Overload Relays	**V5-T1-130**
C440/*XT* Electronic Overload Relay	**V5-T1-143**
Manual Motor Protectors	**V5-T1-159**
Combination Motor Controllers	**V5-T1-193**
XT Electronic Manual Motor Protector	
Catalog Number Selection	**V5-T1-220**
Product Selection	**V5-T1-221**
Accessories	**V5-T1-223**
Technical Data and Specifications	**V5-T1-229**
Dimensions	**V5-T1-231**
EMS—Electronic Motor Starter	**V5-T1-232**
XT DC Contactors	**V5-T1-234**
Reference Data	**V5-T1-236**

EMS—Electronic Motor Starter

Product Description

The electronic motor starter (EMS) is the latest technology in safe and efficient motor starting from Eaton's Electrical Sector. The EMS is a full starter with built-in solid-state contacts and integral overload protection. Its compact size and high-electrical life make it an ideal replacement for the traditional contactor/overload relay starter configuration.

Applications

A versatile solution, the EMS also supports the following installation applications:

- Logistics
- Conveyer control
- Production machines
- Tooling machines
- Packaging machines
- Small elevators

Features and Benefits

Multifunctional

The EMS comes with an optional reversing start feature, eliminating the need for an additional contactor. The optional E-stop functionality eliminates the need for a separate E-stop contactor.

Extended Life

High-electrical life provides up to 30 million operations. The EMS is ideal for customer applications requiring multiple motor start/stops per hour.

Easy Installation

The EMS comes equipped with push-in terminals for quick and easy wiring of power and control circuits. Push-in terminals provide 60% time savings over screw-in terminals and better contact against vibrations.

Standards and Certifications

Safety Rated

Functional safety is growing in importance for the machinery OEM. The EMS is rated at SIL3 per IEC 62061 and PLe per ISO® 13849, meeting the most stringent of safety requirements.

The EMS carries IEC and UL short-circuit ratings, with 100 kAIC UL short-circuit rating when mated with 30 A Class J fuse.

- UL



Panel with four traditional starters installed:
FVNR, FVR, FVNR with E-stop and FVR with E-stop



Identical panel with four EMS starters installed, producing the same functionality

Catalog Number Selection

EMS—Electronic Motor Starter

EMS ROS T 2.4 24VDC

Device Type
EMS = Electronic motor starter

Control Voltage
24VDC = 24 Vdc
SWD = SmartWire-DT

Configuration/Function
DO = Non-reversing
DOS = Non-reversing with E-stop
RO = Reversing
ROS = Reversing with E-stop

Ampere Rating
2.4 = 2.4 A
9 = 9 A

Product Selection

EMS-_



EMS—Electronic Motor Starters

Function	Current Range AC-51a (A)	Current Range AC-53a (A)	Motor Rating AC-53a 380 V, 400 V, 415 V (kW)	Catalog Number
Non-reversing	0.18–2.4	0.18–2.4	0.06–0.75	**EMS-DO-T-2.4-24VDC**
Reversing	0.18–2.4	0.18–2.4	0.06–0.75	**EMS-RO-T-2.4-24VDC**
Non-reversing, with E-stop	0.18–2.4	0.18–2.4	0.06–0.75	**EMS-DOS-T-2.4-24VDC**
Reversing, with E-stop	0.18–2.4	0.18–2.4	0.06–0.75	**EMS-ROS-T-2.4-24VDC**
Non-reversing	1.5–9	1.5–6.5	0.55–3.0	**EMS-DO-T-9-24VDC**
Reversing	1.5–9	1.5–6.5	0.55–3.0	**EMS-RO-T-9-24VDC**
Non-reversing, with E-stop	1.5–9	1.5–6.5	0.55–3.0	**EMS-DOS-T-9-24VDC**
Reversing, with E-stop	1.5–9	1.5–6.5	0.55–3.0	**EMS-ROS-T-9-24VDC**

EMS-DOS-…,
EMS-ROS-…



EMS with SmartWire-DT

Electronic Motor Starters with SmartWire-DT built in do not require a separate module for connection to the SmartWire-DT network. Connection is made directly to the SmartWire-DT flat cable.

Description	Max. Equivalent hp Rating for Three-Phase Motors, 60 Hz 208 V	480 V	AC1	AC3	Setting Range of Overload Releases I_r A	DC Operation 24 Vdc Catalog Number
DOL starting, Motor protection, For connecting to SmartWire-DT. Circuit design: Safety output stage with bypass, three-phase disconnect.	—	1	2.4	2.4	0.18–2.4	**EMS-DO-T-2.4-SWD**
	2	5	9.0	7.6	1.5–9 7 (AC–53a)	**EMS-DO-T-9-SWD**
DOL starting, Motor protection, Emergency-stop actuator. Circuit design: Safety output stage with bypass, three-phase disconnect.	—	1	2.4	2.4	0.18–2.4	**EMS-DOS-T-2.4-SWD** ①
	2	5	9.0	7.6	1.5–9 7 (AC–53a)	**EMS-DOS-T-9-SWD** ①
DOL starting, Reversing start, Motor protection, For connecting to SmartWire-DT. Circuit design: Safety output stage with bypass, three-phase disconnect.	—	1	2.4	2.4	0.18–2.4	**EMS-RO-T-2.4-SWD**
	2	5	9.0	7.6	1.5–9 7 (AC–53a)	**EMS-RO-T-9-SWD**
DOL starting, Reversing start, Motor protection, Emergency-stop actuator. Circuit design: Safety output stage with bypass, three-phase disconnect.	—	1	2.4	2.4	0.18–2.4	**EMS-ROS-T-2.4-SWD** ①
	2	5	9.0	7.6	1.5–9 7 (AC–53a)	**EMS-ROS-T-9-SWD** ①

Note

① EMS-DOS and EMS-ROS starters with emergency stop function have an additional terminal that needs to be connected to 0 V / 24 Vdc to provide an enable signal. (This is in addition to the SmartWire-DT signal.) Actuation of an E-stop will interrupt the 0 V / 24 Vdc connection and also override the SmartWire-DT signal.

1

XT DC Contactors



Contents

Description	*Page*
Relays and Timers	V5-T1-3
Miniature Controls	V5-T1-18
Contactors and Starters	V5-T1-35
Thermal Overload Relays	V5-T1-130
C440/*XT* Electronic Overload Relay	V5-T1-143
Manual Motor Protectors	V5-T1-159
Combination Motor Controllers	V5-T1-193
XT Electronic Manual Motor Protector	
Catalog Number Selection	V5-T1-220
Product Selection	V5-T1-221
Accessories	V5-T1-223
Technical Data and Specifications	V5-T1-229
Dimensions	V5-T1-231
EMS—Electronic Motor Starter	V5-T1-232
XT DC Contactors	V5-T1-234
Reference Data	V5-T1-236

XT DC Contactors

Product Description

The *XT* DC contactors for the current range 300 A to 600 A can be used in a variety of applications. The proven hybrid technology ensures a long life span of the devices. Compared to similar DC contactors, Eaton contactors are characterized by much higher electrical switching cycles. This makes the *XT* DC contactors a maintenance- free and reliable part of any machine or system.

Application Description

Best suited for a breadth of DC non-motor applications that require frequent switching or switching under load:

- Solar energy
- Energy storage
- Railway transportation
- Automotive infrastructure
- Marine and offshore DC
- DC-grids
- Testing equipment

Features and Benefits

Maintenance Free

The *XT* DC contactors hybrid switching technology allows for nearly arc-free switching under load and an electrical life of 150,000 operations—the best in the industry by 6x. This feature greatly reduces maintenance cost while extending the life of the device.

Reliable and Flexible

The contactors feature wide coil range and also direct PLC control, making them suitable for most systems. A wide temperature range of –40 °C to +70 °C allows them to handle any environment and their low coil consumption and switching energy means less heat output than standard DC contactors.

Space Savings

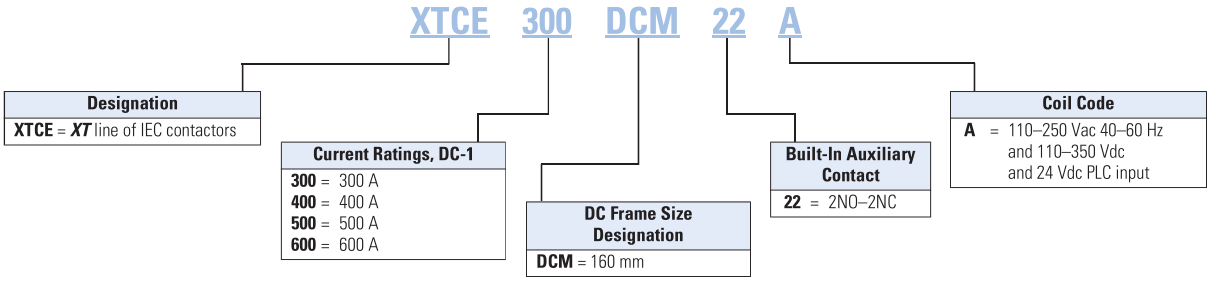
The contactors are true two-pole units—they are compact, take up less space and do not require series wiring. They also allow bi-directional switching, meaning they are polarity independent.

Standards and Certifications

- CE approved
- UL Listed
- IEC/EN 60947-4-1, 60947-5-1
- CSA File 70044143

Catalog Number Selection

XT DC Contactors



Product Selection

Frame M DC



Two-Pole Contactors, Frame M—UL/CSA Ratings

Thermal Current (I_{th}) Ampere Rating	Voltage	Article Number	Auxiliary Contacts	Catalog Number ①
300	1000	183314	2NO–2NC	**XTCE300DCM22A**
400	1000	186872	2NO–2NC	**XTCE400DCM22A**
500	1000	186873	2NO–2NC	**XTCE500DCM22A**
600	1000	183315	2NO–2NC	**XTCE600DCM22A**

Note

① Does not include lugs.

1

Reference Data

Type 2 Coordination **V5-T1-237**
Approvals for World Markets **V5-T1-246**
IEC Utilization Categories **V5-T1-249**
Motor Ratings Data **V5-T1-252**
Ampacities of Insulated Conductors (Based on 2005 NEC) **V5-T1-256**

Type 1 and Type 2 Coordination

What is it?

The International Electrotechnical Commission (IEC) developed short-circuit performance criteria for contactors and starters called Type 1 coordination and Type 2 coordination. This defines motor controller protection levels following a short-circuit fault. In order to achieve this performance, the combination of a motor controller (contactor or starter) and short-circuit protective device (manual motor protector, circuit breaker or fuse) must meet the following criteria as specified by IEC 60947-4-1—Low voltage switchgear and controlgear—Part 4-1: Contactors and motor-starters—Electromechanical contactors and motor-starters:

Type 1 Coordination

Type 1 Coordination requires that under short-circuit conditions, the contactor or starter shall cause no danger to persons or installation and may not be suitable for further service without repair and replacement of parts.

In this case, *significant damage is allowed* to the contactor/starter (for example, contact welding, burning or disintegration) and the overload relay (for example, component harm or heater element burn-out).

Type 2 Coordination

Type 2 Coordination requires that under short-circuit conditions, the contactor or starter shall cause no danger to persons or installation and shall be suitable for further use. The risk of contact welding is recognized, in which case the manufacturer shall indicate the measures to be taken as regards to the maintenance of the equipment.

Type 2 Coordination

400, xx415V Type 2 Coordination—MMC

P (kW)	I_e (A)	I_q (kA)	MMP Catalog Number	Contactor Catalog Number ②	MMC Catalog Number ②
0.06	0.21	50 (150) ①	XTPRP25BC1	XTCE007B10_	XTSCP25BB_
0.09	0.31	50 (150) ①	XTPRP40BC1	XTCE007B10_	XTSCP40BB_
0.12	0.41	50 (150) ①	XTPRP63BC1	XTCE007B10_	XTSCP63BB_
0.18	0.60	50 (150) ①	XTPRP63BC1	XTCE007B10_	XTSCP63BB_
0.25	0.80	50 (150) ①	XTPR001BC1	XTCE007B10_	XTSC001BB_
0.37	1.10	50 (150) ①	XTPR1P6BC1	XTCE007B10_	XTSC1P6BB_
0.55	1.50	50 (150) ①	XTPR1P6BC1	XTCE007B10_	XTSC1P6BB_
0.75	1.90	50 (150) ①	XTPR2P5BC1	XTCE007B10_	XTSC2P5BB_
1.10	2.60	50 (150) ①	XTPR004BC1	XTCE007B10_	XTSC004BB_
1.50	3.60	50 (150) ①	XTPR004BC1	XTCE007B10_	XTSC004BB_
2.20	5.00	50 (150) ①	XTPR6P3BC1	XTCE007B10_	XTSC6P3BB_
3.00	6.60	50 (150) ①	XTPR010BC1	XTCE018C10_	XTSC010BC_
4.00	8.50	50 (150) ①	XTPR010BC1	XTCE018C10_	XTSC010BC_
5.50	11.3	50	XTPR012BC1	XTCE018C10_	XTSC012BC_
7.50	16.0	50	XTPR016BC1	XTCE018C10_	XTSC016BC_
11.0	21.7	50	XTPR025BC1	XTCE025C10_	XTSC025BC_
15.0	29.3	50	XTPR032BC1	XTCE032C10_	XTSC032BC_
5.50	11.3	50	XTPR016DC1	XTCE018C10_	XTSC016DC_
7.50	16.0	50	XTPR016DC1	XTCE018C10_	XTSC016DC_
11.0	21.7	50	XTPR025DC1	XTCE025C10_	XTSC025DC_
15.0	29.3	50	XTPR032DC1	XTCE032C10_	XTSC032DC_
18.5	36.0	50	XTPR040DC1	XTCE040D00_	XTSC040DD_
22.0	41.0	50	XTPR050DC1	XTCE050D00_	XTSC050DD_
30.0	55.0	50	XTPR058DC1	XTCE065D00_	XTSC058DD_
34.0	63.0	50	XTPR063DC1	XTCE065D00_	XTSC063DD_

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Values in parentheses ( ) are for Type 1 Coordination.

② Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-245**.

480V Type 2 Coordination—MMC

P (hp)	I_e (A)	I_q (kA)	MMP Catalog Number	Current Limiter Catalog Number	Contactor Catalog Number ②	MMC Catalog Number ②
1/2	0.24	65	XTPRP25BC1	—	XTCE007B10_	XTSCP25BB_
1/2	0.32	65	XTPRP40BC1	—	XTCE007B10_	XTSCP40BB_
1/2	0.51	65	XTPRP63BC1	—	XTCE007B10_	XTSCP63BB_
1/2	0.74	65	XTPR001BC1	—	XTCE007B10_	XTSC001BB_
1/2	0.94	65	XTPR001BC1	—	XTCE007B10_	XTSC001BB_
3/4	1.32	65	XTPR1P6BC1	—	XTCE007B10_	XTSC1P6BB_
1	1.72	65	XTPR2P5BC1	—	XTCE018C10_	XTSC2P5BC_
2	2.55	65	XTPR004BC1	—	XTCE018C10_	XTSC004BC_
2	3.10	65	XTPR004BC1	—	XTCE018C10_	XTSC004BC_
3	4.55	65 (50) ①	XTPR6P3BC1	XTPAXCL	XTCE018C10_	XTSC6P3BC_
3	6.15	65 (50) ①	XTPR6P3BC1	XTPAXCL	XTCE018C10_	XTSC6P3BC_
7-1/2	8.40	65 (50) ①	XTPR010BC1	XTPAXCL	XTCE018C10_	XTSC010BC_
7-1/2	11.0	65 (50) ①	XTPR012BC1	XTPAXCL	XTCE018C10_	XTSC012BC_
10	14.5	65 (50) ①	XTPR016BC1	XTPAXCL	XTCE018C10_	XTSC016BC_
10	20.0	65 (50) ①	XTPR020BC1	XTPAXCL	XTCE025C10_	XTSC020BC_
20	20.0	65	XTPR025DC1	—	XTCE040D00_	XTSC025DD_
25	27.0	65	XTPR032DC1	—	XTCE040D00_	XTSC032DD_
25	32.0	65	XTPR032DC1	—	XTCE040D00_	XTSC032DD_
30	37.5	65	XTPR040DC1	—	XTCE040D00_	XTSC040DD_
40	40.5	65	XTPR050DC1	—	XTCE050D00_	XTSC050DD_
40	50.5	65	XTPR058DC1	—	XTCE065D00_	XTSC058DD_
40	64.0	65	XTPR063DC1	—	XTCE065D00_	XTSC063DD_

600V Type 2 Coordination—MMC

P (hp)	I_e (A)	I_q (kA)	MMP Catalog Number	Current Limiter Catalog Number	Contactor Catalog Number ②	MMC Catalog Number ②
1/2	0.19	50	XTPRP25BC1	—	XTCE007B10_	XTSCP25BB_
1/2	0.26	50	XTPRP40BC1	—	XTCE007B10_	XTSCP40BB_
1/2	0.41	50	XTPRP63BC1	—	XTCE007B10_	XTSCP63BB_
1/2	0.59	50	XTPRP63BC1	—	XTCE007B10_	XTSCP63BB_
1/2	0.75	50	XTPR001BC1	—	XTCE007B10_	XTSC001BB_
1	1.06	50	XTPR1P6BC1	—	XTCE007B10_	XTSC1P6BB_
1	1.38	50	XTPR1P6BC1	—	XTCE007B10_	XTSC1P6BB_
1-1/2	2.04	50	XTPR2P5BC1	—	XTCE018C10_	XTSC2P5BC_
1-1/2	2.48	50	XTPR2P5BC1	—	XTCE018C10_	XTSC2P5BC_
3	3.64	50	XTPR004BC1	—	XTCE018C10_	XTSC004BC_
5	4.92	50 (18) ①	XTPR6P3BC1	XTPAXCL	XTCE018C10_	XTSC6P3BC_
10	6.72	50 (18) ①	XTPR010BC1	XTPAXCL	XTCE018C10_	XTSC010BC_
10	8.60	50 (18) ①	XTPR010BC1	XTPAXCL	XTCE018C10_	XTSC010BC_
10	11.5	50 (18) ①	XTPR012BC1	XTPAXCL	XTCE018C10_	XTSC012BC_
10	16.0	50 (18) ①	XTPR016BC1	XTPAXCL	XTCE018C10_	XTSC016BC_
25	21.5	50	XTPR025DC1	—	XTCE040D00_	XTSC025DD_
30	25.5	50	XTPR032DC1	—	XTCE040D00_	XTSC032DD_
30	30.0	50	XTPR032DC1	—	XTCE040D00_	XTSC032DD_
30	37.5	50	XTPR040DC1	—	XTCE040D00_	XTSC050DD_
40	40.5	50	XTPR050DC1	—	XTCE050D00_	XTSC050DD_
40	51.0	42	XTPR058DC1	—	XTCE065D00_	XTSC058DD_
50	61.0	42	XTPR063DC1	—	XTCE065D00_	XTSC063DD_

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Values in parentheses ( ) are achieved without the current limiter.

② Underscore (_) indicates magnet coil suffix required. See **Page V5-T1-245.**

400, 415V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Fused Disconnect

P (kW)	I_e (A)	I_q (kA)	Fuses Class gG/gL	Contactor Catalog Number ①	Overload Relay Catalog Number	Assembled Starter Catalog Number ①
0.12	0.41	100	2	XTCE007B10_	XTOBP60BC1	XTAE007B10_P60
0.18	0.60	100	2	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.25	0.80	100	4	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.37	1.10	100	4	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
0.55	1.50	100	4	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
0.75	1.90	100	6	XTCE007B10_	XTOB2P4BC1	XTAE007B10_2P4
1.10	2.60	100	6	XTCE007B10_	XTOB004BC1	XTAE007B10_004
1.50	3.60	100	6	XTCE007B10_	XTOB004BC1	XTAE007B10_004
2.20	5.00	100	10	XTCE007B10_	XTOB006BC1	XTAE007B10_006
3.00	6.60	100	16	XTCE007B10_	XTOB010BC1	XTAE007B10_010
4.00	8.50	100	20	XTCE009B10_	XTOB010BC1	XTAE009B10_010
5.50	11.3	100	25	XTCE018C10_	XTOB016CC1	XTAE018C10_016
7.50	16.0	100	32	XTCE018C10_	XTOB016CC1	XTAE018C10_016
11.0	21.7	100	40	XTCE025C10_	XTOB024CC1	XTAE032C10_024
15.0	29.3	100	63	XTCE032C10_	XTOB032CC1	XTAE032C10_032
18.5	36.0	100	63	XTCE040D00_	XTOB040DC1	XTAE040D00_040
22.0	41.0	100	80	XTCE050D00_	XTOB057DC1	XTAE065D00_057
30.0	55.0	100	100	XTCE065D00_	XTOB057DC1	XTAE065D00_057
37.0	68.0	100	125	XTCE080F00_	XTOB070GC1	XTAE080F00_070
45.0	81.0	100	160	XTCE095F00_	XTOB100GC1	XTAE095F00_100
55.0	99.0	100	200	XTCE115G00_	XTOB100GC1	XTAE115G00_100
75.0	134.0	100	200	XTCE150G00_	XTOB150GC1	XTAE150G00_150
90.0	161.0	100	250	XTCE185L22_	XTOB220LC1	XTAE185L22_220
110.0	196.0	100	315	XTCE225L22_	XTOB220LC1	XTAE225L22_220
132.0	231.0	100	400	XTCE250L22_	XTOB250LC1	XTAE250L22_250
160.0	279.0	100	400	XTCE300M22_	XTOT290C35	XTAE300M22_290
200.0	349.0	100	500	XTCE400M22_	XTOT400C35	XTAE400M22_400
250.0	437.0	100	630	XTCE500M22_	XTOT540C35	XTAE500M22_540

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Underscore (_) indicates magnet coil code required. See **Page V5-T1-245**.

1

500V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Fused Disconnect

P (kW)	I_e (A)	I_q (kA)	Fuses Class gG/gL	Contactor Catalog Number ①	Overload Relay Catalog Number	Assembled Starter Catalog Number ①
0.12	0.33	100	2	XTCE007B10_	XTOBP40BC1	XTAE007B10_P40
0.18	0.48	100	2	XTCE007B10_	XTOBP60BC1	XTAE007B10_P60
0.25	0.70	100	2	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.37	0.90	100	2	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.55	1.20	100	4	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
0.75	1.50	100	4	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
1.10	2.10	100	6	XTCE007B10_	XTOB2P4BC1	XTAE007B10_2P4
1.50	2.90	100	6	XTCE007B10_	XTOB004BC1	XTAE007B10_004
2.20	4.00	100	10	XTCE007B10_	XTOB006BC1	XTAE007B10_006
3.00	5.30	100	16	XTCE009B10_	XTOB006BC1	XTAE009B10_006
4.00	6.80	100	16	XTCE009B10_	XTOB010BC1	XTAE009B10_010
5.50	9.00	100	20	XTCE012B10_	XTOB010BC1	XTAE012B10_010
7.50	12.1	100	25	XTCE018C10_	XTOB016CC1	XTAE018C10_016
11.0	17.4	100	32	XTCE025C10_	XTOB024CC1	XTAE025C10_024
15.0	23.4	100	50	XTCE040D00_	XTOB024DC1	XTAE040D00_024
18.5	28.9	100	50	XTCE040D00_	XTOB040DC1	XTAE040D00_040
22.0	33.0	100	63	XTCE050D00_	XTOB040DC1	XTAE050D00_040
30.0	44.0	100	80	XTCE065D00_	XTOB057DC1	XTAE065D00_057
37.0	54.0	100	100	XTCE080F00_	XTOB070GC1	XTAE080F00_070
45.0	65.0	100	125	XTCE095F00_	XTOB070GC1	XTAE095F00_070
55.0	79.0	100	160	XTCE115G00_	XTOB100GC1	XTAE115G00_100
75.0	107.0	100	200	XTCE185L22_	XTOB125LC1	XTAE185L22_125
90.0	129.0	100	200	XTCE185L22_	XTOB125LC1	XTAE185L22_125
110.0	157.0	100	250	XTCE185L22_	XTOB160LC1	XTAE185L22_160
132.0	184.0	100	250	XTCE185L22_	XTOB220LC1	XTAE185L22_220
160.0	224.0	100	315	XTCE225L22_	XTOB250LC1	XTAE225L22_250

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Underscore (_) indicates magnet coil code required. See **Page V5-T1-245.**

690V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Fused Disconnect

P (kW)	I_e (A)	I_q (kA)	Fuses Class gG/gL	Contactor Catalog Number ①	Overload Relay Catalog Number	Assembled Starter Catalog Number ①
0.12	0.24	100	1	XTCE007B10_	XTOBP40BC1	XTAE007B10_P40
0.18	0.35	100	2	XTCE007B10_	XTOBP40BC1	XTAE007B10_P40
0.25	0.50	100	2	XTCE007B10_	XTOBP60BC1	XTAE007B10_P60
0.37	0.70	100	2	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.55	0.90	100	4	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.75	1.10	100	4	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
1.10	1.50	100	4	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
1.50	2.10	100	6	XTCE007B10_	XTOB2P4BC1	XTAE007B10_2P4
2.20	2.90	100	10	XTCE007B10_	XTOB004BC1	XTAE007B10_004
3.00	3.80	100	10	XTCE007B10_	XTOB004BC1	XTAE007B10_004
4.00	4.90	100	16	XTCE009B10_	XTOB006BC1	XTAE009B10_006
5.50	6.50	100	16	XTCE012B10_	XTOB010BC1	XTAE012B10_010
7.50	8.80	100	20	XTCE018C10_	XTOB010CC1	XTAE018C10_010
11.0	12.6	100	25	XTCE025C10_	XTOB016CC1	XTAE025C10_016
15.0	17.0	100	32	XTCE032C10_	XTOB024CC1	XTAE032C10_024
18.5	20.9	100	32	XTCE040D00_	XTOB024DC1	XTAE040D00_024
22.0	23.8	100	50	XTCE040D00_	XTOB040DC1	XTAE040D00_040
30.0	32.0	100	63	XTCE065D00_	XTOB040DC1	XTAE065D00_040
37.0	39.0	100	80	XTCE080F00_	XTOB050GC1	XTAE080F00_050
45.0	47.0	100	80	XTCE080F00_	XTOB050GC1	XTAE080F00_050
55.0	58.0	100	100	XTCE080F00_	XTOB070GC1	XTAE080F00_070
75.0	78.0	100	160	XTCE095F00_	XTOB100GC1	XTAE095F00_100
90.0	93.0	100	160	XTCE115G00_	XTOB100GC1	XTAE115G00_100
110.0	114.0	100	200	XTCE185L22_	XTOB125LC1	XTAE185L22_125
132.0	134.0	100	250	XTCE185L22_	XTOB160LC1	XTAE185L22_160
160.0	162.0	100	250	XTCE185L22_	XTOB220LC1	XTAE185L22_220

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Underscore (_) indicates magnet coil code required. See **Page V5-T1-245**.

400, 415V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Fused Disconnect

P (kW)	I_e (A)	I_q (kA)	Fuses ① Class BS88	Contactor Catalog Number ②	Overload Relay Catalog Number	Assembled Starter Catalog Number ②
0.12	0.41	80	4	XTCE007B10_	XTOBP60BC1	XTAE007B10_P60
0.18	0.60	80	4	XTCE007B10_	XTOBP60BC1	XTAE007B10_P60
0.25	0.80	80	4	XTCE007B10_	XTOB001BC1	XTAE007B10_001
0.37	1.10	80	6	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
0.55	1.50	80	10	XTCE007B10_	XTOB1P6BC1	XTAE007B10_1P6
0.75	1.90	80	16	XTCE007B10_	XTOB2P4BC1	XTAE007B10_2P4
1.10	2.60	80	16	XTCE007B10_	XTOB004BC1	XTAE007B10_004
1.50	3.60	80	20	XTCE007B10_	XTOB004BC1	XTAE007B10_004
2.20	5.00	80	20	XTCE007B10_	XTOB006BC1	XTAE007B10_006
3.00	6.60	80	20	XTCE007B10_	XTOB010BC1	XTAE007B10_010
4.00	8.50	80	25	XTCE009B10_	XTOB010BC1	XTAE009B10_010
5.50	11.3	80	25	XTCE018C10_	XTOB016CC1	XTAE018C10_016
7.50	16.0	80	25	XTCE018C10_	XTOB016CC1	XTAE018C10_016
11.0	21.7	80	35 and 32M35	XTCE025C10_	XTOB024CC1	XTAE032C10_024
15.0	29.3	80	50	XTCE032C10_	XTOB032CC1	XTAE032C10_032
18.5	36.0	80	63	XTCE040D00_	XTOB040DC1	XTAE040D00_040
22.0	41.0	80	80	XTCE050D00_	XTOB057DC1	XTAE065D00_057
30.0	55.0	80	100	XTCE065D00_	XTOB065DC1	XTAE065D00_065

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① GEC/Alstom "Red Spot."

② Underscore (_) indicates magnet coil code required. See **Page V5-T1-245**.

400, 415V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Circuit Breaker

P (kW)	I_e (A)	I_q (kA)	Circuit Breaker	Contactor Catalog Number ①	Overload Relay Catalog Number	Assembled Starter Catalog Number ①
0.12	0.41	15	②	②	②	②
0.18	0.60	15	②	②	②	②
0.25	0.80	15	②	②	②	②
0.37	1.10	15	②	②	②	②
0.55	1.50	15	②	②	②	②
0.75	1.90	15	②	②	②	②
1.10	2.60	15	②	②	②	②
1.50	3.60	15	②	②	②	②
2.20	5.00	15	②	②	②	②
3.00	6.60	15	②	②	②	②
4.00	8.50	15	HMCPE015E0C	XTCE018C10_	XTOB010CC1	XTAE018C10_010
5.50	11.3	15	HMCPE015E0C	XTCE018C10_	XTOB016CC1	XTAE018C10_016
7.50	16.0	15	②	②	②	②
11.0	21.7	15	②	②	②	②
15.0	29.3	15	②	②	②	②
18.5	36.0	50	②	②	②	②
22.0	41.0	50	HMCPE100R3C	XTCE050D00_	XTOB057DC1	XTAE050D00_057
30.0	55.0	50	HMCPE100R3C	XTCE065D00_	XTOB065DC1	XTAE065D00_065
37.0	68.0	80	HMCPJ250D5L	XTCE080F00_	XTOB070GC1	XTAE080F00_070
45.0	81.0	80	HMCPJ250F5L	XTCE095F00_	XTOB100GC1	XTAE095F00_100
55.0	99.0	80	HMCPJ250G5L	XTCE115G00_	XTOB125GC1	XTAE115G00_125
75.0	134.0	80	HMCPJ250J5L	XTCE150G00_	XTOB150GC1	XTAE150G00_150
90.0	161.0	80	HMCPJ250W5L	XTCE185L22_	XTOB220LC1	XTAE185L22_220
110.0	196.0	70	HMCPJ250W5L	XTCE225L22_	XTOB220LC1	XTAE225L22_220
132.0	231.0	70	HMCPL600R6G	XTCE300M22_	XTOT240C3S	XTAE300M22_240
160.0	279.0	70	HMCPL600X6G	XTCE300M22_	XTOT400C3S	XTAE300M22_400
200.0	349.0	70	HMCPL600P6G	XTCE400M22_	XTOT400C3S	XTAE400M22_400
250.0	430.0	70	HMCPL600M	XCE500M22_	XTOT540C3S	XTAE500M22_540

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Underscore (_) indicates magnet coil code required. See **Page V5-T1-245**.

② Use MMP contactor combination. See **Page V5-T1-237**.

525V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Circuit Breaker

P (kW)	I_e (A)	I_q (kA)	Circuit Breaker	Contactor Catalog Number ①	Overload Relay Catalog Number	Assembled Starter Catalog Number ①
0.37	1.02	50	②	②	②	②
0.55	1.22	50	②	②	②	②
0.75	1.66	50	②	②	②	②
1.10	2.22	50	②	②	②	②
1.50	3.16	50	②	②	②	②
2.20	4.25	50	②	②	②	②
3.00	5.60	50	②	②	②	②
4.00	7.50	50	②	②	②	②
5.50	9.90	50	②	②	②	②
7.50	14.1	50	②	②	②	②
11.0	19.3	50	②	②	②	②
15.0	23.5	50	②	②	②	②
18.5	27.2	50	②	②	②	②
22.0	37.0	50	②	②	②	②
30.0	45.0	50	②	②	②	②
37.0	54.0	50	HMCP100R3C	XTCE080F00_	XTOB070GC1	XTAE080F00_070
45.0	66.0	50	HMCPJ250D5L	XTCE080F00_	XTOB070GC1	XTAE080F00_070
55.0	79.0	50	HMCPJ250F5L	XTCE115G00_	XTOB100GC1	XTAE115G00_100
75.0	111.0	50	HMCPJ250J5L	XTCE115G00_	XTOB125GC1	XTAE115G00_125
90.0	130.0	50	HMCPJ250K5L	XTCE185L00_	XTOB160LC1	XTAE185L00_160
110.0	159.0	50	HMCPJ250W5L	XTCE185L00_	XTOB160LC1	XTAE185L00_160
132.0	185.0	50	HMCPL600N6G	XTCE185L22_	XTOB220LC1	XTAE185L22_220
160.0	225.0	50	HMCPL600R6G	XTCE225L22_	XTOB250LC1	XTAE225L22_250
200.0	270.0	50	HMCPL600X6G	XTCE300M22_	XTOT290C3S	XTAE300M22_290

480V Type 2 Coordination—Contactor and Overload Relay (Motor Starter) with Circuit Breaker

P (hp)	I_e (A)	I_q (kA)	Circuit Breaker	Contactor Catalog Number ①	Overload Relay Catalog Number	Assembled Starter Catalog Number ①
50.0	65.0	65	HMCPJ250D5L	XTCE080F00_	XTOB070GC1	XTAE080F00_070
60.0	77.0	65	HMCPJ250G5L	XTCE080F00_	XTOB100GC1	XTAE080F00_100
75.0	96.0	25	HMCPJ250J5L	XTCE115G00_	XTOB125GC1	XTAE115G00_125
100.0	124.0	50	HMCPJ250K5L	XTCE185L22_	XTOB160LC1	XTAE185L22_160
125.0	156.0	50	HMCPJ250W5L	XTCE185L22_	XTOB160LC1	XTAE185L22_160
150.0	180.0	25	HMCPL600N6G	XTCE225L22_	XTOB220LC1	XTAE225L22_220
200.0	240.0	50	HMCPL600N	XTCE300M22_	XTOB240C3S	XTAE300M22_240
250.0	290.0	50	HMCPL600R	XTCE300M22_	XTOB290C3S	XTAE300M22_290
300.0	361.0	50	HMCPL600Y	XTCE400M22_	XTOB400C3S	XTAE400M22_400
350.0	414.0	50	HMCPL600M	XTCE500M22_	XTOB540C3S	XTAE500M22_540

Notes

See **Page V5-T1-245** for more information on wye-delta (star delta) applications.

① Underscore (_) indicates magnet coil code required. See **Page V5-T1-245.**

② Use MMP contactor combination.

400, 415V Type 2 Coordination—Contactor with Circuit Breaker ①

P (kW)	I_e (A)	I_q (kA)	Circuit Breaker—MCP	Contactor Catalog Number ②
1.50	3.60	50	HMCPE015E0C	XTCE018C10_
2.20	5.00	50	HMCPE015E0C	XTCE018C10_
3.00	6.60	50	HMCPE015E0C	XTCE018C10_
4.00	8.50	50	HMCPE015E0C	XTCE018C10_
5.50	11.3	50	HMCPE015E0C	XTCE018C10_
7.50	16.0	50	HMCPE015E0C	XTCE018C10_
11.0	21.7	50	HMCPE100R3C	XTCE040D00_
15.0	29.3	50	HMCPE100R3C	XTCE040D00_
18.5	36.0	50	HMCPE100R3C	XTCE040D00_
22.0	41.0	50	HMCPE100R3C	XTCE050D00_
30.0	55.0	50	HMCPE100R3C	XTCE065D00_
37.0	68.0	80	HMCPJ250D5L	XTCE080F00_
45.0	81.0	80	HMCPJ250F5L	XTCE095F00_
55.0	99.0	80	HMCPJ250G5L	XTCE115G00_
75.0	134.0	80	HMCPJ250J5L	XTCE150G00_
90.0	161.0	80	HMCPJ250W5L	XTCE185L22_
110.0	196.0	80	HMCPJ250W5L	XTCE225L22_
132.0	231.0	70	HMCPL600R	XTCE300M22_
160.0	279.0	70	HMCPL600X	XTCE300M22_
200.0	350.0	70	HMCPL600P	XTCE400M22_
250.0	430.0	70	HMCPL600M	XTCE500M22_

480V Type 2 Coordination—Contactor with Circuit Breaker ①

P (hp)	I_e (A)	I_q (kA)	Circuit Breaker—MCP	Contactor Catalog Number ②
50.0	65.0	65	HMCPJ250G5L	XTCE080F00_
60.0	77.0	65	HMCPJ250G5L	XTCE080F00_
150.0	180.0	50	HMCPL600N	XTCE300M00_
200.0	240.0	50	HMCPL600N	XTCE300M22__
250.0	300.0	50	HMCPL600R	XTCE300M22_
300.0	361.0	50	HMCPL600Y	XTCE400M00_
350.0	414.0	50	HMCPL600M	XTCE500M00_

Magnet Coil Suffix

Frames A–B

Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24 Vdc	**TD** ③
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
24V 50 Hz	**U**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
120 Vdc	**AD** ③
220 Vdc	**BD** ③
12 Vdc	**RD** ③
48 Vdc	**WD** ③

Frames C–F

Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
230V 50 Hz	**F**
24V 50/60 Hz	**T**
24–27 Vdc	**TD** ③
415V 50 Hz, 480V 60 Hz	**C**
600V 60 Hz	**D**
208V 60 Hz	**E**
190V 50 Hz, 220V 60 Hz	**G**
240V 50 Hz, 277V 60 Hz	**H**
380V 50 Hz, 440V 60 Hz	**L**
400V 50 Hz	**N**
380V 60 Hz	**P**
12V 50/60 Hz	**R**
24V 50 Hz	**U**
42V 50 Hz, 48V 60 Hz	**W**
48V 50 Hz	**Y**
110–130 Vdc	**AD** ③
200–240 Vdc	**BD** ③
12–14 Vdc	**RD** ③
48–60 Vdc	**WD** ③

Frame G

Coil Voltage	Suffix Code
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
24V 50/60 Hz	**T**
24–27 Vdc	**TD** ③
480–500V 50/60 Hz	**C**
380–440V 50/60 Hz	**L**
42–48V 50/60 Hz	**W**
110–130 Vdc	**AD** ③
200–240 Vdc	**BD** ③
48–60 Vdc	**WD** ③

Frames L–M

Coil Voltage	Suffix Code
110–250V 40–60 Hz/DC	**A**
250–500V 40–60 Hz/DC	**C**
48–110V 40–60 Hz/DC	**Y** ③
24–48 Vdc	**TD** ③

Wye-Delta (Star-Delta) Applications

If Type 2 Coordination is required when using wye-delta starters, the full voltage (direct on-line) test data that is included in this document is valid. To ensure proper protection, the K1M (main), K3M (star) and K5M (delta) contactors must all be the same size (amperage). For wye-delta starter kits, please see **Page V5-T1-55**.

Notes

① For use with magnetic sensing means to monitor motor current.

② Underscore (_) indicates magnet coil code required. See magnet coil suffix tables on this page.

③ With DC operation: integrated diode-resistor combination, coil rating 2.6W.

1

Approvals for World Markets

Overview

The ***XT*** line of products is approved for use throughout the world, including the USA and Canada. As such, they can be used without restriction as devices for world markets.

The majority of countries permit the import of devices on the manufacturer's undertaking that they have been constructed in accordance with the pertinent specifications. In the USA and Canada, however, there is a legal obligation to obtain official approval. In these countries, devices and enclosures—sometimes even complete control systems—are tested and approved by independent bodies.

In Europe, there also used to be a legal obligation to obtain official approval for low-voltage switchgear and controlgear. For industrial control gear, this legal obligation has now been abolished, provided the devices have been manufactured and tested in accordance with harmonized European standards (such as IEC/EN 60947). There is then no longer a requirement for them to carry their country's own approval mark.

Since January 1997, all devices must conform to the European Low-Voltage Directive and, where intended for sale within the European Union, must carry the CE mark.

Europe
Conformité Européen (CE)

This mark denotes that the device carrying it conforms to all relevant requirements and specifications. The mandatory application of this mark therefore enables the unrestricted use of marked devices within the European economic area.

Since January 1996, all devices sold within the European union must comply with the Electromagnetic Compatibility (EMC) Directive. ***XT*** has passed the required tests to these Directives and the devices carry the CE mark, demonstrating compliance with the EMC Directive. *Because devices bearing the CE mark comply with the harmonized standards, approval and the associated marking is no longer required in the following countries:*

Belgium
Comité Electro-technique Belge
Belgisch Elektro-technisch Comité
(CEBEC)

Denmark
Danmarks Elektriske Materielkontrol
(DEMKO)

Finland
(FIMKO)

France
Union Technique de l'Electricité
(UTE)

Netherlands
Naamloze Vennootschap tot Keuring van Electrotechnische Materialien
(KEMA)

Norway
Norges Elektriske Materiellkontrol
(NEMKO)

Sweden
Svenska Elektriska Materiel-Kontrollanstalten
(SEMKO)

Switzerland
Schweizerischer Elektrotechischer Verein
(SEV)

Devices in the USA and Canada have UL and CSA approval.

USA
Underwriters Laboratories
(UL) **Listing**
Recognition

Canada
Canadian Standards Association
(CSA)

Recently introduced is the mandatory approval of electrical products for:

- Slovakia
- Poland
- South Africa
- China
- Russia
- Turkey
- Argentina

Marking is partly mandatory for these countries. The IEC rating data is accepted as in other European countries.

Approval is not mandatory in the Czech Republic and Hungary. The manufacturer's declaration of conformity is sufficient here.

Romania requires that components that are to be used in public buildings must be approved by the Romanian test authority ICECON.

Russia
Devices for Russia must bear the appropriate marking.

Russia
Goststandart
(GOST-R)

South Africa
ZA
SABS

Argentina

Selection of Devices

"Selection appropriate for export" does not mean merely meeting the requisite approvals and conformity to relevant specifications. The meaning of the term goes a great deal further by even including that equipment and installations must be designed to a concept with export in mind.

The following are important criteria for selecting switchgear suitable for export:

For motor-protective circuit breakers
Use inherently short-circuit proof switches capable of controlling the highest prospective fault levels at the point of installation without the need for back-up protection.

Advantage:

- No restrictions whatsoever for installation
- Complete independence from the on-site protective system
- No problems getting spare parts

For circuit breakers
Use types with visible contacts, quick-make and quick-break operation as standard. Use current-limiting circuit breakers for high short-circuit levels. Selective switches are recommended for the selective graduation of networks.

Advantage:

- Independence from local accident prevention regulations requiring visible contacts and safety faults caused by inexperienced operating personnel.
- The effects of short-circuits are kept to a minimum.
- Fuseless installations offer greater safety and reliability in plant operation. In the event of a fault, only the faulty section of the system is isolated.

For contactors
Use contactors whose entire range provides consistently reliable operation in the event of voltage drops (consistently down to 80% U_n should be aimed for) and whose contact system will not assume an indeterminate position either on closing or on opening in such conditions.

Advantage:

- During electrification work in areas such as Africa and the Middle East, an insufficient voltage stability is—at least for a certain time—likely in many applications (for example due to long spur lines or small local generators). The use of devices that fulfill the above requirements will eliminate one of the main failure causes related to contactors.

For enclosures
Use insulated enclosures with transparent covers (that is, "totally insulated" enclosures).

Advantage:

- Total insulation is the best possible protective measure from the user's point of view, avoiding reliance on the possibly doubtful skills of unknown installation personnel. Furthermore, protective measures based on earthing are often extremely difficult, if not impossible (in the Middle East, for example, due to the dryness of the ground).
- Insulated enclosures completely eliminate the need for any additional protection against corrosion. The transparent covers contribute significantly to the correct operation of a system, because switchgear operation can be monitored even with the doors or covers closed, thus virtually eliminating the possibility of these being left open through carelessness. The transparent cover is an important contribution to safety, especially where exports to areas of uncertain skills are concerned.

For overcurrent protective devices
Always use circuit breakers and motor-protective circuit breakers. Avoid fuses as much as possible.

Advantage:

- The operational reliability of a system is especially important for export contracts. Circuit breakers and motor-protective circuit breakers provide this reliability in full measure since they can be immediately reclosed once a fault has been cleared, they disconnect all poles, they have ideal protection through high tripping accuracy and they can be used for selective operation. Because they have no fuses or other consumables, they also greatly reduce the problem of obtaining replacement parts. The advantages of fuseless design for export are especially evident in this case. No complicated investigation is needed to find out which fusing system is used in the respective location and which specifications have to be followed to select the correct fuses. Often several different fuse systems with widely varying characteristics are used side-by-side in the same country. For the uninitiated, it may be almost impossible to find the right fuse in these circumstances. These problems do not arise where a circuit breaker is used.

1

For main switches and safety switches
Use devices with positive contact separation and clear switch position indication.

Advantage:

- The mechanical coupling of the actuating element with the contacts ensues that the OFF position is indicated only when all main contacts are separated by the prescribed distance and only in this position can the switch be padlocked. This ensures safety when carrying out maintenance and repair work on the installation or machinery.

Test Authorities

USA
USA
UL

Canada
CDN
CSA

Romania
RO
ICECON
ML PAT

Russia
RUS
GOST-R

South Africa
ZA
SABS

Slovakia
SK
SKTC

Poland
PL
BBJ-SEP

Turkey
TR
TSE

China
PRC
CCC

Ukraine
UA
Ukrain-GOST

Shipping Classifications

Germany
Germanischer Lloyd (GL)

Great Britain
Lloyd's Register of Shipping (LR)

France
Bureau Veritas (BV)

Russia
Russian Maritime Register of Shipping (RS)

Italy
Registro Italiano Navale (RINA)

Norway
Det Norske Veritas(DNV)

Poland
Polski Rejestr Statkow (PRS)

Approvals for North America

In the U.S., the legally established OSHA (Occupational Safety and Health Act) and the NEC (National Electrical Code) require the use of approved devices and systems.

In Canada, all electrical apparatus must comply with the CEC (Canadian Electrical Code), which requires that all equipment and installations have CSA approval.

In addition to the normal UL and CSA approvals, the trade regulations originating from the NAFTA agreements allow the application for a joint UL and CSA approval. The devices then carry a logo that is recognized in both countries.

Some local inspectors and end users still refuse to accept the joint listing.

Approvals for North America

Type of Approval	Approval Mark
The device is UL- and CSA-approved as discrete device.	
The device is CSA-approved as discrete device.	
The device is UL-approved as discrete device.	
The device contains UL-approved components; its approval conditions must be maintained in use (UL Recognized). The device is CSA-approved as discrete device.	

IEC Utilization Categories

(See also IEC/EN 60947-1; 2.1.18/IEV 441-17-19)

A combination of specified requirements relating to the condition in which the switching device or fuse fulfills its purpose and selected to represent a characteristic group of real-life applications. The specified requirements may, for example, relate to the values of making and breaking capacity and other characteristic values, data concerning associated circuits and the applicable conditions of use and operational behavior.

Used in Technical Data and Formula

Code	Description
DF	Duty factory
I_{Dn}	Response value of earth-fault release
I_{cm}	Rated short-circuit making capacity
I_{cn}	Rated short-circuit breaking capacity
I_{cs}	Rated service short-circuit breaking capacity
I_{cu}	Rated ultimate short-circuit breaking capacity
I_{cw}	Rated short-time withstand current
I_e	Rated operational current
I_k	Transformer initial short-circuit AC current
I_L	Load monitoring response value
I_n	Rated current
I_{NT}	Transformer rated current
I_{PK}	Rated peak withstand current
I_q	Rated conditional short-circuit current
I_r	Overcurrent release set value
I_{rm}	Response value of non-delayed short-circuit release
I_i	Response value of non-delayed short-circuit release
I_{rmf}	Response value of fixed, non-delayed short-circuit release

Code	Description
I_{rmv}	Response value of short-time delayed short-circuit release
I_{sd}	Response value of short-time delayed short-circuit release
I_T	Response value of earth-fault release
I_g	Response value of earth-fault release
I_{th}	Conventional free air thermal current
I_{the}	Conventional thermal current of enclosed devices
I_u	Rated uninterrupted current
S_{NT}	Transformer rating
t_r	Time delay of overload release response
t_T	Time delay of earth-fault release response
t_g	Time delay of earth-fault release response
t_v	Time delay of short-circuit release response
U_c	Rated actuating voltage
U_e	Rated operational voltage
U_i	Rated insulation voltage
U_{imp}	Rated impulse withstand voltage
U_k	Transformer short-circuit voltage
U_s	Rated control voltage

1

Annex A (informative)

Examples of Utilization Categories for Low Voltage Switchgear and Controlgear ①

Category	Typical Application	Relevant IEC Product Standard
Nature of Current—AC		
AC-1	Non-inductive or slightly inductive loads, resistance furnaces	60947-4-1
AC-2	Slip-ring motors: starting, switching off	60947-4-1
AC-3	Squirrel cage motors: starting, switching off motors during running	60947-4-1
AC-4	Squirrel cage motors: starting, plugging ②, inching ③	60947-4-1
AC-5a	Switching of electric discharge lamp controls	60947-4-1
AC-5b	Switching of incandescent lamps	60947-4-1
AC-6a	Switching of transformers	60947-4-1
AC-6b	Switching of capacitor banks	60947-4-1
AC-7a	Slightly inductive loads for household appliances and similar applications	61095
AC-7b	Motor-loads for household applications	61095
AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases	60947-4-1
AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases	60947-4-1
AC-12	Control of resistive loads and solid-state loads with isolation by optocouplers	60947-5-1
AC-12	Control of resistive loads and solid-state loads with optical isolation	60947-5-2
AC-13	Control of solid-state loads with transformer isolation	60947-5-1
AC-14	Control of small electromagnetic loads	60947-5-1
AC-15	Control of AC electromagnetic loads	60947-5-1
AC-20	Connecting and disconnecting under no-load conditions	60947-3
AC-21	Switching of resistive loads, including moderate overloads	60947-3
AC-22	Switching of mixed resistive and inductive loads, including moderate overloads	60947-3
AC-23	Switching of motor loads or other highly inductive loads	60947-3
AC-31	Non-inductive or slightly inductive loads	60947-6-1
AC-33	Motor loads or mixed loads including motors, resistive loads and up to 30% incandescent lamp loads	60947-6-1
AC-35	Electric discharge lamp loads	60947-6-1
AC-36	Incandescent lamp loads	60947-6-1
AC-40	Distribution circuits comprising mixed resistive and reactive loads having a resultant inductive reactance	60947-6-2
AC-41	Non-inductive or slightly inductive loads, resistance furnaces	60947-6-2
AC-42	Slip-ring motors: starting, switching off	60947-6-2
AC-43	Squirrel cage motors: starting, switching off motors during running	60947-6-2
AC-44	Squirrel cage motors: starting, plugging ②, inching ③	60947-6-2
AC-45a	Switching of electric discharge lamp controls	60947-6-2
AC-45b	Switching of incandescent lamps	60947-6-2
AC-51	Non-inductive or slightly inductive loads, resistance furnaces	60947-4-3
AC-52a	Control of slip ring motor stators: 8 h duty with on-load currents for start, acceleration, run	60947-4-2
AC-52b	Control of slip ring motor stators: intermittent duty	60947-4-2
AC-53a	Control of squirrel cage motors: 8 h duty with on-load currents for start, acceleration, run	60947-4-2
AC-53b	Control of squirrel cage motors: intermittent duty	60947-4-2
AC-55a	Switching of electric discharge lamp controls	60947-4-3
AC-55b	Switching of incandescent lamps	60947-4-3
AC-56a	Switching of transformers	60947-4-3
AC-56b	Switching of capacitor banks	60947-4-3

Notes

① 60947-1 © IEC: 2004.

② Plugging is stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

③ Inching (jogging) is energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Examples of Utilization Categories for Low-Voltage Switchgear and Controlgear, continued ①

Category	Typical Application	Relevant IEC Product Standard
Nature of Current—AC, continued		
AC-58a	Control of hermetic refrigerant compressor motors with automatic resetting of overload releases: h duty with on-load currents for start, acceleration, run	60947-4-2
AC-58b	Control of hermetic refrigerant compressor motors with automatic resetting of overload releases: intermittent duty	60947-4-2
AC-140	Control of small electromagnetic loads with holding (closed) current ≤0,2 A, for example, contactor relays	60947-5-2
Nature of Current—AC and DC		
A	Protection of circuits, with no rated short-time withstand current	60947-2
B	Protection of circuits, with a rated short-time withstand current	60947-2
Nature of Current—DC		
DC-1	Non-inductive or slightly inductive loads, resistance furnaces	60947-4-1
DC-3	Shunt-motors: starting, plugging ②, inching ③, dynamic breaking of motors	60947-4-1
DC-5	Series-motors: starting, plugging ②, inching ③, dynamic breaking of motors	60947-4-1
DC-6	Switching of incandescent lamps	60947-4-1
DC-12	Control of resistive loads and solid-state loads with isolation by optocouplers	60947-5-1
DC-12	Control of resistive loads and solid-state loads with optical isolation	60947-5-2
DC-13	Control of electromagnets	60947-5-1
DC-13	Control of electromagnets	60947-5-2
DC-14	Control of electromagnetic loads having economy resistors in circuit	60947-5-1
DC-20	Connecting and disconnecting under no-load conditions	60947-3
DC-21	Switching of resistive loads, including moderate overloads	60947-3
DC-22	Switching of mixed resistive and inductive loads, including moderate overloads (for example, shunt motors)	60947-3
DC-23	Switching of motor loads or other highly inductive loads (for example, series motors)	60947-3
DC-31	Resistive loads	60947-6-1
DC-33	Motor loads or mixed loads including motors	60947-6-1
DC-36	Incandescent lamp loads	60947-6-1
DC-40	Distribution circuits comprising mixed resistive and reactive loads having a resultant inductive reactance	60947-6-2
DC-41	Non-inductive or slightly inductive loads, resistance furnaces	60947-6-2
DC-43	Shunt-motors: starting, plugging ②, inching ③, dynamic breaking of DC	60947-6-2
DC-45	Series-motors: starting, plugging ②, inching ③, dynamic breaking of DC	60947-6-2
DC-46	Switching of incandescent lamps	60947-6-2

Notes

① 60947-1 © IEC: 2004.

② Plugging is stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

③ Inching (jogging) is energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

1

Motor Ratings Data

Ampere Rating of AC and DC Motors

Ampere ratings of motors vary somewhat, depending upon the type of motor. The values given below are for drip-proof, Class B insulated (T Frame) where available, 1.15 service factor, NEMA Design B motors. These values represent an average full load motor current that was calculated from the motor performance data published by several motor manufacturers. In the case of high torque squirrel cage motors, the ampere ratings will be at least 10% greater than the values given below.

Caution—These average ratings could be high or low for a specific motor and therefore heater coil selection on this basis always involves risk. For fully reliable motor protection, select heater coils on the basis of full load current rating as shown on the motor nameplate.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor

	Syn. Speed	Current in Amperes				
hp	RPM	200V	230V	380V ①	460V	575V
1/4	1800	1.09	0.95	0.55	0.48	0.38
	1200	1.61	1.40	0.81	0.70	0.56
	900	1.84	1.60	0.93	0.80	0.64
1/3	1800	1.37	1.19	0.69	0.60	0.48
	1200	1.83	1.59	0.92	0.80	0.64
	900	2.07	1.80	1.04	0.90	0.72
1/2	1800	1.98	1.72	0.99	0.86	0.69
	1200	2.47	2.15	1.24	1.08	0.86
	900	2.74	2.38	1.38	1.19	0.95
3/4	1800	2.83	2.46	1.42	1.23	0.98
	1200	3.36	2.92	1.69	1.46	1.17
	900	3.75	3.26	1.88	1.63	1.30
1	3600	3.22	2.80	1.70	1.40	1.12
	1800	4.09	3.56	2.06	1.78	1.42
	1200	4.32	3.76	2.28	1.88	1.50
	900	4.95	4.30	2.60	2.15	1.72
1-1/2	3600	5.01	4.36	2.64	2.18	1.74
	1800	5.59	4.86	2.94	2.43	1.94
	1200	6.07	5.28	3.20	2.64	2.11
	900	6.44	5.60	3.39	2.80	2.24
2	3600	6.44	5.60	3.39	2.80	2.24
	1800	7.36	6.40	3.87	3.20	2.56
	1200	7.87	6.84	4.14	3.42	2.74
	900	9.09	7.90	4.77	3.95	3.16
3	3600	9.59	8.34	5.02	4.17	3.34
	1800	10.8	9.40	5.70	4.70	3.76
	1200	11.7	10.2	6.20	5.12	4.10
	900	13.1	11.4	6.90	5.70	4.55
5	3600	15.5	13.5	8.20	6.76	5.41
	1800	16.6	14.4	8.74	7.21	5.78
	1200	18.2	15.8	9.59	7.91	6.32
	900	18.3	15.9	9.60	7.92	6.33
7-1/2	3600	22.4	19.5	11.8	9.79	7.81
	1800	24.7	21.5	13.0	10.7	8.55
	1200	25.1	21.8	13.2	10.9	8.70
	900	26.5	23.0	13.9	11.5	9.19
10	3600	29.2	25.4	15.4	12.7	10.1
	1800	30.8	26.8	16.3	13.4	10.7
	1200	32.2	28.0	16.9	14.0	11.2
	900	35.1	30.5	18.5	15.2	12.2

Note

① 380V 50 Hz.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor, continued

hp	Syn. Speed RPM	Current in Amperes 200V	230V	380V ①	460V	575V
15	3600	41.9	36.4	22.0	18.2	14.5
	1800	45.1	39.2	23.7	19.6	15.7
	1200	47.6	41.4	25.0	20.7	16.5
	900	51.2	44.5	26.9	22.2	17.8
20	3600	58.0	50.4	30.5	25.2	20.1
	1800	58.9	51.2	31.0	25.6	20.5
	1200	60.7	52.8	31.9	26.4	21.1
	900	63.1	54.9	33.2	27.4	21.9
25	3600	69.9	60.8	36.8	30.4	24.3
	1800	74.5	64.8	39.2	32.4	25.9
	1200	75.4	65.6	39.6	32.8	26.2
	900	77.4	67.3	40.7	33.7	27.0
30	3600	84.8	73.7	44.4	36.8	29.4
	1800	86.9	75.6	45.7	37.8	30.2
	1200	90.6	78.8	47.6	39.4	31.5
	900	94.1	81.8	49.5	40.9	32.7
40	3600	111	96.4	58.2	48.2	38.5
	1800	116	101	61.0	50.4	40.3
	1200	117	102	61.2	50.6	40.4
	900	121	105	63.2	52.2	41.7
50	3600	138	120	72.9	60.1	48.2
	1800	143	124	75.2	62.2	49.7
	1200	145	126	76.2	63.0	50.4
	900	150	130	78.5	65.0	52.0
60	3600	164	143	86.8	71.7	57.3
	1800	171	140	90.0	74.5	59.4
	1200	173	150	91.0	75.0	60.0
	900	177	154	93.1	77.0	61.5

hp	Syn. Speed RPM	Current in Amperes 200V	230V	380V ①	460V	575V
75	3600	206	179	108	89.6	71.7
	1800	210	183	111	91.6	73.2
	1200	212	184	112	92.0	73.5
	900	222	193	117	96.5	77.5
100	3600	266	231	140	115	92.2
	1800	271	236	144	118	94.8
	1200	275	239	145	120	95.6
	900	290	252	153	126	101
125	3600	—	292	176	146	116
	1800	—	293	177	147	117
	1200	—	298	180	149	119
	900	—	305	186	153	122
150	3600	—	343	208	171	137
	1800	—	348	210	174	139
	1200	—	350	210	174	139
	900	—	365	211	183	146
200	3600	—	452	257	226	181
	1800	—	458	265	229	184
	1200	—	460	266	230	184
	900	—	482	279	241	193
250	3600	—	559	338	279	223
	1800	—	568	343	284	227
	1200	—	573	345	287	229
	900	—	600	347	300	240
300	1800	—	678	392	339	271
	1200	—	684	395	342	274
400	1800	—	896	518	448	358
500	1800	—	1110	642	555	444

Single-Phase AC Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. Motors built for especially low speeds or high torques may have higher full-load currents and multispeed motors will have full-load current varying with speed, in which case the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240V.

Full-Load Currents in Amperes, Single-Phase Alternating-Current Motor

hp	115V	200V	208V	230V
1/6	4.4	2.5	2.4	2.2
1/4	5.8	3.3	3.2	2.9
1/3	7.2	4.1	4.0	3.6
1/2	9.8	5.6	5.4	4.9
3/4	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8
1-1/2	20	11.5	11	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7-1/2	80	46	44	40
10	100	57.5	55	50

Note

① 380V 50 Hz.

Three-Phase AC Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics.

Motors built for low speeds (1,200 RPM or less) or high torques may require more running current and multi-speed motors will have full-load current varying with speed. In these cases the nameplate current rating shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480 and 550 to 600V.

Full-Load Current Three-Phase Alternating-Current Motors

	Induction Type Squirrel Cage and Wound-Rotor Amperes						Synchronous Type Unity Power Factor ① Amperes		
hp	**115V**	**200V**	**208V**	**230V**	**460V**	**575V**	**230V**	**460V**	**575V**
1/2	4.4	2.5	2.4	2.2	1.1	.9	—	—	—
3/4	6.4	3.7	3.5	3.2	1.6	1.3	—	—	—
1	8.4	4.8	4.6	4.2	2.1	1.7	—	—	—
1-1/2	12.0	6.9	6.6	6.0	3.0	2.4	—	—	—
2	13.6	7.8	7.5	6.8	3.4	2.7	—	—	—
3	—	11.0	10.6	9.6	4.8	3.9	—	—	—
5	—	17.5	16.7	15.2	7.6	6.1	—	—	—
7-1/2	—	25.3	24.2	22	11	9	—	—	—
10	—	32.2	30.8	28	14	11	—	—	—
15	—	48.3	46.2	42	21	17	—	—	—
20	—	62.1	59.4	54	27	22	—	—	—
25	—	78.2	74.8	68	34	27	53	26	21
30	—	92	88	80	40	32	63	32	26
40	—	120	114	104	52	41	83	41	33
50	—	150	143	130	65	52	104	52	42
60	—	177	169	154	77	62	123	61	49
75	—	221	211	192	96	77	155	78	62
100	—	285	273	248	124	99	202	101	81
125	—	359	343	312	156	125	253	126	101
150	—	414	396	360	180	144	302	151	121
200	—	552	528	480	240	192	400	201	161
250	—	—	—	—	302	242	—	—	—
300	—	—	—	—	361	289	—	—	—
350	—	—	—	—	414	336	—	—	—
400	—	—	—	—	477	382	—	—	—
450	—	—	—	—	515	412	—	—	—
500	—	—	—	—	590	472	—	—	—

Note

① For 90 and 80 percent power factor, the above figures shall be multiplied by 1.1 and 1.25 respectively.

DC Motors

The following values of full-load currents are for motors running at base speed.

Full-Load Current in Amperes, Direct-Current Motors

	Armature Voltage Rating ①		Ampere Capacity of Fuses for Motors Recommended Values	
hp	120V	240V	120V	240V
1/4	3.1	1.6	5	3
1/3	4.1	2.0	5	3
1/2	5.4	2.7	7	3
3/4	7.6	3.8	10	5
1	9.5	4.7	15	7
1-1/2	13.2	6.6	20	10
2	17	8.5	25	12
3	25	12.2	30	15
5	40	20	50	25
7-1/2	58	29	80	40
10	76	38	100	50
15	—	55	—	75
20	—	72	—	100
25	—	89	—	125
30	—	106	—	150
40	—	140	—	200
50	—	173	—	250
60	—	206	—	275
75	—	255	—	350
100	—	341	—	500
125	—	425	—	600
150	—	506	—	—
200	—	675	—	—

Note

① These are average direct-current quantities.

Ampacities of Insulated Conductors (Based on 2005 NEC)

Table 310.16. Allowable Ampacities of Insulated Conductors Rated 0–2000V, 60°–90°C [140°–194°F], Not More Than Three Current-Carrying Conductors in Raceway or Cable or Earth (Directly Buried), Based on Ambient Temperature of 30°C [86°F] ①

Temperature Rating of Conductor. See NEC Table 310-13.							
Copper				Aluminum or Copper-Clad Aluminum			
60°C [140°F]	75°C [167°F]	90°C [194°F]		60°C [140°F]	75°C [167°F]	90°C [194°F]	
Size AWG kcmil	Types TW†, UF ②	Types FEPW ②, RH ②, RHW ②, THHW ②, THW ②, THWN ②, XHHW ②, USE ②, ZW ②	Types TBS, SA, SIS, FEP ②, FEPB ②, MI, RHH ②, RHW-2, THHN ②, THHW ②, THW-2 ②, THWN-2 ②, USE-2, XHH, XHHW ②, XHHW-2, ZW-2	Types TW ②, UF ②	Types RH ②, RHW ②, THHW ②, THW ②, THWN ②, XHHW ②, USE ②	Types TBS, SA, SIS, THHN ②, THHW ②, THW-2, THWN-2, RHH ②, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Size AWG kcmil
18	—	—	14	—	—	—	—
16	—	—	18	—	—	—	—
14	20†	20†	25†	—	—	—	—
12	25†	25†	30†	20†	20†	25†	12
10	30	35†	40†	25	30†	35†	10
8	40	50	55	30	40	45	8
6	55	65	75	40	50	60	6
70	85	95	55	65	75	4	70
85	100	110	65	75	85	3	85
95	115	130	75	90	100	2	95
110	130	150	85	100	115	1	110
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	190	230	255	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	355	420	475	285	340	385	600
700	385	460	520	310	375	420	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	450	800
600	355	420	475	285	340	385	600
700	385	460	520	310	375	420	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	450	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	520	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	560	665	750	470	560	630	2000

Notes

① Reprinted by permission from NFPA 70-2005. National Electrical Code®, Copyright© 2005. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

② Unless otherwise specifically permitted elsewhere in this *Code*, the overcurrent protection for conductor types marked with an obelisk (†) shall not exceed 15A for No. 14, 20A for No. 12 and 30A for No. 10 copper; or 15A for No. 12 and 25A for No. 10 aluminum and copper-clad aluminum after any correction factors for ambient temperature and number of conductors have been applied.

Table 310.16. Allowable Ampacities of Insulated Conductors Rated 0–2000V, 60°–90°C [140°–194°F], Not More Than Three Current-Carrying Conductors in Raceway or Cable or Earth (Directly Buried), Based on Ambient Temperature of 30°C [86°F]—Correction Factors ①

Temperature Rating of Conductor. See NEC Table 310-13.								
Copper				Aluminum or Copper-Clad Aluminum			
60°C [140°F]	75°C [167°F]	90°C [194°F]		60°C [140°F]	75°C [167°F]	90°C [194°F]	
Size		Types FEPW ②, RH ②, RHW ②, THHW ②, THW ②,	Types TBS, SA, SIS, FEP ②, FEPB ②, MI, RHH ②, RHW-2, THHN ②, THHW ②,		Types RH ②, RHW ②, THHW ②, THW ②,	Types TBS, SA, SIS, THHN ②, THHW ②, THW-2, THWN-2,	Size
AWG kcmil	Types TW†, UF ②	THWN ②, XHHW ②, USE ②, ZW ②	THW-2 ②, THWN-2 ②, USE-2, XHH, XHHW ②, XHHW-2, ZW-2	Types TW ②, UF ②	THWN ②, XHHW ②, USE ②	RHH ②, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	AWG kcmil
Ambient Temp. °C	For Ambient Temperatures Other Than 30°C [86°F], Multiply the Allowable Ampacities Shown in the Table on Page V5-T1-256 by the Appropriate Factor Shown Below			For Ambient Temperatures Other Than 30°C [86°F], Multiply the Allowable Ampacities Shown in the Table on Page V5-T1-256 by the Appropriate Factor Shown Below			Ambient Temp. °F
21–25	1.08	1.05	1.04	1.08	1.05	1.04	70–77
26–30	1.00	1.00	1.00	1.00	1.00	1.00	78–86
31–35	0.91	0.94	0.96	0.91	0.94	0.96	87–95
36–40	0.82	0.88	0.91	0.82	0.88	0.91	96–104
41–45	0.71	0.82	0.87	0.71	0.82	0.87	105–113
46–50	0.58	0.75	0.82	0.58	0.75	0.82	114–122
51–55	0.41	0.67	0.76	0.41	0.67	0.76	123–131
56–60	—	0.58	0.71	—	0.58	0.71	132–140
61–70	—	0.33	0.58	—	0.33	0.58	141–158
71–80	—	—	0.41	—	—	0.41	159–176

Where the number of current-carrying conductors in a raceway or cable exceeds three, the allowable ampacities shall be reduced as shown in the following table:

Table 310.15 (B)(2)(a). Adjustment Factor for More Than Three Current-Carrying Conductors in Raceway or Cable

Number of Current-Carrying Conductors	Percent of Values in Tables as Adjusted for Ambient Temperature if Necessary
4–6	80
7–9	70
10–20	50
21–30	45
31–40	40
41 and above	35

Where single conductors or multiconductor cables are stacked or bundled longer than 24 in (610 mm) without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in the above table.

Notes

① Reprinted by permission from NFPA 70-2005. National Electrical Code®, Copyright© 2005. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

② Unless otherwise specifically permitted elsewhere in this *Code*, the overcurrent protection for conductor types marked with an obelisk (†) shall not exceed 15A for No. 14, 20A for No. 12 and 30A for No. 10 copper; or 15A for No. 12 and 25A for No. 10 aluminum and copper-clad aluminum after any correction factors for ambient temperature and number of conductors have been applied.

1

Table 310.18. Allowable Ampacities of Three Single Insulated Conductors Rated 0–2000V, 150°–250°C [302°–482°F], in Raceway or Cable Based on Ambient Air Temperature of 40°C [104°F] ①

Size	Temperature Rating of Conductor. See NEC Table 310-13.				Size
	150°C [302°F]	200°C [392°F]	250°C [482°F]	150°C [302°F]	
	Type Z	Types FEP, FEPB, PFA	Types PFAH, TFE	Type Z	
AWG kcmil	Copper		Nickel or Nickel-Coated Copper	Aluminum or Copper-Clad Aluminum	AWG kcmil
14	34	36	39	—	14
12	43	45	54	30	12
10	55	60	73	44	10
8	76	83	93	57	8
6	96	110	117	75	6
4	120	125	148	94	4
3	143	152	166	109	3
2	160	171	191	124	2
1	186	197	215	145	1
1/0	215	229	244	169	1/0
2/0	251	260	273	198	2/0
3/0	288	297	308	227	3/
4/0	332	346	361	260	4/0
250	—	—	—	—	250
300	—	—	—	—	300
350	—	—	—	—	350
400	—	—	—	—	400
500	—	—	—	—	500
600	—	—	—	—	600
700	—	—	—	—	700
750	—	—	—	—	750
800	—	—	—	—	800
1000	—	—	—	—	1000
1500	—	—	—	—	1500
2000	—	—	—	—	2000

Correction Factors

Ambient Temp. °C	For Ambient Temperatures Other Than 40°C [104°F], Multiply the Allowable Ampacities Shown Above By the Appropriate Factor Shown Below				Ambient Temp. °F
41–50	0.95	0.97	0.98	0.95	105–122
51–60	0.90	0.94	0.95	0.90	123–140
61–70	0.85	0.90	0.93	0.85	141–158
71–80	0.80	0.87	0.90	0.80	159–176
81–90	0.74	0.83	0.87	0.74	177–194
91–100	0.67	0.79	0.85	0.67	195–212
101–120	0.52	0.71	0.79	0.52	213–248
121–140	0.30	0.61	0.72	0.30	249–284
141–160	—	0.50	0.65	—	285–320
161–180	—	0.35	0.58	—	321–356
181–200	—	—	0.49	—	357–392
201–225	—	—	0.35	—	393–437

Note

① Reprinted by permission from NFPA 70-2005. National Electrical Code®, Copyright© 2005. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NEMA Contactors and Starters

NEMA AN16DN0AB
NEMA Size 1 Starter



NEMA Size 1 Contactor



NEMA Space-Savings Size 1C Contactor



2.1 Freedom Series

Product Overview V5-T2-2
Features, Benefits and Functions V5-T2-2
Standards and Certifications V5-T2-3
Catalog Number Selection V5-T2-3
Contactors—Non-Reversing and Reversing V5-T2-4
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage V5-T2-10
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload V5-T2-15
Accessories V5-T2-21
Renewal Parts V5-T2-30
Technical Data and Specifications V5-T2-35
Relays—Thermal Overload V5-T2-39
C440/***XT*** Electronic Overload Relay V5-T2-48

2.2 Space-Savings Series

Contactors and Starters
- Product Description V5-T2-63
- Product Selection V5-T2-64
- Technical Data and Specifications V5-T2-71

XTOE/***XT*** Electronic Overload Relay
- Product Description V5-T2-78
- Product Selection V5-T2-81
- Technical Data and Specifications V5-T2-85

2.3 A200 Series

Contactors—Non-Reversing and Reversing V5-T2-97
Starters—Non-Reversing and Reversing V5-T2-103
Relays—Thermal and Fast Trip V5-T2-124
Thermal Type B, Class 20, Manual Reset V5-T2-126
Thermal Type A, Class 20, Auto/Manual Reset V5-T2-129
Type FT Fast Trip, Class 10 . . . . . V5-T2-132
Heater Selection V5-T2-135
Relays—Current Sensing Protective V5-T2-137

2.4 Solenoids—Alternating Current

Product Description V5-T2-140
Product Selection V5-T2-141
Dimensions V5-T2-142

2.5 Shoe Brakes—AC and DC Magnetic

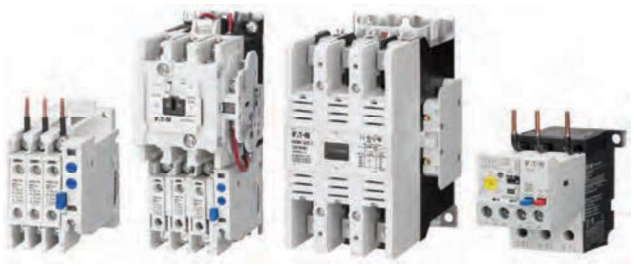
Product Description V5-T2-143
Product Selection V5-T2-144
Dimensions V5-T2-146

2.6 Reference Data

IEC Utilization Categories V5-T2-148
Annex A (informative) V5-T2-149
Motor Ratings Data V5-T2-151

Drawings Online

Freedom Series



Contents

Description	*Page*
Freedom Series	
Standards and Certifications	**V5-T2-3**
Catalog Number Selection	**V5-T2-3**
Contactors—Non-Reversing and Reversing	**V5-T2-4**
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage	**V5-T2-10**
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload	**V5-T2-15**
Accessories	**V5-T2-21**
Renewal Parts	**V5-T2-30**
Technical Data and Specifications	**V5-T2-35**
Relays—Thermal Overload	**V5-T2-39**
C440/***XT*** Electronic Overload Relay	**V5-T2-48**

Product Overview

Freedom Series starters and contactors feature a compact, space-saving design, using state-of-the-art technology and the latest in high strength, impact and temperature resistant insulating materials.

Features, Benefits and Functions

Freedom NEMA

- Adjustable bimetallic ambient compensated overload relays with interchangeable heater packs—available in three basic sizes, covering applications up to 900 hp—reducing the number of different contactor/overload relay combinations that have to be stocked. Fixed heater overloads are optional
- Electronic overload relay (C440) available as a stand-alone unit and assembled with Freedom Contactor
- 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 ± 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
- Designed to meet or exceed NEMA, UL, CSA, VDE, BS and other international standards and listings
- American engineering—built by Eaton, using the latest in statistical process control methods to produce high quality, reliable products
- Sized based on standard NEMA classifications
- Easy coil change and inspectable/replaceable contacts
- Available in open and NEMA Type 1, 3R, 4/4X and 12 enclosures

Standards and Certifications

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

Listed

ISO 9000 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. This commitment to quality will result in increased product reliability and total customer satisfaction.

Short Circuit Protection

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

Catalog Number Selection

Freedom Series

A N 1 9 A N 0 A 5E 005

Device Type

A	= Starter
C	= Contactor

Standard

E	= IEC
N	= NEMA

Device Assembly Configuration

70	= Multi-speed
1	= Non-reversing
5	= Reversing

OLR Type

5	= Contactor only—no overload relay
6	= Starter w/C306 bi-metal OLR
9	= Starter w/C440 electronic overload

Contactor Frame Size ①

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

NEMA Enclosure

N	= Open

For Starters

Starter Mounting Option

0	= Horizontal
V	= Vertical ②
For Contactors Only	
2	= Two-pole
3	= Three-pole
4	= Four-pole
5	= Five-pole

AC Coil Suffix

Suffix	Coil Volts and Hertz
A	= 120/60 or 110/50
B	= 240/60 or 220/50
C	= 480/60 or 440/50
D	= 600/60 or 550/50
E	= 208/60
H	= 277/60
J	= 208 – 240/60 ③
K	= 240/50
L	= 380 – 415/50
N	= 550/50
T	= 24/60, 24/50 ④
U	= 24/50
V	= 32/50
W	= 48/60
Y	= 48/50

C440 OLR Designation (FVNR and FVR only)

5E	= Standard feature set SEL Reset, SEL Class (10A, 10, 20, 30)
5G	= Ground fault feature set SEL Reset, SEL Class (10, 20)

C440 FLA Range (FVNR and FVR only)

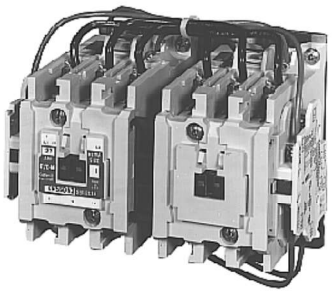
NEMA Size 00	
1P6	= 0.33–1.65A
005	= 1–5A
020	= 4–20A
NEMA Size 0	
1P6	= 0.33–1.65A
005	= 1–5A
020	= 4–20A
NEMA Size 1	
1P6	= 0.33–1.65A
005	= 1–5A
020	= 4–20A
045	= 9–45A
NEMA Size 2	
005	= 1–5A
020	= 4–20A
045	= 9–45A
NEMA Size 3	
100	= 20–100A
NEMA Size 4	
140	= 28–140A
NEMA Size 5 ⑤	
300	= 60–300A

Notes

① For contactor only orders, add **B** to end of catalog number if NEMA Size 00–2, 6.
② Only available on AN56 reversing starters.
③ NEMA Sizes 00 and 0 only.
④ NEMA Sizes 00 and 0 only. Sizes 1–8 are 24/60 only.
⑤ NEMA Size 5 requires the use of CTs with 1-5A OL relay.

Non-Reversing and Reversing Contactors





Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	
Product Selection	**V5-T2-5**
Kits and Accessories	**V5-T2-6**
Renewal Parts Publication Numbers	**V5-T2-6**
Technical Data and Specifications	**V5-T2-7**
Dimensions	**V5-T2-8**
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage	**V5-T2-10**
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload	**V5-T2-15**
Accessories	**V5-T2-21**
Renewal Parts	**V5-T2-30**
Technical Data and Specifications	**V5-T2-35**
Relays—Thermal Overload	**V5-T2-39**

Contactors—Non-Reversing and Reversing

Product Description

Non-Reversing

Contactors are most commonly used to switch motor loads in applications where running overcurrent protection is either not required or is provided separately. Contactors consist of a magnetically actuated switch which can be remotely operated by a pushbutton station or pilot device such as a proximity switch, limit switch, float switch, auxiliary contacts, and so on.

Reversing

Reversing contactors are used primarily for reversing single- or three-phase motors in applications where running overcurrent protection is either not required or is provided separately. They consist of two contactors mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features, Benefits and Functions

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

Non-Reversing

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

Reversing

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

Product Selection

Three-Pole Contactors

NEMA Size 00
CN55AN3AB



NEMA Size 0
CN15BN3AB



NEMA Size 3
CN15KN3A



Type CN15/CN55 NEMA Contactors—Non-Reversing and Reversing

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

Magnet Coils—AC and DC

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

For Sizes 00–2, the magnet coil alpha designation will be the next to the last digit of the listed catalog number.

EXAMPLE: For a 380V, 50 Hz coil, change CN15AN3_B to CN15AN3**L**B. For all other sizes, the magnet coil alpha designation will be the last digit of the listed catalog number.

For **DC Magnet Coils**, see Accessories, **Pages V5-T2-28** and **V5-T2-29**.

AC Suffix

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208–240/60 ③	**J**
240/50	**K**

Coil Volts and Hertz	Code Suffix
380–415/50	**L**
550/50	**N**
24/60, 24/50 ④	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

Notes

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

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

② Common control. For separate 120V control, insert letter **D** in 7th position of listed catalog number. Example:CN15VN**D**3C.

③ NEMA Sizes 00 and 0 only.

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

Two-, Four- and Five-Pole Contactors

NEMA Size 2 Five-Pole Contactor CN15GN5AB



Type CN15 NEMA Contactors—Non-Reversing

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

Magnet Coils—AC and DC

Select required starter by catalog number and replace the magnet coil alpha designation in the catalog number (_) with the proper code suffix from the table.

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

For **DC Magnet Coils**, see Accessories, **Pages V5-T2-28** and **V5-T2-29**.

AC Suffix

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208–240/60 ①	**J**
240/50	**K**

Coil Volts and Hertz	Code Suffix
380–415/50	**L**
550/50	**N**
24/60, 24/50 ②	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

Kits and Accessories

- Auxiliary contacts, contactor mounted—**Pages V5-T2-25** to **V5-T2-27**
- Transient suppressor, for magnet coil—**Page V5-T2-24**
- Timers—solid-state and pneumatic, mount on contactor—**Page V5-T2-22**

Publication Numbers

- See **Page V5-T2-30**

Renewal Parts

Notes

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

Technical Data and Specifications

Wire (75°C) Sizes—AWG or kcmil—Open and Enclosed

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

Plugging and Jogging Service Horsepower Ratings ②

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

Notes

① Two compartment box lug.

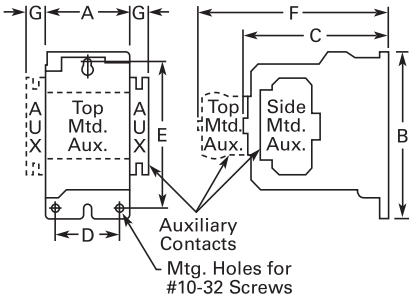
② Maximum horsepower where operation is interrupted more than 5 times per minute or more than 10 times in a 10 minute period. NEMA standard ICS 2-1993 table 2-4-3.

Dimensions

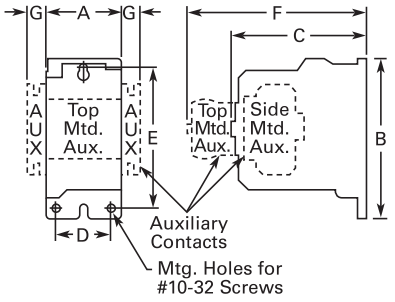
Approximate Dimensions in Inches (mm)

2

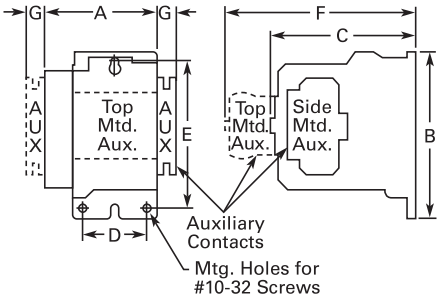
Non-Reversing Contactors—Open Type



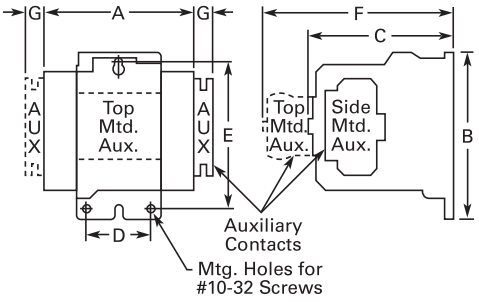
Sizes 00, Two- to Four-Pole



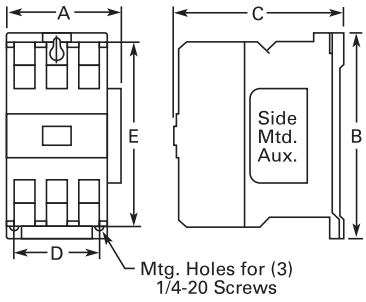
Sizes 0–2, Two- and Three-Pole



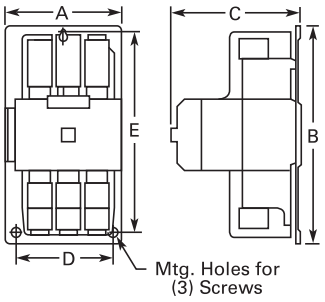
Sizes 0–2, Two- and Three-Pole



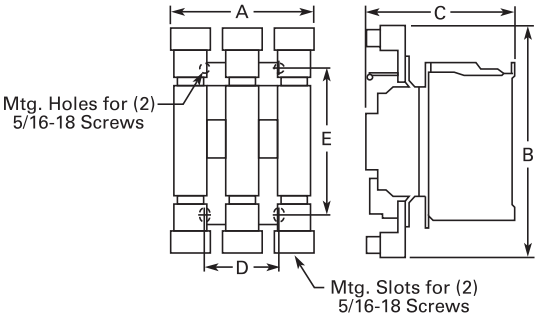
Sizes 1–2, Five-Pole



Size 3



Sizes 4–5



Size 6

Dimensions and Shipping Weights

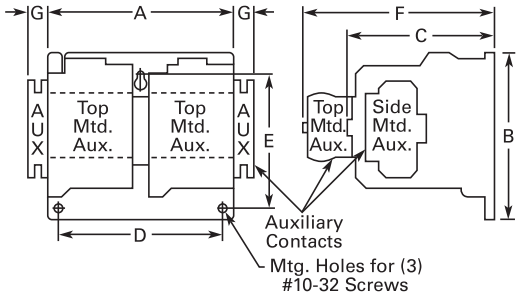
NEMA Size	Number of Poles	Wide A	High B	Deep C	Mounting D	Mounting E	F	G	Shipping Weight Lbs (kg)
00	2–4	1.75 (44.5)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1) ①	3.38 (85.9)	4.62 (117.3)	0.54 (13.7)	1.7 (0.7)
0	2–3	1.75 (44.5)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1) ①	3.38 (85.9)	4.62 (117.3)	0.54 (13.7)	1.8 (0.8)
1–2	2–3	2.56 (65.0)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8) ①	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.1 (1.4)
1–2	4	3.44 (87.4)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8) ①	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.6 (1.6)
1–2	5	4.32 (109.7)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8) ①	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	4.0 (1.8)
3	2–3	4.08 (103.6)	7.17 (182.1)	5.94 (150.9)	3.00 (76.2)	6.63 (168.4)	—	—	8.5 (3.9)
4	2–3	7.05 (179.1)	9.11 (231.4)	7.25 (184.2)	6.00 (152.4)	8.50 (215.9)	—	—	20.0 (9.1)
5	2–3	7.05 (179.1)	13.12 (333.2)	7.78 (197.6)	6.00 (152.4)	12.50 (317.5)	—	—	23.0 (10.4)
6	3	8.63 (219.2)	13.54 (343.9)	8.88 (225.6)	4.33 (110.0)	8.63 (219.2)	—	—	35.0 (15.9)
7	3	11.02 (279.9)	19.30 (490.2)	11.46 (291.1)	6.89 (175.0)	11.02 (279.9)	—	—	100.0 (45.4)
8	3	13.00 (330.2)	24.50 (622.3)	13.63 (346.2)	4.22 (107.2)	14.86 (377.4)	—	—	160.0 (72.6)

Note

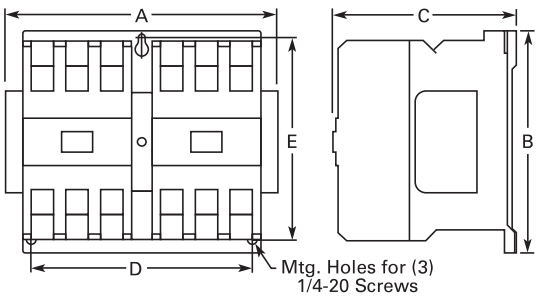
① Center mounting slot at bottom supplied only on Size 00 and 0 contactors.

Approximate Dimensions in Inches (mm)

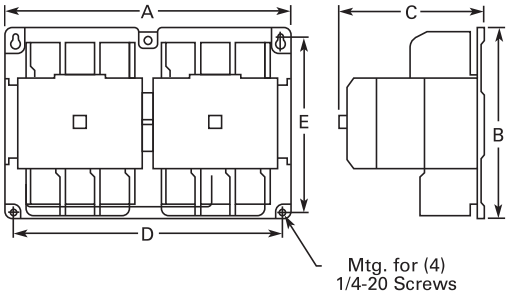
Reversing Contactors—Open Type



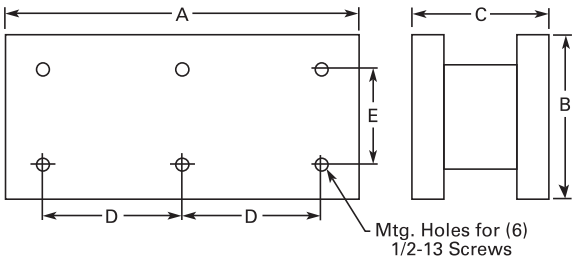
Sizes 00–2



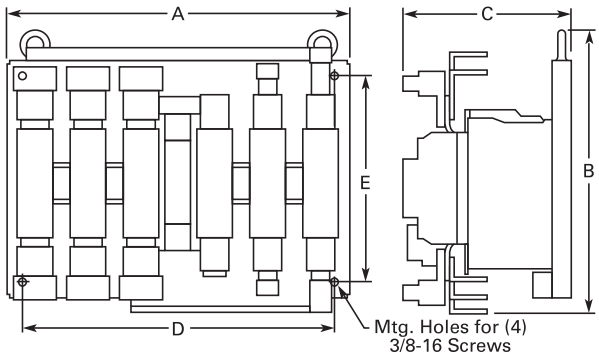
Size 3



Sizes 4–5



Open Type—Sizes 7–8 Horizontal



Size 6

Dimensions and Shipping Weights

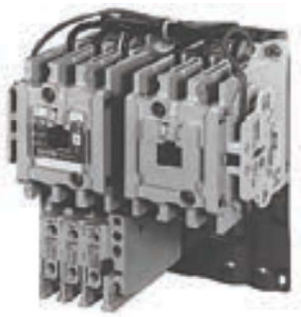
NEMA Size	Wide A	High B	Deep C	Mounting D	Mounting E	F	G	Shipping Weight Lbs (kg)
00–0	4.20 (106.7)	4.35 (110.5)	3.52 (89.4)	3.50 (88.9)	3.86 (98.0)	4.90 (124.5)	0.54 (13.7)	3.3 (1.5)
1–2	5.71 (145.0)	5.05 (128.3)	4.44 (112.8)	5.25 (133.4)	3.63 (92.2)	5.80 (147.3)	0.54 (13.7)	7.8 (3.5)
3	8.70 (221.0)	7.17 (182.1)	5.94 (150.9)	7.00 (177.8)	6.63 (168.4)	—	—	17.0 (7.7)
4	14.68 (372.9)	9.11 (231.4)	7.25 (184.2)	13.50 (342.9)	8.50 (215.9)	—	—	47.0 (21.3)
5	14.50 (368.3)	12.25 (311.2)	7.78 (197.6)	13.50 (342.9)	11.50 (292.1)	—	—	63.0 (28.6)
6	19.77 (502.2)	16.61 (421.9)	9.90 (251.5)	18.00 (457.2)	12.00 (304.8)	—	—	80.0 (36.3)
7	28.00 (711.2)	26.75 (679.5) ①	12.75 (323.9)	12.75 (323.9)	11.00 (279.4)	—	—	260.0 (118.0)
8	30.13 (765.3)	39.00 (990.6) ①	14.69 (373.1)	14.13 (358.9)	15.00 (381.0)	—	—	350.0 (158.9)

Note

① Includes cross wiring.

Three-Phase Non-Reversing and Reversing, Full Voltage Starters





Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-4**
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage	
Product Selection	**V5-T2-11**
Kits and Accessories	**V5-T2-13**
Renewal Parts Publication Numbers	**V5-T2-13**
Technical Data and Specifications	**V5-T2-13**
Wiring Diagrams	**V5-T2-14**
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload	**V5-T2-15**
Accessories	**V5-T2-21**
Renewal Parts	**V5-T2-30**
Technical Data and Specifications	**V5-T2-35**
Relays—Thermal Overload	**V5-T2-39**
C440/***XT*** Electronic Overload Relay	**V5-T2-48**

Starters—Three-Phase Non-Reversing and Reversing, Full Voltage

Product Description

Non-Reversing

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

Reversing

Three-phase, full voltage magnetic starters are used primarily for reversing of three-phase squirrel cage motors. They consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features, Benefits and Functions

- Bimetallic ambient compensated overload relays—available in three basic sizes covering applications up to 900 hp—reducing number of different contactor/overload relay combinations that have to be stocked

  These overload relays feature:
  - Selectable manual or automatic reset operation
  - Interchangeable heater packs adjustable ±24% to match motor FLA and calibrated for 1.0 and 1.15 service factors. Heater packs for smaller overload relay will mount in larger overload relay—useful in derating applications such as jogging
  - Load lugs built into relay base
  - Single-phase protection, Class 20 or Class 10 trip time
  - Overload trip indication
  - Electrically isolated NO-NC contacts (pull RESET button to test)
- The C440 is a self-powered, robust electronic overload designed for integrated use with Freedom NEMA contactors
  - Tiered feature set to provide coverage specific to your application
  - Broad 5: 1 FLA range for maximum flexibility
  - Coverage from 0.05–1500A to meet all your needs
- Long life twin break, silver cadmium oxide contacts—provide excellent conductivity and superior resistance to welding and arc erosion. Generously sized for low resistance and cool operation
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V
- Steel mounting plate standard on all open type starters
- Wired for separate or common control

Non-Reversing

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

Reversing

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

Product Selection

When Ordering Supply

- Catalog number
- Heater pack number (see selection table, **Pages V5-T2-41** to **V5-T2-43**) or full load current

Size 0
Non-Reversing Starter



Size 1
Reversing Starter



Type AN16/AN56 NEMA—Manual or Automatic Reset Overload Relay—Non-Reversing and Reversing ①

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

Magnet Coils—AC or DC

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

For Sizes 00–2 and 5–8, the magnet coil alpha designation will be the next to last digit of the listed catalog number.

EXAMPLE: For a 380V, 50 Hz coil, change AN16BN0_C to AN16BN0**L**C. For all other sizes, the magnet coil alpha designation will be the last digit of the listed catalog number.

For **DC Magnet Coils**, see Accessories, **Pages V5-T2-28** and **V5-T2-29**.

AC Suffix

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208–240/60 ⑥	**J**
240/50	**K**

Coil Volts and Hertz	Code Suffix
380–415/50	**L**
550/50	**N**
24/60, 24/50 ⑦	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**
48/50	**Y**

Notes

① Starter catalog numbers do not include heater packs. Select one carton of three heater packs. Heater pack selection, **Pages V5-T2-41** to **V5-T2-43**.

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

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

③ Underscore (_) indicates coil suffix required, see AC Suffix table.

④ The service-limit current ratings represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.

⑤ Common control. For separate 120V control, insert letter **D** in 7th position of listed catalog number. Example: AN56VN**D**0CB.

⑥ NEMA Sizes 00 and 0 only.

⑦ NEMA Sizes 00 and 0 only. Sizes 1–8 are 24/60 only.

2

Two-Speed Selective Control

When Ordering Supply

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

For two-speed other than selective control:

- Catalog number plus magnet coil code suffix and option required. Example: AN700BN022B except compelling
- Heater pack number or full load current for each speed

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

Two-Winding AN700DN022



Separate Winding ①

Maximum Horsepower—60/50 Hertz

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

Prices of starters do not include heater packs. Select two packs (two overload relays, one for each speed). Heater pack selection, **Pages V5-T2-41** to **V5-T2-43**.

One-Winding AN700BN0218



One-Winding AN700DN0218



Reconnectable Winding ①

Maximum Horsepower—60/50 Hertz

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

Prices of starters do not include heater packs. Select two packs (two overload relays, one for each speed). Heater pack selection, **Pages V5-T2-41** to **V5-T2-43**.

Magnetic Coils—AC or DC

Coil Voltage and Hz	Code Suffix	Coil Voltage and Hz	Code Suffix	Coil Voltage and Hz	Code Suffix
120/60 or 110/50	**A**	277/60	**H**	24/60, 24/50 ②	**T**
240/60 or 220/50	**B**	208–240/60	**J**	24/50	**U**
480/60 or 440/50	**C**	240/50	**K**	32/50	**V**
600/60 or 550/50	**D**	380–415/50	**L**	48/60	**W**
208/60	**E**	550/50	**N**	48/50	**Y**

Notes

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

② NEMA Sizes 00 and 0 only. Sizes 1–5 are 24/60 only.

Kits and Accessories

- Auxiliary contacts, contactor mounted—**Pages V5-T2-25** to **V5-T2-27**
- Transient suppressor, for magnet coil—**Page V5-T2-24**
- Timers—solid-state and pneumatic, mount on contactor—**Page V5-T2-22**

Renewal Parts Publication Numbers

- See **Page V5-T2-30**

Technical Data and Specifications

Wire (75°C) Sizes—AWG or kcmil—NEMA Sizes 00–2—Open and Enclosed

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

Wire (75°C) Sizes—AWG or kcmil—NEMA Sizes 3–8—Open and Enclosed

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

Plugging and Jogging Service Horsepower Ratings ③

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

Notes

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

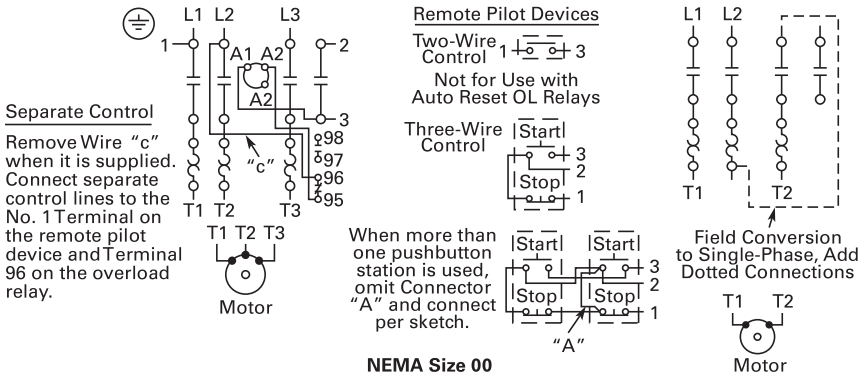
② Two compartment box lug.

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

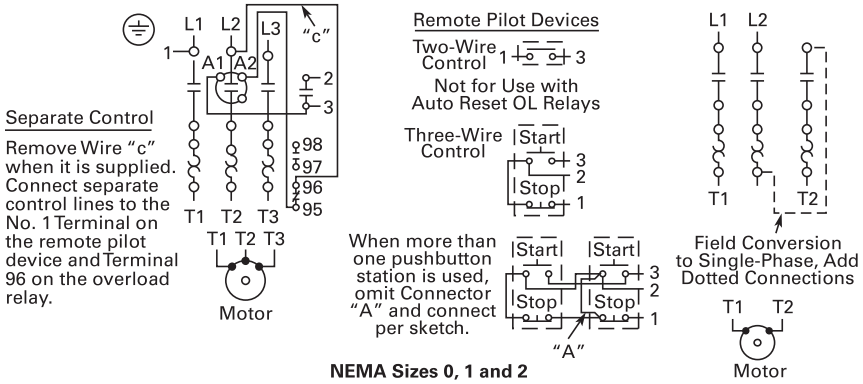
Wiring Diagrams

2

Three-Phase and Single-Phase Applications



NEMA Size 00



NEMA Sizes 0, 1 and 2

NEMA Size 1—BN15DN0AB



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-4**
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage	**V5-T2-10**
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload	
Product Selection	**V5-T2-16**
Wiring Diagrams	**V5-T2-16**
Dimensions	**V5-T2-17**
Accessories	**V5-T2-21**
Renewal Parts	**V5-T2-30**
Technical Data and Specifications	**V5-T2-35**
Relays—Thermal Overload	**V5-T2-39**
C440/***XT*** Electronic Overload Relay	**V5-T2-48**

Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload

Product Description

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

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

Product Selection

2

When Ordering Specify

- Catalog number
- Heater pack number (see selection table, **Pages V5-T2-41** to **V5-T2-43**) or full load current

BN16DM0AB



Type BN16 NEMA—Manual or Automatic Reset Overload Relay

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

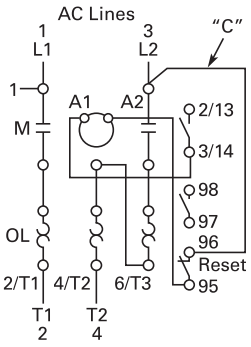
Starter catalog numbers do not include heater packs. Select one carton of three heater packs. Heater pack selection, **Pages V5-T2-41** to **V5-T2-43**.

Note

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

Wiring Diagrams

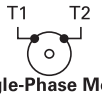
Single-Phase Applications (Factory Wired)



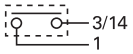
Separate Control

Remove Wire "C" if supplied and connect separate control lines to the Number 1 Terminal on the remote pilot device and to the Number 96 Terminal on the overload relay.

Front View of Panel

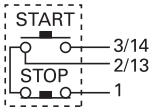


Single-Phase Motor



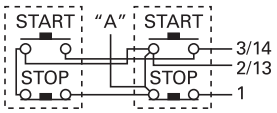
Not for Use with Auto Reset OL Relays

Two-Wire Control



Three-Wire Control

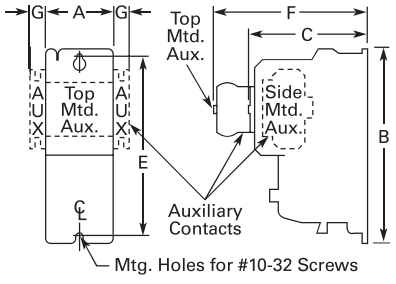
When more than one pushbutton station is used, omit Connector "A" and connect per sketch at right.



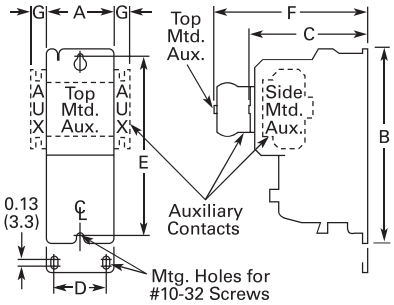
Dimensions

Approximate Dimensions in Inches (mm)

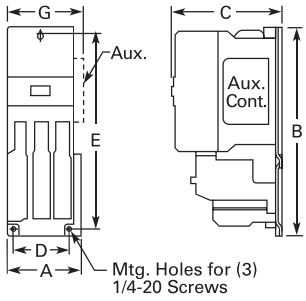
Non-Reversing Starters, Bi-Metallic Overload—Open Type



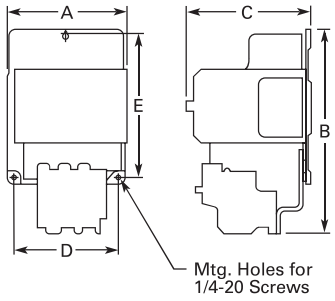
Sizes 00–0 ①



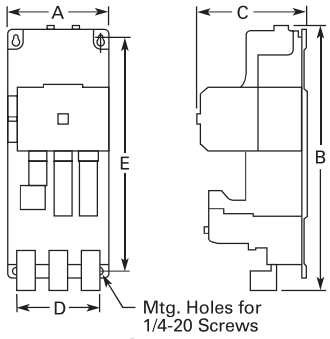
Sizes 1–2



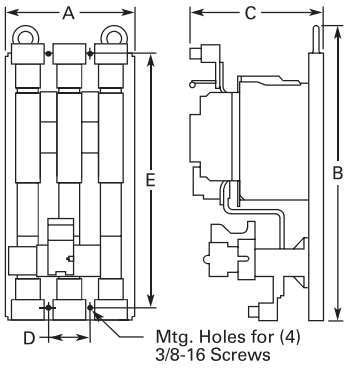
Size 3



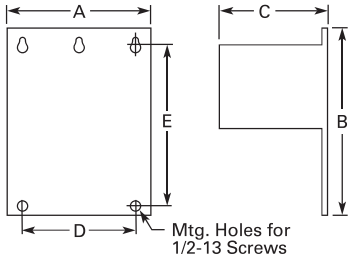
Size 4



Size 5



Size 6



Sizes 7–8

Dimensions and Shipping Weights

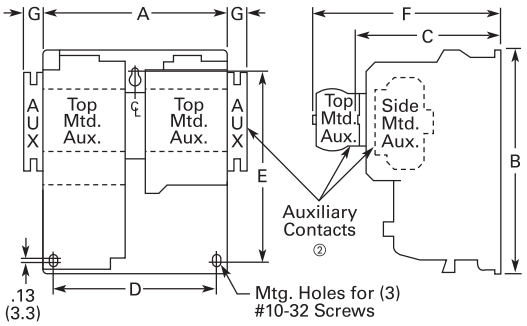
NEMA Size	Wide A	High B	Deep C	Mounting D	Mounting E	F	G	Shipping Weight Lbs (kg)
00–0	1.80 (45.7)	6.60 (167.6)	3.52 (89.4)	—	6.07 (154.2)	4.90 (124.5)	0.54 (13.7)	2.2 (1.0)
1–1P	2.56 (65.0)	7.08 (179.8)	4.44 (112.8)	2.00 (50.8)	6.63 (168.4)	5.80 (147.3)	0.54 (13.7)	4.5 (2.0)
2	2.56 (65.0)	8.08 (205.2)	4.44 (112.8)	2.00 (50.8)	7.63 (193.8)	5.80 (147.3)	0.54 (13.7)	4.7 (2.1)
3	4.08 (103.6)	11.35 (288.3)	5.94 (150.9)	3.00 (76.2)	10.81 (274.6)	—	—	11.0 (5.0)
4	7.05 (179.1)	12.06 (306.3)	7.25 (184.2)	6.00 (152.4)	8.50 (215.9)	—	—	23.0 (10.4)
5	7.00 (177.8)	17.77 (451.4)	7.76 (197.1)	6.00 (152.4)	16.00 (406.4)	—	—	36.0 (16.3)
6	9.47 (240.5)	21.69 (550.9)	9.90 (251.5)	3.10 (78.7)	18.00 (457.2)	—	—	75.0 (34.1)
7	15.13 (384.3)	29.13 (739.9)	12.64 (321.1)	13.25 (336.6)	21.25 (539.8)	—	—	120.0 (54.5)
8	15.13 (384.3)	34.50 (876.3)	15.00 (381.0)	13.25 (336.6)	16.75 (425.5)	—	—	210.0 (95.3)

Note

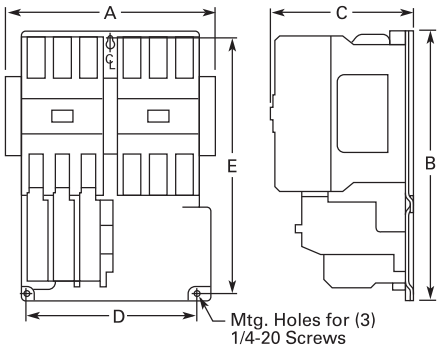
① Holding circuit contact for Size 00 occupies 4th power pole position—no increase in width.

Approximate Dimensions in Inches (mm)

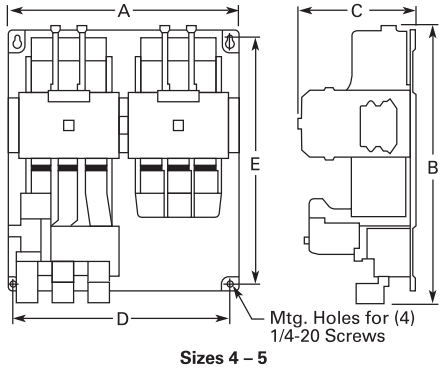
Reversing Starters, Bi-Metallic Overload—Open Type



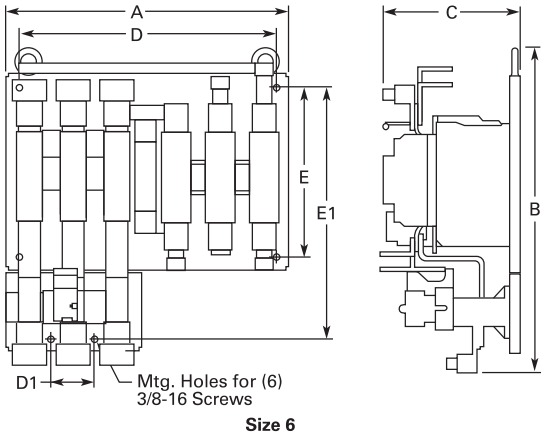
Sizes 00 – 2



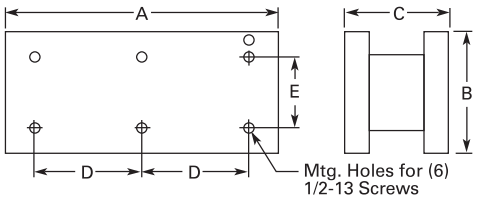
Size 3



Sizes 4 – 5



Size 6



Open Type — Sizes 7 – 8 Horizontal

Dimensions and Shipping Weights

NEMA Size	Wide A	High B	Deep C	Mounting D	Mounting E	D1	E1	F	G	Shipping Weight Lbs (kg)
00–0	4.20 (106.7)	7.38 (187.5)	3.52 (89.4)	3.50 (88.9)	6.87 (174.5)	—	—	4.90 (124.5)	0.54 (13.7	3.6 (1.6)
1	5.71 (145.0)	7.08 (179.8)	4.44 (112.8)	5.25 (133.4)	5.75 (146.1)	—	—	5.80 (147.3)	0.54 (13.7)	8.3 (3.8)
2	5.71 (145.0)	8.08 (205.2)	4.44 (112.8)	5.25 (133.4	6.75 (171.5)	—	—	5.80 (147.3)	0.54 (13.7)	8.5 (3.9)
3	8.70 (221.0)	11.35 (288.3)	5.94 (150.9)	7.00 (177.8)	10.81 (274.6)	—	—	—	—	20.0 (9.1)
4	14.68 (372.9)	12.06 (306.3)	7.25 (184.2)	13.50 (342.9)	8.50 (215.9)	—	—	—	—	49.0 (22.2)
5	14.50 (368.3)	17.77 (451.4)	7.76 (197.1)	13.50 (342.9)	16.00 (406.4)	—	—	—	—	68.0 (30.9)
6	19.77 (502.2)	22.63 (574.8)	9.90 (251.5)	18.00 (457.2)	12.00 (304.8)	3.10 (78.7)	18.00 (457.2)	—	—	90.0 (40.9)
7	28.06 (712.7)	32.13 (816.1) ①	12.70 (322.6)	12.75 (323.9)	21.25 (539.8)	—	—	—	—	175.0 (79.5)
8	30.38 (771.7)	41.50 (1054.1) ①	14.70 (373.4)	14.13 (358.9)	16.75 (425.5)	—	—	—	—	430.0 (195.2)

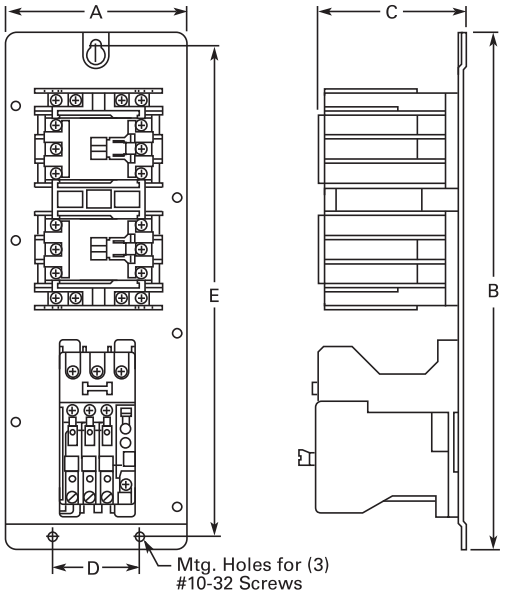
Notes

① Includes cross wiring overhang.

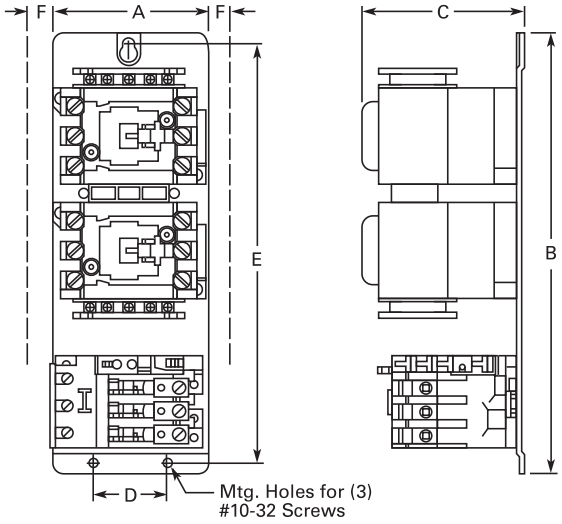
② See catalog listings for type and location of auxiliary contacts supplied with a particular starter.

Approximate Dimensions in Inches (mm)

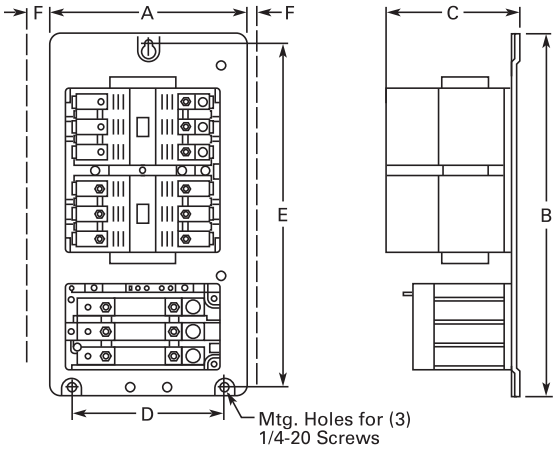
Reversing Starters—Vertical Construction, Bi-Metallic Overload—AN56V Open Vertical Starter



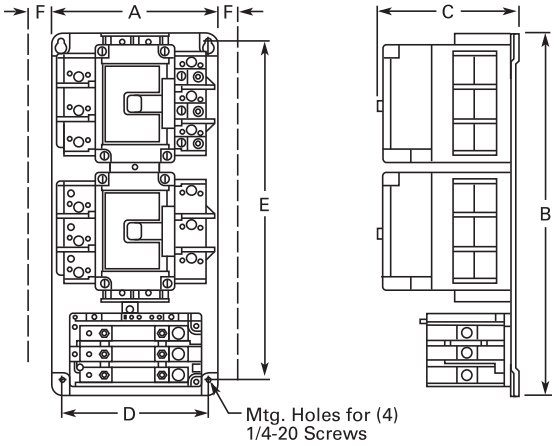
NEMA Size 0



NEMA Sizes 1 – 2



NEMA Size 3



NEMA Size 4

Dimensions and Shipping Weights

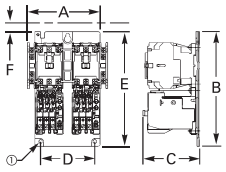
NEMA Size	Wide A	High B	Deep C	Mounting Wide D	Mounting HIgh E	Wire Zone	Shipping Weight Lbs (kg)
0	4.25 (108.0)	12.05 (306.1)	3.84 (97.5)	2.00 (50.8)	11.50 (292.1)	—	4.0 (1.8)
1	4.25 (108.0)	12.05 (306.1)	3.86 (98.0)	2.00 (50.8)	11.50 (292.1)	1.00 (25.4)	9.0 (4.1)
2	4.25 (108.0)	12.05 (306.1)	3.86 (98.0)	2.00 (50.8)	11.50 (292.1)	1.00 (25.4)	9.5 (4.3)
3	9.25 (235.0)	16.75 (425.5)	5.18 (131.6)	7.15 (181.6)	16.07 (408.2)	①	21.0 (9.5)
4	9.08 (230.6)	19.84 (503.9)	5.18 (131.6)	8.00 (203.2)	18.51 (470.2)	1.50 (38.1)	50.0 (22.7)

Note

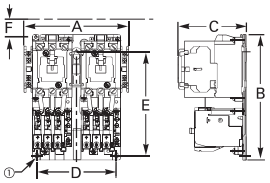
① Wire overhang 1.00 mm left, 50 mm right.

Approximate Dimensions in Inches (mm)

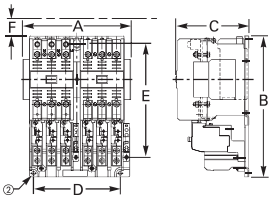
Multispeed Starters, Bi-Metallic Overload—AN700 Open Vertical Starter



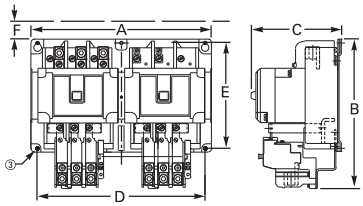
Size "0" Multispeed Starter
2-Speed, 2-Winding



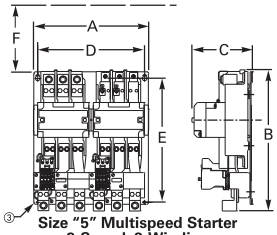
Size "1 – 2" Multispeed Starter
2-Speed, 2-Winding



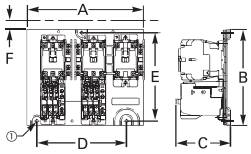
Size "3" Multispeed Starter
2-Speed, 2-Winding



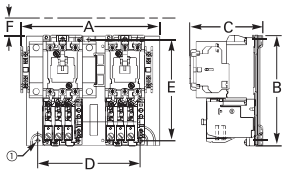
Size "4" Multispeed Starter
2-Speed, 2-Winding



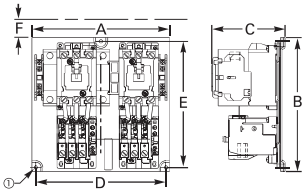
Size "5" Multispeed Starter
2-Speed, 2-Winding



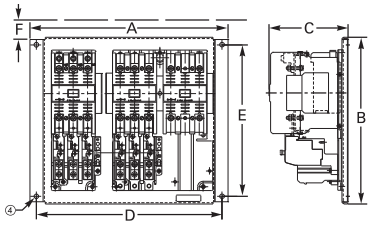
Size "0" Multispeed Starter
2-Speed, 1-Winding



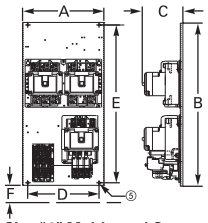
Size "1" Multispeed Starter
2-Speed, 1-Winding



Size "2" Multispeed Starter
2-Speed, 1-Winding



Size "3" Multispeed Starter
2-Speed, 1-Winding



Size "4" Multispeed Starter
2-Speed, 1-Winding

Dimensions and Shipping Weights

NEMA Size	Wide A	High B	Deep C	Mounting Wide D	Mounting High E	Wire Zone F	Shipping Weight Lbs (kg)
Two-Speed—Selective Control—Separate Winding							
0	5.19 (132)	7.38 (188)	3.52 (89)	3.50 (89)	6.87 (175)	0.89 (23)	4.5 (2.0)
1	5.66 (144)	7.08 (180)	4.42 (112)	5.25 (133)	5.75 (146)	1.23 (31)	9.0 (4.1)
2	5.66 (144)	8.08 (205)	4.42 (112)	5.25 (133)	6.75 (165)	1.63 (41)	10.0 (4.5)
3	8.72 (221)	11.35 (288)	5.89 (150)	7.00 (178)	10.81 (275)	1.77 (45)	24.0 (10.9)
4	14.68 (373)	12.06 (306)	7.25 (184)	13.50 (343)	8.50 (216)	1.95 (50)	53.0 (24.1)
5	14.50 (368)	17.82 (453)	7.76 (197)	13.50 (343)	16.00 (406)	4.56 (116)	73.0 (33.1)
Two-Speed—Selective Control—Reconnectable Winding							
0	8.62 (219)	7.06 (179)	3.82 (81)	6.62 (168)	6.50 (165)	0.50 (13)	6.0 (2.7)
1	8.97 (228)	7.12 (181)	4.72 (120)	6.62 (168)	6.50 (165)	1.04 (26)	10.0 (4.5)
2	8.90 (226)	8.62 (219)	4.75 (121)	8.40 (213)	8.12 (206)	1.03 (26)	11.0 (5.0)
3	16.00 (406)	13.46 (342)	6.38 (162)	15.00 (381)	12.25 (311)	1.24 (31)	31.0 (14.1)
4	15.46 (393)	31.00 (787)	7.74 (197)	13.50 (343)	30.00 (762)	1.84 (47)	72.0 (32.7)

Notes

① Mounting holes for (3) #10 screws.
② Mounting holes for (3) 1/4-20 screws.
③ Mounting holes for (4) 1/4-20 screws.
④ Mounting holes for (4) 5/16 screws.
⑤ Mounting holes for (4) 3/8 screws.

Accessories

Three-Pole Top Mounted Fuse Block Kit

IEC Sizes A–K, NEMA Sizes 00–2

Field mount to Freedom Series starters and contactors. Designed to save space and reduce installation costs. They provide short circuit protection for branch circuits.

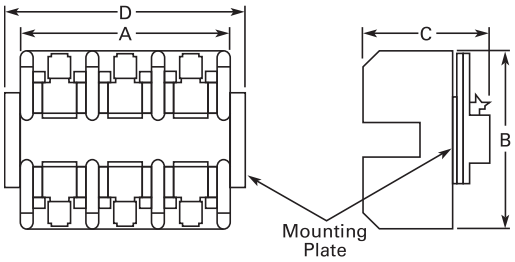
Mounted Fuse Block Kit



Fuse Block Kits

Fuse Type	Catalog Number
Class H—30A 250V	**C350KH21**
Class R—30A 250V	**C350KR21**
Class G—15A 300V	**C350KG37**
Class G—20A 300V	**C350KG38**
Class G—30A 300V	**C350KG31**
Class G— 60A 300V	**C350KG32**
Class T— 30A 300V	**C350KT31**
Class T— 60A 300V	**C350KT32**
Class J—30A 600V	**C350KJ61**
Class J—60A 600V	**C350KJ62**
Type M—30A 600V ①	**C350KM61**
Class CC—30A 600V	**C350KC63**
Class T—30A 600V	**C350KT61**
Class T—60A 600V	**C350KT62**

Three-Pole Top Mounted Fuse Block Kit



Fuse Block			Approximate Dimensions in Inches (mm)			
Class	Amperes	Volts	Wide A	High B	Deep C	D
G	15, 20, 30 60	300	2.40 (61.0)	3.00 (76.2)	2.04 (51.8)	—
		300	2.62 (66.5)	4.25 (108.0)	2.08 (52.8)	—
H	30	250	3.00 (76.2)	3.10 (78.7)	2.23 (56.6)	3.62 (91.9)
J	30, 60	600	4.81 (122.2)	4.12 (104.6)	2.82 (71.6)	—
M, CC	30	600	2.40 (61.0)	3.00 (76.2)	2.04 (51.8)	—
R	30	250	3.00 (76.2)	3.10 (78.7)	2.23 (56.6)	3.62 (91.9)
T	30, 60	300	3.44 (87.4)	3.00 (76.2)	2.33 (59.2)	—
	30	600	3.75 (95.3)	3.31 (84.1)	2.26 (57.4)	—
	60	600	4.87 (123.7)	3.00 (76.2)	2.58 (65.5)	—

Mechanical Interlock and Reversing Kits

Mechanical interlocks and reversing kits are designed for field assembly of reversing contactors or starters from Freedom Series components. The reversing kits include a mechanical interlock, stabilizer bar and a pre-cut, trimmed and formed wire set. Auxiliary contacts, if required, must be ordered separately. See **Pages V5-T2-25** and **V5-T2-26**.

C321KM60B



Part No. 23-7165



Wire Set



Mechanical Interlock Only ②③

Application NEMA Size	IEC Size	Contactor Mounting	Catalog Number
00–2	A–K	Horizontal	**C321KM60B**
3	L–N	Horizontal	**C321KM30**
3 to 4	N to P	Horizontal	**C321KM43**
4	P–S	Horizontal	**C321KM40**
4 to 5	—	Horizontal	**C321KM45**
4 to 6	S to T/U	Horizontal	**C321KM80**
5	—	Horizontal	**C321KM50**
5 to 6	—	Horizontal	**C321KM56**
6	T and U	Horizontal	**C321KM70**
6 to 7	T/U to V–X	Horizontal	**C321KM90**
7	V, W and X	Horizontal	**C321KM34**
4 or 5 to 5	P–S to 5	Vertical	**C321KM55**
5 to 6	—	Vertical	**C321KM65**
6	T and U	Vertical	**C321KM66**
6 to 7	T/U to V–X	Vertical	**C321KM67**

Reversing Kits (Horizontal Contactor Mounting Only)

Application NEMA Size	IEC Size	Catalog Number
00	A–C	**C321KM60K14B**
0	D–F	**C321KM60K13B**
1	—	**C321KM60K15B**
2	G–K	**C321KM60K16B**
3	—	**C321KM60K17** ④
—	L and M	**C321KM60K21** ④
—	N	**C321KM60K18** ④
4	—	**C321KM60K19** ④
5	—	**C321KM60K20** ④
—	P–S	**C321KM60K44** ④

Notes

① Type M fuse block not approved for branch circuit protection.
② Without cross-wiring.
③ For use with latest series product.
④ Kit includes (2) NC auxiliary contacts.

Solid-State Timers

Solid-State ON DELAY Timer—Side Mounted on Freedom Series NEMA 00–2, IEC A–K and C25D, C25E and C25F Frame

This timer is designed to be **wired in series with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON DELAY timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.

Solid-State Timer



Mounted Timer Product Selection

Timing Range	Catalog Number ①②③
1–30 seconds	**C320TDN30_**
30–300 seconds	**C320TDN300_**

Shorting Bar Kits

These kits provide phase-to-phase power connections of contactors for field assembly. The kits include bus connections and mounting hardware. The shorting bars connect all three phases of a single contactor.

Shorting Bar Kits

Description	Catalog Number
NEMA Size 3, IEC Sizes L–N	**C321SB18**
NEMA Size 4, IEC Sizes A–S	**C321SB19**
NEMA Size 6, IEC Sizes T and U	**C321SB22**

Pneumatic Timers—Top Mounted

Attachment mounts on top of any NEMA Size 00–2 or IEC Size A–K Freedom Series starter or contactor (top mounted auxiliary contacts cannot be installed on device when timer is used). Timer unit has 1NO-1NC isolated timed contacts—circuits in each pole must be the same polarity. Units are convertible from OFF to ON DELAY or vice-versa.

Pneumatic Timers



Pneumatic Timers

Timing Range	Catalog Number
0.1 to 30 seconds	**C320TP1**
10 to 180 seconds	**C320TP2**

Maximum Ampere Ratings

	Vac			
Description	120	240	480	600
Make	30	15	7.5	6
Break	3	1.5	0.75	0.6

Locking Cover for Overload Relay—C306 Only

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial—helps prevent accidental or unauthorized changes to trip and reset setting.

Locking Cover for Overlay Relay



Locking Cover for Overlay Relay

Description	Min. Ordering Quantity (Std. Pkg.)	Catalog Number
Clear cover, no accessibility	50	**C320PC3**
Gray cover, no accessibility, with Auto only nib	50	**C320PC4**
Gray cover, no accessibility, with Manual only nib	50	**C320PC5**
Gray cover with FLA dial accessibility, A, B, C, D positions and Auto only nib	50	**C320PC6**
Gray cover with FLA dial accessibility, A, B, C, D positions and Manual only nib	50	**C320PC7**

Notes

① Add operating voltage suffix to catalog number.
A = 120V, **B** = 240V, **E** = 208V

② Rated 0.5 ampere pilot duty—not to be used on larger contactors.

③ Terminal connections are quick connects only. Two per side.

④ 240V operating voltage not available for C320TDN3000_.

Identification Markers

IEC Sizes A–K, NEMA Sizes 00–2

Designed to snap on the face of contactor for easy, personalized identification of individual devices. Includes holder and labels.

Identification Markers

Description	Catalog Number
Identification marker	**C320DL2**

Control Circuit Fuse Block

These panel mounted fuse holders, designed for control circuit protection or other similar low current requirements, have extractor type fuse caps. The Class CC rejection type fuses (KTK-R) used in these holders are intended for use with equipment designated as being suitable for use on systems having high available fault currents. If branch circuit protective device is 45A or greater, C320FBR fuse kit may be required for control circuit protection per NEC 430-72.

Control Circuit Fuse Block

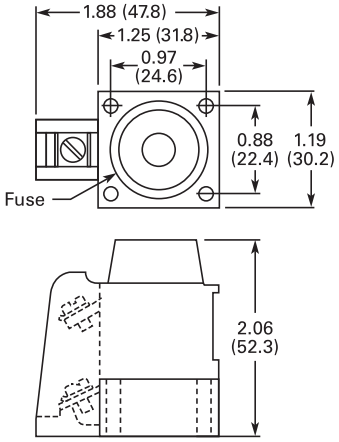


Control Circuit Fuse Block

Type	Max. Amperes	Catalog Number
Fuse holder only	15	**C320FB** ①
	30	**C320FBR** ②

Dimensions

Approximate Dimensions in Inches (mm)



DIN Rail Mounting Channel—35 mm

Designed for DIN rail mounting of IEC style contactors and starters.

DIN Rail



DIN Rail

Description	Catalog Number
1 meter length	**MC382MA1**

Finger Protection Shields

Snap-on shields for both contactors and starters provide IEC Type IP20 finger protection. Prevents accidental contact with line/load terminals.

Finger Protection Shields

Application	Catalog Number
NEMA Size 00, IEC Sizes A–C	**C320LS1**
NEMA Size 0, IEC Sizes D–F	**C320LS2**
NEMA Sizes 1–2, IEC Sizes G–K	
Contactors	**C320LS3**
Reversing contactors	**C320LS4**
NEMA Size 1	
Starters	**C320LS5**
Reversing starters	**C320LS6**
NEMA Size 2, IEC Sizes G–K	
Starters	**C320LS7**
Reversing starters	**C320LS8**

Adapter to DIN Rail Mount

NEMA 1–2 and IEC G–K Contactors

Designed to allow DIN rail mounting of NEMA 1–2 and IEC G–K contactors. Includes all hardware required to convert contactors from panel mounting to 35 mm DIN rail mounting.

Adapter to DIN Rail Mount

Catalog Number
C320DN65

Notes

① A fuse is not supplied, but holder will accept a Bussman Type KTK or KTK-R (13/32 in x 1-1/2 in) fuse, 600V maximum.

② Includes a 5A, 600V KTK-R fuse.

Transient Suppressor Kits

NEMA Sizes 00–2, IEC Sizes A–K

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24–120V, 208–240V or 277–480V coils respectively.

These devices mount directly to the coil terminals of Freedom Series contactors or starters NEMA Sizes 00–2, IEC Sizes A–K and lighting contactors 10–60A. Reversing devices will require two.

C320TS2



NEMA Sizes 00–2, IEC Sizes A–K

Description	Coil Voltage ①	Catalog Number
Transient suppressor	24/120V	**C320TS1**
	208/240V	**C320TS2**
	277/480V	**C320TS3**

NEMA Sizes 3–5, IEC Sizes L–S

This device mounts on top of any side mounted auxiliary contact on Freedom Series NEMA Sizes 3–5, IEC Sizes L–S and lighting contactors 100–300A. It connects across coil terminals on any 120V contactor or starter magnet coil (reversing starters or contactors require 2).

Limits high voltage transients produced in the circuit when power is removed from the coil.

C320AS1



NEMA Sizes 3–5, IEC Sizes L–S

Description	Coil Voltage	Catalog Number
Transient suppressor	120V	**C320AS1**

Add-On Power Pole Kit ②

NEMA Sizes 00–0, IEC Sizes A–F

This device mounts on the side of Freedom NEMA Size 00–0 and IEC Sizes A–F contactors. One unit can be mounted on each side and carries UL, cUL and IEC ratings. The device is rated for resistive, inductive and lighting applications.

NEMA Sizes 00–0, IEC Sizes A–F

UL Ampere Rating						IEC 947 Ampere Rating			
		Horsepower Single-Phase		Locked	Lighting Ballast			AC-5a	1NO Power Pole
Inductive 600V	Resistive 600V	115V	230V	Rotor 240V	Tungsten 480V	AC-1 600V	AC-3 600V	AC-5b 480V	Catalog Number
15	20	1/2	2	96	20	20	12	18	**C320PPD10**

Notes

① Suppressor is compatible with coil voltages/ranges as shown, both 50 and 60 Hz.

② Power pole kits sold for replacement purposes only. For new applications, order the correct four-pole and five-pole contactor catalog numbers.

Adhesive Dust Cover

NEMA Sizes 00–2, IEC Sizes A–K

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom NEMA Sizes 00–2 and IEC Sizes A–K. Adhesive covers are easily applied to side opening where auxiliaries are not installed and provide extra protection from metal filings and other debris.

NEMA Sizes 00–2, IEC Sizes A–K

Description	Catalog Number
25 to a package	**C320DSTCVR**

Auxiliary Contacts

Contact Configuration Code

This two-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

NEMA Sizes 00–2—IEC Sizes A–K

The auxiliary contacts listed on this page are designed for installation on Freedom Series starters and contactors. Snap-on design facilitates quick, easy installation.

These bifurcated design contact blocks, featuring silver cadmium alloy contacts, are well suited for use in very low energy (logic level) circuits.

NEMA Sizes 00–2—IEC Sizes A–K ①

Side Mounted



Top Mounted



Description	Contact Configuration Code ②	Catalog Number
Side Mounted		
1NO	10	**C320KGS1**
1NC	01	**C320KGS2**
1NO-1NC	11	**C320KGS3**
2NO	20	**C320KGS4**
2NC	02	**C320KGS5**
1NO-1NCI	N/A	**C320KGS6**
1NO (EC)-1NC (LO)	N/A	**C320KGS7**
1NCI	N/A	**C320KGS8**
Top Mounted		
1NO	10	**C320KGT1**
1NC	01	**C320KGT2**
1NO-1NC	11	**C320KGT3**
2NO	20	**C320KGT4**
2NC	02	**C320KGT5**
1NO-1NCI	N/A	**C320KGT6**
1NO (EC)-1NC (LO)	N/A	**C320KGT7**
1NCI	N/A	**C320KGT8**
3NO	30	**C320KGT9**
2NO-1NC	21	**C320KGT10**
1NO-2NC	12	**C320KGT11**
3NC	03	**C320KGT12**
4NO	40	**C320KGT13**
3NO-1NC	31	**C320KGT14**
2NO-2NC	22	**C320KGT15**
1NO-3NC	13	**C320KGT16**
4NC	04	**C320KGT17**
3NO-1NCI	N/A	**C320KGT18**
2NO-1NCI-1NC	N/A	**C320KGT19**
2NO-1NO (EC)-1NC (LO)	N/A	**C320KGT20**
1NO-1NC-1NO (EC)-1NC (LO)	N/A	**C320KGT21**

Notes

① NCI = Normally Closed early opening designed for use in reversing applications. EC = Early Closing. LO = Late Opening.

② For reference only—not part of catalog number.

NEMA Sizes 3–8—IEC Sizes L–Z

C320KGS42



Base Auxiliary Contacts—NEMA Sizes 3–5, IEC Sizes L–S

Circuit	Contact Configuration Code ①	NEMA Size 3 IEC Sizes L–N Catalog Number	NEMA Sizes 4–5 IEC Sizes P–S Catalog Number
NO	10	**C320KGS31**	**C320KGS41**
NO-NC	11	**C320KGS32**	**C320KGS42**

C320KGS22



Auxiliary Contacts—NEMA Sizes 3–5, IEC Sizes L–S

Circuit	Contact Configuration Code ①	Catalog Number
NO	10	**C320KGS20**
NC	01	**C320KGS21**
NO-NC ②	11	**C320KGS22**
Sealed Logic Level		
NO	10	**C320KGS20L**
NC	01	**C320KGS21L**
NO-NC ③	11	**C320KGS22L**

Auxiliary Contacts—NEMA Sizes 6–8, IEC Sizes T–Z

Circuit	Contact Configuration Code ①	Size	Catalog Number
NO-NC	11	NEMA 8, IEC Z	**C320KA5**
2NO-2NC	22	NEMA 6–7	**C320KA6**
2NO-2NC	22	IEC T–X	**C320KA8**

Auxiliary Contact Ratings (Amperes)

Ratings—NEMA A600

Current	AC Volts 120V	240V	480V	600V
Make	60	30	15	12
Break	6	3	1.5	1
Continuous	10	10	10	10

Ratings—NEMA P300

Continuous Thermal Rating: 5A

DC Volts	Make/Break Amperes
125	1.10
250	0.55

Ratings—Logic Level

Minimum Ratings for Logic Level and Hostile Atmosphere Application

Minimum Amperes	20 mA
Minimum Volts	24 Vac/Vdc

Ratings C320KGS20L, C320KGS21L, C320KGS22L

DC-12		AC-12	
U_e	I_e	U_e	I_e
80	0.1	250	0.1

Notes

① For reference only—not part of catalog number.
② NO-NC occupies two position—L2 and L3, or R2 and R3. See figure on **Page V5-T2-27**.
③ Form C contacts.

Auxiliary Contact Location

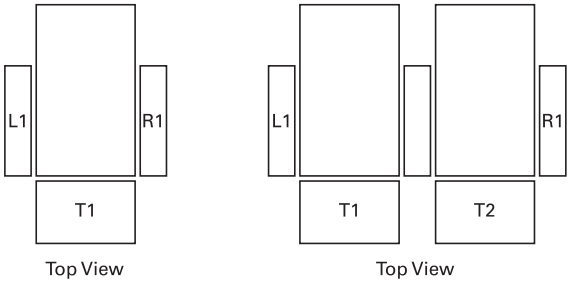
NEMA Sizes 00–2, IEC Sizes A–K

The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor or starter and their locations.

Auxiliary Contacts

Size	Poles	Available Mounting Positions ①② Open Type	Enclosed	Catalog Number
A–K	3	T1, L1	L1	**AE16**
00	3	T1, L1, R1	L1	**AN16**
0–2	3	T1, L1	L1	
A–K	3	L1, R1	L1, R1	**AE56**
00–2	3	T1, T2	—	**AN56**
A–C	2–4	T1, L1, R1	L1, R1	**CE15**
D–K	3	T1, L1	L1	
G–J	4	T1, R1	—	
G–J	5	T1	—	
00	2–4	T1, L1, R1	L1	**CN15**
0–2	2–3	T1, L1	L1	
1, 2	4	T1, L1	—	
1, 2	5	T1, L1	—	
10A	2–4	T1, L1, R1	L1	**CN35**
20–60A	2–3	T1, L1	L1	
60A	4	T1, L1	—	
60A	5	T1, L1	—	
A–K	3	L1, R1	L1, R1	**CE55**
00–2	3	T1, T2	—	**CN55**

Auxiliary Contact Location



Non-Reversing Contactors and Starters

Reversing Contactors and Starters

NEMA Sizes 3–8, IEC Sizes L–Z

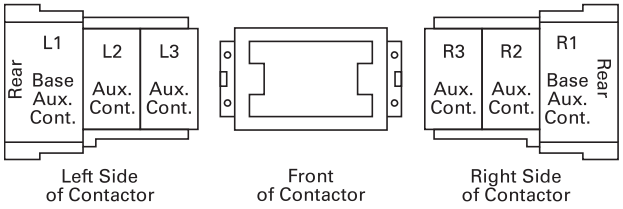
The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor and their locations.

Note: A base auxiliary contact must be added in position R1 before additional auxiliary contacts can be mounted on NEMA Size 3 and IEC Sizes L–N, or in L1 on NEMA Sizes 4–5 and IEC Sizes P–S.

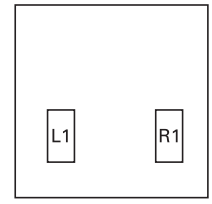
Mounting Positions

Size	Available Mounting Positions ①
NEMA Size 3, IEC Sizes L–N	R2, R3, L1, L2, L3
NEMA Sizes 4–5, IEC Sizes P–S	L2, L3, R1, R2, R3
NEMA Sizes 6–7, IEC Sizes T–X	R1
NEMA Size 8, IEC Size Z	L2, R2

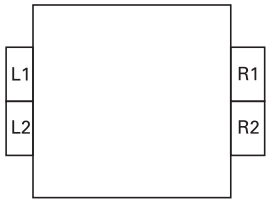
Auxiliary Contact Location



NEMA Sizes 3–5
IEC Sizes L–S



NEMA Sizes 6–7
IEC Sizes T, U, V, W and X



NEMA Size 8
IEC Size Z

Notes

① Available positions on contactors or starters other than what is factory installed.

② When a pneumatic timer is mounted on contactor, only side mounted auxiliary contact positions are available. The solid-state timer, when added, takes up side mounted auxiliary contact position.

DC Magnet Coils

2

When Ordering Specify

Conversion Kit for Field Assembly

- Catalog number

Factory Installed DC Coil

- For factory installed DC magnet coil on AC contactors or non-combination starters (open type only), substitute the code suffix from the table on this page for the magnet coil identifier in the device catalog number. EXAMPLE: For Size 0 AC contactor with a 24 Vdc coil, change AN16BN0**A**C to AN16BN0**T1**C

Application

- Connect for separate control
- Not for use with cover control switch operators
- Use twin break, heavy-duty pilot devices
- Designed for +10%, –20% rated voltage, continuous duty operation

Non-Reversing Kit Consists of:

- One encapsulated DC magnet coil
- One NCI or NO/NCI side mounted auxiliary contact

Note: These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.

- Two blue colored connection wires
- One instruction publication

Operation

See next page for operation details.

DC Magnet Coils

Contactor or Starter Size		Conversion Data					Complete Conversion Kit		Factory Installed
			Magnet Coil						
NEMA	IEC	Volts	Coil Number	Amps P.U./Seal	Watts P.U./Seal	NCI Interlock	Catalog Number	Ship Wt. Lbs (kg)	Code Suffix
Non-Reversing—Kit Includes NCI Side Mounted Auxiliary Contact									
00 and 0 CN35–A, B, D D15 Relays	A–F	12	**9-2988-11**	6.4/0.28	76.8/3.36	**C320KGD1**	**C335KD3R1**	1.0 (0.5)	**R1**
		24	**9-2988-12**	3.2/0.14	76.8/3.36	**C320KGD1**	**C335KD3T1**		**T1**
		48	**9-2988-13**	1.6/0.07	76.8/3.36	**C320KGD1**	**C335KD3W1**		**W1**
		120	**9-2988-14**	0.64/0.028	76.8/3.36	**C320KGD1**	**C335KD3A1**		**A1**
① 00 and 0 CN35–A, B, D D15 Relays	A–F	12	**9-2988-11**	6.4/0.28	76.8/3.36	**C320KGD2** ①	**C335KD3R4**	1.0 (0.5)	**R4**
		24	**9-2988-12**	3.2/0.14	76.8/3.36	**C320KGD2** ①	**C335KD3T4**		**T4**
		48	**9-2988-13**	1.6/0.07	76.8/3.36	**C320KGD2** ①	**C335KD3W4**		**W4**
		120	**9-2988-14**	0.64/0.028	76.8/3.36	**C320KGD2** ①	**C335KD3A4**		**A4**
1 and 2 CN35–G	G–K	12	**9-2990-1**	15.4/0.42	185/4.98	**C320KGD5**	**C335KD4R4**	1.0 (0.5)	**R4**
		24	**9-2990-2**	7.7/0.021	185/4.96	**C320KGD5**	**C335KD4T4**		**T4**
		48	**9-2990-3**	3.9/0.11	185/5.04	**C320KGD5**	**C335KD4W4**		**W4**
		120	**9-2990-4**	1.5/0.041	185/4.87	**C320KGD5**	**C335KD4A4**		**A4**
3 CN35–K	L–N	12	**9-3002-1**	24/0.40	293/4.84	**C320KGD3**	**C335KD5R1**	2.0 (0.9)	**R1**
		24	**9-3002-2**	12/0.20	288/4.75	**C320KGD3**	**C335KD5T1**		**T1**
		48	**9-3002-3**	6.1/0.097	295/4.67	**C320KGD3**	**C335KD5W1**		**W1**
		120	**9-3002-4**	2.5/0.038	298/4.57	**C320KGD3**	**C335KD5A1**		**A1**
4 and 5 CN35–N, S	P–S	24	**9-2026-4**	18/0.22	400/5.3	**C320KGD3**	**C335KA3T1**	2.5 (1.1)	**T1**
		48	**9-2026-3**	9/0.11	400/5.2	**C320KGD3**	**C335KA3W1**		**W1**
		120	**9-2026-2**	3.3/0.05	450/5.4	**C320KGD3**	**C335KA3A1**		**A1**
		240	**9-2026-1**	1.7/0.02	440/4.9	**C320KGD3**	**C335KA3B1**		**B1**
Reversing									
00 and 0 CN35–A, B, D D15 relays	A–F	12	**(2) 9-2988-1**	6.4/0.28	76.8/3.36	**(2) C320KGD1**	**C335RD3R1** ②	1.0 (0.5)	**R1** ③
		24	**(2) 9-2988-2**	3.2/0.14	76.8/3.36	**(2) C320KGD1**	**C335RD3T1** ②		**T1** ③
		48	**(2) 9-2988-3**	1.6/0.07	76.8/3.36	**(2) C320KGD1**	**C335RD3W1** ②		**W1** ③
		120	**(2) 9-2988-4**	0.64/0.028	76.8/3.36	**(2) C320KGD1**	**C335RD3A1** ②		**A1** ③
1 and 2 CN35–G	G–K	12	**(2) 9-2990-1**	15.4/0.42	185/4.98	**(2) C320KGD3**	④	—	**R1** ③
		24	**(2) 9-2990-2**	7.7/0.21	185/4.96	**(2) C320KGD3**	④		**T1** ③
		48	**(2) 9-2990-3**	3.9/0.11	185/5.04	**(2) C320KGD3**	④		**W1** ③
		120	**(2) 9-2990-4**	1.5/0.041	185/4.87	**(2) C320KGD3**	④		**A1** ③

Notes

① These kits are supplied with a NO/NCI side mounted auxiliary contact in place of the NCI contact.

② Kit does not include mechanical interlock or crossover wiring. Two NO/NCI top mounted auxiliary contacts are supplied for electrical interlocking.

③ Factory installed DC coils on NEMA contactors and starters include a NO/NC top mounted auxiliary contact on each contactor for electrical interlocking. On IEC contactors and starters, a NC top mounted auxiliary contact is supplied on each contactor for electrical interlocking.

④ Available factory assembled only.

Operation

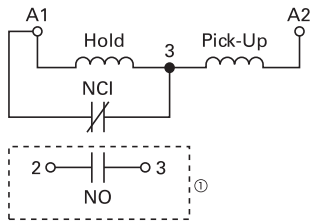
These DC coil kits have separate pick-up and seal windings. A **special** (side mounted) early-break NCI auxiliary contact is used to either disconnect the pick-up winding or insert the seal winding in series with the pick-up winding, depending on the frame size of the contactor. DC coil kits come in two styles, a suffix **1** and a suffix **4**. Suffix 1 contains only the **special** (side mounted) early break NCI auxiliary contact. Suffix 4 contains a NO contact in the same package as the **special** (side mounted) early-break NCI auxiliary contact.

Note: For NEMA Sizes 00 and 0 and IEC Sizes A–F, contactors may utilize either suffix 1 or 4 DC coil kits; starters may utilize suffix 4 DC coil kits only. For NEMA Sizes 1 and 2 and IEC Sizes G–K, both contactors and starters may utilize a suffix 4 DC coil kit only.

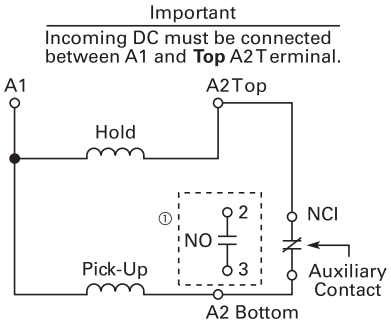
On the above sizes only, when the **special** auxiliary package is mounted on the side of a contactor or starter, **no** standard auxiliary contact may be mounted on the same side.

Note: For NEMA Sizes 3–5 and IEC Sizes L–S, special coil NCI clearing contact is an add-on auxiliary (**must** mount on a base mount auxiliary contact; normally a 1NO). This arrangement will normally account for two of the three contact positions on the side of each contactor or starter.

Elementary Diagrams



DC Coil Elementary Diagram for NEMA Sizes 1–3 and IEC Sizes G–N Contactors and Starters



DC Coil Elementary Diagram for NEMA Sizes 00, 0, 4 and 5 and IEC Sizes A–F and P–S Contactors and Starters

Competitive Mounting Plates

The C321 adapter plates permit direct replacement of competitive starters with Freedom Series starters without drilling and tapping new mounting holes. Allen-Bradley 509, Eaton's A10 (adapter plate not required for replacing A10 Starter Sizes 1, 4 and 5), Furnas 14, ESP100, General Electric CR206, CR306, Siemens SXL, Square D 8536, Westinghouse A200, B200.

C321CMP1



Competitive Mounting Plates

Freedom NEMA Size	Index Number ② Catalog Number
00, 0	**C321CMP0**
1	**C321CMP1**
2	**C321CMP2**
3	**C321CMP3**
4	**C321CMP4**
5	**C321CMP5**

Note

① 1NO available in Suffix 4 kits only.

② Handling number only—does not appear on product. The handling number is stamped on the carton label only.

Special Modifications

For Catalog Numbers AN19, AN16, AN59, AN59, AN56, CE15, CN15, CN35, CN55

Addition or Special Feature	Starter Size —NEMA 00	0	1/—	2	3	4	5	6	7	8
Control Circuit										
Extra auxiliary circuit, factory installed NO or NC—each contact ①②	Consult sales office for pricing adders.									
Transient suppressor ①	Consult sales office for pricing adders.									
Power Circuit										
Contactor/starter for ring lug capability—add Mod Code **T16** to catalog number ③ (Power terminals only, control terminals as standard) Standalone overload relays can not accept ring lugs on line side	Consult sales office for pricing adders.									
Factory Installed Dust Covers										
Factory installed C320DSTCVR—add Mod Code **-53** to catalog number ①					NA	NA	NA	NA	NA	NA

Renewal Parts

For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

For Catalog Numbers AN19, AN16, AN30, AN40, AN59, AN56, AN70, AN80, AN800, CN15, CN35 ④ and CN55 Contactors and Starters (Size 00, 0)

Description		NEMA Size 00 Series B1 Part No.	Series C1 Part No.	NEMA Size 0 Series B1 Part No.	Series C1 Part No.
Renewal Parts Publication Number		**22177**	**22177**	**22177**	**22177**
Contact Kits					
Two-pole		⑤	⑤	⑤	⑤
Three-pole		⑤	⑤	⑤	⑤
Four-pole		⑤	⑤	⑤	⑤
Five-pole		⑤	⑤	⑤	⑤
Magnet Coils	**Coil Suffix**				
120V 60 Hz or 110V 50 Hz	**A**	**9-2875-1**	**9-2875-1**	**9-2876-1**	**9-2876-1**
240V 60 Hz or 220V 50 Hz	**B**	**9-2875-2**	**9-2875-2**	**9-2876-2**	**9-2876-2**
480V 60 Hz or 440V 50 Hz	**C**	**9-2875-3**	**9-2875-3**	**9-2876-3**	**9-2876-3**
600V 60 Hz or 550V 50 Hz	**D**	**9-2875-4**	**9-2875-4**	**9-2876-4**	**9-2876-4**
208V 60 Hz	**E**	**9-2875-5**	**9-2875-5**	**9-2876-5**	**9-2876-5**
277V 60 Hz	**H**	**9-2875-12**	**9-2875-12**	**9-2876-12**	**9-2876-12**
208/240V 60 Hz	**J**	**9-2875-37**	**9-2875-37**	**9-2876-37**	**9-2876-37**
240V 50 Hz	**K**	**9-2875-11**	**9-2875-11**	**9-2876-11**	**9-2876-11**
380–415V 50 Hz	**L**	**9-2875-6**	**9-2875-6**	**9-2876-6**	**9-2876-6**
380V 50 Hz	**L**	—	—	—	—
415V 50 Hz	**M**	—	—	—	—
550V 50 Hz	**N**	—	—	—	—
24V 60 Hz–24V 50 Hz	**T**	**9-2875-36**	**9-2875-36**	**9-2876-36**	**9-2876-36**
24V 60 Hz	**T**	—	—	—	—
24V 50 Hz	**U**	**9-2875-36**	**9-2875-36**	**9-2876-36**	**9-2876-36**
32V 50 Hz	**V**	**9-2875-16**	**9-2875-16**	**9-2876-16**	**9-2876-16**
48V 60 Hz	**W**	**9-2875-8**	**9-2875-8**	**9-2876-8**	**9-2876-8**
48V 50 Hz	**Y**	**9-2875-9**	**9-2875-9**	**9-2876-9**	**9-2876-9**
Magnet Frame Armature					
Lower magnet frame		⑤	⑤	⑤	⑤
Upper magnet frame		⑤	⑤	⑤	⑤

Notes

① These modifications are generally available in kit form at lower cost. See specific product sections for kit listings.

② Terminal extensions provided on Size 2 and up; not required for Size 1.

③ The T16 modifications are only available on C306 overloads and the following three-pole devices: CN15, CN55, AN16, AN56 and AN700 (separate winding only). The 45 mm and 65 mm frames (NEMA Size 0–2) reversing devices (CN55B, CN55D, CN55G, AN56B, AN56D, AN56G, AN700 and AN700G) with the T16 modification are supplied without crossover wires.

④ CN35A = Size 00, CN35B and CN35D = Size 0, CN35G = Size 2, CN35K = Size 3, CN35N = Size 4, and CN35S = Size 5.

⑤ Replace with complete contactor.

For Catalog Numbers AN19, AN16, AN30, AN40, AN59, AN56, AN70, AN80, AN800, CN15, CN35 ① and CN55 Contactors and Starters (Size 1, 2)

Description		NEMA Size 1 Series A1 Part No.	Series B1 Part No.	NEMA Size 2 Series A1 Part No.	Series B1 Part No.	NEMA Size 3 Part No.
Renewal Parts Publication Number		**20861**	**22177**	**20861**	**22177**	**20426**
Contact Kits						
Two-pole		**6-65**	**6-65**	**6-65-7**	**6-65-7**	**6-43-5**
Three-pole		**6-65-2**	**6-65-2**	**6-65-8**	**6-65-8**	**6-43-6**
Four-pole		**6-65-9**	**6-65-9**	**6-65-15**	**6-65-15**	—
Five-pole		**6-65-10**	**6-65-10**	**6-65-16**	**6-65-16**	—
Magnet Coils	**Coil Suffix**					
120V 60 Hz or 110V 50 Hz	**A**	**9-3285-1**	**9-3285-1**	**9-3285-1**	**9-3285-1**	**9-2756-1 KIT**
240V 60 Hz or 220V 50 Hz	**B**	**9-3285-2KIT**	**9-3285-2KIT**	**9-3285-2KIT**	**9-3285-2KIT**	**9-2756-2 KIT**
480V 60 Hz or 440V 50 Hz	**C**	**9-2703-3 KIT**	**9-2703-3 KIT**	**9-2703-3 KIT**	**9-2703-3 KIT**	**9-2756-3 KIT**
600V 60 Hz or 550V 50 Hz	**D**	**9-2703-4 KIT**	**9-2703-4 KIT**	**9-2703-4 KIT**	**9-2703-4 KIT**	**9-2756-4 KIT**
208V 60 Hz	**E**	**9-3285-9KIT**	**9-3285-9KIT**	**9-3285-9KIT**	**9-3285-9KIT**	**9-2756-5 KIT**
277V 60 Hz	**H**	**9-2703-7 KIT**	**9-2703-7 KIT**	**9-2703-7 KIT**	**9-2703-7 KIT**	**9-2756-9 KIT**
208/240V 60 Hz	**J**	—	—	—	—	—
240V 50 Hz	**K**	**9-2703-14 KIT**	**9-2703-14 KIT**	**9-2703-14 KIT**	**9-2703-14 KIT**	**9-2756-13 KIT**
380–415V 50 Hz	**L**	**9-2703-8 KIT**	**9-2703-8 KIT**	**9-2703-8 KIT**	**9-2703-8 KIT**	—
380V 50 Hz	**L**	—	—	—	—	**9-2756-12 KIT**
415V 50 Hz	**M**	—	—	—	—	**9-2756-8 KIT**
550V 50 Hz	**N**	—	—	—	—	**9-2756-14 KIT**
24V 60 Hz–24V 50 Hz	**T**	—	—	—	—	—
24V 60 Hz	**T**	**9-3285-6KIT**	**9-3285-6KIT**	**9-3285-6KIT**	**9-3285-6KIT**	**9-2756-6 KIT**
24V 50 Hz	**U**	**9-3285-12KIT**	**9-3285-12KIT**	**9-3285-12KIT**	**9-3285-12KIT**	**9-2756-11 KIT**
32V 50 Hz	**V**	**9-2703-10 KIT**	**9-2703-10 KIT**	**9-2703-10 KIT**	**9-2703-10 KIT**	**9-2756-10 KIT**
48V 60 Hz	**W**	**9-2703-11 KIT**	**9-2703-11 KIT**	**9-2703-11 KIT**	**9-2703-11 KIT**	**9-2756-15 KIT**
48V 50 Hz	**Y**	**9-2703-13 KIT**	**9-2703-13 KIT**	**9-2703-13 KIT**	**9-2703-13 KIT**	**9-2756-7 KIT**
Magnet Frame Armature						
Lower magnet frame		**17-18200**	**17-18200**	**17-18200**	**17-18200 KIT**	**17-8955-2 KIT**
Upper magnet frame		**48-1936**	**48-1936**	**48-1936**	**48-1936 KIT**	**48-1902 KIT**

Note

① CN35A = Size 00, CN35B and CN35D = Size 0, CN35G = Size 2, CN35K = Size 3, CN35N = Size 4, and CN35S = Size 5.

For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

For Catalog Numbers AN19, AN16, AN30, AN40, AN59, AN56, AN70, AN80, AN800, CN15, CN35 ① and CN55 Contactors and Starters (Size 4, 5, 6)

Description		NEMA Size 4 Series A1 Part No.	NEMA Size 4 Series B1 Part No.	NEMA Size 5 Series A1 Part No.	NEMA Size 5 Series B1 Part No.	NEMA Size 6 Contactor and Starter Series A1, Starter Series B1 Part No.	Contactor and Starter Series B1, Starter Series C1 Part No.
Renewal Parts Publication Number		**20428**	**20428**	**20429**	**20429**	**20146**	**23349**
Contact Kits							
Two-pole		**6-44**	**6-26**	**6-45**	**6-45**	**6-601-2**	—
Three-pole		**6-44-2**	**6-26-2**	**6-45-2**	**6-45-2**	**6-601**	**6-648**
Magnet Coils	**Coil Suffix**						
120V 60 Hz or 110V 50 Hz	**A**	**9-1891-1 KIT**	**9-1891-1 KIT**	**9-1891-1 KIT**	**9-1891-1 KIT**	**9-2698**	**9-3006**
240V 60 Hz or 220V 50 Hz	**B**	**9-1891-2 KIT**	**9-1891-2 KIT**	**9-1891-2 KIT**	**9-1891-2 KIT**	**9-2698-2**	**9-3006-2**
480V 60 Hz or 440V 50 Hz	**C**	**9-1891-3 KIT**	**9-1891-3 KIT**	**9-1891-3 KIT**	**9-1891-3 KIT**	**9-2698-3**	**9-3006-3**
600V 60 Hz or 550V 50 Hz	**D**	**9-1891-4 KIT**	**9-1891-4 KIT**	**9-1891-4 KIT**	**9-1891-4 KIT**	**9-2698-4**	**9-3006-4**
208V 60 Hz	**E**	**9-1891-13 KIT**	**9-1891-13 KIT**	**9-1891-13 KIT**	**9-1891-13 KIT**	**9-2698-5**	—
277V 60 Hz	**H**	**9-1891-26 KIT**	**9-1891-26 KIT**	**9-1891-26 KIT**	**9-1891-26 KIT**	—	—
208/240V 60 Hz	**J**	—	—	—	—	—	—
240V 50 Hz	**K**	**9-1891-20 KIT**	**9-1891-20 KIT**	**9-1891-20 KIT**	**9-1891-20 KIT**	—	—
380–415V 50 Hz	**L**	—	—	—	—	**9-2698-6**	**9-3006-7**
380V 50 Hz	**L**	**9-1891-14 KIT**	**9-1891-14 KIT**	**9-1891-14 KIT**	**9-1891-14 KIT**	—	—
415V 50 Hz	**M**	**9-1891-21 KIT**	**9-1891-21 KIT**	**9-1891-21 KIT**	**9-1891-21 KIT**	—	—
550V 50 Hz	**N**	**9-1891-8 KIT**	**9-1891-8 KIT**	**9-1891-8 KIT**	**9-1891-8 KIT**	—	—
24V 60 Hz–24V 50 Hz	**T**	—	—	—	—	—	**9-3006-8**
24V 60 Hz	**T**	**9-1891-15 KIT**	**9-1891-15 KIT**	**9-1891-15 KIT**	**9-1891-15 KIT**	—	—
24V 50 Hz	**U**	**9-1891-16 KIT**	**9-1891-16 KIT**	**9-1891-16 KIT**	**9-1891-16 KIT**	—	—
48V 60 Hz	**W**	—	—	—	—	**9-2698-8**	**9-3006-9**
48V 50 Hz	**Y**	**9-1891-18 KIT**	**9-1891-18 KIT**	**9-1891-18 KIT**	**9-1891-18 KIT**	—	—
Overload Relays							
For replacement on existing starters three-pole—ambient compensated bimetallic ②		**10-6530-4**	**10-6530-4**	**C306DN3B**	**C306DN3B**	**C306DN3B**	**C306DN3B**
For replacement on existing AN19 / AN59 starters—C440 solid-state overload		—	④	—	④	—	④
Current Transformer		—	—	**42-3564**	**42-3564**	**42-3598**	**42-3598**
Magnet Frame Armature ③							
Lower Magnet Frame		**48-1030-2**	**48-1030-2**	**48-1030-2**	**48-1030-2**	—	—
Upper Magnet Frame		**48-1029-4**	**48-1029-4**	**48-1029-4**	**48-1029-4**	—	—

Feeder Group Renewal ⑤

Volts	Hertz	NEMA Size 4 Series A1	NEMA Size 4 Series B1	NEMA Size 5 Series A1	NEMA Size 5 Series B1	NEMA Size 6 Contactor and Starter Series A1, Starter Series B1 Part No.	Contactor and Starter Series B1, Starter Series C1 Part No.
110–120	50/60	—	—	—	—	**9-2705**	**9-3007**
220–240	50/60	—	—	—	—	**9-2705-2**	**9-3007-2**
440–480	50/60	—	—	—	—	**9-2705-3**	**9-3007-3**
550–600	50/60	—	—	—	—	**9-2705-4**	**9-3007-4**
208	50/60	—	—	—	—	**9-2705-5**	**9-3007-5**
380–415	50/60	—	—	—	—	**9-2705-6**	**9-3007-7**
48–52	50/60	—	—	—	—	**9-2705-8**	**9-3007-9**
24	50/60	—	—	—	—	**9-2705-9**	**9-3007-8**

Notes

① CN35A = Size 00, CN35B and CN35D = Size 0, CN35G = Size 2, CN35K = Size 3, CN35N = Size 4, and CN35S = Size 5.
② Not for use with AN19 and AN59 starters.
③ Consult factory.
④ See C440 electronic overload relay chart for C440 overload replacement options.
⑤ Voltage ratings of the main coils must match those of the feeder group for proper operation of the starter/contactor.

For a complete listing of parts, refer to the Renewal Parts Publication Number referenced below.

For Catalog Numbers AN16, AN30, AN40, AN56, AN70, AN80, AN800, CN15, CN35 ① and CN55 Contactors and Starters (Size 7, 8)

Description		NEMA Size 7 Series A1 Part No.	NEMA Size 7 Series B1 Part No.	NEMA Size 8 Series A1 Part No.	NEMA Size 8 Series B1 Part No.
Renewal Parts Publication Number		**20848**	**20848**	**20849**	**20849**
Contact Kits					
Two-pole		—	—	—	—
Three-pole		**6-613**	**6-613**	**6-571**	**6-571**
Magnet Coils	**Coil Suffix**				
120V 60 Hz or 110V 50 Hz	**A**	**9-2698**	**9-2698**	**9-2654**	**9-2654**
240V 60 Hz or 220V 50 Hz	**B**	**9-2698-2**	**9-2698-2**	**9-2654-2**	**9-2654-2**
480V 60 Hz or 440V 50 Hz	**C**	**9-2698-3**	**9-2698-3**	**9-2654-3**	**9-2654-3**
600V 60 Hz or 550V 50 Hz	**D**	**9-2698-4**	**9-2698-4**	**9-2654-4**	**9-2654-4**
208V 60 Hz	**E**	**9-2698-5**	**9-2698-5**	**9-2654-6**	**9-2654-6**
277V 60 Hz	**H**	—	—	—	—
208/240V 60 Hz	**J**	—	—	—	—
240V 50 Hz	**K**	—	—	—	—
380–415V 50 Hz	**L**	—	—	—	—
380V 50 Hz	**L**	**9-2698-6**	**9-2698-6**	**9-2654-5**	**9-2654-5**
415V 50 Hz	**M**	—	—	—	—
550V 50 Hz	**N**	—	—	—	—
24V 60 Hz–24V 50 Hz	**T**	—	—	—	—
24V 60 Hz	**T**	—	—	—	—
24V 50 Hz	**U**	—	—	—	—
32V 50 Hz	**V**	—	—	—	—
48V 60 Hz	**W**	—	—	—	—
48V 50 Hz	**Y**	—	—	—	—
Overload Relays					
For replacement on existing starters three-pole—ambient compensated bimetallic ②		**C306DN3B**	**C306DN3B**	**C306DN3B**	**C306DN3B**
Current Transformer		**42-3598-2**	**42-3598-2**	**42-3598-3**	**42-3598-3**
Magnet Frame Armature ③					
Lower magnet frame		—	—	—	—
Upper magnet frame		—	—	—	—

Notes

① CN35A = Size 00, CN35B and CN35D = Size 0, CN35G = Size 2, CN35K = Size 3, CN35N = Size 4, and CN35S = Size 5.
② Not for use with AN19 and AN59 starters.
③ Consult factory.

C440 Electronic Overload Relays

2

45 mm C440 for Direct Mount



C440 Electronic Overload Relays for Direct Mount to Freedom Series Contactors

For Use with Freedom NEMA Contactor Size	For Use with Contactor ①	Overload Range (Amps)	Standard Feature Set Catalog Number	Standard Feature Set with Ground Fault Catalog Number
00	CN15AN3_B	0.33–1.65	**C440A1A1P6SF00**	**C440A2A1P6SF00**
		1–5	**C440A1A005SF00**	**C440A2A005SF00**
		4–20	**C440A1A020SF00**	**C440A2A020SF00**
0	CN15BN3_B	0.33–1.65	**C440A1A1P6SF0**	**C440A2A1P6SF0**
		1–5	**C440A1A005SF0**	**C440A2A005SF0**
		4–20	**C440A1A020SF0**	**C440A2A020SF0**
1	CN15DN3_B	0.33–1.65	**C440A1A1P6SF1**	**C440A2A1P6SF1**
		1–5	**C440A1A005SF1**	**C440A2A005SF1**
		4–20	**C440A1A020SF1**	**C440A2A020SF1**
		9–45	**C440A1A045SF1**	**C440A2A045SF1**
2	CN15GN3_B	1–5	**C440A1A005SF2**	**C440A2A005SF2**
		4–20	**C440A1A020SF2**	**C440A2A020SF2**
		9–45	**C440A1A045SF2**	**C440A2A045SF2**
3	CN15KN3_	20–100	**C440B1A100SF3**	**C440B2A100SF3**
4	CN15NN3_	28–140	**C440C1A140SF4**	**C440C2A140SF4**

1–5 A OL with CTs



C440 Electronic Overload Relays for use with NEMA Contactors Sizes 5–8

Use CTs and 1–5 A C440 overload relay. CT kit does not include overload relay (order separately).

For Use with NEMA Contactor Size	CT Range (Amps)	Description	CT Kit Catalog Number ②	Terminal Size	Overload Relay Catalog Number
5	60–300	300: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT300**	750 kcmil (2) 250 kcmil 3/0 Cu/Al	**C440A1A005SAX**
6	120–600	600: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT600**	(2) 750 kcmil 3/0 Cu/Al	**C440A1A005SAX**
7	200–1000	1000: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1000**	(3) 750 kcmil 3/0 Cu/Al	**C440A1A005SAX**
8	300–1500	1500: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1500**	(4) 750 kcmil 1/0 Cu/Al	**C440A1A005SAX**

Notes

① CN15 contactor listed is non-reversing with a 120 Vac coil. For more options, see Tab 2 in this volume, section 2.1.

② ZEB kits are not recommended for use with C440 overload relays with ground fault option.

Feeder Group Renewal ①

Volts	Hertz	NEMA Size 7 Series A1	NEMA Size 7 Series B1	NEMA Size 8 Series A1	NEMA Size 8 Series B1
110–120	50/60	**9-2705**	**9-2705**	—	—
220–240	50/60	**9-2705-2**	**9-2705-2**	—	—
440–480	50/60	**9-2705-3**	**9-2705-3**	—	—
550–600	50/60	**9-2705-4**	**9-2705-4**	—	—
208	50/60	**9-2705-5**	**9-2705-5**	—	—
380–415	50/60	**9-2705-6**	**9-2705-6**	—	—
48–52	50/60	**9-2705-8**	**9-2705-8**	—	—
120	50/60	—	—	**9-2664**	**9-2664**
240	50/60	—	—	**9-2664-2**	**9-2664-2**
480	50/60	—	—	**9-2664-3**	**9-2664-3**
600	50/60	—	—	**9-2664-4**	**9-2664-4**
380	50/60	—	—	**9-2664-5**	**9-2664-5**
208	50/60	—	—	**9-2664-6**	**9-2664-6**
415	50/60	—	—	**9-2664-7**	**9-2664-7**
110	50/60	—	—	**9-2664-8**	**9-2664-8**
220	50/60	—	—	**9-2664-9**	**9-2664-9**
550	50/60	—	—	**9-2664-10**	**9-2664-10**
440	50/60	—	—	**9-2664-11**	**9-2664-11**

Technical Data and Specifications

All data is based on a standard contactor with no auxiliary devices and a 120 Vac or 24 Vdc magnet coil. Coil data has a ±5% range depending on the application, therefore specific data may vary.

Coil Data Notes

P.U.	Pick-up time is the average time taken from closing of the coil circuit to main contact touch
D.O.	Drop-out time is the average time taken from opening of the coil circuit to main contact separation
Cold	Coil data with a cold coil
Hot	Coil data with a hot coil

Note

① Voltage ratings of the main coils must match those of the feeder group for proper operation of the starter/contactor.

Specifications—Sizes 00–3

Description	Contactor Catalog Number/Size CN15A NEMA Size 00	CN15B NEMA Size 0	CN15D NEMA Size 1	CN15G NEMA Size 2	CN15K NEMA Size 3
Configuration					
Number of poles	2, 3, 4	2, 3	2, 3, 4, 5	2, 3, 4, 5	2, 3
Auxiliary contacts, standard	4th pole NO (1)	Side NO (1)	Side NO (1)	Side NO (1)	Side NO (1)
Add-on auxiliary contacts	Top (4) or side (4)	Top (4) or side (3)	Top (4) or side (3)	Top (4) or side (3)	Left side (4) or right side (3)
Frame size	45 mm	45 mm	65 mm	65 mm	90 mm
Maximum voltage rating	600 Vac	600 Vac	600 Vac	600 Vac	600 Vac
Continuous ampere ratings (I)	9A	18A	27A	45A	90A
Maximum Horsepower (hp)					
Single-phase					
115V	1/3	1	2	3	7-1/2
230V	1	2	3	7-1/2	15
Three-phase					
200V	1-1/2	3	7-1/2	10	25
230V	1-1/2	3	7-1/2	15	30
460V	2	5	10	25	50
575V	2	5	10	25	50
AC Magnet Coil Data					
Pick-up volts—cold	85%	85%	85%	85%	85%
Pick-up volts—hot	85%	85%	85%	85%	85%
Pick-up voltamperes	80	100	230	230	390
Pick-up watts	49	65	95	95	112
Sealed voltamperes	7.5	10	28	28	49.8
Sealed watts	2.4	3.1	7.8	7.8	13
Drop-out volts—cold	75%	75%	75%	75%	75%
Drop-out volts—hot	75%	75%	75%	75%	75%
Maximum operation rate—ops/hour	12,000	12,000	12,000	12,000	7,200
Pick-up time (ms)	12	12	20	20	14
Drop-out time (ms)	12	12	14	14	11
Coil operating range % of rated voltage	–15% to +10%	–15% to +10%	–15% to +10%	–15% to +10%	–15% to +10%
DC magnet coil data	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**
Operating temperature	–20° to 65°C	–20° to 65°C	–20° to 65°C	–20° to 65°C	–20° to 65°C
Maximum operating altitude (ft)	6000	6000	6000	6000	6000
Mechanical life	20,000,000	20,000,000	10,000,000	10,000,000	6,000,000
Electrical Life (480V/60 Hz)					
AC-3	4,000,000	3,000,000	5,000,000	3,500,000	1,700,000
AC-4	90,000	85,000	200,000	62,000	80,000
Wire Range					
Power terminals	12–16 stranded, 12–14 solid Cu	8–16 stranded, 10–14 solid Cu	8–14 stranded or solid Cu	2–14 (upper) and/or 6–14 (lower) stranded or solid Cu	1/0–14 Cu
Control terminals	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu
Power terminal torque Line and load—lb-in	7	15	20	40 (14–8 AWG)	35 (14–10 AWG)
				45 (6–4 AWG)	40 (8 AWG)
				50 (3 AWG)	45 (6–4 AWG)
					50 (3–1/0 AWG)
Auxiliary contact rating	A600, P300	A600, P300	A600, P300	A600, P300	A600, P300

Specifications—Sizes 4–8

Description	Contactor Catalog Number/Size CN15N NEMA Size 4	CN15S NEMA Size 5	CN15T NEMA Size 6	CN15U NEMA Size 7	CN15V NEMA Size 8
Configuration					
Number of poles	2, 3	2, 3	3	3	3
Auxiliary contacts, standard	Side NO (1)	Side NO (1)	Top left 2NO/2NC (1)	Top left 2NO/2NC (1)	Side 2NO/NC (1)
Add-on auxiliary contacts	Left side (3) or right side (4)	Left side (3) or right side (4)	Top right 2NO/2NC (1)	Top right 2NO/2NC (1)	NO/NC (2)
Frame size	180 mm	180 mm	280 mm	280 mm	334 mm
Maximum voltage rating	600 Vac	600 Vac	600 Vac	600 Vac	600 Vac
Continuous ampere ratings (I)	135A	270A	540A	810A	1215A
Maximum Horsepower (hp)					
Single-phase					
115V	—	—	—	—	—
230V	—	—	—	—	—
Three-phase					
200V	40	75	150	200	400
230V	50	100	200	300	450
460V	100	200	400	600	900
575V	100	200	400	600	900
AC Magnet Coil Data					
Pick-up volts—cold	85%	85%	85%	85%	85%
Pick-up volts—hot	85%	85%	85%	85%	85%
Pick-up voltamperes	1158	1158	1600	1600	2450
Pick-up watts	240	240	1345	1345	2060
Sealed voltamperes	100	100	25	25	75
Sealed watts	27.2	27.2	22	22	60
Drop-out volts—cold	75%	75%	①	①	①
Drop-out volts—hot	75%	75%	①	①	①
Maximum operation rate—ops/hour	2400	2400	N/A	N/A	N/A
Pick-up time (ms)	28	25	105	105	70
Drop-out time (ms)	14	13	200	200	50
Coil operating range % of rated voltage	–15% to +10%	–15% to +10%	–15% to +10%	–15% to +10%	–15% to +10%
DC magnet coil data	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**	For DC magnet coils (and coil data), see Accessories, **Pages V5-T2-28** and **V5-T2-29.**
Operating temperature	–20° to 65°C	–20° to 65°C	–20° to 65°C	–20° to 65°C	–20° to 65°C
Maximum operating altitude (ft)	6000	6000	6000	6,00	6000
Mechanical life	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
Electrical Life (480V/60 Hz)					
AC-3	800,000	500,000	590,000	450,000	420,000
AC-4	70,000	34,000	7400	5000	4200
Wire Range					
Power terminals	Open—3/0–8 Cu; Enclosed—250 kcmil–6 Cu/Al	750 kcmil—2 or (2) 250 kcmil–3/0 Cu/Al	(2) 750 kcmil–3/0 Cu/Al	(3) 750 kcmil–3/0 Cu/Al	(4) 750 kcmil–1/0 Cu/Al
Control Terminals	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu	12–16 stranded, 12–14 solid Cu
Power terminal torque line and load—lb-in	200	550	550	550	500
Auxiliary contact rating	A600, P300	A600, P300	A600, P300	A600, P300	A600, P300

Note

① 20–30% of rated coil voltage.

Electrical Life—AC-3 and AC-4 Utilization Categories

Life Load Curves

Eaton's Freedom Series NEMA contactors have been designed and manufactured for superior life performance in any worldwide application. All testing has been based on requirements as found in NEMA and UL standards and conducted by Eaton. Actual application life may vary depending on environmental conditions and application duty cycle.

Utilization Categories

The International Electrotechnical Commission (IEC) has developed utilization categories for contactors and auxiliary contacts. The IEC utilization categories are used to define the type of electrical load for estimating electrical life, and do not imply the devices are IEC rated.

AC-1—Non-inductive or slightly inductive loads, such as resistance furnaces and heating.

AC-2—Starting of slip-ring motors.

AC-3—Squirrel cage motors; starting, switching off motors during running.

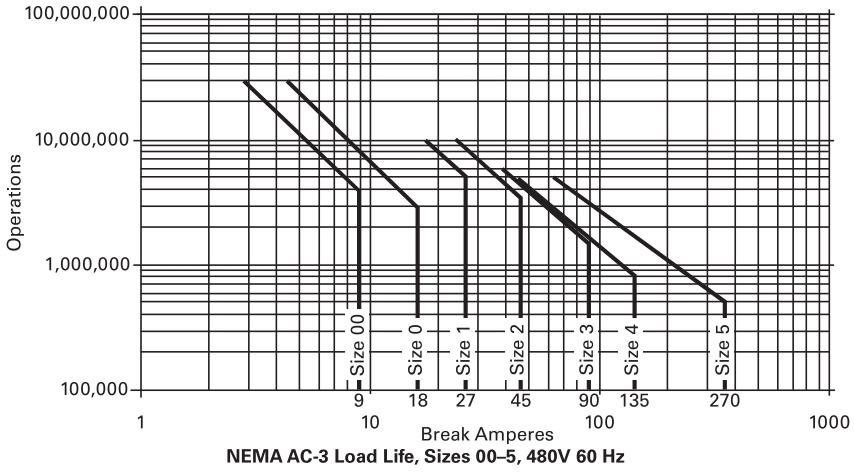
AC-4—Squirrel cage motors; starting, plugging, inching or jogging.

Note: AC-3 tests are conducted at rated device currents and AC-4 tests are conducted at six times rated device currents. All tests have been run at 460V, 60 Hz.

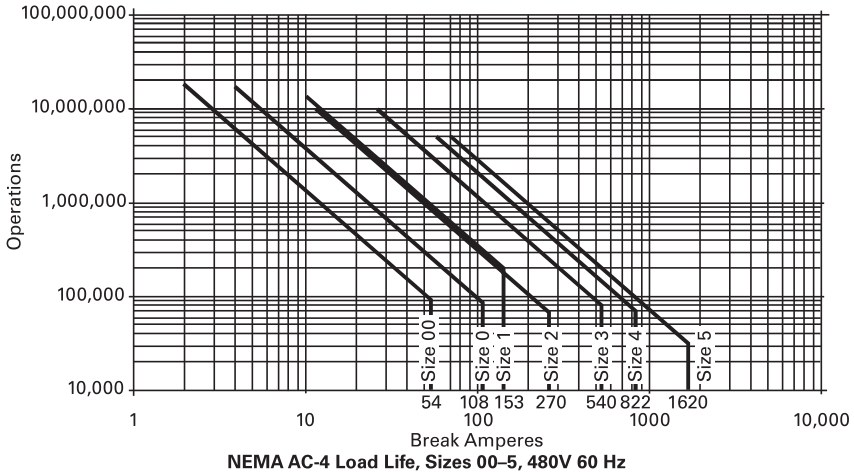
Contactor Choice

- Decide what utilization category your application is and choose the appropriate curve
- Locate the intersection of the life-load curve of the appropriate contactor with the applications operational current (I_e), as found on the horizontal axis
- Read the estimated contact life along the vertical axis in number of operational cycles

AC-3 and AC-4 Utilization Categories



NEMA AC-3 Load Life, Sizes 00–5, 480V 60 Hz



NEMA AC-4 Load Life, Sizes 00–5, 480V 60 Hz

32A Overload—C306DN3B



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-4**
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage	**V5-T2-10**
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload	**V5-T2-15**
Accessories	**V5-T2-21**
Renewal Parts	**V5-T2-30**
Technical Data and Specifications	**V5-T2-35**
Relays—Thermal Overload	
Product Selection	**V5-T2-40**
Accessories	**V5-T2-44**
Modifications	**V5-T2-44**
Replacement Parts	**V5-T2-44**
Technical Data and Specifications	**V5-T2-45**
Dimensions	**V5-T2-47**
C440/***XT*** Electronic Overload Relay	**V5-T2-48**

Relays—Thermal Overload

Product Description

C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144A.

Features

- Selectable manual or automatic reset operation
- Interchangeable heater packs adjustable ±24% to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32A overload relay will mount in 75A overload relay—useful in derating applications such as jogging
- Class 10 or 20 heater packs
- Load lugs built into relay base
- Bimetallic, ambient compensated operated. Trip free mechanism
- Electrically isolated NO-NC contacts (pull RESET button to test). (Electrical ratings see table on **Page V5-T2-46**)
- Overload trip indication
- Shrouded or fingerproof terminals to reduce possibility of electrical shock

Standards and Certifications

- Meets UL 508 single-phasing requirements
- UL listed, CSA certified and NEMA compliance

Listed

Product Selection

C306 Thermal Overload Relays

C306DN3B



C306GN3B



Contactors

NEMA Size	Maximum Ampere Rating	Number of Poles	Open Type Catalog Number	NEMA 1 Enclosed Catalog Number
00, 0	32 ②	3	**C306DN3B**	**C306DG3B**
1, 2	75 ②	3	**C306GN3B**	**C306GG3B**
3	105 ③	3	**C306KN3**	—
4	144 ③	3	**C306NN3**	—
5–8 ①	—	—	—	—

C306DT3B



C306GT3B



Standalone Applications

NEMA Size	Maximum Ampere Rating	Number of Poles	Open Type Catalog Number
00, 0, 1 ④	32	3	**C306DT3B**
1 ④	75	3	**C306GT3B**
3 ⑤	105	3	**C306KN3**
4 ⑤	144	3	**C306NN3**
5–8 ⑥	—	—	—

Notes

① NEMA Sizes 5–8 use the 32A overload in conjunction with CTs.
② Series B overload relays have load lugs built into relay base and will only accept Series B heater packs. These relays can be directly attached to contactor or they can be DIN rail or panel mounted using adapter on **Page V5-T2-44.**
③ These relays can be panel mounted only.
④ Overload relay assembled with mounting adapter for DIN rail or panel mount.
⑤ Panel mount only.
⑥ NEMA Sizes 5–8 use the 32A overload in conjunction with CTs.

Heater Pack Selection

Heater packs H2001B to H2017B and H2101B to H2117B are to be used only with Series B overload relays Catalog Numbers C306DN3B (Part No. 10-7016) and C306GN3B (Part No. 10-7020). The load lugs are built into the overload relay base to allow load wiring prior to heater pack installation. The previous heater design had integral load lugs. The Series B heater packs are electrically equivalent to the previous heater design. Heaters H2018-3 to H2024-3 have not changed.

Starters with Series B Overload Relays ①

NEMA—AN Type		IEC—AE Type	
Size	**Series**	**Size**	**Series**
00–0	**C**	A–F	**C**
1–2	**B**	G–K	**B**
5	**B**	G–K	**B**
6	**C**	G–K	**B**
7–8	**B**	G–K	**B**

Heater Pack H2001B–H2017B



Standard Trip—Class 20 Heater

	Motor Full Load Ampere Rating Dial Position				
Overload Relay Size	**A**	**B**	**C**	**D**	**Catalog Number ②**
For Use with NEMA Sizes 00–0 Series C, NEMA Sizes 1–2 Series B; IEC Sizes A–F Series C, IEC Sizes G–K Series B					
32A or 75A	0.254	0.306	0.359	0.411	**H2001B-3**
	0.375	0.452	0.530	0.607	**H2002B-3**
	0.560	0.676	0.791	0.907	**H2003B-3**
	0.814	0.983	1.15	1.32	**H2004B-3**
	1.20	1.45	1.71	1.96	**H2005B-3**
	1.79	2.16	2.53	2.90	**H2006B-3**
	2.15	2.60	3.04	3.49	**H2007B-3**
	3.23	3.90	4.56	5.23	**H2008B-3**
	4.55	5.50	6.45	7.40	**H2009B-3**
	6.75	8.17	9.58	11.0	**H2010B-3**
	9.14	10.8	12.4	14.0	**H2011B-3**
	14.0	16.9	19.9	22.8	**H2012B-3**
	18.7	22.7	26.7	30.7	**H2013B-3**
	23.5	28.5	33.5	38.5	**H2014B-3**
For Use with NEMA Size 2, IEC Sizes G–K Only, Series B					
75A	29.0	34.0	39.1	44.1	**H2015B-3**
	39.6	45.5	51.5	57.4	**H2016B-3**
	53.9	60.9	67.9	74.9	**H2017B-3**

Notes

① The series of a starter is the last digit of the listed catalog number. Example: AN16DN0AB.

② Heater packs are shipped three to a carton. catalog numbers are for three heater packs.

Heater Pack H2018–H2024



Standard Trip—Class 20 Heater, continued

Overload Relay Size	Motor Full Load Ampere Rating Dial Position A	B	C	D	Catalog Number ①
For Use with NEMA Sizes 3–4, IEC Sizes L–N Only—Series A					
105A or 144A	8.0	9.2	10.3	11.5	**H2025-3**
	11.4	12.8	14.3	15.7	**H2026-3**
	14.3	15.7	17.4	19.0	**H2027-3**
	18.0	20.2	22.3	24.5	**H2018-3**
	24.6	27.6	30.5	33.4	**H2019-3**
	33.5	37.5	41.5	45.6	**H2020-3**
	45.7	51.2	56.7	62.1	**H2021-3**
	62.2	69.7	77.1	84.6	**H2022-3**
	84.7	95.0	105.0	115.0	**H2023-3**
	106.0	118.0	131.0	144.0	**H2024-3**
For Use with Size 5 Starters—Series B and IEC P, R and S with 300/5 CT					
32A ②	49	59	69	79	**H2004B-3**
	72	87	103	118	**H2005B-3**
	107	130	152	174	**H2006B-3**
	129	156	182	209	**H2007B-3**
	194	234	274	—	**H2008B-3**
For Use with Size 6 Starters Only—Series B and IEC T–V with 600/5 CT					
32A ②	144	174	205	235	**H2005B-3**
	215	259	304	348	**H2006B-3**
	258	312	365	419	**H2007B-3**
	388	468	547	627	**H2008B-3**
For Use with Size 7 Starters Only—Series B and IEC W–X with 1000/5 CT					
32A ②	163	197	230	264	**H2004B-3**
	240	290	342	392	**H2005B-3**
	358	432	506	580	**H2006B-3**
	430	520	608	698	**H2007B-3**
	646	780	912	—	**H2008B-3**
For Use Size 8 Starters Only—Series B and IEC Z with 1500/5 CT					
32A ②	244	295	345	396	**H2004B-3**
	360	435	513	588	**H2005B-3**
	537	648	759	870	**H2006B-3**
	645	780	912	1047	**H2007B-3**
	969	1170	1368	—	**H2008B-3**

Notes

① Heater packs are shipped three to a carton. catalog numbers are for three heater packs.

② Sizes 5–8 and IEC P–Z use the 32A overload relay with current transformers.

Heater Pack
H2101B–H2117B



Fast Trip—Class 10 Heater

Overload Relay Size	Motor Full Load Ampere Rating Dial Position A	B	C	D	Catalog Number ①
For Use with NEMA Sizes 00–0 Series C, NEMA Sizes 1–2 Series B; IEC Sizes A–F Series C, IEC Sizes G–K Series B					
32A or 75A	0.260	0.313	0.367	0.420	**H2101B-3**
	0.384	0.464	0.543	0.623	**H2102B-3**
	0.570	0.688	0.806	0.924	**H2103B-3**
	0.846	1.02	1.20	1.37	**H2104B-3**
	1.28	1.55	1.83	2.10	**H2105B-3**
	1.92	2.33	2.74	3.15	**H2106B-3**
	2.30	2.79	3.28	3.77	**H2107B-3**
	3.38	4.10	4.82	5.54	**H2108B-3**
	4.96	6.03	7.09	8.16	**H2109B-3**
	7.07	8.58	10.1	11.6	**H2110B-3**
	9.60	11.2	12.8	14.4	**H2111B-3**
	14.4	17.5	20.7	23.8	**H2112B-3**
	18.7	21.8	25.0	28.1	**H2113B-3**
	23.5	27.3	31.0	34.8	**H2114B-3**
For Use with Size 2, IEC Sizes G–K Only—Series B					
75A	28.3	32.6	37.0	41.3	**H2115B-3**
	36.6	42.3	48.1	53.8	**H2116B-3**
	53.8	60.8	67.9	74.9	**H2117B-3**
For Use with Size 5 Starters Only—Series B and IEC P, R and S with 300/5 CT					
32A ②	51	61	72	82	**H2104B-3**
	77	93	110	126	**H2105B-3**
	115	140	164	189	**H2106B-3**
	138	167	197	226	**H2107B-3**
	203	246	289	—	**H2108B-3**
For Use with Size 6 Starters Only—Series B and IEC T–V with 600/5 CT					
32A ②	154	186	220	252	**H2105B-3**
	230	280	329	378	**H2106B-3**
	276	335	394	452	**H2107B-3**
	406	492	578	—	**H2108B-3**
For Use with Size 7 Starters Only—Series B and IEC W–X with 1000/5 CT					
32A ②	169	204	240	274	**H2104B-3**
	256	310	366	420	**H2105B-3**
	384	466	543	630	**H2106B-3**
	460	558	656	754	**H2107B-3**
	676	820	—	—	**H2108B-3**
For Use with Size 8 Starters Only—Series B and IEC Z with 1500/5 CT					
32A ②	254	306	360	411	**H2104B-3**
	384	465	549	630	**H2105B-3**
	576	699	822	945	**H2106B-3**
	690	837	984	1131	**H2107B-3**
	1014	1230	—	—	**H2108B-3**

Notes

① Heater packs are shipped three to a carton. catalog numbers are for three heater packs.
② Sizes 5–8 and IEC P–Z use the 32A overload relay with current transformers.

Accessories

DIN Rail and Panel Mounting Adapter

These adapters are required when component overload relays are to be separately mounted. The terminal base adapter includes line terminals and connects with the overload relays on **Page V5-T2-40**.

C306TB1



DIN Rail and Panel Mounting Adapter

Description	Catalog Number
For 32A overload relay	**C306TB1**
For 75A overload relay	**C306TB2B** ①

Locking Cover for Overload Relay—C306 Only

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial—helps prevent accidental or unauthorized changes to trip and reset setting.

Overload Relay Cover



Locking Cover for Overload Relay—C306 Only

Description	Min. Order Qty. (Std. Pkg.)	Catalog Number
Clear cover, no accessibility	50	**C320PC3**
Gray cover, no accessibility with auto only nib	50	**C320PC4**
Gray cover, no accessibility with manual only nib	50	**C320PC5**
Gray cover with FLA dial accessibility, A, B, C, D positions and auto only nib	50	**C320PC6**
Gray cover with FLA dial accessibility, A, B, C, D positions and manual only nib	50	**C320PC7**

Modifications

C306 Thermal Overload Relays with Mounting Adapter

Consists of a thermal overload relay mounted to a terminal base adapter—permits fast and easy installation.

C306 Thermal Overload Relays with Mounting Adapter

Description	Catalog Number
C306DN3B + C306TB1	**C306DT3B**
C306GN3B + C306TB2B	**C306GT3B**

Replacement Parts

Heater Pack Replacement

The heater pack series is determined by the 6th character of the catalog number. Series A or prior heater packs (identified by either "A" or "-" as the 6th character) have built-in load lugs. Series B or later heater packs do not (load lugs are on overload relay). Replacement of Series A or earlier heater packs with Series B or later heater packs, requires the one time addition of Lug Adapter Kit C306KAL1-3B to the Series A1 overload relay.

Superseded Series A Heater Pack



Series B Heater Pack



Heater Pack Replacement Requirements

Existing Heater Pack Catalog Numbers	Replacement Product Required
H2001-3–H2013-3 **H2001A-3–H2013A-3**	Lug adapter kit C306KAL1-3B and Series B heater pack
H2001B-3–H2013B-3	Series B heater pack
H2014-3 **H2014A-3**	Replace with lug adapter kit C306KAL1-3B and Series B heater pack
H2014B-3	Series B heater pack
H2015-3–H2017-3	Replace with heater pack chosen from table below
H2015A-3–H2017A-3	Replace with lug adapter kit C306KAL1-3B and Series B heater pack
H2015B-3–H2017B-3	Series B heater pack

Heater Pack Ratings

Motor Full Load Ampere Rating Dial Position A	B	C	D	Order Heater Pack Catalog Number
29.0	32.5	36.0	39.5	**H2015B-3**
39.6	44.3	49.1	53.8	**H2016B-3**
53.9	60.4	66.8	74.9	**H2017B-3**

Overload Relay Lug Adapter Kit

Superseded 32A Series A Overload Relay—C306DN3



Superseded 75A Series A Overload Relay—C306GN3



These kits are used in conjunction with Catalog Numbers H2001B–H2014B or H2101B–H2114B heater packs as a means of utilizing these Series B heater packs in Catalog Numbers C306DN3 and C306GN3 Series AI overload relays. The kit consists of three lug adapters and installation instructions. When installing Series B heater packs plus lug adapters in Series A overload relays, refer to heater pack FLA adjustment tables originally supplied with equipment (also supplied with kit).

C306KAL1



Overload Relay Lug

Description	Catalog Number
Series AI overload relay lug adapter kit	**C306KAL1-3B**

Overload Relay Replacement—Series A Only

When replacing a Catalog Number C306DN3 (Part No. 10-6044) or C306GN3 (10-6319) Series A overload relay on a starter, order a Series B overload relay and Series B heater packs.

Note

① This Series B adapter will accept Series A or B overload relays (C306GN3 or C306GN3B), C306TB2 can only be used with C306GN3.

Technical Data and Specifications

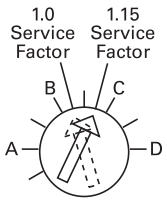
Operation

C306 Overload Relay Setting
For motors having a 1.15 service factor, rotate the FLA (Full Load Amperes) adjustment dial to correspond to the motor's FLA rating.

Estimate the dial position when the motor FLA falls between two letter values as shown in the example.

For motors having a 1.0 service factor, rotate the FLA dial one-half position counterclockwise (CCW).

FLA Dial Adjustment

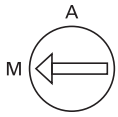


Example of 12.0 FLA setting for heater pack number H2011B showing position for 1.0 or 1.15 service factor motors.

The overload relay is factory set at M for manual reset operation. For automatic reset operation, turn the reset adjustment dial to the A position as shown in the illustration.

Automatic reset is not intended for two-wire control devices.

Manual/Automatic Reset



Example of setting for manual reset.

Test for Trip Indication

To test overload relay for trip indication when in manual reset, pull out the blue reset button. An orange flag will appear indicating that the device has tripped. Push reset button in to reset.

Warning—To provide continued protection against fire or shock hazard, the complete overload relay must be replaced if burnout of the heater element occurs.

General

"Overload relays are provided to protect motors, motor control apparatus and motor-branch circuit conductors against excessive heating due to motor overloads and failure to start. This definition does not include: 1) motor circuits over 600V, 2) short circuits, 3) ground faults and 4) fire pump control." (NEC Art. 430-31)

Time Current Characteristics

The time-current characteristics of an overload relay is an expression of performance which defines its operating time at various multiples of its current setting. Tests are run at Underwriters Laboratories (UL) in accordance with NEMA Standards and the NEC. UL requires:

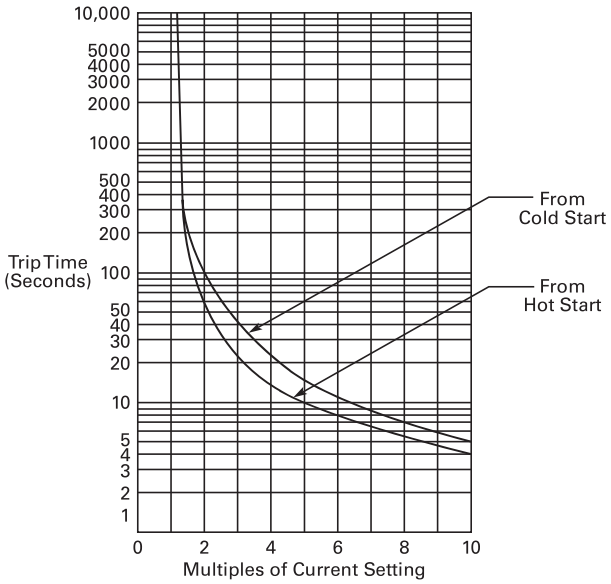
- When tested at 100 percent of its current rating, the overload relay shall trip ultimately
- When tested at 200 percent of its current rating, the overload relay shall trip in not more than 8 minutes
- When tested at 600 percent of the current rating, the overload relay shall trip in not more than 10 or 20 seconds, depending on the Class of the relay

"Current Rating" is defined as the minimum current at which the relay will trip. Per NEC, an overload must ultimately trip at 125% of FLA current (heater) setting for a 1.15 service factor motor and 115% FLA for a 1.0 service factor motor.

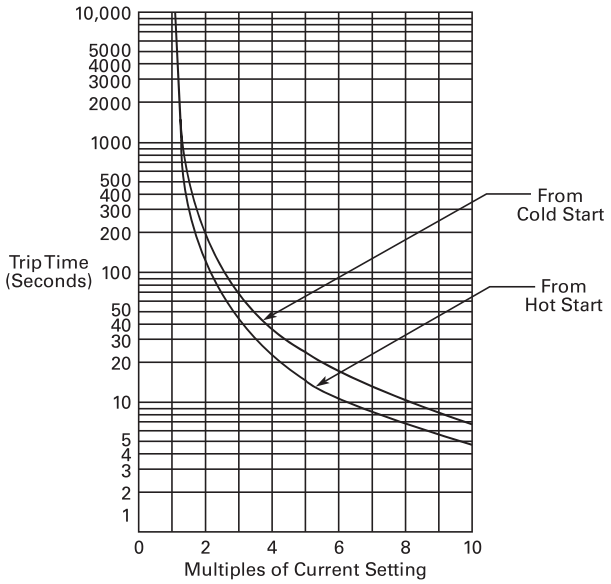
"Current Setting" is defined as the FLA of the motor and thus the overload heater pack setting.

Example: 600% of current rating is defined as 750% (600 x 1.25) of FLA current (heater) setting for a 1.15 service factor motor. A 10A heater setting must trip in 20 seconds or less at 75A motor current for a Class 20 relay.

Class 10 and Class 20 Trip Curves



Class 10 Overload Relay 25C Open Rating



Class 20 Overload Relay 25C Open Rating

Wire (75°C) Sizes—AWG or kcmil—NEMA Sizes 00–2, IEC A–K—Open

Power Terminals—Line

IEC Size	NEMA Size	Cu Only
A, B, C	00	12–16 stranded, 12–14 solid
D, E, F	0	8 –16 stranded, 10–14 solid
	1	8–14 stranded or solid
G, H, J, K	2	3–14 (upper) and/or 6–14 (lower) stranded or solid ①

Power Terminals—Load—Cu Only (Stranded or Solid)

Catalog Number	Terminal	Wire Size
C306DN3B	32A	14–6 AWG
C306GN3B	75A	14–2 AWG
Control Terminals—Cu Only		
12–16 AWG stranded, 12–14 AWG solid		

Wire (75°C) Sizes—AWG or kcmil—NEMA Sizes 3–8, IEC L–N—Open

Power Terminals—Line and Load

IEC Size	NEMA Size	Wire Size
L	3	1/0–14 Cu/Al
M	—	14–2/0 Cu/Al
N	—	3/0–8 Cu/Al
—	4	Open—3/0–8 Cu
		Enclosed—250 kcmil—6 Cu/Al
—	5	750 kcmil—2 or (2) 250 kcmil—3/0 Cu/Al
	6–7	(2) 750 kcmil—3/0 Cu/Al
	8	(2) 750 kcmil—1/0 Cu/Al
Control Terminals—Cu Only		
12–16 AWG stranded, 12–14 AWG solid		

Power Terminal Torque Line and Load Terminals

Catalog Number	Terminal	Torque in lb-in
C306DT3B	32A	20
C306GT3B	75A	35 (14–10 AWG)
		40 (8 AWG)
		45 (6–4 AWG)
		50 (3–2 AWG)
C306KN3 (socket head screw)	105A	120 (3/16)
		200 (1/4)
		250 (5/16)
C306NN3 (socket head screw)	144A	120 (3/16)
		200 (1/4)
		250 (5/16)
C306NN3 (slotted head screw)		35 (14–10 AWG)
		40 (8 AWG)
		45 (6–4 AWG)
		50 (3–1/0 AWG)

Plugging and Jogging Service Horsepower Ratings ②

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

Overload Relay UL/CSA Contact Ratings Control Circuit ③

AC Volts	120V	240V	480V	600V
NC Contact B600				
Make and break amperes	30	15	7.5	6
Break amperes	3	1.5	0.75	0.6
Continuous amperes	5	5	5	5
NO Contact C600				
Make and break amperes	15	7.5	3.375	3
Break amperes	1.5	0.75	0.375	0.3
Continuous amperes	2.5	2.5	2.5	2.5

Notes

① Two compartment box lug.

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

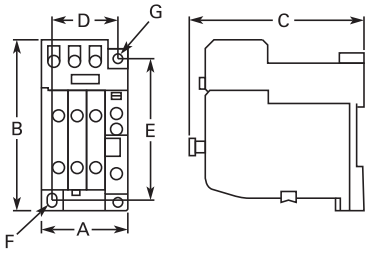
③ DC ratings cover Freedom Series coils only.

Dimensions

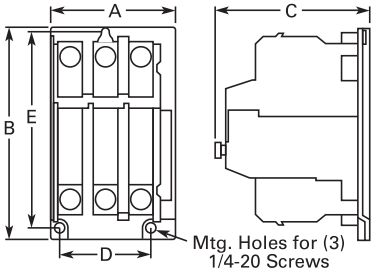
Approximate Dimensions in Inches (mm)

Stand-Alone Overload Relays

32A and 75A Sizes—C306DT38 and C306GT3B



105A and 144A Sizes—C306KN38 and C306NN3B



Dimensions and Shipping Weights

Ampere Size	Wide A	High B	Deep C	Mounting D	E	F (Slot)	G (Hole)	Shipping Weight Lbs (kg)
32A	1.77 (45.0)	4.13 (104.9)	3.69 (93.7)	1.36 (34.5)	3.74 (95.0)	0.18 x 0.30 (4.6 x 7.6)	0.18 (4.6) dia.	0.8 (0.4)
75A	2.54 (64.5)	4.69 (119.1)	3.74 (95.0)	2.00 (50.8)	3.45 (87.6)	0.22 x 0.26 (5.6 x 6.6)	0.21 (5.3) dia.	1.4 (0.6)
105 and 144A	4.00 (101.6)	7.17 (182.1)	4.91 (124.7)	3.00 (76.2)	6.62 (168.1)	—	—	4.0 (1.8)

2

C440/*XT* Electronic Overload Relay



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-4**
Starters—Three-Phase Non-Reversing and Reversing, Full Voltage	**V5-T2-10**
Starters—Single-Phase Non-Reversing, Full Voltage, Bi-Metallic Overload	**V5-T2-15**
Accessories	**V5-T2-21**
Renewal Parts	**V5-T2-30**
Technical Data and Specifications	**V5-T2-35**
Relays—Thermal Overload	**V5-T2-39**
C440/***XT*** Electronic Overload Relay	
Standards and Certifications	**V5-T2-49**
Catalog Number Selection	**V5-T2-50**
Product Selection	**V5-T2-51**
Accessories	**V5-T2-53**
Technical Data and Specifications	**V5-T2-55**
Dimensions	**V5-T2-61**

C440/*XT* Electronic Overload Relay

Product Description

Eaton's new electronic overload relay (EOL) is the most compact, high-featured, economical product in its class. Designed on a global platform, the new EOL covers the entire power control spectrum including NEMA, IEC and DP contactors. The NEMA and DP versions are offered with the *C440* designation while the IEC offering has the ***XT*** designation. The electronic design provides reliable, accurate and value driven protection and communications capabilities in a single compact device. It is the flexible choice for any application requiring easy-to-use, reliable protection.

Eaton has a long history of innovations and product development in motor control and protection, including both traditional NEMA, as well as IEC control. It was from this experience that the C440 was developed, delivering new solutions to meet today's demands.

C440 is a self-powered electronic overload relay available up to 175A as a self contained unit. With external CTs, C440 can protect motor up to 1500 FLA. Available add-on accessories include remote reset capability and communication modules with I/O for DeviceNet, PROFIBUS, and Modbus.

Features and Benefits

Features

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Compact size
- Flexible, intelligent design
- Global product offering—available with NEMA, IEC and DP power control

Size/Range

- Broad FLA range (0.33–1500A)
- Selectable trip class (10A, 10, 20, 30)
- Direct mounting to NEMA, IEC and DP contactors
- Most compact electronic overload in its class

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase unbalance
- Selectable (ON/OFF) ground fault

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase unbalance and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
  - 120 Vac
  - 24 Vac
  - 24 Vdc
- Tamper-proof cover
- Communications modules
  - Modbus RTU RS-485
  - DeviceNet with I/O
  - PROFIBUS with I/O
  - Modbus RTU with I/O
  - Ethernet IP with I/O
  - Modbus TCP with I/O

Benefits

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

- Available with NEMA, IEC and DP contactors
- 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
- Available as an open component and in enclosed control and motor control center assemblies

Monitoring Capabilities

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

Safety

- IP 20 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

Standards and Certifications

- UL
- CSA
- CE
- NEMA
- IEC/EN 60947 VDE 0660
- ISO 13849-1 (EN954-1)
- RoHS
- ATEX directive 94/9/EC
- Equipment Group 2, Category 2

Electronic Overload Education

Description	Definition	Cause	Effect if not Protected	C440/*XT* Protection
Motor Protection				
Thermal overload	Overload is a condition in which current draw exceeds 115% of the full load amperage rating for an inductive motor.	• An increase in the load or torque that is being driven by the motor. • A low voltage supply to the motor causes the current to go high to maintain the power needed. • A poor power factor causing above normal current draw.	• Increase in current draw leads to heat and insulation breakdown, which can cause system failure. • Increase in current can increase power consumption and waste valuable energy.	• Thermal trip behavior is defined by UL, CSA and IEC standards. • Trip class is settable from 10A, 10, 20, 30
Ground fault	A line to ground fault.	A current leakage path to ground.	An undetected ground fault can burn through multiple insulation windings, ultimately leading to motor failure, not to mention risk to equipment or personnel	Fixed protective setting that takes the starter offline if ground fault current exceeds 50% of the FLA dial setting, that is, if the FLA dial is set to 12A, the overload relay will trip if the ground current exceeds 6A.
Unbalanced phases (voltage and current)	Uneven voltage or current between phases in a three-phase system.	When a three-phase load is powered with a poor quality line, the voltage per phase may be unbalanced.	Unbalanced voltage causes large unbalanced currents and as a result this can lead to motor stator windings being overloaded, causing excessive heating, reduced motor efficiency and reduced insulation life.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.
Phase loss—current (single-phasing)	One of the three-phase voltages is not present.	Multiple causes, loose wire, improper wiring, grounded phase, open fuse, and so on.	Single-phasing can lead to unwanted motor vibrations in addition to the results of unbalanced phases as listed above.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.

Catalog Number Selection

Freedom Series NEMA Starters with C440 Electronic Overload Relays ①

A N 1 9 A N 0 A 5E 005

Device Type
A = Starter

Standard
N = NEMA

Device Assembly Configuration
1 = Non-reversing
5 = Reversing

OLR Type
9 = Starter w/C440 EOLR

Contactor Frame Size

	NEMA Size	Continuous Amperes
A =	00	9
B =	0	18
C =	1C	27
D =	1	27
G =	2	45
K =	3	90
M =	4C	135
N =	4	135
S =	5	270

NEMA Enclosure
N = Open

For Starters

Starter Mounting Option
0 = Horizontal

C440 OLR Designation (FVNR and FVR only)
5E = Standard feature set
SEL Reset, SEL Class (10A, 10, 20, 30)
5G = Ground fault feature set
SEL Reset, SEL Class (10, 20)

AC Coil Suffix

Suffix	Volts and Hertz
A=	120/60 or 110/50
B=	240/60 or 220/50
C=	480/60 or 440/50
D=	600/60 or 550/50
E=	208/60
H=	277/60
J=	208–240/60 ②
K=	240/50
L=	380–415/50
N=	550/50
T=	24/60, 24/50 ③
U=	24/50
V=	32/50
W=	48/60
Y=	48/50

C440 FLA Range (FVNR and FVR only)

NEMA Size 00
1P6 = 0.33–1.65A
005 = 1–5A
020 = 4–20A

NEMA Size 0
1P6 = 0.33–1.65A
005 = 1–5A
020 = 4–20A

NEMA Size 1/1C
1P6 = 0.33–1.65A
005 = 1–5A
020 = 4–20A
045 = 9–45A

NEMA Size 2
005 = 1–5A
020 = 4–20A
045 = 9–45A

NEMA Size 3
100 = 20–100A

NEMA Size 4/4C
140 = 28–140A

NEMA Size 5 ④
300 = 60–300A

Notes
① See **Page V5-T2-51** for Product Selection.
② NEMA Sizes 00 and 0 only.
③ NEMA Sizes 00 and 0 only. Sizes 1–3 are 24/60 only.
④ NEMA Size 5 starter available with 60-300A panel mounted CTs. Starter shipped as an assembled unit with 1–5A C440 overload relay (C440A1A005SELAX or C440A2A005SELAX).

Product Selection

Type AN19/59 Freedom Series Starters

Type AN19/59 Freedom Series Starters with C440 Electronic Overload Relays

NEMA Starter



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115V	Single-Phase 230V	Three-Phase 208V	Three-Phase 240V	Three-Phase 480V	Three-Phase 600V	Three-Pole Non-Reversing ①② Catalog Number	Three-Pole Reversing ①② Catalog Number
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN19AN0_5E _**	**AN59AN0_5E _**
0	18	21	1	2	3	3	5	5	**AN19BN0_5E _**	**AN59BN0_5E _**
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN19DN0_5E _**	**AN59DN0_5E _**
2	45	52	3	7-1/2	10	15	25	25	**AN19GN0_5E _**	**AN59GN0_5E _**
3	90	104	—	—	25	30	50	50	**AN19KN0_5E _**	**AN59KN0_5E _**
4	135	156	—	—	40	50	100	100	**AN19NN0_5E _**	**AN59NN0_5E _**
5③	270	311	—	—	75	100	200	200	**AN19SN0_5E _**	**AN59SN0_5E _**

Type AN19/59 Freedom Series Starters with C440 with Ground Fault Electronic Overload Relays

NEMA Starter with Ground Fault



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115V	Single-Phase 230V	Three-Phase 208V	Three-Phase 240V	Three-Phase 480V	Three-Phase 600V	Three-Pole Non-Reversing ①② Catalog Number	Three-Pole Reversing ①② Catalog Number
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN19AN0_5G _**	**AN59AN0_5G _**
0	18	21	1	2	3	3	5	5	**AN19BN0_5G _**	**AN59BN0_5G _**
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN19DN0_5G _**	**AN59DN0_5G _**
2	45	52	3	7-1/2	10	15	25	25	**AN19GN0_5G _**	**AN59GN0_5G _**
3	90	104	—	—	25	30	50	50	**AN19KN0_5G _**	**AN59KN0_5G _**
4	135	156	—	—	40	50	100	100	**AN19NN0_5G _**	**AN59NN0_5G _**
5③	270	311	—	—	75	100	200	200	**AN19SN0_5G _**	**AN59SN0_5G _**

Coil Suffix Codes

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

C440 FLA Range (FVNR and FVR Starters Only)

NEMA Size	OLR Code	FLA Range	OLR Code	FLA Rating
00	**1P6**	0.33–1.65A	**020**	4.0–20A
	005	1.0–5.0A	**—**	—
0	**1P6**	0.33–1.65A	**020**	4.0–20A
	005	1.0–5.0A	**—**	—
1	**1P6**	0.33–1.65A	**020**	4.0–20A
	005	1.0–5.0A	**045**	9.0–45A
2	**005**	1.0–5.0A	**045**	9.0–45A
	020	4.0–20A	**—**	—
3	**100**	20–100A	**—**	—
4	**140**	28–140A	**—**	—
5③	**300**	60–300A	**—**	—

Notes

① Underscore (_) indicates coils suffix required, see Coil Suffix table above.
② Underscore (_) indicates OLR designation required, see C440 FLA Range table above.
③ NEMA Size 5 starter available with 60-300A panel mounted CTs. Starter shipped as an assembled unit with 1–5A C440 overload relay (C440A1A005SELAX or C440A2A005SELAX).

Compact NEMA Size 1 and 4 Starters

New Compact NEMA Size 1 and 4 starters—available with electronic overload relay **only**.

2

Non-Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115V	Single-Phase 230V	Three-Phase 208V	Three-Phase 240V	Three-Phase 480V	Three-Phase 600V	Three-Pole Non-Reversing Catalog Number
Standard Fault Overload									
1C	27	32	2	3	7.5	7.5	10	10	**AN19CN0_5E_**
4C	135	156	—	—	40	50	100	100	**AN19MN0_5E_**
Ground Fault Overload									
1C	27	32	2	3	7.5	7.5	10	10	**AN19CN0_5G_**
4C	135	156	—	—	40	50	100	100	**AN19MN0_5G_**

Electrical Life at Rated Continuous Current

NEMA Size	Rated Current (Amperage) AC3/AC4	Operations
1C	27/150	2,500,000/40,000
1	27/153	5,000,000/110,000

NEMA Size	Rated Current (Amperage) AC3/AC4	Operations
4C	135/516	500,000/40,000
4	135/822	800,000/70,000

AN19 Competitive Retrofit Kits

The retrofit kits provide a packaged solution to replace competitive starters with the Freedom AN19 starter using existing hole patterns. Suitable for replacement of Allen-Bradley, Square D, GE and Siemens starters.



Kit contents

- Competitive mounting plate
- AN19 starter
- Remote reset module
- NO 10250T pushbutton
- RESET pushbutton legend plate
- 16 gauge control wire

AN19 Competitive Retrofit Kit—Product Selection

Size	Description	Catalog Number
1	120 Vac coil, 4–20A overload	**AN19DN0A5E020-CRK**
2	120 Vac coil, 9–45A overload	**AN19GN0A5E045-CRK**
3	120 Vac coil, 20–100A overload	**AN19KN0A5E100-CRK**
4	120 Vac coil, 28–140A overload	**AN19NN0A5E140-CRK**
5	120 Vac coil, 60–300A overload	**AN19SN0A5E300-CRK**

AN19 Competitive Retrofit Kit—Catalog Number Selection

A N 1 9 D N 0 A 5E 020 – CRK

Device Type
A = Starter

Standard
N = NEMA

Device Assembly Configuration
1 = Non-reversing

OLR Type
9 = Starter w/C440 EOLR

Contactor Frame Size

	NEMA Size	Continuous Amperes
D =	1	27
G =	2	45
K =	3	90
N =	4	135
S =	5	270

NEMA Enclosure
N = Open

For Starters

Starter Mounting Option
0 = Horizontal

AC Coil Suffix

Suffix	Volts and Hertz
A =	120/60 or 110/50

C440 OLR Designation
5E = Standard feature set
SEL Reset,
SEL Class (10A, 10, 20, 30)

Competitive Retrofit Kit

C440 FLA Range
NEMA Size 1/1C
020 = 4–20A
NEMA Size 2
045 = 9–45A
NEMA Size 3
100 = 20–100A
NEMA Size 4/4C
140 = 28–140A
NEMA Size 5
300 = 60–300A

Accessories

CT Kits

Accessories

Description	Catalog Number
Safety Cover	
Clear Lexan cover that mounts on top of the FLA dial and DIP switches when closed.	**ZEB-XSC**
Reset Bar	
Assembles to the top of the overload to provide a larger target area for door mounted reset operators.	**ZEB-XRB**
Remote Reset	
Remote reset module (24 Vdc) ①	**C440-XCOM**
Remote reset module (120 Vac) ①	**ZEB-XRR-120**
Remote reset module (24 Vac) ①	**ZEB-XRR-24**

Safety Cover



Reset Bar



Remote Reset



Communication

The C440/XTOE is provided with two levels of communication capability.

Basic Communication via Expansion Module—Monitoring Only

Basic communication on the C440 is accomplished using an expansion module (C440-XCOM). The expansion module plugs into the expansion bay on the C440 overload relay, enabling communications with the overload via their Modbus RTU (RS-485) network. No additional cards or modules are required. See figure below.

Advanced Communication—Monitoring and Control

C440 also has the ability to communicate on industrial protocols such as Modbus RTU, DeviceNet, PROFIBUS, Modbus TCP, and EtherNet/IP while providing control capability using I/O.

An expansion module (C440-XCOM) combined with a communication module allows easy integration onto the customer's network. See figure below.

C440 communication modules, wired to the C440-XCOM give C440 control capability via communications. The communication modules offer flexible mounting options (DIN rail or panel) along with four inputs (24 Vdc or 120 Vac) and two outputs as standard.



Basic Communication—Modbus



Advanced Communication—Communication Module

Note

① Customer can wire remote mounted button to reset module (that is, 22 mm pushbutton, catalog number M22-D-B-GB14-K10).

The following information can be viewed using the communication option:

- Motor status—running, stopped, tripped or resetting
- Individual rms phase currents (A, B, C)
- Average of three-phase rms current
- Percent thermal capacity
- Fault codes (only available prior to reset)
- Percent phase unbalance
- Ground fault current and percent
- Overload relay settings—trip class, DIP switch selections, reset selections
- Modbus address (can be set over the network)

Features and Benefits

Ethernet modules

- Single device supports both EtherNet/IP, Modbus TCP
- Internal switch with two Ethernet ports allows linear or ring network configurations
- Embedded web-services for easy configuration and monitoring with Internet Explorer

DeviceNet

- I/O assemblies with the same size and layout as the legacy Advantage (WPONIDNA) and ***IT.*** (DSNAP) Starter platforms for seamless upgrades to C441 technology with no program changes
- Communication uses only one DeviceNet MAC ID

PROFIBUS

- Capable of baud rates up to 12 Mb
- Intuitive configuration with common PROFIBUS tools

Modbus

- Modbus address and baud rate can be changed easily with C441's user interface (C441M only)

Terminals

- Unique locking mechanism provides easy removal of terminal block with field wiring installed
- Marked terminals for ease of wiring and troubleshooting

On-board I/O assemblies

- Modules offer 4 IN / 2 OUT of network programmable I/O
- 24 Vdc or 120 Vac signal options
- Optical isolation protects the I/O and communication circuits from possible damage due to transients and ground loops
- Inputs feature user-definable debounce, which limits the effects of transients and electrical noise
- Outputs feature a user-definable state for loss of communication: hold last state, ON or OFF

Communication Accessories

Communication modules mount on their own to be used as stand-alone network based I/O or be wired to the C440-XCOM. Parts are available for purchase individually (see "consists of" below) or as part of a kit for C440 communications.

Expansion Module



Description	Catalog Number
Expansion Module	
Expansion module (Remote Reset/Modbus RTU, RS-485 Communication)	**C440-XCOM**

Ethernet with I/O Module



Communication Modules	
DeviceNet communication module kit—120 V I/O (consists of C440-XCOM + C441KS)	**C440-DN-120**
DeviceNet communication module kit—24 Vdc I/O (consists of C440-XCOM + C441LS)	**C440-DN-24**
PROFIBUS communication module kit—120 V I/O (consists of C440-XCOM + C441SS)	**C440-DP-120**
PROFIBUS communication module kit—24 V I/O (consists of C440-XCOM + C441QS)	**C440-DP-24**
Modbus communication module kit—120 V I/O (consists of C440-XCOM + C441NS)	**C440-MOD-120**
Modbus communication module kit—24 Vdc I/O (consists of C440-XCOM + C441PS)	**C440-MOD-24**
Modbus TCP/Ethernet IP communication module kit—120 V I/O (consists of C440-XCOM + C441U)	**C440-ET-120**
Modbus TCP/Ethernet IP communication module kit—24 V I/O (consists of C440-XCOM + C441V)	**C440-ET-24**

Technical Data and Specifications

Electronic Overload Relays up to 1500A

Description	Specification 45 mm	55 mm	110 mm
Electrical Ratings	**Range**	**Range**	**Range**
Operating voltage (three-phase) and frequency	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)
FLA Range			
	0.33–1.65A 1–5A 4–20A 9–45A	20–100A	28–140A (NEMA) 35–175A (IEC)
Use with Contactors			
XT IEC frames	B, C, D	D, F, G	G, H
Freedom NEMA sizes	00, 0, 1, 2	3	4
Trip Class			
	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable
Motor Protection			
Thermal overload setting	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip
Feature	**Range**	**Range**	**Range**
Phase loss	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Phase unbalance (selectable: enable/disable)	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Ground fault (selectable: enable/disable)	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec
Reset	Manual/automatic	Manual/automatic	Manual/automatic
Indicators			
Trip status	Orange flag	Orange flag	Orange flag
Mode LED	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip
Options			
Remote reset	Yes	Yes	Yes
Reset bar	Yes	Yes	Yes
Communication expansion module	Yes	Yes	Yes
Communication adapter	Yes	Yes	Yes
Capacity			
Load terminals			
Terminal capacity	12–10 AWG (4–6 mm^2) 8–6 AWG (6–16 mm^2)	6–1 AWG (16–50 mm^2)	8–4/0 AWG (10–95 mm^2)
Tightening torque	20–25 lb-in (2.3–2.8 Nm) 25–30 lb-in (2.8–3.4 Nm)	25–30 lb-in (2.8–3.4 Nm)	124 lb-in (14 Nm)
Input, auxiliary contact and remote reset terminals			
Terminal capacity	2 x (18–12) AWG	2 x (18–12) AWG	2 x (18–12) AWG
Tightening torque	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)
Voltages			
Insulation voltage U_i (three-phase)	690 Vac	690 Vac	690 Vac
Insulation voltage U_i (control)	500 Vac	500 Vac	500 Vac
Rated impulse withstand voltage	6000 Vac	6000 Vac	6000 Vac
Overvoltage category/pollution degree	III/3	III/3	III/3

Electronic Overload Relays up to 1500A, continued

Description	Specification 45 mm	55 mm	110 mm
Auxiliary and Control Circuit Ratings			
Conventional thermal continuous current	5A	5A	5A
Rated operational current—IEC AC-15			
Make contact (1800 VA)			
120V	15A	15A	15A
240V	15A	15A	15A
415V	0.5A	0.5A	0.5A
500V	0.5A	0.5A	0.5A
Break contact (180 VA)			
120V	1.5A	1.5A	1.5A
240V	1.5A	1.5A	1.5A
415V	0.9A	0.9A	0.9A
500V	0.8A	0.8A	0.8A
IEC DC-13 (L/R F 15 ms1)			
0–250V	1.0A	1.0A	1.0A
Rated operational current—UL B600			
Make contact (3600 VA)			
120V	30A	30A	30A
240V	15A	15A	15A
480V	7.5A	7.5A	7.5A
600V	6A	6A	6A
Break contact (360 VA)			
120V	3A	3A	3A
240V	1.5A	1.5A	1.5A
480V	0.75A	0.75A	0.75A
600V	0.6A	0.6A	0.6A
R300—Vdc ratings (28 VA)			
0–120V	0.22A	0.22A	0.22A
250V	0.11A	0.11A	0.11A
Short-Circuit Rating without Welding			
Maximum fuse	6A gG/gL	6A gG/gL	6A gG/gL
Environmental Ratings			
Ambient temperature (operating)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity UL 991 (H3)	5% to 95% non-condensing	5% to 95% non-condensing	5% to 95% non-condensing
Altitude (no derating) NEMA ICS1	2000m	2000m	2000m
Shock (IEC 600068-2-27)	15g any direction	15g any direction	15g any direction
Vibration (IEC 60068-2-6)	3g any direction	3g any direction	3g any direction
Pollution degree per IEC 60947-4-1	3 for product (2 for pcb)	3 for product (2 for pcb)	3 for product (2 for pcb)
Ingress protection	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Mounting position	Any	Any	Any
Climatic proofing	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30

Electronic Overload Relays up to 1500A, continued

Description	Specification 45 mm	55 mm	110 mm
Electrical/EMC			
Radiated emissions IEC 60947-4-1-Table 15 EN 55011 (CISPIR 11) Group 1, Class A, ISM	30 mHz to 1000 mHz	30 mHz to 1000 mHz	30 mHz to 1000 mHz
Conducted emissions IEC 60947-4-1-Table 14 EN 55011 (CISPIR 11) Group 1; Class ISM	0.15 mHz to 30 mHz	0.15 mHz to 30 mHz	0.15 mHz to 30 mHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact
Radiated immunity IEC 60947-4-1 IEC 61000-4-3	10 V/m 80 mHz–1000 mHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 mHz–1000 mHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 mHz–1000 mHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1, IEC 61000-4-6	140 dub (10V rms) 150 kHz–100 mHz	140 dub (10V rms) 150 kHz–100 mHz	140 dub (10V rms) 150 kHz–100 mHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 a Class 4	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)
Power freq. magnetic field immunity IEC 60947-4-1, IEC 61000-4-8	30 A/m, 50 Hz	30 A/m, 50 Hz	30 A/m, 50 Hz
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m	10 V/m	10 V/m
Distortion IEEE 519	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.
Electrostatic discharge (ESD) IEC 61000-4-2, EN 61131-2	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge
Electrical fast transient (EFT) IEC 61000-4-4, EN 61131-2	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 61000-4-5, EN 61131-2	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)

Communication Modules

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
Electrical/EMC				
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 mHz	30–1000 mHz	30–1000 mHz	30–1000 mHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 mHz	0.15–30 mHz	0.15–30 mHz	0.15–30 mHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 mHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10V rms) 150 kHz–80 mHz	140 dBuV (10V rms) 150 kHz–80 mHz	140 dBuV (10V rms) 150 kHz–80 mHz	140 dBuV (10V rms) 150 kHz–80 mHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 6100-4-4	±2 kV using direct method	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 3	User IO and communication lines ①: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)
Electromagnetic field ① IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m	10 V/m	10 V/m	10 V/m
Environmental Ratings				
Ambient temperature (operating)	–4° to 122°F (–20° to 50°C)	–13° to 122°F (–25° to 50°C)	–13° to 122°F (–25° to 50°C)	–13° to 122°F (–25° to 50°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing
Altitude (no derating)	2000m	2000m	2000m	2000m
Shock (IEC 600068-2-27)	15G any direction	15G any direction	15G any direction	15G any direction
Vibration (IEC 60068-2-6)	3G any direction	3G any direction	3G any direction	3G any direction
Pollution degree per IEC 60947-1	3	3	3	3
Degree of protection	IP20	IP20	IP20	IP20
Overvoltage category per UL 508	III	III	III	III
DeviceNet				
DeviceNet connections	—	Group 2, polling, bit strobe, explicit, no UCMM	—	—
DeviceNet baud rate	—	125K, 250K, 500K	—	—
Ethernet				
Ethernet connections	—	—	—	Integrated two-port switch with dual RJ45 Ethernet connections
Ethernet type	—	—	—	Ethernet 10/100 Mbs, AutoMDX, Auto Negotiation
PROFIBUS				
PROFIBUS connections	—	—	Group 2, polling, bit strobe, explicit, no UCMM	—
PROFIBUS baud rate	—	—	9.6K, 19.2K, 45.45K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M	—

Note

① Relates to C441M only.

Communication Modules, continued

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
C441_ 24 Vdc Input				
Nominal input voltage	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Operating voltage	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
Number of inputs	4	4	4	4
Signal delay	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)
OFF-state voltage	<6 Vdc	<6 Vdc	<6 Vdc	<6 Vdc
ON-state voltage	>18 Vdc	>18 Vdc	>10 Vdc	>18 Vdc
Nominal input current	5 mA	5 mA	5 mA	5 mA
Isolation	1500V	1500V	1500V	1500V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
24V source current	50 mA	50 mA	50 mA	50 mA
Operating Voltage Range—DC Input Modules				
OFF state	0–6 Vdc	0–6 Vdc	0–6 Vdc	0–6 Vdc
Transition region	6–18 Vdc	6–18 Vdc	6–18 Vdc	6–18 Vdc
ON state	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
C441_ 120 Vac Input				
Nominal input voltage	120 Vac	120 Vac	120 Vac	120 Vac
Operating voltage	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Number of inputs	4	4	4	4
OFF-state voltage	<30 Vac	<30 Vac	<20 Vac	<30 Vac
ON-state voltage	>80 Vac	>80 Vac	>70 Vac	>80 Vac
Nominal input current	15 mA	15 mA	15 mA	15 mA
Signal delay	1/2 cycle	1/2 cycle	1/2 cycle	1/2 cycle
Isolation	1500V	1500V	1500V	1500V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
Operating Voltage Range—AC Input Modules				
OFF state	0–30 Vac	0–30 Vac	0–30 Vac	0–30 Vac
Transition region	30–80 Vac	30–80 Vac	30–80 Vac	30–80 Vac
ON state	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Output Modules				
Nominal voltage	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc
Number of outputs	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C
Relay OFF time	3 ms	3 ms	3 ms	3 ms
Relay ON time	7 ms	7 ms	7 ms	7 ms
Max. current per point ①	5A (B300 rated)	5A (B300 rated)	5A (B300 rated)	5A (B300 rated)
Electrical life	100,000 cycles	100,000 cycles	100,000 cycles	100,000 cycles
Mechanical life	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles

Note

① Relates to C441M only.

Short Circuit Ratings (North America CSA, cUL)

Changes to UL 508A and NEC in recent years have brought a focus to control panel safety with regard to short-circuit current ratings (SCCR). Eaton's C440 electronic overload relays combined with ***XT*** series IEC and Freedom Series NEMA contactors provide a wide variety of SCCR solutions needed for a variety of applications. The SCCR data in this document reflects the latest information as of April 2010.

C440/*XT* Standalone Overload Relays (*XT*, C440)

		Standard-Fault Short Circuit Data			High-Fault Short Circuit Data					
					Fuses (RK5, J, CC)			Thermal-Magnetic Circuit Breakers		
Overload FLA Range	Maximum Operating Voltage	600V (kA)	Maximum Fuse Size (A) (RK5)	Maximum Breaker Size (A)	480V (kA)	600V (kA)	Maximum Fuse Size	480V (kA)	600V (kA)	Maximum Breaker Size
0.33–1.65A	600 Vac	1	6	15	—	—	—	—	—	—
1–5A	600 Vac	5	20	20	100	100	30	100	35	20
4–20A	600 Vac	5	80	80	100	100	100	100	35	80
9–45A	600 Vac	5	175	175	100	100	100	100	35	100/175 (480/600)
20–100A	600 Vac	10	400	400	100	100	200	150	35	250/400 (480/600)
28–140A	600 Vac	10	450	500	100	100	400	100	65	400
35–175A	690 Vac	10	500 (gG)	350 (690 Vac) 320 (415 Vac)	100	100	500 (gG)	100 (415 Vac)	—	350 (LGC3350) 320 (NZMH3)

NEMA Freedom Series Starters with C440 Electronic Overload Relays

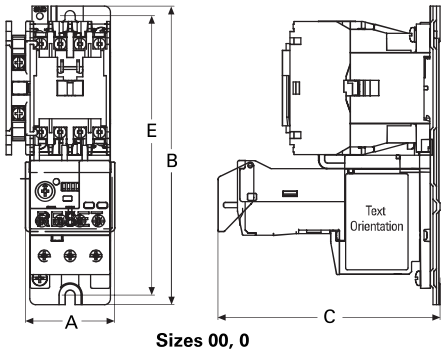
		High-Fault Short Circuit Data			Thermal-Magnetic Circuit Breakers		
		Fuses (RK5, J, CC)					
NEMA Size	Maximum Operating Voltage	480V	600V	Maximum Fuse Size	480V	600V	Maximum Breaker Size
00	0.33–1.65A	100	100	30	—	—	—
	1–5A	100	100	30	100	35	35
	4–20A	100	100	30	100	35	35
0	0.33–1.65A	100	100	60	—	—	—
	1–5A	100	100	60	100	35	70
	4–20A	100	100	60	100	35	70
1	0.33–1.65A	100	100	100	—	—	—
	1–5A	100	100	100	100	35	100
	4–20A	100	100	100	100	35	100
	9–45A	100	100	100	100	35	100
2	1–5A	100	100	100	100	35	175
	4–20A	100	100	100	100	35	175
	9–45A	100	100	100	100	35	175
3	20–100A	100	100	200	50	50	250
4	28–140A	100	100	400	100	65	300

Dimensions

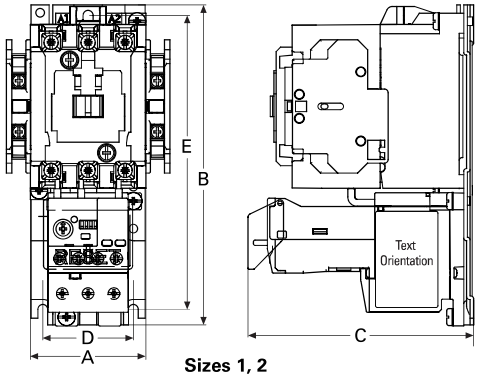
Approximate Dimensions in Inches (mm)

NEMA Starters

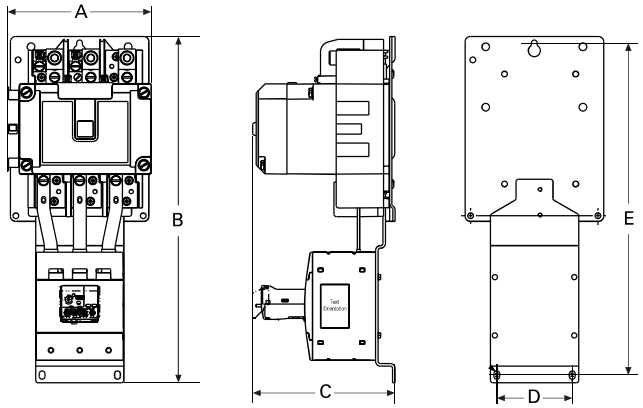
Full Voltage Non-Reversing Starters



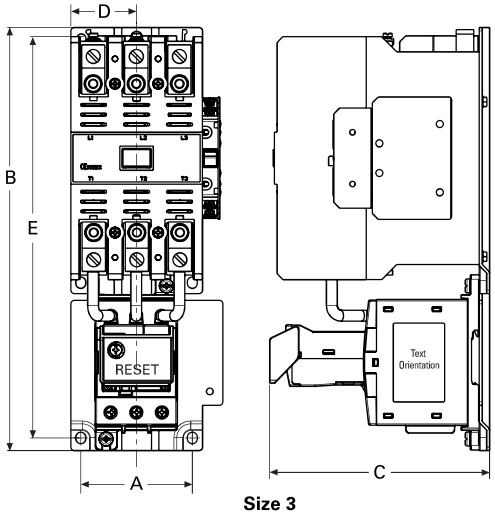
Sizes 00, 0



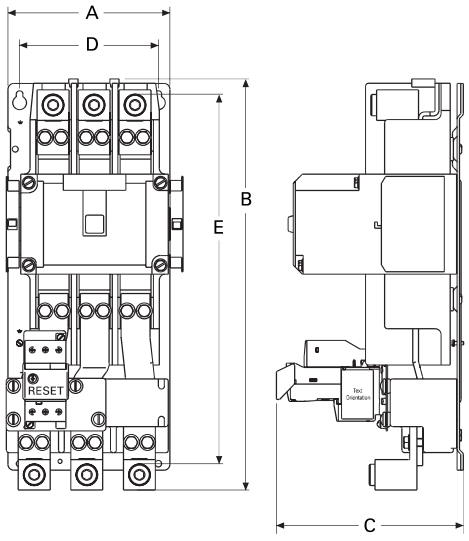
Sizes 1, 2



Size 4



Size 3

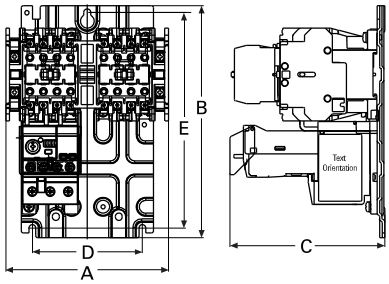


Size 5

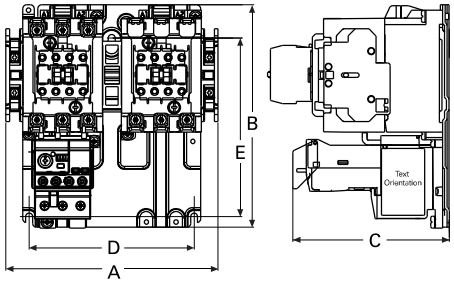
NEMA Size	A	B	C	D	E
00, 0	1.97 (50.0)	6.60 (167.6)	4.90 (124.5)	—	6.18 (157.0)
1, 2	2.60 (65.0)	7.10 (180.0)	4.98 (126.5)	2.00 (50.8)	6.50 (165.0)
3	3.00 (76.2)	11.40 (289.6)	5.92 (150.3)	1.77 (44.9)	10.81 (274.6)
4	7.10 (179.0)	17.00 (432.0)	7.00 (177.0)	3.70 (94.0)	16.30 (415.0)
5	7.00 (177.8)	17.81 (452.3)	8.08 (205.2)	6.00 (152.4)	16.01 (406.6)

Approximate Dimensions in Inches (mm)

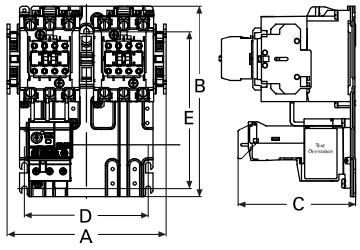
Full Voltage Reversing Starters



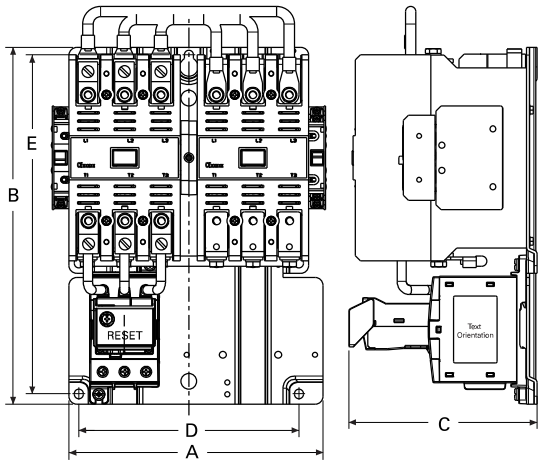
Sizes 00, 0



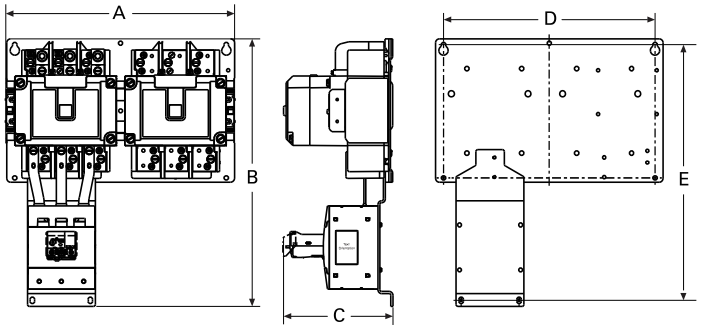
Size 1



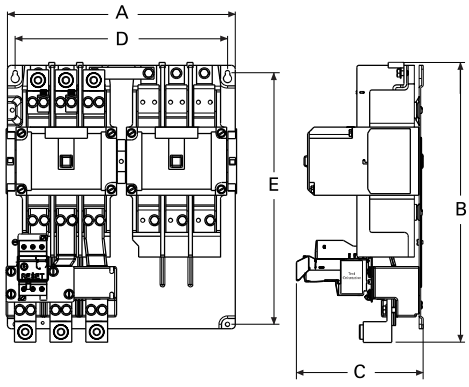
Size 2



Size 3



Size 4



Size 5

NEMA Size	A	B	C	D	E
00, 0	5.20 (132.0)	7.40 (187.0)	4.90 (125.0)	3.50 (89.0)	6.90 (174.0)
1	6.70 (171.0)	7.10 (180.0)	4.98 (126.5)	5.25 (133.0)	5.70 (144.0)
2	6.70 (171.0)	8.10 (205.0)	4.98 (126.5)	5.25 (133.0)	6.70 (170.0)
3	8.08 (205.2)	11.35 (288.3)	6.00 (152.0)	7.00 (177.8)	10.77 (273.6)
4	14.60 (371.0)	17.10 (433.0)	7.00 (177.0)	13.50 (343.0)	16.30 (145.0)
5	14.50 (368.3)	17.81 (452.3)	8.06 (204.8)	13.50 (342.9)	16.00 (406.6)

NEMA Space-Savings Family of Contactors and Starters



Contents

Description	*Page*
Contactors and Starters	
Catalog Number Selection	**V5-T2-64**
Product Selection	**V5-T2-64**
Accessories	**V5-T2-66**
Renewal Parts	**V5-T2-70**
Technical Data and Specifications	**V5-T2-71**
Dimensions	**V5-T2-93**

An Eaton Green Solution

Contactors and Starters

Product Description

The Eaton NEMA® Space-Savings line of contactors and starters includes non-reversing and reversing contactors, electronic overload relays and a variety of related accessories. Because the Space-Savings family meets IEC, UL®, CSA® and CE standards, it is the perfect product solution for applications all over the world. The compact and easy to install Space-Savings line of NEMA contactors and starters is the efficient and effective solution for customer applications from Size 0 through Size 5.

Application Description

The Space-Savings line of NEMA power control was engineered to provide highly effective control and protection for a variety of loads, including motors, compressors, pumps, resistive, capacitor banks, isolation and others.

The Space-Savings contactors are perfectly suited for use in Motor Control Center applications where bucket space sizing is critical. With both AC and DC control and flexible communication options, the Space-Savings family can be easily integrated into various customer applications.

Features and Benefits

- AC control from 120V to 600V 50/60 Hz
- 24 Vdc control
- Reversing or non-reversing contactors and starters
- XTOE self-powered electronic overload relay
- Non-reversing starters to NEMA Size 5
- Panel or DIN rail mounting to NEMA Size 2
- IP20 finger and back-of-hand proof
- Large ambient temperature range, –25 to 50°C [–13 to 122°F]
- AC and DC controlled contactors in the same compact frame
- Low power consumption AC and DC coils
- Built-in NO or NC auxiliary contacts to 32A
- Plug-in accessories for reduced installation time
- Coil replacement on NEMA Size 0–5
- Contact replacement on NEMA Size 1–5
- Integrated suppressor NEMA Size 0–4 DC operated contactors and NEMA Size 5 AC and DC operated contactors

Standards and Certifications

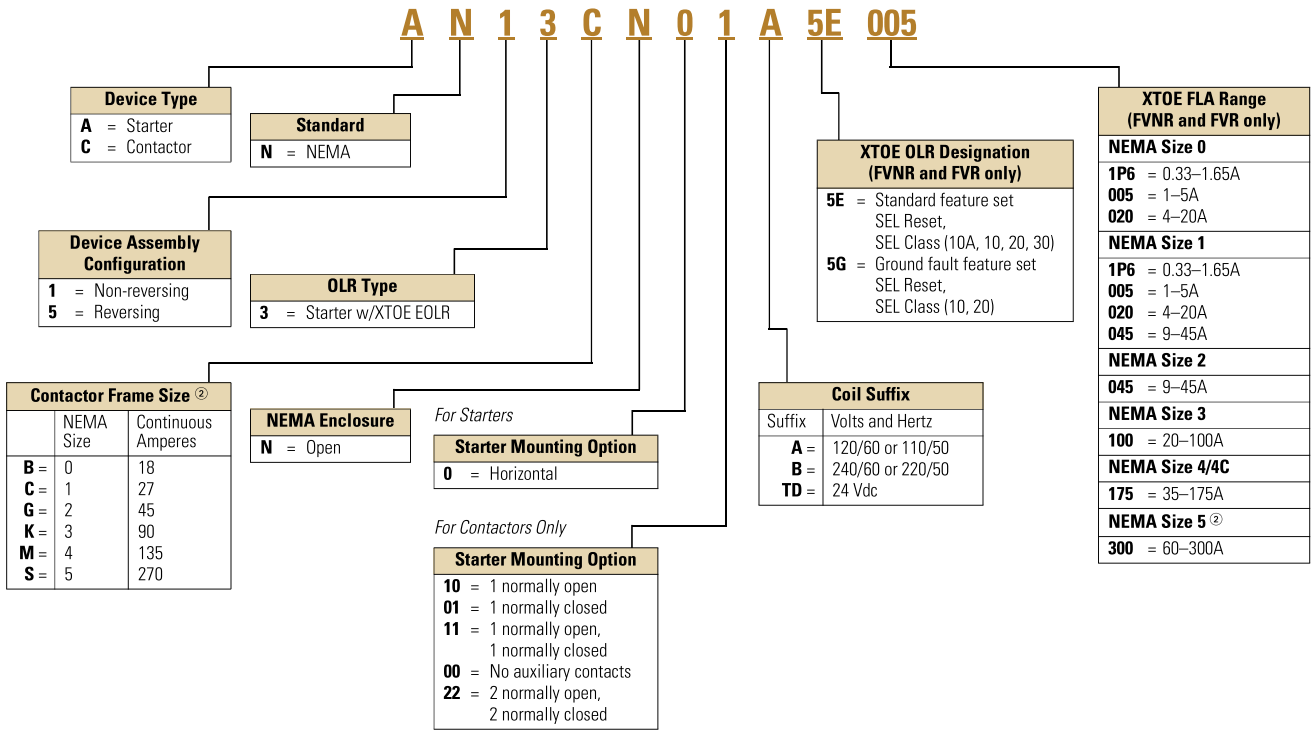
- IEC EN 60947
- CE approved
- UL
- CSA
- ATEX
- RoHS

CE UL SA RoHS COMPLIANT

Catalog Number Selection

2

Space-Savings NEMA Starters with XTOE Electronic Overload Relays



Product Selection

Type CN13/53 Space-Savings NEMA Contactors

NEMA Contactor



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115V	Single-Phase 230V	Three-Phase 208V	Three-Phase 240V	Three-Phase 480V	Three-Phase 600V	Three-Pole Non-Reversing ① Catalog Number	Three-Pole Reversing ① Catalog Number
0	18	21	1	2	3	3	5	5	**CN13BN010_**	—
1	27	32	2	3	7-1/2	7-1/2	10	10	**CN13CN010_**	**CN53CN011_**
2	45	52	3	7-1/2	10	15	25	25	**CN13GN000_**	**CN53GN011_**
3	90	104	7.5	15	25	30	50	50	**CN13KN000_**	**CN53KN011_**
4	135	156	—	—	40	50	100	100	**CN13MN000_**	—
5	270	311	—	—	75	100	200	200	**CN13SN022_**	—

Notes

① Underscore (_) indicates coils suffix required, see Coil Suffix table above.

② NEMA Size 5 starter components to be ordered separately: Contactor (CN13SN022_), 60–300A CT kit, and 1–5A overload relay. See page **V5-T2-82** for CT kit and overload part numbers.

Type AN13/53 Space-Savings Starters with XTOE Electronic Overload Relays

NEMA Starter



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115V	Single-Phase 230V	Three-Phase 208V	Three-Phase 240V	Three-Phase 480V	Three-Phase 600V	Three-Pole Non-Reversing ①② Catalog Number ③	Three-Pole Reversing ①② Catalog Number ③
0	18	21	1	2	3	3	5	5	**AN13BN0_ 5E _**	**AN53BN0_ 5E _**
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN13CN0_ 5E _**	**AN53CN0_ 5E _**
2	45	52	3	7-1/2	10	15	25	25	**AN13GN0_ 5E _**	**AN53GN0_ 5E _**
3	90	104	—	—	25	30	50	50	**AN13KN0_ 5E _**	**AN53KN0_ 5E _**
4	135	156	—	—	40	50	100	100	**AN13MN0_ 5E _**	**AN53MN0_ 5E _**
5 ④	270	311	—	—	75	100	200	200	④	—

Type AN13/53 Space-Savings Starters with XTOE Ground Fault Electronic Overload Relays

NEMA Starter with Ground Fault



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115V	Single-Phase 230V	Three-Phase 208V	Three-Phase 240V	Three-Phase 480V	Three-Phase 600V	Three-Pole Non-Reversing ①② Catalog Number ③	Three-Pole Reversing ①② Catalog Number ③
0	18	21	1	2	3	3	5	5	**AN13BN0_ 5G _**	**AN53BN0_ 5G _**
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN13CN0_ 5G _**	**AN53CN0_ 5G _**
2	45	52	3	7-1/2	10	15	25	25	**AN13GN0_ 5G _**	**AN53GN0_ 5G _**
3	90	104	—	—	25	30	50	50	**AN13KN0_ 5G _**	**AN53KN0_ 5G _**
4	135	156	—	—	40	50	100	100	**AN13MN0_5G_**	**AN53MN0_5G_**
5 ④	270	311	—	—	75	100	200	200	④	—

XTOE Overload FLA Range (FVNR and FVR Starters Only) Magnet Coil Suffix

NEMA Size	OLR Code	FLA Range	OLR Code	FLA Rating
0	**1P6**	0.33–1.65A	**020**	4.0–20A
	005	1.0–5.0A	**—**	—
1	**1P6**	0.33–1.65A	**020**	4.0–20A
	005	1.0–5.0A	**045**	9.0–45A
2	**—**	—	**045**	9.0–45A
	—	—	**—**	—
3	**100**	20–100A	**—**	—
4	**175**	35–175A	**—**	—
5 ④	**300**	60–300A	**—**	—

Coil Voltage	Suffix Code
Sizes 0–2	
110V 50 Hz, 120V 60 Hz	**A**
220V 50 Hz, 240V 60 Hz	**B**
24–27 Vdc	**TD**
Sizes 3, 4	
100–120V 50/60 Hz	**A**
190–240V 50/60 Hz	**B**
24–27 Vdc	**TD**
Sizes 5	
100–120V 50/60 Hz	**A**
24–48 Vdc	**TD**

Notes

① Underscore (_) indicates coils suffix required, see Coil Suffix table above.

② Underscore (_) indicates OLR designation required, see XTOE FLA Range table above.

③ For MCC replacement needs, contact MCC Aftermarket.

④ NEMA Size 5 starter components to be ordered separately: Contactor (CN13SN022_), 60–300A CT kit, and 1–5A overload relay. See page **V5-T2-82** for CT kit and overload part numbers.

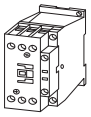
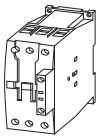
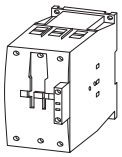
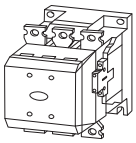
Accessories

2

Auxiliary Contacts—Overview

Front-mounted snap-on auxiliary contacts for Space-Savings contactors are available with screw terminals in a variety of contact configurations.

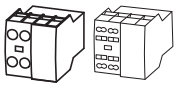
Auxiliary Contacts Possible Combinations

Frame Size	Catalog Number	Contactor	Built-In Auxiliary	Front (Top) Mount Two-Pole	Front (Top) Mount Four-Pole	Side-Mount Single-Pole	Side-Mount Two-Pole	Total Auxiliary Contacts Available
0, 1	**CN13BN0_ – CN13CN0_**		1NO or 1NC	1	—	—	—	3
				—	1	—	—	5
				—	—	—	1	3
						—		—
2	**CN13GN0_**		—	1	—	—	2	6
				—	1	—	1	6
						—		—
3, 4	**CN13KN0_ – CN13MN0_**		—	1	—	—	2	6
				—	1	—	2	8
				—	—	—	4	8
						—		—
5	**CN13SN0**		2NO–2NC	—	—		2	8
				—	—			—

Auxiliary Contacts

NEMA Size 0, 1— Front (Top) Mount—Two-Pole

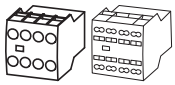
XTCEXF_



Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	2NO	53 63 / 54 64	5	**XTCEXFAC20**
16	1NO-1NC	53 61 / 54 62	5	**XTCEXFAC11** ②
16	2NC	51 61 / 52 62	5	**XTCEXFAC02**

NEMA Size 0, 1— Front (Top) Mount—Four-Pole

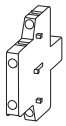
XTCEXF_



Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	4NO	53 63 73 83 / 54 64 74 84	5	**XTCEXFAC40** ②
16	3NO-1NC	53 61 73 83 / 54 62 74 84	5	**XTCEXFAC31** ②
16	2NO-2NC	53 61 71 83 / 54 62 72 84	5	**XTCEXFAC22** ②
16	1NO-3NC	53 61 71 81 / 54 62 72 82	5	**XTCEXFAC13**
16	4NC	51 61 71 81 / 52 62 72 82	5	**XTCEXFAC04**

NEMA Size 0, 1—Side-Mount—Two-Pole

XTCEXSCC11



Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
10	1NO-1NC	53 61 / 54 62	1	**XTCEXSCC11** ③

Notes

No auxiliary contacts can be fitted between two contactors.

① Orders must be placed in multiples of package quantity listed.

② To avoid duplicate terminal numbers in contact sequence, these auxiliary contacts should only be used with contactors having a built-in 1NO contact (XTCE…B10_, XTCE…C10_).

③ Can be mounted to the left side of contactor only. Cannot be used in combination with front (top) mount auxiliary contacts or mechanical interlocks.

NEMA Sizes 2–4—Two-Pole

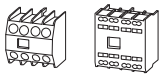
XTCEXF_

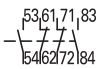


Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	2NO		5	**XTCEXFBG20**
16	1NO-1NC		5	**XTCEXFBG11**
16	2NC		5	**XTCEXFBG02**

NEMA Sizes 2–4—Four-Pole

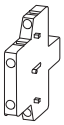
XTCEXF_



Conventional Thermal Current, Open at 60°C $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
16	4NO-0NC		5	**XTCEXFBG40**
16	3NO-1NC		5	**XTCEXFBG31**
16	2NO-2NC		5	**XTCEXFBG22**
16	2NO-2NC		5	**XTCEXFAG22**
16	1NO-3NC		5	**XTCEXFBG13**

NEMA Sizes 2–4, Side Mount (Snap-On)—Two-Pole

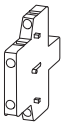
XTCEXS_



Conventional Free Air Thermal Current, $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
10	1NO–1NC		1	**XTCEXSBN11**

NEMA Size 5, Side Mount (Screw Mount)—Two-Pole

XTCEXS_



Conventional Free Air Thermal Current, $I_{th} = I_e$, AC-1 in Amps	Contact Configuration	Circuit Symbol	Pkg. Qty. ①	Screw Terminal Catalog Number
10	1NO–1NC		1	**XTCEXSBR11** ②

Notes

No auxiliary contacts can be fitted between two contactors.

① Orders must be placed in multiples of package quantity listed.

② For replacement only. XTCEXSBR11 and XTCEXSBLR11 cannot be added onto side mount auxiliaries that come with the Size 5 contactors as standard. To add auxiliaries onto the included side auxiliaries on Size 5 contactors, use XTCEXSCR11.

Suppressors

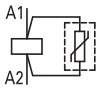
The switching of contactor coils can generate voltage transients that may cause arching on switch contacts and/or damage electronics on the control line. Either an RC or varistor suppressor is recommended in these types of applications. All Space-Savings DC contactor coils have built-in suppression.

Varistor suppressors clamp the voltage transient above the maximum coil voltage and are recommended when the level of the transient is known to not exceed the coil voltage. RC suppressors slow and reduce the level of the voltage transient but do not clamp them at a specific level. The slowing of the transient can reduce electrical interference. These are recommended in applications where operating rates are high.

XTCEXVS_



Contact Sequence



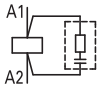
Varistor Suppressor ①②

Voltage	For Use with…	Pkg. Qty. ③	Catalog Number
48–130	CN13BN0_ CN13CN0_	10	**XTCEXVSCA**
48–130	CN13GN0_	10	**XTCEXVSFA**

XTCEXRS_



Contact Sequence



RC Suppressor ①②

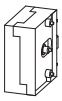
Voltage	For Use with…	Pkg. Qty. ③	Catalog Number
24–48	CN13GN0_	—	**XTCEXRSFW**
110–130		—	**XTCEXRSFA**

Additional Accessories

XTCEXML_



XTCEXMLM



Mechanical Interlock ⑤

For Use with…	Pkg. Qty. ③	Catalog Number
CN13BN0_, CN13CN0_	1	**XTCEXMLC**
CN13GN0_	1	**XTCEXMLD**
CN13KN0_, CN13MN0_	1	**XTCEXMLG** ⑥
CN13SN0_	1	**XTCEXMLM**

XTCEXRL_



Reversing Link Kits

For Use with…	Pkg. Qty. ③	Catalog Number
CN13BN0_, CN13CN0_	1	**XTCEXRLC**
CN13GN0_	1	**XTCEXRLD**
CN13KN0_, CN13MN0_	1	**XTCEXRLG**

Main current wiring for reversing combinations. Includes paralleling bridge and reversing bridge. Does not include mechanical interlock, see table on this page.

XTCEXTLA400



Terminal Lug Assembly

For Use with…	Pkg. Qty. ③	Catalog Number
CN13SN0_	1	**XTCEXTLA400**

For connection of: round conductor, flexible and stranded, flat strip conductor, with control circuit terminal. See **Page V5-T2-72** for terminal capacities.

XTCEXTS_



Terminal Shroud

For Use with…	Pkg. Qty. ③	Catalog Number
CN13SN0_	1	**XTCEXTS400**

Protection against direct contact with connection lugs when touched vertically from the front.

Notes

① Note dropout delay.
② For AC operated contactors, 50–60 Hz. Sizes 0–5 DC operated contactors and Size 5 AC operated contactors have a built-in suppressor circuit.
③ Orders must be placed in multiples of package quantity listed.
④ In addition to the built-in suppressor circuit for DC actuated contactors. Prevents negative breaking voltage when contactors are used in combination with a safety PLC.
⑤ For two contactors with AC or DC operated magnet system which are horizontally or vertically mounted. For Sizes 0–4, mechanical lifespan is 2.5 x 10^6 operations and the distance between contactors is 0 mm. For Size 5, mechanical lifespan is 5 x 10^6 operations and no auxiliary contact can be mounted between the mechanical interlock and the contactor—the distance between contactors is 15 mm.
⑥ XTCEXMLG and XTCEXMLN consist of an interlock element and mounting plate.

Renewal Parts

2

XTCERENC_





Replacement Coils

Voltage	Coil Suffix	Catalog Number
Size 0, 1		
110/50 120/60	**A**	**XTCERENCOILCA**
220/50 240/60	**B**	**XTCERENCOILCB**
24–27 Vdc	**TD**	**XTCERENCOILCTD**
Size 2		
110/50 120/60	**A**	**XTCERENCOILDA**
220/50 240/60	**B**	**XTCERENCOILDB**
24–27 Vdc	**TD**	**XTCERENCOILDTD**
Size 3, 4		
100–120V 50/60	**A**	**XTCERENCOILGA**
190–240V 50/60	**B**	**XTCERENCOILGB**
24–27 Vdc	**TD**	**XTCERENCOILGTD**
Size 5		
110–250 Vac/Vdc	**A**	**XTCERENCOILLA**
24–48 Vdc	**TD**	**XTCERENCOILLTD**

Replacement Contact Kit

For Use with…	Catalog Number
CN13GN0_	**XTCERENCONTACTD**
CN13SN0_	**XTCERENCONTACTL**

Replacement Arc Chamber

For Use with…	Catalog Number
CN13SN0_	**XTCERENARC250**

Technical Data and Specifications

Auxiliary Contacts

Description	CN13BN0_, CN13CN0_	XTCEXFAC_ XTCEXFATC_	XTCEXFCC_ XTCEXSCC_	XTCEXFAG_	XTCEXSBLN_ XTCEXSBN_ XTCEXSBNC_ XTCEXSCN_ XTCEXSCNC_
Interlocked opposing contacts with an auxiliary contact module (to IEC 60947-5 -1 Annex L)	—	Yes	Yes	Yes	Yes
Break contact (not late-break contact) suitable as a mirror contact (to IEC/EN 60947-4 -1 Annex F)	CN13BN0_, CN13CN0_	CN13BN0_, CN13CN0_	CN13BN0_, CN13CN0_	CN13GN0_	CN13GN0_, CN13SN0_
Rated impulse withstand voltage, (U_{imp}) Vac	6000	6000	6000	6000	6000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3
Rated insulation voltage, (U_i) Vac	690	690	690	690	690
Rated operational voltage, (U_e) Vac	500	500	500	500	500
Safe isolation to VDE 0106 Part 101 and Part 101(A) in Vac					
Between coil and auxiliary contacts	400	400	400	440	440
Between the auxiliary contacts	400	400	400	440	440
Rated operational current, I_e					
AC-15					
230V	6A	6A	6A	6A	6A
380/415V	4A	3A	4A	4A	4A
500V	1.5A	—	1.5A	1.5A	1.5A
DC-3 L/R ≤5 ms ①					
24V	10A	10A	10A	10A	10A
60V	6A	6A	6A	6A	6A
110V	3A	3A	3A	3A	3A
220V	1A	1A	1A	1A	1A
Conventional thermal current, I_{th}	16A	16A	16A ③	10A	10A
Control circuit reliability (at U_e = 24 Vdc, U_{min} = 17 V, I_{min} = 5.4 mA)	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations	$<10^{-8}$, <1 failure at 100 million operations
Component lifespan, operations x 10^6 at U_e = 230V, AC-15, 3A	1.3	1.3	1.3	1.3	1.3
Short-circuit rating without welding ②					
Maximum fuse, gG/gL	10A	10A	10A	16A	16A

Notes

① Making and breaking conditions to DC-13, time L/R contact as stated.
② See fuses overlay for time/current characteristic (on request).
③ Conventional thermal current (I_{th}) of XTCEXSCC_ is 10A.

Parallel Link

Description	XTCEXPLKB	XTECXPLKC	XTCEXPLKD	XTCEXPLKG	XTCEXPLK185
Terminal capacity					
Solid (mm^2)	1–16	16	16	—	—
Flexible with ferrule (mm^2)	1 x (0.5–25) 2 x (0.5–16)	1 x (16–35)	1 x (16–120)	—	—
Stranded (mm^2)	1 x (0.5–25) 2 x (0.5–16)	1 x (16–50)	1 x (16–120)	1 x (35–300) 2 x (35–120)	—
Flat conductor—number of segments x width x thickness (mm)	6 x 9 x 0.8	—	—	2 x (11 x 21 x 1)	1 x (6 x 16 x 0.8) 2 x (20 x 32 x 0.5) 2 x (11 x 21 x 1)
Tightening torque (Nm)	4	4	14	—	—
Tools					
Pozidriv screwdriver	Size 2	Size 2	—	—	—
Hexagon socket head spanner—SW (mm)	—	—	5	6	—
Conventional thermal current					
Three-pole (I_{th}) A	50	100	180	400	—
Four-pole (I_{th}) A	60	—	—	—	—

Cable Terminal Block, Flat Cable Terminal

Description	XTCEXTLA400	XTCEXPLK185	XTCEXTFB650	XTCEXTFB820
Terminal capacity				
Stranded (mm^2)	1 x (120–300) 2 x (70–240)	—	—	—
Stranded (AWG)	1 x (250–600 kcmil) 2 x (2/0–500 kcmil)	—	—	—
Flat conductor—number of segments x width x thickness (mm)	—	1 x (6 x 16 x 0.8) 2 x (20 x 32 x 0.5) 2 x (11 x 21 x 1)	1 x (6 x 16 x 0.8) 2 x (20 x 32 x 0.5) 2 x (11 x 21 x 1)	1 x (6 x 16 x 0.8) 2 x (10 x 40 x 1) 2 x (20 x 40 x 0.5)

AC Ratings—AC-1 Operation

Description	CN13B	CN13C	CN13G	CN13K	CN13M	CN13S
Conventional free air thermal current, three-pole, 50–60 Hz						
Open						
at 40°C (I_{th})	40A	45A	80A	130A	190A	490
at 50°C (I_{th})	38A	43A	71A	125A	180A	438
at 55°C (I_{th})	37A	42A	68A	115A	170A	418
at 60°C (I_{th})	35A	40A	65A	110A	160A	400
Enclosed	32A	36A	58A	100A	144A	315
Conventional free air thermal current, single-pole (I_{th})						
Open	88A	100A	162A	275A	400A	—
Enclosed	80A	90A	145A	250A	360A	—

Space-Savings Contactors—NEMA Sizes 0–2

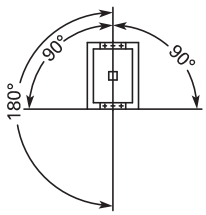
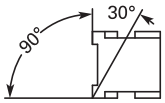
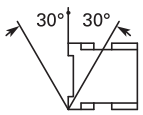
Description	Size 0 CN13BN010_	Size 1 CN13CN010_	Size 2 CN13GN000_
General			
Standards	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS
Weights in kg [lb]			
AC operated	0.42 [0.93]	0.42 [0.93]	0.9 [2.0]
DC operated	0.48 [1.06]	0.48 [1.06]	1.1 [2.4]
Mechanical life—operations	10,000,000	10,000,000	10,000,000
Climatic proofing	①	①	①
Insulation voltage (U_i) Vac	690	690	690
Impulse withstand voltage (U_{imp}) Vac	8000	8000	8000
Operating voltage (U_e) Vac	690	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1			
Between coil and contacts (Vac)	440	440	440
Between contacts (Vac)	238	440	440
Making capacity (amps)	238	384	910
Breaking capacity (amps)			
220/230V	170	320	650
380/400V	170	320	650
500V	170	320	650
660/690V	120	180	370
Short-circuit protection rating maximum fuse (amps)			
Type 2 coordination ②			
400V; gG/gL 500V	25	63	125
690V; gG/gL 690V	25	35	80
Type 1 coordination ②			
400V; gG/gL 500V	63	125	250
690V; gG/gL 690V	50	63	100
Degree of protection	IP00	IP00	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Terminal capacity main cable—screw terminals			
Solid (mm^2)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)
Flexible with ferrule (mm^2)	1 x (0.75–16) 2 x (0.75–10)	1 x (0.75–16) 2 x (0.75–10)	1 x (2.5–35) 2 x (2.5–25)
Stranded (mm^2)	1 x 16	1 x 16	1 x (16–50) 2 x (16–35)
Solid or stranded (AWG)	18–6	18–6	12–2
Flat conductor (number of segments x width x thickness) (mm)	—	—	2 x (6 x 9 x 0.8)

Notes

① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.

② IEC 60947 Standard.

Space-Savings Contactors—NEMA Sizes 0–2, continued

Description	Size 0 CN13BN010_	Size 1 CN13CN010_	Size 2 CN13GN000_
General, continued			
Main cable connection screw/bolt	M5	M5	M6
Tightening torque			
Nm	3	3	3.3
Lb-in	26.6	26.6	29.2
Terminal capacity control circuit cable—screw terminals			
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)	1 x (0.75–4) 2 x (0.75–4)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14
Control circuit cable connection screw/bolt	M3.5	M3.5	M3.5
Tightening torque			
Nm	1.2	1.2	1.2
Lb-in	10.6	10.6	10.6
Tools			
Main and control circuit cable—screw terminals	Size 2	Size 2	Size 2
Pozidriv screwdriver	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5
Standard screwdriver	1 x 6	1 x 6	1 x 6
Terminal capacity control circuit cable—spring cage terminals			
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	18–14
Tools			
Main and control circuit cable—spring cage terminals			
Stripping length (mm)	10	10	10
Screwdriver blade width (mm)	3.5	3.5	3.5
Mounting position, AC and DC operated			
Ambient temperature			
Open	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Enclosed	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental			
Mechanical shock resistance (IEC/EN 60068-2-27)			
Main contact—NO Contact	10	10	1
Auxiliary contact—NO Contact	7	7	7
Auxiliary contact—NC Contact	5	5	5
Overvoltage category/pollution degree	III/3	III/3	III/3

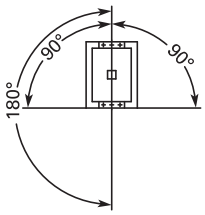
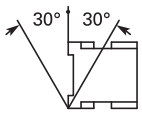
Space-Savings Contactors—NEMA Sizes 3, 4

Description	Size 3 CN13KN000_	Size 4 CN13MN000_
General		
Standards	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS	IEC/EN 60947, VDE 0660, UL, CSA, CCC, RoHS
Weights in kg [lb]		
AC operated	2 [4.41]	2 [4.41]
DC operated	2.1 [4.63]	2.1 [4.63]
Mechanical life—operations	10,000,000	10,000,000
Climatic proofing	①	①
Insulation voltage (U_i) Vac	690	690
Impulse withstand voltage (U_{imp}) Vac	8000	8000
Operational voltage (U_e) Vac	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1		
Between coil and contacts (Vac)	690	690
Between contacts (Vac)	690	690
Making capacity (amps)	1610	2100
Breaking capacity (amps)		
220/230V	1150	1500
380/400V	1150	1500
500V	1150	1500
660/690V	1100	1200
1000V	—	—
Short-circuit protection rating maximum fuse		
Type 2 coordination ②		
400V; gG/gL 500V	250	25
690V; gG/gL 690V	25	250
Type 1 coordination ②		
400V; gG/gL 500V	250	250
690V; gG/gL 690V	250	250
Degree of protection	IP00	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof
Terminal capacity main cable—screw terminals		
Solid (mm^2)	—	—
Flexible with ferrule (mm^2)	1 x (10–95) 2 x (10–70)	1 x (10–95) 2 x (10–70)
Stranded (mm^2)	1 x (10–95) 2 x (10–20)	1 x (10–95) 2 x (10–20)
Flat conductor (number of segments x width x thickness) (mm)	2 x (6 x 16 x 0.8)	2 x (6 x 16 x 0.8)
Solid or stranded (AWG)	8–3/0	8–3/0
Main cable connection screw/bolt	M10	M10
Tightening torque		
Nm	14	14
Lb-in	123.9	123.9

Notes

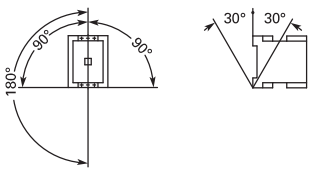
① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.
② IEC 60947 Standard.

Space-Savings Contactors—NEMA Sizes 3, 4, continued

Description	Size 3 CN13KN000_	Size 4 CN13MN000_
General, continued		
Terminal capacity control circuit cable—screw terminals		
Solid (mm^2)	1 x (0.75–4) 1 x (0.75–4)	1 x (0.75–4) 1 x (0.75–4)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14
Control circuit cable connection screw/bolt	M3.5	M3.5
Tightening torque		
Nm	1.2	1.2
Lb-in	10.6	10.6
Tools		
Main circuit cable—screw terminals		
Hexagon socket-head spanner (mm)	5	5
Control circuit cable—screw terminals	Size 2	Size 2
Pozidriv screwdriver	0.8 x 5.5	0.8 x 5.5
Standard screwdriver	1 x 6	1 x 6
Terminal capacity control circuit cable—spring cage terminals		
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14
Tools		
Control circuit cable—spring cage terminals		
Stripping length (mm)	10	10
Screwdriver blade width (mm)	3.5	3.5
Mounting position, AC and DC operated		
Ambient temperature		
Open	–25 to 60°C [–13 to 140°F]	–25 to 60°C [–13 to 140°F]
Enclosed	–25 to 40°C [–13 to 104°F]	–25 to 40°C [–13 to 104°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]	–40 to 80°C [–40 to 176°F]
Environmental		
Mechanical shock resistance (IEC/EN 60068-2-27)		
Half-sinusoidal shock 10 ms		
Main contact—NO contact	10g	10g
Auxiliary contact—NO contact	7g	7g
Auxiliary contact—NC contact	5g	5g
Overvoltage category/pollution degree	III/3	III/3

Space-Savings Contactors—NEMA Size 5

Description	Size 5 CN13SN022_
General	
Standards	IEC/EN 60947, VDE 0660, UL, CSA
Weights in kg [lb]	6.5 [14.3]
Mechanical life—operations	10,000,000
Mechanical operating frequency (ops/hr)	
AC operated	3000
DC operated	3000
Climatic proofing	①
Insulation voltage (U_i) Vac	1000
Impulse withstand voltage (U_{imp}) Vac	8000
Operating voltage (U_e) Vac	1000
Safe isolation to VDE 0106 Part 101 and Part 101/A1	
Between coil and contacts (Vac)	500
Between contacts (Vac)	500
Making capacity (amps)	3000
Breaking capacity (amps)	
220/230V	2500
380/400V	2500
500V	2500
660/690V	2500
1000V	760
Short-circuit protection rating maximum fuse	
Type 2 coordination ②	
400V; gG/gL 500V	315
690V; gG/gL 690V	315
1000V; gG/gL 1000V	160
Type 1 coordination ②	
400V; gG/gL 500V	400
690V; gG/gL 690V	400
1000V; gG/gL 1000V	200
Degree of protection	IP00
Protection against direct contact when actuated from front (IEC 536)	Finger and back-of-hand proof with terminal shroud or terminal block
Main cable cross-section	
Flexible with cable lug (mm^2)	50–240
Stranded with cable lug (mm^2)	70–240
Solid or stranded (AWG)	1/0–250 kcmil
Flat conductor (mm)	③
Bus bar—width in mm	25
Main cable connection screw/bolt	M10
Tightening torque	
Nm	24
Lb-in	213

Description	Size 5 CN13SN022_
General, continued	
Control circuit cable cross-sections	
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	2 x (18–12)
Control circuit cable connection screw/bolt	M3.5
Tightening torque	
Nm	1.2
Lb-in	10.6
Tools	
Main cable wrench	16 mm
Control circuit cable pozidriv screwdriver	Size 2
Mounting position, AC and DC operated	
Ambient temperature	–25 to 60°C [–13 to 140°F]
Ambient storage temperature	–40 to 80°C [–40 to 176°F]
Environmental	
Mechanical shock Resistance (IEC/EN 60068-2-27)	
Half-sinusoidal shock 10 ms	
Main contact—NO contact	10g
Auxiliary contact—NO contact	10g
Auxiliary contact—NC contact	8g
Overvoltage category/pollution degree	III/3
Switching capacity, kVAR ④	
Individual compensation	
230V	—
400/420/440V	—
525V	—
690V	—
Group compensation, with choke	
230V	100
400/420/440V	190
525V	260
690V	340
Group compensation, without choke	
230V	—
400/420/440V	—
525V	—
690V	—

Notes

① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclic, to IEC 60 068-2-30.
② IEC 60947 Standard.
③ Screw tightening with flat cable terminal or cable terminal blocks. See terminal capacity for cable terminal blocks.
④ When using contactors for group compensation, a minimum inductance of approx. 6 uh per capacitor must be available to limit the high inrush current peaks. This corresponds to an air-cored coil with five windings and a coil diameter of approximately 140 mm. The conductor cross-section must be selected according to the rated current per phase.

XTOE/*XT* Electronic Overload Relay



2

Contents

Description	*Page*
XTOE/***XT*** Electronic Overload Relay	
Standards and Certifications	**V5-T2-79**
Catalog Number Selection	**V5-T2-80**
Product Selection	**V5-T2-81**
Accessories	**V5-T2-83**
Technical Data and Specifications	**V5-T2-85**
Dimensions	**V5-T2-93**

An Eaton Green Solution

XTOE/*XT* Electronic Overload Relay

Product Description

Eaton's new electronic overload relay (EOL) is the most compact, high-featured, economical product in its class. Designed on a global platform, the new EOL covers the entire power control spectrum including NEMA, IEC and DP Contactors. The standard NEMA and DP versions are offered with the C440 designation while the Space-Savings NEMA and IEC versions have the XTOE designation. The electronic design provides reliable, accurate and value driven protection and communications capabilities in a single compact device. It is the flexible choice for any application requiring easy-to-use, reliable protection.

Eaton has a long history of innovations and product development in motor control and protection, including both traditional NEMA, as well as IEC control. It was from this experience that the XTOE was developed, delivering new solutions to meet today's demands.

XTOE is a self-powered electronic overload relay available up to 175A as a self contained unit. With external CTs, XTOE can protect motor up to 1500 FLA. Available add-on accessories include remote reset capability and communication modules with I/O for DeviceNet, PROFIBUS, Modbus, EtherNet/IP, and Modbus TCP.

Features and Benefits

Features

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Compact size
- Flexible, intelligent design
- Global product offering—available with NEMA, IEC and DP power control

Size/Range

- Broad FLA range (0.33–1500A)
- Selectable trip class (10A, 10, 20, 30)
- Direct mounting to NEMA, IEC and DP contactors
- Most compact electronic overload in its class

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase unbalance
- Selectable (ON/OFF) ground fault

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase unbalance and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
  - 120 Vac
  - 24 Vac
  - 24 Vdc
- Tamper-proof cover
- Communications modules
  - Modbus RTU RS-485
  - DeviceNet with I/O
  - PROFIBUS with I/O
  - Modbus RTU with I/O
  - Ethernet IP with I/O
  - Modbus TCP with I/O

Benefits

Reliability and Improved Uptime

- XTOE 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

- Available with NEMA, IEC and DP contactors
- 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
- Available as an open component and in enclosed control and motor control center assemblies

Monitoring Capabilities

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

Safety

- IP 20 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

Standards and Certifications

- UL
- CSA
- CE
- NEMA
- IEC/EN 60947 VDE 0660
- ISO 13849-1 (EN954-1)
- RoHS
- ATEX directive 94/9/EC
- Equipment Group 2, Category 2

Electronic Overload Education

Description	Definition	Cause	Effect if not Protected	XTOE/*XT* Protection
Motor Protection				
Thermal overload	Overload is a condition in which current draw exceeds 115% of the full load amperage rating for an inductive motor.	• An increase in the load or torque that is being driven by the motor. • A low voltage supply to the motor causes the current to go high to maintain the power needed. • A poor power factor causing above normal current draw.	• Increase in current draw leads to heat and insulation breakdown, which can cause system failure. • Increase in current can increase power consumption and waste valuable energy.	• Thermal trip behavior is defined by UL, CSA and IEC standards. • Trip class is settable from 10A, 10, 20, 30
Ground fault	A line to ground fault.	A current leakage path to ground.	An undetected ground fault can burn through multiple insulation windings, ultimately leading to motor failure, not to mention risk to equipment or personnel	Fixed protective setting that takes the starter offline if ground fault current exceeds 50% of the FLA dial setting, i.e., if the FLA dial is set to 12A, the overload relay will trip if the ground current exceeds 6A.
Unbalanced phases (voltage and current)	Uneven voltage or current between phases in a three-phase system.	When a three-phase load is powered with a poor quality line, the voltage per phase may be unbalanced.	Unbalanced voltage causes large unbalanced currents and as a result this can lead to motor stator windings being overloaded, causing excessive heating, reduced motor efficiency and reduced insulation life.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.
Phase loss—current (single-phasing)	One of the three-phase voltages is not present.	Multiple causes, loose wire, improper wiring, grounded phase, open fuse, etc.	Single-phasing can lead to unwanted motor vibrations in addition to the results of unbalanced phases as listed above.	Fixed protective setting that takes the starter offline if a phase is lost.

Catalog Number Selection

XT Electronic Overload Relay—NEMA Space-Savings

XT OE 1P6 C CS S

Designation
XT = NEMA Space-Savings control

Type
OE = Electronic overload relay

Mounting
Blank = Direct to contactor **P** = Pass-through **S** = Separate mount (Frames C and G only)

Trip Type
CS = Selectable Class 10A, 10, 20, 30 **GS** = Ground fault with selectable Class 10, 20

Overload Range	Contactor Frame
1P6 = 0.33–1.65A **005** = 1–5A **020** = 4–20A	**C** = Space-Savings Size 0
1P6 = 0.33–1.65A **005** = 1–5A **020** = 4–20A **045** = 9–45A	**C** = Space-Savings Size 1
045 = 9–45A	**D** = Space-Savings Size 2
100 = 20–100A	**G** = Space-Savings Size 3
175 = 35–175A	**G** = Space-Savings Size 4

Product Selection

XT Electronic Overload Relays

XTOE for Direct Mount to NEMA Size 1



XT Electronic Overload Relays for Direct Mount to NEMA Space-Savings Contactors

NEMA Space-Savings Size	For Use with Contactor	Overload Range (Amps)	Contact Sequence	Frame Size	Auxiliary Contact Configuration	Catalog Number
0	CN13BN010_	0.35–1.65		45 mm	NO-NC	**XTOE1P6CCS**
		1–5				**XTOE005CCS**
		4–20				**XTOE020CCS**
1	CN13CN010_	0.35–1.65		45 mm	NO-NC	**XTOE1P6CCS**
		1–5				**XTOE005CCS**
		4–20				**XTOE020CCS**
		9–45				**XTOE045CCS**
2	CN13GN000_	9–45		45 mm	NO-NC	**XTOE045DCS**
		20–100		55 mm	NO-NC	**XTOE100DCS**
3	CN13KN000_	20–100		55 mm	NO-NC	**XTOE100GCS**
4	CN13MN000_	35–175		110 mm	NO-NC	**XTOE175GCS**

XTOE for Direct Mount to NEMA Size 4



XT Electronic Overload Relays with Ground Fault for Direct Mount to NEMA Space-Savings Contactors

NEMA Space-Savings Size	For Use with Contactor	Overload Range (Amps)	Contact Sequence	Frame Size	Auxiliary Contact Configuration	Catalog Number
0	CN13BN010_	0.33–1.65		45 mm	NO-NC	**XTOE1P6CGS**
		1–5				**XTOE005CGS**
		4–20				**XTOE020CGS**
1	CN13CN010_	0.33–1.65		45 mm	NO-NC	**XTOE1P6CGS**
		1–5				**XTOE005CGS**
		4–20				**XTOE020CGS**
		9–45				**XTOE045CGS**
2	CN13GN000_	9–45		45 mm	NO-NC	**XTOE045DGS**
		20–100		55 mm	NO-NC	**XTOE100DGS**
3	CN13KN000_	20–100		55 mm	NO-NC	**XTOE100GGS**
4	CN13MN000_	35–175		110 mm	NO-NC	**XTOE175GGS**

1–5A OL with CTs



XT Electronic Overload Relays for use with Size 5 NEMA Space-Savings Contactors

Use CTs and 1-5A ***XT*** overload relay. CT kit does not include overload relay (order separately).

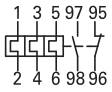
Space-Savings Contactor Size	For Use with Contactor	CT Range (Amps)	Description	CT Kit Catalog Number	Terminal Size	Overload Relay Catalog Number
1	CN13SN022_	60-300	300: 5 panel-mount CT kit with integrated lugs	**ZEB-XCT300**	750 kcmil (2) 250 kcmil 3/0 Cu/Al	**XTOE005CCSS**

45 mm *XT* for Separate Mount



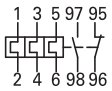
XT Electronic Overload Relays for Separate Mount

ZEB kits are not recommended for use with XTOE overload relays with ground fault option.

Overload Range (Amps)	Frame Size	Contact Sequence	Type	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
Overload Relay					
0.33–1.65	45 mm		ZEB32-1,65/KK	**XTOE1P6CCSS**	**XTOE1P6CGSS**
1–5			ZEB32-5/KK	**XTOE005CCSS**	**XTOE005CGSS**
4–20			ZEB32-20/KK	**XTOE020CCSS**	**XTOE020CGSS**
9–45			ZEB32-45/KK	**XTOE045CCSS**	**XTOE045CGSS**
20–100	55 mm		ZEB150-100/KK	**XTOE100GCSS**	**XTOE100GGSS**
35–175	110 mm		ZEB150-175/KK	**XTOE175GCSS**	**XTOE175GGSS**

XT Electronic Overload Relay for Pass-Through Design

Pass-through design does not include any lugs to land wires.
Terminate motor leads directly on contactor.

Overload Range (Amps)	Frame Size	Contact Sequence	Type	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
35–175	110 mm		ZEB150-175/PT	**XTOE175GCSP**	**XTOE175GGSP**

Accessories

CT Kits

Accessories

Description	Catalog Number
Safety Cover	
Clear Lexan cover that mounts on top of the FLA dial and DIP switches when closed.	**ZEB-XSC**
Reset Bar	
Assembles to the top of the overload to provide a larger target area for door mounted reset operators.	**ZEB-XRB**
Remote Reset	
Remote reset module (24 Vdc) ①	**C440-XCOM**
Remote reset module (120 Vac) ①	**ZEB-XRR-120**
Remote reset module (24 Vac) ①	**ZEB-XRR-24**

Safety Cover



Reset Bar



Remote Reset



Communication

The C440/XTOE is provided with two levels of communication capability.

Basic Communication via Expansion Module—Monitoring Only

Basic communication on the C440 is accomplished using an expansion module (C440-XCOM). The expansion module plugs into the expansion bay on the C440 overload relay, enabling communications with the overload via their Modbus RTU (RS-485) network. No additional cards or modules are required. See figure below.

Advanced Communication—Monitoring and Control

C440 also has the ability to communicate on industrial protocols such as Modbus RTU, DeviceNet, PROFIBUS, Modbus TCP, and EtherNet/IP while providing control capability using I/O.

An expansion module (C440-XCOM) combined with a communication module allows easy integration onto the customer's network. See figure below.

C440 communication modules, wired to the C440-XCOM give C440 control capability via communications. The communication modules offer flexible mounting options (DIN rail or panel) along with four inputs (24 Vdc or 120 Vac) and two outputs as standard.



Basic Communication—Modbus



Advanced Communication—Communication Module

Note

① Customer can wire remote mounted button to reset module (i.e., 22 mm pushbutton, catalog number M22-D-B-GB14-K10).

The following information can be viewed using the communication option:

- Motor status—running, stopped, tripped or resetting
- Individual rms phase currents (A, B, C)
- Average of three-phase rms current
- Percent thermal capacity
- Fault codes (only available prior to reset)
- Percent phase unbalance
- Ground fault current and percent
- Overload relay settings—trip class, DIP switch selections, reset selections
- Modbus address (can be set over the network)

Features and Benefits

Ethernet modules

- Single device supports both EtherNet/IP, Modbus TCP
- Internal switch with two Ethernet ports allows linear or ring network configurations
- Embedded web-services for easy configuration and monitoring with Internet Explorer

DeviceNet

- I/O assemblies with the same size and layout as the legacy Advantage (WPONIDNA) and ***IT.*** (DSNAP) Starter platforms for seamless upgrades to C441 technology with no program changes
- Communication uses only one DeviceNet MAC ID

PROFIBUS

- Capable of baud rates up to 12 Mb
- Intuitive configuration with common PROFIBUS tools

Modbus

- Modbus address and baud rate can be changed easily with C441's user interface (C441M only)

Terminals

- Unique locking mechanism provides easy removal of terminal block with field wiring installed
- Marked terminals for ease of wiring and troubleshooting

On-board I/O assemblies

- Modules offer 4 IN / 2 OUT of network programmable I/O
- 24 Vdc or 120 Vac signal options
- Optical isolation protects the I/O and communication circuits from possible damage due to transients and ground loops
- Inputs feature user-definable debounce, which limits the effects of transients and electrical noise
- Outputs feature a user-definable state for loss of communication: hold last state, ON or OFF

Communication Accessories

Communication modules mount on their own to be used as stand-alone network based I/O or be wired to the C440-XCOM. Parts are available for purchase individually (see "consists of" below) or as part of a kit for C440 communications.

Expansion Module



Description	Catalog Number
Expansion Module	
Expansion module (Remote Reset/Modbus RTU, RS-485 Communication)	**C440-XCOM**

Ethernet with I/O Module



Communication Modules	
DeviceNet communication module kit—120 V I/O (consists of C440-XCOM + C441KS)	**C440-DN-120**
DeviceNet communication module kit—24 Vdc I/O (consists of C440-XCOM + C441LS)	**C440-DN-24**
PROFIBUS communication module kit—120 V I/O (consists of C440-XCOM + C441SS)	**C440-DP-120**
PROFIBUS communication module kit—24 V I/O (consists of C440-XCOM + C441QS)	**C440-DP-24**
Modbus communication module kit—120 V I/O (consists of C440-XCOM + C441NS)	**C440-MOD-120**
Modbus communication module kit—24 Vdc I/O (consists of C440-XCOM + C441PS)	**C440-MOD-24**
Modbus TCP/Ethernet IP communication module kit—120 V I/O (consists of C440-XCOM + C441U)	**C440-ET-120**
Modbus TCP/Ethernet IP communication module kit—24 V I/O (consists of C440-XCOM + C441V)	**C440-ET-24**

Technical Data and Specifications

Electronic Overload Relays up to 1500A

Description	Specification 45 mm	55 mm	110 mm
Electrical Ratings	**Range**	**Range**	**Range**
Operating voltage (three-phase) and frequency	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)
FLA Range			
	0.33–1.65A 1–5A 4–20A 9–45A	20–100A	28–140A (NEMA) 35–175A (IEC)
Use with Contactors			
Space-Savings NEMA Size	0, 1, 2	2, 3	4
Trip Class			
	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable
Motor Protection			
Thermal overload setting	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip
Feature	**Range**	**Range**	**Range**
Phase loss	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Phase unbalance (selectable: enable/disable)	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Ground fault (selectable: enable/disable)	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec
Reset	Manual/automatic	Manual/automatic	Manual/automatic
Indicators			
Trip status	Orange flag	Orange flag	Orange flag
Mode LED	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip
Options			
Remote reset	Yes	Yes	Yes
Reset bar	Yes	Yes	Yes
Communication expansion module	Yes	Yes	Yes
Communication adapter	Yes	Yes	Yes
Capacity			
Load terminals			
Terminal capacity	12–10 AWG (4–6 mm^2) 8–6 AWG (6–16 mm^2)	6–1 AWG (16–50 mm^2)	8–4/0 AWG (10–95 mm^2)
Tightening torque	20–25 lb-in (2.3–2.8 Nm) 25–30 lb-in (2.8–3.4 Nm)	25–30 lb-in (2.8–3.4 Nm)	124 lb-in (14 Nm)
Input, auxiliary contact and remote reset terminals			
Terminal capacity	2 x (18–12) AWG	2 x (18–12) AWG	2 x (18–12) AWG
Tightening torque	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)
Voltages			
Insulation voltage U_i (three-phase)	690 Vac	690 Vac	690 Vac
Insulation voltage U_i (control)	500 Vac	500 Vac	500 Vac
Rated impulse withstand voltage	6000 Vac	6000 Vac	6000 Vac
Overvoltage category/pollution degree	III/3	III/3	III/3

Electronic Overload Relays up to 1500A, continued

Description	Specification 45 mm	55 mm	110 mm
Auxiliary and Control Circuit Ratings			
Conventional thermal continuous current	5A	5A	5A
Rated operational current—IEC AC-15			
Make contact (1800 VA)			
120V	15A	15A	15A
240V	15A	15A	15A
415V	0.5A	0.5A	0.5A
500V	0.5A	0.5A	0.5A
Break contact (180 VA)			
120V	1.5A	1.5A	1.5A
240V	1.5A	1.5A	1.5A
415V	0.9A	0.9A	0.9A
500V	0.8A	0.8A	0.8A
IEC DC-13 (L/R F 15 ms1)			
0–250V	1.0A	1.0A	1.0A
Rated operational current—UL B600			
Make contact (3600 VA)			
120V	30A	30A	30A
240V	15A	15A	15A
480V	7.5A	7.5A	7.5A
600V	6A	6A	6A
Break contact (360 VA)			
120V	3A	3A	3A
240V	1.5A	1.5A	1.5A
480V	0.75A	0.75A	0.75A
600V	0.6A	0.6A	0.6A
R300—Vdc ratings (28 VA)			
0–120V	0.22A	0.22A	0.22A
250V	0.11A	0.11A	0.11A
Short-Circuit Rating without Welding			
Maximum fuse	6A gG/gL	6A gG/gL	6A gG/gL
Environmental Ratings			
Ambient temperature (operating)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity UL 991 (H3)	5% to 95% noncondensing	5% to 95% noncondensing	5% to 95% noncondensing
Altitude (no derating) NEMA ICS1	2000m	2000m	2000m
Shock (IEC 600068-2-27)	15g any direction	15g any direction	15g any direction
Vibration (IEC 60068-2-6)	3g any direction	3g any direction	3g any direction
Pollution degree per IEC 60947-4-1	3 for product (2 for pcb)	3 for product (2 for pcb)	3 for product (2 for pcb)
Ingress protection	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Mounting position	Any	Any	Any
Climatic proofing	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30

Electronic Overload Relays up to 1500A, continued

Description	Specification 45 mm	55 mm	110 mm
Electrical/EMC			
Radiated emissions IEC 60947-4-1-Table 15 EN 55011 (CISPIR 11) Group 1, Class A, ISM	30 MHz to 1000 MHz	30 MHz to 1000 MHz	30 MHz to 1000 MHz
Conducted emissions IEC 60947-4-1-Table 14 EN 55011 (CISPIR 11) Group 1; Class ISM	0.15 MHz to 30 MHz	0.15 MHz to 30 MHz	0.15 MHz to 30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact
Radiated immunity IEC 60947-4-1 IEC 61000-4-3	10 V/m 80 MHz–1000 MHz 3 V/m from 1.4 to 2.7 GHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 MHz–1000 MHz 3 V/m from 1.4 to 2.7 GHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 MHz–1000 MHz 3 V/m from 1.4 to 2.7 GHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1, IEC 61000-4-6	140 dub (10V rms) 150 kHz–100 MHz	140 dub (10V rms) 150 kHz–100 MHz	140 dub (10V rms) 150 kHz–100 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 a Class 4	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)
Power freq. magnetic field immunity IEC 60947-4-1, IEC 61000-4-8	30 A/m, 50 Hz	30 A/m, 50 Hz	30 A/m, 50 Hz
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m	10 V/m	10 V/m
Distortion IEEE 519	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.
Electrostatic discharge (ESD) IEC 61000-4-2, EN 61131-2	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge
Electrical fast transient (EFT) IEC 61000-4-4, EN 61131-2	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 61000-4-5, EN 61131-2	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)

Communication Modules

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
Electrical/EMC				
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz	30–1000 MHz	30–1000 MHz	30–1000 MHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10V rms) 150 kHz–80 MHz	140 dBuV (10V rms) 150 kHz–80 MHz	140 dBuV (10V rms) 150 kHz–80 MHz	140 dBuV (10V rms) 150 kHz–80 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 6100-4-4	±2 kV using direct method	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 3	User IO and communication lines ①: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)
Electromagnetic field ① IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m	10 V/m	10 V/m	10 V/m
Environmental Ratings				
Ambient temperature (operating)	–4° to 122°F (–20° to 50°C)	–13° to 122°F (–25° to 50°C)	–13° to 122°F (–25° to 50°C)	–13° to 122°F (–25° to 50°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing
Altitude (no derating)	2000m	2000m	2000m	2000m
Shock (IEC 600068-2-27)	15G any direction	15G any direction	15G any direction	15G any direction
Vibration (IEC 60068-2-6)	3G any direction	3G any direction	3G any direction	3G any direction
Pollution degree per IEC 60947-1	3	3	3	3
Degree of protection	IP20	IP20	IP20	IP20
Overvoltage category per UL 508	III	III	III	III
DeviceNet				
DeviceNet connections	—	Group 2, polling, bit strobe, explicit, no UCMM	—	Group 2, polling, bit strobe, explicit, no UCMM
DeviceNet baud rate	—	125K, 250K, 500K	—	125K, 250K, 500K
Ethernet				
Ethernet connections	—	—	—	Integrated two-port switch with dual RJ45 Ethernet connections
Ethernet type	—	—	—	Ethernet 10/100 Mbs, AutoMDX, Auto Negotiation
PROFIBUS				
PROFIBUS connections	—	—	Group 2, polling, bit strobe, explicit, no UCMM	—
PROFIBUS baud rate	—	—	9.6K, 19.2K, 45.45K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M	—

Note

① Relates to C441M only.

Communication Modules, continued

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
C441_ 24 Vdc Input				
Nominal input voltage	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Operating voltage	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
Number of inputs	4	4	4	4
Signal delay	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)
OFF-state voltage	<6 Vdc	<6 Vdc	<6 Vdc	<6 Vdc
ON-state voltage	>18 Vdc	>18 Vdc	>10 Vdc	>18 Vdc
Nominal input current	5 mA	5 mA	5 mA	5 mA
Isolation	1500V	1500V	1500V	1500V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
24V source current	50 mA	50 mA	50 mA	50 mA
Operating Voltage Range—DC Input Modules				
OFF state	0–6 Vdc	0–6 Vdc	0–6 Vdc	0–6 Vdc
Transition region	6–18 Vdc	6–18 Vdc	6–18 Vdc	6–18 Vdc
ON state	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
C441_ 120 Vac Input				
Nominal input voltage	120 Vac	120 Vac	120 Vac	120 Vac
Operating voltage	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Number of inputs	4	4	4	4
OFF-state voltage	<30 Vac	<30 Vac	<20 Vac	<30 Vac
ON-state voltage	>80 Vac	>80 Vac	>70 Vac	>80 Vac
Nominal input current	15 mA	15 mA	15 mA	15 mA
Signal delay	1/2 cycle	1/2 cycle	1/2 cycle	1/2 cycle
Isolation	1500V	1500V	1500V	1500V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
Operating Voltage Range—AC Input Modules				
OFF state	0–30 Vac	0–30 Vac	0–30 Vac	0–30 Vac
Transition region	30–80 Vac	30–80 Vac	30–80 Vac	30–80 Vac
ON state	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Output Modules				
Nominal voltage	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc
Number of outputs	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C
Relay OFF time	3 ms	3 ms	3 ms	3 ms
Relay ON time	7 ms	7 ms	7 ms	7 ms
Max. current per point ①	5A (B300 rated)	5A (B300 rated)	5A (B300 rated)	5A (B300 rated)
Electrical life	100,000 cycles	100,000 cycles	100,000 cycles	100,000 cycles
Mechanical life	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles

Note

① Relates to C441M only.

Short Circuit Ratings (North America CSA, cUL)

Changes to UL 508A and NEC in recent years have brought a focus to control panel safety with regard to short-circuit current ratings (SCCR). Eaton's XTOE electronic overload relays combined with ***XT*** Series IEC, Freedom Series NEMA and ***XT*** NEMA contactors provide a wide variety of SCCR solutions needed for a variety of applications. The SCCR data in this document reflects the latest information as of April 2010.

XTOE Standalone Overload Relays (XTOE)

		Standard-Fault Short Circuit Data			High-Fault Short Circuit Data					
					Fuses (RK5, J, CC)			Thermal-Magnetic Circuit Breakers		
Overload FLA Range	Maximum Operating Voltage	600V (kA)	Maximum Fuse Size (A) (RK5)	Maximum Breaker Size (A)	480V (kA)	600V (kA)	Maximum Fuse Size	480V (kA)	600V (kA)	Maximum Breaker Size
0.33–1.65A	600 Vac	1	6	15	—	—	—	—	—	—
1–5A	600 Vac	5	20	20	100	100	30	100	35	20
4–20A	600 Vac	5	80	80	100	100	100	100	35	80
9–45A	600 Vac	5	175	175	100	100	100	100	35	100/175 (480/600)
20–100A	600 Vac	10	400	400	100	100	200	150	35	250/400 (480/600)
28–140A	600 Vac	10	450	500	100	100	400	100	65	400
35–175A	690 Vac	10	500 (gG)	350 (690 Vac) 320 (415 Vac)	100	100	500 (gG)	100 (415 Vac)	—	350 (LGC3350) 320 (NZMH3)

NEMA Space-Savings Starters with XTOE Electronic Overload Relays

		High-Fault Short Circuit Data					
		Fuses (RK5, J, CC)			Thermal-Magnetic Circuit Breakers		
Contactor Frame Size	Overload FLA Range	480V	600V	Maximum Fuse Size	480V	600V	Maximum Breaker Size
B	1–5A	100	100	30	—	—	—
	4–20A	100	100	30	—	—	—
C	1–5A	100	100	60	—	—	—
	4–20A	100	100	60	—	—	—
	9–45A	100	100	60	—	—	—
D	9–45A	100	100	200	65	35	175
	20–100A	100	100	200	65	35	175
F	20–100A	100	100	200	65	65	350
G	20–100A	100	100	200	65	65	350
	35–175A	100	100	400	65	30	250 (480 Vac) 350 (600 Vac)
H	35–175A	100	100	400	65	30	400

Coil Data—Frames B, C, G

Description	CN13B_ NEMA Size 0	CN13C_ NEMA Size 1	CN13G_ NEMA Size 2
Voltage Tolerance			
Pickup (x U_c)			
AC operated	0.8–1.1	0.8–1.1	0.8–1.1
DC operated	0.7–1.2 ①	0.7–1.2 ①	0.7–1.2 ①
Dropout (x U_c)			
AC operated	0.3–0.6	0.3–0.6	0.3–0.6
DC operated	0.15–0.6	0.15–0.6	0.15–0.6
Power Consumption of the Coil at Cold State and 1.0 x U_c			
AC operated Single-voltage coil 50 Hz			
Pickup VA	52	52	149
Pickup W	40	40	80
Sealing VA	7.1	7.1	16
Sealing W	2.1	2.1	4.3
Single-voltage coil 60 Hz			
Pickup VA	67	67	178
Pickup W	50	50	117
Sealing VA	8.7	8.7	19
Sealing W	2.6	2.6	5.3
50/60 Hz			
Pickup VA	62 58	62 58	168 154
Pickup W	48 43	48 43	120 43
Sealing VA	9.1 6.5	9.1 6.5	22 14
Sealing W	2.5 2	2.5 2	5.3 4.3
DC operated			
Pickup W	12 at 24V	12 at 24V	24 at 24V
Sealing W	0.5 at 24V	0.5 at 24V	0.5 at 24V
Duty factor (%DF)	100	100	100
Switching Time at 100% U_c (Approximate Values)			
Main contact			
AC operated			
Closing delay (ms)	<22	<22	<18
Opening delay (ms)	<14	<14	<13
DC operated			
Closing delay (ms)	<47	<47	<54
Opening delay (ms)	<30	<30	<24
Arcing time (ms)	10	10	10
Electromagnetic Compatibility (EMC)			
Emitted interference	To EN-60947-1	To EN-60947-1	To EN-60947-1
Noise immunity	To EN-60947-1	To EN-60947-1	To EN-60947-1

Note

① Coil Suffix TD: U_{min} 24 Vdc/U_{max} 27 Vdc.
Coil Suffix WD: U_{min} 48 Vdc/U_{max} 60 Vdc.
Coil Suffix AD: U_{min} 110 Vdc/U_{max} 130 Vdc.
Coil Suffix BD: U_{min} 200 Vdc/U_{max} 240 Vdc.
Example:
U_c = 0.7 x U_{min}—1.2 x U_{max}
U_c = 0.7 x 24V—1.2 x 27 Vdc

Coil Data—Frames K–M

Description	CN13K_ NEMA Size 3	CN13M_ NEMA Size 4
Voltage Tolerance		
Pickup (x U_c)		
AC operated	0.8–1.1	0.8–1.1
DC operated	0.7–1.2 ①	0.7–1.2 ①
Dropout (x U_c)		
AC operated	0.25–0.6	0.25–0.6
DC operated	0.15–0.6	0.15–0.6
Power Consumption of the Coil at Cold State and 1.0 x U_c		
AC operated Single-voltage coil 50 Hz		
Pickup VA	180	180
Pickup W	130	130
Sealing VA	3.1	3.1
Sealing W	2.1	2.1
Single-voltage coil 60 Hz		
Pickup VA	170	170
Pickup W	130	130
Sealing VA	3.1	3.1
Sealing W	2.1	2.1
50/60 Hz		
Pickup VA	170	170
Pickup W	130	130
Sealing VA	3.1	3.1
Sealing W	2.1	2.1
DC operated		
Pickup W	149 at 24V	149 at 24V
Sealing W	2.1 at 24V	2.1 at 24V
Duty factor (%DF)	100	100
Switching Time at 100% U_c (Approximate Values)		
Main contact		
AC operated		
Closing delay (ms)	<33	<33
Opening delay (ms)	<41	<41
DC operated		
Closing delay (ms)	<35	<35
Opening delay (ms)	<30	<30
Arcing time (ms)	15	15
Permissible residual current with actuation of A1–A2 by the electronics (with 0 signal) (mA)	≤1	≤1
Electromagnetic Compatibility (EMC)		
Emitted interference	To EN60947-1	To EN60947-1
Noise immunity	To EN60947-1	To EN60947-1

Coil Data—Frame S

Description	CN13S_ NEMA Size 5
Voltage Tolerance	
Pickup (x U_c)	0.7 x U_{cmin}–1.15 x U_{cmax}
Dropout (x U_c)	0.2 x U_{cmin}–0.6 x U_{cmax}
Power Consumption of the Coil at Cold State and 1.0 x U_c	
XTCE185L–XTCEC20R	
Pickup VA	380 ②
Pickup W	250
Sealing VA	4.3
Sealing W	3.3
Switching Time at 100% Main Contact U_c (Approximate Values)	
XTCE185L–XTCEC20R	
Closing delay (ms)	<80
Opening delay (ms)	<110
Reaction in Threshold and Sealing State Transition Range	
Voltage interruptions	
(0–0.2 x U_{cmin}) ≤10 ms	Time is bridged successfully
(0–0.2 x U_{cmin}) >10 ms	Dropout of the contactor
Voltage dips	
(0.2–0.6 x U_{cmin}) ≤12 ms	Time is bridged successfully
(0.2–0.6 x U_{cmin}) >12 ms	Dropout of the contactor
(0.6–0.7 x U_{cmin})	Contactor remains switched on
Excess voltage	
(1.15–1.3 x U_{cmax})	Contactor remains switched on
(>1.3 x U_{cmax}) ≤3s	Contactor remains switched on
(>1.3 x U_{cmax}) >3s	Dropout of the contactor
Pickup phase	
(0–0.7 x U_{cmin})	Contactor does not switch on
(0.7 x U_{cmin} –1.15 x U_{cmax})	Contactor switches on with certainty
(>1.15 x U_{cmax})	Contactor switches on with certainty

Notes

① At 24V: 0.7–1.3 without additional auxiliary contact modules and ambient temperature +40°C [104°F].

② Control transformer with U_k ≤6%.

Current Heat Loss (Three-Pole) in Watts

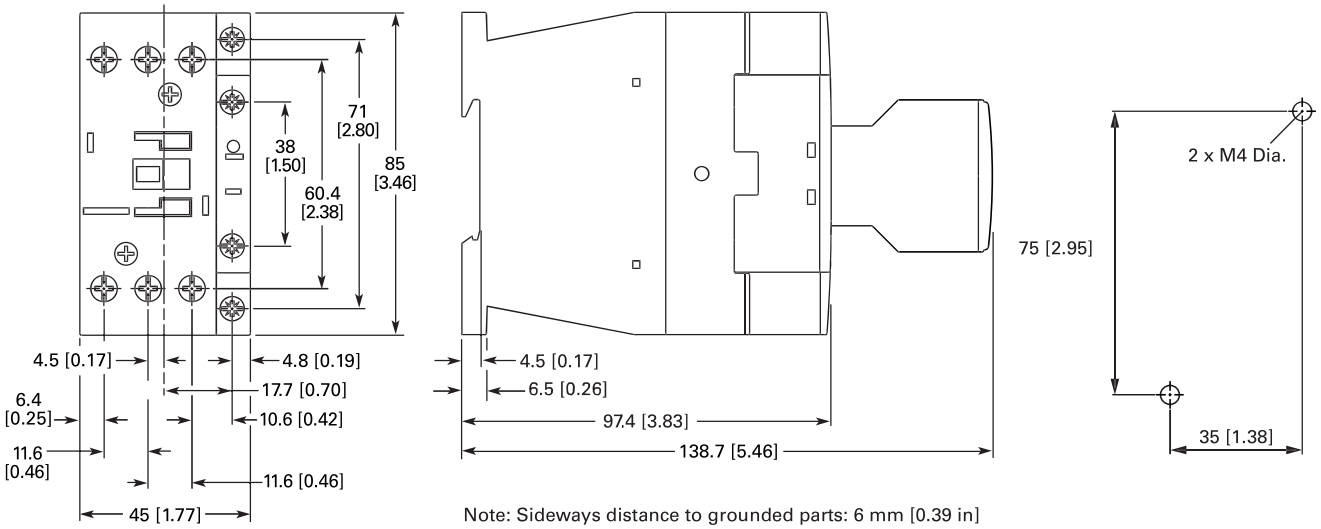
Description	CN13BN0_	CN13CN0_	CN13GN0_	CN13KN0_	CN13MN0_
Current heat loss (three-pole) in watts					
at I_{th}	7.3	12.1	28.8	20.3	30.7
at I_e to AC-3/400V	1.9	6.1	19	15.9	27.0
Impedance per pole, megohms	2	2	1.5	0.4	0.4

Dimensions

Approximate Dimensions in mm [in]

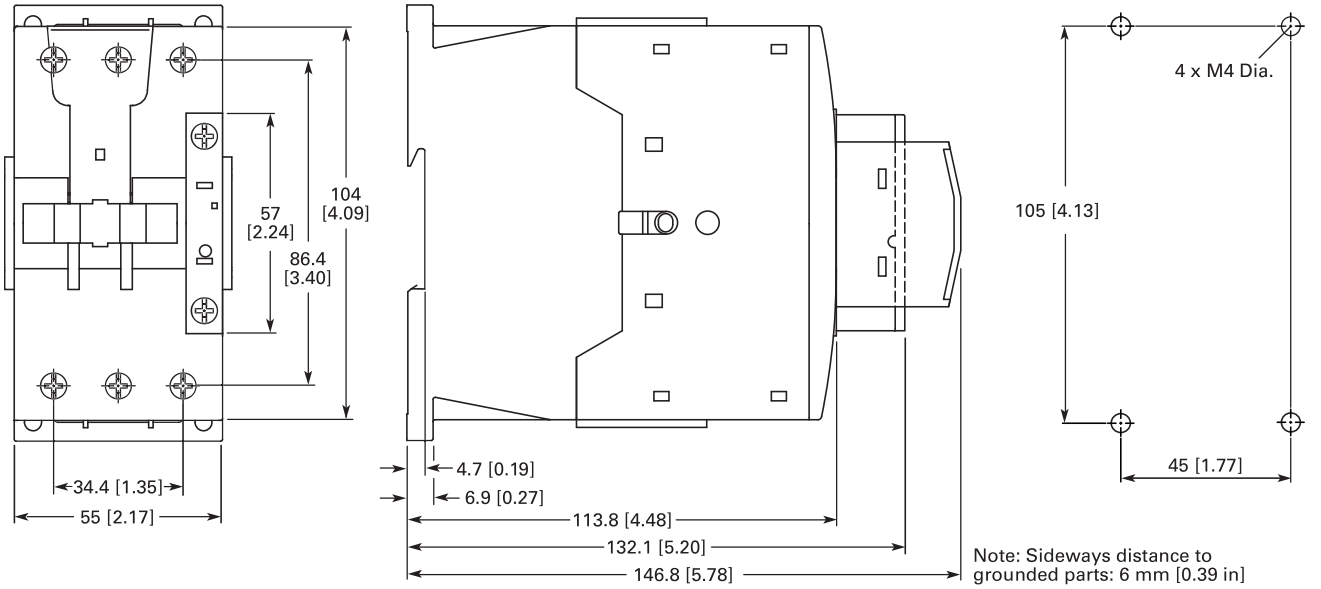
Contactors

Type CN13 NEMA Size 0 and 1



Note: Sideways distance to grounded parts: 6 mm [0.39 in]

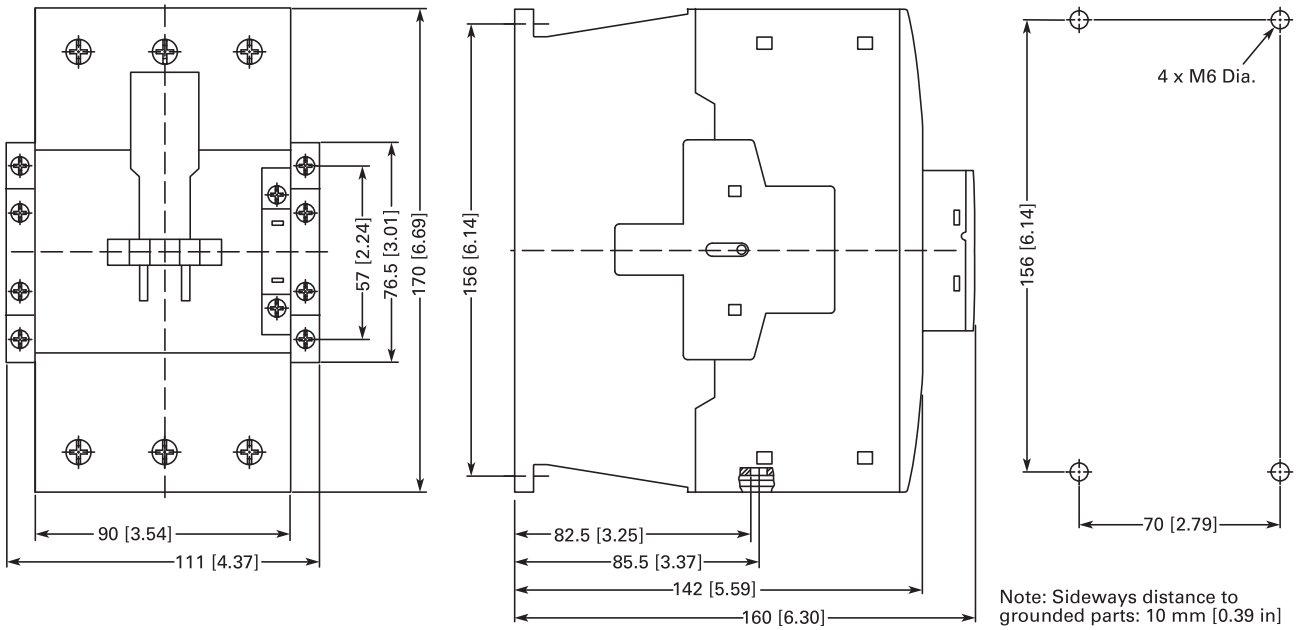
Type CN13 NEMA Size 2



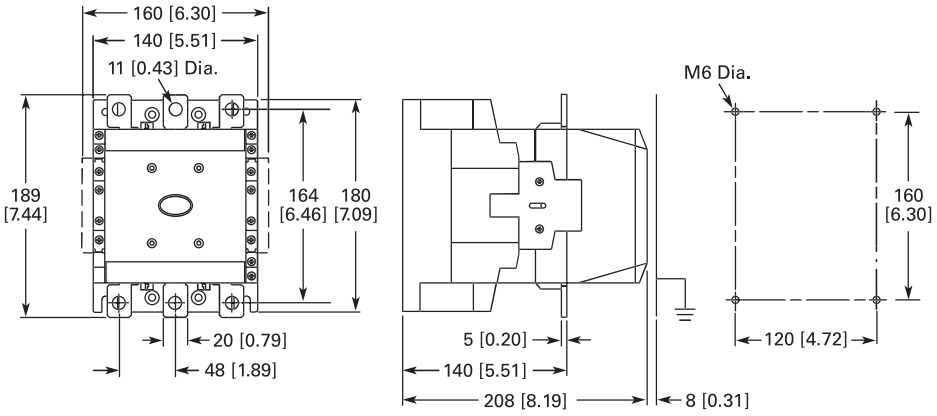
Note: Sideways distance to grounded parts: 6 mm [0.39 in]

Approximate Dimensions in mm [in]

Type CN13 NEMA Size 3 and 4



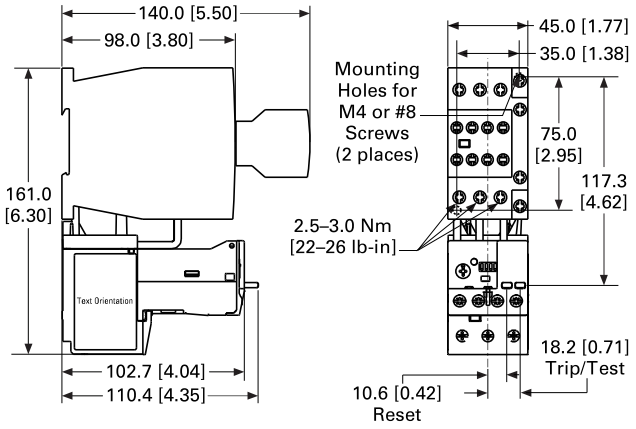
Type CN13 NEMA Size 5



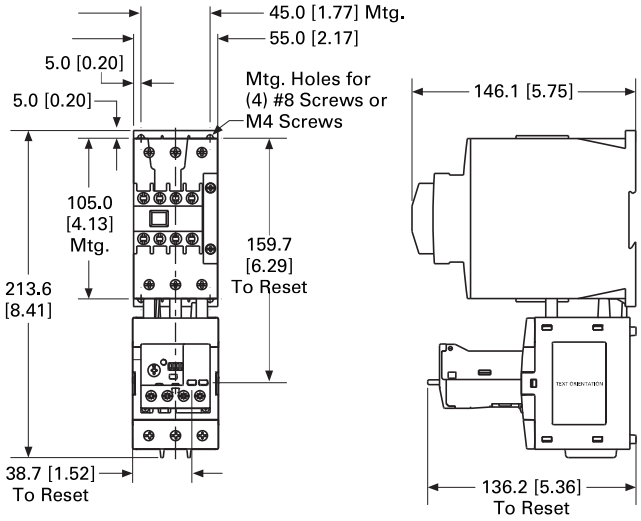
Approximate Dimensions in mm [in]

XTAE Starters with XTOE Overload Relay

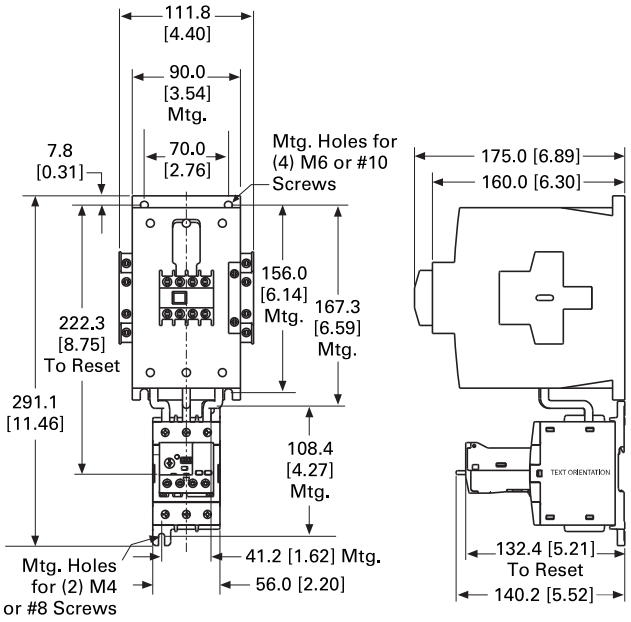
Type AN13 NEMA Size 0 and 1



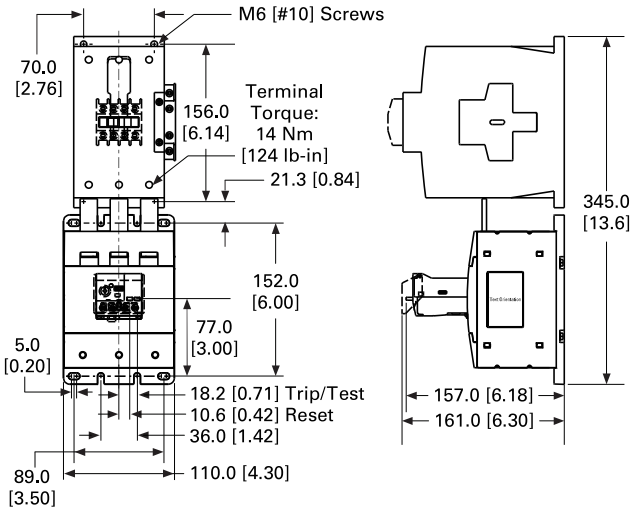
Type AN13 NEMA Size 2



Type AN13 NEMA Size 3



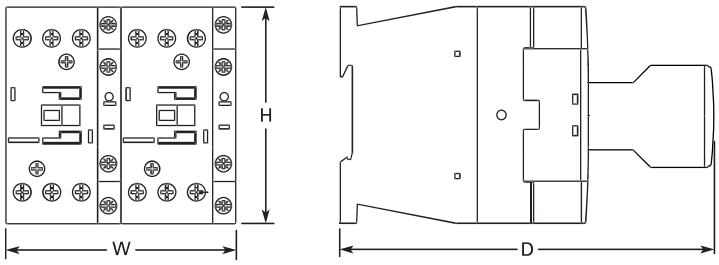
Type AN13 NEMA Size 4



Approximate Dimensions in mm [in]

Reversing Contactors

Type CN53 Size 0, 1 and 2



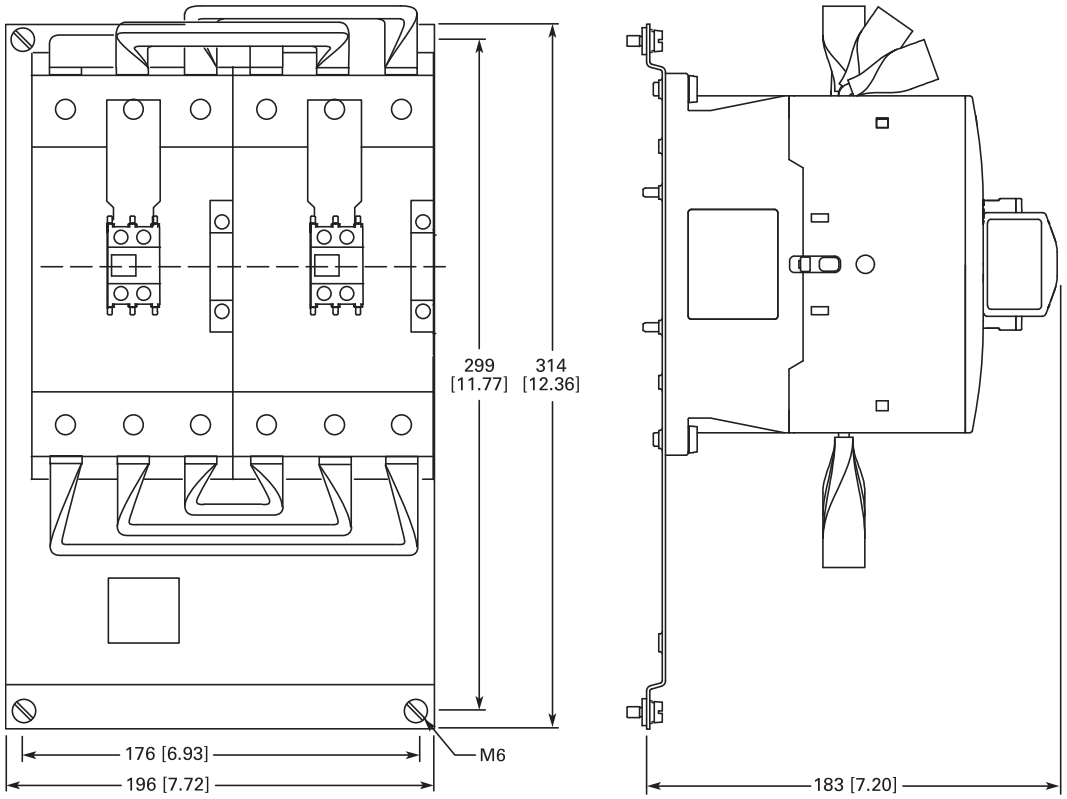
Size 0 and 1

W	H	D
90 [3.54]	85 [3.34]	138 [5.43]

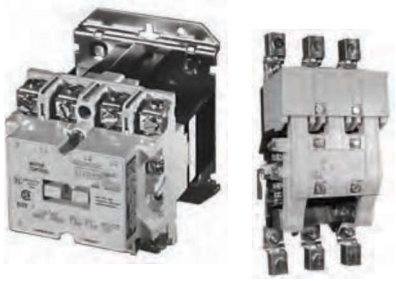
Size 2

W	H	D
110 [4.33]	115 [4.53]	146.8 [5.78]

Type CN53 Size 3 and 4



Contactors—Non-Reversing and Reversing



Contents

Description	*Page*
A200 Series	
Contactors—Non-Reversing and Reversing	
Starters—Non-Reversing and Reversing	**V5-T2-103**
Relays—Thermal and Fast Trip	**V5-T2-124**
Thermal Type B, Class 20, Manual Reset	**V5-T2-126**
Thermal Type A, Class 20, Auto/Manual Reset	**V5-T2-129**
Type FT Fast Trip, Class 10	**V5-T2-132**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	**V5-T2-137**

Contactors—Non-Reversing and Reversing

Product Description

Class A201 Contactors, Sizes 00–4; Three-Phase, 1-1/2–100 hp

A201 Magnetic Contactors from Eaton's Electrical Sector are 600V rated devices available in NEMA Sizes 00–4, 10A through 150A (open rating). Product features include:

- Straight-through wiring to line and load terminals located up front for ease of installation
- Moving and stationary contacts are front accessible, simplifying inspection and maintenance
- Reliable U-shaped magnet for reduced power consumption
- Coil design reduces inventory/maintenance expenses. For a given voltage, one size coil fits all contactors Sizes 00–2, and a second coil fits three-pole Model J Sizes 3 and 4. Model K coils are different design

A201 contactors have normally open holding circuit interlocks which are supplied as standard.

Panel layout and drilling are simplified through the use of common backplates, one for Sizes 00–2 and one for Sizes 3–4. In addition, panel space is reduced dramatically through the use of unique corner cavities for mounting the wide variety of modifications shown on **Page V5-T2-116.**

For reversing applications, two contactors are supplied on a common base with electrical and mechanical interlocks which prevent both contactors from being closed at the same time.

Class A201 Contactors, Sizes 5–9; Three-Phase, Over 100 hp

These AC magnetic contactors utilize clapper design and feature straight-through wiring.

Contacts are silver alloy for longer life. The contacts close with optimum wiping action which serves to keep the contacting surfaces clean. De-ion® arc quenchers draw the arc away from the contacts at opening, which reduces burning and pitting and increases contact life.

All of the contactors are complete with one unwired, normally-open (NO) auxiliary contact mounted and have accommodations for additional auxiliary contacts. No control circuit wiring or terminal markings are included.

Size 5, 300A, 600V, Open
Size 6, 600A, 600V, Open

Class A201 Size 5 and 6 contactors are front clapper design, AC operated with the armature pivoting on dual needle bearings which assure accurate contact alignment.

The contactor base is molded of a high impact, non-tracking, non-hygroscopic glass polyester material permitting front mounting and wiring on a steel panel.

Floating magnet assures quiet operation.

Size 5 and 6 contactors must be mounted with the line terminals directly above the load terminals.

Multi-voltage coil ratings allow selection of the voltage which closely matches the actual system voltage to assure optimum contactor operation.

Each contactor accommodates two Type J11 auxiliary contacts, providing up to four auxiliary circuits, normally-open or normally-closed (NO and NC).

A201 Size 5 and 6 contactors and starters are UL recognized when supplied without terminals. When supplied with terminals, the devices are UL listed.

Two special configurations of the Class A201 Size 5 and 6 contactors are available:

- **Latched Design—** This is a mechanically held, electrically released device. It is applied where the contactor must remain closed during extreme voltage fluctuations or power failure. It is also suitable for applications requiring quiet operation since the operating coil is de-energized when the contactor is closed. The latch assembly consists of a mechanical latch mechanism, electrically operated AC trip solenoid and a clearing contact
- **DC Operated**—This device is DC operated. It is used where low dropout voltage or exceptionally quiet operation is desired. The DC assembly consists of a DC operating coil, integrally mounted rectifier and shorting contact

Size 7, 900A, 600V, Open
Size 8, 1350A, 600V, Open
Size 9, 2500A, 600V, Open

Class A201 Size 7 and 8 contactors are DC operated side clapper design with the shaft mounted on dual needle bearings to ensure positive contact alignment and long contact life.

A steel panel base permits mounting on angle or channel without additional support, for versatile low cost installation.

Each stationary contact assembly is mounted on an individual molded insulator. Each pair of contacts is surrounded by a De-ion grid type arc quencher for rapid and confined arc interruption and long contact life.

The shunt for each pole is made of flexible, braided copper cable for freedom of movement and long life.

The rugged DC operating coils are designed to operate at high temperature and insulated to meet Class H service.

An integrally mounted avalanche type silicon rectifier supplies DC coil voltage from the AC control circuit.

Sizes 7 and 8 accommodate three Type L-63 auxiliary contacts which are easily converted from normally-open to normally-closed, providing auxiliary circuit flexibility. Size 9 uses L-64 auxiliary contacts with a total of four circuits.

A201 Size 7, 8 and 9 contactors and starters are UL recognized when supplied without terminals. When supplied with terminals, the devices are UL listed.

Application Description

Magnetic contactors are used to switch transformers and capacitors and to control electrical power circuits such as heating, lighting and motors that require no overload protection, or where overload protection is separately provided. They can be operated remotely by manual or automatic pilot devices.

Standards and Certifications

A201 contactors are UL listed components and also have CSA certification.

Listed

Instructional Leaflets

16960B Sizes 00–1 Magnetic Contactor, Non-reversing or Reversing

16961E Size 2 Magnetic Contactor, Non-reversing or Reversing

13238G Size 3 Magnetic Contactor, Non-reversing or Reversing

17001C Size 4 Magnetic Contactor, Non-reversing or Reversing

17049D Size 5 Magnetic Contactor, Non-reversing or Reversing

17053B Size 6 Magnetic Contactor, Non-reversing or Reversing

17048 Sizes 7–8 Magnetic Contactor, Non-reversing or Reversing

16978 Size 9 Magnetic Contactor, Non-reversing or Reversing

Product Selection

Non-Reversing, Sizes 00–9

When Ordering Specify

Order by catalog number from the table below, plus suffix for coil voltages, verifying usage of appropriate sizes.

A201 Size 1 Contactor



Front Connected Contactors

Size	Amps	Max. UL Horsepower Single-Phase 115V	230V	Three-Phase 208V	240V	480V	600V	Two Poles Open Catalog Number	Three Poles Open Catalog Number	Four Poles Open Catalog Number	Five Poles Open Catalog Number
Sizes 00–6											
00	9	1/3	1	1-1/2	1-1/2	2	2	**A201KAB_**	**A201KAC_**	**A201KAD_**	**A201KAE_**
0	18	1	2	3	3	5	5	**A201K0B_**	**A201K0C_**	**A201K0D_**	**A201K0E_**
1	27	2	3	7-1/2	7-1/2	10	10	**A201K1B_**	**A201K1C_**	**A201K1D_**	**A201K1E_**
2	45	3	7-1/2	10	15	25	25	**A201K2B_**	**A201K2C_**	**A201K2D_**	**A201K2E_**
3	90	—	—	25	30	50	50	**A201K3B_**	**A201K3C_**	**A201K3D_**	**A201K3E_**
4	135	—	—	40	50	100	100	**A201K4B_**	**A201K4C_**	**A201K4D_**	**A201K4E_**
5	270	—	—	75	100	200	200	**A201K5B_**	**A201K5C_**	—	—
6	540	—	—	150	200	400	400	**A201K6B_**	**A201K6C_**	—	—
Sizes 7–9											
7 ①	810	—	—	200	300	600	600	**A201K7B_**	**A201K7C_**	—	—
8 ①	1215	—	—	400	450	900	900	**A201K8B_**	**A201K8C_**	—	—
9 ①	2250	—	—	—	800	1600	—	**A201K9B_**	**A201K9C_Z1** ②③	—	—

Rear Connected Contactors

120V Rectified Coil/Open Only

Size	Catalog Number
7	**A201K7CJZ1Z4**
8	**A201K8CJZ1Z4**
9	**A201K9CJZ1Z4**

Coil Suffix

Coil Volts and Hz	Code Suffix
Sizes 00–6	
120/60 or 110/50	**A**
200–208/60	**B**
240/60	**W**
Sizes 7, 8 and 9 ②	
480/60	**X**
600/60	**E**
110–120/50 or 60	**J**
220–240/50 or 60	**K**
440–480/50 or 60	**U**
600/60	**E**

Notes

① Sizes 7–9 use rectifier with DC coil.
② For Size 9, only available coil voltage is 120V.
③ Supplied without terminal lugs.

Reversing, Sizes 00–9

When Ordering Specify

Order by catalog number from the table below, plus suffix for coil voltages, verifying usage of appropriate sizes.

Size 1 Horizontal Reversing Contactor



Class A211—Horizontally Mounted and Class A251—Vertically Mounted Reversing Contactors

Size	Amps	Max. UL Horsepower Single-Phase 115V	230V	Three-Phase 208V	240V	480V	600V	Horizontal Design Catalog Number	Vertical Design Catalog Number
Sizes 0–6									
0	18	1	2	3	3	5	5	**A211K0C_**	**A251K0C_**
1	27	2	3	7-1/2	7-1/2	10	10	**A211K1C_**	**A251K1C_**
2	45	3	7-1/2	10	15	25	25	**A211K2C_**	**A251K2C_**
3	90	—	—	25	30	50	50	**A211K3C_**	**A251K3C_**
4	135	—	—	40	50	100	100	**A211K4C_**	**A251K4C_**
5	270	—	—	75	100	200	200	**A211K5C_**	**A251K5C_**
6	540	—	—	150	200	400	400	**A211K6C_**	**A251K6C_**
Sizes 7–9									
7 ①	810	—	—	200	300	600	600	—	**A251K7C_**
8 ①	1215	—	—	400	450	900	900	—	**A251K8C_**
9 ①	2250	—	—	—	800	1600	—	—	**A251K9C_** ②

Coil Suffix

Coil Volts and Hz	Code Suffix
Sizes 00–6	
120/60 or 110/50	**A**
200–208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**
Sizes 7, 8 and 9 ②	
110–120/50 or 60	**J**
220 –240/50 or 60	**K**
440–480/50 or 60	**U**
600/60	**E**

Notes

① Sizes 7–9 use rectifier with DC coil.

② For Size 9, only available coil voltage is 120V.

Dimensions

Approximate Dimensions in Inches (mm)

Not to be used for construction purposes unless approved.

Non-Reversing Open Contactors

Figure A—Sizes 00–4 A210

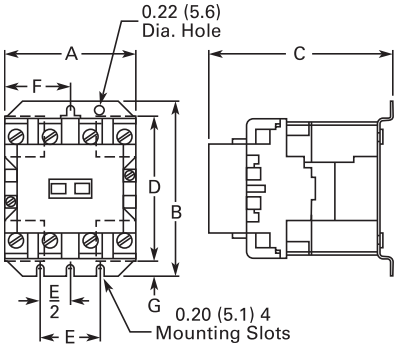


Figure B—Size 5

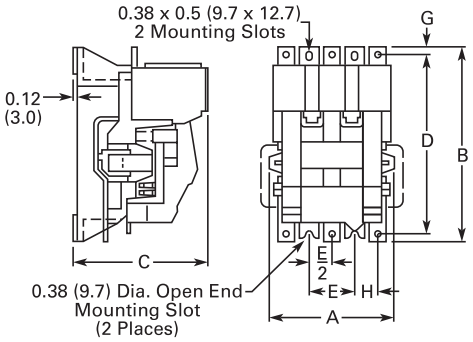


Figure C—Size 6

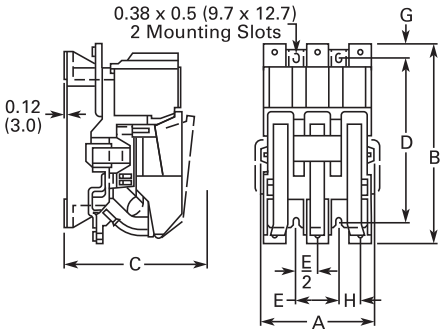
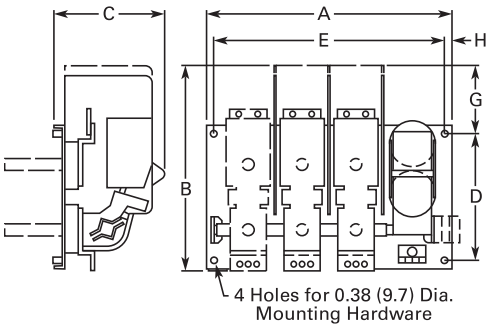


Figure D—Sizes 7–9



Dimensions and Shipping Weights

NEMA Size	No. of Poles	Fig.	Mounting Screws No.	Size	A	B	C	D	E	F	G	H	Weight, Lbs (kg)
00, 0, 1	2–4	A	3	#10	3.31 (84.1)	4.38 (111.3)	4.61 (117.1)	3.95 (100.3)	1.50 (38.1)	1.66 (42.2)	0.45 (11.5)	—	2.6 (1.2)
	5	A	3	#10	4.19 (106.4)	4.38 (111.3)	4.61 (117.1)	3.95 (100.3)	1.50 (38.1)	2.09 (53.1)	0.45 (11.5)	—	3.2 (1.5)
2	2, 3	A	3	#10	3.31 (84.1)	4.38 (111.3)	4.94 (125.5)	3.95 (100.3)	1.50 (38.1)	1.66 (42.2)	0.45 (11.5)	—	3.3 (1.5)
	4, 5	A	3	#10	5.06 (128.5)	4.38 (111.3)	4.94 (125.5)	3.95 (100.3)	1.50 (38.1)	2.53 (64.3)	0.45 (11.5)	—	4.5 (2.0)
3, 4	2, 3	A	3	1/4 in.	4.63 (117.6)	6.63 (168.4)	6.75 (171.5)	6.00 (152.4)	1.88 (47.8)	2.31 (58.7)	0.38 (9.7)	—	9.3 (4.2)
	4, 5	A	3	1/4 in.	7.25 (184.2)	6.63 (168.4)	6.75 (171.5)	6.00 (152.4)	1.88 (47.8)	3.63 (92.2)	0.38 (9.7)	—	13.0 (5.9)
5	2, 3	B	4	3/8 in.	7.22 (183.4)	12.00 (304.8)	7.75 (196.9)	11.00 (279.4)	2.75 (69.9)	—	0.59 (15.0)	2.22 (56.4)	25.0 (11.4)
6	2, 3	C	4	3/8 in.	7.22 (183.4)	13.50 (342.9)	9.50 (251.3)	11.00 (279.4)	2.75 (69.9)	—	0.59 (15.0)	2.22 (56.4)	42.0 (19.1)
7	3	D	4	3/8 in.	23.50 (596.9)	18.63 (473.2)	11.00 (279.4)	12.00 (304.8)	22.00 (558.8)	—	5.63 (143.0)	0.75 (19.1)	215.0 (97.6)
8	3	D	4	3/8 in.	23.50 (596.9)	19.25 (489.0)	11.00 (279.4)	12.00 (304.8)	22.00 (558.8)	—	5.63 (143.0)	0.75 (19.1)	265.0 (120.3)
9	3	D	4	1/2 in.	33.00 (838.2)	29.75 (755.7)	12.94 (328.7)	8.00 (203.2)	30.75 (781.1)	—	14.50 (368.3)	1.63 (41.4)	315.0 (143.0)

Approximate Dimensions in Inches (mm)

Not to be used for construction purposes unless approved.

2

Reversing Open Contactors

Figure A—Sizes 00–4 Horizontal

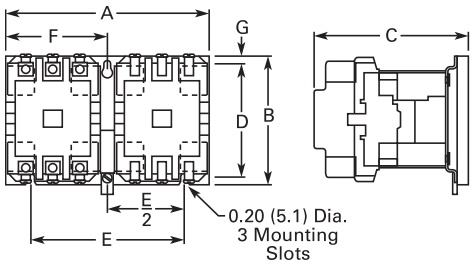


Figure C—Sizes 5, 6 Horizontal

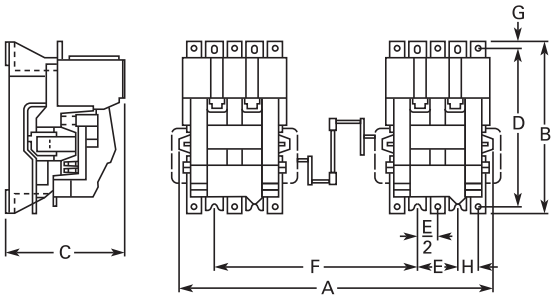


Figure B—Sizes 00–4 Vertical

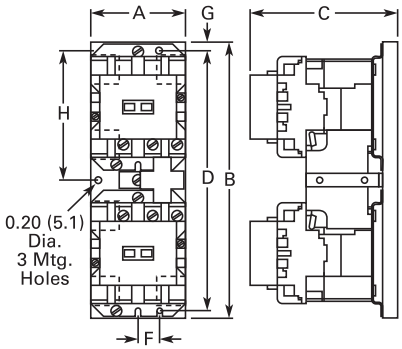


Figure D—Sizes 5, 6 Vertical

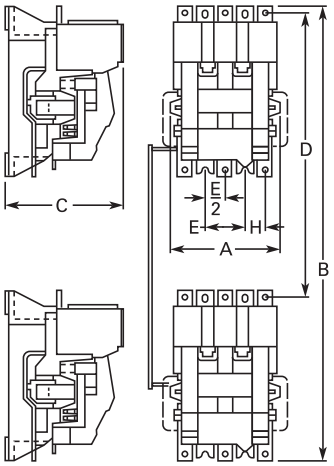
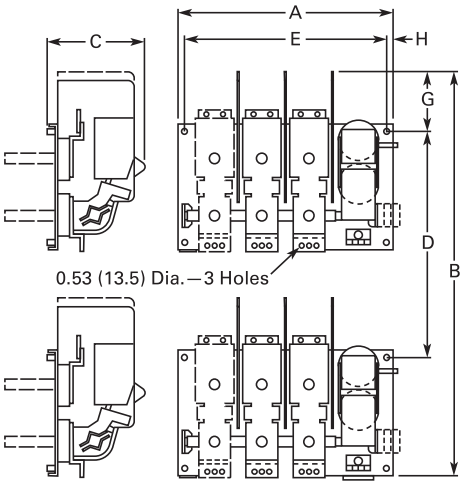
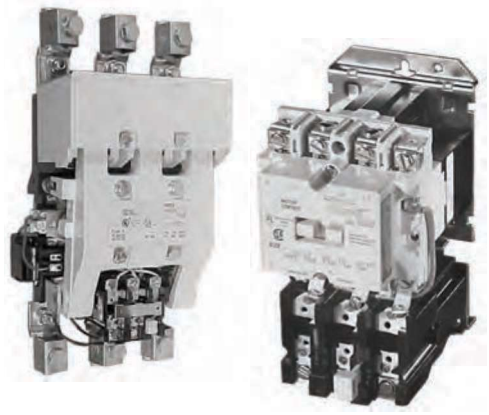


Figure E—Sizes 7–9 Vertical



Dimensions and Shipping Weights

NEMA Size	No. of Poles	Fig.	Mounting Screws No.	Mounting Screws Size	A	B	C	D	E	F	G	H	Weight, Lbs (kg)
00, 0, 1	3 x 3 H.	A	3	#10	7.13 (181.1)	4.45 (113.0)	5.05 (128.3)	3.95 (100.3)	5.31 (134.9)	3.56 (90.4)	0.25 (6.4)	—	7.8 (3.5)
	3 x 3 V.	B	3	#10	3.33 (84.6)	9.61 (244.1)	5.05 (128.3)	9.08 (230.6)	2.16 (54.9)	0.75 (19.1)	0.25 (6.4)	4.52 (114.8)	8.9 (4.0)
2	3 x 3 H.	A	3	#10	7.13 (181.1)	4.45 (113.0)	5.38 (136.7)	3.95 (100.3)	5.31 (134.9)	3.56 (90.4)	0.25 (6.4)	—	9.1 (4.1)
	3 x 3 V.	B	3	#10	3.33 (84.6)	9.61 (244.1)	5.38 (136.7)	9.08 (230.6)	2.16 (54.9)	0.75 (19.1)	0.25 (6.4)	4.52 (114.8)	10.0 (4.5)
3, 4	3 x 3 H.	A	3	1/4 in.	9.75 (247.7)	6.88 (174.8)	7.25 (184.2)	6.00 (152.4)	7.00 (177.8)	4.88 (124.0)	0.44 (11.2)	—	24.0 (10.9)
	3 x 3 V.	B	3	1/4 in.	4.63 (117.6)	16.56 (420.6)	7.25 (184.2)	15.69 (398.5)	2.75 (69.9)	0.94 (23.9)	0.44 (11.2)	7.78 (197.6)	25.0 (11.4)
5	3 x 3 H.	C	8	3/8 in.	17.22 (437.4)	12.00 (304.8)	7.75 (196.9)	11.00 (279.4)	2.75 (69.9)	10.00 (254.0	0.59 (15.0)	1.38 (35.1)	55.0 (25.0)
	3 x 3 V.	D	8	3/8 in.	8.25 (209.6)	30.00 (762.0)	7.75 (196.9)	18.00 (457.8)	2.75 (69.9)	—	—	1.38 (35.1)	55.0 (25.0)
6	3 x 3 H.	C	8	3/8 in.	17.22 (437.4)	13.50 (342.9)	8.75 (222.3)	11.00 (279.4)	2.75 (69.9)	10.00 (254.0)	0.59 (15.0)	1.38 (35.1)	90.0 (40.9)
	3 x 3 V.	D	8	3/8 in.	8.25 (209.6)	41.50 (1054.1)	8.75 (222.3)	28.00 (711.2)	2.75 (69.9)	—	—	1.38 (35.1)	90.0 (40.9)
7	3 x 3 V.	E	8	3/8 in.	23.50 (596.9)	38.63 (981.2)	11.00 (279.4)	20.00 (508.0)	22.00 (558.8)	—	5.63 (143.0)	0.75 (19.1)	450.0 (204.3)
8	3 x 3 V.	E	8	3/8 in.	23.50 (596.9)	39.25 (997.0)	11.00 (279.4)	20.00 (508.0)	22.00 (558.8)	—	5.63 (143.0)	0.75 (19.1)	550.0 (249.7)
9	3 x 3 V.	E	8	1/2 in.	33.00 (838.2)	62.75 (1593.9)	12.94 (328.7)	33.00 (838.2)	30.75 (781.1)	—	14.50 (368.3)	1.63 (41.4)	650.0 (295.1)



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-97**
Starters—Non-Reversing and Reversing	
Application Description	**V5-T2-104**
Features and Benefits	**V5-T2-104**
Standards and Certifications	**V5-T2-104**
Instructional Leaflets	**V5-T2-104**
Product Selection	**V5-T2-105**
Accessories	**V5-T2-108**
Renewal Parts	**V5-T2-111**
Modifications	**V5-T2-116**
Technical Data and Specifications	**V5-T2-117**
Mechanical Characteristics	**V5-T2-119**
Dimensions	**V5-T2-121**
Relays—Thermal and Fast Trip	**V5-T2-124**
Thermal Type B, Class 20, Manual Reset	**V5-T2-126**
Thermal Type A, Class 20, Auto/Manual Reset	**V5-T2-129**
Type FT Fast Trip, Class 10	**V5-T2-132**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	**V5-T2-137**

Starters—Non-Reversing and Reversing

Product Description

NEMA Sizes 00–4; Three-Phase, 1-1/2–100 hp

These Starters from Eaton's Electrical Sector use Class A201 contactors as described on **Page V5-T2-97**. Contactor features are enhanced through the ability to provide positive motor protection in the form of several types of overload relays. See **Pages V5-T2-124** to **V5-T2-136**.

Type B Overload Relay, Manual Reset Only

Supplied as standard on Class A200 and A900 starters (two-speed). The bi-metallic overload relay offers ambient compensation and trip-to-test feature (relay contact status check) as standard. In addition, an isolated normally-open contact is available in kit form for customer mounting. Type B overload relays are manual reset only.

Type A Overload Relay, Manual or Automatic Reset

This is an optional overload relay, offering the capability of field conversion to automatic reset. It is available as an ambient compensated or non-compensated type.

Non-Reversing Starters

Non-reversing starters are supplied as open devices. All starters are supplied with a normally-open holding circuit interlock.

Reversing Starters

For reversing applications (Class A210), a starter and a contactor electrically and mechanically interlocked are supplied on a common baseplate. Reversing starters are used to start, stop and reverse AC squirrel cage motors and for primary control of reversing wound-rotor motors.

For plugging or inching, when operations exceed five times per minute, decreased horsepower ratings in accordance with NEMA Standard ICS 2-321 are recommended.

Two-Speed Starters, A900s

For across-the-line starting of two-speed constant hp, constant torque and variable torque squirrel cage motors, two-speed starters (Class A900) are available. These starters consist of two starters, one for each motor speed, mechanically and electrically interlocked and wired for manual speed selection by means of pushbuttons. Auxiliary relays may be added to provide automatic acceleration or deceleration.

Starters for two-speed, two independent winding motors consist of two-, three- or four-pole starters electrically and mechanically interlocked.

Starters for two-speed, single reconnectable winding motors consist of one three-pole and one five-pole starter mechanically and electrically interlocked.

NEMA Sizes 5–9; Three-Phase 75 to 1600 hp

Non-reversing (Class A200), and reversing (Classes A210, A250) full voltage starters are used for across-the-line starting of squirrel cage induction motors. They are used with motors rated above 50 hp at 230V, and above 100 hp at 460 through 600V.

Sizes 5 and 6 starters use Class A201 contactors as described on **Page V5-T2-97**. In addition to standard motor starters, special application devices are available: Sizes 5 and 6 starters with integrally rectified AC to DC coils for applications where low voltage problems are prevalent are available.

Front Removable Parts— All operating parts can be removed quickly and easily from the front. Straight-through wiring and conveniently located connection points for external wires and cables minimize installation time.

Type B Block Type Thermal Overload Relay— Dependable overload protection is assured by these snap-action, manual reset relays. Automatic reset Type A relays are available as an option.

Types of Starters

Class A200, Sizes 5 and 6— Non-reversing starters contain an AC magnetically-operated Size 5 or Size 6 line contactor and block Type B three-pole overload relay, along with three current transformers. A control relay whose contacts handle the coil current of the starter is provided with Size 6 starters.

Class A200, Sizes 7, 8 and 9—Non-reversing starters contain a DC operated line contactor, DC power supply, block Type B three-pole overload relay with three current transformers and a control relay.

Class A960/A970/A980 Multi-Speed Starters: Refer to **Page V5-T2-107**.

Application Description

Magnetic starters are used for full-voltage, across-the-line starting and stopping of squirrel cage motors. They can be operated locally or remotely by manual or automatic pilot devices.

Features and Benefits

Sizes 00–4

- **Straight-Through Wiring, Up-Front, Out-Front Terminals** for ease in installation
- **Unique Accessory Mounting Cavities** reduce panel space requirements
- **Snap-in Accessories** for application flexibility
- **Vertical and Horizontal Interlocking** capability increases application flexibility
- **Ambient Compensated Overload Relays** available as standard, offering superior motor protection in variable motor/controller environments
- **Isolated Normally Open Relay Contact** available in kit mounting form on Type B Overload Relay

Sizes 5–9

- **Rectified AC/DC Coils** available to reduce premature drop-out or "kiss" problems due to inherent low voltage conditions
- **Clapper Design** armature assembly pivots on needle bearings resulting in quick, smooth opening and closing of the magnet
- **Stainless Steel Kick-Out Spring** assures quick, positive drop-out time
- **Front Removable Parts** all current carrying parts front removable for easy inspection and maintenance

Standards and Certifications

Class A200 starters are UL listed and recognized and also carry CSA certification.

Listed

Instructional Leaflets

16958	Sizes 00–1, 3-Pole Motor Controller
16956	Sizes 00–1, 2-Pole, Single-Phase Motor Controller
16959	Size 2, 3-Pole Motor Controller
16957	Size 2, 2-Pole, Single-Phase Motor Controller
15465C	Sizes 3 and 4J Motor Controller
17000C	Size 4, Model K Motor Controller
17054C	Size 5 Motor Controller
17055C	Size 6 Motor Controller

Product Selection

Non-Reversing, Sizes 00–9

When Ordering Specify

Order by catalog number from the tables to the right, plus suffix for coil voltages, verifying usage of appropriate sizes.

Heaters

Enter heaters as separate item by listing catalog number from the tables on **Pages V5-T2-135** and **V5-T2-136**, as required per starter.

Size 3 Starter



Non-Reversing Starters

Size	Amperes	Max. UL Horsepower Single-Phase 115V	230V	Three-Phase 208V	240V	480V	600V	Open Catalog Number ①
Two-Poles ② —Sizes 00–2								
00	9	1/3	—	1-1/2	1-1/2	2	2	**A200MABR**
0	18	1	—	3	3	5	5	**A200M0BR**
1	27	2	—	7-1/2	7-1/2	10	10	**A200M1BR**
1-1/2	36	3	—	—	—	—	—	**A200MDBR**
2	45	7-12	—	10	15	25	25	**A200M2BR**
Three Poles—Sizes 00–6								
00	9	1/3	—	1-1/2	1-1/2	2	2	**A200MAC_**
0	18	1	—	3	3	5	5	**A200M0C_**
1	27	2	—	7-1/2	7-1/2	10	10	**A200M1C_**
2	45	7-12	—	10	15	25	25	**A200M2C_**
3	90	—	—	25	30	50	50	**A200M3C_**
4	135	—	—	40	50	100	100	**A200M4C_**
5	270	—	—	75	100	200	200	**A200M5C_**
6	540	—	—	150	200	400	400	**A200M6C_**
Three Poles—Sizes 7–9								
7 ③	810	—	—	200	300	600	600	**A200M7C_**
8 ③	1215	—	—	400	450	900	900	**A200M8C_**
9 ③	2250	—	—	—	800	1600	—	**A200M9C_** ④

Coil Suffix

Coil Volts and Hz	Code Suffix
Sizes 00–6	
120/60 or 110/50	**AC**
200–208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**
Sizes 7, 8 and 9 ④	
110–120/50 or 60	**J**
220–240/50 or 60	**W**
440–480/50 or 60	**X**
600/60	**E**

Notes

① For ambient compensated overload relay with auto-reset, add Suffix **D.**
② Single-phase with one single-pole overload relay.
③ Sizes 7–9 use rectifier with DC coil.
④ For Size 9, only available coil voltage is 120V.

Reversing, Sizes 00–9

When Ordering Specify

Order by catalog number from table below, plus suffix for coil voltages, verifying usage of appropriate sizes.

Heaters

Enter heaters as separate item by listing catalog number from the tables on **Pages V5-T2-135** and **V5-T2-136**, as required per starter.

Size 1 Horizontal Reversing Starter



Reversing Starters

Size	Amps	Max. UL Horsepower Single-Phase 115V	230V	Three-Phase 208V	240V	480V	600V	Horizontal Design Catalog Number ①	Vertical Design Catalog Number ①
Sizes 00–6									
00	9	1/3	1	1-1/2	1-1/2	2	2	**A210MAC_**	**A250MAC_**
0	18	1	2	3	3	5	5	**A210M0C_**	**A250M0C_**
1	27	2	3	7-1/2	7-1/2	10	10	**A210M1C_**	**A250M1C_**
2	45	3	7-1/2	10	15	25	25	**A210M2C_**	**A250M2C_**
3	90	—	—	25	30	50	50	**A210M3C_**	**A250M3C_**
4	135	—	—	40	50	100	100	**A210M4C_**	**A250M4C_**
5	270	—	—	75	100	200	200	**A210M5C_**	**A250M5C_**
6	540	—	—	150	200	400	400	**A210M6C_**	**A250M6C_**
Sizes 7–9									
7 ②	810	—	—	200	300	600	600	—	**A250M7C_**
8 ②	1215	—	—	400	450	900	900	—	**A250M8C_**
9 ②	2250	—	—	—	800	1600	—	—	**A250M9C_** ③

Coil Suffix

Coil Volts and Hz	Code Suffix
Sizes 00–6	
120/60 or 110/50	**AC**
200–208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**
Sizes 7, 8 and 9 ③	
110–120/50 or 60	**J**
220–240/50 or 60	**W**
440–480/50 or 60	**X**
600/60	**E**

Notes

① For ambient compensated overload relay with auto-reset, add Suffix **D.**
② Sizes 7–9 use rectifier with DC coil.
③ For Size 9, only available coil voltage is 120V.

For Separate Two-Winding Motors

Heaters

Enter heaters as separate item by listing catalog number from the tables on **Pages V5-T2-135** and **V5-T2-136**, as required per starter.

Three-Phase, Non-Reversing, Reversing 60 Hz Starters—Heater Selection

		Constant or Variable Torque				Constant Horsepower				Three Poles Open
NEMA	Amperes	208V	240V	480V	600V	208V	240V	480V	600V	Catalog Number ①
Sizes 0–6										
0	18	3	3	5	5	2	2	3	3	**A960M0C_**
1	27	7-1/2	7-1/2	10	10	5	5	7-1/2	7-1/2	**A960M1C_**
2	45	10	15	25	25	7-1/2	10	20	20	**A960M2C_**
3	90	25	30	50	50	20	25	40	40	**A960M3C_**
4	135	40	50	100	100	30	40	75	75	**A960M4C_**
5	270	75	100	200	200	60	75	150	150	**A960M5C_**
6	540	150	200	400	400	100	150	300	300	**A960M6C_**

For Single-Winding Motors

Sizes 0–6

						Three Poles Open
NEMA	Amperes	208V	240V	480V	600V	Catalog Number ①
Constant Horsepower						
0	18	3	3	5	5	**A970M0C_**
1	27	7-1/2	7-1/2	10	10	**A970M1C_**
2	45	10	15	25	25	**A970M2C_**
3	90	25	30	50	50	**A970M3C_**
4	135	40	50	100	100	**A970M4C_**
5	270	75	100	200	200	**A970M5C_**
6	540	150	200	400	400	**A970M6C_**
Constant or Variable Torque						
0	18	2	2	3	3	**A980M0C_**
1	27	5	5	7-1/2	7-1/2	**A980M1C_**
2	45	7-1/2	10	20	20	**A980M2C_**
3	90	20	25	40	40	**A980M3C_**
4	135	30	40	75	75	**A980M4C_**
5	270	60	75	150	150	**A980M5C_**
6	540	100	150	300	300	**A980M6C_**

Coil Suffix

Coil Volts and Hz	Coil Suffix
Sizes 0–6	
120/60 or 110/50	**AC**
200–208/60	**B**
240/60	**W**
480/60	**X**
600/60	**E**

Note

① For ambient compensated overload relay with auto-reset, add Suffix **D**.

Accessories

SS-56 Surge Suppressor

- Designed to be used with magnetic motor controllers through Size 4 in 120V, 60 Hz control circuit applications where electronic equipment is used
- Steady state coil volts: 120, 60 Hz, rms
- Peak input volts: 169.6, 60 Hz, max. amplitude
- Max. ambient temperature: 65°C
- Nominal limiting volts: 270 peak
- Nominal rate of volt rise: 0.5 per ms

SS-56 Surge Suppressor



Surge Suppressor ①

Type Mounting	Kit Catalog Number
Starter	**SS-56**

Mechanical Interlock

- Prevents closing of one member of a reversing or multi-speed contactor until the opposite member is completely open
- Lever type mechanism assures positive action
- Can be factory assembled or field mounted on A200 and A900 starters and contactors

Mechanical Interlock

Contactor Arrangement (Number of Poles, Horizontal or Vertical)	Continuous Size	Interlock Catalog Number
3 x 3 horizontal	0, 1	**M-33-1B**
4 x 4 horizontal	0, 1	**M-33-1B**
5 x 3 horizontal	0, 1	**M-33-1B**
All pole combination, vertical	0, 1	**M-34-1A**
3 x 3 horizontal reversing	2	**M-33-2B**
3 x 3 vertical reversing	2	**M-34-2A**
5 x 3 horizontal	2	**M-35-2A**
4 x 4 horizontal	2	**M-36-2A**
All pole combination horizontal	3, 4	**M-33-3B**
All pole combination vertical	3, 4	**M-34-3**

B3NO Bell Alarm Contact

- Isolated normally open bell alarm contact
- Mounts in Type B block-type overload relay

Bell Alarm Contact

Kit Catalog Number
B3NO-2
B3NO-4 ②

Control Contact Ratings (B600)

	Maximum Amperes	
AC Volts	**Make**	**Break**
24–120	30	3.00
121–600	3600 VA	360 VA
Continuous current rating: 5A		

Overload Relay Reset Extension

- Used to adjust overload reset rod depth of Class A200 Model J starters and current design overload relays to same dimensions as obsolete B200 starters and overloads identified by suffix **B**, for example, BA13**B**

When replacing obsolete B200 device with Class A200 starter and Type B overload, order Style 6710C11H03. No charge.

When replacing obsolete B200 device with Class A200 starter and Type A overload, order Style 1490C15H10. No charge.

Notes

① Can be used on Sizes 5 and 6 with 120V coil. Mounting bracket required—order separately. Mounting bracket 177C043G04.

② For Size 3 and 4.

Power Pole Kit

- Adds 1NO or 1NC power pole to Size 00–1 A201 Class contactors
- Factory installed or field mountable in load side auxiliary cavities
- 600 Vac
- Continuous current rating of 18A for Size 0, 27A for Size 1

Power Pole Kit ①

Continuous Current Rating	Kit Size	Kit Catalog Number
Normally Open		
18	0	**PNO-0**
27	1	**PNO-1**
Normally Closed		
18	0	**PNC-0**
27	1	**PNC-1**

Replacement Auxiliary Contacts

Contactor Size	Contact Arrangement	Auxiliary Elect. Contact Catalog Number	Auxiliary Elect. Contact Style Number
5, 6	1NO + 1NC	**J11**	**9084A17G01**
	2NO	**J20**	**9084A17G02**
	2NC	**J02**	**9084A17G03**
7, 8	1NO	—	**578D461G01**
	1NC	—	**578D461G03**
9	1NO + 1NC	—	**843D943G04**
	2NO	—	**843D943G05**
	2NC	—	**843D943G06**

Extra Auxiliary Contact Kits

All starters include an auxiliary contact with 1NO and 1NC contact. These kits include an auxiliary contact with contacts as shown, plus operating arm and mounting bracket when required.

Extra Auxiliary Contact Kits

Contactor Size	Contact Arrangement	Style Number
5, 6	1NO + 1NC	**3463D94G18**
	2NO	**3463D94G04**
	2NC	**3463D94G19**
7, 8 ②	2NO	**818D498G06**
	1NO	**818D498G04**

DC Coil Conversion Kits

Kits listed below include all necessary parts to convert from AC to DC control including the DC coil with built-in diode, rectifier, auxiliary interlock and all mounting hardware.

DC Coil Conversion Kits

Size	Voltage	Kit Style Number
5	110-120	**7864A28G01**
	220-240	**7864A28G02**
	440-480	**7864A28G03**
6	110-120	**7864A29G01**
	220-240	**7864A29G02**
	440-480	**7864A29G03**

Mechanical Interlocks

Contactor Sizes	Style Numbers Horizontal	Vertical
3, 4 and 5	**2050A11G75**	**2050A11G65**
5 and 5	**2050A11G27**	**2050A11G17**
5 and 6	**2050A11G26**	**2050A11G16**
6 and 7, 8	—	**2050A11G55**
7, 8 and 7, 8	No (rear conn.)	**567D624G01**
7, 8 and 9	No (rear conn.)	**9944D56G06**
9 and 9	No (rear conn.)	**9944D56G01**

Notes

① Do not use with DC operated contactors.
② Size 7 and larger use DC coils as standard.

Overload Protection

Overload Protection Size 5 Starters

Type B overload relay is a three-pole, block type, thermal ambient compensated device with manual reset mounted integrally. Current transformers are enclosed in a protective case and integrally mounted to save panel space. Standard ratio is 300:5.

Overload Protection Size 6 Starters

Overload protection assembly consists of three current transformers, Type B three-pole block overload relay and an optional interposing relay. These parts are mounted on a panel which connects directly to the load terminal of the contactor. Current transformers are 600:5 ratio as standard.

If automatic reset is required, the Type A, three-pole block, ambient compensated relay is available upon request.

Overload Relay Kits

Each kit includes three current transformers (standard ratio) and one Type B, three-pole block overload relay, ambient compensated with manual reset.

Overload Relay Kits

Kit Size	Kit Part Number
5	**2057A34G01**
6	**6379D80G10**

Replacement Terminal Lugs ①

		Terminals		
Contactor Size	Cable Size	Quantity in Kit	Quantity Required per Pole	Kit Style Number
5	1-500 MCM	6	2	**2119A76G01**
6	2-500 MCM	6	2	**7858A96G01**
7	4-500 MCM	12	4	**7858A96G02**
8	4-500 MCM	12	4	**7858A96G03**

Note

① All mounting hardware is included in kit.

Renewal Parts

When Ordering Specify

Use this renewal parts data to identify device by style number, catalog number and/or description.

Select style number of replacement part from the following pages.

For clarification of ordering procedure, pricing and discounts, contact the Customer Support Center.

General Information

This renewal parts data will provide the proper identification of standard parts which may be required for maintenance of Eaton's components.

It is the intent of this catalog section to make it possible to quickly select the parts needed.

An investment in renewal parts and regular maintenance program will protect against downtime and ensure a proper duty cycle for your equipment.

To maintain maximum operating efficiency and dependability of your equipment, only genuine Eaton replacement parts should be used.

This section identifies the replacements parts which are available. Order by style number.

JF Autostarters

JF Autostarter Kits ①

Frame Size	Start Contacts Required	Start Contacts Style Number	Run Contacts Required	Run Contacts Style Number	Grid Stack Kit Required	Grid Stack Kit Style Number
2–3	1	**38A7018G12**	1	**38A7018G13**	1	**3354D90G10**
4–5 5L	1	**550D409G18**	1	**550D409G19**	1	**3354D90G10**
5M–5MM	1	**3354D90G08**	1	**3354D90G09**	2	**3354D90G10**

Solenoid Assembly with Coil (All Sizes) ②

Volt	Hz	Style Number ③
115	60	**5264C05H01**
230	60	**5264C05H02**
460	60	**5264C05H03**
575	60	**5264C05H04**

Notes

① Kits contain a complete set of moving contacts, stationary contacts and springs.

② When replacing solenoid assembly series 416C160 use adapter plate style 9917D02H01—one required.

③ These styles replace coil style 296B892G___. When ordering new style as replacement, customer must order adapter plate 9917D02H01, one required.

AC Starters, Contactors A200, A201

AC Contactors Model J Sizes 00, 0, 1, 2 Kits ①

Part	Poles	Size 00 Style Number	Size 0 Style Number	Size 1 Style Number	Size 2 Style Number
Contact kit	2	**373B331G17**	**373B331G02**	**373B331G07**	**373B331G11**
	3	**373B331G18**	**373B331G04**	**373B331G09**	**373B331G12**
	4	**373B331G18**	**373B331G04**	**373B331G09**	**373B331G13** ③
	5	**373B331G19**	**373B331G05**	**373B331G10**	—
Arc box ②	2, 3, 4	**6714C74G01**	**6714C74G02**	**6714C74G03**	**6714C74G07** ④
	5	**6714C74G04**	**6714C74G05**	**6714C74G06**	**6714C74G08** ⑤
Cross bar	2, 3	**N/A**	**N/A**	**N/A**	**672B788G32**
	4, 5	**N/A**	**N/A**	**N/A**	**672B788G34**
Upper base (for single rated coils only)	2, 3	**N/A**	**N/A**	**N/A**	**672B788G33**
	4, 5	**N/A**	**N/A**	**N/A**	**672B788G35**
Lower base	2, 3	**N/A**	**N/A**	**N/A**	**1250C33G09**
	4, 5	**N/A**	**N/A**	**N/A**	**1250C33G05**
KO spring (package of 10)	All	**N/A**	**N/A**	**N/A**	**503C796G01**
Terminal line/load (package of 3)	All	**N/A**	**N/A**	**N/A**	**371B870G03**

AC Coils

Voltage	Hz	Size 00, 0, 1 Two-, Three-, Four-Pole Style Number	Five-Pole Style Number	Size 2 Two-, Three-Pole Style Number	Four-, Five-Pole Style Number
120/110	60/50	**505C806G01**	**505C808G01**	**505C806G01**	**505C818G01**
208	60	**505C806G02**	**505C808G02**	**505C806G02**	**505C818G02**
600/550	60/50	**505C806G05**	**505C808G05**	**505C806G05**	**505C818G05**
380	50	**505C806G07**	**505C808G07**	**505C806G07**	**505C818G07**
240/220	60/50	**505C806G12**	**505C808G12**	**505C806G12**	**505C818G12**
480/440	60/50	**505C806G13**	**505C808G13**	**505C806G13**	**505C818G13**
24	60	**505C806G16**	**N/A**	**505C806G16**	**505C818G15**
277	60	**505C806G18**	**505C808G16**	**505C806G18**	**505C818G16**
240/480 ⑥	60/60	**505C806G03**	**505C808G03**	**505C806G03**	**505C818G03**
120/240 ⑦	60/60	**505C806G10**	**505C808G10**	**505C806G10**	**505C818G10**

DC Coil ⑦

Voltage	Size 0, 1 Single-, Two-, Three-, Four-Pole Style Number	Size 2 Single-, Two-, Three-Pole Style Number
12	**1268C86G07**	**1268C86G07**
24	**1268C86G04**	**1268C86G04**
48	**1268C86G05**	**1268C86G05**
125	**1268C86G02**	**1268C86G02**
250	**1268C86G01**	**1268C86G01**
125/250 ⑥	**1268C86G03**	**1268C86G03**

Notes

① Model C contact tips and coils 00-4, two-, three-, four- and five-pole contactors are same as Model J. All other parts are unavailable.
② Mounting hardware included.
③ Use one each of 373B331G11 and 373B331G12.
④ Two-, three-pole.
⑤ Four-, five-pole.
⑥ Dual voltage coils. Use only on contactors or starters originally supplied with a dual voltage coil.
⑦ Use only on contactors originally supplied with a DC coil.

Accessories for Size 5–9 AC Contactors

A rectifier circuit converts the AC supply to DC supply. This conversion provides pick up and drop out characteristics. All necessary parts are included in the kit.

AC-DC Coil Conversion Kits

Voltage	Size 5 Style Number	Size 6 Style Number
120 Vac	**7864A28G01**	**7864A29G01**
240 Vac	**7864A28G02**	**7864A29G02**
480 Vac	**7864A28G03**	**7864A29G03**

Replacement Coils for AC-DC Coil Conversion Kit

Voltage	Size 5 Style Number	Size 6 Style Number
120 Vac	**7856A15G05**	**7856A16G05**
240 Vac	**7856A15G10**	**7856A16G10**
480 Vac	**7856A15G15**	**7856A16G15**

Auxiliary Electrical Interlocks Size 7–9 AC and All DC Units

Type	Circuits	Application	Style Number
L63	NO	Size 7–8	**578D461G01**
L63	NC	Size 7–8	**578D461G03**
L64	NO-NC	Size 9	**843D943G04**
L64	2NO	Size 9	**843D943G05**
L64	2NC	Size 9	**843D943G06**

Accessories for Size 00–6 AC Contactors

Auxiliary Electrical Interlocks

Catalog Number (Obsolete)	Style Number (Obsolete)	Circuits	Catalog Number Current	Style Number Current
(L-56)	(2609D01G01)	1NO and 1NC	**J11**	**9084A17G01**
(L-56D)	(2609D01G02)	2NO	**J20**	**9084A17G02**
(L-56E)	(2609D01G03)	1NO and 1NC	**J11**	**9084A17G01**
(L-56B)	(2609D01G04)	2NO	**J20**	**9084A17G02**
(L-56H)	(2609D01G05)	2NO	**J20**	**9084A17G02**
(L-56J)	(2609D01G06)	1NO and1NC DB	**J1C**	**9084A17G04**
(L-56A)	(2609D01G07)	N/A	**N/A**	**N/A**
(L-56B)	(2609D01G08)	N/A	**N/A**	**N/A**
(L-56F)	(2609D01G09)	N/A	**N/A**	**N/A**
(L-56G)	(2609D01G10)	1NO and 1NC DB	**J1C**	**9084A17G04**
(L-56C)	(2609D01G11)	2NC	**J02**	**9084A17G03**
(L-56M)	(2609D01G12)	N/A	**N/A**	**N/A**
(L-56P)	(2609D01G17)	1NO and 1NC	**J11**	**9084A17G01**
(L-56R)	(2609D01G18)	2NC	**J02**	**9084A17G03**
(L-56S)	(2609D01G19)	1NO and 1NC	**J11**	**9084A17G01**

Model J–K, Sizes 3 and 4

Sizes 3 and 4 Kits ①

Part	Poles	Size 3–Model J Style Number	Size 4–Model J ② Style Number	Size 4–Model K ③ Style Number
Contact kit	2	**626B187G12**	**626B187G16**	**5250C81G16**
	3	**626B187G13**	**626B187G17**	**5250C81G17**
	4	④	⑥	**5250C81G18**
	5	⑤	⑦	**5250C81G19**
Arc box	2, 3	**6714C74G09**	**6714C74G11**	**6714C74G11**
	4, 5	**6714C74G10**	**6714C74G12**	**6714C74G12**
Cross bar	2, 3	**672B788G36**	**672B788G36**	**672B788G40**
	4, 5	**672B788G38**	**672B788G38**	—
Upper base	2, 3	**672B788G37**	**672B788G37**	**672B788G52**
	4, 5	**672B788G39**	**672B788G39**	—
Lower base	2, 3	**1250C33G03**	**1250C33G03**	**1250C33G10**
	4, 5	**1250C33G06**	**1250C33G06**	—
KO spring (package of 10)	All	**503C796G02**	**503C796G02**	**672B788G50**
Terminal line/load (package of 3)	All	**372B357G12**	**372B357G18**	**372B357G18**

Notes

① Model C contact tips and coils 00-4, two-, three-, four- and five-pole contactors are same as Model J. All other parts are unavailable.
② For 200A A202 magnetically latched lighting contactors order three-pole contact kit style 672B788G07.
③ Model K replaces Model J, offering superior design life characteristics. Renewal parts are different. Use parts for proper model only.
④ Use quantity two of 626B187G12.
⑤ Use quantity one each of 626B187G12 and 626B187G13.
⑥ Use quantity two of 626B187G16.
⑦ Use quantity one each of 626B187G16 and 626B187G17.

Accessories for Model J–K, Series 3, 4

DC Coils ①

Voltage	Model J Size 3, 4 Two-, Three-Pole Style Number
24	**1255C68G04**
48	**1255C68G05**
125	**1255C68G01**
250	**1255C68G02**
125/250 ②	**1255C68G03**

AC Coils

Voltage	Hz	Model J Size 3, 4 Two-, Three-Pole Style Number	Four-, Five-Pole Style Number	Model K Size 4 ③ Two-, Three-Pole Style Number	Four-, Five-Pole Style Number
120/110	60/50	**505C633G01**	**505C635G01**	**5250C79G01**	**5250C80G01**
208	60	**505C633G02**	**505C635G02**	**5250C79G02**	**5250C80G02**
600/550	60/50	**505C633G05**	**505C635G05**	**5250C79G05**	**5250C80G05**
380	50	**505C633G07**	**505C635G07**	**5250C79G07**	**5250C80G07**
240/220	60/50	**505C633G12**	**505C635G12**	**5250C79G12**	**5250C80G12**
480/440	60/50	**505C633G13**	**505C635G13**	**5250C79G13**	**5250C80G13**
24	60	**505C633G34**	**N/A**	**5250C79G34**	**N/A**
277	60	**505C633G14**	**N/A**	**5250C79G14**	**N/A**
240/480 ②	60/60	**505C633G03**	**505C635G03**	**5250C79G03**	**5250C80G03**
120/244 ②	60/60	**505C633G10**	**505C635G10**	**5250C79G10**	**5250C80G10**

A201 Contactors—Size 5–9

GCA 530/630—GPD 7, 8, 9 Kits ④

Part	Size 5 Style Number	Size 6 Style Number	Size 7 Style Number	Size 8 Style Number	Size 9 Style Number
Contact kit (one per pole)	**477B477G05** ⑤	**2066A10G11**	**461A757G17**	**646C829G05**	**5264C42G01** ⑥
					5264C42G02 ⑦
Arc box	**2050A15G45**	**2066A10G45**	**831D580G01**	**831D580G01**	**9917D69G02**
Magnet assembly	**2050A15G46**	**2050A15G46**	**N/A**	**N/A**	**N/A**
Mag. spg. kit	**2050A15G47**	**2050A15G47**	**N/A**	**N/A**	**N/A**
Acr cup kit	**2050A15G48**	**N/A**	**N/A**	**N/A**	**N/A**
Load conversion kit	**2050A15G49**	**2066A10G49**	**N/A**	**N/A**	**N/A**
Line conversion kit	**2050A15G50**	**2066A10G50**	**N/A**	**N/A**	**N/A**
K.O. spring–6	**2050A15G51**	**2066A10G46**	**N/A**	**N/A**	**N/A**
C.T. 300/5	**655C285H03**	**N/A**	**N/A**	**N/A**	**N/A**
C.T. 400/5	**655C285H04**	**N/A**	**N/A**	**N/A**	**N/A**
C.T. 600/5 ⑧	**N/A**	**2066A10G18**	**N/A**	**N/A**	**N/A**
C.T. 800/5 ⑧	**N/A**	**2066A10G19**	**N/A**	**N/A**	**N/A**
Phase barrier	**N/A**	**N/A**	**640C441G01**	**640C441G01**	**5264C35G03** ⑥
Cross bar	**2050A15G12**	**2066A10G15**	**N/A**	**N/A**	**N/A**
Shunt	**N/A**	**2066A10G48**	**650C129G01**	**646C831G02** ⑨	**5264C39G02** ⑩

Notes

① Use only on units originally supplied with DC coil.
② Dual voltage coils. Use only on contactors or starters originally supplied with dual voltage coil.
③ Model K replaces Model J, offering superior design life characteristics. Renewal parts are different. Use parts for proper model only.
④ Catalog Number A201/A200 Series replaces GCA/GPD series. Renewal parts are the same.
⑤ Use 477B477G06 for silver tungsten applications.
⑥ R.C.
⑦ F.C.
⑧ C.T. kit which replaces the single molded 1 C.T. assembly used on the old size 6 airbreak. The kit includes a single molded 3 C.T. assembly, 2 bus bar and hardware. This C.T. kit also replaces the single molded 3 C.T. assembly used on the present size 6 airbreak and size vacuum.
⑨ Set of three.
⑩ Set of four.

Accessories for A201 Contactors—Size 5–9

Coils (Sizes 5 and 6)

Voltage	Hz	Size 5 Style Number	Size 6 Style Number
Sizes 5 and 6			
110/120	60	**2050A14G05**	**2050A12G05**
110/120	50	**2050A14G06**	**2050A12G06**
200/208	50	**2050A14G07**	**2050A12G07**
220/240	50	**2050A14G08**	**2050A12G08**
200/208	60	**2050A14G09**	**2050A12G09**
220/240	60	**2050A14G10**	**2050A12G10**
277/303	60	**2050A14G12**	**2050A12G12**
380/415	50	**2050A14G14**	**2050A12G14**
440/480	60	**2050A14G15**	**2050A12G15**
440/480	50	**2050A14G16**	**2050A12G16**
550/600	60	**2050A14G17**	**2050A12G17**
550/600	50	**2050A14G18**	**2050A12G18**
380/415	60	**2050A14G19**	**2050A12G19**
120/240	60	**2050A14G20**	**2050A12G20**
24 DC	—	**2050A14G21**	**2050A12G21**
48 DC	—	**2050A14G22**	**2050A12G22**
125 DC	—	**2050A14G25**	**2050A12G25**
250 DC	—	**2050A14G27**	**2050A12G27**

Coils (Sizes 7–9)

Line Voltage	Style Number	Required
Sizes 7 and 8		
125 Vdc	**438C805G04**	2
230 Vdc	**438C805G02**	2
250 Vdc	**438C805G03**	2
110/120 Vac ①④	**438C805G12**	2
220/240 Vac ②④	**438C805G11**	2
380 Vac ③④	**438C805G15**	2
440/480 Vac ③④	**438C805G10**	2
550/575 Vac ③④	**438C805G13**	2
Size 9		
110 Vdc	**5264C34G01** ⑤	—

Notes

① Rectifier 125V 2018A40G01 (one required).
② Rectifier 250V 2018A40G02 (one required).
③ Rectifier 600V 2018A40G03 (one required).
④ These coils require an external rectifier. If the rectifier needs replacement, order by the appropriate style number.
⑤ Contains coil and resistor.

Modifications

Factory Modifications

Modification	Description	Catalog Number Suffix	NEMA Size 00–1	2	3	4	5	6	7	8	9
Control circuit	1 Extra auxiliary contact (1NO-1NC) non-reversing, reversing, 2-speed unwired	**J1**	Consult sales office for pricing adders.								
	2 Extra auxiliary contact non-reversing, reversing, 2-speed unwired	**J2**	Consult sales office for pricing adders.								
	3 Extra auxiliary contact non-reversing, unwired	**J3**	Consult sales office for pricing adders.								
	4 Extra auxiliary contact non-reversing, unwired	**J4**	Consult sales office for pricing adders.								
	Wired for separate control (NC)	**C**	Consult sales office for pricing adders.								
	Omit control wiring (NC)	**X**	Consult sales office for pricing adders.								
Overload relays (substitutions)	Ambient compensated with auto reset (NC)	**D**	Consult sales office for pricing adders.								
	Fast trip—ambient compensated (specify motor FLA)	**D7**	Consult sales office for pricing adders.								
	Overload relay alarm contact (NO) per overload	**E**	Consult sales office for pricing adders.								

Accessories and Field Modification Kits

Type J Auxiliary Contact



- Capable of being field mounted in a contactor or starter (Classes A200, A900 Sizes 00–6, V200, V201 vacuum and definite purpose controllers)
- Provides two separate electrical contact sets which wire vertically and are color coded; black designates NC and silver designates NO. Please note that the vertical wiring is contrary to the horizontal wiring of the L-56 auxiliary contacts
- Designed to fit within dimensions of starter; no additional panel space is required
- Provides circuit isolation (no polarity restrictions) and single break bifurcated contacts

Auxiliary Contact Ratings

Voltage	Make	Break
NEMA A600		
120–600 Vac	7200 VA	720 VA
72–120 Vac	60A	720 VA
28–72 Vac	60A	10A
NEMA R300		
28–300 Vdc	28 VA	28 VA

Auxiliary Contact Types

Contact Type	Max.	Catalog Number
1NO and 1NC	4	**J11**
2NC	4	**J02**
2NO	4	**J20**
1 coil clearing NC and 1NO	4	**J1C**

Technical Data and Specifications

Electrical Characteristics

Sizes 00–4

	Size 00	Size 0	Size 1	Size 2	Size 3	Size 4
Max. voltage rating	600V	600V	600V	600V	600V	600V
Ampere rating						
(Open)	10A	20A	30A	50A	100A	150A
(Enclosed)	9A	18A	27A	45A	90A	135A
Squirrel Cage Motor						
Maximum horsepower at:						
200V/60 Hz	1-1/2 hp	3 hp	7-1/2 hp	10 hp	25 hp	40 hp
230V/ 60 Hz	1-1/2 hp	3 hp	7-1/2 hp	15 hp	30 hp	50 hp
380V/50 Hz	1-1/2 hp	5 hp	10 hp	25 hp	50 hp	75 hp
460V–575V/60 Hz	2 hp	5 hp	10 hp	25 hp	50 hp	100 hp
Resistive Heating kW ①						
Single-phase, two-pole						
120V	—	—	3 kW	5 kW	10 kW	15 kW
240V	—	—	6 kW	10 kW	20 kW	30 kW
480V	—	—	12 kW	20 kW	40 kW	60 kW
600V	—	—	15 kW	25 kW	50 kW	75 kW
Three-phase, three-pole						
120V	—	—	5 kW	8.5 kW	17 kW	26 kW
240V	—	—	10 kW	17 kW	34 kW	68 kW
480V	—	—	20 kW	34 kW	68 kW	105 kW
600V	—	—	25 kW	43 kW	86 kW	130 kW
Capacitor Switching kVAR, Three-Phase						
240V	—	—	—	12 kVAR	27 kVAR	40 kVAR
480V	—	—	—	25 kVAR	53 kVAR	80 kVAR
600V	—	—	—	31 kVAR	67 kVAR	100 kVAR
Transformer Switching kVA ②						
Single-phase, two-pole						
120V	—	0.6 kVA	1.2 kVA	2.1 kVA	4.1 kVA	6.8 kVA
240V	—	1.2 kVA	2.4 kVA	4.1 kVA	8.1 kVA	14 kVA
480V	—	2.4 kVA	4.9 kVA	8.3 kVA	16 kVA	27 kVA
600V	—	3 kVA	6.2 kVA	10 kVA	20 kVA	34 kVA
Three-phase, three-pole						
120V	—	1.8 kVA	3.6 kVA	6.3 kVA	12 kVA	20 kVA
240V	—	2.1 kVA	4.3 kVA	7.2 kVA	14 kVA	23 kVA
480V	—	4.2 kVA	8.5 kVA	14 kVA	28 kVA	47 kVA
600V	—	5.2 kVA	11 kVA	18 kVA	35 kVA	59 kVA

Sizes 5–9

	Size 5	Size 6	Size 7	Size 8	Size 9
Max. voltage rating	600V	600V	600V	600V	600V
Ampere rating					
(Open)	300A	600A	900A	1350A	2500A
(Enclosed)	270A	540A	810A	1215A	2250A
Squirrel Cage Motor					
Maximum horsepower at:					
200V/60 Hz	75 hp	150 hp	—	—	—
230V/60 Hz	100 hp	200 hp	300 hp	450 hp	800 hp
380V/50 Hz	150 hp	300 hp	—	—	—
460V–575V/60 Hz	200 hp	400 hp	600 hp	900 hp	1600 hp
Resistive Heating kW ①					
Single-phase, two-pole					
120V	30 kW	60 kW	90 kW	③	③
240V	60 kW	120 kW	180 kW	③	③
480V	120 kW	240 kW	360 kW	③	③
600V	150 kW	300 kW	450 kW	③	③
Three-phase, three-pole					
120V	52 kW	105 kW	155 kW	③	③
240V	105 kW	210 kW	315 kW	③	③
480V	210 kW	415 kW	625 kW	③	③
600V	260 kW	515 kW	775 kW	③	③
Capacitor Switching kVAR, Three-Phase					
240V	80 kVAR	160 kVAR	240 kVAR	360 kVAR	665 kVAR
480V	160 kVAR	320 kVAR	480 kVAR	720 kVAR	1325 kVAR
600V	200 kVAR	400 kVAR	600 kVAR	900 kVAR	1670 kVAR
Transformer Switching kVA ②					
Single-phase, two-pole					
120V	14 kVA	27 kVA	41 kVA	61 kVA	112 kVA
240V	27 kVA	54 kVA	81 kVA	122 kVA	225 kVA
480V	54 kVA	108 kVA	162 kVA	244 kVA	450 kVA
600V	68 kVA	135 kVA	203 kVA	304 kVA	562 kVA
Three-phase, three-pole					
120V	41 kVA	81 kVA	122 kVA	182 kVA	337 kVA
240V	47 kVA	94 kVA	140 kVA	210 kVA	342 kVA
480V	94 kVA	188 kVA	280 kVA	420 kVA	783 kVA
600V	117 kVA	234 kVA	351 kVA	526 kVA	975 kVA

Notes

① Resistive loads having inrush currents not exceeding 1.5 times continuous rating.

② These ratings are for transformers having inrush currents not more than 20 times peak of continuous current ratings. For inrush currents greater than 20 times, refer to factory.

③ For ratings refer to factory.

DC Power Pole Ratings

The following represent typical production test values and should not be interpreted as a guarantee of actual performance.

DC Operated 120 and 240V Coils

Contactor Size	DC Contact Ampere Rating Two Poles in Series ① 120V	240V
0	—	—
1	20	10
2	45	30
3	75	40
4	90	70

380V, 50 Hz Starter Maximum Horsepower Ratings

Horsepower Ratings

NEMA Size	00	0	1	2	3	4	5	6	7	8
Maximum horsepower	1-1/2	5	10	25	50	75	150	300	450	700

Operating Coil Characteristics at Rated Coil Volts, Sizes 00–9

The following represent typical production test values and should not be interpreted as a guarantee of actual performance.

Operating Coil Characteristics

	Sizes 00, 0, 1	Size 2	Size 3	Size 4 ②	Size 5	Size 6	Size 7	Size 8	Size 9
AC Coil									
Burden									
(Open VA)	160 VA	160 VA	625 VA	700 VA	1700 VA	2900 VA	③	③	③
(Closed VA)	25 VA	25 VA	50 VA	64 VA	180 VA	220 VA	③	③	③
(Closed Watts)	7.8 W	7.8 W	18 W	21 W	32 W	42 W	—	—	—
Pick-up volts ④	85%	85%	85%	85%	78%	70%	—	—	—
Drop-out volts ④	40–60%	40–60%	40–60%	40–60%	65 to 75%	60 to 70%	—	—	—
Pick-up time Hz ⑤⑥	1–1-1/2	1-1/2–2	2–2-1/2	1–1-1/2	1.5	4.0	—	—	—
Drop-out time Hz ⑤	3/4–1	3/4–1	3/4–1	3/4–1	0.75	0.75	—	—	—
DC Coil									
Burden									
(Open VA)	17 VA	17 VA	35 VA	35 VA	600 VA	2120 VA	400 VA	400 VA	2100 VA
(Closed VA)	17 VA	17 VA	35 VA	35 VA	22 VA	21 VA	400 VA	400 VA	350 VA
(Closed Watts)	18 W	18 W	35 W	35 W	20 W	20 W	400 W	400 W	350 W
Pick-Up Volts ④	80%	80%	80%	80%	64%	73%	45%–65% ⑦	45%–65% ⑦	50%–65% ⑦
Drop-Out Volts ④	5–10%	5–10%	5–10%	5–10%	18%	13%	30%–45% ⑦	30%–45% ⑦	40%–50% ⑦
Pick-Up Time Hz ⑥	—	25–75 ms	25–75 ms	25–75 ms	2.7 Hz ⑤	3 Hz ⑤	21–41 Hz ⑦⑤	17–29 Hz ⑦⑤	16–18 ⑦⑤
Drop-Out Time Hz ⑤	—	16–25 ms	16–25 ms	16–25 ms	9.3 Hz ⑤	17.5 Hz ⑤	7–12 Hz ⑧⑤	7–12 Hz ⑧⑤	18–20 Hz ⑦⑤

Notes

① Non-inductive load.
② AC coil data pertains to Model K, DC coil data pertains to Model J.
③ DC operated only.
④ Percent of rated coil voltage.
⑤ At 60 Hz base.
⑥ To contact touch.
⑦ Lower figure when coil is cold. Higher figure when coil is hot.
⑧ Drop-out time to clear arc. Time varies with type of load and contact wear.

Mechanical Characteristics

NEMA Standard ICS 2-110

Direct-current operated contactors shall withstand 110% of their rated voltage continuously without injury to the operating coils and shall close successfully at 80% of their rated voltage.

Alternating-current operated contactors shall withstand 110% of their rated voltage continuously without injury to the operating coils and shall close successfully at 85% of their rated voltage.

Mechanical Characteristics, Sizes 00–9

	Sizes 00, 0, 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7	Size 8	Size 9
Dimensions in inches (mm)									
Height	6.45 (163.8)	7.16 (181.9)	9.93 (252.2)	9.93 (252.2)	12.00 (304.8) ①	13.50 (342.9) ①	18.62 (472.9) ①	19.25 (489) ①	25.00 (635) ①
Width	3.31 (84.1)	3.31 (84.1)	4.62 (117.3)	4.62 (117.3)	7.00 (177.8) ①	7.00 (177.8) ①	23.50 (596.9) ①	23.50 (596.9) ①	32.00 (812.8) ①
Depth	4.61 (117.1)	4.96 (126)	6.75 (171.5)	6.75 (171.5)	7.75 (196.9) ①	8.75 (222.3) ①	11.00 (279.4) ①	11.00 (279.4) ①	13.00 (330.2) ①
Panel area—square inches	21.35	23.7	46.0	46.0	84.0	94.5	437.5	452.4	800
Weight—pounds	3.5	3.5	11.5	11.5	25	42	215	265	315
Cable connection	—	—	—	—	Front	Front	Front/rear	Front/rear	Front/rear
Maximum cable size/phase copper (AWG/MCM)	6 AWG	3 AWG	1/0	4/0	1–500 MCM	2–500 MCM	3–500 MCM	4–500 MCM	8–500 MCM
Auxiliary electrical circuits available	8	6	6	6	4	4	3	3	4
Latched version available	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Mechanical interlock combinations available									
Sizes									
00, 0, 1, 2, 3, 4	Vert., Horiz.	Vert., Horiz.	Vert., Horiz.	Vert., Horiz.	Vert., Horiz.	—	—	—	—
5	—	—	—	—	Vert., Horiz.	Vert., Horiz.	—	—	—
6	—	—	—	—	Vert., Horiz.	Vert., Horiz.	Vertical	Vertical	—
7, 8	—	—	—	—	—	Vertical	Vertical	Vertical	Vertical
9	—	—	—	—	—	—	Vertical	Vertical	Vertical

Data from Tables 430—147 Through 150 of 1996 NEC: Motor Amperes at Full Load ②, Three-Phase AC

	Single-Phase AC		Induction Type Squirrel Cage and Wound-Rotor Amperes				DC			Single-Phase AC		Induction Type Squirrel Cage and Wound-Rotor Amperes				DC	
hp	115V	230V	200V	230V	460V	575V	120V	240V	hp	115V	230V	200V	230V	460V	575V	120V	240V
1/6	4.4	2.2	—	—	—	—	—	—	30	—	—	92	80	40	32	—	106
1/4	5.8	2.9	—	—	—	—	3.1	1.6	40	—	—	120	104	52	41	—	140
1/3	7.2	3.6	—	—	—	—	4.1	2.0	50	—	—	150	130	65	52	—	173
1/2	9.8	4.9	2.5	2.2	1.1	0.9	5.4	2.7	60	—	—	177	154	77	62	—	206
3/4	13.8	6.9	3.7	3.2	1.6	1.3	7.6	3.8	75	—	—	221	192	96	77	—	255
1	16	8	4.8	4.2	2.1	1.7	9.5	4.7	100	—	—	285	248	124	99	—	341
1-1/2	20	10	6.9	6.0	3.0	2.4	13.2	6.6	125	—	—	359	312	156	125	—	425
2	24	12	7.8	6.8	3.4	2.7	17	8.5	150	—	—	414	360	180	144	—	506
3	34	17	11.0	9.6	4.8	3.9	25	12.2	200	—	—	552	480	240	192	—	675
5	56	28	17.5	15.2	7.6	6.1	40	20	250	—	—	—	—	302	242	—	—
7-1/2	80	40	25.3	22	11	9	58	29	300	—	—	—	—	361	289	—	—
10	100	50	32.2	28	14	11	76	38	350	—	—	—	—	414	336	—	—
15	—	—	48.3	42	21	17	—	55	400	—	—	—	—	477	382	—	—
20	—	—	62.1	54	27	22	—	72	450	—	—	—	—	515	412	—	—
25	—	—	78.2	68	34	27	—	89	500	—	—	—	—	590	472	—	—

Notes

① For Sizes 5–9 contactors only; for starter Sizes 5–9, refer to factory.

② These current values are for motors running at usual speeds and with normal torque characteristics. Motors for special low speed or high torque may require higher current. In all cases, heaters should be selected on basis of information on motor nameplate or motor card data.

Combination Ratings

2

Sizes 00–2

Short-Circuit Protective Device (SCPD)	Max. Rating SCPD	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Capability Current	Voltage
Sizes 00, 0, 1				
Class H fuse	60A	—	5000A	600V
Class J fuse	60A	—	100,000A	600V
Class R fuse	60A	—	100,000A	600V
Class T fuse	60A	—	100,000A	600V
Magnetic only ① Type CB ②	30A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/magnetic Type CB ③	50A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic only Type CB + CL ④	30A	HMCP + current limiter	100,000A	600V
Thermal/magnetic Type CLB ⑤	50A	150,000A	100,000A	480V
Size 2				
Class H fuse	100A	—	5000A	600V
Class J fuse	100A	—	100,000A	600V
Class R fuse	100A	—	100,000A	600V
Class T fuse	100A	—	100,000A	600V
Magnetic only ① Type CB ②	50A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/magnetic Type CB ③	90A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic only Type CB + CL ④	50A	HMCP + current limiter	100,000A	600V
Thermal/magnetic Type CLB ⑤	50A	150,000A	100,000A	480V

Sizes 3 and 4

Short-Circuit Protective Device (SCPD)	Max. Rating SCPD	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Capability Current	Voltage
Size 3				
Class H fuse	60A	—	5000A	600V
Class J fuse	60A	—	100,000A	600V
Class R fuse	60A	—	100,000A	600V
Class T fuse	60A	—	100,000A	600V
Magnetic only ① Type CB ②	100A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/magnetic Type CB ③	150A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic only Type CB + CL ④	100A	HMCP + current limiter	100,000A	600V
Thermal/magnetic Type CLB ⑤	150A	50,000A	100,000A	480V
Size 4				
Class H fuse	400A	—	10,000A	600V
Class J fuse	400A	—	100,000A	600V
Class R fuse	400A	—	100,000A	600V
Class T fuse	400A	—	100,000A	600V
Magnetic only ① Type CB ②	150A	Marked HMCP	100,000A	480V
			50,000A	600V
Thermal/magnetic Type CB ③	250A	65,000A	65,000A	480V
		25,000A	25,000A	600V
		100,000A	100,000A	480V
		35,000A	35,000A	600V
Magnetic only Type CB + CL ④	150A	HMCP + current limiter	100,000A	600V
Thermal/magnetic Type CB + CL ⑤	250A	200,000A	100,000A	600V
Thermal/magnetic Type CLB ⑥	250A	150,000A	100,000A	480V

Coil Suffix

Other Available Coil Voltages—AC and DC Coils ⑦

Coils	Catalog Number Suffix	Coil Rating (Volts/Hertz)	Catalog Number Suffix	Coil Rating (Volts/Hertz)
AC	**A**	120/60, 110/50	**N**	110/50
	B	200-208/60	**P**	48/60
	C	240/60 and 480/60	**R**	120/60 and 240/60
	D	440/50	**U**	440-480/50 or 60 Rect. to DC
	E	600/60 Hz	**V**	110/60
	G	220/50	**W**	240/60
	H	380/50	**X**	480/60
	I	24/60	**Y**	415/50
	J	110-120/50 or 60 Rect. to DC	**Z**	277/60
	K	220-240/50 or 60 Rect. to DC	—	—
DC ⑧⑨	**L**	24 Vdc	**S**	125 Vdc
	M	48 Vdc	**T**	250 Vdc

Notes

① Instantaneous adjustable trip.
② Circuit breaker.
③ Inverse time circuit breaker.
④ Instantaneous adjustable trip with current limiting attachment.
⑤ Inverse time with built-in current limiting attachment.
⑥ Inverse time current limiting breaker.
⑦ Availability may be limited.
⑧ DC coils for Size 5 and 6 contactors and starters are intermittent duty rated only. A mechanical latch is required.
⑨ DC coils. Use only on contactors originally supplied with a DC coil.

Dimensions

Approximate Dimensions in Inches (mm)

Not to be used for construction purposes unless approved.

Open Non-Reversing Starters

Figure A—Sizes 00–4

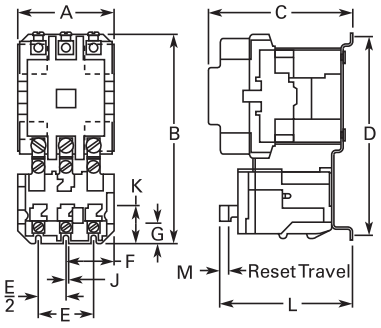


Figure B—Size 5

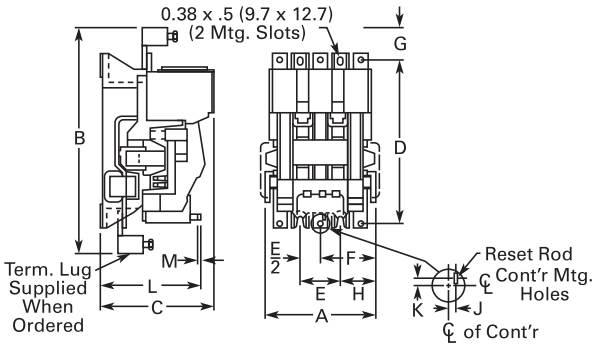
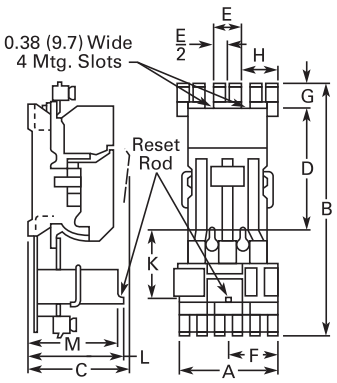


Figure C—Size 6



Dimensions and Shipping Weights

NEMA Size	No. of Poles	Fig.	Mounting Screws No.	Mounting Screws Size	A	B	C	D	E	F	G	H	J	K	L	M	Weight, Lbs (kg)
00, 0, 1	2, 3	A	3	#10	3.31 (84.1)	6.42 (163.1)	4.61 (117.1)	6.00 (152.4)	1.88 (47.8)	1.66 (42.2)	0.23 (5.8)	—	0.39 (9.9)	0.59 (15.0)	4.48 (113.8)	0.27 (6.9)	3.5 (1.6)
2	2, 3	A	3	#10	3.31 (84.1)	7.17 (182.1)	4.94 (125.5)	6.75 (171.5)	1.88 (47.8)	1.66 (42.2)	0.23 (5.8)	—	0.41 (10.4)	0.77 (19.6)	4.53 (115.1)	0.27 (6.9)	4.3 (2.0)
3, 4	2, 3	A	3	1/4 in.	4.63 (117.6)	9.94 (252.5)	6.75 (171.5)	9.25 (235.0)	2.88 (73.2)	.94 (23.9)	0.38 (9.7)	—	0.55 (14.0)	0.80 (20.3)	6.36 (161.5)	0.27 (6.9)	11.5 (5.2)
5	3	B	4	3/8 in.	7.59 (192.8)	16.22 (412.0)	7.75 (196.9)	11.00 (279.4)	2.75 (69.9)	3.81 (96.8)	2.69 (68.3)	2.42 (61.5)	0.33 (8.4)	0.33 (8.4)	7.00 (177.8)	0.27 (6.9)	29.0 (13.2)
6	3	C	4	3/8 in.	9.25 (235.0)	23.50 (596.9)	9.50 (241.3)	11.00 (279.4)	2.75 (69.9)	4.81 (122.2)	2.75 (69.9)	3.06 (77.7)	—	6.50 (165.1)	8.44 (214.4)	0.27 (6.9)	55.0 (25.0)
7	3	①	①	①	37.88 (962.2)	21.50 (546.1)	11.75 (298.5)	—	—	—	—	—	—	—	—	—	—
8	3	①	①	①	37.88 (962.2)	21.50 (546.1)	11.75 (298.5)	—	—	—	—	—	—	—	—	—	—
9	3	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①

Note

① Refer to factory.

Approximate Dimensions in Inches (mm)

Not to be used for construction purposes unless approved.

2

Open Reversing Starters

Figure A—Sizes 00–4 Horizontal

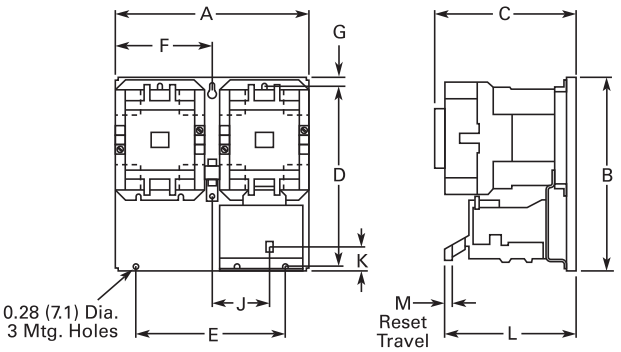
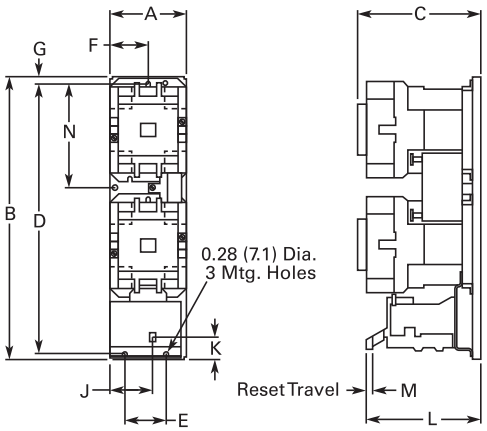


Figure B—Sizes 00–4 Vertical



Dimensions and Shipping Weights

NEMA Size	Number of Poles	Fig.	Mounting Screws No.	Mounting Screws Size	A	B	C	D	E	F	G	J	K	L	M	N	Weight, Lbs (kg)
00, 0, 1	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	6.50 (165.1)	5.05 (128.3)	6.00 (152.4)	5.69 (144.5)	3.56 (90.4)	0.25 (6.4)	2.3 (58.4)	0.59 (15.0)	4.92 (125.0	0.27 (6.9)	—	9.0 (4.0)
	3 x 3 Vert.	B	3	#10	3.33 (84.6)	11.63 (295.4)	5.05 (128.3)	11.13 (282.7)	1.88 (47.8)	1.66 (42.2)	0.25 (6.4)	0.39 (9.9)	0.59 (15.0)	4.92 (125.0)	0.27 (6.9)	4.52 (114.8)	9.8 (4.4)
2	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	7.25 (184.2)	5.38 (136.7)	6.75 (171.5)	5.69 (144.5)	3.56 (90.4)	0.25 (6.4)	2.31 (58.7)	0.77 (19.6)	4.97 (126.2)	0.27 (6.9)	—	10.8 (4.9)
	3 x 3 Vert.	B	3	#10	3.33 (84.6)	12.38 (314.5)	5.38 (136.7)	11.88 (301.8)	1.88 (47.8)	1.66 (42.2)	0.25 (6.4)	0.39 (9.9)	0.77 (19.6)	4.97 (126.2)	0.27 (6.9)	4.52 (114.8)	12.2 (5.5)
3, 4	3 x 3 Horiz.	A	3	1/4 in.	9.75 (247.7)	10.13 (257.3)	7.25 (184.2)	9.25 (235.0)	8.00 (203.2)	4.88 (124.0)	0.44 (11.2)	3.11 (79.0)	0.80 (20.3)	6.86 (174.2)	0.27 (6.9)	—	26.0 (11.8)
	3 x 3 Vert.	B	3	1/4 in.	4.63 (117.6)	19.81 (503.2)	7.25 (184.2)	18.94 (481.1)	2.88 (73.2)	2.94 (74.7)	0.44 (11.2)	0.55 (14.0)	0.80 (20.3)	6.86 (174.2)	0.27 (6.9)	7.91 (200.9)	28.0 (12.7)
5	3 x 3 Horiz.	—	4	3/8 in.	35.25 (895.4)	25.50 (647.7)	8.75 (222.3)	—	—	—	—	—	—	—	—	—	73.0 (33.1)
6	3 x 3 Horiz.	—	4	3/8 in.	35.25 (895.4)	25.50 (647.7)	10.50 (266.7)	—	—	—	—	—	—	—	—	—	127.0 (57.7)
7	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①
8	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①
9	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①

Note

① Refer to factory.

Approximate Dimensions in Inches (mm)

Not to be used for construction purposes unless approved.

Open Multi-Speed Starters

Figure A—Sizes 00–4

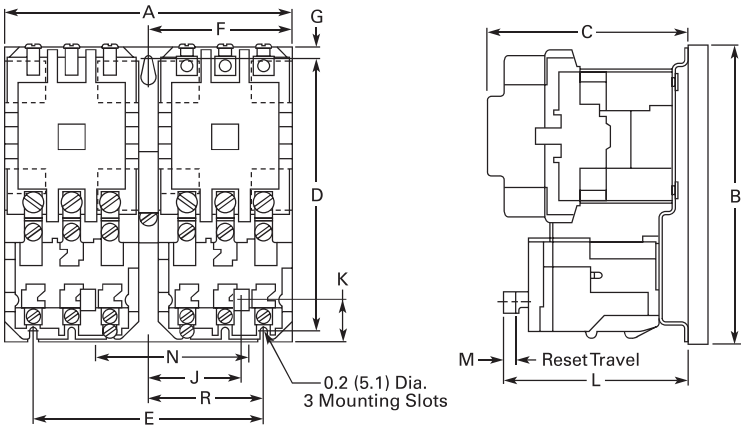
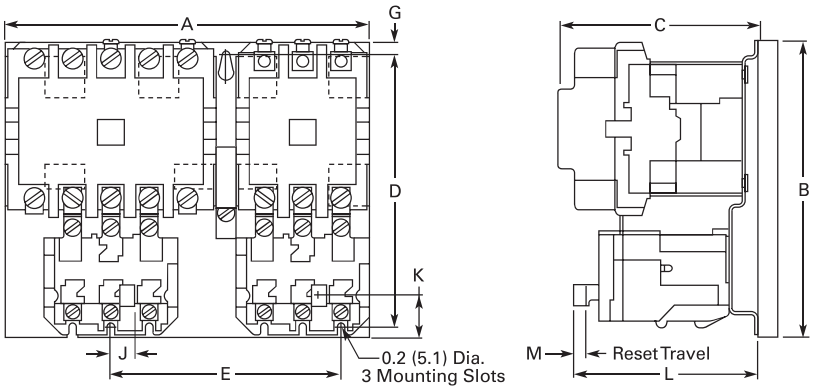


Figure B—Sizes 2



Dimensions and Shipping Weights

NEMA Size	Number of Poles	Fig.	Mounting Screws No.	Mounting Screws Size	A	B	C	D	E	F	G	J	K	L	M	N	P	R	Weight, Lbs (kg)
00, 0, 1	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	6.50 (165.1)	5.05 (128.3)	6.00 (152.4)	5.69 (144.5)	3.56 (90.4)	0.25 (6.4)	2.30 (58.4)	0.33 (8.4)	4.92 (125.0)	0.27 (6.9)	3.81 (96.8)	—	2.91 (73.9)	10.0 (4.5)
	5 x 3 Horiz.	B	3	#10	8.00 (203.2)	6.50 (165.1)	5.05 (128.3)	6.00 (152.4)	6.53 (165.9)	3.56 (90.4)	0.25 (6.4)	2.30 (58.4)	0.48 (12.2)	4.92 (125.0)	0.27 (6.9)	4.66 (118.4)	—	2.91 (73.9)	11.0 (5.0)
2	3 x 3 Horiz.	A	3	#10	7.13 (181.1)	7.25 (184.2)	5.38 (136.7)	6.75 (171.5)	5.69 (144.5)	3.56 (90.4)	0.25 (6.4)	2.69 (68.3)	0.69 (17.5)	4.97 (126.2)	0.27 (6.9)	3.81 (96.8)	—	2.91 (73.9)	11.0 (5.0)
	5 x 3 Horiz.	B	3	#10	8.88 (225.6)	7.25 (184.2)	5.38 (136.7)	6.75 (171.5)	6.56 (166.6)	3.56 (90.4)	0.25 (6.4)	2.69 (68.3)	0.69 (17.5)	4.97 (126.2)	0.27 (6.9)	4.66 (118.4)	—	2.84 (72.1)	13.0 (5.9)
3, 4	3 x 3 Horiz.	A	3	1/4 in.	9.75 (247.7)	10.13 (257.3)	7.25 (184.2)	9.25 (235.0)	8.00 (203.2)	4.88 (124.0)	0.44 (11.2)	3.11 (79.0)	0.80 (20.3)	6.86 (174.2)	0.27 (6.9)	5.13 (130.3)	—	4.00 (101.6)	28.0 (12.7)
	5 x 3 Horiz.	B	3	1/4 in.	12.38 (314.5)	10.13 (257.3)	7.25 (184.2)	9.25 (235.0)	9.31 (236.5)	4.88 (124.0)	0.44 (11.2)	3.11 (79.0)	0.80 (20.3)	6.86 (174.2)	0.27 (6.9)	6.44 (163.6)	—	4.00 (101.6)	33.5 (15.2)
5	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①
6	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①

Notes

Three-pole x three-pole devices are for Wye-Wye two-winding motors only.

① Refer to factory.



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-97**
Starters—Non-Reversing and Reversing	**V5-T2-103**
Relays—Thermal and Fast Trip	
Standards and Certifications	**V5-T2-125**
Instruction Leaflets	**V5-T2-125**
Thermal Type B, Class 20, Manual Reset	**V5-T2-126**
Thermal Type A, Class 20, Auto/Manual Reset	**V5-T2-129**
Type FT Fast Trip, Class 10	**V5-T2-132**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	**V5-T2-137**

Relays—Thermal and Fast Trip

Product Overview

Type B and Type A, Class 20 Thermal Overload Relays from Eaton's Electrical Sector will protect the motor against abnormal overload conditions. Bimetallic actuated, they are available as either ambient compensated or non-compensated in either single-pole or block type three-pole design. Type B use one pole of the three-pole block for single-phase.

Single-pole relays are also available as Fast Trip Class 10 ambient compensated type, which provides approximately 125% motor protection with a tripping time of less than 10 seconds, at 600% of heater current rating.

Fast trip relays can be identified by the green reset rods. They are available for panel or starter mounting. The three-pole fast trip design is composed of three single-pole relays on a common baseplate, with a common reset bar.

The bimetal element is actuated by precisely calibrated heater elements which are connected directly in the circuit to be protected. Thermal actuation of this device opens the contacts in the coil circuit of a contactor or relay which results in the disconnection of power to the overloaded circuit.

Interchangeable thermal heater elements for single-pole standard trip and block type overload relays are available to cover motor full load currents from 0.29 to 133A in approximately 10% steps (see Heater Application Table). Fast trip overload relays do not have interchangeable heater elements but are available in a series of ratings to cover motor full load currents from 1.6 to 150A in approximately 50% steps.

Features

Manual or Automatic Reset

Type B is furnished with a manual reset. Type A is normally furnished set for manual reset operation and may be quickly adjusted for automatic reset when required. Automatic reset should not be used with two-wire control or where automatic restarting would endanger either personnel or equipment.

Trip Indication

An immediate visible indication of trip is provided on the overload relay. When an overload occurs, which causes the relay to operate, a trip indicator projects out and thus shows positive visual indication of trip. Type B has a mechanical trip bar to manually check the NC contact operation on the overload relay.

Adjustable Trip

On Type A, the trip rating of a specific heater element can be adjusted over a range of approximately 85% to 115% of its respective rating to permit the desired close protection.

This is accomplished by turning the adjusting knob on the relay to the respective stop position.

Positive Contact Break

A follow-through contact, provided on the stationary terminal of the snap action control switch, provides reliable electrical continuity during toggling, thus eliminating false trip sometimes prevalent with thermally operated switches. This contact also allows contact wipe for further reliability.

Ambient Compensation

Motor overload protection can be provided with the same trip characteristics in ambient temperature from –40° to 77°C (–40° to 167°F). A compensating bimetal maintains a constant "travel to trip" distance independent of ambient conditions. The compensating feature is fully automatic and no adjustments are required over wide fluctuations in ambient temperatures. Compensated relays are identified by black reset rods on Type A and light gray reset rods on Type B, while non-compensated relays use red reset rods. AA three-pole units have gray reset rods. AA one-pole units have black reset rods.

Control Contact

Single-pole and block type relays are supplied as standard with a SPST NC control contact. A SPDT NO-NC with common is available as a factory modification on Type A. An isolated NO contact can be supplied on Type B as either a factory modification or as a field kit.

Standards and Certifications

- UL 508
- CSA
- ANSI/NEMA ICS 2-222

Instruction Leaflets

14885B	Fast Trip A Sizes 0–4, 3-Pole OL Relay
14567E	Type A Sizes 1–2, 1-Pole OL Relay Mod A
14568	Type A Sizes 1–2, 3-Pole OL Relay Mod J
14570D	Type A Sizes 3–4, 3-Pole OL Relay Mod J
14569C	Type A Sizes 3–4, 1-Pole OL Relay Mod A
17093A	Type B OLR for Sizes 7, 8 and 9 Contactors
16955A	Type B Sizes 1–2, 1-Pole OL Relay
16954A	Type B Sizes 1–2, 3-Pole OL Relay
15392B	Type B Sizes 3–4, 3-Pole OL Relay
13676F	Fast Trip Sizes 0–4, 1-Pole OL Relay

Thermal Type B, Class 20, Manual Reset



2

Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-97**
Starters—Non-Reversing and Reversing	**V5-T2-103**
Relays—Thermal and Fast Trip	**V5-T2-124**
Thermal Type B, Class 20, Manual Reset	
Product Selection	**V5-T2-127**
Accessories	**V5-T2-127**
Technical Data	**V5-T2-128**
Dimensions	**V5-T2-128**
Thermal Type A, Class 20, Auto/Manual Reset	**V5-T2-129**
Type FT Fast Trip, Class 10	**V5-T2-132**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	**V5-T2-137**

Thermal Type B, Class 20, Manual Reset

Application Description

The Type B overload relay is designed to protect industrial motors against overload conditions. Using modern block type, bimetallic design, this relay will provide Class 20 operation in either single-phase or three-phase applications.

Operation

The Type B overload relay is a bimetallic actuated device. The bimetal elements are operated by precisely calibrated heaters. The heater elements are connected either directly in the circuit to be measured, or through current transformers on applications NEMA Size 5 and larger.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap-action output contact.

Ambient Compensation

The Type B ambient compensated design is supplied as standard on all A200 starters. This design uses a second compensating bimetal responsive to ambient air temperature in the surrounding enclosure. This feature reduces nuisance tripping in applications using compact control panels and motor control centers where internal temperature rise is significant compared to motor ambient temperature. The compensating characteristic is maintained in ambient temperatures from 40° to 77°C.

Features

- Ambient compensation standard
- Alarm contact field mountable
- Class 20—600V design
- Inverse time delay trip
- Test trip device for weld check
- Hi-visibility up-front trip indication
- Trip-free reset mechanism

Product Selection

Heaters

Enter heaters as separate item by listing catalog number from tables, **Pages V5-T2-135** and **V5-T2-136**, as required per starter.

Relays

Type B Overload Relay Panel Mounting



Thermal Type B Overload Relay

Motor Full Load Amps	Panel Mounted Ambient Comp. Catalog Number	Panel Mounted Non-Comp. Catalog Number	Starter Mounted Replacement for Type B Overload Relays Ambient Comp. Catalog Number	Starter Mounted Replacement for Type B Overload Relays Non-Comp. Catalog Number	Replacement for Type A Overload Relays in Manual Reset Mode (Three-Pole Only) ① Ambient Comp. Catalog Number	Replacement for Type A Overload Relays in Manual Reset Mode (Three-Pole Only) ① Non-Comp. Catalog Number
Single-Pole (One NC Contact)						
0.25–26.2	**BA11JP**	**BN11JP**	**BA11A**	**BN11A**	—	—
26.3–45	**BA21JP**	**BN21JP**	**BA21A**	**BN21A**	—	—
19–90	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series
19–135	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series	Use three-pole design, wire three poles in series
Three-Pole (One NC Contact)						
0.25–26.2	**BA13JP**	**BN13JP**	**BA13A** ②	**BN13A** ②	**BA13J**	**BN13J**
26.3–45	**BA23JP**	**BN23JP**	**BA23A**	**BN23A**	**BA23J**	**BN23J**
19–90	**BA33P**	**BN33P**	**BA33A**	**BN33A**	**BA33A**	**BN33A**
19–135	**BA43P**	**BN43P**	**BA43A**	**BN43A**	**BA43A**	**BN43A**

Accessories

Alarm Contact Kit Selection ①

Type B Overload Relay Size	Catalog Number
1, 2	**B3NO-2**
3, 4	**B3NO-4**

Notes

① Includes contactor mounting bracket, overload relay and connection straps to contactor.

② For replacement on B200 size 00, 0, 1 use BA23A instead of BA13A and use BN23A instead of BN13A.

Technical Data

2

Control Contact Ratings—NEMA B600 NO and NC Control Contact Rating

AC Volts	Make	Break
24–120	30A	3A
120–600	3600 VA	360 VA

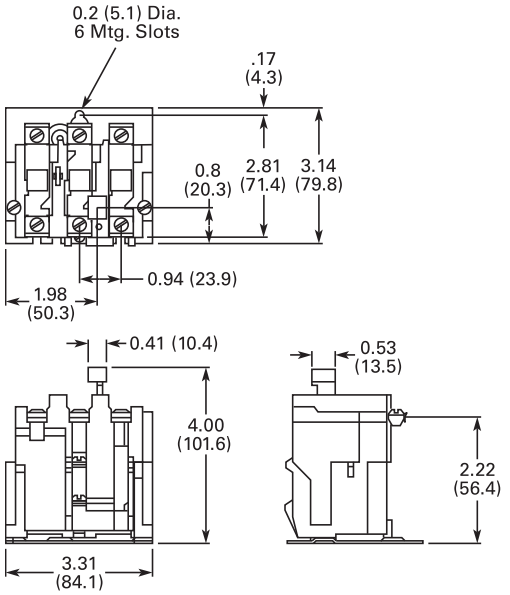
Dimensions

Approximate Dimensions in Inches (mm)

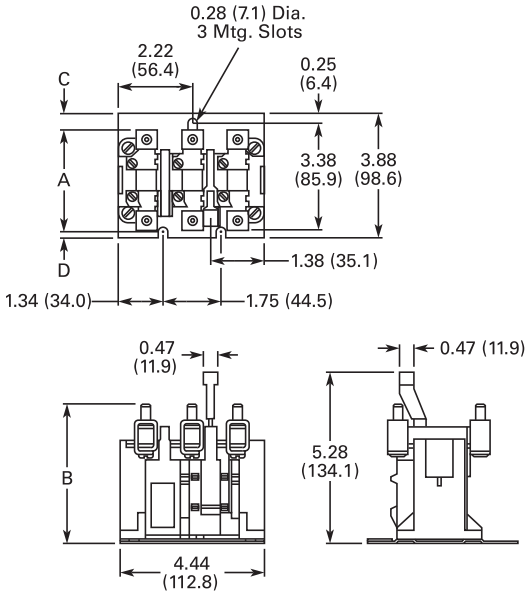
Not to be used for construction purposes unless approved.

Thermal Type B Overload Relays

Sizes 1 and 2—Three-Pole, Panel Mounted



Sizes 3 and 4—Three-Pole, Panel Mounted



Dimensions

Relay Size	A	B	C	D
3	3.13 (79.5)	4.06 (103.1)	044 (11.2)	0.31 (7.9)
4	3.38 (85.9)	4.38 (111.3)	0.31 (7.9)	0.19 (4.8)

Note

① Alarm contact available as factory modification of field mountable. For factory modification, add suffix B.

Thermal Type A, Class 20, Auto/Manual Reset



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-97**
Starters—Non-Reversing and Reversing	**V5-T2-103**
Relays—Thermal and Fast Trip	**V5-T2-124**
Thermal Type B, Class 20, Manual Reset	**V5-T2-126**
Thermal Type A, Class 20, Auto/Manual Reset	
Product Selection	**V5-T2-130**
Technical Data and Specifications	**V5-T2-130**
Dimensions	**V5-T2-131**
Type FT Fast Trip, Class 10	**V5-T2-132**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	**V5-T2-137**

Thermal Type A, Class 20, Auto/Manual Reset

Application Description

The Type A overload relay is designed to protect industrial motors against overload conditions. Using modern block type, bimetallic design, this relay will provide Class 20 operation in either single- or three-phase applications.

Features

- Field selectable manual/auto reset
- Alarm contract factory available
- Class 20—600V design
- Inverse time delay trip
- Adjustable trip rating ±15%
- Color coded reset rod:
  - Compensated (gray)
  - Non-compensated (red)

Operation

The Type A overload relay is a bimetallic actuated device. The bimetal elements are operated by precisely calibrated heaters. The heater elements are connected either directly in the circuit to be measured, or through current transformers on applications NEMA Size 5 and larger.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap-action output contact.

Automatic Reset

The Type A overload relay can be supplied as an option on all A200 starters to provide automatic reset operation. The overload relay is always shipped in the non-automatic mode. To set up auto operation, reposition the reset rod by loosening and re-tightening a hold-down clamp at the base of overload relay.

Product Selection

Heaters

Enter heaters as separate item by listing catalog number from tables, **Pages V5-T2-135** and **V5-T2-136**, as required per starter.

Relays

Type A Overload Relay Single-Pole Panel Mounting



Thermal Type A Overload Relay ①

Motor Full Load Amps	Panel Mounted Ambient Comp. Catalog Number	Panel Mounted Non-Comp. Catalog Number	Starter Replacement Ambient Comp. Catalog Number	Starter Replacement Non-Comp. Catalog Number
Single-Pole (One NC Contact)				
0.25–26.2	**AA11P**	**AN11P**	**AA11A**	**AN11A**
26.3–45	**AA21P**	**AN21P**	**AA21A**	**AN21A**
19–90	**AA31P**	**AN31P**	**AA31A**	**AN31A**
19–135	**AA41P**	**AN41P**	**AA41A**	**AN41A**
Three-Pole (One NC Contact)				
0.25–26.2	**AA13P** ②	**AN13P** ②	**AA13A** ②	**AN13A** ②
26.3–45	**AA23P** ②	**AN23P** ②	**AA23A** ②	**AN23A** ②
19–90	**AA33P** ②	**AN33P** ②	**AA33A** ②	**AN33A** ②
19–135	**AA43P** ②	**AN43P** ②	**AA43A** ②	**AN43A** ②

Technical Data and Specifications

Control Contact Ratings

AC Volts	Normally Closed Make	Normally Closed Break	Normally Open Make	Normally Open Break
Three-Pole Control Contact Ratings				
24–120	20A	2A	0.5A	0.5A
120–600	2400 VA	240 VA	600 VA	60 VA
Single-Pole Control Contact Ratings				
24–120	30A	3A	10A	1A
120–600	3600 VA	360 VA	1200 VA	120 VA

Notes

① For alarm contact (Form C), add Suffix **B**. Available only as factory modification on Type A relay.

② Three-pole Type B overload relay is a suitable alternative to a three-pole Type A overload relay in manual reset mode. For example, BA13JP for AA13P, BN23J for AN23A, and so on. (See **Page V5-T2-127**.)

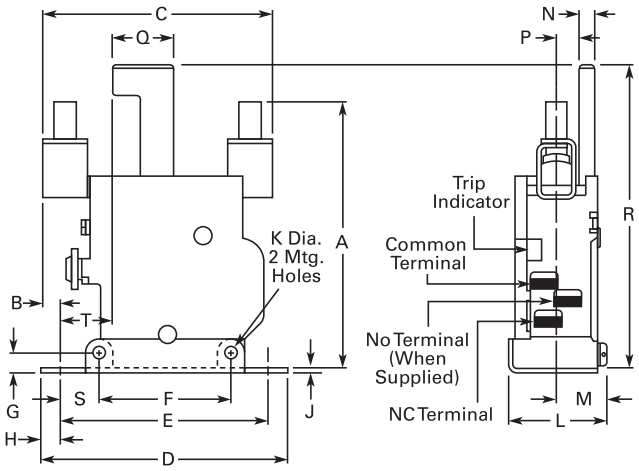
Dimensions

Approximate Dimensions in Inches (mm)

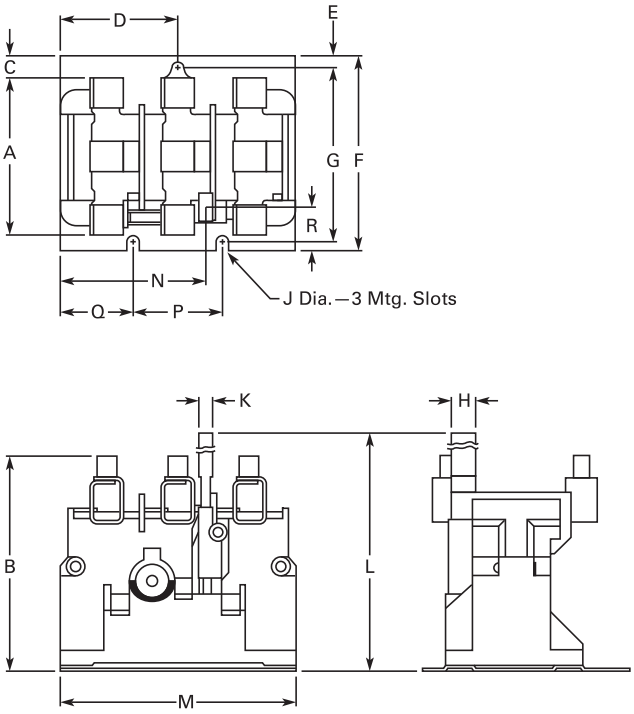
Not to be used for construction purposes unless approved.

Type A

Single-Pole (Sizes 4 Shown)



Three-Pole (Size 4 Shown)



Dimensions

Dimension	Relay Size 1	2	3	4
A	2.72 (69.1)	3.48 (88.4)	4.19 (106.4)	4.5 (114.3)
B	0.94 (23.9)	0.67 (17.0)	0.25 (6.4)	0.38 (9.7)
C	2.75 (69.9)	3.5 (88.9)	3.53 (89.7)	3.78 (96.0)
D	3.25 (82.6)	3.25 (82.6)	4.13 (104.9)	4.13 (104.9)
E	2.63 (66.8)	2.63 (66.8)	3.38 (85.9)	3.38 (85.9)
F	1.34 (34.0)	1.34 (34.0)	2.19 (55.6)	2.19 (55.6)
G	0.25 (6.4)	0.25 (6.4)	0.28 (7.1)	0.28 (7.1)
H	0.31 (7.9)	0.31 (7.9)	0.38 (9.7)	0.38 (9.7)
J	0.06 (1.5)	0.06 (1.5)	0.06 (1.5)	0.06 (1.5)
K	0.22 (5.6)	0.22 (5.6)	0.27 (6.8)	0.27 (6.8)
L	1.34 (34.0)	1.34 (34.0)	1.69 (42.9)	1.69 (42.9)
M	0.66 (16.8)	0.66 (16.8)	0.88 (22.4)	0.88 (22.4)
N	0.16 (4.1)	0.16 (4.1)	0.27 (6.8)	0.27 (6.8)
P	0.22 (5.6)	0.22 (5.6)	0.34 (8.6)	0.34 (8.6)
Q	0.06 (1.5)	0.06 (1.5)	0.69 (17.5)	0.69 (17.5)
R	4.00 (101.6)	4.00 (101.6)	5.19 (131.8)	5.19 (131.8)
S	0.47 (11.9)	0.47 (11.9)	0.59 (15.0)	0.59 (15.0)
T	1.11 (28.2)	1.11 (28.2)	0.69 (17.5)	0.69 (17.5)

Dimensions

Dimension	Relay Size 1	2	3	4
A	2.38 (60.5)	2.44 (62.0)	3.13 (79.5)	3.38 (85.9)
B	3.13 (79.5)	3.17 (80.5)	4.06 (103.1)	4.38 (111.3)
C	0.36 (9.1)	0.33 (8.4)	0.44 (11.2)	0.31 (7.9)
D	1.66 (42.2)	1.66 (42.2)	2.22 (56.4)	2.22 (56.4)
E	0.17 (4.3)	0.17 (4.3)	0.25 (6.4)	0.25 (6.4)
F	2.81 (71.4)	2.81 (71.4)	3.38 (85.9)	3.38 (85.9)
G	3.08 (78.2)	3.08 (78.2)	3.88 (98.6)	3.88 (98.6)
H	0.47 (11.9)	0.47 (11.9)	0.47 (11.9)	0.47 (11.9)
J	0.20 (5.1)	0.20 (5.1)	0.28 (7.1)	0.28 (7.1)
K	0.28 (7.1)	0.28 (7.1)	0.47 (11.9)	0.47 (11.9)
L	4.00 (101.6)	4.00 (101.6)	5.28 (134.1)	5.28 (134.1)
M	3.31 (84.1)	3.31 (84.1)	4.44 (112.8)	4.44 (112.8)
N	1.80 (45.7)	1.80 (45.7)	2.77 (70.4)	2.77 (70.4)
P	1.89 (48.0)	1.89 (48.0)	1.75 (44.5)	1.75 (44.5)
Q	1.00 (25.4)	1.00 (25.4)	1.34 (34.0)	1.34 (34.0)
R	—	—	1.03 (26.2)	1.03 (26.2)

Type FT Fast Trip, Class 10



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-97**
Starters—Non-Reversing and Reversing	**V5-T2-103**
Relays—Thermal and Fast Trip	**V5-T2-124**
Thermal Type B, Class 20, Manual Reset	**V5-T2-126**
Thermal Type A, Class 20, Auto/Manual Reset	**V5-T2-129**
Type FT Fast Trip, Class 10	
Product Selection	**V5-T2-133**
Technical Data and Specifications	**V5-T2-133**
Dimensions	**V5-T2-134**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	**V5-T2-137**

Type FT Fast Trip, Class 10

Application Description

The Type FT overload relay is designed to protect special purpose motors having restricted thermal and locked rotor capabilities. Using modern block type, bimetallic design, this relay will provide Class 10 operation in single- or three-phase applications.

Operation

The Type FT overload relay is a bimetallic actuated device. The bimetal elements are operated directly from line current, thus separate calibrating heater elements are not utilized. The overload relay may be wired directly in the motor circuit, or through-current transformers on applications larger than 150A.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap action output contact.

Features

- Class 10—600V design
- Inverse time delay trip
- Color coded reset rod—green
- Alarm contact factory available
- Field selectable manual/auto reset
- Adjustable trip rating ±20%
- Ambient compensation included

Product Selection

Type FT Single-Pole



Type FT Single-Pole (One NC Contact); Three-Phase (Three NC Contacts in Series) ①

Motor Full Load Amperes	Panel Mounted Single-Pole Catalog Number	Three-Pole Catalog Number	Starter Replacement NEMA Size	Single-Pole Catalog Number
0.76–1.1	**FT11P-1.1**	**FT13P-1.1**	—	**FT11A-1.1**
1.1–1.6	**FT11P-1.6**	**FT13P-1.6**	—	**FT11A-1.6**
1.6–2.4	**FT11P-2.4**	**FT13P-2.4**	0, 1	**FT11A-2.4**
2.4–3.6	**FT11P-3.6**	**FT13P-3.6**	0, 1	**FT11A-3.6**
3.6–5.4	**FT11P-5.4**	**FT13P-5.4**	0, 1	**FT11A-5.4**
5.4–8.0	**FT11P-8.0**	**FT13P-8**	0, 1	**FT11A-8**
8.0–12	**FT11P-12**	**FT13P-12**	0, 1	**FT11A-12**
12–18	**FT11P-18**	**FT13P-18**	1	**FT11A-18**
16–24	—	**FT13P-24**		—
22–32	**FT11P-32**	**FT13P-32**	0, 1	**FT11A-32**
24–36	**FT21P-36**	**FT23P-36**	2	**FT21A-36**
36–54	**FT21P-54**	**FT23P-54**	12	**FT21A-54**
22–32	**FT31P-32**	**FT33P-32**	3	**FT31A-32**
32–48	**FT31P-48**	**FT33P-48**	3	**FT31A-48**
48–72	**FT31P-72**	**FT33P-72**	3	**FT31A-72**
72–110	**FT41P-110**	**FT43P-110**	4	**FT41A-110**
100–150	**FT41P-150**	**FT43P-150**	4	**FT41A-150**

Technical Data and Specifications

Control Contact Ratings

AC Volts	Normally Closed Make	Normally Closed Break	Normally Open Make	Normally Open Break
24–120	30A	3A	10A	1A
120–600	3600 VA	360 VA	1200 VA	120 VA

Note

① Single-pole (1NO-NC contact): add suffix **B**. Three-pole (3NO-NC contacts): add suffix **B**. Example: FT13P**B**-12.

Dimensions

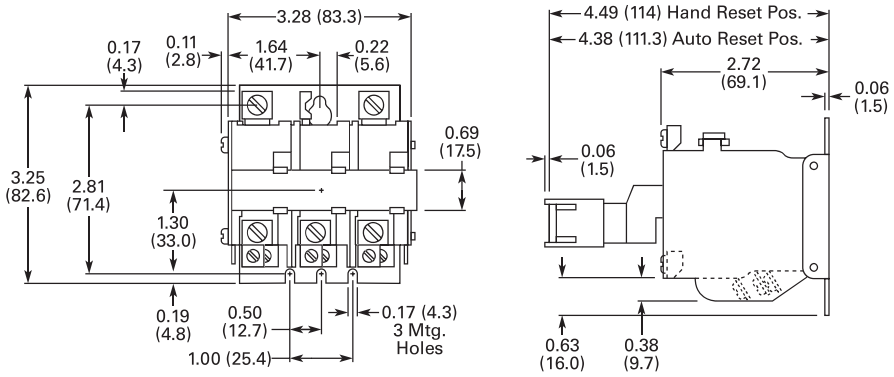
Approximate Dimensions in Inches (mm)

2

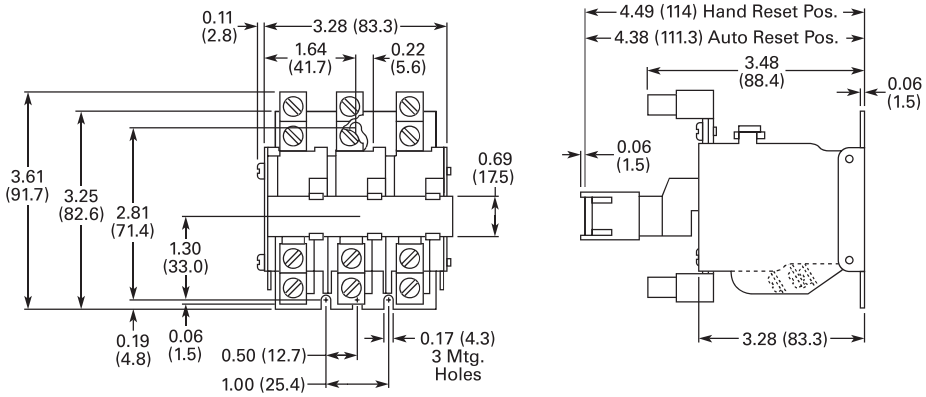
Not to be used for construction purposes unless approved.

Type FT Overload Relays

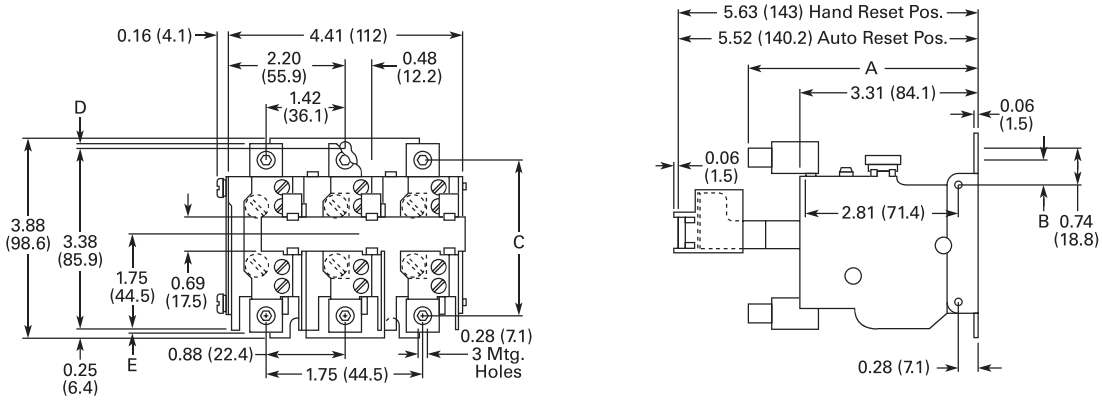
Three-Pole, Size 1



Three-Pole, Size 2



Three-Pole, Sizes 3, 4



Dimensions

Relay Size	A	B	C	D	E
3	4.25 (108.0)	0.53 (13.5)	2.91 (73.9)	0.09 (2.3)	0.06 (1.5)
4	4.50 (114.3)	0.59 (15.0)	3.03 (77.0)	0.22 (5.6)	0.19 (4.8)

Heater Selection

General Information on Heater Coil Selection

For maximum motor protection and compliance with Article 430-32 of the National Electrical Code, select heater coils from the tables in this section on the basis of motor nameplate full load current.

When the full load current is unknown, selection may be made on the basis of average full load currents as shown on **Pages V5-T2-151** and **V5-T2-152**. **Caution—The average ratings could be high or low for a specific motor and therefore selection on this basis always involves risk. For fully reliable motor protection, select heater coils on the basis of full load current rating as shown on the motor nameplate.**

Heater coils are rated to protect 40°C rise motors, and open and drip-proof motors having a **service factor of 1.15** where the motor and the controller are at the same ambient temperature.

For other conditions:

1. For 50°C, 55°C, 75°C rise motors and **enclosed motors having a service factor of 1.0, select one size smaller coil.**
2. Ambient temperature of controller lower than motor by 26°C (47°F), use one size smaller coil.
3. Ambient temperature of controller higher than motor by 26°C (47°F), use one size larger coil.

Ultimate tripping current of heater coils is approximately 1.25 times the minimum current rating listed in the tables.

Type A and B Overload Relays, Sizes 3 and 4

Size Starter	Ambient Compensated Enclosed Starters All Applications Full Load Current of Motor Amps	Non-Compensating Enclosed Starters	Heater (One Heater per Catalog Number) Catalog Number
For Size 4 Starters / For Size 3 Starters	12.8–14.1	11.9–13.0	**FH68**
	14.2–15.5	13.1–14.3	**FH69**
	15.6–17.1	14.4–15.9	**FH70**
	17.2–18.9	16.0–17.4	**FH71**
	19.0–20.8	17.5–19.1	**FH72**
	20.9–22.9	19.2–21.1	**FH73**
	23.0–25.2	21.2–23.2	**FH74**
	25.3–27.8	23.3–25.6	**FH75**
	27.9–30.6	25.7–28.1	**FH76**
	30.7–33.5	28.2–30.8	**FH77**
	33.6–37.5	30.9–34.5	**FH78**
	37.6–41.5	34.6–38.2	**FH79**
	41.6–56.3	38.3–42.6	**FH80**
	46.4–50	42.7–46	**FH81**
	51–55	47–51	**FH82**
	56–61	52–56	**FH83**
	62–66	57–61	**FH84**
	67–73	62–67	**FH85**
	74–78	68–72	**FH86**
	79–84	73–77	**FH87**
	85–92	78–84	**FH88**
	93–101	85–91	**FH89**
	102–110	92–99	**FH90**
	111–122	100–110	**FH91**
	123–129	111–122	**FH92**
	130–133	123–128	**FH93**
	—	129–133	**FH94**

Type A and B Overload Relays, Sizes 5 and 6 ①

Compensated Overload Relay Open Starter Full Load Current of Motor (Amps)	Enclosed Starter	Heater (One Heater per Catalog Number) Catalog Number
Size 5 (with 300/5 Current Transformers)		
—	—	**FH23**
118–129	118–129	**FH24**
130–141	130–141	**FH25**
142–155	142–155	**FH26**
156–170	156–170	**FH27**
171–187	171–187	**FH28**
188–205	188–205	**FH29**
206–224	206–224	**FH30**
225–244	225–244	**FH31**
245–263	245–263	**FH32**
264–292	264–292	**FH33**
293–300	—	**FH34**
Size 6 (with 600/5 Current Transformers)		
—	—	**FH23**
236–259	236–259	**FH24**
260–283	260–283	**FH25**
284–310	284–310	**FH26**
311–340	311–340	**FH27**
341–374	341–374	**FH28**
375–411	375–411	**FH29**
412–448	412–448	**FH30**
449–489	449–489	**FH31**
490–527	490–527	**FH32**
528–585	528–540	**FH33**
586–600	—	**FH34**

Note

① Size 7 and larger—advise full load current.

Type A and B Overload Relays, Sizes 0, 1 and 2

Size Starter	Non-Compensated Open Starters and Ambient Comp. Open and Enclosed Starters: Block Type Overload sing Three Heaters	Non-Compensated Open Starters and Ambient Comp. Open and Enclosed Starters: Single-Pole Type Overload	Heater (One Heater per Catalog Number) Catalog Number	Non-Compensating Enclosed Starters: Block Type Overload Using Three Heaters	Non-Compensating Enclosed Starters: Single-Pole Type Overload	Heater Catalog Number
Full Load Current of Motor (Amps)						
For Size 2 Starters / For Size 1 Starters / For Size 0 Starters	0.25–0.27	0.29–0.31	**FH03**	0.24–0.25	0.28–0.30	**FH03**
	0.28–0.31	0.32–0.35	**FH04**	0.26–0.28	0.31–0.34	**FH04**
	0.32–0.34	0.36–0.39	**FH05**	0.29–0.31	0.35–0.37	**FH05**
	0.35–0.38	0.40–0.43	**FH06**	0.32–0.35	0.38–0.42	**FH06**
	0.39–0.42	0.44–0.48	**FH07**	0.36–0.39	0.43–0.47	**FH07**
	0.43–0.46	0.49–.053	**FH08**	0.40–0.43	0.48–0.52	**FH08**
	0.47–0.50	0.54–0.58	**FH09**	0.44–0.47	0.53–0.56	**FH09**
	0.51–0.55	0.59–0.64	**FH10**	0.48–0.51	0.57–0.63	**FH10**
	0.56–0.62	0.65–0.71	**FH11**	0.52–0.57	0.64–0.70	**FH11**
	0.63–0.68	0.72–0.79	**FH12**	0.58–0.63	0.71–0.77	**FH12**
	0.69–0.75	0.80–0.87	**FH13**	0.64–0.70	0.78–0.85	**FH13**
	0.76–0.83	0.88–0.96	**FH14**	0.71–0.77	0.86–0.94	**FH14**
	0.84–0.91	0.97–1.06	**FH15**	0.78–0.85	0.95–1.03	**FH15**
	0.92–1.00	1.07–1.16	**FH16**	0.86–0.93	1.04–1.13	**FH16**
	1.01–1.11	1.17–1.28	**FH17**	0.94–1.03	1.14–1.25	**FH17**
	1.12–1.22	1.29–1.41	**FH18**	1.04–1.13	1.26–1.38	**FH18**
	1.23–1.34	1.42–1.55	**FH19**	1.14–1.25	1.39–1.52	**FH19**
	1.35–1.47	1.56–1.71	**FH20**	1.26–1.37	1.53–1.67	**FH20**
	1.48–1.62	1.72–1.87	**FH21**	1.38–1.51	1.68–1.83	**FH21**
	1.63–1.78	1.88–2.06	**FH22**	1.52–1.65	1.84–2.01	**FH22**
	1.79–1.95	2.07–2.26	**FH23**	1.66–1.81	2.02–2.21	**FH23**
	1.96–2.15	2.27–2.48	**FH24**	1.82–1.99	2.22–2.43	**FH24**
	2.16–2.35	2.49–2.72	**FH25**	2.00–2.19	2.44–2.66	**FH25**
	2.36–2.58	2.73–2.99	**FH26**	2.20–2.39	2.67–2.92	**FH26**
	2.59–2.83	3.00–3.28	**FH27**	2.40–2.63	2.93–3.21	**FH27**
	2.84–3.11	3.29–3.60	**FH28**	2.64–2.89	3.22–3.53	**FH28**
	3.12–3.42	3.61–3.95	**FH29**	2.90–3.17	3.54–3.87	**FH29**
	3.43–3.73	3.96–4.31	**FH30**	3.18–3.47	3.88–4.22	**FH30**
	3.74–4.07	4.32–4.71	**FH31**	3.48–3.79	4.23–4.61	**FH31**
	4.08–4.39	4.72–5.14	**FH32**	3.80–4.11	4.62–4.9	**FH32**
	4.40–4.87	5.15–5.6	**FH33**	4.12–4.55	5.0–5.5	**FH33**
	4.88–5.3	5.7–6.2	**FH34**	4.56–5.0	5.6–6.0	**FH34**
	5.4–5.9	6.3–6.8	**FH35**	5.1–5.5	6.1–6.6	**FH35**
	6.0–6.4	6.9–7.5	**FH36**	5.6–5.9	6.7–7.3	**FH36**
	6.5–7.1	7.6–8.2	**FH37**	6.0–6.6	7.4–8.0	**FH37**
	7.2–.78	8.3–9.0	**FH38**	6.7–7.2	8.1–8.7	**FH38**
	7.9–8.5	9.1–9.9	**FH39**	7.3–7.9	8.8–9.7	**FH39**
	8.6–9.4	10.0–10.8	**FH40**	8.0–8.7	9.8–10.5	**FH40**
	9.5–10.3	10.9–11.9	**FH41**	8.8–9.5	10.6–11.7	**FH41**
	10.4–11.3	12.0–13.1	**FH42**	9.6–10.5	11.8–12.7	**FH42**
	11.4–12.4	13.2–14.3	**FH43**	10.6–11.5	12.8–14.0	**FH43**
	12.5–13.5	14.4–15.7	**FH44**	11.6–12.6	14.1–15.3	**FH44**
	13.6–14.9	15.8–17.2	**FH45**	12.7–13.8	15.4–16.6	**FH45**
	15.0–16.3	17.3–18.9	**FH46**	13.9–15.1	16.7–18.3	**FH46**
	16.4–18.0	19.0–20.8	**FH47**	15.2–16.7	18.4–20.0	**FH47**
	18.1–19.8	20.9–22.9	**FH48**	16.8–18.3	20.1–21.9	**FH48**
	19.9–21.7	23.0–25.2	**FH49**	18.4–20.2	22.0–23.9	**FH49**
	21.8–23.9	25.3–27.6	**FH50**	20.3–22.2	24.0–26.2	**FH50**
	24.0–26.2	27.7–30.3	**FH51**	22.3–24.3	26.3–28.8	**FH51**
	26.3–28.7	30.4–33.3	**FH52**	24.4–26.6	28.9–31.4	**FH52**
	28.8–31.4	33.4–36.4	**FH53**	26.7–29.1	31.5–34.5	**FH53**
	31.5–34.5	36.5–39.9	**FH54**	29.2–32.0	34.6–37.9	**FH54**
	34.6–37.9	40.0–43.9	**FH55**	32.1–35.2	3.80–41.9	**FH55**
	38.0–41.5		**FH56**	35.3–38.5	42.0–45.0	**FH56**
	41.6–45.0		**FH57**	38.6–42.3		**FH57**



Contents

Description	*Page*
Contactors—Non-Reversing and Reversing	**V5-T2-97**
Starters—Non-Reversing and Reversing	**V5-T2-103**
Relays—Thermal and Fast Trip	**V5-T2-124**
Thermal Type B, Class 20, Manual Reset	**V5-T2-126**
Thermal Type A, Class 20, Auto/Manual Reset	**V5-T2-129**
Type FT Fast Trip, Class 10	**V5-T2-132**
Heater Selection	**V5-T2-135**
Relays—Current Sensing Protective	
Features	**V5-T2-138**
Standards and Certifications	**V5-T2-138**
Product Selection	**V5-T2-138**
Dimensions	**V5-T2-139**

Relays—Current Sensing Protective

Product Description

The IQ500 is a heaterless, current-sensing, solid-state motor protective relay with optional communications capabilities. Several functions are incorporated into the base relay (IQ502/IQ504) as standard:

- Overload (overcurrent) protection
- Phase unbalance and phase loss protection
- Ground current protection (Class II)

The base relay can serve as the initial building block for a motor protection system by adding the IQ500M Special Function Module. The module can address application related motor load functions with the additional features:

- Underload protection
- Long acceleration
- Jam protection
- Load control

The IQ500 can provide a cost-effective alternative to conventional protective relays such as current relays, ground fault relays and phase loss or phase unbalance relays. Used with the PowerNet system, a low-cost, local area communication network, information such as current values, status, setpoint values and cause of trip can be displayed remotely. The IQ500 relay is ideal for a variety of industrial applications such as mining, timber, material handling, air conditioning compressors, wastewater treatment plants and petrochemical industries.

Features

- Overload class is adjustable using DIP switches for 5, 10, 20 or 30 seconds, maximum trip times at six times rated current
- Designed for 1000V and less distribution systems
- Form C (NO/NC) contact on output relay
- Isolated alarm relay output contact
- Communications capability using IMPACC network
- Manual or automatic reset (either a true manual or remote electrical reset)—selectable
- Overload, Class II ground current, phase unbalance and single-phase protection are standard
- LED indication (bi-colored—red/green) for device status, including overload, phase unbalance or ground current trip
- Special Function Module adds protection for underload and jam conditions, also provides for long acceleration
- Optional load control feature available with special function module
- Feed-through current transformer windows for contactors, NEMA Sizes 1–4 (for Size 5 and larger, external current transformers can be used)
- Fits mounting footprint of Eaton's MORA relay
- Panel or starter mountable
- Cause of trip is held in memory through a power loss
- Bell alarm contact available for remote status indication
- DIP switch provided for setting operating frequency—50 or 60 Hz
- Plug-in terminal block for control power, trip relay and bell alarm relay connections
- Operating temperature: –20° to 60°C (–4° to 140°F)

Benefits

- No external current transformers are required since they are internal to the IQ500
- DIP switches used to select functions and settings on base relay are clearly marked and covered with screw-on plastic covers
- On the automatic reset, the reset times can be selected for long (90 second) or short (10 second) delay
- Device can be set for different motor full load currents without additional parts or modules

Optional Benefits

- With the addition of the IQ500M Special Function Module, the enhanced protection includes jam (overtorque) and underload and provides long acceleration time (high inertia load)
- The underload and jam protection functions each have independent Form C output relays as part of the module. In addition, the underload and jam functions each have their own LEDs for status indication
- The underload and jam functions also have separate selectable trip levels and adjustable trip-delay and start-delay settings
- The IQ500M can be used as a load control module that allows "shedding and restoring" a particular load that contributes to the load being monitored
- The PONI (Product Operated Network Interface) card attaches directly to the base relay or special function module for interfacing with the Eaton's PowerNet communications system
- Localized display can be achieved with the Central Monitoring Unit

Standards and Certifications

- UL File No. E19223

Product Selection

IQ502A



Current Sensing Protective Relay

Maximum Horsepower				Control Voltage	
200V	230V	460–475V	Ampere Rating	110/120V 50/60 Hz Catalog Number	220/240V 50/60 Hz Catalog Number
20	25	50	3.4–66A	**IQ502A**	**IQ502B**
60	75	150	10.8–207A	**IQ504A**	**IQ504B**
—	—	—	0.32–5.4A	**IQ500LA** ①	**IQ500LB** ①
Special function module				**IQ500M**	**IQ500M**

Note

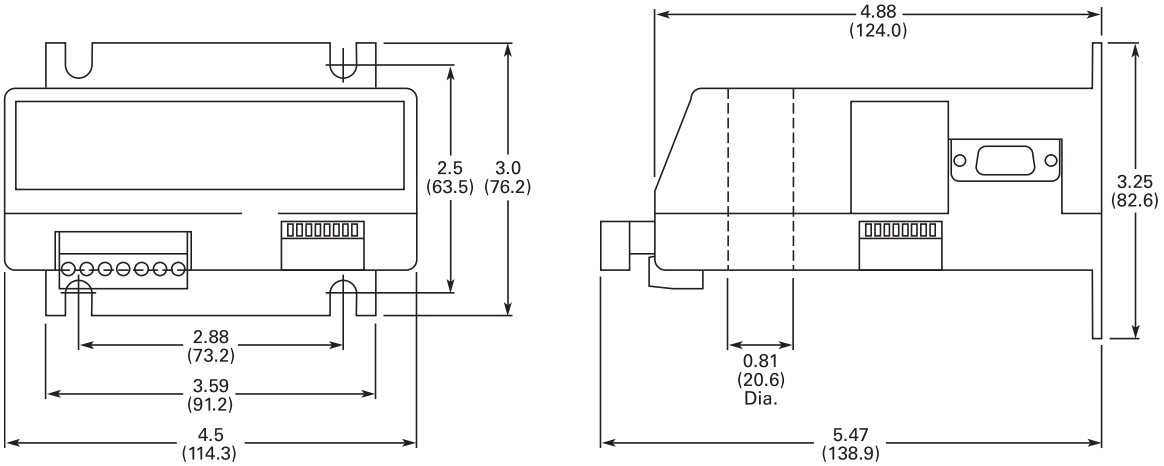
① Can be used with external CTs having 5A secondary.

Dimensions

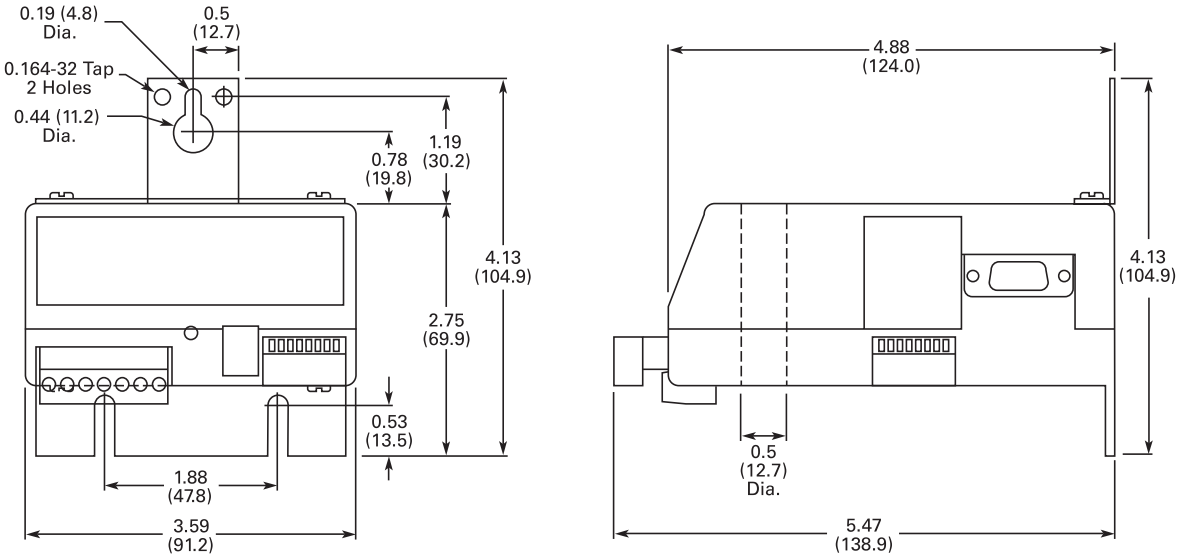
Approximate Dimensions in Inches (mm)

Current Sensing Protective Relays

IQ504



IQ500L and IQ502





Contents

Description	*Page*
Solenoids—Alternating Current	
Product Selection	**V5-T2-141**
Dimensions	**V5-T2-142**

Product Description

Solenoids from Eaton's Electrical Sector are used for a wide variety of applications where straight line motion is to be obtained automatically or at a remote point.

Features

- Plunger and frame are machined to ensure quiet operation
- Push- and pull-type operation
- With and without terminal box
- Plunger provided with connecting pin
- Size C and D solenoids are provided with special bearing to minimize wear in clevis under severe service

Product Selection

When Ordering Specify

- Catalog number

10370



AC Solenoids—60 Hz, Continuous Duty

Size	Volt.	Operating Data ① Magnetic Force in Lbs Horizontal Position With Gravity At 100% Voltage	With Gravity At 85% Voltage	Against Gravity At 100% Voltage	Against Gravity At 85% Voltage	Max. Stroke in Inches (mm)	Current Inrush	Current Sealed	Without Conduit Box Floor Mtg. Catalog Number	Wall Mtg. Catalog Number	With Conduit Box Mtg. ② Catalog Number
60 Hertz Pull Type											
A	110	0.72	0.50	0.90	0.68	0.55	0.33	1 (25.4)	1.83	0.34	—	**10370H1**	**10370H610**
	220	0.72	0.50	0.90	0.68	0.55	0.33	1 (25.4)	0.92	0.17	—	**10370H2**	**10370H611**
	440	0.72	0.50	0.90	0.68	0.55	0.33	1 (25.4)	0.45	0.08	—	**10370H3**	**10370H612**
B	110	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	5.4	0.87	**10370H57**	**10370H694**	**10370H69**
	220	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	2.6	0.42	**10370H58**	**10370H696**	**10370H70**
	440	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	1.29	0.20	**10370H59**	**10370H697**	**10370H71**
C	110	7	5.25	8	6.25	6	4.25	1.25 (31.8)	10.4	1.07	**10370H244**	—	**10370H256**
	220	7	5.25	8	6.25	6	4.25	1.25 (31.8)	5.2	0.52	**10370H245**	—	**10370H257**
	440	7	5.25	8	6.25	6	4.25	1.25 (31.8)	2.5	0.26	**10370H246**	—	**10370H258**
D	110	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	18	1.58	**10370H356**	**10370H814** ③	**10370H368**
	220	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	9.3	0.81	**10370H357**	**10370H816** ③	**10370H369**
	440	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	4.4	0.40	**10370H358**	**10370H817** ③	**10370H370**
60 Hertz Push Type											
A	110	0.72	0.50	0.90	0.68	0.55	0.33	1 (25.4)	1.83	0.34	—	**10370H13**	**10370H25**
	220	0.72	0.50	0.90	0.68	0.55	0.33	1 (25.4)	0.92	0.17	—	**10370H14** ③	**10370H26**
	440	0.72	0.50	0.90	0.68	0.55	0.33	1 (25.4)	0.45	0.08	—	**10370H15**	**10370H27**
B	110	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	5.4	0.87	**10370H81**	**10370H708**	**10370H93**
	220	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	2.6	0.42	**10370H82**	**10370H710**	**10370H94**
	440	4.2	3	4.5	3.3	3.9	2.7	1 (25.4)	1.29	0.20	**10370H83**	**10370H711**	**10370H95**
C	110	7	5.25	8	6.25	6	4.25	1.25 (31.8)	10.4	1.07	**10370H268**	—	**10370H280**
	220	7	5.25	8	6.25	6	4.25	1.25 (31.8)	5.2	0.52	—	**10370H774**	**10370H281**
	440	7	5.25	8	6.25	6	4.25	1.25 (31.8)	2.5	0.26	—	**10370H775**	**10370H282**
D	110	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	18	1.58	**10370H380**	**10370H828** ③	**10370H392**
	220	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	9.3	0.81	**10370H381**	**10370H830** ③	**10370H393**
	440	12.4	10	13.65	11.25	11.15	8.75	1.25 (31.8)	4.4	0.40	**10370H382**	**10370H831** ③	**10370H394**

Notes

① Mounting of solenoids "with conduit box"—Size A are for wall mounting—Size B, C and D are for floor mounting.

② Recommended selection of solenoids on basis of 85% voltage values.

③ Part numbers are now obsolete.

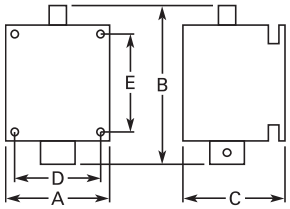
Dimensions

Approximate Dimensions in Inches (mm)

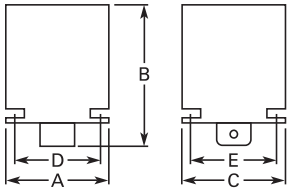
2

AC Solenoids

Wall Mounted



Floor Mounted



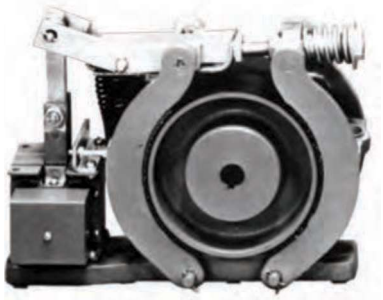
Dimensions and Shipping Weights

Size	Push Type Wide A	High B ①	Deep C	Mounting D	Mounting E	Shipping Weight Lbs (kg)	Pull Type Wide A	High B ①	Deep C	Mounting D	Mounting E	Shipping Weight Lbs (kg)
Wall Mounted												
A	2.38 (60.5)	3.63 (92.2)	2.25 (57.2)	1.13 (28.7)	1.63 (41.4)	2.0 (0.9)	2.38 (60.5)	2.63 (66.8)	2.25 (57.2)	1.13 (28.7)	1.63 (41.4)	2.0 (0.9)
B	2.63 (66.8)	4.88 (124.0)	3.00 (76.2)	2.00 (50.8)	2.13 (54.1)	2.5 (1.1)	2.63 (66.8)	3.63 (92.2)	3.00 (76.2)	2.00 (50.8)	2.13 (54.1)	2.5 (1.1)
C	3.00 (76.2)	6.13 (155.7)	4.13 (104.9)	2.38 (60.5)	3.13 (79.5)	5.0 (2.3)	3.00 (76.2)	4.88 (124.0)	4.13 (104.9)	2.38 (60.5)	3.13 (79.5)	5.0 (2.3)
D	4.00 (101.6)	6.13 (155.7)	4.13 (104.9)	2.75 (69.9)	3.13 (79.5)	7.0 (3.2)	4.00 (101.6)	4.88 (124.0)	4.13 (104.9)	2.75 (69.9)	3.13 (79.5)	7.0 (3.2)
Floor Mounted												
B	3.13 (79.5)	4.88 (124.0)	3.00 (76.2)	1.50 (38.1)	2.25 (57.2)	2.5 (1.1)	3.13 (79.5)	3.88 (98.6)	3.00 (76.2)	1.50 (38.1)	2.25 (57.2)	2.5 (1.1)
C	3.50 (88.9)	6.13 (155.7)	3.75 (95.3)	1.75 (44.5)	3.13 (79.5)	5.0 (2.3)	3.50 (88.9)	4.88 (124.0)	3.75 (95.3)	1.75 (44.5)	3.13 (79.5)	5.0 (2.3)
D	3.88 (98.6)	6.13 (155.7)	3.75 (95.3)	2.25 (57.2)	3.13 (79.5)	7.0 (3.2)	3.88 (98.6)	4.88 (124.0)	3.75 (95.3)	2.25 (57.2)	3.13 (79.5)	7.0 (3.2)

Note

① In sealed state.

Shoe Brakes—AC and DC, 511 Series



Contents

Description *Page*

Shoe Brakes—AC and DC Magnetic

Product Selection **V5-T2-144**
Dimensions **V5-T2-146**

Product Description

Type S Brakes from Eaton's Electrical Sector are electrically released and spring applied providing "fail-safe" operation. The retarding torque developed is directly proportional to the spring pressure.

Application Description

- Conveyors
- Machine tools
- Printing presses
- Small cranes
- Overhead doors
- Dumb waiters
- Vacuum molding machines
- Carnival rides

Features

The brake wheel is of relatively large size in relation to the torque developed by the brake. This permits use of a larger brake shoe lining and lower shoe pressures. Low shoe pressure, equally distributed over a large lining area, results in even wear of the friction surfaces and even braking torque. The oversize wheel type construction also permits use of a smaller operating solenoid that requires less current for a given torque rating.

DC Brakes

Standard DC brakes are equipped with shunt coils. The magnet coil circuit on DC brakes consists of two separate windings and a protective switch.

Mounting

Type S brakes are designed and recommended for use and mounting only in the horizontal position. Side or vertical mountings are not recommended because the solenoid loading is altered, resulting in accelerated wear and premature coil failure.

Product Selection

When Ordering Specify

- Brake
  - Catalog number plus suffix number for coil
  - Example: 511H1193-**41**
  - Wheel
  - Catalog number plus suffix number for bore size
  - Example: 511H1150-**3**

Size S-4 Brake and Wheel



Type S Brakes—Floor Mounting

Torque—lb-ft			AC	For Type S4, S5-1/2, S7, S10		DC		
Continuous	Intermittent ①	Brake Size	Base Catalog Number ②③	Coil Volts and Hertz	Coil Suffix ②	Base Catalog Number ②③	Coil Voltage	Coil Suffix ②
3	3	S-4	**511H1194**	120V 60 Hz	**-39**	**511H955**	120 Vdc	**-97**
10	10	S-4	**511H1193**	208V 60 Hz	**-45**	**511H956**	240 Vdc	**-98**
—	15	S-4	**511H1192**	240V 60 Hz	**-40**	**511H957**		
25	25	S-5-1/2	**511H992**	480V 60 Hz	**-41**	**511H994**		
—	35	S-5-1/2	**511H993**	600V 60 Hz	**-58**	**511H995**		
50	50	S-7	**511H970**	110V 50 Hz	**-5**	**511H975**		
—	75	S-7	**511H971**	220V 50 Hz	**-6**	**511H976**		
85	85	S-7	**511H1195**	380V 50 Hz	**-7**	**511H1197**		
—	110	S-7	**511H1196**	440V 50 Hz	**-8**	**511H1198**		
				550V 50 Hz	**-9**			

Notes

① Intermittent duty indicates that the coil can be placed across the line continuously for one hour maximum without excessive heating. It is equivalent to 1/2 time ON and 1/2 time OFF.

② Add suffix number for coil voltage to base catalog number.

③ Does not include wheel.

Brake Selection

The method most generally used to determine required braking torque is to calculate the full load motor torque by the following formula:

$$T = \frac{5252 \times hp}{rpm}$$

T = Full load motor torque in lb-ft

hp = Motor horsepower

rpm = Speed of shaft on which brake wheel is mounted

The torque rating of the brake selected should be at least equal to the full load motor torque for the duty considered.

Brake Wheels

Wheel Size in Inches	Min. Bore in Inches (mm)	Max. Bore in Inches (mm)	Pilot Bore in Inches (mm)	WK^2	Straight Bore ① Base ③ Catalog Number	Tapered Bore ② Base ③ Catalog Number
4.0	0.50 (12.7)	1.38 (35.1)	0.50 (12.7)	0.06	**511H1150**	**511H1151**
5.5	0.75 (19.1)	2.00 (50.8)	0.75 (19.1)	0.26	**511H1160**	**511H1161**
7.0	1.00 (25.4)	2.25 (57.2)	0.75 (19.1)	0.77	**511H1170**	**511H1171**

Brake Wheel Suffix Numbers

Bore Size Suffix Number—Add to Base Catalog Number

Bore ④ in Inches (mm)	Keyway in Inches	Suffix Number	Bore ④ in Inches (mm)	Keyway in Inches (mm)	Suffix Number
Standard Bore Sizes					
Pilot bore	None	**-1**	1.625 (41.28)	3/38 x 3/16	**-9**
0.625 (15.88)	3/16 x 3/32	**-2**	1.875 (47.63)	1/2 x 1/4	**-10**
0.750 (19.05)	3/16 x 3/32	**-3**	2.125 (53.98)	1/2 x 1/4	**-11**
0.875 (22.23)	3/16 x 3/32	**-4**	—	—	**—**
1.000 (25.40)	1/4 x 1/8	**-5**	—	—	**—**
1.125 (28.58)	1/4 x 1/8	**-6**	—	—	**—**
1.250 (31.75)	1/4 x 1/8	**-7**	—	—	**—**
1.375 (34.93)	5/16 x 5/32	**-8**	—	—	**—**
Non-Standard Bore Sizes					
0.500 (12.70)	1/8 x 1/16	**-50**	1.687 (42.85)	3/8 x 3/16	**-58**
0.750 (19.05)	1/4 x 1/8	**-51**	1.750 (44.45)	3/8 x 3/16	**-59**
0.875 (22.23)	1/4 x 1/8	**-52**	1.937 (49.20)	1/2 x 1/4	**-60**
1.000 (25.40)	5/16 x 5/32	**-53**	2.000 (50.80)	1/2 x 1/4	**-61**
1.187 (30.15)	1/4 x 1/8	**-54**	2.250 (57.15)	1/2 x 1/4	**-62**
1.375 (34.93)	3/8 x 3/16	**-55**	—	—	**—**
1.437 (36.50)	3/8 x 3/16	**-56**	—	—	**—**
1.500 (38.10)	3/8 x 3/16	**-57**	—	—	**—**

Notes

① Bore tolerance: +0.000–0.001 in.

② Taper is at rate of 1.25 in per ft on diameter. In bore size selection, use diameter of tapered shaft. Bore tolerance: +0.000–0.005 in.

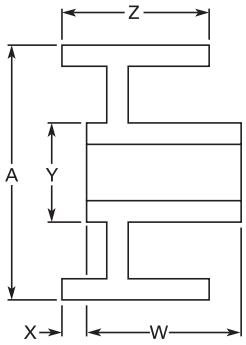
③ Add suffix number for bore size to base catalog number.

④ Bore size selected must be between minimum and maximum dimensions listed in brake wheel selection table.

Dimensions

Approximate Dimensions in Inches (mm)

Standard Brake Wheels



Standard Brake Wheel Dimensions

A	Z	W ①	X	Y	Bore Max.	Bore Min.
4.00 (101.6)	2.75 (69.9)	1.63 (41.4)	1.38 (35.1)	2.50 (63.5)	1.38 (35.1)	0.50 (12.7)
5.50 (139.7)	3.25 (82.6)	2.00 (50.8)	1.63 (41.4)	3.25 (82.6)	2.00 (50.8)	0.75 (19.1)
7.00 (177.8)	4.25 (108.0)	3.00 (76.2)	1.25 (31.8)	4.00 (101.6)	2.25 (57.2)	1.00 (25.4)

Approximate Shipping Weights

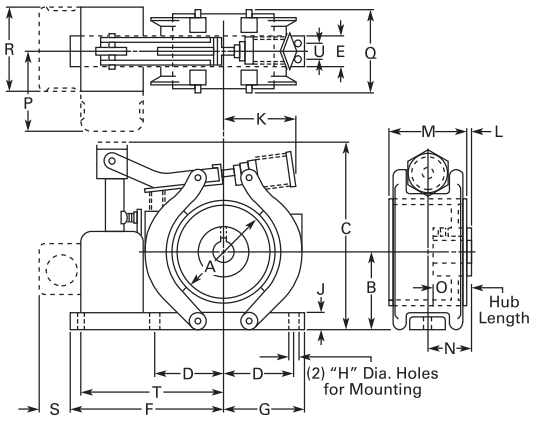
Brake Size	Torque Rating ft-lb	Weight in Lbs (kg) Net — Brake with Wheel	Net — Wheel Only	Boxed — Brake with Wheel
Type "S" AC Shoe Brakes				
S-4	3	15.8 (7.2)	3.4 (1.5)	17.0 (7.7)
S-4	10	15.8 (7.2)	3.4 (1.5)	17.0 (7.7)
S-4	15	15.8 (7.2)	3.4 (1.5)	17.0 (7.7)
S-5-1/2	25	33.2 (15.1)	7.5 (3.4)	36.0 (16.3)
S-5-1/2	35	33.2 (15.1)	7.5 (3.4)	36.0 (16.3)
S-7	50	52.1 (23.7)	18.8 (8.5)	55.0 (25.0)
S-7	75	52.1 (23.7)	18.8 (8.5)	55.0 (25.0)
Type "S" DC Shoe Brakes				
S-4	3	18.0 (8.2)	3.4 (1.5)	20.0 (9.1)
S-4	10	18.0 (8.2)	3.4 (1.5)	20.0 (9.1)
S-4	15	18.0 (8.2)	3.4 (1.5)	20.0 (9.1)
S-5-1/2	25	35.0 (15.9)	7.5 (3.4)	38.0 (17.3)
S-5-1/2	35	35.0 (15.9)	7.5 (3.4)	38.0 (17.3)
S-7	50	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)
S-7	75	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)
S-7	85	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)
S-7	110	54.0 (24.5)	18.8 (8.5)	58.0 (26.3)

Note

① Hub lengths other than standard are not available.

Approximate Dimensions in Inches (mm)

Type S4, S5-1/2 and S7 Solenoid Operated



Type "S" AC Shoe Brakes

Brake Size	Torque Rating ft-lb	A	B ①	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R
S-4	3	4.00 (101.6)	2.88 (73.2)	7.50 (190.5)	2.63 (66.8)	1.25 (31.8)	7.50 (190.5)	3.13 (79.5)	0.38 (9.7)	0.63 (16.0)	2.88 (73.2)	0.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.88 (73.2)	3.00 (76.2)	3.13 (79.5)
S-4	10	4.00 (101.6)	2.88 (73.2)	7.50 (190.5)	2.63 (66.8)	1.25 (31.8)	7.50 (190.5)	3.13 (79.5)	0.38 (9.7)	0.63 (16.0)	2.88 (73.2)	0.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.88 (73.2)	3.00 (76.2)	3.13 (79.5)
S-4	15	4.00 (101.6)	2.88 (73.2)	7.50 (190.5)	2.63 (66.8)	1.25 (31.8)	7.50 (190.5)	3.13 (79.5)	0.38 (9.7)	0.63 (16.0)	2.88 (73.2)	0.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.88 (73.2)	3.00 (76.2)	3.13 (79.5)
S-5-1/2	25	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	0.44 (11.2)	1.00 (25.4)	4.88 (124.0)	0.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	3.13 (79.5)	3.75 (95.3)	3.13 (79.5)
S-5-1/2	35	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	0.44 (11.2)	1.00 (25.4)	7.88 (200.2)	0.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	3.13 (79.5)	3.75 (95.3)	3.13 (79.5)
S-7	50	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	0.56 (14.2)	1.00 (25.4)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	3.13 (79.5)	4.75 (120.7)	3.13 (79.5)
S-7	75	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	0.56 (14.2)	1.00 (25.4)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	3.13 (79.5)	4.75 (120.7)	3.13 (79.5)

Type "S" DC Shoe Brakes

Brake Size	Torque Rating ft-lb	A	B ①	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R
S-4	3	4.00 (101.6)	3.50 (88.9)	8.00 (203.2)	2.63 (66.8)	1.25 (31.8)	7.56 (192.0)	3.25 (82.6)	0.38 (9.7)	0.75 (19.1)	2.88 (73.2)	0.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.63 (66.8)	3.00 (76.2)	4.06 (103.1)
S-4	10	4.00 (101.6)	3.50 (88.9)	8.00 (203.2)	2.63 (66.8)	1.25 (31.8)	7.56 (192.0)	3.25 (82.6)	0.38 (9.7)	0.75 (19.1)	2.88 (73.2)	0.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.63 (66.8)	3.00 (76.2)	4.06 (103.1)
S-4	15	4.00 (101.6)	3.50 (88.9)	8.00 (203.2)	2.63 (66.8)	1.25 (31.8)	7.56 (192.0)	3.25 (82.6)	0.38 (9.7)	0.75 (19.1)	2.88 (73.2)	.25 (6.4)	2.75 (69.9)	1.63 (41.4)	1.63 (41.4)	2.63 (66.8)	3.00 (76.2)	4.06 (103.1)
S-5-1/2	25	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	0.44 (11.2)	0.75 (19.1)	4.88 (124.0)	0.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	2.88 (73.2)	3.75 (95.3)	4.06 (103.1)
S-5-1/2	35	5.50 (139.7)	4.00 (101.6)	9.50 (241.3)	3.50 (88.9)	2.00 (50.8)	8.38 (212.9)	4.13 (104.9)	0.44 (11.2)	0.75 (19.1)	4.88 (124.0)	0.38 (9.7)	3.25 (82.6)	2.00 (50.8)	2.00 (50.8)	2.88 (73.2)	3.75 (95.3)	4.06 (103.1)
S-7	50	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	0.56 (14.2)	0.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)
S-7	75	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	0.56 (14.2)	0.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)
S-7	85	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	0.56 (14.2)	0.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)
S-7	110	7.00 (177.8)	5.00 (127.0)	11.50 (292.1)	4.38 (111.3)	2.50 (63.5)	9.50 (241.3)	5.00 (127.0)	0.56 (14.2)	0.75 (19.1)	6.00 (152.4)	—	4.25 (108.0)	2.13 (54.1)	3.00 (76.2)	2.88 (73.2)	4.88 (124.0)	4.06 (103.1)

Note

① Open type brake only.

Reference Data

IEC Utilization Categories

(See also IEC/EN 60947-1; 2.1.18/IEV 441-17-19)

A combination of specified requirements relating to the condition in which the switching device or fuse fulfills its purpose and selected to represent a characteristic group of real-life applications. The specified requirements may, for example, relate to the values of making and breaking capacity and other characteristic values, data concerning associated circuits and the applicable conditions of use and operational behavior.

Used in Technical Data and Formulas

Code	Descriptions
DF	Duty factory
I_{Dn}	Response value of earth-fault release
I_{cm}	Rated short-circuit making capacity
I_{cn}	Rated short-circuit breaking capacity
I_{cs}	Rated service short-circuit breaking capacity
I_{cu}	Rated ultimate short-circuit breaking capacity
I_{cw}	Rated short-time withstand current
I_e	Rated operational current
I_k	Transformer initial short-circuit AC current
I_L	Load monitoring response value
I_n	Rated current
I_{NT}	Transformer rated current
I_{PK}	Rated peak withstand current
I_q	Rated conditional short-circuit current
I_r	Overcurrent release set value
I_{rm}	Response value of non-delayed short-circuit release
I_i	Response value of non-delayed short-circuit release
I_{rmf}	Response value of fixed, non-delayed short-circuit release

Code	Descriptions
I_{rmv}	Response value of short-time delayed short-circuit release
I_{sd}	Response value of short-time delayed short-circuit release
I_T	Response value of earth-fault release
I_g	Response value of earth-fault release
I_{th}	Conventional free air thermal current
I_{the}	Conventional thermal current of enclosed devices
I_u	Rated uninterrupted current
S_{NT}	Transformer rating
t_r	Time delay of overload release response
t_T	Time delay of earth-fault release response
t_g	Time delay of earth-fault release response
t_v	Time delay of short-circuit release response
U_c	Rated actuating voltage
U_e	Rated operational voltage
U_i	Rated insulation voltage
U_{imp}	Rated impulse withstand voltage
U_k	Transformer short-circuit voltage
U_s	Rated control voltage

Annex A (informative)

Examples of Utilization Categories for Low-Voltage Switchgear and Controlgear ①

Category	Typical Applications	Relevant IEC Product Standard
Nature of Current—AC		
AC-1	Non-inductive or slightly inductive loads, resistance furnaces	60947-4-1
AC-2	Slip-ring motors: starting, switching off	60947-4-1
AC-3	Squirrel-cage motors: starting, switching off motors during running	60947-4-1
AC-4	Squirrel-cage motors: starting, plugging ②, inching ③	60947-4-1
AC-5a	Switching of electric discharge lamp controls	60947-4-1
AC-5b	Switching of incandescent lamps	60947-4-1
AC-6a	Switching of transformers	60947-4-1
AC-6b	Switching of capacitor banks	60947-4-1
AC-7a	Slightly inductive loads for household appliances and similar applications	61095
AC-7b	Motor-loads for household applications	61095
AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases	60947-4-1
AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases	60947-4-1
AC-12	Control of resistive loads and solid-state loads with isolation by optocouplers	60947-5-1
AC-12	Control of resistive loads and solid-state loads with optical isolation	60947-5-2
AC-13	Control of solid-state loads with transformer isolation	60947-5-1
AC-14	Control of small electromagnetic loads	60947-5-1
AC-15	Control of AC electromagnetic loads	60947-5-1
AC-20	Connecting and disconnecting under no-load conditions	60947-3
AC-21	Switching of resistive loads, including moderate overloads	60947-3
AC-22	Switching of mixed resistive and inductive loads, including moderate overloads	60947-3
AC-23	Switching of motor loads or other highly inductive loads	60947-3
AC-31	Non inductive or slightly inductive loads	60947-6-1
AC-33	Motor loads or mixed loads including motors, resistive loads and up to 30% incandescent lamp loads	60947-6-1
AC-35	Electric discharge lamp loads	60947-6-1
AC-36	Incandescent lamp loads	60947-6-1
AC-40	Distribution circuits comprising mixed resistive and reactive loads having a resultant inductive reactance	60947-6-2
AC-41	Non-inductive or slightly inductive loads, resistance furnaces	60947-6-2
AC-42	Slip-ring motors: starting, switching off	60947-6-2
AC-43	Squirrel cage motors: starting, switching off motors during running	60947-6-2
AC-44	Squirrel cage motors: starting, plugging ②, inching ③	60947-6-2
AC-45a	Switching of electric discharge lamp controls	60947-6-2
AC-45b	Switching of incandescent lamps	60947-6-2
AC-51	Non-inductive or slightly inductive loads, resistance furnaces	60947-4-3
AC-52a	Control of slip ring motor stators: 8 h duty with on-load currents for start, acceleration, run	60947-4-2
AC-52b	Control of slip ring motor stators: intermittent duty	60947-4-2
AC-53a	Control of squirrel cage motors: 8 h duty with on-load currents for start, acceleration, run	60947-4-2
AC-53b	Control of squirrel cage motors: intermittent duty	60947-4-2

Notes

① 60947-1 © IEC: 2004.

② Plugging is understood to be stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

③ Inching is understood to be energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Examples of Utilization Categories for Low-Voltage Switchgear and Controlgear, continued ①

Category	Typical Applications	Relevant IEC Product Standard
Nature of Current—AC, continued		
AC-55a	Switching of electric discharge lamp controls	60947-4-3
AC-55b	Switching of incandescent lamps	60947-4-3
AC-56a	Switching of transformers	60947-4-3
AC-56b	Switching of capacitor banks	60947-4-3
AC-58a	Control of hermetic refrigerant compressor motors with automatic resetting of overload releases: 8 h duty with on-load currents for start, acceleration, run	60947-4-2
AC-58b	Control of hermetic refrigerant compressor motors with automatic resetting of overload releases: intermittent duty	60947-4-2
AC-140	Control of small electromagnetic loads with holding (closed) current ≤0,2 A, for example contactor relays	60947-5-2
Nature of Current—AC and DC		
A	Protection of circuits, with no rated short-time withstand current	60947-2
B	Protection of circuits, with a rated short-time withstand current	60947-2
Nature of Current—DC		
DC-1	Non-inductive or slightly inductive loads, resistance furnaces	60947-4-1
DC-3	Shunt-motors: starting, plugging ②, inching ③, dynamic breaking of motors	60947-4-1
DC-5	Series-motors: starting, plugging ②, inching ③, dynamic breaking of motors	60947-4-1
DC-6	Switching of incandescent lamps	60947-4-1
DC-12	Control of resistive loads and solid-state loads with isolation by optocouplers	60947-5-1
DC-12	Control of resistive loads and solid-state loads with optical isolation	60947-5-2
DC-13	Control of electromagnets	60947-5-1
DC-13	Control of electromagnets	60947-5-2
DC-14	Control of electromagnetic loads having economy resistors in circuit	60947-5-1
DC-20	Connecting and disconnecting under no-load conditions	60947-3
DC-21	Switching of resistive loads, including moderate overloads	60947-3
DC-22	Switching of mixed resistive and inductive loads, including moderate overloads (for example shunt motors)	60947-3
DC-23	Switching of motor loads or other highly inductive loads (for example series motors)	60947-3
DC-31	Resistive loads	60947-6-1
DC-33	Motor loads or mixed loads including motors	60947-6-1
DC-36	Incandescent lamp loads	60947-6-1
DC-40	Distribution circuits comprising mixed resistive and reactive loads having a resultant inductive reactance	60947-6-2
DC-41	Non-inductive or slightly inductive loads, resistance furnaces	60947-6-2
DC-43	Shunt-motors: starting, plugging ②, inching ③, dynamic breaking of DC	60947-6-2
DC-45	Series-motors: starting, plugging ②, inching ③, dynamic breaking of DC	60947-6-2
DC-46	Switching of incandescent lamps	60947-6-2

Notes

① 60947-1 © IEC: 2004.

② Plugging is understood to be stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

③ Inching is understood to be energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Motor Ratings Data

Ampere Rating of AC and DC Motors

Ampere ratings of motors vary somewhat, depending upon the type of motor. The values given below are for drip-proof, Class B insulated (T Frame) where available, 1.15 service factor, NEMA Design B motors. These values represent an average full load motor current which was calculated from the motor performance data published by several motor manufacturers. In the case of high torque squirrel cage motors, the ampere ratings will be at least 10% greater than the values given in the following table.

Caution—These average ratings could be high or low for a specific motor and therefore heater coil selection on this basis always involves risk. For fully reliable motor protection, select heater coils on the basis of full load current rating as shown on the motor nameplate.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor

hp	Syn. Speed RPM	Current in Amperes 200V	230V	380V ①	460V	575V	2200V
1/4	1800	1.09	.95	0.55	0.48	0.38	—
	1200	1.61	1.40	0.81	0.70	0.56	—
	900	1.84	1.60	0.93	0.80	0.64	—
1/3	1800	1.37	1.19	0.69	0.60	0.48	—
	1200	1.83	1.59	0.92	0.80	0.64	—
	900	2.07	1.80	1.04	0.90	0.72	—
1/2	1800	1.98	1.72	0.99	0.86	0.69	—
	1200	2.47	2.15	1.24	1.08	0.86	—
	900	2.74	2.38	1.38	1.19	0.95	—
3/4	1800	2.83	2.46	1.42	1.23	0.98	—
	1200	3.36	2.92	1.69	1.46	1.17	—
	900	3.75	3.26	1.88	1.63	1.30	—
1	3600	3.22	2.80	1.70	1.40	1.12	—
	1800	4.09	3.56	2.06	1.78	1.42	—
	1200	4.32	3.76	2.28	1.88	1.50	—
	900	4.95	4.30	2.60	2.15	1.72	—
1-1/2	3600	5.01	4.36	2.64	2.18	1.74	—
	1800	5.59	4.86	2.94	2.43	1.94	—
	1200	6.07	5.28	3.20	2.64	2.11	—
	900	6.44	5.60	3.39	2.80	2.24	—
2	3600	6.44	5.60	3.39	2.80	2.24	—
	1800	7.36	6.40	3.87	3.20	2.56	—
	1200	7.87	6.84	4.14	3.42	2.74	—
	900	9.09	7.90	4.77	3.95	3.16	—
3	3600	9.59	8.34	5.02	4.17	3.34	—
	1800	10.8	9.40	5.70	4.70	3.76	—
	1200	11.7	10.2	6.20	5.12	4.10	—
	900	13.1	11.4	6.90	5.70	4.55	—
5	3600	15.5	13.5	8.20	6.76	5.41	—
	1800	16.6	14.4	8.74	7.21	5.78	—
	1200	18.2	15.8	9.59	7.91	6.32	—
	900	18.3	15.9	9.60	7.92	6.33	—
7-1/2	3600	22.4	19.5	11.8	9.79	7.81	—
	1800	24.7	21.5	13.0	10.7	8.55	—
	1200	25.1	21.8	13.2	10.9	8.70	—
	900	26.5	23.0	13.9	11.5	9.19	—
10	3600	29.2	25.4	15.4	12.7	10.1	—
	1800	30.8	26.8	16.3	13.4	10.7	—
	1200	32.2	28.0	16.9	14.0	11.2	—
	900	35.1	30.5	18.5	15.2	12.2	—
15	3600	41.9	36.4	22.0	18.2	14.5	—
	1800	45.1	39.2	23.7	19.6	15.7	—
	1200	47.6	41.4	25.0	20.7	16.5	—
	900	51.2	44.5	26.9	22.2	17.8	—
20	3600	58.0	50.4	30.5	25.2	20.1	—
	1800	58.9	51.2	31.0	25.6	20.5	—
	1200	60.7	52.8	31.9	26.4	21.1	—
	900	63.1	54.9	33.2	27.4	21.9	—

Note

① 380V 50 Hz.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor, continued

hp	Syn. Speed RPM	Current in Amperes 200V	230V	380V ①	460V	575V	2200V
25	3600	69.9	60.8	36.8	30.4	24.3	—
	1800	74.5	64.8	39.2	32.4	25.9	—
	1200	75.4	65.6	39.6	32.8	26.2	—
	900	77.4	67.3	40.7	33.7	27.0	—
30	3600	84.8	73.7	44.4	36.8	29.4	—
	1800	86.9	75.6	45.7	37.8	30.2	—
	1200	90.6	78.8	47.6	39.4	31.5	—
	900	94.1	81.8	49.5	40.9	32.7	—
40	3600	111	96.4	58.2	48.2	38.5	—
	1800	116	101	61.0	50.4	40.3	—
	1200	117	102	61.2	50.6	40.4	—
	900	121	105	63.2	52.2	41.7	—
50	3600	138	120	72.9	60.1	48.2	—
	1800	143	124	75.2	62.2	49.7	—
	1200	145	126	76.2	63.0	50.4	—
	900	150	130	78.5	65.0	52.0	—
60	3600	164	143	86.8	71.7	57.3	—
	1800	171	140	90.0	74.5	59.4	—
	1200	173	150	91.0	75.0	60.0	—
	900	177	154	93.1	77.0	61.5	—
75	3600	206	179	108	89.6	71.7	—
	1800	210	183	111	91.6	73.2	—
	1200	212	184	112	92.0	73.5	—
	900	222	193	117	96.5	77.5	—
100	3600	266	231	140	115	92.2	—
	1800	271	236	144	118	94.8	23.6
	1200	275	239	145	120	95.6	24.2
	900	290	252	153	126	101	24.8
125	3600	—	292	176	146	116	—
	1800	—	293	177	147	117	29.2
	1200	—	298	180	149	119	29.9
	900	—	305	186	153	122	30.9
150	3600	—	343	208	171	137	—
	1800	—	348	210	174	139	34.8
	1200	—	350	210	174	139	35.5
	900	—	365	211	183	146	37.0
200	3600	—	452	257	226	181	—
	1800	—	458	265	229	184	46.7
	1200	—	460	266	230	184	47.0
	900	—	482	279	241	193	49.4
250	3600	—	559	338	279	223	—
	1800	—	568	343	284	227	57.5
	1200	—	573	345	287	229	58.5
	900	—	600	347	300	240	60.5
300	1800	—	678	392	339	271	69.0
	1200	—	684	395	342	274	70.0
400	1800	—	896	518	448	358	91.8
500	1800	—	1110	642	555	444	116

Single-Phase AC Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. Motors built for especially low speeds or high torques may have higher full-load currents and multispeed motors will have full-load current varying with speed, in which case the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240V.

Table 430.248. Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

hp	115V	200V	208V	230V
1/6	4.4	2.5	2.4	2.2
1/4	5.8	3.3	3.2	2.9
1/3	7.2	4.1	4.0	3.6
1/2	9.8	5.6	5.4	4.9
3/4	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8
1-1/2	20	11.5	11	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7-1/2	80	46	44	40
10	100	57.5	55	50

Note

① 380V 50 Hz.

DC Motors

The following values of full-load currents are for motors running at base speed.

These are average direct-current quantities.

Three-Phase AC Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics.

Motors built for low speeds (1,200 RPM or less) or high torques may require more running current and multispeed motors will have full-load current varying with speed. In these cases the nameplate current rating shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480 and 550 to 600V.

Table 430.247 Full-Load Current in Amperes, Direct-Current Motors

	Armature Voltage Rating ①		Ampere Capacity of Fuses for Motors Recommended Values	
hp	120V	240V	120V	240V
1/4	3.1	1.6	5	3
1/3	4.1	2.0	5	3
1/2	5.4	2.7	7	3
3/4	7.6	3.8	10	5
1	9.5	4.7	15	7
1-1/2	13.2	6.6	20	10
2	17	8.5	25	12
3	25	12.2	30	15
5	40	20	50	25
7-1/2	58	29	80	40
10	76	38	100	50
15	—	55	—	75
20	—	72	—	100
25	—	89	—	125
30	—	106	—	150
40	—	140	—	200
50	—	173	—	250
60	—	206	—	275
75	—	255	—	350
100	—	341	—	500
125	—	425	—	600
150	—	506	—	—
200	—	675	—	—

Table 430.250. Full-Load Current Three-Phase Alternating-Current Motors

	Induction Type Squirrel Cage and Wound-Rotor Amperes							Synchronous Type Unity Power Factor ② Amperes			
hp	115V	200V	208V	230V	460V	575V	2300V	230V	460V	575V	2300V
1/2	4.4	2.5	2.4	2.2	1.1	0.9	—	—	—	—	—
3/4	6.4	3.7	3.5	3.2	1.6	1.3	—	—	—	—	—
1	8.4	4.8	4.6	4.2	2.1	1.7	—	—	—	—	—
1-1/2	12.0	6.9	6.6	6.0	3.0	2.4	—	—	—	—	—
2	13.6	7.8	7.5	6.8	3.4	2.7	—	—	—	—	—
3	—	11.0	10.6	9.6	4.8	3.9	—	—	—	—	—
5	—	17.5	16.7	15.2	7.6	6.1	—	—	—	—	—
7-1/2	—	25.3	24.2	22	11	9	—	—	—	—	—
10	—	32.2	30.8	28	14	11	—	—	—	—	—
15	—	48.3	46.2	42	21	17	—	—	—	—	—
20	—	62.1	59.4	54	27	22	—	—	—	—	—
25	—	78.2	74.8	68	34	27	—	53	26	21	—
30	—	92	88	80	40	32	—	63	32	26	—
40	—	120	114	104	52	41	—	83	41	33	—
50	—	150	143	130	65	52	—	104	52	42	—
60	—	177	169	154	77	62	16	123	61	49	12
75	—	221	211	192	96	77	20	155	78	62	15
100	—	285	273	248	124	99	26	202	101	81	20
125	—	359	343	312	156	125	31	253	126	101	25
150	—	414	396	360	180	144	37	302	151	121	30
200	—	552	528	480	240	192	49	400	201	161	40
250	—	—	—	—	302	242	60	—	—	—	—
300	—	—	—	—	361	289	72	—	—	—	—
350	—	—	—	—	414	336	83	—	—	—	—
400	—	—	—	—	477	382	95	—	—	—	—
450	—	—	—	—	515	412	103	—	—	—	—
500	—	—	—	—	590	472	118	—	—	—	—

Notes

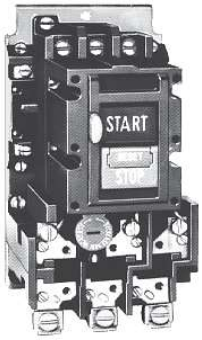
① These are average direct-current quantities.

② For 90 and 80 percent power factor, the above figures shall be multiplied by 1.1 and 1.25 respectively.

MS Series, Single-Phase Starters



Type B100, Single- and Three-Phase Starters



Types B230, B330 Switches

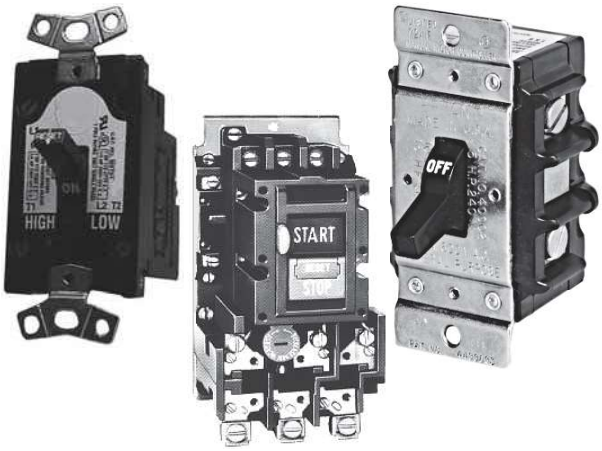


3.1 Starters and Switches

Product Overview V5-T3-2
Types B230, B330, Switches V5-T3-3
MS Series, Single-Phase Starters V5-T3-6
Type B100, Single- and Three-Phase Starters V5-T3-10
Type 9441, Reversing Drum Switches V5-T3-15

3

Starters and Switches



Contents

Description	*Page*
Starters and Switches	
Types B230, B330, Switches	**V5-T3-3**
MS Series, Single-Phase Starters	**V5-T3-6**
Type B100, Single- and Three-Phase Starters	**V5-T3-10**
Type 9441, Reversing Drum Switches	**V5-T3-15**

Product Overview

Eaton offers the most complete line of manual motor starters in the industry. Product offering includes manual motor starters and switches that cover single as well as three-phase motor applications.

Application Description

MS Motor Starter is a compact, versatile unit featuring heavy sliding contacts as well as "quick-make" and "quick-break" mechanism.

B100 Manual Motor Starters can be used in single-phase applications rated 3 hp at 240 Vac or 2 hp at 230 Vdc. The starter can also be rated for three-phase applications up to 10 hp at 600 Vac.

B230 and B330 Manual Motor Switches are available in two- or three-pole configurations rated at 30A.

Types B230, B330 Switches



Contents

Description	*Page*
Types B230, B330, Switches	
Product Selection	**V5-T3-4**
Wiring Diagrams	**V5-T3-4**
Dimensions	**V5-T3-5**
MS Series, Single-Phase Starters	**V5-T3-6**
Type B100, Single- and Three-Phase Starters	**V5-T3-10**
Type 9441, Reversing Drum Switches	**V5-T3-15**

Types B230, B330, Switches

Product Description

Manual Motor Switches are available in two- or three-pole configurations rated at 30A.

Optional NEMA 1 aluminum enclosure is supplied with a padlock guard for locking in the OFF or STOP position.

Application Description

Manual Motor Switches provide manual control of single- and three-phase motors where overload protection is not required or provided separately. Applications include:

- Fans
- Blowers
- Pumps
- Wood working equipment
- Machine tools

Features

- Compact size
- Easy installation
- Simple operation
- Padlockable NEMA 1 enclosure available

Standards and Certifications

- UL File No. E146654, Category NLRV
- CSA File No. LR710828, Class 3211-05

Instructional Leaflet

Pub25371

Product Selection

When Ordering Specify

- Catalog number of manual motor switch

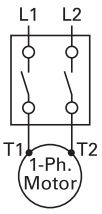
3

Manual Motor Switches without Overload

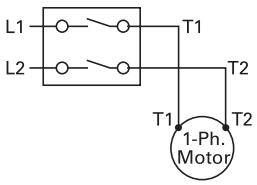
	Maximum Horsepower Ratings					
	120V	240V	480V	600V	Open	NEMA 1 Enclosed
Two-Pole B230AN	**Two-Pole—Manual Motor Switches**					
	2	5	—	—	**B230AN**	**B230AG**
Two-Pole NEMA 1 Enclosure B230BG	2	5	10	15	**B230BND**	**B230BGD**
						
Three-Pole B330AN	**Three-Pole—Manual Motor Switches**					
	3	7-1/2	15	20	**B330AND**	**B330AGD**

Wiring Diagrams

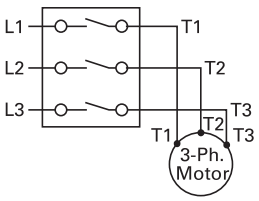
B230AN



B230BN



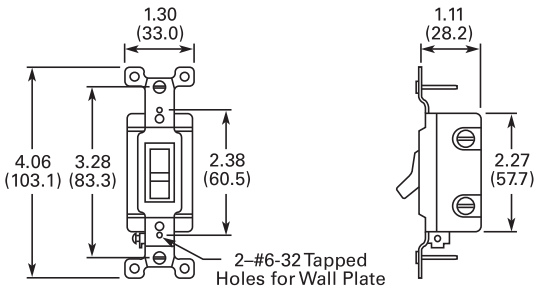
B330AN



Dimensions

Approximate Dimensions in Inches (mm)

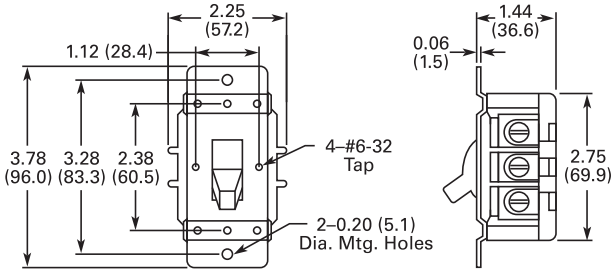
B230AN



Approximate Shipping Weight

4 oz. (0.11 kg)

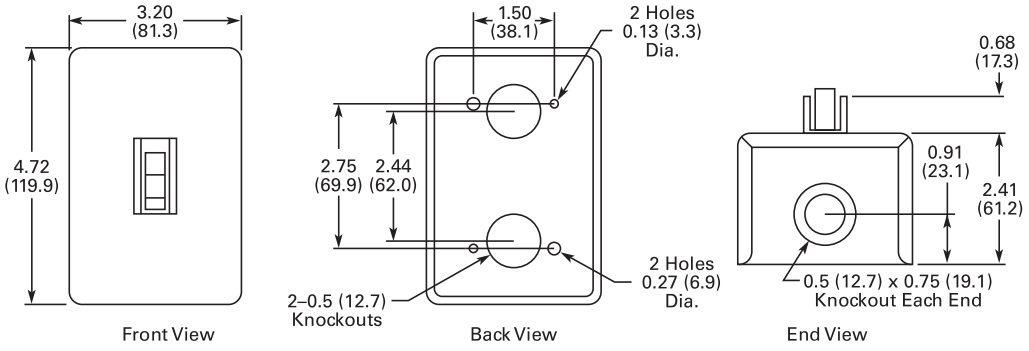
B230BN and B330AN



Approximate Shipping Weight

6 oz. (0.17 kg)

B230AG, B230BG, B330AG



Approximate Shipping Weight

14 oz. (0.40 kg)

MS Series, Single-Phase Starters



Contents

Description	*Page*
Types B230, B330, Switches	**V5-T3-3**
MS Series, Single-Phase Starters	
Product Selection	**V5-T3-7**
Accessories	**V5-T3-9**
Dimensions	**V5-T3-9**
Type B100, Single- and Three-Phase Starters	**V5-T3-10**
Type 9441, Reversing Drum Switches	**V5-T3-15**

MS Series, Single-Phase Starters

Product Description

- The MS Motor Starter is a compact, versatile unit featuring heavy sliding contacts as well as "quick-make" and "quick-break" mechanism
- Standard with large pressure type terminals, straight-through wiring and a trip-free handle mechanism
- The "plug-in" heater element is keyed to ensure proper positioning and an adjustable knob allows a setting of plus or minus ten percent of the nominal heater rating

Application Description

The MS Manual Motor Starter provides manual control and overload protection to single-phase motors. By utilizing the interchangeable heater elements, the starter can protect motors ranging from 0.40A up to 16.0A. Ideal for HVAC applications.

Features

- Compact size
- Trip-free handle mechanism
- Keyed heater elements to ensure proper installation
- Starters available with red pilot light
- The operating handle of the enclosed units can be locked in the OFF position
- Enclosures are offered in NEMA 1, 3, 4 and 5
- Hazardous locations cast aluminum enclosures are available rated for Type 7, Class I, Group D (vapors) and Type 9, Class II, Groups E, F an G (dust)

Standards and Certifications

- UL File No. E19222, Category NLRV
- CSA File No. LR39402-6, Class 3211-05

Instructional Leaflet

IL12987G

Product Selection

When Ordering Specify

- Catalog number of manual motor starter
- Heater pack selection
- Any required accessories
- Heater coil selection according to the motor full load current requirements

MS Series Starters

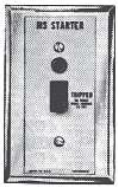
MS Series, Single-Phase Starters



Open Type

Number of Poles	Horsepower	Voltage	Catalog Number ①
1	1	120/240V, 277 Vac	**MST01**
	1/4	120/240 Vdc	**MST01**
	1/4	32 Vdc	**MST01**
2	1	120/240V, 277 Vac	**MST02**
	1	120/240 Vdc	**MST02**
	1/4	32 Vdc	**MST02**

Switch and Pilot Light Mounted on Flush Plate



Flush Plate (No Enclosure Included)

Number of Poles	Flush Plate Type	Voltage	Catalog Number ①
1	General purpose	Switch only	**MST01FN**
2		Switch with pilot light	**MST02FN1P**
1	Stainless steel	Switch only	**MST01DN**
		Switch with pilot light	**MST01DN1P**
2		Switch only	**MST02DN**
		Switch with pilot light	**MST02DN1P**

Note

① Does not include heater. Select heater from tables on **Page V5-T3-8**.

Enclosed Types

Starter and Pilot Light Mounted in Type 1 Enclosure



Number of Poles	Enclosure Type	Product Feature	Catalog Number ①
1	General purpose Type 1	Starter only	**MST01SN**
		Starter with pilot light	**MST01SN1P**
2		Starter only	**MST02SN**
		Starter with pilot light	**MST02SN1P**

Starter, Hand/Auto and Pilot Light—Type 1 Enclosure



2	General purpose NEMA 1	Starter with Hand/Auto switch and pilot light	**MST02RN1PH** ②

Waterproof Type 3, 4 and 5



1	Waterproof Type 3, 4 and 5	Through hub	**MST01AH**
2		Through hub	**MST02AH**

Hazardous Location Type 7D, 9E, 9F and 9G



1	Hazardous location ③ Types 7D, 9E, 9F and 9G	Through hub	**MST01EH**
2		Through hub	**MST02EH**

Typical Heater



Heater Element Installation



Heater Selection for MS Starters

Motor Full Load Current	Catalog Number	Motor Full Load Current	Catalog Number	Motor Full Load Current	Catalog Number	Motor Full Load Current	Catalog Number
0.4 – 0.43	**MSH-5A**	1.04–1.15	**MSH1-3A**	2.72–2.95	**MSH3-4A**	7.04– 7.74	**MSH8-8A**
0.44–0.48	**MSH-55A**	1.16–1.27	**MSH1-45A**	2.96–3.27	**MSH3-7A**	7.75– 8.46	**MSH9-7A**
0.49 –0.53	**MSH-61A**	1.28–1.35	**MSH1-6A**	3.28–3.59	**MSH4-1A**	8.47– 9.35	**MSH10-6A**
0.54–0.58	**MSH-67A**	1.36–1.51	**MSH1-7A**	3.60–3.99	**MSH4-5A**	9.36–10.30	**MSH11-7A**
0.59–0.64	**MSH-74A**	1.52–1.67	**MSH1-9A**	4.00–4.39	**MSH5-0A**	10.31–11.35	**MSH12-9A**
0.65–0.71	**MSH-81A**	1.68–1.83	**MSH2-1A**	4.40–4.79	**MSH5-5A**	11.36–12.47	**MSH14-2A**
0.72 –0.78	**MSH-89A**	1.84–1.99	**MSH2-3A**	4.80–5.26	**MSH6-0A**	12.48–13.67	**MSH15-6A**
0.79–0.87	**MSH-98A**	2.00–2.23	**MSH2-5A**	5.27–5.83	**MSH6-6A**	13.68–15.12	**MSH17-1A**
0.88–0.95	**MSH1-1A**	2.24–2.47	**MSH2-8A**	5.84–6.39	**MSH7-3A**	15.13–16.00	**MSH18-6A**
0.96–1.03	**MSH1-2A**	2.48–2.71	**MSH3-1A**	6.40–7.03	**MSH8-0A**	—	**—**

Notes

① Does not include heater. Select heater from table above.
② For OFF function, use OFF position on starter toggle switch.
③ Type 7D = Type 7, Class I, Group D; Type 9E, 9F and 9G = Type 9, Class II, Groups E, F and G.

Accessories

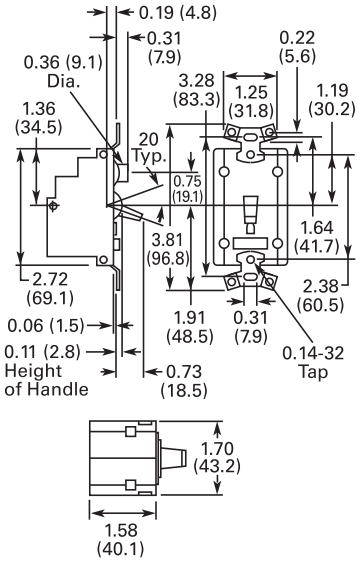
MS Accessories

Description	Catalog Number
Pilot light kit (NEMA 1 enclosure and flush plates)	**MSPT**
Box, 1 unit (NEMA 1 enclosure)	**MS1BN**
Cover, 1 unit (NEMA 1 enclosure)	**MS1CN**
Flush plate, 1 unit (steel)	**MS1FN**
Flush plate, 1 unit (stainless steel)	**MS1DN**
Handle guard (padlockable for NEMA 1 enclosure and flush plates)	**MSLG**

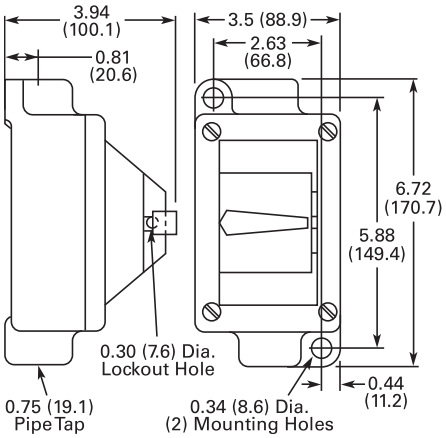
Dimensions

Approximate Dimensions in Inches (mm)

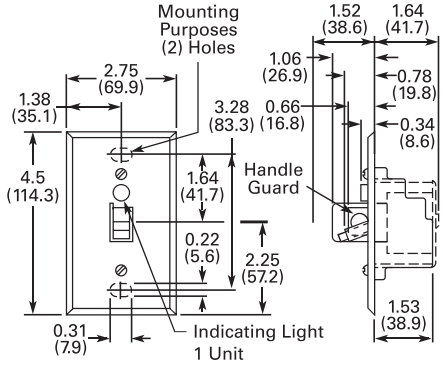
MS Motor Starter Toggle Operated Open Units



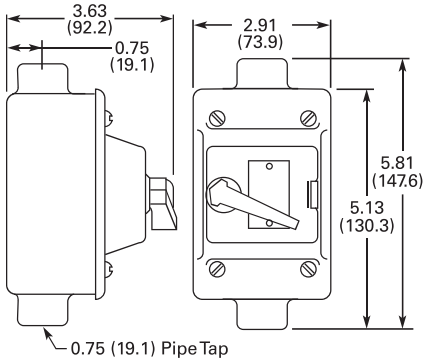
Hazardous Location (Cast Aluminum)



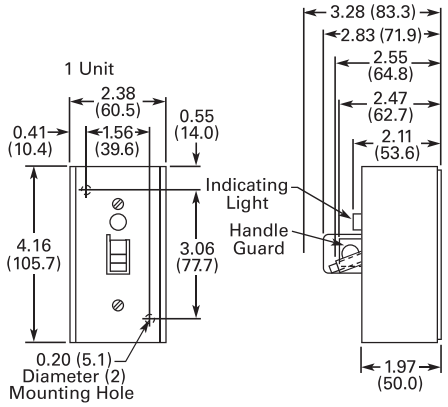
Flush Plates



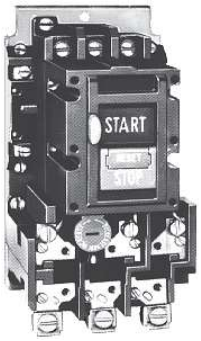
Watertight (Cast Aluminum)



Type 1 Enclosure (Boxes and Covers)



Type B100, Single- and Three-Phase Starters



Contents

Description	*Page*
Types B230, B330, Switches	**V5-T3-3**
MS Series, Single-Phase Starters	**V5-T3-6**
Type B100, Single- and Three-Phase Starters	
Product Selection	**V5-T3-11**
Accessories	**V5-T3-12**
Options	**V5-T3-12**
Technical Data and Specifications	**V5-T3-13**
Dimensions	**V5-T3-13**
Type 9441, Reversing Drum Switches	**V5-T3-15**

Type B100, Single- and Three-Phase Starters

Product Description

The B100 Manual Motor Starters can be used in single-phase applications rated 3 hp at 240 Vac or 2 hp at 230 Vdc. The starter can also be rated for three-phase applications up to 10 hp at 600 Vac.

There are two methods of operation for the B100 Manual Starter. It can be ordered with a toggle switch operator or a START/STOP pushbutton operator.

Application Description

The B100 family of Manual Motor Starters provides manual control, as well as overload protection, to both single-phase and three-phase motors. The starter protects motors up to 38.9A single-phase and 26.8A three-phase with the appropriate heater selection.

Features

- Includes three-pole bimetallic overload relay
- Straight-through wiring
- Field mounted auxiliary contacts
- Available in NEMA 1, 4, 7, 9 and 12 enclosures with toggle operation (NEMA 1 enclosure for pushbutton operator)
- Standard with a lockout device to lock motor in the OFF position

Standards and Certifications

- UL File No. E19222, Category NLRV
- CSA File No. LR39402-6, Class 3211-05 (Open Starters)
- CSA File No. LR54517-1, Class 3211-05 (Closed Starters)

Instructional Leaflet

IL14890

Product Selection

When Ordering Specify

- Catalog number of Starter with application modifications
- Heater pack selection—a three-phase starter requires three heaters, and a single-phase starter requires two heaters
- Any required accessories

Toggle Operated



Type 1 Enclosure



Toggle and Pushbutton Operated Starters

NEMA Size	Open Type Toggle Handle Catalog Number ④	Enclosed NEMA 1 General Purpose Catalog Number ④	Enclosed NEMA 4 Watertight, Stainless Steel ① Catalog Number ④	Enclosed NEMA 7D, 9E, 9F and 9G for Hazardous Locations ②③ Catalog Number ④	Enclosed NEMA 12 Dust-Tight Catalog Number ④
Type B100 Non-Reversing Two-Pole (For Single-Phase Motors and DC)					
M-0	**B100M0B**	**B100S0B**	**B100W0B**	**B100U0B**	**B100J0B**
M-1	**B100M1B**	**B100S1B**	**B100W1B**	**B100U1B**	**B100J1B**
Type B100 Non-Reversing Three-Pole (For Polyphase Motors) ④					
M-0	**B100M0C**	**B100S0C**	**B100W0C**	**B100U0C**	**B100J0C**
M-1	**B100M1C**	**B100S1C**	**B100W1C**	**B100U1C**	**B100J1C**

Heater Selection—Single-Phase Enclosed Starters ⑤

Motor Full Load Current	Maximum Fuse Amps	Catalog Number	Motor Full Load Current	Maximum Fuse Amps	Catalog Number	Motor Full Load Current	Maximum Fuse Amps	Catalog Number
0.28–0.29	1	**FH03**	1.90–2.10	7	**FH22**	9.59–10.40	35	**FH40**
0.30–0.33	1	**FH04**	2.11–2.32	8	**FH23**	10.41–11.30	35	**FH41**
0.34–0.36	1	**FH05**	2.33–2.54	8	**FH24**	11.40–12.20	40	**FH42**
0.37–0.40	1	**FH06**	2.55–2.79	9	**FH25**	12.30–13.50	45	**FH43**
0.41–0.45	1	**FH07**	2.80–3.07	10	**FH26**	13.60–14.90	50	**FH44**
0.46–0.50	1	**FH08**	3.08–3.36	10	**FH27**	15.00–16.00	50	**FH45**
0.51–0.56	1	**FH09**	3.37–3.68	10	**FH28**	16.10–17.10	60	**FH46**
0.57–0.63	2	**FH10**	3.69–4.03	10	**FH29**	17.20–18.30	60	**FH47**
0.64–0.70	2	**FH11**	4.04–4.40	15	**FH30**	18.40–19.70	70	**FH48**
0.71–0.78	2	**FH12**	4.41–4.81	15	**FH31**	19.80–21.20	70	**FH49**
0.79–0.86	2	**FH13**	4.82–5.26	15	**FH32**	21.30–22.80	80	**FH50**
0.87–0.95	3	**FH14**	5.27–5.74	15	**FH33**	22.90–24.50	88	**FH51**
0.96–1.04	3	**FH15**	5.75–6.26	20	**FH34**	24.60–26.40	90	**FH52**
1.05–1.14	3	**FH16**	6.27–6.83	20	**FH35**	26.50–28.50	90	**FH53**
1.15–1.25	4	**FH17**	6.84–7.45	25	**FH36**	28.60–30.80	100	**FH54**
1.26–1.39	4	**FH18**	7.46–8.11	25	**FH37**	30.90–33.30	110	**FH55**
1.40–1.54	5	**FH19**	8.12–8.81	30	**FH38**	33.40–36.00	125	**FH56**
1.55–1.71	5	**FH20**	8.82–9.58	30	**FH39**	36.10–38.90	125	**FH57**
1.72–1.89	6	**FH21**	—	—	**—**	—	—	**—**

Notes

① One 1 in chrome hub supplied on each end.
② NEMA 7D = NEMA 7, Class I, Group D. NEMA 9E, 9F and 9G = NEMA 9, Class II, Groups E, F and G.
③ Tapped for 1 in conduit on each end.
④ Starter does not include heaters. Select catalog numbers of heaters from table on **Page V5-T3-12.**
⑤ Single-phase starters require two overload heaters.

Heater Selection—Three-Phase Enclosed Starters ②

Motor Full Load Current	Maximum Fuse Amps	Catalog Number	Motor Full Load Current	Maximum Fuse Amps	Catalog Number	Motor Full Load Current	Maximum Fuse Amps	Catalog Number
0.25–0.26	1	**FH03**	1.51–1.66	5	**FH21**	7.12–7.73	25	**FH38**
0.27–0.29	1	**FH04**	1.67–1.84	6	**FH22**	7.74–8.40	25	**FH39**
0.30–0.32	1	**FH05**	1.85–2.03	7	**FH23**	8.41–9.12	30	**FH40**
0.33–0.35	1	**FH06**	2.04–2.23	7	**FH24**	9.13–9.89	35	**FH41**
0.36–0.39	1	**FH07**	2.24–2.45	8	**FH25**	9.90–10.70	35	**FH42**
0.40–0.44	1	**FH08**	2.46–2.69	9	**FH26**	10.80–11.80	40	**FH43**
0.45–0.49	1	**FH09**	2.70–2.95	10	**FH27**	11.90–13.00	45	**FH44**
0.50–0.55	1	**FH10**	2.96–3.23	10	**FH28**	13.10–14.00	50	**FH45**
0.56–0.61	2	**FH11**	3.24–3.53	10	**FH29**	14.10–15.00	50	**FH46**
0.62–0.68	2	**FH12**	3.54–3.85	10	**FH30**	15.10–16.10	50	**FH47**
0.69–0.75	2	**FH13**	3.86–4.22	10	**FH31**	16.20–17.30	60	**FH48**
0.78–0.83	2	**FH14**	4.23–4.61	15	**FH32**	17.40–18.60	60	**FH49**
0.84–0.91	3	**FH15**	4.62–5.03	15	**FH33**	18.70–20.00	70	**FH50**
0.92–1.00	3	**FH16**	5.04–5.49	15	**FH34**	20.10–21.50	70	**FH51**
1.01–1.10	3	**FH17**	5.50–5.99	20	**FH35**	21.60–23.20	80	**FH52**
1.11–1.22	4	**FH18**	6.00–6.53	20	**FH36**	23.30–25.00	80	**FH53**
1.23–1.3	4	**FH19**	6.54–7.11	25	**FH37**	25.10–26.80	90	**FH54**
1.36–1.50	5	**FH20**	—	—	**—**	—	—	**—**

Accessories

Type B100 Starters

Description	Catalog Number
Field Mounting Kits	
1NO elect. auxiliary	**B1A**
1NC elect. auxiliary	**B1B**
Red pilot light 120/60 (NEMA 1 enclosure only)	**LK-21**
Red pilot light 208-240/6 (NEMA 1 enclosure only)	**LK-22**
Red pilot light 480/60 (NEMA 1 enclosure only)	**LK-26**

Options

Modifications

Description	Catalog Number Suffix ③
Pushbutton operator (open and NEMA 1 only)	**A**
Without lockoff (open only)	**X**

Notes

① Single-phase starters require two overload heaters.

② Three-phase starters require three overload heaters.

③ Add suffix letter to starter catalog number Example: B100MOC**A.**

FH Series heaters are for Type B100 manual motor starters. Heater element selection is based on motor nameplate's listed full load amperes. Trip rating of this series of elements is 125% of minimum motor full load amperes listed for the element. When motor and overload relay are in the same ambient and the service factor of the motor is 1.15 to 1.25, select heaters from the heater selection table. If the service factor is 1.0 or less (including zero), or a maximum of 115% protection is desired, select a heater one size smaller than indicated for the amperage range required.

Technical Data and Specifications

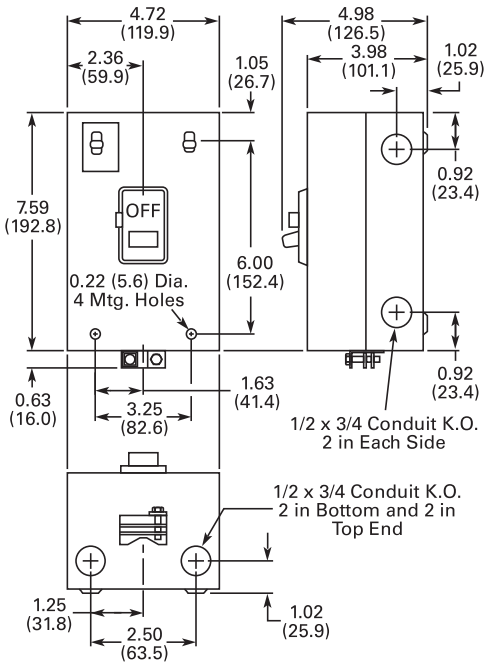
Type B100 Starters

NEMA Size	Maximum hp for AC Ratings ① 120 Vac	208–240 Vac	480–600 Vac	Maximum hp for DC Ratings 115 Vdc	230 Vdc
Two-Pole, Single-Phase					
M-0	1	2	—	1	1-1/2
M-1	2	3	—	1-1/2	2
Three-Pole, Three-Phase					
M-0	2	3	5	—	—
M-1	3	7-1/2	10	—	—

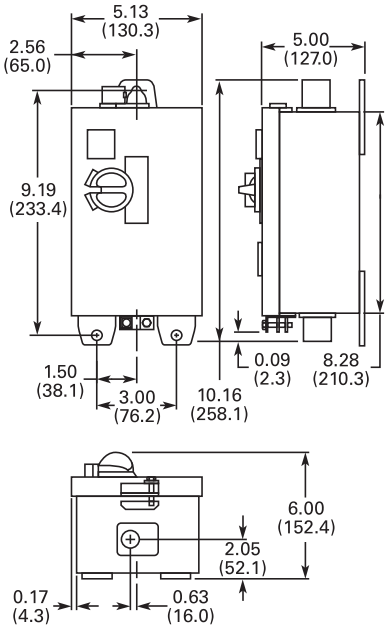
Dimensions

Approximate Dimensions in Inches (mm)

Type 1 Enclosed



Type 4 Enclosed

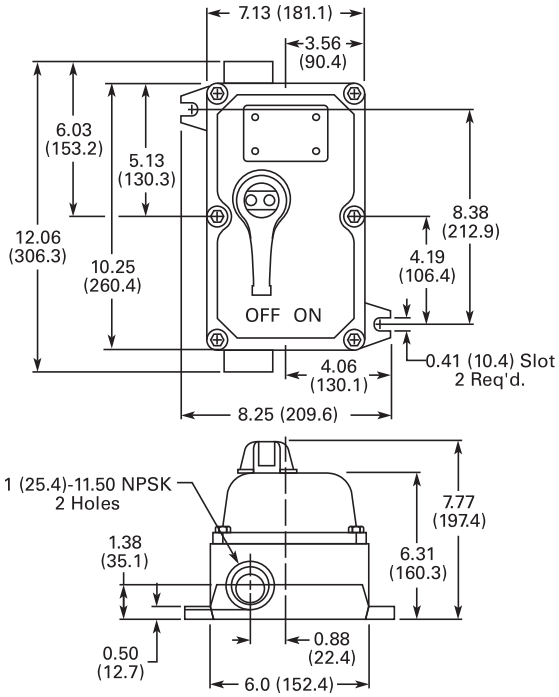


Note

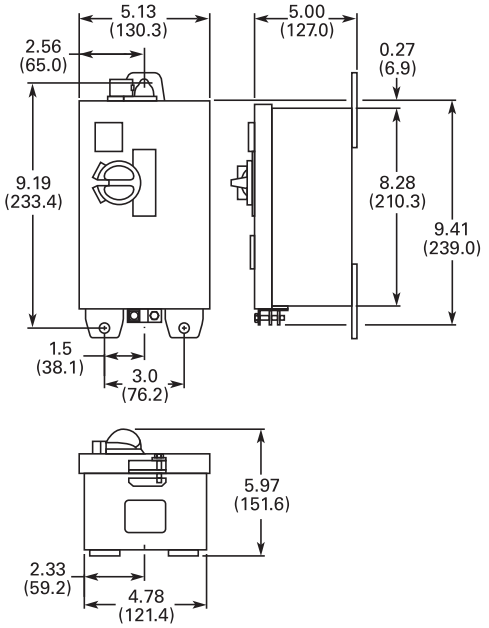
① Ratings up to 3 hp, three-phase are suitable for group fusing.

Approximate Dimensions in Inches (mm)

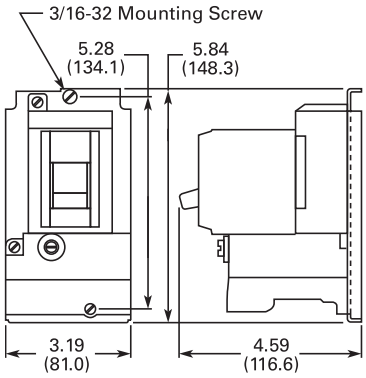
Type 7 and 9 Enclosed



Type 12 Enclosed



Open, Non-Reversing Starter



Type 9441, Reversing Drum Switches



Contents

Description	*Page*
Types B230, B330, Switches	**V5-T3-3**
MS Series, Single-Phase Starters	**V5-T3-6**
Type B100, Single- and Three-Phase Starters	**V5-T3-10**
Type 9441, Reversing Drum Switches	
Product Selection	**V5-T3-16**
Wiring Diagrams	**V5-T3-17**
Dimensions	**V5-T3-17**

Type 9441, Reversing Drum Switches

Application Description

These drum switches are designed primarily for use with single-phase and squirrel cage, single-speed reversible motors which may be connected directly across-the-line. Typical applications would be hoists and machine tools.

Features

- Compact size
- Front mounting—easily installed
- Terminals front accessible—slanted 45° for extra convenience
- Captive pressure clamps on terminal screws back off with screw—no prying with screwdriver necessary
- Choice of operators
  - Large
  - Lever
  - Knob
- Orientation of operator independent of legend—360° positioning in 22-1/2° increments—pointer remains oriented to legend
- Field convertible from maintained to momentary operation
- Replaceable, large volume, silver plated contacts
- Oiltight machine cavity or surface mounting types
- Modern attractive appearance

Operation

All of the operators may be rotated 360° in 22-1/2° increments without losing the indication of the drum position. A red-lined pointer is permanently orientated to the legend markings and clearly indicates the selected drum function regardless of the selected setting for the operator. This enables the user to “offset” the operator to afford the most comfortable operating position. This is accomplished simply by loosening and retightening one screw.

Standards and Certifications

- UL File No. E37316, Category NLRV
- CSA Guide No. 184-N-13.13A, Class 3211

Product Selection

When Ordering Specify

- Catalog number

3

Type DB1 Flush Mount Standard Lever



Type DB and DD Surface Mounting Standard Lever



Type DB1 Flush Mount Knob Operator



Type DB and DD Surface Mounting Knob Operator



Reversing Drum Type without Overload Relay

Maximum Horsepower								Surface Mounting General Purpose—NEMA 1		Flush or Cavity Mounting (Oiltight Mounting on Sizes DB and DD)	
Three-Phase		Single-Phase		DC				Lever Operator	Knob	Lever Operator	Knob
200–230V	380–575V	115V	230V	115V	230V	Size	Type of Operation	Catalog Number		Catalog Number	
Three-Pole											
2	2	1-1/2	2	1	1	DB 1	Maintained ①	**9441H268**	**9441H269**	**9441H274**	**9441H275**
							Maintained and Momentary ②	**9441H271**	**9441H272**	**9441H276**	—
3	5	1-1/2	2	1	1	DB 2	Maintained ①	**9441H353**	**9441H354**	**9441H347**	—
							Maintained and Momentary ②	**9441H356**	**9441H357**	**9441H349**	**9441H350**
5	7-1/2	1-1/2	3	2	3	DD 1	Maintained ①	**9441H284**	**9441H285**	**9441H388**	—
7-1/2	10	2	5	2	3	DD 2	Maintained ①	**9441H361**	**9441H363**	**9441H362**	—

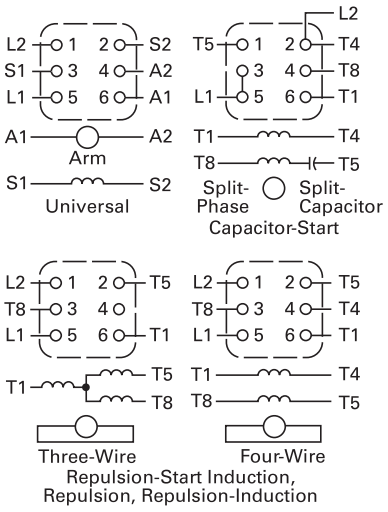
Notes

① These devices are field convertible from maintained both positions to momentary both positions.

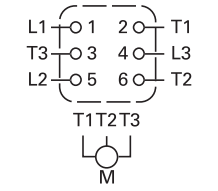
② These devices are field convertible from maintained FORWARD and momentary REVERSE to momentary FORWARD and maintained REVERSE.

Wiring Diagrams

Single-Phase Motors

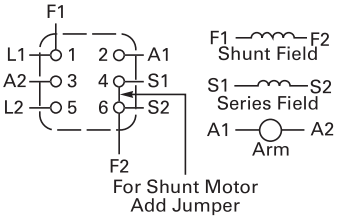


Polyphase Motors



Three-Phase Three-Wire

DC Motors

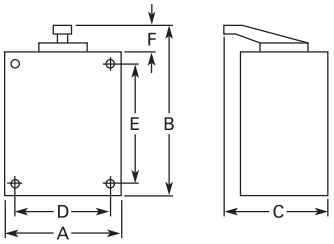


Series, Compound, Shunt

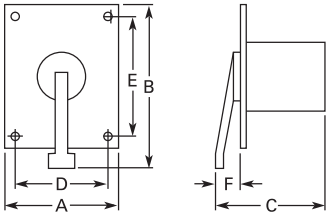
Dimensions

Approximate Dimensions in Inches (mm)

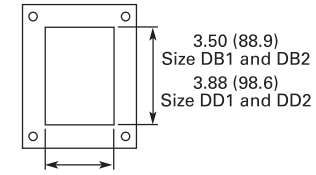
Surface Mounting



Cavity Mounting



Panel Cutout Cavity Mounting



Dimensions and Shipping Weights

Size	Type of Operator	Wide A	HIgh B	Deep C	Mounting D	Mounting E	Lever F	Shipping Weight Lbs (kg)
Surface Mounting								
DB1 and DB2	Lever	2.50 (63.5)	5.88 (149.4)	4.38 (111.3)	2.00 (50.8)	2.25 (57.2)	1.88 (47.8)	3.0 (1.4)
	Knob	2.50 (63.5)	5.38 (136.7)	3.00 (76.2)	2.00 (50.8)	2.25 (57.2)	1.38 (35.1)	3.0 (1.4)
DD1 and DD2	Lever	3.38 (85.9)	6.88 (174.8)	4.75 (120.7)	2.63 (66.8)	2.75 (69.9)	2.00 (50.8)	4.0 (1.8)
	Knob	3.38 (85.9)	6.25 (158.8)	3.63 (92.2)	2.63 (66.8)	2.75 (69.9)	1.38 (35.1)	4.0 (1.8)
Cavity Mounting								
DB1 and DB2	Lever	4.00 (101.6)	4.75 (120.7)	5.00 (127.0)	3.50 (88.9)	4.00 (101.6)	1.88 (47.8)	3.0 (1.4)
	Knob	4.00 (101.6)	4.50 (114.3)	4.50 (114.3)	3.50 (88.9)	4.00 (101.6)	1.38 (35.1)	3.0 (1.4)
DD1 and DD2	Lever	4.50 (114.3)	5.75 (146.1)	5.25 (133.4)	4.00 (101.6)	4.50 (114.3)	2.00 (50.8)	4.0 (1.8)
	Knob	4.50 (114.3)	5.13 (130.3)	4.63 (117.6)	4.00 (101.6)	4.50 (114.3)	1.38 (35.1)	4.0 (1.8)

Definite Purpose Contactors and Starters

0–40A Compact Contactor



25–60A Starter



Heavy-Duty Special Purpose



4.1 Product Overview—Contactors and Starters
- Product Overview V5-T4-2
- Application Description V5-T4-2
- Catalog Number Selection V5-T4-3

4.2 Contactors
- 20–40A, Compact Single- and Two-Pole—C25 . . . . . V5-T4-4
- 15–360A, Two-, Three- and Four-Pole—C25 . . . . . V5-T4-8
- Accessories V5-T4-11
- 15–40A, Three-Pole Fuse Block V5-T4-17
- 15–75A, Reversing and Two-Speed—C65 . . . . . V5-T4-20

4.3 Starters
- 25–60A, Single- and Three-Phase—A25, B25 . . . . . V5-T4-23
- 15–45A, Single- and Three-Phase—A27, B27 . . . . . V5-T4-30
- 15–75A, Single- and Three-Phase—A30, B30 and C440/XT Electronic Overload Relay V5-T4-38

4.4 NEMA Type 1 Enclosed Control
- 15–60A Contactors—C25 . . . . . V5-T4-46
- 25–60A Starters—A25, B25 . . . . . V5-T4-49
- 15–45A Starters—A27, B27 . . . . . V5-T4-52
- Accessories V5-T4-55
- Options V5-T4-57
- Technical Data and Specifications V5-T4-58

4.5 Renewal Parts
- Product Selection
  - Contact Kits, Coils V5-T4-59

4.6 Heavy-Duty Special Purpose Contactors
- Product Selection V5-T4-64
- Accessories V5-T4-64
- Renewal Parts V5-T4-65
- Technical Data and Specifications V5-T4-65
- Dimensions V5-T4-66

4.7 Direct Current Contactors
- DC Contactors—Type C80 . . . . . V5-T4-67
- 600V Contactors V5-T4-74
- DPM 750V Contactor V5-T4-78
- AVD–Contactor V5-T4-81
- D–Contactor V5-T4-84
- Reversing/Assignment Contactor V5-T4-87

4.8 Ratings
- Ampere Rating of AC Motors V5-T4-90

Definite Purpose Contactors and Starters



Contents

Description	*Page*
Contactors	
20–40A, Compact Single- and Two-Pole—C25	**V5-T4-4**
15–360A, Two-, Three- and Four-Pole—C25	**V5-T4-8**
15–40A, Three-Pole Fuse Block	**V5-T4-17**
15–75A, Reversing and Two-Speed—C65	**V5-T4-20**
Starters	
25–60A, Single- and Three-Phase—A25, B25	**V5-T4-23**
15–45A, Single- and Three-Phase—A27, B27	**V5-T4-30**
15–75A, Single- and Three-Phase—A30, B30 and C440/XT Electronic Overload Relay	**V5-T4-38**

Product Overview

Eaton offers the most complete line of Definite Purpose (DP) contactors in the industry. Designed for heating, ventilation, air conditioning and refrigeration (HVACR) applications, Eaton's DP contactors are designed to handle the most challenging installations.

Application Description

These ampere and horsepower rated devices from Eaton's Electrical Sector are designed for service in applications such as refrigeration, air conditioning and resistance heating and are manufactured to traditional standards for quality and reliability. They are subjected to stringent quality assurance inspections and testing procedures. The life expectancy, both electrical and mechanical, will meet or exceed industry performance requirements for Definite Purpose devices.

If more detailed technical information is required—specifications, ratings, and so on—contact your local Eaton distributor or sales office.

Features

- Completely encased design impervious to dust and other environmental elements
- 15–360A contactor ratings
- Single-, two-, three- and four-pole configurations
- Contactors and starters (up to 60A)
- Open components and enclosed designs

Catalog Number Selection

Definite Purpose Control—Contactors and Starters

C 25 D N A 2 15 A A 161 -84

Model
- **C** = Contactor
- **A** = Three-phase starter
- **B** = Single-phase starter

Type
- **25** = Non-reversing contactors and starters (C306)
- **27** = Non-reversing starters (XTOB)
- **30** = Non-reversing starters (C440 EOL)
- **65** = Reversing contactors

Contactor Frame Size
- **A** = Compact, single-pole
- **B** = Compact, two-pole
- **C** = Compact, single-pole w/shunt
- **D** = 15–50A, two- and three-pole
- **E** = 25–40A, four-pole
- **F** = 60–75A, two- and three-pole
- **G** = 90A, two- and three-pole
- **H** = 120A, two- and three-pole
- **K** = 200 and 300A, three-pole
- **L** = 360A, three-pole

For Starters Only
- **C** = Common control wiring
- **S** = Separate control wiring

Enclosure Type
- **N** = Open with metal mounting plate
- **R** = Open with DIN rail mounting adapter (two- and three-pole, 15–50A contactors only)
- **G** = NEMA Type 1 Enclosed

Power Terminals
- **A** = Binding head screw
- **B** = Binding head screw and quick connect terminals (side-by-side)
- **C** = Screw/pressure plate ①
- **D** = Screw/pressure plate and quick connect terminals (side-by-side) ①
- **E** = Box lugs (posidrive setscrew)
- **F** = Box lugs (posidrive setscrew) and quick connect terminals (side-by-side) ②
- **G** = Binding head screw and quick connect terminals (vertical in-line)
- **H** = Screw/pressure plate and quick connect terminals (vertical in-line) ①
- **J** = Box lugs (posidrive setscrew) and quick connect terminals (vertical in-line)
- **K** = Box lugs (hex socket allen head setscrew)
- **L** = Box lugs (hex socket allen head setscrew) and quick connect terminals (side-by-side)
- **M** = Box lugs (hex socket allen head setscrew) and quick connect terminals (vertical in-line)

Number of Poles
- **1** = Single-pole
- **2** = Two-pole
- **3** = Three-pole
- **4** = Four-pole

Current Rating

15 = 15A	**75** = 75A
25 = 25A	**90** = 90A
30 = 30A	**120** = 120A
40 = 40A	**200** = 200A
50 = 50A	**300** = 300A
60 = 60A	**360** = 360A

Coil Selection

A = 110–120 Vac, 50/60 Hz	**R** = 12 Vac, 50/60 Hz
B = 208–240 Vac, 50/60 Hz	**T** = 24 Vac, 50/60 Hz
C = 440–480 Vac, 50/60 Hz	**1R** = 12 Vdc
D = 550–600 Vac, 50/50 Hz	**1T** = 24 Vdc
H = 277 Vac, 60 Hz	**1W** = 48 Vdc
J = 220–240 Vac, 50/60 Hz	**1A** = 120 Vdc
L = 380–415 Vac, 50 Hz	

Auxiliary Contacts (Side Mount)
- **A** = 1NO pressure plate
- **B** = 1NC pressure plate
- **C** = 1NO-1NC pressure plate
- **D** = 2NO pressure plate
- **E** = 2NC pressure plate
- **F** = 1NO pressure plate and QC
- **G** = 1NC pressure plate and QC
- **H** = 1NO-1NC pressure plate and QC
- **J** = 2NO pressure plate and QC
- **K** = 2NC pressure plate and QC
- **L** = 1NO-1NC snap switch QC only
- **M** = 2NO-2NC snap switch QC only

Fuse Blocks
- **161** = Class M, 600V, 30A
- **237** = Class G, 300V, 15A
- **238** = Class G, 300V, 20A
- **231** = Class G, 300V, 30A
- **232** = Class G, 300V, 60A
- **361** = Class J, 600V, 30A
- **362** = Class J, 600V, 60A
- **431** = Class T, 300V, 30A
- **432** = Class T, 300V, 60A
- **461** = Class T, 600V, 30A
- **462** = Class T, 600V, 60A
- **521** = Class H, 250V, 30A
- **522** = Class H, 250V, 60A
- **621** = Class R, 250V, 30A
- **622** = Class R, 250V, 60A

Options
- **Blank** = Individual pkg.
- **GL** = Global listed
- **-84** = 20 pc./pkg. (C25D_) 50 pc./pkg. (C25A_, C25B_, C25C_)
- **-86** = Rotate coil terminals 180° for 15A–50A contactors

Notes

① Not available on 50A devices.

② Vertical in-line quick connect terminals on 60A and 75A F frame.

20–40A, Compact Single- and Two-Pole—C25



Contents

Description	*Page*
20–40A, Compact Single- and Two-Pole—C25	
Catalog Number Selection	**V5-T4-5**
Product Selection	**V5-T4-5**
Options	**V5-T4-6**
Technical Data and Specifications	**V5-T4-6**
Dimensions	**V5-T4-7**
15–360A, Two-, Three- and Four-Pole—C25	**V5-T4-8**
15–40A, Three-Pole Fuse Block	**V5-T4-17**
15–75A, Reversing and Two-Speed—C65	**V5-T4-20**

20–40A, Compact Single- and Two-Pole—C25

Product Description

Eaton's 20–40A, single- and two-pole, Type C25 contactors from Eaton's Electrical Sector feature a compact, efficient design with a low VA coil and straight-through wiring. New contactor housing design effectively limits dust and other contaminants from magnet structure—reduces or eliminates noise. These economically priced, UL recognized/CSA certified, ampere rated devices are well suited for use in heating/air conditioning, refrigeration, data processing and food service applications.

Standards and Certifications

- UL Recognized Components: UL File Number E1491, Guides NLDX2 and NLDX8
- CSA Certified Components: CSA C22.2 No. 14-05, File Number 238083 Class 3211 84
- IEC 60947-4-1
- EN 60947-4-1
- ARI 780/790 Standard
- CE
- RoHS Compliance

Catalog Number Selection

20–40A, Compact Single- and Two-Pole—C25

C25BNB230 A

C25BNB230: Incomplete catalog number
A: Magnet coil suffix

When Ordering Specify

- Catalog number plus magnet coil suffix, see below
- Modify catalog number for any options required, see Options, **Page V5-T4-6**

Product Selection

Compact Contactors—Open Type

Ampere Rating ① Inductive Full Load	Resistive	Locked Rotor 240–277V	Locked Rotor 480V	Locked Rotor 575V	Maximum Motor (hp) 115V	Maximum Motor (hp) 230V	Maximum Motor (kW) 115V	Maximum Motor (kW) 230V	Catalog Number ②③
Single-Pole									
25	30	150	—	—	2	3	1.5	2.2	**C25ANB125_**
30	40	150	75	50	2	5	1.5	3.7	**C25ANB130_**
40	50	240	—	—	3	7-1/2	2.2	5.5	**C25ANB140_**
Single-Pole with Shunt									
25	30	150	—	—	2	3	1.5	2.2	**C25CNB125_**
30	40	150	75	50	2	5	1.5	3.7	**C25CNB130_**
40	50	240	—	—	3	7-1/2	2.2	5.5	**C25CNB140_**
Two-Pole									
20	30	120	100	80	1-1/2	3	1.1	2.2	**C25BNB220_**
25	35	150	125	100	2	3	1.5	2.2	**C25BNB225_**
30	40	150	125	100	2	5	1.5	3.7	**C25BNB230_**
40	50	240	200	160	3	7-1/2	2.2	5.5	**C25BNB240_**

Single-Pole



Single-Pole with Shunt



Two-Pole



Magnet Coil Suffix

AC Coil Voltage 50/60 Hz	Coil Suffix
24	**T**
110–120	**A**
208–240	**B**
277	**H**
380–415 (50 Hz), 440–480 (60 Hz)	**C**

Notes

① Rating per pole.
② Incomplete catalog number. Replace underscore (_) in catalog number with coil suffix letter from the table above.
③ Bulk pack quantities are available in quantities of 50, contact local sales office.

Options

When Ordering Specify

To order replace letter in the **6th** position of catalog number with letter **F**. Example: C25BN**F**240A.

Compact Factory Installed Options

Description
Box lugs with quick connects for 20–40A contactors
Single-pole
Single-pole with shunt
Two-pole

Technical Data and Specifications

20–40A, Compact Single- and Two-Pole—C25

Description	Specification
Insulation voltage	690V
Current rated and hp/kw rated contacts	Double break
Magnet coil	Class F, 155°C
Contact arc covers	Standard on all contactors
Standard power terminals	5/16 in hex washer head screws Quad (4) quick connect terminals on all line and load terminals Box lugs available as option
Line and load terminal designations	Marked on contactors
Operating temperature range	–13° to 158°F (–25° to 70°C)
Terminal wire range	
Hex washer head screws	6–10 AWG, 30 lb-in torque rating
Box lugs	6–10 AWG, 35 lb-in torque rating 8 AWG, 40 lb-in torque rating 6–4 AWG, 45 lb-in torque rating
Mounting position	Vertical, horizontal or tabletop

Coil Characteristics

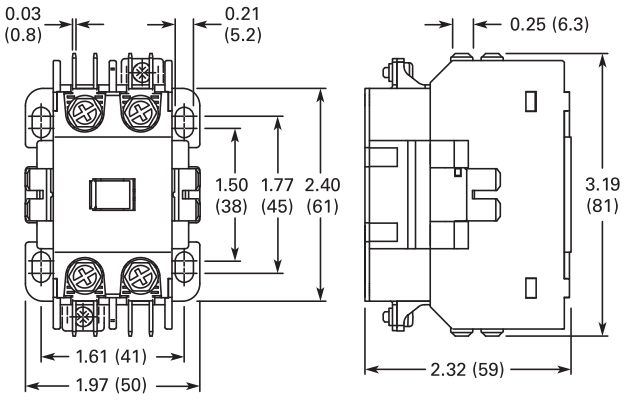
AC Coil Voltage 50/60 Hz	Maximum Inrush VA		Maximum Sealed VA		Sealed Watts
	50 Hz	60 Hz	50 Hz	60 Hz	60 Hz
Single-Pole (with shunt)					
24	55	40	10.0	7.5	3.0
120	55	40	10.0	7.5	3.0
208/240	55	40	10.0	7.5	3.0
277	55	40	10.0	7.5	3.0
Two-Pole					
24	55	45	10.5	8.0	3.5
120	55	45	10.5	8.0	3.5
208/240	55	45	10.5	8.0	3.5
277	55	45	10.5	8.0	3.5
480	55	45	10.5	8.0	3.5

Dimensions

Approximate Dimensions in Inches (mm)

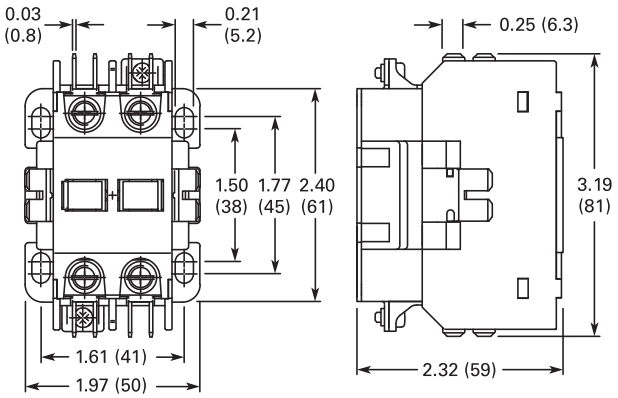
20–40A, Compact Single- and Two-Pole—C25

Single-Pole and Single-Pole + Shunt



Approximate Shipping Weight
0.5 lb (0.2 kg)

Two-Pole



Approximate Shipping Weight
0.7 lb (0.3 kg)

4

15–360A, Two-, Three- and Four-Pole—C25



Contents

Description	*Page*
20–40A, Compact Single- and Two-Pole—C25	**V5-T4-4**
15–360A, Two-, Three- and Four-Pole—C25	
Product Selection	**V5-T4-9**
Accessories	**V5-T4-11**
Options	**V5-T4-13**
Technical Data and Specifications	**V5-T4-14**
Dimensions	**V5-T4-16**
15–40A, Three-Pole Fuse Block	**V5-T4-17**
15–75A, Reversing and Two-Speed—C65	**V5-T4-20**

15–360A, Two-, Three- and Four-Pole—C25

Product Description

Eaton offers the most comprehensive line of definite purpose contactors in the industry. Initially designed as an HVAC and refrigeration product, the C25 line is now the market leader and the product of choice for many OEMs and contractors serving diverse markets. Featuring current ratings between 15A and 360A, the contactors are dual-rated for inductive and resistive ratings as well as for horsepower and kilowatt ratings.

Other terminal configurations are available, see **Page V5-T4-13**. Contactors will accept add-on auxiliary contacts—order factory assembled or as kits for field installation.

The separately available snap-on mechanical interlock permits interlocking two contactors for reversing or two-speed applications.

Contactors between 15A and 50A are offered as two different lines—Standard and Global Listed.

Standard DP Contactors (15–50A, Two- and Three-Pole)

The standard line of C25 DP contactor features:

- Pressure plates and quick connects are standard on 15–30A contactors
- Lugs and quick connects are standard on 40A and 50A contactors
- Highest electrical life in its class—minimum 250,000 operations
- Universal baseplate allows for easy retrofit of competitive units (optional DIN rail mounting)
- UL recognized design in U.S. and Canada "cURus" (CSA approval pending)
- Accessories including auxiliary contacts, mechanical interlocks and fuse blocks
- RoHS (Reduction of Hazardous Substances) compliant

Global Listed Contactors (15–50A, Two- and Three-Pole)

In addition to all the features of the standard DP line, the Global Listed line also features:

- Exact footprint and mounting dimensions as the standard line—ideal for retrofits
- CE (Conformité Européen), CCC (China) and DEMKO (Denmark) certifications
- Higher electrical life—minimum 300,000 operations

Standards and Certifications

- UL Recognized Components UL File #E-1491, Guide NLDX2
- CSA Certified Components (excluding 90A) File #LR353, Class 3211 04, 481301 and 122201
- CE mark (Global line only) EN 60947-4-1
- RoHS Compliance (15A to 50A and 90A)

Product Selection

When Ordering Specify

- Catalog number plus magnet coil suffix, see **Page V5-T4-10**
- Catalog numbers of accessory kits required, see Accessories, **Page V5-T4-11**
- Modify catalog number for any options required, see Options, **Page V5-T4-13**

DP Contactor



C25 Contactors—Open Type

Ampere Rating				Maximum Motor (hp)		Maximum Motor (kW)			Standard DP Contactors		Global Listed Line
Inductive Full Load	Resistive per Pole	Line Voltage	Locked Rotor	Single-Phase	Three-Phase	Single-Phase	Three-Phase	Number of Poles	With Baseplate Catalog Number ①	With DIN Rail Adapter Catalog Number ①	With Baseplate Catalog Number ①
15	20	115	90	3/4	—	0.40	—	2	**C25DND215_**	**C25DRD215_**	**C25DND215_-GL**
		230	90	2	3	1.5	2.2	3	**C25DND315_**	**C25DRD315_**	**C25DND315_-GL**
		460	75	—	5	—	3.7				
		575	60	—	5	—	3.7				
25	35	115	150	2	—	1.5	—	2	**C25DND225_**	**C25DRD225_**	**C25DND225_-GL**
		230	150	3	7-1/2	2.2	5.5	3	**C25DND325_**	**C25DRD325_**	**C25DND325_-GL**
		460	125	—	10	—	7.5	4	**C25END425_**	—	—
		575	100	—	10	—	7.5				
30	40	115	180	2	—	1.5	—	2	**C25DND230_**	**C25DRD230_**	**C25DND230_-GL**
		230	180	5	10	3.7	7.5	3	**C25DND330_**	**C25DRD330_**	**C25DND330_-GL**
		460	150	—	15	—	11	4	**C25END430_**	—	—
		575	120	—	15	—	11				
40	50	115	240	3	—	2.2	—	2	**C25DNF240_**	**C25DRF240_**	**C25DNF240_-GL**
		230	240	7-1/2	10	5.5	7.5	3	**C25DNF340_**	**C25DRF340_**	**C25DNF340_-GL**
		460	200	—	20	—	15	4	**C25ENF440_**	—	—
		575	160	—	20	—	15				
50	65	115	300	3	—	2.2	—	2	**C25DNJ250_**	**C25DRJ250_**	**C25DNJ250_-GL**
		230	300	10	15	7.5	11	3	**C25DNJ350_**	**C25DRJ350_**	**C25DNJ350_-GL**
		460	250	—	30	—	22				
		575	200	—	30	—	22				
60	75	115	360	5	—	3.7	—	2	**C25FNF260_**	—	—
		230	360	10	20	7.5	15	3	**C25FNF360_**	—	—
		460	300	—	40	—	30				
		575	240	—	40	—	30				
75	90	115	450	5	—	3.7	—	2	**C25FNF275_**	—	—
		230	450	15	20	11	18.5	3	**C25FNF375_**	—	—
		460	375	—	50	—	37				
		575	300	—	50	—	37				
90	120	115	540	7-1/2	—	5.5	—	2	**C25GNF290_**	—	—
		230	540	15	30	11	22	3	**C25GNF390_**	—	—
		460	450	—	50	—	37				
		575	360	—	50	—	37				
120	140	230	720	—	—	—	—	3	**C25HNE3120_**	—	—
		460	720								
		575	570								
200	200	240	1200	—	—	—	—	3	**C25KNE3200_**	—	—
		480	1200								
		600	1000								
300	300	240	1800	—	—	—	—	3	**C25KNE3300_**	—	—
		480	1800								
		600	1500								
360	360	240	2320	—	—	—	—	3	**C25LNE3360_**	—	—
		480	2320								
		600	1900								

Note

① Incomplete catalog number. Replace underscore (_) in catalog number with magnet coil suffix from table on **Page V5-T4-10**.

Magnet Coil Suffix

Voltage 60 Hertz	50 Hertz	Coil Suffix
AC ①		
12 ②	12	**R**
24 ③	24	**T**
110–120 ④	110–120 ④	**A**
208 ⑤	—	**E**
208–240 ⑥	208–240	**B**
240 ⑦	220	**J**
277	—	**H**
—	380–415	**L**
440–480	440–480	**C**
550–600 ⑧	550–600	**D**

Voltage 60 Hertz	Coil Suffix
DC ⑨	
12	**1R**
24	**1T**
48	**1W**
120	**1A** ⑩

Notes

① Class H AC coils available as option for 15A–50A contactor. Add 2 before AC coil suffix letter.
② Available through 75A.
③ Available through 120A.
④ 104–120V 50/60 Hz for 60A, 75A and all four-pole contactors (25A–40A).
⑤ Available 120–360A.
⑥ Available 15–90A, others 240V.
⑦ Available through 50A.
⑧ Not available for 90A.
⑨ Contactors with DC coils (only available up to 75A) include an early break NC auxiliary contact, C320KGD1. See **Page V5-T4-62** for more details.
⑩ Available only for 15A through 75A contactors and four-pole contactors.

Accessories

Auxiliary Contact Kits (Side Mounted)

Side Mounted Auxiliary Contact



Heavy-Duty Pilot Rated for 10A at 600 Vac

Circuit	With Standard Pressure Plate Terminals Catalog Number	With Pressure Plate and Quick Connect Terminals Catalog Number
For 15 through 75A		
1NO	**C320KG1**	**C320KG11**
1NC	**C320KG2**	**C320KG12**
1NO-1NC	**C320KG3**	**C320KG13**
2NO	**C320KG4**	**C320KG14**
2NC	**C320KG5**	**C320KG15**

Auxiliary Contact for FI Series Contactors



For 90A		
1NO	—	**FIC320DPG10** ①
1NC	—	**FIC320DPG01** ①
1NO-1NC	—	**FIC320DPG11** ①
2NO	—	**FIC320DPG20** ①
For 120 through 360A		
1NO	**C320KGS20**	—
1NC	**C320KGS21**	—
1NO-1NC	**C320KGS22**	—

Side Mounted Snap Switch



Snap Switch Design Side Mounted Auxiliary Contacts (For 15–75A Contactors Only)

Circuit	Snap Switch Design with Quick Connect Terminals Catalog Number
1NO-1NC	**C320SNP11**
2NO-2NC	**C320SNP22**

Magnet Coil Quick Connect Terminal

Description
Extra dual quick connect terminals (U-shaped) for magnet coil terminals ②

Notes

① Valid on Series **FI** contactors only.

② To order, add suffix number **9** to the complete catalog number. Example: C25DND215A**9**.

Auxiliary Contact Kits (Top Mounted)

Top Mounted Auxiliary Contact



Heavy-Duty Pilot Rated for 10A at 600 Vac

Circuit	With Standard Pressure Plate Terminals Catalog Number	Circuit	With Standard Pressure Plate Terminals Catalog Number
For 15 through 75A ①			
1NO	**C320KGT1**	1NO-2NC	**C320KGT11**
1NC	**C320KGT2**	3NC	**C320KGT12**
1NO-1NC	**C320KGT3**	4NO	**C320KGT13**
2NO	**C320KGT4**	3NO-1NC	**C320KGT14**
2NC	**C320KGT5**	2NO-2NC	**C320KGT15**
3NO	**C320KGT9**	1NO-3NC	**C320KGT16**
2NO-1NC	**C320KGT10**	4NC	**C320KGT17**

Mechanical Interlock



Mechanical Interlock Kit

Description	Catalog Number
Mechanical interlock kit for 15 through 75A	**C321KM60B**

Solid-State ON DELAY Timer

Side mounted on C25D, C25E and C25F frame.

This timer is designed to be **wired in series with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON DELAY timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.

Solid-State ON DELAY Timer



Solid-State ON DELAY Timer

Timing Range	Catalog Number ②③④
0.1–1.0 seconds	**C320TDN1_**
1–30 seconds	**C320TDN30_**
30–300 seconds	**C320TDN300_**
5–30 minutes	**C320TDN3000_**

Separate Enclosures

NEMA 1 Enclosure



Separate Enclosures—NEMA 1

Application	Catalog Number
15 through 50A, two- and three-pole	**C799B18**
60A, two- and three-pole or 25 through 40A, four-pole	**C799B19**

Notes

① Not available for four-pole contactors (15–40 Amp).
② Add operating voltage suffix to catalog number.
A = 120V, **B** = 240V, **E** = 208V
③ Rated 0.5 ampere pilot duty—not to be used on larger contactors.
④ Terminal connections are quick connects only. Two per side.

Options

To order C25, C65, A25 and B25 contactors and starters with the factory installed options listed below, change the basic catalog number listed in the product selection table as noted.

Factory Installed Options

Description	Code Letter	Number of Poles
Terminals—15A through 50A		
Binding head screws		
Without quick connect terminals	**A**	2-, 3-, 4-pole
With quick connect terminals (side-by-side)	**B**	2-, 3-, 4-pole
With quick connect terminals (vertical in-line)	**G**	2-, 3-pole
Screw/pressure plate ①		
Without quick connect terminals	**C**	2-, 3-, 4-pole
With quick connect terminals (side-by-side)	**D**	2-, 3-, 4-pole
With quick connect terminals (vertical in-line)	**H**	2-, 3-pole
Box lugs (#2 posidrive/slotted screw		
Without quick connect terminals	**E**	2-, 3-, 4-pole ②
With quick connect terminals (side-by-side)	**F**	2-, 3-, 4-pole ②
With quick connect terminals (vertical in-line)	**J**	2-, 3-pole
Box lugs (hex socket allen head screw)		
Without quick connect terminals	**K**	2-, 3-pole
With quick connect terminals (side-by-side)	**L**	2-, 3-pole
With quick connect terminals (vertical in-line)	**M**	2-, 3-pole
Terminals—60A through 75A ③		
Box lugs (slotted screw)		
Without quick connect terminals	**E**	2-, 3-pole
With quick connect terminals	**F**	2-, 3-pole

Field Installed Options

Description	Catalog Number
Finger-proof shield for 15–50A	**49-7899KIT** ⑤⑥

Auxiliary Contacts (Side Mount)

Add code letter listed below to complete catalog number.
Example: Change C25DND215**A** to C25DND215**AA**.

Auxiliary Contacts—Factory Installed

Description	With Standard Pressure Plate Terminals Code Letter	With Quick Connect Terminals Code Letter	Snap Switch Design with Quick Connect Terminals Code Letter
For 15 through 90A ④			
1NO	**A**	**F**	—
1NC	**B**	**G**	—
1NO-1NC	**C**	**H**	—
2NO	**D**	**J**	—
2NC	**E**	**K**	—
For 15 through 75A			
1NO-1NC	—	—	**L**
2NO-2NC	—	—	**M**
For 120 through 360A			
1NO	**A**	—	—
1NO-1NC	**C**	—	—
2NO	**D**	—	—
2NC	**E**	—	—
Special Marking (Special contactor marking, consult local sales office)			

Notes

① Screw/pressure plate terminals are not available on 50A contactors.
② Four-pole contactors have box lugs with slotted screws.
③ Replace letter in the **6th** position of catalog number with code letter listed. Example: Change C25FN**F**250 to C25FN**E**250.
④ 90A available only with binding head screw and quick connect terminals.
⑤ Kit contains quantity 1 shield.
⑥ Not for use with Quick Connect terminals on the power poles.

Technical Data and Specifications

Standard and Global Listed Line

15–360A, Two-, Three- and Four-Pole—C25

	Specification	
Description	**Standard**	**Global Listed Line**
Magnet coil	Class B (C25E, F, G, H and K), 130°C Class F (C25D and L), 155°C Class H (C25D), 180°C (available as factory installed option)	Class B (C25E, F, G, H and K), 130°C Class F (C25D and L), 155°C Class H (C25D), 180°C (available as factory installed option)
Contacts	Double break	Double break
Coil terminals	18 AWG (90A)	18 AWG (90A)
Ambient temperature	150°F (65°C) maximum	150°F (65°C) maximum
Terminal wire range		
#8–32 binding head screw	14–12 AWG (one conductor-solid)	14–12 AWG (one conductor-solid)
#8–32 screw/pressure plate	14–8 AWG (one conductor); 14–8 AWG (two conductors)	14–8 AWG (one conductor); 14–8 AWG (two conductors)
Box lugs—15–50A ①	# 2 posidrive screw or 5/32 hex socket screw Upper level: 14–4 AWG (one conductor) Lower level: 14–6 AWG (one conductor)	# 2 posidrive screw or 5/32 hex socket screw Upper level: 14–4 AWG (one conductor) Lower level: 14–6 AWG (one conductor)
Box lugs—60–75A ①	Upper level: 14–2 AWG Lower level: 14–6 AWG	Upper level: 14–2 AWG Lower level: 14–6 AWG
Box lugs—90A	1/0–8 AWG	1/0–8 AWG
Box lugs—120A	3/0–8 AWG	3/0–8 AWG
Box lugs—200–300A	350 kcmil–6 AWG	350 kcmil–6 AWG
Box lugs—360A	750 kcmil–2 AWG	750 kcmil–2 AWG

Contactor Torque Ratings

Contactor Size	Terminal	Wire Range	Tightening Torque
15–50A ②	8–32 binding head screw	12–14 AWG	22 lb-in
	Screw/pressure plate	8–14 AWG	15 lb-in
	Box lug	12–14 AWG	15 lb-in
		10 AWG	25 lb-in
		8 AWG	40 lb-in
		4–6 AWG	45 lb-in
60–75A ③	Box lug	10–14 AWG	40 lb-in
		8 AWG	45 lb-in
		3–6 AWG	50 lb-in
90A	Box lug	1/0–8 AWG	60 lb-in
120A	Box lug	8 AWG	40 lb-in
		4–6 AWG	45 lb-in
		3–1/0 AWG	50 lb-in
200–300A	Box lug	6–350 kcmil	200 lb-in
360A	Box lug	2–750 kcmil	550 lb-in

Notes

① The box lugs on the 15–75A device can accept two conductors per pole.

② The box lugs on the 15–50A device can accept two conductors per pole, the upper section will accept 4–14 AWG and the lower section will accept 6–14 AWG.

③ The box lugs on the 60–75A device can accept two conductors per pole, the upper section will accept 3–14 AWG and the lower section will accept 6–14 AWG.

For Global Line Only

DC Ratings (Global Listed Line Only)

	Two-Pole, 15–30A Inductive			Two-Pole, 40A Inductive			Three-Pole, 15–30A Inductive			Three-Pole, 40A Inductive		
	UL/CSA		DC-3/DC-5	UL/CSA		DC-3/DC-5	UL/CSA		DC-3/DC-5	UL/CSA		DC-3/DC-5
Voltage	**FLA**	**hp**	**I_e**	**FLA**	**hp**	**I_e**	**FLA**	**hp**	**I_e**	**FLA**	**hp**	**I_e**
240 Vdc three poles in series	—	—	—	—	—	—	4	3/4	4	5	1	5
120 Vdc three poles in series	—	—	—	—	—	—	8	3/4	8	10	1	10
120 Vdc two poles in series	5.5	1/2	5.5	8	3/4	8	5.5	1/2	5.5	8	3/4	8
120 Vdc per pole	2	1/10	2	3.5	1/4	3.5	2	1/10	2	3.5	1/4	3.5
24 Vdc per pole	15	—	15	20	—	20	15	—	15	20	—	20

Lighting Duty Ratings (Global Listed Line Only)

C25D_ Inductive Rating	Tungsten and Ballast (480V)
25A	30A
30A	40A
40A	50A
50A	60A

IEC/CE Ratings (IEC 60947-4-1, EN 60947-4-1) for 15A through 50A C25 D–Contactors (Global Listed Line Only)

C25D_	AC-1 (I_c)		AC-3 (I_e)		AC-4 (I_e)		AC-8a	
Inductive Rating	**480V**	**600V**	**480V**	**600V**	**480V**	**600V**	**480V**	**600V**
15A	20A	20A	15A	15A	15A	—	15A	15A
25A	30A	30A	25A	25A	25A	—	25A	25A
30A	40A	40A	30A	30A	30A	—	30A	30A
40A	50A	—	40A	—	40A	—	40A	—
50A	65A	65A	50A	50A	50A	—	50A	50A

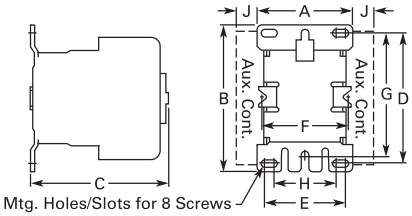
4

Dimensions

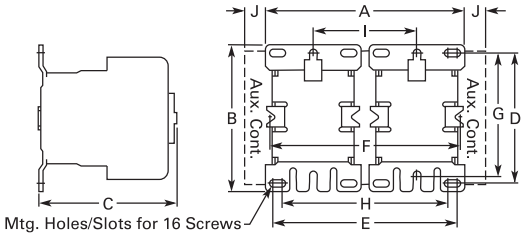
Approximate Dimensions in Inches (mm)

C25 Contactors, Open Type and Open Type—Reversing

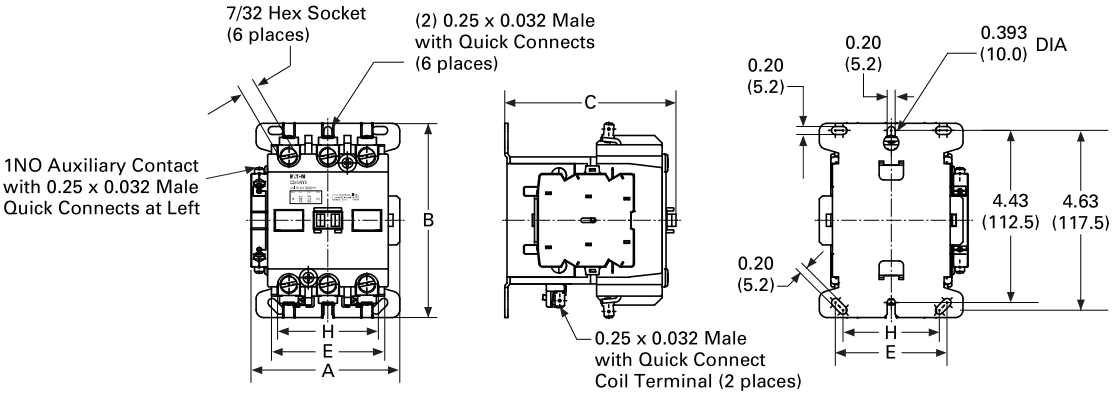
15–75 Ampere (Non-Reversing)



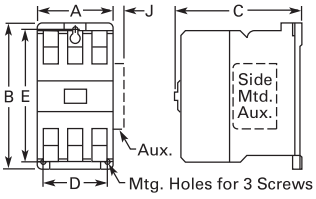
15–75 Ampere (Reversing)



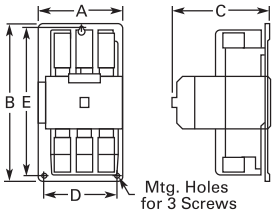
90 Ampere



120 Ampere



200–360 Ampere



Dimensions and Shipping Weights

Ampere Size	Number of Poles	Wide A	High B	Deep C	Mounting D	E	F	G	H	Side Auxiliary Contact Adder J	Shipping Weight Lbs (kg)
Open Type											
15–50	2 and 3	2.40 (61.0) ①	3.75 (95.0)	3.35 (85.0)	3.25 (83.0)	2.00 (51.0)	—	3.13 (79.0)	1.50 (38.0)	0.34 (8.6)	1.3 (.6)
25–40	4	2.68 (68.0) ①	3.75 (95.0)	3.38 (86.0)	3.25 (83.0)	2.00 (51.0)	1.50 (38.0)	3.13 (79.0)	1.50 (38.0)	0.50 (12.5)	2.3 (1.0)
60–75	2 and 3	2.63 (67.0) ①	3.75 (95.0)	3.97 (101.0)	3.25 (83.0)	2.00 (51.0)	1.50 (38.0)	3.13 (79.0)	1.50 (38.0)	0.37 (9.5)	2.8 (1.3)
90	2 and 3	3.86 (98.0)	5.00 (127.0)	4.41 (112.0)	—	2.87 (73.0)	—	—	2.48 (63.0)	—	NN (NN)
120	2 and 3	3.54 (90.0)	7.17 (182.0)	5.94 (151.0)	3.00 (76.0)	6.63 (168.0)	—	—	—	0.54 (13.7)	8.5 (3.9)
200 and 300	2 and 3	7.05 (179.0)	9.11 (232.0)	7.25 (184.0)	6.00 (152.0)	8.50 (216.0)	—	—	—	—	20.0 (9.1)
360	2 and 3	7.05 (179.0)	13.12 (333.0)	7.78 (198.0)	6.00 (152.0)	12.50 (318.0)	—	—	—	—	23.0 (10.4)
Open Type—Reversing											
15–50	2 and 3	5.0 (127.0)	3.75 (95.0)	3.35 (85.0)	3.25 (83.0)	4.53 (118.0)	—	3.13 (79.0)	4.13 (105.0)	0.34 (8.6)	2.6 (1.2)
60–75	2 and 3	5.77 (147.0)	3.75 (95.0)	3.97 (101.0)	3.25 (83.0	5.15 (131.0)	3.15 (80.0)	3.13 (79.0)	4.65 (118.0)	0.37 (9.5)	5.6 (2.5)

Note

① Add 0.30 in (8 mm) to width for C25 contactors with DC coils.

15–40A, Three-Pole Fuse Block



Contents

Description	*Page*
20–40A, Compact Single- and Two-Pole—C25	**V5-T4-4**
15–360A, Two-, Three- and Four-Pole—C25	**V5-T4-8**
15–40A, Three-Pole Fuse Block	
Product Selection	**V5-T4-18**
Dimensions	**V5-T4-19**
15–75A, Reversing and Two-Speed—C65	**V5-T4-20**

4

15–40A, Three-Pole Fuse Block

Product Description

Designed to save space and reduce installation costs, these three-pole fuse blocks will accommodate a variety of fuse classes and fuse holders to satisfy a wide range of electrical/electronic applications such as commercial space and water heaters, dishwashers, food coolers and sterilizing equipment. They are supplied either factory assembled, mounted and wired to the contactor or in kit form.

Note: Available only on three-pole, 15–50A contactors

Product Selection

Optional Three-Pole Fuse Block

Available only on three-pole, 15–50A contactors

Designed to save space and reduce installation costs, these three-pole fuse blocks will accommodate a variety of fuse classes and fuse holders to satisfy a wide range of electrical/electronic applications such as commercial space and water heaters, dishwashers, food coolers and sterilizing equipment. They are supplied either factory assembled, mounted and wired to the contactor or in kit form.

To order factory assembled, add suffix number from table below to catalog number of contactor listed on **Page V5-T4-9**. Example: C25DND325A**361**.

Three-Pole Fuse Block



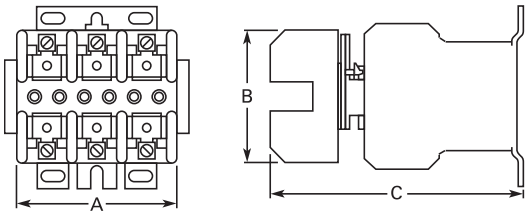
Three-Pole Fuse Blocks

Fuse Holder		Fuse Dimensions in Inches (mm)			Maximum	Factory Installed	Field Installation Kit
Volts	Amperes	Diameter	Length	Terminal Type	Wire Size	Ordering Suffix	Catalog Number
Class M							
600	30	0.41 (10.4)	1.50 (38.1)	Pressure plate	10 AWG Cu	**161**	**C350KM61**
Class G							
600	15	0.41 (10.4)	1.31 (33.3)	Pressure plate	10 AWG Cu	**237**	**C350KG37**
	20		1.41 (35.8)	Pressure plate	10 AWG Cu	**238**	**C350KG38**
480	30	0.41 (10.4)	1.63 (41.4)	Pressure plate	10 AWG Cu	**231**	**C350KG31**
	60		2.25 (57.2)	Box lug	2 AWG Cu/Al	**232**	**C350KG32**
Class J							
600	30	0.81 (20.6)	2.25 (57.2)	Pressure plate	10 AWG Cu	**361**	**C350KJ61**
	60	1.06 (26.9)	2.38 (60.5)	Box lug	2 AWG Cu/Al	**362**	**C350KJ62**
Class T							
300	30	0.41 (10.4)	0.88 (22.4)	Box lug	6 AWG Cu	**431**	**C350KT31**
	60	0.56 (14.2)	0.88 (22.4)	Box lug	2 AWG Cu/Al	**432**	**C350KT32**
600	30	0.56 (14.2)	1.50 (38.1)	Box lug	6 AWG Cu	**461**	**C350KT61**
	60	0.81 (20.6)	1.56 (39.6)	Box lug	2 AWG Cu/Al	**462**	**C350KT62**
Class H							
250	30	0.56 (14.2)	2.00 (50.8)	Pressure plate	10 AWG Cu	**521**	**C350KH21**
	60	0.81 (20.6)	3.00 (76.2)	Box lug	2 AWG Cu/Al	**522**	**C350KH22**
Class R							
250	30	0.56 (14.2)	2.00 (50.8)	Pressure plate	10 AWG Cu	**621**	**C350KR21**
	60	0.81 (20.6)	3.00 (76.2)	Box lug	2 AWG Cu/Al	**622**	**C350KR22**

Dimensions

Approximate Dimensions in Inches (mm)

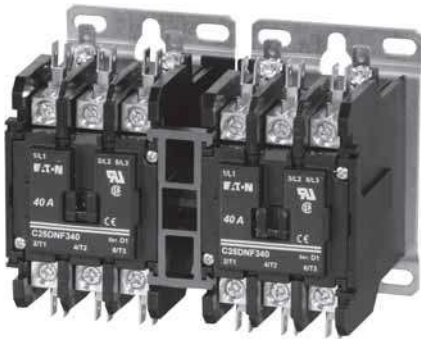
Three-Pole Fuse Block and Contactor



Front View Side View

Fuse Size Class	Amps	Volts	Wide A	High B	Deep C
G	15	600	2.41 (61)	2.81 (71)	5.14 (131)
	20		2.41 (61)	2.81 (71)	5.14 (131)
	30	480	2.41 (61)	2.81 (71)	5.14 (131)
	60		2.62 (67)	4.25 (108)	5.18 (132)
H	30	250	3.00 (76)	3.03 (77)	5.33 (135)
	60		4.22 (107)	4.75 (121)	5.86 (149)
J	30	600	4.81 (122)	4.12 (105)	5.92 (150)
	60		4.81 (122)	4.12 (105)	5.92 (150)
M	30	600	2.41 (61)	2.81 (71)	5.14 (131)
R	30	250	3.00 (76)	3.03 (77)	5.33 (135)
	60		4.22 (107)	4.75 (121)	5.86 (149)
T	30	300	3.44 (87)	2.75 (70)	5.43 (138)
	60	300	3.44 (87)	2.75 (70)	5.43 (138)
	30	600	3.75 (95)	3.19 (81)	5.36 (136)
	60	600	4.87 (124)	2.94 (75)	5.68 (144)

15–75A, Reversing and Two-Speed—C65



Contents

Description	*Page*
20–40A, Compact Single- and Two-Pole—C25	**V5-T4-4**
15–360A, Two-, Three- and Four-Pole—C25	**V5-T4-8**
15–40A, Three-Pole Fuse Block	**V5-T4-17**
15–75A, Reversing and Two-Speed—C65	
Catalog Number Selection	**V5-T4-21**
Product Selection	**V5-T4-21**

15–75A, Reversing and Two-Speed—C65

Product Description

C65 Reversing Contactors from Eaton's Electrical Sector are furnished with pressure plates and quick connect terminals as standard on 15, 25 and 30A devices and with box lugs and quick connect terminals on 40, 50, 60 and 75A.

Other terminal configurations are available—see Factory Installed Options on **Page V5-T4-13**. Reversing contactors will accept add-on auxiliary contacts on either side—order factory assembled or as kits for field installation. See **Page V5-T4-13**.

Standards and Certifications

- UL Recognized Components UL File #E-1491, Guide NLDX2
- CSA Certified Components File #LR353, Guide 380w-1.14 Class 3211 04
- CE

Catalog Number Selection

15–75A, Reversing and Two-Speed—C65

C65DND315 A X

- C65DND315: Incomplete catalog number
- A: Magnet coil suffix
- X: Option code as necessary

When Ordering Specify

- Catalog number plus magnet coil suffix, see **Page V5-T4-22**
- Catalog numbers of accessory kits required, see Accessories, **Page V5-T4-11**
- Modify catalog number for any options required, see Options, **Page V5-T4-13**

Product Selection

C65 Reversing Contactor



Open Type Contactors—Unwired, Mechanically Interlocked Only

Ampere Rating				Maximum Motor (hp)		Maximum Motor (kW)				
Inductive Full Load	Resistive per Pole	Line Voltage	Locked Rotor	Single-Phase	Three-Phase	Single-Phase	Three-Phase	Number of Poles	Open Type with Metal Mounting Plate Catalog Number ①	Open Type with DIN Rail Adapter Catalog Number ①
15	20	115	90	3/4	—	0.40	—	2	**C65DND215_**	**C65DRD215_**
		230	90	2	3	1.5	2.2	3	**C65DND315_**	**C65DRD315_**
		460	75	—	5	—	3.7		**C65DND315_**	**C65DRD315_**
		575	60	—	5	—	3.7		**C65DND315_**	**C65DRD315_**
25	35	115	150	2	—	1.5	—	2	**C65DND225_**	**C65DRD225_**
		230	150	3	7-1/2	2.2	5.5	3	**C65DND325_**	**C65DRD325_**
		460	125	—	10	—	7.5		**C65DND325_**	**C65DRD325_**
		575	100	—	10	—	7.5		**C65DND325_**	**C65DRD325_**
30	40	115	180	2	—	1.5	—	2	**C65DND230_**	**C65DRD230_**
		230	180	5	10	3.7	7.5	3	**C65DND330_**	**C65DRD330_**
		460	150	—	15	—	11		**C65DND330_**	**C65DRD330_**
		575	120	—	15	—	11		**C65DND330_**	**C65DRD330_**
40	50	115	240	3	—	2.2	—	2	**C65DNF240_**	**C65DRF240_**
		230	240	7-1/2	10	5.5	7.5	3	**C65DNF340_**	**C65DRF340_**
		460	200	—	20	—	15		**C65DNF340_**	**C65DRF340_**
		575	160	—	20	—	15		**C65DNF340_**	**C65DRF340_**
50	65	115	300	3	—	2.2	—	2	**C65DNJ250_**	**C65DRJ250_**
		230	300	10	15	7.5	11	3	**C65DNJ350_**	**C65DRJ350_**
		460	250	—	30	—	22		**C65DNJ350_**	**C65DRJ350_**
		575	200	—	30	—	22		**C65DNJ350_**	**C65DRJ350_**
60	75	115	360	5	—	3.7	—	2	**C65FNF260_**	—
		230	360	10	20	7.5	15	3	**C65FNF360_**	—
		460	300	—	40	—	30		**C65FNF360_**	—
		575	240	—	40	—	30		**C65FNF360_**	—
75	90	115	450	5	—	3.7	—	2	**C65FNF275_**	—
		230	450	15	20	11	18.5	3	**C65FNF375_**	—
		460	375	—	50	—	37		**C65FNF375_**	—
		575	300	—	50	—	37		**C65FNF375_**	—

Note

① Incomplete catalog number. Replace underscore (_) with magnet coil suffix from **Page V5-T4-22**.

Magnet Coil Suffix

Volts 60 Hz	50 Hz	Coil Suffix ①
12	12	**R**
24	24	**T**
110–120 ②	110–120 ②	**A**
208–240	208–240	**B**
240 ③	220	**J**
277	—	**H**
—	380–415	**L**
440–480	440–480	**C**
550–600	550–600	**D**

Magnet Coil Options

Description
Extra dual quick connect terminals ("U" shaped) for magnet coil terminals. To order, add Suffix Number **9** to the complete catalog number. Example: C65DND315A**9**.

Notes

① Class H AC coils available as option for 15A–50A contactor.
Add **2** before AC coil suffix letter.

② 104–120V 50/60 Hz for 60A, 75A.

③ Available through 50A.

25–60A, Single- and Three-Phase—A25, B25



Contents

Description	*Page*
25–60A, Single- and Three-Phase—A25, B25	
Product Selection	**V5-T4-24**
Accessories	**V5-T4-26**
Technical Data and Specifications	**V5-T4-27**
Trip Curves	**V5-T4-28**
Wiring Diagrams	**V5-T4-28**
Dimensions	**V5-T4-29**
15–45A, Single- and Three-Phase—A27, B27	**V5-T4-30**
15–75A, Single- and Three-Phase—A30, B30 and C440/***XT*** Electronic Overload Relay	**V5-T4-38**

25–60A, Single- and Three-Phase—A25, B25

Product Description

A25 and B25 Definite Purpose Starters from Eaton's Electrical Sector combine the features and flexibility of the C25 Definite Purpose Contactors and Freedom Series Bi-metallic Ambient Compensated Overload Relays mounted on a common mounting plate.

Features and Benefits

Overload Relay

- Selectable manual or automatic reset operation
- Interchangeable heater packs adjustable ±24% to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors
- Class 10 or 20 heater packs
- Bimetallic, ambient compensated operated. Trip free mechanism
- Electrically isolated NO-NC contacts (pull RESET button to test)
- Overload trip indication
- Shrouded or fingerproof terminals to reduce possibility of electrical shock
- Single-phase sensitivity

Standards and Certifications

- UL Recognized Components UL File #E-1491, Guide NLDX2
- CSA Certified Components File #LR353, Guide 380W-1.14 Class 3211 04

Catalog Number Selection

25–60A, Single- and Three-Phase—A25, B25



When Ordering Specify

- Catalog number plus magnet coil suffix, see **Page V5-T4-24** Example, order catalog number A25CNC30**A**
- Heater packs for specific FLA of motor, see **Pages V5-T4-26** and **V5-T4-27**

Product Selection

A25 Starter



Single- and Three-Phase Starters—Open Type

Ampere Rating			Maximum Motor (hp)		Maximum Motor (kW)		Single-Phase ①②		Three-Phase ①	
							Common Control	Separate Control	Common Control	Separate Control
Inductive Full Load	Line Voltage	Locked Rotor	Single-Phase	Three-Phase	Single-Phase	Three-Phase	Catalog Number ③	Catalog Number ③	Catalog Number ③	Catalog Number ③
25	115	150	2	—	1.5	—	**B25CNC25_**	**B25SNC25_**	**A25CNC25_**	**A25SNC25_**
	230	150	3	7-1/2	2.2	5.5	**B25CNC25_**	**B25SNC25_**	**A25CNC25_**	**A25SNC25_**
	460	125	—	10	—	7.5	**B25CNC25_**	**B25SNC25_**	**A25CNC25_**	**A25SNC25_**
	575	100	—	10	—	7.5	**B25CNC25_**	**B25SNC25_**	**A25CNC25_**	**A25SNC25_**
30	115	180	2	—	1.5	—	**B25CNC30_**	**B25SNC30_**	**A25CNC30_**	**A25SNC30_**
	230	180	5	10	3.7	7.5	**B25CNC30_**	**B25SNC30_**	**A25CNC30_**	**A25SNC30_**
	460	150	—	15	—	11	**B25CNC30_**	**B25SNC30_**	**A25CNC30_**	**A25SNC30_**
	575	120	—	15	—	11	**B25CNC30_**	**B25SNC30_**	**A25CNC30_**	**A25SNC30_**
40	115	240	3	—	2.2	—	**B25CNE40_**	**B25SNE40_**	**A25CNE40_**	**A25SNE40_**
	230	240	7-1/2	10	5.5	7.5	**B25CNE40_**	**B25SNE40_**	**A25CNE40_**	**A25SNE40_**
	460	200	—	20	—	15	**B25CNE40_**	**B25SNE40_**	**A25CNE40_**	**A25SNE40_**
	575	160	—	20	—	15	**B25CNE40_**	**B25SNE40_**	**A25CNE40_**	**A25SNE40_**
50	115	300	—	—	—	—	**N/A**	**N/A**	**A25CNE50_**	**A25SNE50_**
	230	300	—	15	—	11	**N/A**	**N/A**	**A25CNE50_**	**A25SNE50_**
	460	250	—	30	—	22	**N/A**	**N/A**	**A25CNE50_**	**A25SNE50_**
	575	200	—	30	—	22	**N/A**	**N/A**	**A25CNE50_**	**A25SNE50_**
60	115	360	—	—	—	—	**N/A**	**N/A**	**A25CNE60_**	**A25SNE60_**
	230	360	—	20	—	15	**N/A**	**N/A**	**A25CNE60_**	**A25SNE60_**
	460	300	—	40	—	30	**N/A**	**N/A**	**A25CNE60_**	**A25SNE60_**
	575	240	—	40	—	30	**N/A**	**N/A**	**A25CNE60_**	**A25SNE60_**

Magnet Coil Suffix

Voltage 60 Hertz	50 Hertz	Coil Suffix
AC ④		
12	12	**R**
24	24	**T**
110–120 ⑤	110–120 ⑤	**A**
208–240	208–240	**B**
240 ⑥	220	**J**
277	—	**H**
—	380–415	**L**
440–480	440–480	**C**
550–600	550–600	**D**

Voltage 60 Hertz	Coil Suffix
DC ⑦	
12	**1R**
24	**1T**
48	**1W**
120	**1A**

Notes

① Starters do not include heater packs. Select heater pack from tables, see **Pages V5-T4-26** and **V5-T4-27**.
② Set of three heater packs required for single-phase applications.
③ Incomplete catalog number. Replace underscore (_) with magnet coil suffix from table above.
④ Class H AC coils available as option for 15A–50A contactor. Add **2** before AC coil suffix letter.
⑤ 104–120V 50/60 Hz for 60A contactor.
⑥ Available through 50A.
⑦ Starters with DC coils include an early breaking auxiliary contact, C320KGD1. See **Page V5-T4-62** for more detail.

Overload Relay

General

Overload relays are provided to protect motors, motor control apparatus and motor-branch circuit conductors against excessive heating due to motor overloads and failure to start. This definition does not include: 1) motor circuits over 600 volts, 2) short-circuits, 3) ground faults and 4) fire pump control. (NEC Art. 430-31)

Time Current Characteristics

The time-current characteristics of an overload relay is an expression of performance which defines its operating time at various multiples of its current setting. Tests are run at Underwriters Laboratory (UL) in accordance with NEMA Standards and the NEC.

UL requires—

- When tested at 100 percent of its current rating, the overload relay shall trip ultimately
- When tested at 200 percent of its current rating, the overload relay shall trip in not more than 8 minutes
- When tested at 600 percent of its current rating, the overload relay shall trip in not more than 10 or 20 seconds, depending on the Class of the relay or heater packs

"Current Rating" is defined as the minimum current at which the relay will trip. Per NEC, an overload must ultimately trip at 125% of FLA (Full Load Amperes) current (heater) setting for a 1.15 service factor motor and 115% FLA for a 1.0 service factor motor. "Current Setting" is defined as the FLA of the motor and thus the overload heater pack setting.

Example: 600% of current rating is defined as 750% (600 x 1.25) of FLA current (heater) setting for a 1.15 service factor motor. A 10 ampere heater setting must trip in 20 seconds or less at 75 amperes motor current for a Class 20 relay.

Overload Relay Setting

FLA Dial Adjustment—

For motors having a 1.15 service factor, rotate the FLA adjustment dial to correspond to the motor's FLA rating. Estimate the dial position when the motor FLA falls between two letter values as shown in the example.

For motors having a 1.0 service factor, rotate the FLA dial single-half position counterclockwise (CCW).

Manual/Automatic Reset—

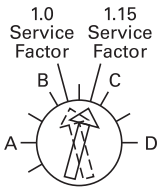
The overload relay is factory set at M for manual reset operation. For automatic reset operation, turn the reset adjustment dial to the A position as shown in the illustration.

Automatic reset is not intended for two-wire control devices.

Test for Trip Indication—

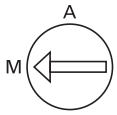
To test overload relay for trip indication when in manual reset, pull out the blue RESET button. An orange flag will appear indicating that the device has tripped. Push RESET button in to reset.

FLA Dial Adjustment



Example of 12.0 FLA setting for heater pack number H2011B showing position for 1.0 or 1.15 service factor motors.

Reset Adjustment Dial



Example of setting for manual reset.

Replacement Overload with Connectors

Starter Size	Overload Part Number
25 and 30A	**10-7125**
40 and 50A	**10-7132**
60A	**10-7131**

Accessories

Contactor Accessories, see **Pages V5-T4-11** and **V5-T4-12**.

Locking Cover for Overload Relay

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial—helps prevent accidental or unauthorized changes to trip and reset setting.

Locking Cover



Locking Cover for Overload Relay

Description	Minimum Order Quantity (Std. Pkg.)	Catalog Number
Clear cover, no accessibility	50	**C320PC3**
Gray cover, no accessibility, with auto only nib	50	**C320PC4**
Gray cover, no accessibility, with manual only nib	50	**C320PC5**
Gray cover with FLA dial accessibility, A, B, C, D positions and auto only nib	50	**C320PC6**
Gray cover with FLA dial accessibility, A, B, C, D positions and manual only nib	50	**C320PC7**

Separate Enclosures

Separate Enclosures—NEMA 1

Application	Catalog Number
25 and 30A	**C799B11**
40, 50 and 60A	**C799B13**

Heater Packs

Fast Trip—Class 10 Heater Packs

Manual or Automatic Reset

Heater packs are shipped three to a carton.
Catalog numbers listed below are for three heater packs.

Fast Trip Ratings

Motor Full Load Ampere Rating ① Dial Position A	B	C	D	Catalog Number ② (Includes Three Heater Packs)
0.26	0.313	0.367	0.42	**H2101B-3**
0.384	0.464	0.543	0.623	**H2102B-3**
0.57	0.688	0.806	0.924	**H2103B-3**
0.846	1.02	1.2	1.37	**H2104B-3**
1.28	1.55	1.83	2.1	**H2105B-3**
1.92	2.33	2.74	3.15	**H2106B-3**
2.3	2.79	3.28	3.77	**H2107B-3**
3.38	4.1	4.82	5.54	**H2108B-3**
4.96	6.03	7.09	8.16	**H2109B-3**
7.07	8.58	10.1	11.6	**H2110B-3**
9.6	11.2	12.8	14.4	**H2111B-3**
14.4	17.5	20.7	23.8	**H2112B-3**
18.7	21.8	25	28.1	**H2113B-3**
23.5	27.3	31	34.8	**H2114B-3**
28.3	32.6	37	41.3	**H2115B-3**
36.6	42.3	48.1	53.8	**H2116B-3**
53.8	60.8	67.9	74.9	**H2117B-3**

Trip Curves, see **Page V5-T4-28.**

Notes

① For motor full load amperes between listed values, adjust dial clockwise for higher or counter-clockwise for lower motor currents. The currents listed are for 1.5 service factor motors. A position adjustment is provided for 1.0 service factor motors.

② Set of three heater packs are required for both single- and three-phase applications.

Standard Trip—Class 20 Heater Packs

Manual or Automatic Reset

Heater packs are shipped three to a carton.
Catalog numbers listed below are for three heater packs.

Standard Trip Ratings

Motor Full Load Ampere Rating ① Dial Position A	B	C	D	Catalog Number ② (Includes Three Heater Packs)
0.254	0.306	0.359	0.411	**H2001B-3**
0.375	0.452	0.53	0.607	**H2002B-3**
0.56	0.676	0.791	0.907	**H2003B-3**
0.814	0.983	1.15	1.32	**H2004B-3**
1.2	1.45	1.71	1.96	**H2005B-3**
1.79	2.16	2.53	2.9	**H2006B-3**
2.15	2.6	3.04	3.49	**H2007B-3**
3.23	3.9	4.56	5.23	**H2008B-3**
4.55	5.5	6.45	7.4	**H2009B-3**
6.75	8.17	9.58	11	**H2010B-3**
9.14	10.8	12.4	14	**H2011B-3**
14	16.9	19.9	22.8	**H2012B-3**
18.7	22.7	26.7	30.7	**H2013B-3**
23.5	28.5	33.5	38.5	**H2014B-3**
29	34	39.1	44.1	**H2015B-3**
39.6	45.5	51.5	57.4	**H2016B-3**
53.9	60.9	67.9	74.9	**H2017B-3**

Trip Curves, see **Page V5-T4-28.**

Technical Data and Specifications

Terminal Wire Sizes

Line Side (Contactor) ③

Terminal Type	Wire Range—Solid or Stranded Power Terminals	Coil Terminals
Screw/pressure plate	8–14 AWG	12–16 AWG
Box lug: 25–50A	4–14 AWG	12–16 AWG
Box lug: 60A	3–14 AWG	12–16 AWG

Power Terminals—Load—Cu Only (Stranded or Solid)

Terminal	Range	Torque Rating
25 and 30A	14–6 AWG	20 lb-in (14–10 AWG)
40, 50 and 60A	14–2 AWG	35 lb-in (14–10 AWG) 40 lb-in (8 AWG) 45 lb-in (6–4 AWG) 50 lb-in (3–2 AWG)
Control Terminals—Cu Only		
12–16 AWG stranded, 12–14 AWG solid		

Notes

① For motor full load amperes between listed values, adjust dial clockwise for higher or counter-clockwise for lower motor currents. The currents listed are for 1.5 service factor motors. A position adjustment is provided for 1.0 service factor motors.

② Set of three heater packs are required for both single- and three-phase applications.

③ Line side (contactor) torque ratings can be found on **Page V5-T4-14.**

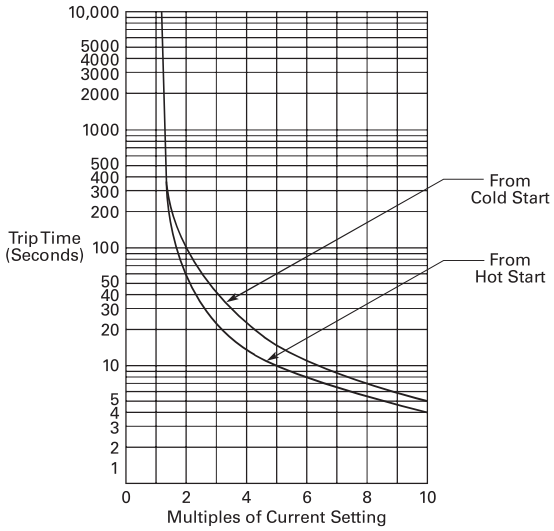
Overload Relay UL/CSA Contact Ratings Control Circuit

AC Volts	120V	240V	480V	600V
NC Contact B600				
Make and break	30A	15A	7.5A	6A
Break	3A	1.5A	0.75A	0.6A
Continuous	5A	5A	5A	5A
NO Contact C600				
Make and break	15A	7.5A	3.375A	3A
Break	1.5A	0.75A	0.375A	0.3A
Continuous	2.5A	2.5A	2.5A	2.5A

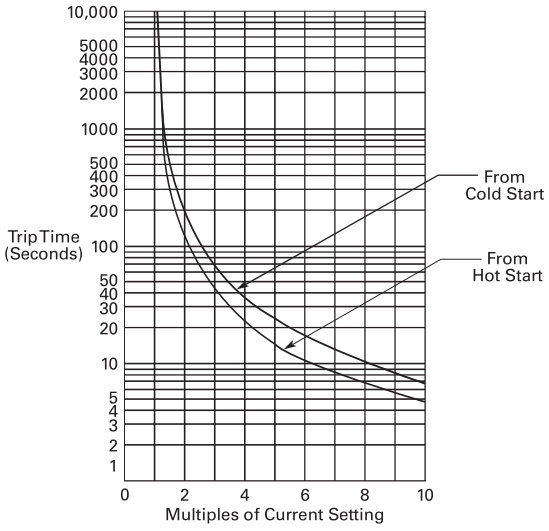
Trip Curves

Bimetallic Ambient Compensated Overload Relay—25°C Open Rating

Class 10 Overload Relay

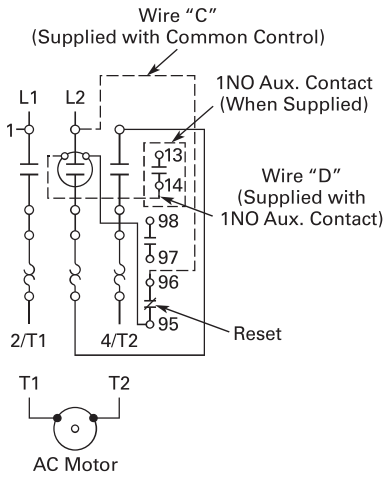


Class 20 Overload Relay

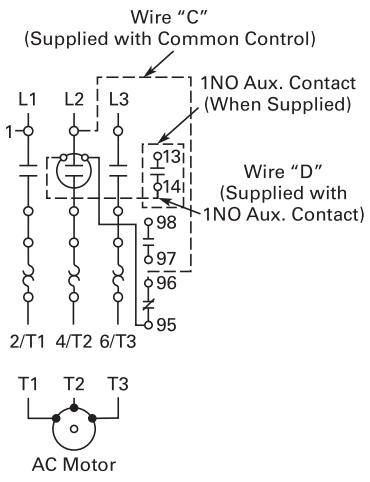


Wiring Diagrams

Single-Phase Connections



Three-Phase Connections

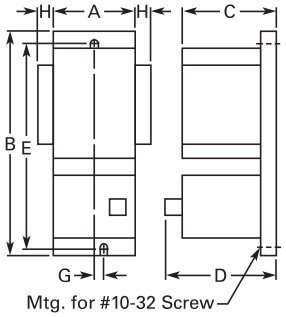


Dimensions

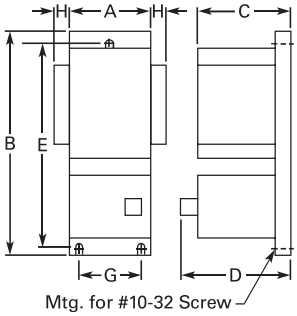
Approximate Dimensions in Inches (mm)

A25 and B25 Starers—Open Type

25 and 30 Ampere



40, 50 and 60 Ampere



Dimensions and Shipping Weights

Ampere Size	Wide A	High B	Deep C	Deep D	Mounting E	Mounting G	Auxiliary Contact Adder H	Shipping Weight Lbs (kg)
25 and 30	2.50 (64.0)	7.14 (181.0)	3.56 (90.4)	3.69 (93.7)	6.55 (166.0)	0.20 (5.1)	0.54 (13.7)	1.8 (0.8)
40	2.56 (65.0)	8.08 (205.0)	3.50 (89.0)	3.66 (93.0)	7.50 (190.5)	2.00 (51.0)	0.54 (13.7)	1.8 (0.8)
50 and 60	2.56 (65.0)	8.08 (205.0)	4.15 (105.0)	3.66 (93.0)	7.50 (190.5)	2.00 (51.0)	0.54 (13.7)	3.6 (1.6)

15–45A, Single- and Three-Phase—A27, B27



Contents

Description	*Page*
25–60A, Single- and Three-Phase—A25, B25	**V5-T4-23**
15–45A, Single- and Three-Phase—A27, B27	
Product Selection	**V5-T4-31**
Renewal Parts	**V5-T4-33**
Technical Data and Specifications	**V5-T4-33**
Trip Curve	**V5-T4-36**
Wiring Diagrams	**V5-T4-36**
Dimensions	**V5-T4-37**
15–75A, Single- and Three-Phase—A30, B30 and C440/***XT*** Electronic Overload Relay	**V5-T4-38**

15–45A, Single- and Three-Phase—A27, B27

Product Description

A27 and B27 Definite Purpose Starters from Eaton's Electrical Sector combine the features and flexibility of the C25 Definite Purpose Contactors and ***XT*** Series Bi-metallic Ambient Compensated Overload Relays.

Features and Benefits

- Selectable manual or automatic reset operation
- Class 10 trip class
- Bimetallic, ambient compensated operated. Trip free mechanism
- Electrically isolated NO-NC contacts (pull TEST button to test)
- Shrouded or fingerproof terminals to reduce possibility of electrical shock
- Single-phase sensitivity

Standards and Certifications

- UL Recognized Components UL File #E-1491, Guide NLDX2
- CSA Certified Components File #LR353, Guide 3 80W-1.14 Class 3211 04
- IEC/EN 60947
- VDE 0660
- UL
- CSA
- CE

Catalog Number Selection

15–45A, Single- and Three-Phase—A27, B27

A27CNE30	A	040
Incomplete catalog number	Magnet coil suffix	Overload relay suffix

When Ordering Specify

- Catalog number plus magnet coil suffix plus overload relay suffix, see **Page V5-T4-32**
  Example, order catalog number A27CNE30**A040**

Product Selection

A27 Starter



Three-Phase Starter—Open Type

Ampere Rating					Common Control		Separate Control	
					Metal Mounting Plate	DIN Rail Adapter	Metal Mounting Plate	DIN Rail Adapter
Inductive Full Load	Line Voltage	Locked Rotor	Maximum Motor (hp)	Maximum Motor (kW)	Catalog Number ①	Catalog Number ①	Catalog Number ①	Catalog Number ①
15	115	90	—	—	**A27CNC15_**	**A27CRC15_**	**A27SNC15_**	**A27SRC15_**
	230	90	3	2.2	**A27CNC15_**	**A27CRC15_**	**A27SNC15_**	**A27SRC15_**
	460	75	5	3.7	**A27CNC15_**	**A27CRC15_**	**A27SNC15_**	**A27SRC15_**
	575	60	5	3.7	**A27CNC15_**	**A27CRC15_**	**A27SNC15_**	**A27SRC15_**
25	115	150	—	—	**A27CNC25_**	**A27CRC25_**	**A27SNC25_**	**A27SRC25_**
	230	150	7-1/2	5.5	**A27CNC25_**	**A27CRC25_**	**A27SNC25_**	**A27SRC25_**
	460	125	10	7.5	**A27CNC25_**	**A27CRC25_**	**A27SNC25_**	**A27SRC25_**
	575	100	10	7.5	**A27CNC25_**	**A27CRC25_**	**A27SNC25_**	**A27SRC25_**
30	115	180	—	—	**A27CNE30_**	**A27CRE30_**	**A27SNE30_**	**A27SRE30_**
	230	180	10	7.5	**A27CNE30_**	**A27CRE30_**	**A27SNE30_**	**A27SRE30_**
	460	150	15	11	**A27CNE30_**	**A27CRE30_**	**A27SNE30_**	**A27SRE30_**
	575	120	15	11	**A27CNE30_**	**A27CRE30_**	**A27SNE30_**	**A27SRE30_**
40	115	240	—	—	**A27CNE40_**	**A27CRE40_**	**A27SNE40_**	**A27SRE40_**
	230	240	10	7.5	**A27CNE40_**	**A27CRE40_**	**A27SNE40_**	**A27SRE40_**
	460	200	20	15	**A27CNE40_**	**A27CRE40_**	**A27SNE40_**	**A27SRE40_**
	575	160	20	15	**A27CNE40_**	**A27CRE40_**	**A27SNE40_**	**A27SRE40_**
45	115	270	—	—	**A27CNE45_**	**A27CRE45_**	**A27SNE45_**	**A27SRE45_**
	230	270	15	11	**A27CNE45_**	**A27CRE45_**	**A27SNE45_**	**A27SRE45_**
	460	225	30	22	**A27CNE45_**	**A27CRE45_**	**A27SNE45_**	**A27SRE45_**
	575	180	30	22	**A27CNE45_**	**A27CRE45_**	**A27SNE45_**	**A27SRE45_**

Note

① Incomplete catalog number. Replace underscore (_) with magnet coil suffix and overload relay suffix from **Page V5-T4-32**.

Single-Phase Starter—Open Type, B27

Ampere Rating Inductive Full Load	Line Voltage	Locked Rotor	Maximum Motor (hp)	Maximum Motor (kW)	Common Control Metal Mounting Plate Catalog Number ①	Common Control DIN Rail Adapter Catalog Number ①	Separate Control Metal Mounting Plate Catalog Number ①	Separate Control DIN Rail Adapter Catalog Number ①
15	115	90	3/4	0.4	**B27CNC15_**	**B27CRC15_**	**B27SNC15_**	**B27SRC15_**
	230	90	2	1.5	**B27CNC15_**	**B27CRC15_**	**B27SNC15_**	**B27SRC15_**
	460	75	—	—	**B27CNC15_**	**B27CRC15_**	**B27SNC15_**	**B27SRC15_**
	575	60	—	—	**B27CNC15_**	**B27CRC15_**	**B27SNC15_**	**B27SRC15_**
25	115	150	2	1.5	**B27CNC25_**	**B27CRC25_**	**B27SNC25_**	**B27SRC25_**
	230	150	3	2.2	**B27CNC25_**	**B27CRC25_**	**B27SNC25_**	**B27SRC25_**
	460	125	—	—	**B27CNC25_**	**B27CRC25_**	**B27SNC25_**	**B27SRC25_**
	575	100	—	—	**B27CNC25_**	**B27CRC25_**	**B27SNC25_**	**B27SRC25_**
30	115	180	2	1.5	**B27CNE30_**	**B27CRE30_**	**B27SNE30_**	**B27SRE30_**
	230	180	5	3.7	**B27CNE30_**	**B27CRE30_**	**B27SNE30_**	**B27SRE30_**
	460	150	—	—	**B27CNE30_**	**B27CRE30_**	**B27SNE30_**	**B27SRE30_**
	575	120	—	—	**B27CNE30_**	**B27CRE30_**	**B27SNE30_**	**B27SRE30_**
40	115	240	3	2.2	**B27CNE40_**	**B27CRE40_**	**B27SNE40_**	**B27SRE40_**
	230	240	7-1/2	5.5	**B27CNE40_**	**B27CRE40_**	**B27SNE40_**	**B27SRE40_**
	460	200	—	—	**B27CNE40_**	**B27CRE40_**	**B27SNE40_**	**B27SRE40_**
	575	160	—	—	**B27CNE40_**	**B27CRE40_**	**B27SNE40_**	**B27SRE40_**
45	115	270	3	2.2	**B27CNE45_**	**B27CRE45_**	**B27SNE45_**	**B27SRE45_**
	230	270	7-1/2	7.5	**B27CNE45_**	**B27CRE45_**	**B27SNE45_**	**B27SRE45_**
	460	225	—	—	**B27CNE45_**	**B27CRE45_**	**B27SNE45_**	**B27SRE45_**
	575	180	—	—	**B27CNE45_**	**B27CRE45_**	**B27SNE45_**	**B27SRE45_**

Magnet Coil Suffix

Voltage 60 Hertz	50 Hertz	Coil Suffix
AC ②		
12	12	**R**
24	24	**T**
110–120	110–120	**A**
208–240	208–240	**B**
240 ③	220	**J**
277	—	**H**
—	380–415	**L**
440–480	440–480	**C**
550–600	550–600	**D**

Voltage 60 Hertz	Coil Suffix
DC ④	
12	**1R**
24	**1T**
48	**1W**
120	**1A**

Overload Relay Suffix

Motor Full Load Amperes	Suffix Code	For use with Contactor Ampere Range
Frame C		
0.1–0.16	**P16**	15–25A
0.16–0.24	**P24**	15–25A
0.24–0.4	**P40**	15–25A
0.4–0.6	**P60**	15–25A
0.6–1	**001**	15–25A
1–1.6	**1P6**	15–25A
1.6–2.4	**2P4**	15–25A
2.4–4	**004**	15–25A
4–6	**006**	15–25A
6–10	**010**	15–25A
10–16	**016**	15–25A
16–24	**024**	15–25A
24–32	**032**	15–25A
Frame D		
6–10	**010**	30–45A
10–16	**016**	30–45A
16–24	**024**	30–45A
24–40	**040**	30–45A
40–57	**057**	30–45A

Notes

① Incomplete catalog number. Replace underscore (_) with magnet coil suffix and overload relay suffix from tables above.
② Class H AC coils available as option. Add **2** before AC coil suffix letter.
③ Available through 45A.
④ Starters with DC coils include an early breaking auxiliary contact, C320KGD1. See **Page V5-T4-62** for more detail.

Renewal Parts

Overload Relays

Motor Full Load Amperes	Suffix Code	For use with Contactor Ampere Range	Overload Relay Catalog Number
Frame C			
0.1–0.16	**P16**	15–25A	**XTOBP16CC1DP**
0.16–0.24	**P24**	15–25A	**XTOBP24CC1DP**
0.24–0.4	**P40**	15–25A	**XTOBP40CC1DP**
0.4–0.6	**P60**	15–25A	**XTOBP60CC1DP**
0.6–1	**001**	15–25A	**XTOB001CC1DP**
1–1.6	**1P6**	15–25A	**XTOB1P6CC1DP**
1.6–2.4	**2P4**	15–25A	**XTOB2P4CC1DP**
2.4–4	**004**	15–25A	**XTOB004CC1DP**
4–6	**006**	15–25A	**XTOB006CC1DP**
6–10	**010**	15–25A	**XTOB010CC1DP**
10–16	**016**	15–25A	**XTOB016CC1DP**
16–24	**024**	15–25A	**XTOB024CC1DP**
24–32	**032**	15–25A	**XTOB032CC1DP**
Frame D			
6–10	**010**	30–45A	**XTOB010DC1DP**
10–16	**016**	30–45A	**XTOB016DC1DP**
16–24	**024**	30–45A	**XTOB024DC1DP**
24–40	**040**	30–45A	**XTOB040DC1DP**
40–57	**057**	30–45A	**XTOB057DC1DP**

Technical Data and Specifications

Terminal Wire Sizes

Line Side (Contactor) ①	Wire Range—Solid or Stranded	
Terminal Type	**Power Terminals**	**Coil Terminals**
Screw/pressure plate	8–14 AWG	12–16 AWG
Box lug: 15–45A	4–14 AWG	12–16 AWG

Power Terminals—Load—Cu Only (Stranded or Solid)

Terminal	Range	Torque Rating
15 and 25A	14–8 AWG	16 lb-in (14–8 AWG)
30, 40 and 45A	14–2 AWG	31 lb-in (14–2 AWG)
Control Terminals—Cu Only		
12–16 AWG stranded, 12–14 AWG solid		

Note

① Line side (contactor) torque ratings can be found on **Page V5-T4-14**.

Overload Relays

These tripping characteristics are the mean values of the spread at 20°C ambient temperature in a cold state.

Tripping time depends on response current. With devices at operating temperature, the tripping time of the overload relay reduces to approximately 25% of the read off value. Specific characteristics for each individual setting range can be found in MN03402001E.

Overload Relays

Description	XTOB … CC1 Specification	XTOB … DC1 Specification
General		
Climatic proofing	Damp heat, constant, to IEC 60068-2-78; Damp heat, cyclic, to IEC 60 068-2-30	Damp heat, constant, to IEC 60068-2-78; Damp heat, cyclic, to IEC 60 068-2-30
Ambient temperature range ①	–25° to 50°C [–13° to 122°F]	–25° to 50°C [–13° to 122°F]
Temperature compensation	Continuous	Continuous
Mechanical shock resistance (IEC/EN 60068-2-27)		
Half-sinusoidal shock 10 ms	10g	10g
Degree of protection	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger and back of hand proof	Finger and back of hand proof
Insulation voltage (U_i) Vac	690	690
Overvoltage category/pollution degree	III/3	III/3
Impulse withstand voltage (U_{imp}) Vac	6000	6000
Operational voltage (U_e) Vac	690	690
Safe isolation to VDE 0106 Part 101 and Part 101/A1		
Between auxiliary contacts and main contacts (Vac)	440	440
Between main contacts (Vac)	440	440
Overload relay setting range	0.1–32A	6–75A
Temperature compensation residual error >20°C (%/K)	≤0.25	≤0.25
Current heat loss (3 conductors)		
Lower value of setting range, W	2.5	3
Upper value of setting range, W	6	7.5
Terminal capacity	2 x (1–6)	2 x (1–6)
Solid, mm^2	2 x (1–4)	1 x 25
Flexible with ferrule, mm^2	2 x (1–6) ②	2 x (1–10) ③
Solid or stranded, AWG	14-8	14-2
Terminal screw	M4	M6
Tightening torque Nm (lb-in)	1.8 (16)	3.5 (31)
Tools		
Pozidrive screwdriver	Size 2	Size 2
Standard screwdriver	1 x 6	1 x 6

Notes

① Ambient temperature operating range to IEC/EN 60947, PTB: –5° to 50°C [23° to 122°F].
② 6 mm^2 flexible with ferrules to DIN 46228.
③ Main contact terminal capacity, solid and stranded conductors with ferrules: When using two conductors use identical cross-section.

Overload Relays, continued

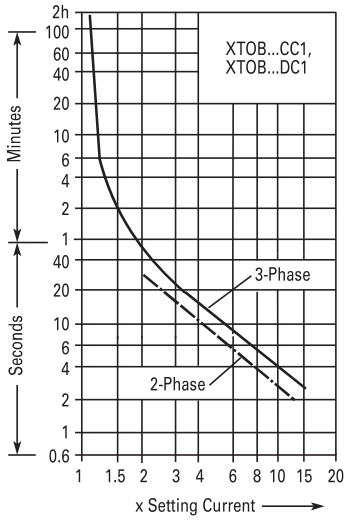
Description	XTOB … CC1 Specification	XTOB … DC1 Specification
Auxiliary and Control Circuit Connections		
Impulse withstand voltage (U_{imp}) Vac	6000	6000
Overvoltage category/pollution degree	III/3	III/3
Terminal capacity		
Solid, mm²	2 x (0.75–4)	2 x (0.75–4)
Flexible with ferrule, mm²	2 x (0.75–2.5)	2 x (0.75–2.5)
Solid or stranded, AWG	2 x (18–12)	2 x (18–12)
Terminal screw	M3.5	M3.5
Tightening torque Nm (lb-in)	0.8–1.3 (7–11.5)	0.8–1.3 (7–11.5)
Tools		
Pozidrive screwdriver	Size 2	Size 2
Standard screwdriver	1 x 6	1 x 6
Auxiliary circuit rated insulation voltage (U_i) Vac	500	500
Rated operational voltage (U_e) Vac	500	500
Safe isolation to VDE 0106 Part 101 and Part 101/A1		
Between the auxiliary contacts (Vac)	240	240
Conventional thermal current, I_{th}	6	6
Rated operational current—AC-15		
NO contact		
120V	1.5	1.5
240V	1.5	1.5
415V	0.5	0.5
500V	0.5	0.5
NC contact		
120V	1.5	1.5
240V	1.5	1.5
415V	0.9	0.9
500V	0.8	0.8
Rated operational current—DC-13 L/R ≤15 ms ①		
NO contact		
24V	0.9	0.9
60V	0.75	0.75
110V	0.4	0.4
220V	0.2	0.2
Short-circuit rating without welding maximum fuse, A gG/gL	6	6

Note

① Rated operational current: Making and breaking conditions to DC-13, L/R constant as stated.

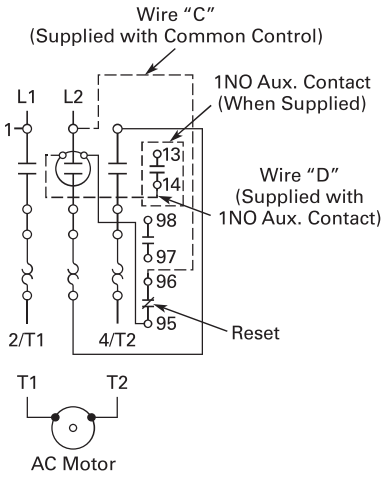
Trip Curve

Overload Relay

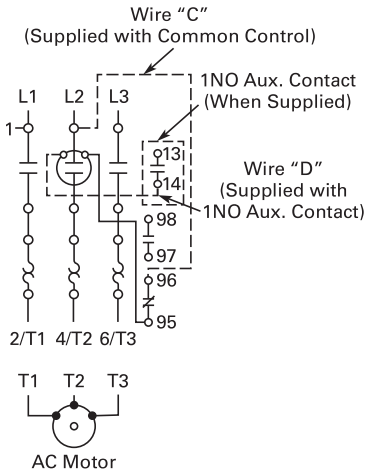


Wiring Diagrams

Single-Phase Connections



Three-Phase Connections

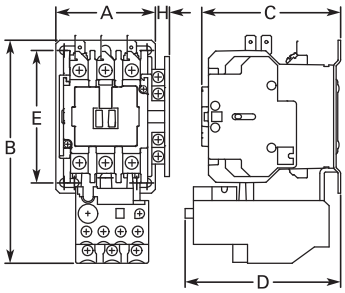


Dimensions

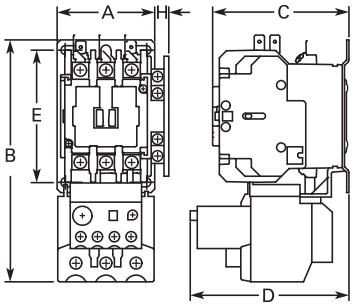
Approximate Dimensions in Inches (mm)

A27 and B27 Starters—Open Type

15 and 25 Ampere



30, 40 and 45 Ampere



Dimensions and Shipping Weights

Ampere Size	Wide A	High B	Deep C	Deep D	Mounting E	Mounting G	Auxiliary Contact Adder H	Shipping Weight Lbs (kg)
15 and 25 (metal plate)	2.40 (61.0)	5.50 (139.0)	3.35 (85.0)	3.70 (94.0)	3.13 (82.6)	—	0.54 (13.7)	1.6 (0.7)
15 and 25 (DIN rail mount)	2.23 (56.5)	5.20 (133.0)	3.35 (85.0)	3.70 (94.0)	—	—	0.54 (13.7)	1.6 (0.7)
30, 40 and 45 (metal plate)	2.40 (61.0)	6.00 (152.0)	3.35 (85.0)	3.90 (98.0)	3.13 (82.6)	—	0.54 (13.7)	1.11 (0.9)
30, 40 and 45 (DIN rail mount)	2.23 (56.5)	5.70 (145.0)	3.35 (85.0)	3.90 (98.0)	—	—	0.54 (13.7)	1.11 (0.9)

15–75A, Single- and Three-Phase—A30, B30 and C440/*XT* Electronic Overload Relay



Contents

Description	*Page*
25–60A, Single- and Three-Phase—A25, B25	**V5-T4-23**
15–45A, Single- and Three-Phase—A27, B27	**V5-T4-30**
15–75A, Single- and Three-Phase—A30, B30 and C440/***XT*** Electronic Overload Relay	
Standards and Certifications	**V5-T4-39**
Catalog Number Selection	**V5-T4-39**
Product Selection	**V5-T4-40**
Accessories	**V5-T4-42**
Technical Data and Specifications	**V5-T4-43**
Wiring Diagrams	**V5-T4-45**

15–75A, Single- and Three-Phase—A30, B30 and C440/*XT* Electronic Overload Relay

Product Description

A30 and B30 Starters

A30 and B30 Definite Purpose Starters from Eaton's Electrical Sector combine the features and flexibility of the C25 Definite Purpose Contactors and C440 Electronic Overload Relays.

C440 Overload

C440 is the most compact, high-featured, economical product in its class.

C440 is a self-powered electronic overload relay available up to 100A as a self contained unit. With external CTs, C440 can protect motor up to 1500 FLA. Available add-on accessories include remote reset capability and communication modules with I/O for DeviceNet, PROFIBUS, and Modbus.

Features

A30 and B30 Starters

- Standard version: selectable trip class (10A, 10, 20, 30) with selectable manual or auto reset
- Current adjustment range: 5:1
- Self-powered design—will accept AC voltages from 12 to 690V 50/60 Hz
- Ambient temperature compensation
- Low heat generation
- Phase loss protection
- Phase unbalance protection
- Electrically isolated 1NO-1NC contacts (push-to-test)
- Trip status indicator

C440 Overload

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Compact size
- Flexible, intelligent design
- Global product offering—available with NEMA, IEC and DP power control

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase unbalance
- Selectable (ON/OFF) ground fault

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase unbalance and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
  - 120 Vac
  - 24 Vac
  - 24 Vdc
- Tamper-proof cover

Standards and Certifications

A30 and B30 Starters

- UL Listed Components
- CSA Certified Components
- IEC EN 60947-4-1, EN 60947-5-1
- CE Certified Components
- CCC Certified Components
- RoHS Certified Components

Catalog Number Selection

A30 and B30 Definite Purpose Starters

A 30 C N C 25 A X 5E 005

Designation
A = Three-phase starter
B = Single-phase starter

Type
30 = Non-reversing

Control
C = Common control
S = Separate control

Enclosure Type
N = Open with metal mounting plate
R = Open with DIN rail mounting adapter (two- and three-pole, 15–50A contactors only)
G = NEMA Type 1 enclosed

Power Terminals

15–40A Contactor
A = Binding head screws without quick connect terminals
B = Binding head screws with quick connect terminals
C = Pressure plate without quick connect terminals
D = Pressure plate with quick connect terminals
E = Lugs without quick connect terminals
F = Lugs with quick connect terminals

50–75A Contactor
E = Lugs without quick connect terminals
F = Lugs with quick connect terminals

Current Ratings

25 = 25A	**45** = 45A
30 = 30A	**60** = 60A
40 = 40A	**75** = 75A

AC Coil Codes

T = 24V	**D** = 550/600V
A = 110/120V	**H** = 277V
B = 208/240V	**L** = 380/415V
C = 440/480V	**J** = 240V/60 Hz; 220V/50 Hz (Available through 50A)

Auxiliary Contacts (Side Mount)
A = 1NO pressure plate
B = 1NC pressure plate
C = 1NO-1NC pressure plate
D = 2NO pressure plate
E = 2NC pressure plate
F = 1NO pressure plate and QC
G = 1NC pressure plate and QC
H = 1NO-1NC pressure plate and QC
J = 2NO pressure plate and QC
K = 2NC pressure plate and QC
L = 1NO-1NC snap switch QC only
M = 2NO-2NC snap switch QC only
X = None

OLR Model Designation
5C = C440 with ground fault
5E = Standard C440 OLR SEL Reset, SEL Class

Overload Range

DP Starters with C440 Electronic Overload

15A–75A Contactor

005 = 1–5A	**045** = 9–45A
020 = 4–20A	**100** = 20–100A

Product Selection

When Ordering Specify

- Catalog number plus AC coil code, auxiliary contact code, OLR model designation and overload range code, see below

A30 Starter



Three-Phase Starters—Open Type A30 with C440 Electronic Overload

Ampere Rating					Common Control		Separate Control	
Inductive Full Load	Line Voltage	Locked Rotor	Maximum Motor (hp)	Maximum Motor (kW)	Metal Mounting Plate Catalog Number ①	DIN Rail Adapter Catalog Number ①	Metal Mounting Plate Catalog Number ①	DIN Rail Adapter Catalog Number ①
25	115	150	—	—	**A30CNC25_**	**A30CRC25_**	**A30SNC25_**	**A30SRC25_**
	230	150	7-1/2	5-1/2				
	460	125	10	7-1/2				
	575	100	10	7-1/2				
30	115	180	—	—	**A30CNE30_**	**A30CRE30_**	**A30SNE30_**	**A30SRE30_**
	230	180	10	7-1/2				
	460	150	15	11				
	575	120	15	11				
40	115	240	—	—	**A30CNE40_**	**A30CRE40_**	**A30SNE40_**	**A30SRE40_**
	230	240	10	7-1/2				
	460	200	20	15				
	575	160	20	15				
45	115	300	—	—	**A30CNE45_**	**A30CRE45_**	**A30SNE45_**	**A30SRE45_**
	230	300	15	11				
	460	250	30	22				
	575	200	30	22				
60	115	360	—	—	**A30CNE60_**	—	**A30SNE60_**	—
	230	360	20	15				
	460	300	40	30				
	575	340	40	30				
75	115	450	—	—	**A30CNE75_**	—	**A30SNE75_**	—
	230	450	20	18-1/2				
	460	375	50	37				
	575	300	50	37				

Note

① Incomplete catalog number. Replace underscore (_) with suffix, see **Page V5-T4-41.**

When Ordering Specify

- Catalog number plus AC coil code, auxiliary contact code, OLR model designation and overload range code, see below

Single-Phase Starters—Open Type, B30 with C440 Electronic Overload

Ampere Rating					Common Control		Separate Control	
Inductive Full Load	Line Voltage	Locked Rotor	Maximum Motor (hp)	Maximum Motor (kW)	Metal Mounting Plate Catalog Number ①	DIN Rail Adapter Catalog Number ①	Metal Mounting Plate Catalog Number ①	DIN Rail Adapter Catalog Number ①
25	115	150	2	1.5	**B30CNC25_**	**B30CRC25_**	**B30SNC25_**	**B30SRC25_**
	230	150	3	2.2				
	460	125	—	—				
	575	100	—	—				
30	115	180	2	1.5	**B30CNE30_**	**B30CRE30_**	**B30SNE30_**	**B30SRE30_**
	230	180	5	3.7				
	460	150	—	—				
	575	120	—	—				
40	115	240	3	2.2	**B30CNE40_**	**B30CRE40_**	**B30SNE40_**	**B30SRE40_**
	230	240	7-1/2	5.5				
	460	200	—	—				
	575	160	—	—				
45	115	300	3	2.2	**B30CNE45_**	**B30CRE45_**	**B30SNE45_**	**B30SRE45_**
	230	300	10	7.5				
	460	250	—	—				
	575	200	—	—				

C440/*XT* Electronic Overload Relay



C440 Electronic Overload Relay for Integrated Use with DP Contactors

C440 Overload Relay for Integrated Use with DP Contactors by Feature Set

FLA Range (Amps)	DP Contactor Rating	Suffix Code	Overload Relay Catalog Number (Standard)	Overload Relay Catalog Number (Ground Fault)
Frame D				
1–5	25–50A	**005**	**C440A1A005SDD**	**C440A2A005SDD**
4–20	25–50A	**020**	**C440A1A020SDD**	**C440A2A020SDD**
9–45	25–50A	**045**	**C440A1A045SDD**	**C440A2A045SDD**
Frame F				
20–100	60–75A	**100**	**C440B1A100SDF**	**C440B2A100SDF**

Note

① Incomplete catalog number. Replace underscore (_) with suffix, see table above.

Accessories

CT Kits

Accessories

Description	Catalog Number
Safety Cover	
Clear Lexan cover that mounts on top of the FLA dial and DIP switches when closed.	**ZEB-XSC**
Reset Bar	
Assembles to the top of the overload to provide a larger target area for door mounted reset operators.	**ZEB-XRB**
Remote Reset	
Remote reset module (24 Vdc) ①	**C440-XCOM**
Remote reset module (120 Vac) ①	**ZEB-XRR-120**
Remote reset module (24 Vac) ①	**ZEB-XRR-24**

Safety Cover



Reset Bar



Remote Reset



Note

① Customer can wire remote mounted button to reset module (that is, 22 mm pushbutton, catalog number M22-D-B-GB14-K10).

Technical Data and Specifications

Electronic Overload Relays up to 1500A

Description	Specification 45 mm	55 mm
Electrical Ratings	**Range**	**Range**
Operating voltage (three-phase) and frequency	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)
FLA Range		
	0.33–1.65A 1–5A 4–20A 9–45A	20–100A
Use with Contactors		
XT IEC frames	B, C, D	F, G
Freedom NEMA sizes	00, 0, 1, 2	3
DP contactors	25–50A	60, 75A
Trip Class		
	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable
Motor Protection		
Thermal overload setting	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip
Feature	**Range**	**Range**
Phase loss	Fixed threshold 50%	Fixed threshold 50%
Phase unbalance (selectable: enable/disable)	Fixed threshold 50%	Fixed threshold 50%
Ground fault (selectable: enable/disable)	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec
Reset	Manual/automatic	Manual/automatic
Indicators		
Trip status	Orange flag	Orange flag
Mode LED	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip
Options		
Remote reset	Yes	Yes
Reset bar	Yes	Yes
Communication expansion module	Yes	Yes
Communication adapter	Yes	Yes
Capacity		
Load terminals		
Terminal capacity	12–10 AWG (4–6 mm^2) 8–6 AWG (6–16 mm^2)	6–1 AWG (16–50 mm^2)
Tightening torque	20–25 lb-in (2.3–2.8 Nm) 25–30 lb-in (2.8–3.4 Nm)	25–30 lb-in (2.8–3.4 Nm)
Input, auxiliary contact and remote reset terminals		
Terminal capacity	2 x (18–12) AWG	2 x (18–12) AWG
Tightening torque	5.3 lb-in (0.8–1.2 Nm)	5.3 lb-in (0.8–1.2 Nm)
Voltages		
Insulation voltage U_i (three-phase)	690 Vac	690 Vac
Insulation voltage U_i (control)	500 Vac	500 Vac
Rated impulse withstand voltage	6000 Vac	6000 Vac
Overvoltage category/pollution degree	III/3	III/3

Electronic Overload Relays up to 1500A, continued

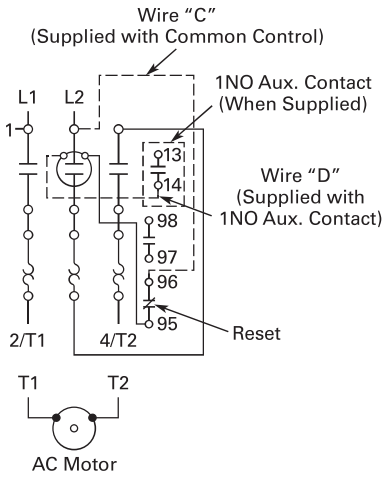
Description	Specification 45 mm	55 mm
Auxiliary and Control Circuit Ratings		
Conventional thermal continuous current	5A	5A
Rated operational current—IEC AC-15		
Make contact (1800 VA)		
120V	15A	15A
240V	15A	15A
415V	0.5A	0.5A
500V	0.5A	0.5A
Break contact (180 VA)		
120V	1.5A	1.5A
240V	1.5A	1.5A
415V	0.9A	0.9A
500V	0.8A	0.8A
IEC DC-13 (L/R F 15 ms1)		
0–250V	1.0A	1.0A
Rated operational current—UL B600		
Make contact (3600 VA)		
120V	30A	30A
240V	15A	15A
480V	7.5A	7.5A
600V	6A	6A
Break contact (360 VA)		
120V	3A	3A
240V	1.5A	1.5A
480V	0.75A	0.75A
600V	0.6A	0.6A
R300—Vdc ratings (28 VA)		
0–120V	0.22A	0.22A
250V	0.11A	0.11A
Short-Circuit Rating without Welding		
Maximum fuse	6A gG/gL	6A gG/gL
Environmental Ratings		
Ambient temperature (operating)	–13° to 149°F (–25° to 65°C)	–13° to 149°F (–25° to 65°C)
Ambient temperature (storage)	–40° to 185°F (–40° to 85°C)	–40° to 185°F (–40° to 85°C)
Operating humidity UL 991 (H3)	5% to 95% non-condensing	5% to 95% non-condensing
Altitude (no derating) NEMA ICS1	2000m	2000m
Shock (IEC 600068-2-27)	15g any direction	15g any direction
Vibration (IEC 60068-2-6)	3g any direction	3g any direction
Pollution degree per IEC 60947-4-1	3 for product (2 for pcb)	3 for product (2 for pcb)
Ingress protection	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Mounting position	Any	Any
Climatic proofing	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30

Electronic Overload Relays up to 1500A, continued

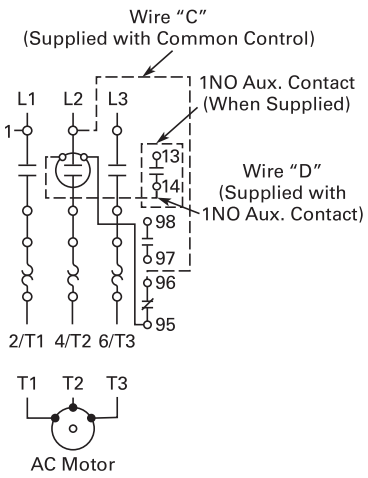
Description	Specification 45 mm	55 mm
Electrical/EMC		
Radiated emissions IEC 60947-4-1-Table 15 EN 55011 (CISPIR 11) Group 1, Class A, ISM	30 MHz to 1000 MHz	30 MHz to 1000 MHz
Conducted emissions IEC 60947-4-1-Table 14 EN 55011 (CISPIR 11) Group 1; Class ISM	0.15 MHz to 30 MHz	0.15 MHz to 30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact
Radiated immunity IEC 60947-4-1 IEC 61000-4-3	10V/m 80 MHz–1000 MHz 3V/m from 1.4 to 2.7 GHz 80% amplitude modulated 1 kHz sine wave	10V/m 80 MHz–1000 MHz 3V/m from 1.4 to 2.7 GHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1, IEC 61000-4-6	140 dub (10V rms) 150 kHz–100 MHz	140 dub (10V rms) 150 kHz–100 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 a Class 4	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)
Power freq. magnetic field immunity IEC 60947-4-1, IEC 61000-4-8	30A/m, 50 Hz	30A/m, 50 Hz
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m	10 V/m
Distortion IEEE 519	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.
Electrostatic discharge (ESD) IEC 61000-4-2, EN 61131-2	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge
Electrical fast transient (EFT) IEC 61000-4-4, EN 61131-2	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 61000-4-5, EN 61131-2	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)

Wiring Diagrams

Single-Phase Connections



Three-Phase Connections



15–60A Contactors—C25



Contents

Description	*Page*
15–60A Contactors—C25	
Catalog Number Selection	**V5-T4-47**
Product Selection	**V5-T4-47**
Dimensions	**V5-T4-48**
25–60A Starters—A25, B25	**V5-T4-49**
15–45A Starters—A27, B27	**V5-T4-52**
Accessories	**V5-T4-55**
Options	**V5-T4-57**
Technical Data and Specifications	**V5-T4-58**

15–60A Contactors—C25

Product Description

Eaton offers the Definite Purpose Contactors and Starters in NEMA 1 enclosures. The C25 contactors are available as enclosed. The A25 and B25 Definite Purpose Starters combine the features and flexibility of the C25 Definite Purpose Contactors and Freedom Series Bimetallic Ambient Compensated Overload Relays mounted on a common mounting plate.

Catalog Number Selection

15–60A Contactors—C25

C25DGD215 A X

Incomplete catalog number	Magnet coil suffix	Option code as necessary

When Ordering Specify

- Catalog number plus magnet coil suffix, see **Page V5-T4-48**
- Modify catalog number for any options required, see Options, **Page V5-T4-57**

Product Selection

C25 Enclosed



Two-, Three- and Four-Pole NEMA Type 1 Enclosed Contactors

Ampere Rating				Maximum Motor (hp)		Maximum Motor (kW)			NEMA Type 1
Inductive Full Load	Resistive per Pole	Line Voltage	Locked Rotor	Single-Phase	Three-Phase	Single-Phase	Three-Phase	Number of Poles	Catalog Number ①
15	20	115	90	3/4	—	0.40	—	2	**C25DGD215_**
		230	90	2	3	1.5	2.2	3	**C25DGD315_**
		460	75	—	5	—	3.7		**C25DGD315_**
		575	60	—	5	—	3.7		**C25DGD315_**
25	35	115	150	2	—	1.5	—	2	**C25DGD225_**
		230	150	3	7-1/2	2.2	5.5	3	**C25DGD325_**
		460	125	—	10	—	7.5	4	**C25EGD425_**
		575	100	—	10	—	7.5		**C25EGD425_**
30	40	115	180	2	—	1.5	—	2	**C25DGD230_**
		230	180	5	10	3.7	7.5	3	**C25DGD330_**
		460	150	—	15	—	11	4	**C25EGD430_**
		575	120	—	15	—	11		**C25EGD430_**
40	50	115	240	3	—	2.2	—	2	**C25DGF240_**
		230	240	7-1/2	10	5.5	7.5	3	**C25DGF340_**
		460	200	—	20	—	15	4	**C25EGF440_**
		575	160	—	20	—	15		**C25EGF440_**
50	65	115	300	3	—	2.2	—	2	**C25DGJ250_**
		230	300	10	15	7.5	11	3	**C25DGJ350_**
		460	250	—	30	—	22		**C25DGJ350_**
		575	200	—	30	—	22		**C25DGJ350_**
60	75	115	360	5	—	3.7	—	2	**C25FGF260_**
		230	360	10	20	7.5	15	3	**C25FGF360_**
		460	300	—	40	—	30		**C25FGF360_**
		575	240	—	40	—	30		**C25FGF360_**

Note

① Incomplete catalog number. Replace underscore (_) in catalog number with magnet coil suffix from table on **Page V5-T4-48**.

Magnet Coil Suffix

Voltage 60 Hertz	50 Hertz	Coil Suffix
AC ①		
12	12	**R**
24	24	**T**
110–120 ②	110–120 ②	**A**
208–240	208–240	**E**
240 ③	220	**B**
277	—	**J**
—	380–415	**H**
440–480	440–480	**L**
550–600	550–600	**C**
12	12	**D**

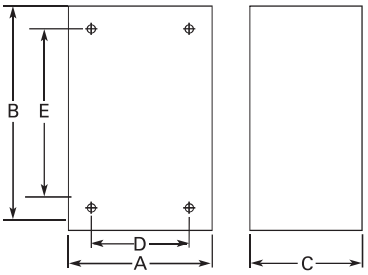
Voltage 60 Hertz	Coil Suffix
DC ④	
12	**1R**
24	**1T**
48	**1W**
120	**1A**

Dimensions

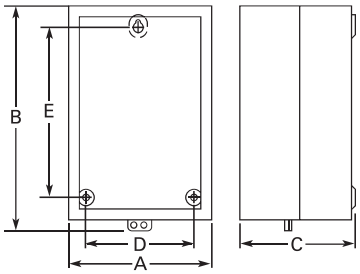
Approximate Dimensions in Inches (mm)

C25 Contactors, NEMA 1 Enclosed

15–50 Ampere, Two- and Three-Pole (C799B18)



25–40 Ampere, Four-Pole— 60 Ampere, Two- and Three-Pole (C799B19)



Dimensions and Shipping Weights

Ampere Size	Number of Poles	Wide A	High B	Deep C	Mounting D	E	Shipping Weight Lbs (kg)
NEMA 1 Enclosed							
15–50	2 and 3	4.10 (104.0)	6.75 (171.0)	3.50 (89.0)	2.75 (70.0)	4.88 (124.0)	3.4 (1.5)
25–40	4	5.62 (142.0)	9.51 (241.0)	4.81 (122.0)	4.50 (114.0)	8.00 (203.0)	5.8 (2.6)
60	2 and 3	5.62 (142.0)	9.51 (241.0)	4.81 (122.0)	4.50 (114.0)	8.00 (203.0)	6.3 (2.9)

Notes

① Class H AC coils available as option. Add **2** before AC coil suffix letter.
② 104–120A 50/60 Hz for 60A contactor.
③ Available through 50A.
④ Contactors with DC coils include an early break NC auxiliary contact, C320KGD1. See **Page V5-T4-62** for more detail.

25–60A Starters—A25, B25



Contents

Description	*Page*
15–60A Contactors—C25	**V5-T4-46**
25–60A Starters—A25, B25	
Catalog Number Selection	**V5-T4-50**
Product Selection	**V5-T4-50**
Dimensions	**V5-T4-51**
15–45A Starters—A27, B27	**V5-T4-52**
Accessories	**V5-T4-55**
Options	**V5-T4-57**
Technical Data and Specifications	**V5-T4-58**

25–60A Starters—A25, B25

Product Description

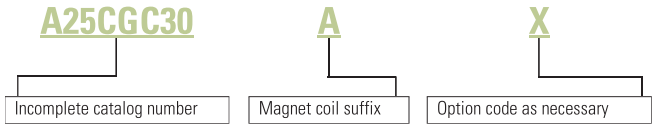
A25 and B25 Definite Purpose Starters from Eaton's Electrical Sector combine the features and flexibility of the C25 Definite Purpose Contactors and Freedom Series Bi-metallic Ambient Compensated Overload Relays mounted on a common mounting plate.

Standards and Certifications

- UL Recognized Components UL File #E-1491, Guide NLDX2
- CSA Certified Components File #LR353, Guide 380W-1.14 Class 3211 04

Catalog Number Selection

25–60A Starters—A25, B25



4

When Ordering Specify

- Catalog number plus magnet coil suffix, see **Page V5-T4-51**
- Modify catalog number for any options required, see Options, **Page V5-T4-57**
- Heater packs for specific FLA of motor, see **Page V5-T4-56**

Product Selection

A25, B25 Enclosed



Single- and Three-Phase NEMA Type 1 Enclosed Starters

Ampere Rating			Maximum Motor (hp)		Maximum Motor (kW)		Single-Phase ①②		Three-Phase ②	
							Common Control	Separate Control	Common Control	Separate Control
Inductive Full Load	Line Voltage	Locked Rotor	Single-Phase	Three-Phase	Single-Phase	Three-Phase	Catalog Number ③	Catalog Number ③	Catalog Number ③	Catalog Number ③
25	115	150	2	—	1.5	—	B25CGC25_	B25SGC25_	A25CGC25_	A25SGC25_
	230	150	3	7-1/2	2.2	5.5	B25CGC25_	B25SGC25_	A25CGC25_	A25SGC25_
	460	125	—	10	—	7.5	B25CGC25_	B25SGC25_	A25CGC25_	A25SGC25_
	575	100	—	10	—	7.5	B25CGC25_	B25SGC25_	A25CGC25_	A25SGC25_
30	115	180	2	—	1.5	—	B25CGC30_	B25SGC30_	A25CGC30_	A25SGC30_
	230	180	5	10	3.7	7.5	B25CGC30_	B25SGC30_	A25CGC30_	A25SGC30_
	460	150	—	15	—	11	B25CGC30_	B25SGC30_	A25CGC30_	A25SGC30_
	575	120	—	15	—	11	B25CGC30_	B25SGC30_	A25CGC30_	A25SGC30_
40	115	240	3	—	2.2	—	B25CGE40_	B25SGE40_	A25CGE40_	A25SGE40_
	230	240	7-1/2	10	5.5	7.5	B25CGE40_	B25SGE40_	A25CGE40_	A25SGE40_
	460	200	—	20	—	15	B25CGE40_	B25SGE40_	A25CGE40_	A25SGE40_
	575	160	—	20	—	15	B25CGE40_	B25SGE40_	A25CGE40_	A25SGE40_
50	115	300	—	—	—	—	—	—	A25CGE50_	A25SGE50_
	230	300	—	15	—	11	—	—	A25CGE50_	A25SGE50_
	460	250	—	30	—	22	—	—	A25CGE50_	A25SGE50_
	575	200	—	30	—	22	—	—	A25CGE50_	A25SGE50_
60	115	360	—	—	—	—	—	—	A25CGE60_	A25SGE60_
	230	360	—	20	—	15	—	—	A25CGE60_	A25SGE60_
	460	300	—	40	—	30	—	—	A25CGE60_	A25SGE60_
	575	240	—	40	—	30	—	—	A25CGE60_	A25SGE60_

Notes

① Starters do not include heater packs. Select heater pack from tables, see **Page V5-T4-56**.
② Set of three heater packs required for single-phase applications.
③ Incomplete catalog number. Replace underscore (_) in catalog number with magnet coil suffix from table on **Page V5-T4-51**.

Magnet Coil Suffix

Voltage 60 Hertz	50 Hertz	Coil Suffix
AC ①		
12	12	**R**
24	24	**T**
110–120 ②	110–120 ②	**A**
208–240	208–240	**B**
240 ③	220	**J**
277	—	**H**
—	380–415	**L**
440–480	440–480	**C**
550–600	550–600	**D**

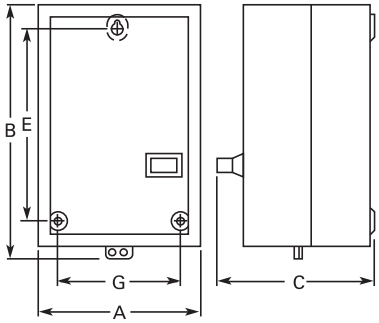
Voltage 60 Hertz	Coil Suffix
DC ④	
12	**1R**
24	**1T**
48	**1W**
120	**1A**

Dimensions

Approximate Dimensions in Inches (mm)

A25 and B25 Starters

25, 30, 40, 50 and 60 Ampere



Dimensions and Shipping Weights

Ampere Size	Wide A	High B	Deep C	Mounting E	Mounting G	Shipping Weight Lbs (kg)
25 and 30	5.63 (143.0)	10.17 (258.0)	5.81 (148.0)	8.00 (203.0)	4.50 (114.0)	4.8 (2.2)
40, 50 and 60	7.64 (194.0)	13.27 (337.0)	6.67 (169.0)	10.75 (273.0)	6.00 (152.0)	10.6 (4.8)

Notes

① Class H AC coils available as option. Add **2** before AC coil suffix letter.
② 104–120A 50/60 Hz for 60A starter.
③ Available through 50A.
④ Starters with DC coils include an early breaking auxiliary contact, C320KGD1. See **Page V5-T4-62** for more detail.

15–45A Starters—A27, B27



Contents

Description	*Page*
15–60A Contactors—C25	**V5-T4-46**
25–60A Starters—A25, B25	**V5-T4-49**
15–45A Starters—A27, B27	
Product Selection	**V5-T4-53**
Dimensions	**V5-T4-54**
Accessories	**V5-T4-55**
Options	**V5-T4-57**
Technical Data and Specifications	**V5-T4-58**

15–45A Starters—A27, B27

Product Description

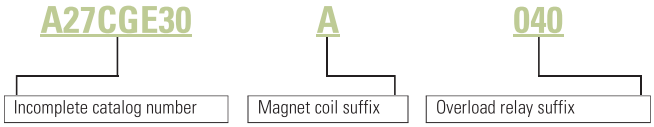
A27 and B27 Definite Purpose Starters from Eaton's Electrical Sector combine the features and flexibility of the C25 Definite Purpose Contactors and ***XT*** Series Bi-metallic Ambient Compensated Overload Relays.

Standards and Certifications

- UL Recognized Components UL File #E-1491, Guide NLDX2
- CSA Certified Components File #LR353, Guide 380W-1.14 Class 3211 04
- CE

Catalog Number Selection

15–45A Starters—A27, B27



When Ordering Specify

- Catalog number plus magnet coil suffix plus overload relay suffix, see **Page V5-T4-54**

Product Selection

A27, B27 Enclosed



Single- and Three-Phase NEMA Type 1 Enclosed Starters

Ampere Rating			Maximum Motor (hp)		Maximum Motor (kW)		Single-Phase		Three-Phase	
							Common Control	Separate Control	Common Control	Separate Control
Inductive Full Load	Line Voltage	Locked Rotor	Single-Phase	Three-Phase	Single-Phase	Three-Phase	Catalog Number ①	Catalog Number ①	Catalog Number ①	Catalog Number ①
15	115	90	3/4	—	0.4	—	B27CGC15_	B27SGC15_	A27CGC15_	A27SGC15_
	230	90	2	3	1.5	2.2	B27CGC15_	B27SGC15_	A27CGC15_	A27SGC15_
	460	75	—	5	—	3.7	B27CGC15_	B27SGC15_	A27CGC15_	A27SGC15_
	575	60	—	5	—	3.7	B27CGC15_	B27SGC15_	A27CGC15_	A27SGC15_
25	115	150	2	—	1.5	—	B27CGC25_	B27SGC25_	A27CGC25_	A27SGC25_
	230	150	3	7-1/2	2.2	5.5	B27CGC25_	B27SGC25_	A27CGC25_	A27SGC25_
	460	125	—	10	—	7.5	B27CGC25_	B27SGC25_	A27CGC25_	A27SGC25_
	575	100	—	10	—	7.5	B27CGC25_	B27SGC25_	A27CGC25_	A27SGC25_
30	115	180	2	—	1.5	—	B27CGE30_	B27SGE30_	A27CGE30_	A27SGE30_
	230	180	5	10	3.7	7.5	B27CGE30_	B27SGE30_	A27CGE30_	A27SGE30_
	460	150	—	15	—	11	B27CGE30_	B27SGE30_	A27CGE30_	A27SGE30_
	575	120	—	15	—	11	B27CGE30_	B27SGE30_	A27CGE30_	A27SGE30_
40	115	240	3	—	2.2	—	B27CGE40_	B27SGE40_	A27CGE40_	A27SGE40_
	230	240	7-1/2	10	5.5	7.5	B27CGE40_	B27SGE40_	A27CGE40_	A27SGE40_
	460	200	—	20	—	15	B27CGE40_	B27SGE40_	A27CGE40_	A27SGE40_
	575	160	—	20	—	15	B27CGE40_	B27SGE40_	A27CGE40_	A27SGE40_
45	115	270	3	—	2.2	—	B27CGE45_	B27SGE45_	A27CGE45_	A27SGE45_
	230	270	7-1/2	15	7.5	11	B27CGE45_	B27SGE45_	A27CGE45_	A27SGE45_
	460	225	—	30	—	22	B27CGE45_	B27SGE45_	A27CGE45_	A27SGE45_
	575	180	—	30	—	22	B27CGE45_	B27SGE45_	A27CGE45_	A27SGE45_

Note

① Incomplete catalog number. Replace underscore (_) in catalog number with magnet coil suffix plus overload relay suffix from tables on **Page V5-T4-54**.

Magnet Coil Suffix

Voltage 60 Hertz	50 Hertz	Coil Suffix
AC ①		
12	12	**R**
24	24	**T**
110–120	110–120	**A**
208–240	208–240	**B**
240 ②	220	**J**
277	—	**H**
—	380–415	**L**
440–480	440–480	**C**
550–600	550–600	**D**

Voltage 60 Hertz	Coil Suffix
DC ③	
12	**1R**
24	**1T**
48	**1W**
120	**1A**

Overload Relay Suffix

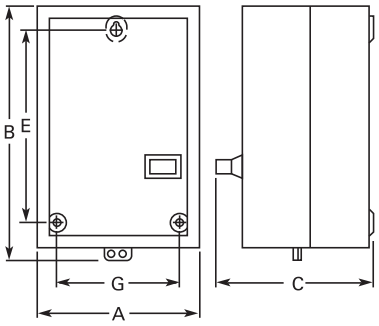
Motor Full Load Amperes	Suffix Code	For use with Contactor Ampere Range
Frame C		
0.1–0.16	**P16**	15–25A
0.16–0.24	**P24**	15–25A
0.24–0.4	**P40**	15–25A
0.4–0.6	**P60**	15–25A
0.6–1	**001**	15–25A
1–1.6	**1P6**	15–25A
1.6–2.4	**2P4**	15–25A
2.4–4	**004**	15–25A
4–6	**006**	15–25A
6–10	**010**	15–25A
10–16	**016**	15–25A
16–24	**024**	15–25A
24–32	**032**	15–25A
Frame D		
6–10	**010**	30–45A
10–16	**016**	30–45A
16–24	**024**	30–45A
24–40	**040**	30–45A
40–57	**057**	30–45A

Dimensions

Approximate Dimensions in Inches (mm)

A27 and B27 Starters

15, 25, 30, 40 and 50 Ampere



Dimensions and Shipping Weights

Ampere Size	Wide A	High B	Deep C	Mounting E	Mounting G	Shipping Weight Lbs (kg)
25 and 30	5.63 (143.0)	10.17 (258.0)	5.81 (148.0)	8.00 (203.0)	4.50 (114.0)	4.8 (2.2)
40, 50 and 60	7.64 (194.0)	13.27 (337.0)	6.67 (169.0)	10.75 (273.0)	6.00 (152.0)	10.6 (4.8)

Notes

① Class H AC coils available as option. Add **2** before AC coil suffix letter.
② Available through 45A.
③ Starters with DC coils include an early breaking auxiliary contact, C320KGD1. See **Page V5-T4-62** for more detail.

Accessories

Auxiliary Contact Kits (Side Mounted)

Side Mounted Auxiliary Contact



Heavy-Duty Pilot Rated for 10A at 600 Vac

Circuit	With Standard Pressure Plate Terminals Catalog Number	With Pressure Plate and Quick Connect Terminals Catalog Number
For 15 through 75A		
1NO	**C320KG1**	**C320KG11**
1NC	**C320KG2**	**C320KG12**
1NO-1NC	**C320KG3**	**C320KG13**
2NO	**C320KG4**	**C320KG14**
2NC	**C320KG5**	**C320KG15**
For 90A		
1NO	—	**C320DPG10**
1NC	—	**C320DPG01**
1NO-1NC	—	**C320DPG11**
2NO	—	**C320DPG20**
For 120 through 360A		
1NO	**C320KGS20**	—
1NC	**C320KGS21**	—
1NO-1NC	**C320KGS22**	—

Side Mounted Snap Switch



Snap Switch Design Side Mounted Auxiliary Contacts

Circuit	Snap Switch Design with Quick Connect Terminals Catalog Number
1NO-1NC	**C320SNP11**
2NO-2NC	**C320SNP22**

Magnet Coil Quick Connect Terminal

Description
Extra dual quick connect terminals (U-shaped) for magnet coil terminals ②

Note

① To order, add suffix number **9** to the complete catalog number. Example: C25DND215A**9**.

Heater Packs

Fast Trip—Class 10 Heater Packs

Manual or Automatic Reset

Heater packs are shipped three to a carton.
Catalog numbers listed below are for three heater packs.

Fast Trip Ratings

Motor Full Load Ampere Rating ① Dial Position A	B	C	D	Catalog Number ② (Includes Three Heater Packs)
0.26	0.313	0.367	0.42	**H2101B-3**
0.384	0.464	0.543	0.623	**H2102B-3**
0.57	0.688	0.806	0.924	**H2103B-3**
0.846	1.02	1.2	1.37	**H2104B-3**
1.28	1.55	1.83	2.1	**H2105B-3**
1.92	2.33	2.74	3.15	**H2106B-3**
2.3	2.79	3.28	3.77	**H2107B-3**
3.38	4.1	4.82	5.54	**H2108B-3**
4.96	6.03	7.09	8.16	**H2109B-3**
7.07	8.58	10.1	11.6	**H2110B-3**
9.6	11.2	12.8	14.4	**H2111B-3**
14.4	17.5	20.7	23.8	**H2112B-3**
18.7	21.8	25	28.1	**H2113B-3**
23.5	27.3	31	34.8	**H2114B-3**
28.3	32.6	37	41.3	**H2115B-3**
36.6	42.3	48.1	53.8	**H2116B-3**
53.8	60.8	67.9	74.9	**H2117B-3**

Trip Curves, see **Page V5-T4-58.**

Notes

① For motor full load amperes between listed values, adjust dial clockwise for higher or counter-clockwise for lower motor currents. The currents listed are for 1.5 service factor motors. A position adjustment is provided for 1.0 service factor motors.

② Set of three heater packs are required for both single- and three-phase applications.

Standard Trip—Class 20 Heater Packs

Manual or Automatic Reset

Heater packs are shipped three to a carton.
Catalog numbers listed below are for three heater packs.

Standard Trip Ratings

Motor Full Load Ampere Rating ① Dial Position A	B	C	D	Catalog Number ② (Includes Three Heater Packs)
0.254	0.306	0.359	0.411	**H2001B-3**
0.375	0.452	0.53	0.607	**H2002B-3**
0.56	0.676	0.791	0.907	**H2003B-3**
0.814	0.983	1.15	1.32	**H2004B-3**
1.2	1.45	1.71	1.96	**H2005B-3**
1.79	2.16	2.53	2.9	**H2006B-3**
2.15	2.6	3.04	3.49	**H2007B-3**
3.23	3.9	4.56	5.23	**H2008B-3**
4.55	5.5	6.45	7.4	**H2009B-3**
6.75	8.17	9.58	11	**H2010B-3**
9.14	10.8	12.4	14	**H2011B-3**
14	16.9	19.9	22.8	**H2012B-3**
18.7	22.7	26.7	30.7	**H2013B-3**
23.5	28.5	33.5	38.5	**H2014B-3**
29	34	39.1	44.1	**H2015B-3**
39.6	45.5	51.5	57.4	**H2016B-3**
53.9	60.9	67.9	74.9	**H2017B-3**

Trip Curves, see **Page V5-T4-58.**

Options

To order C25, C65, A25 and B25 contactors and starters with the factory installed options listed below, change the basic catalog number listed in the product selection table as noted.

Factory Installed Options

Description	Code Letter	Number of Poles
Terminals—15A through 50A		
Binding head screws		
Without quick connect terminals	**A**	2-, 3-, 4-pole
With quick connect terminals (side-by-side)	**B**	2-, 3-, 4-pole
With quick connect terminals (vertical in-line)	**G**	2-, 3-pole
Screw/pressure plate ①		
Without quick connect terminals	**C**	2-, 3-, 4-pole
With quick connect terminals (side-by-side)	**D**	2-, 3-, 4-pole
With quick connect terminals (vertical in-line)	**H**	2-, 3-pole
Box lugs (#2 posidrive/slotted screw)		
Without quick connect terminals	**E**	2-, 3-, 4-pole ②
With quick connect terminals (side-by-side)	**F**	2-, 3-, 4-pole ②
With quick connect terminals (vertical in-line)	**J**	2-, 3-pole
Box lugs (hex socket allen head screw)		
Without quick connect terminals	**K**	2-, 3-pole
With quick connect terminals (side-by-side)	**L**	2-, 3-pole
With quick connect terminals (vertical in-line)	**M**	2-, 3-pole
Terminals—60A through 75A ③		
Box lugs (slotted screw)		
Without quick connect terminals	**E**	2-, 3-pole
With quick connect terminals	**F**	2-, 3-pole

Notes

① Screw/pressure plate terminals are not available on 50A contactors.

② Four-pole contactors have box lugs with slotted screws.

③ Replace letter in the **6th** position of catalog number with code letter listed. Example: Change C25FN**F**250 to C25FN**E**250.

Technical Data and Specifications

20–40A, Compact Single- and Two-Pole—C25

Description	Specification
Insulation voltage	690V
Current rated and hp/kw rated contacts	Double break
Magnet coil	Class F, 155°C
Contact arc covers	Standard on all contactors
Standard power terminals	5/16 in hex washer head screws Quad (4) quick connect terminals on all line and load terminals Box lugs available as option
Line and load terminal designations	Marked on contactors
Operating temperature range	–13° to 158°F (–25° to 70°C)
Terminal wire range	
Hex washer head screws	6–10 AWG, 30 lb-in torque rating
Box lugs	6–10 AWG, 35 lb-in torque rating 8 AWG, 40 lb-in torque rating 6–4 AWG, 45 lb-in torque rating
Mounting position	Vertical, horizontal or tabletop

Coil Characteristics

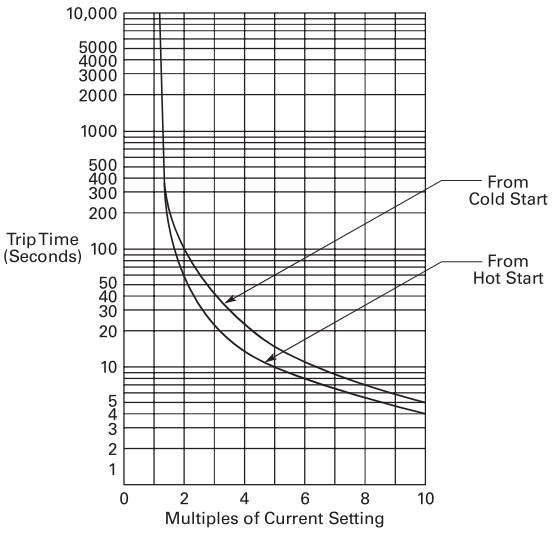
AC Coil Voltage 50/60 Hz	Maximum Inrush VA	Maximum Sealed VA	Maximum Sealed Watts
Single-Pole			
24	33	6	2
120	33	6	2
208/240	33	6	2
277	33	6	2

AC Coil Voltage 50/60 Hz	Maximum Inrush VA	Maximum Sealed VA	Maximum Sealed Watts
Two-Pole			
24	41	6.5	3
120	41	6.5	3
208/240	41	6.5	3
277	41	6.5	3

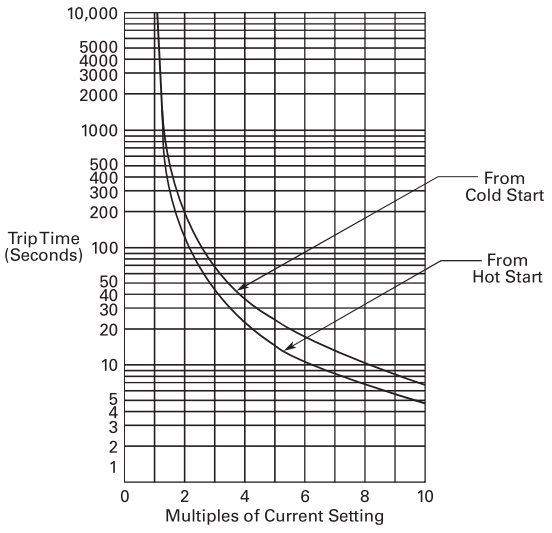
Trip Curves

Bimetallic Ambient Compensated Overload Relay—25°C Open Rating

Class 10 Overload Relay (25°C Open Rating)



Class 20 Overload Relay (25°C Open Rating)



Renewal Parts

Renewal Contact Kits for C25 Definite Purpose Contactors

- Replace complete contactor for:
  - C25A_
  - C25B_
  - C25C_
  - C25D_

Renewal Contact Kits for C25 Definite Purpose Contactors

Catalog Number	Single-Pole Kit Part Number	Two-Pole Kit Part Number	Three-Pole Kit Part Number
C25FNF250	—	6-65-5	—
C25FNF350	—	—	6-65-6
C25FNF260	—	6-65-7	—
C25FNF360	—	—	6-65-8
C25FNF275	—	6-65-20	—
C25FNF375	—	—	6-65-19
C25GNF290	—	—	—
C25GNF390	—	—	—
C25HNE3120	—	—	6-43-6
C25KNE3200	—	—	6-288
C25KNE3300	—	—	6-286
C25LNE3360	—	—	6-45-2

Product Selection

AC Coils

AC Coil Voltage	Frequency	Inrush (Maximum) VA	Inrush (Maximum) Watts	Sealed (Maximum) VA	Sealed (Maximum) Watts	Coil Suffix	Class	Part Number
15, 25, 30 and 40A—Two- and Three-Pole (Series D1 and E1)								
12	60	74.85	46.1	5.53	1.68	**R**	Class F, 155°C	**9-3185-5**
24		81.35	49.7	5.83	1.74	**T**		**9-3185-6**
110/120		74.69	51.6	5.79	1.81	**A**		**9-3185-1**
208/240		82.64	59.1	6.96	2.38	**B**		**9-3185-2**
220/240	60	74.03	51.8	5.85	1.99	**J**	Class F, 155°C	**9-3185-10**
440/480		73.39	52.1	6.09	2.58	**C**		**9-3185-3**
550/600		79.47	51.7	6.56	3.05	**D**		**9-3185-4**
277		72.88	52.4	6.09	2.58	**H**		**9-3185-7**
380/415	50	64.5	50.6	6.08	2.43	**L**	Class F, 155°C	**9-3185-8**
15, 25, 30 and 40A—Two- and Three-Pole (Series C1)								
12	60	65	30	11	2.5	**R**	Class F, 155°C	**9-3125-5**
24		65	30	11	2.5	**T**		**9-3125-6**
104/120		65	30	11	2.5	**A**		**9-3125-1**
208/240	50	75	35	17	3.5	**B**	Class F, 155°C	**9-3125-2**
440/480		75	35	17	3.5	**C**		**9-3125-3**
550/600		75	35	17	3.5	**D**		**9-3125-4**
277	60	65	30	11	2.5	**H**	Class F, 155°C	**9-3125-8**
380/415	50	75	35	17	3.5	**L**	Class F, 155°C	**9-3125-8**

AC Coils, continued

AC Coil Voltage	Frequency	Inrush (Maximum) VA	Inrush (Maximum) Watts	Sealed (Maximum) VA	Sealed (Maximum) Watts	Coil Suffix	Class	Part Number
15, 25, 30 and 40A—Two- and Three-Pole (Series D1 and E1)								
12	60	74.85	46.1	5.53	1.68	**R**	Class H, 180°C	**9-3252-5**
24		81.35	49.7	5.83	1.74	**T**		**9-3252-6**
110/120		74.69	51.6	5.79	1.81	**A**		**9-3252-1**
208/240		82.64	59.1	6.96	2.38	**B**		**9-3252-2**
220/240	60	74.03	51.8	5.85	1.99	**J**	Class H, 180°C	**9-3252-10**
440/480		73.39	52.1	6.09	2.58	**C**		**9-3252-3**
550/600		79.47	51.7	6.56	3.05	**D**		**9-3252-4**
277		72.88	52.4	6.09	2.58	**H**		**9-3252-7**
380/415	50	64.5	50.6	6.08	2.43	**L**	Class H, 180°C	**9-3252-8**
50A—Two- and Three-Pole (Series D1 and E1)								
12	60	115.8	73.6	7.71	2.8	**R**	Class F, 155°C	**9-3186-5**
24		118.1	70.7	7.58	2.79	**T**		**9-3186-6**
110/120		110.7	73.3	7.67	2.89	**A**		**9-3186-1**
208/240		124.9	90.3	10.04	3.74	**B**		**9-3186-2**
220/240	60	112.9	76.2	7.6	3.02	**J**	Class F, 155°C	**9-3186-10**
440/480		114.7	75.6	8.01	3.68	**C**		**9-3186-3**
550/600		109	78.6	8.21	4.11	**D**		**9-3186-4**
277		115.4	73.1	7.73	3.12	**H**		**9-3186-7**
380/415	50	110.3	77	8.66	3.31	**L**	Class F, 155°C	**9-3186-8**
50A—Two- and Three-Pole (Series D1 and E1)								
12	60	115.8	73.6	7.71	2.8	**R**	Class H, 180°C	**9-3253-5**
24		118.1	70.7	7.58	2.79	**T**		**9-3253-6**
110/120		110.7	73.3	7.67	2.89	**A**		**9-3253-1**
208/240		124.9	90.3	10.04	3.74	**B**		**9-3253-2**
220/240	60	112.9	76.2	7.6	3.02	**J**	Class H, 180°C	**9-3253-10**
440/480		114.7	75.6	8.01	3.68	**C**		**9-3253-3**
550/600		109	78.6	8.21	4.11	**D**		**9-3253-4**
277		115.4	73.1	7.73	3.12	**H**		**9-3253-7**
380/415	50	110.3	77	8.66	3.31	**L**	Class H, 180°C	**9-3253-8**
60 and 75A—Two- and Three-Pole; 25, 30 and 40A—Four-Pole								
12	60	204	84	36.5	8	**R**	Class B, 130°C	**9-3256-5**
24						**T**		**9-3256-6**
104/120						**A**		**9-3256-1**
208/240	50	240	100.8	50.4	10.8	**B**	Class B, 130°C	**9-3256-2**
440/480						**C**		**9-3256-3**
550/600						**D**		**9-3256-4**
277	60	204	84	36.5	8	**H**	Class B, 130°C	**9-3256-7**
380/415	50	199	88.8	37.8	8.8	**L**	Class B, 130°C	**9-3256-8**

AC Coils, continued

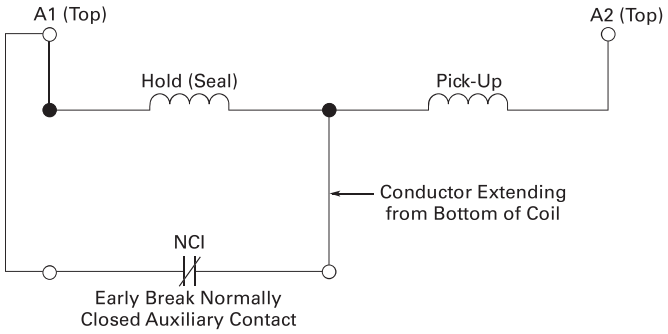
AC Coil Voltage	Frequency	Inrush (Maximum) VA	Watts	Sealed (Maximum) VA	Watts	Coil Suffix	Class	Part Number
90A—Two- and Three-Pole (Series F1)								
24	50/60	325/300	—	48/35	12	**T**	Class B, 130°C	**9-3080-1**
110/120						**A**		**9-3080-2**
208–220						**B**		**9-3080-3**
380–415	50/60	325/300	—	48/35	12	**C**	Class B, 130°C	**9-3080-5**
277	60	325/300	—	48/35	12	**H**	Class B, 130°C	**9-3080-4**
120A—Three-Pole								
24	50/60	390	112	49.8	13	**T**	Class B, 130°C	**9-2756-16**
110/120						**A**		**9-2756-1**
220/240						**B**		**9-2756-2**
440/480						**C**		**9-2756-3**
550/600						**D**		**9-2756-4**
208	60	390	112	49.8	13	**E**	Class B, 130°C	**9-2756-5**
277						**H**		**9-2756-9**
200, 300 and 360A—Three-Pole								
110/120	50/60	1040	216	116	17	**A**	Class F, 155°C	**9-1891-1**
220/240						**B**		**9-1891-2**
440/480						**C**		**9-1891-3**
550/600						**D**		**9-1891-4**
208	60	1040	216	116	17	**E**	Class F, 155°C	**9-1891-13**
277						**H**		**9-1891-26**

DC Operation

These DC coils have separate pick-up and seal windings. The pick-up winding must be connected to an early break normally closed auxiliary contact block and provide the magnetic force required to close the magnet. As the magnet approaches the closed position, the early break normally closed contact is opened and the holding coil is inserted in series with the pick-up winding.

The early break contact block (C320KGD1) has to be attached to the side of the contactor, taking up one of the positions available for add-on auxiliary contact blocks.

DC Coil Elementary Diagram—Contactors and Starters



DC Coils ①

DC Coil Voltage	Inrush (Maximum) Amperes	Inrush (Maximum) Watts	Sealed (Maximum) Amperes	Sealed (Maximum) Watts	Coil Suffix	Class	Part Number
15, 25, 30 and 40A—Two- and Three-Pole (Series D1 and E1)							
12	5.8	69	0.272	3.27	**1R**	Class F, 155°C	**9-3254-2**
24	2.9	69	0.13	3.12	**1T**		**9-3254-3**
48	1.5	72	0.07	3.37	**1W**		**9-3254-4**
120	0.61	73	0.03	3.68	**1A**		**9-3254-5**
50A—Two- and Three-Pole (Series D1 and E1)							
12	5.8	69	0.272	3.27	**1R**	Class F, 155°C	**9-3255-2**
24	2.9	69	0.13	3.12	**1T**		**9-3255-3**
48	1.5	72	0.07	3.37	**1W**		**9-3255-4**
120	0.61	73	0.03	3.68	**1A**		**9-3255-5**
15, 25, 30 and 40A—Two- and Three-Pole (Series C1)							
12	4.7	51	232 mA	1.8	**1R**	Class F, 155°C	**9-3126-1**
24	2.7	64	110 mA	2.4	**1T**		**9-3126-2**
48	1.4	65	55 mA	2.5	**1W**		**9-3126-3**
60 and 75A—Two- and Three-Pole; 25, 30 and 40A—Four-Pole (Series C1)							
12	15.4	126	0.434	5.26	**1R**	Class F, 155°C	**9-3257-1**
24	6.2	88.4	0.211	5.12	**1T**		**9-3257-2**
48	2.9	76.2	0.102	4.92	**1W**		**9-3257-3**
120	1.1	67.3	0.044	5.32	**1A**		**9-3257-4**

Note

① DC coils require an early break NC auxiliary contact C320KGD1 (1NCI) or C320KGD2 (1NO-1NCI). Order separately, not included with replacement coil.

Heavy-Duty Special Purpose Contactors



Contents

Description	*Page*
Heavy-Duty Special Purpose Contactors	
Product Selection	**V5-T4-64**
Accessories	**V5-T4-64**
Renewal Parts	**V5-T4-65**
Technical Data and Specifications	**V5-T4-65**
Dimensions	**V5-T4-66**

Product Description

The DPCK Contactors are designed to provide peak performance and reliability on special switching applications. These heavy-duty special purpose contactors are rated for applications up to 1500 Vac.

Application Description

- Typical applications include mining equipment, welding equipment, heating and air conditioning applications and other loads that require a compact heavy-duty contactor rated up to 1500 Vac
- The DPCK Contactors are supplied with bolts and washers on each terminal for use with customer supplied lugs

Features

- A double wound epoxy coil allows for lower temperature rise and longer life
- The U-shaped magnet provides fast, reliable action, long life and lower power requirements
- Stainless steel kick-out springs
- Rugged single-piece mounting plate
- Allows up to four double circuit auxiliary contacts per contactor

Benefits

- All contacts are silver alloy, providing long life and resistance to welding
- Straight-through wiring and up front terminals allow for fast, easy installation
- Loosening two captive screws allows for easy visual inspection of contacts

Product Selection

When Ordering Specify

- Catalog number with any required accessories from below

35A 600/1000V Contactor



DPCK Air Break Contactors—Two- and Three-Pole ①

Open Ampere Rating			Coil Voltage	Open Type—Two-Pole	Three-Pole
600V	1000V	1500V	60 Hz ②	Catalog Number	Catalog Number
35	35	20	240	**DPCK2035WW**	**DPCK3035WW**
			480	**DPCK2035XW**	**DPCK3035XW**
			600	**DPCK2035EW**	**DPCK3035EW**
100	100	75	240	**DPCK2100WW**	**DPCK3100WW**
			480	**DPCK2100XW**	**DPCK3100XW**
			600	**DPCK2100EW**	**DPCK3100EW**

250A 600V Contactor



DPCK Air Break Contactors—Four- and Five-Pole ①

Open Ampere Rating			Coil Voltage	Open Type—Four-Pole	Five-Pole
600V	1000V	1500V	60 Hz ②	Catalog Number	Catalog Number
35	35	20	240	**DPCK4035WW**	**DPCK5035WW**
			480	**DPCK4035XW**	**DPCK5035XW**
			600	**DPCK4035EW**	**DPCK5035EW**

Accessories

Accessory Kits

Description	Catalog Number
Auxiliary contacts, 1NO-1NC	**J11**
Horizontal Mechanical Interlock	
35A	**180C113G09**
100A	**1264C37G01**
Surge suppressor	**SS56**

Notes

① Holding circuit auxiliary contact not included. If required, order from Accessories above.

② For other coil voltages, refer to replacement coils on **Page V5-T4-65** and insert proper letter in place of **9th** character of listed catalog number. Example: DPCK3035**W**W with 380/50 coil DPCK3035**H**W.

Renewal Parts

DPCK Contactor Renewal Parts

Description	Hz	Coil Suffix Code	35A Two-, Three-Pole Part Number	Four-, Five-Pole Part Number	100A Two-, Three-Pole Part Number
Contact Kit					
Two-pole	—	—	**180C180G01**	①	**180C180G05**
Three-pole	—	—	**180C180G02**	②	**180C180G06**
ARC box	—	—	**673B439G01**	**673B439G02**	**673B440G01**
Upper base	—	—	**673B439G03**	**673B439G04**	**673B440G02**
Lower base	—	—	**673B439G05**	**673B439G06**	**673B440G03**
Crossbar	—	—	**673B439G07**	**673B439G08**	**673B440G04**
Magnet Coil					
120/110	60/50	**A**	**1266C28G01**	**1266C29G01**	**1254C70G01**
110	60	**V**	**1266C28G08**	**1266C29G06**	**1254C70G08**
208/220	60	**B**	**1266C28G02**	**1266C29G02**	**1254C70G02**
220/240	60	—	**N/A**	**N/A**	**N/A**
240/220	60/50	**W**	**1266C28G09**	**1266C29G07**	**1254C70G03**
480/440	60/50	**X**	**1266C28G10**	**1266C29G08**	**1254C70G05**
440/480	60	—	**N/A**	**N/A**	**N/A**
600/550	60/50	**E**	**1266C28G05**	**1266C29G04**	**1254C70G07**
550	60	—	**N/A**	**N/A**	**N/A**
380	50	**H**	**1266C28G06**	**1266C29G09**	**N/A**
380/110	60	—	**N/A**	**N/A**	**1254C70G12**

Technical Data and Specifications

Magnet Coil VA—60 Hz

Catalog Number	Open VA	Closed VA	Closed Watts
DPCK3035	625	50	18
DPCK3100	1200	130	40

Notes

① For a four-pole device, use (2) of the 180C180G01 contact kits.

② For a five-pole device, use (1) of the 180C180G01 and (1) of the 180C180G02 contact kits.

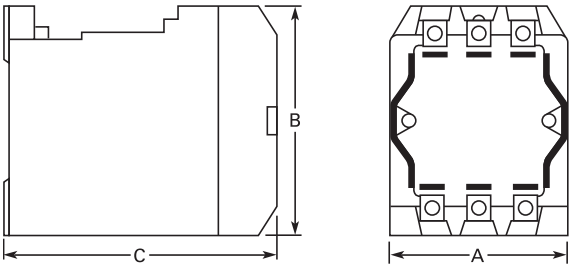
Contact Ratings

Volts	Full Load Current (Amperes)	Locked Rotor Current (Amperes)	Resistive Load (Amperes)	Lighting Load (Amperes)
Catalog Number DPCK3035				
120	35	240	35	35
240	35	240	35	35
480	35	200	35	35
600	35	200	35	35
1000	35	200	—	—
1500	20	160	—	—
Catalog Number DPCK3100				
120	100	600	100	100
240	100	600	100	100
480	100	600	100	100
600	100	600	100	100
1000	100	450	—	—
1500	75	300	—	—

Dimensions

Approximate Dimensions in Inches (mm)

DPCK Air Break Contactors—35 and 100 Ampere



Poles	Wide A	High B	Deep C	Shipping Weight Lbs (kg)
35A Contactors				
2 and 3	4.06 (103.1)	5.44 (138.2)	5.63 (143.0)	16.0 (7.3)
4 and 5	6.06 (153.9)	5.44 (138.2)	5.63 (143.0)	19.0 (8.6)
100A Contactors				
2 and 3	5.38 (136.7)	7.81 (198.4)	6.75 (171.5)	28.0 (12.7)

DC Contactors—Type C80



Cat. No. C80FJ421N00
Size 4 — NC Contactor



Cat. No. C80DG221N00
Size 2 — 2 Pole Contactor

Contents

Description	*Page*
DC Contactors—Type C80	
Catalog Number Selection	**V5-T4-68**
Product Selection	**V5-T4-69**
Options	**V5-T4-70**
Accessories	**V5-T4-70**
Renewal Parts	**V5-T4-72**
Technical Data and Specifications	**V5-T4-72**
Dimensions	**V5-T4-73**
600V Contactors	**V5-T4-74**
DPM 750V Contactor	**V5-T4-78**
AVD–Contactor	**V5-T4-81**
D–Contactor	**V5-T4-84**
Reversing/Assignment Contactor	**V5-T4-87**

DC Contactors—Type C80

Product Description

These dc mill type contactors are designed for heavy industry service and are suitable for use on moving machinery. The contactors listed in this section are for surface mounting on steel panels and front-of-panel wiring. The power stud assembly is mounted on the side of the contactor, rather than as part of a separate mounting kit.

These contactors utilize dc coils. If control power is 120 Vac, the rectifier module listed on **Page V5-T4-71** should be used in conjunction with a 100 V coil contactor.

Auxiliary contacts and mechanical interlocks for use with these contactors are listed on the following pages.

The contactors feature forged steel armature levers and magnet frames for superior physical strength. Self-lubricating bearings eliminate the need for lubricating the contactor. Hot-molded arc chute assemblies contain no asbestos and have better arc extinction characteristics for longer contact life. The short stroke armature results in a mechanical life of more than 20 million operations.

The arc chutes and magnetic blowout structures are designed to quickly absorb and dissipate the heat caused by arcing. In addition to increasing contact life, the molded arc chute offers advantages of improved mechanical life and cooling characteristics plus superior arc-tracking resistance. The arc chutes are hinged to provide front accessibility, easy inspection or replacement of contacts without removing any other contactor parts.

Construction of the pivot pin assembly provides positive pin locking so that the bearing pin remains stationary with respect to the operating movement of the forged armature.

A leaf spring attached to the unit base and the arc chute holds the chute in the "down" or functioning position. The addition of this assembly resists the violent vibrations encountered on open hearth charging machines and on a wide variety of crane applications.

Pre-drilled mounting holes are provided on the unit base to accommodate interlock mounting brackets. An interlock is merely attached to a bracket and the assembly is then bolted in the desired operating position on the contactor.

DC Drive Service Contactors

Eaton's industrial type contactors modified for dc drive service are provided with silver faced contact tips, to provide optimum contact structure and minimum maintenance under continuous duty service. These contactors are designed for steel panel surface mounting.

Power studs are a part of the contact or assembly.

Standards and Certifications

- CMAA 5.6.6-2
- NEMA ICS3-441, 442, 443
- NEMA ICS2-331.23
- NEMA ICS2-110.05.02
- NEMA ICS2-125.21.02

4

Catalog Number Selection

DC Contactor Catalog Numbering System

C80 E H 4 2 1 B 0 2

Base Catalog Number
C80

NEMA Size
D = Size 2
E = Size 3
F = Size 4
G = Size 5
J = Size 6
K = 6A ①
W = Size 8

Blowout Coil Rating
X = None
C = 5
D = 10
F = 25
G = 50
H = 100
J = 150
K = 300
L = 600
M = 810
N = 1350

Power Pole Configuration
1 = 1NO
2 = 2NO
4 = 1NC

Coil Voltage
1 = 115 Vdc
2 = 230 Vdc
4 = 100 Vdc

Type of Mounting
0 = None
1 = Surface, front of panel
3 = Elevated, front of panel

Auxiliary Contact Location
A = Size 2 side mounted
B = Size 2 thru 8 bottom mounted with LH and/or RH interlock
N = None

LH Auxiliary Contacts
1 = 1NO
2 = 2NO
3 = 1NO-1NC
4 = 1NC
0 = None

RH Auxiliary Contacts
1 = 1NO
2 = 2NO
3 = 1NO-1NC
4 = 1NC
0 = None

Product Selection

When Ordering

Select complete Catalog Number from the tables below and on **Page V5-T4-70**. If contactor is to include factory assembled auxiliary contacts, change **N00** suffix to correct suffix letter and digits from Accessories—Auxiliary Contacts tables on **Page V5-T4-71**.

Example: Catalog Number for elevated Size 3 NO contactor, 230 Vdc coil with 2NO auxiliary contact bottom mounted on RH side of contactor is C80EH123**B02**.

Surface Mounted



Surface Mounted DC Contactors without Auxiliary Contacts

NEMA Size	Number of Poles	Blowout Coil Ampere	Catalog Number 100 Vdc Coil	115 Vdc Coil	230 Vdc Coil
2	1NO	None	C80DX141N00	C80DX111N00	C80DX121N00
		5	C80DC141N00	C80DC111N00	C80DC121N00
		10	C80DD141N00	C80DD111N00	C80DD121N00
		25	C80DF141N00	C80DF111N00	C80DF121N00
		50	C80DG141N00	C80DG111N00	C80DG121N00
	2NO	None	C80DX241N00	C80DX211N00	C80DX221N00
		5	C80DC241N00	C80DC211N00	C80DC221N00
		10	C80DD241N00	C80DD211N00	C80DD221N00
		25	C80DF241N00	C80DF211N00	C80DF221N00
		50	C80DG241N00	C80DG211N00	C80DG221N00
3	1NO	100	C80EH141N00	C80EH111N00	C80EH121N00
	1NC	100	C80EH441N00	C80EH411N00	C80EH421N00
4	1NO	150	C80FJ141N00	C80FJ111N00	C80FJ121N00
	1NC	150	C80FJ441N00	C80FJ411N00	C80FJ421N00
5	1NO	300	C80GK141N00	G80GK111N00	C80GK121N00
	1NC	300	C80GK441N00	C80GK411N00	C80GK421N00
6	1NO	600	C80JL141N00	C80JL111N00	C80JL121N00
	1NC	600	C80JL441N00	C80JL411N00	C80JL421N00
6A ①	1NO	810	C80KM141N00	C80KM111N00	C80KM121N00
8	1NO	1350	C80WN141N00	C80WN111N00	C80WN121N00

Elevated Mounted



Elevated Mounted DC Contactors without Auxiliary Contacts

NEMA Size	Number of Poles	Blowout Coil Ampere	Catalog Number 100 Vdc Coil	115 Vdc Coil	230 Vdc Coil
3	1NO	100	C80EH143N00	C80EH113N00	C80EH123N00
	1NC	100	C80EH443N00	C80EH413N00	C80EH423N00
4	1NO	150	C80FJ143N00	C80FJ113N00	C80FJ123N00
	1NC	150	C80FJ443N00	C80FJ413N00	C80FJ423N00
5	1NO	300	C80GK143N00	G80GK113N00	C80GK123N00
	1NC	300	C80GK443N00	C80GK413N00	C80GK423N00
6	1NO	600	C80JL143N00	C80JL113N00	C80JL123N00
	1NC	600	C80JL443N00	C80JL413N00	C80JL423N00
6A ①	1NO	810	C80KM143N00	C80KM113N00	C80KM123N00
8	1NO	1350	C80WN143N00	C80WN113N00	C80WN123N00

Note

① Not a NEMA size.

Surface Mounted DP Drive Service Contactors without Auxiliary Contacts

Number of Poles	Ampere Rating	Catalog Number 100 Vdc Coil
1NO	260	**C80RK141N00**
1NC	260	**C80RK441N00**
1NO	480	**C80SL141N00**
1NC	480	**C80SL441N00**
1NO	960	**C80TM141N00**

Options

Other Options Available

- Silver faced contact tips:
  - Can be supplied in place of standard contact tips

Note: Use silver tips for non-arcing or long (8 hour) extended continuous current applications.

- Special voltage coils:
  - Coils with dc voltage ratings other than those listed are available
- 1800 A contactors:
  - Size 8 A (not a NEMA size) contactors are also available
- Consult factory for pricing

Accessories

Auxiliary Contacts

Mounting Kits for Auxiliary Contacts

Separate for Field Installation						Factory Installed
For Size and Type of Contactor		Location of Auxiliary Contacts on Contactor and Number of Units Kit Will Mount				
NEMA Size	Contactor Power Pole Configuration	Location	Number of Units	Maximum Number of Units Acceptable per Contactor	Mounting Kit Catalog Number	Suffix Code Letter for Factory Installation
2	1NO	Bottom —right and left	2	2	**10923H11**	**B**
	1NO or 1NO Ltl	Side—right or left	1	1	**10923H12**	**A**
	2NO	Bottom—right and left	1	2	**10923H14**	**B**
		Side—left	1	2	**10923H15**	**A**
		Side—right	1	2	**10923H16**	**A**
	2NO-1NC	Side—left	1	2	**10923H15**	**A**
		Side—right	1	2	**10923H16**	**A**
3, 4 and 5	1NO	Bottom—right and left	2	2	**10923H19**	**B**
		Bottom—left only	1	1	**10923H38**	**B**
	1NO Ltl or 1NC	Bottom—right	1	1	**10923H20**	**B**
6, 6A, 8 and 8A	1NO	Bottom—right and left	2	2	**10923H19**	**B**
		Bottom—left only	1	1	**10923H38**	**B**
	1NO Ltl	Bottom—right	1	1	**10923H20**	**B**
	1NC	Bottom—right	1	1	①	—

Note

① 10923H19 supplied with contactor as standard. No charge.

Auxiliary Contacts—without Mounting Kit All Sizes Bottom Mounted

Separate for Field Installation		Factory Installed	
Contact Configuration	Catalog Number	Suffix Code LH Position	Suffix Code RH Position
None	—	0	0
1NO	10923H1	1	1
2NO	10923H2	2	2
1NO-1NC	10923H3	3	3
1NC	10923H4	4	4
2NC	10923H5	5	5

Auxiliary Contacts—without Mounting Kit Size 2 Side Mount Only

Separate for Field Installation		Factory Installed	
Contact Configuration	Catalog Number	Suffix Code LH Position	Suffix Code RH Position
None	—	0	0
1NO	10923H6	1	1
2NO	10923H7	2	2
1NO-1NC	10923H8	3	3
1NC	10923H9	4	4

Rectifiers

Rectifier Module

Description	Contactor Size	Catalog Number
120 Vac input	All	C81EB
100 Vdc output 3.5 A		

Mounting Kits and Mechanical Interlocks

Contactor Mounting Kits ① and Mechanical Interlocks

NEMA Size	Number of Poles	Type of Mounting	For Metal Panels Catalog Number
Mounting Kits			
3, 4	1	Surface, front-of-panel wiring	C81AEA11
		Elevated, front-of-panel wiring	C81AEA13
5	1	Surface, front-of-panel wiring	C81AGA11
		Elevated, front-of-panel wiring	C81AGA13
6, 6A	1	Surface, front-of-panel wiring	C81AJA11
		Elevated, front-of-panel wiring	C81AJA13
8, 8A	1	Surface, front-of-panel wiring	C81ALA11
		Elevated, front-of-panel wiring	C81ALA13
Mechanical Interlocks			
2	1	Surface	C81DDA11
	2		C81DDA12
	3		C81DDA13
3, 4	1	Surface	C81DEA11
		Elevated	C81DEA21
5	1	Surface	C81DGA11
		Elevated	C81DGA21
6, 6A	1	Surface	C81DJA11
		Elevated	C81DJA21
8, 8A	1	Surface	C81DLA11
		Elevated	C81DLA21

Note

① Mounting kits include power studs and stud mounting, as well as contactor mounting hardware, but do not include lugs.

Renewal Parts

Renewal Parts ①

Description		Size 2 Single-, Two-, Three-Pole and Ltl 25 and 50 Ampere Part Number	Size 3 Single-Pole NO, NC and Ltl 100 Ampere Part Number	Size 4 Single-Pole NO, NC and Ltl 150 Ampere Part Number	Size 5 Single-Pole NO, NC and Ltl 300 Ampere Part Number	Size 6 Single-Pole NO, NC and Ltl 600 Ampere Part Number	Size 6A Single-Pole NO, NC and Ltl 810 Ampere Part Number	Size 8 Single-Pole NO 1350 Ampere Part Number
Set of Contacts								
Single-pole copper		6-599	6-189	6-189	6-189-3	6-189-4	6-189-4	6-215
Single-pole silver		—	6-189-5	6-189-5	6-189-7	6-189-8	6-189-8	6-215-2
Two-pole copper		6-169-4	—	—	—	—	—	—
Three-pole copper		6-169-5	—	—	—	—	—	—
Arc Shield								
Right-hand		73-2676-2	62-791	62-791	62-793	62-840	62-840	62-804
Left-hand		73-2676	62-791-2	62-791-2	62-793-2	62-840-2	62-840-2	62-804
Coils								
Single-pole NO	100 V	9-1549-18	9-1583-15	9-1583-15	9-1589-10	9-1688-8	9-1688-8	9-547-7 ③
	115 V	9-1549-2	9-1583-2	9-1583-2	9-1589-2	9-1688-2	9-1688-2	9-547-7 ③
	230 V	9-1549-1	9-1583-1	9-1583-1	9-1589-1	9-1688-1	9-1688-1	9-547-4 ③
Single-pole NC	110 V	—	9-1585-18	9-1585-18	9-967-13	9-1717-4	—	—
	115 V	—	9-1585-2	9-1585-2	9-967-8	9-1717-1	—	—
	230 V	—	9-1585-1	9-1585-1	9-967-7	9-1717-2	—	—
Single-pole Ltl ②	100 V	9-1549-18	9-1583-15	9-1583-15	9-1589-10	9-1688-8	—	—
	115 V	9-1549-2	9-1583-2	9-1583-2	9-1589-2	9-1688-2	—	—
	230 V	9-1549-1	9-1583-1	9-1583-1	9-1589-1	9-1688-1	—	—
Two-pole	100 V	9-1585-18	—	—	—	—	—	—
	115 V	9-1585-2	—	—	—	—	—	—
	230 V	9-1585-1	—	—	—	—	—	—
Three-pole	110 V	9-1585-18	—	—	—	—	—	—
	115 V	9-1585-2	—	—	—	—	—	—
	230 V	9-1585-1	—	—	—	—	—	—

Technical Data and Specifications

- Current range: 5 to 1800 A
- Voltage: 600 Vdc
- Operation: magnetic
- Mounting: steel panel
- Mechanical life: 20 million operations
- Electrical life: 500,000 operations
- Interlock ratings:
  - 10 A continuous
  - 2.2 A inductive breaking at 115 V
  - 1.1 A inductive breaking at 230 V
- Continuous duty (for intermittent ratings consult factory)

Coil Ampere Data

NEMA Size	Number of Poles	100 Vdc Coil	115 Vdc Coil	230 Vdc Coil
2	1NO	0.288	0.263	0.125
	2NO	0.339	0.274	0.140
3	1NO	0.268	0.235	0.112
	1NC	0.339	0.274	0.140
4	1NO	0.268	0.235	0.112
	1NC	0.339	0.274	0.140
5	1NO	0.433	0.391	0.187
	1NC	0.424	0.329	0.164
6	1NO	0.450	0.365	0.200
	1NC	1.832/0.597 ④	1.337/0.485 ④	0.714/0.267 ④
6A	1NO	0.450	0.365	0.200
8	1NO	0.787 ⑤	0.757 ⑤	0.438 ⑤

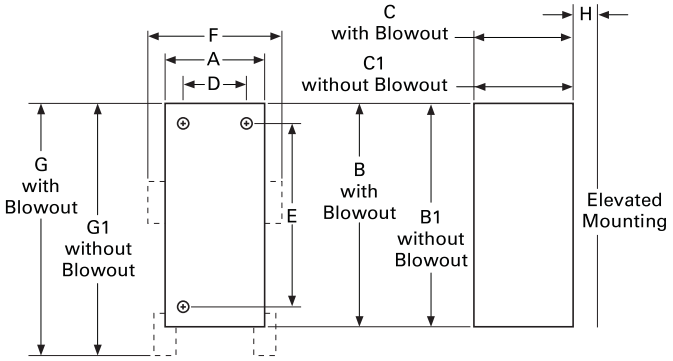
Notes

① For prices refer to Eaton's parts distributor or call factory.
② Magnet closing coil only. If holdout coil is required, give number stamped on coil or advise bulletin or serial number of controller.
③ Series resistor used with coil for voltage shown.
④ Inrush/sealed current.
⑤ Coil used with series resistor.

Dimensions

Approximate Dimensions in Inches (mm)

Type C80 Contactors



Open Type

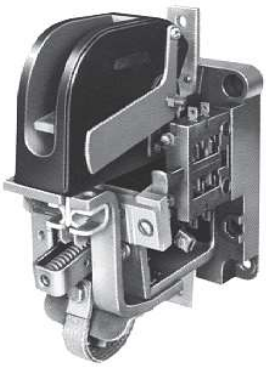
Size	Poles	Wide A	High B	B1	Deep C	C1	Mounting D	E	With Auxiliary Contacts F	G	G1	H	Minimum Arc Clearance 250 V	600 V	Ship. Wt. Lb (kg)	Stud Size
Open Type DC Contactors																
2	1NO	3.00 (76.2)	8.38 (212.9)	6.50 (165.1)	6.00 (152.4)	5.38 (136.7)	2.25 (57.2)	4.50 (114.3)	7.38 (187.5)	10.88 (276.4)	9.13 (231.9)	—	0.59 (15.1)	0.91 (23.0)	6 (2.7)	1/4-20
	2NO	5.75 (146.1)	8.88 (225.6)	8.88 (225.6)	6.88 (174.8)	6.50 (165.1)	5.00 (127.0)	4.63 (117.6)	10.13 (257.3)	11.38 (289.1)	11.38 (289.1)	—	1.19 (30.2)	2.19 (55.6)	10 (4.5)	
	2NO-1NC	5.75 (146.1)	12.63 (320.8)	12.63 (320.8)	6.88 (174.8)	6.50 (165.1)	5.00 (127.0)	8.38 (212.9)	10.13 (257.3)	—	—	—	1.19 (30.2)	2.19 (55.6)	13 (5.9)	
3, 4	1NO	4.25 (108.0)	12.13 (308.1)	12.13 (308.1)	7.25 (184.2)	6.38 (162.1)	—	11.25 (285.8)	4.50 (114.3)	12.13 (308.1)	12.13 (308.1)	1.63 (41.4)	2.75 ① (69.9)	3.75 ② (95.3)	11 (5)	3/8-16
	1NC	4.25 (108.0)	13.63 (346.2)	13.63 (346.2)	7.25 (184.2)	5.63 (143.0)	—	12.75 (323.9)	5.00 (127.0)	13.63 (346.2)	13.63 (346.2)	1.63 (41.4)	4.25 ① (108.0)	5.25 ② (133.4)	13 (5.9)	
5	1NO	5.13 (130.3)	16.88 (428.8)	16.88 (428.8)	10.00 (254.0)	8.00 (203.2)	1.25 (31.8)	16.00 (406.4)	5.13 (130.3)	16.88 (428.8)	16.88 (428.8)	1.88 (47.8)	3.50 (88.9)	4.50 (114.3)	26 (12)	1/2-13
	1NC	5.25 (133.4)	18.88 (479.6)	16.88 (428.8)	10.00 (254.0)	7.50 (190.5)	1.25 (31.8)	18.00 (457.2)	6.13 (155.7)	18.88 (479.6)	18.88 (479.6)	1.88 (47.8)	3.00 (76.2)	4.00 (101.6)	34 (15)	
6	1NO	7.13 (181.1)	18.75 (476.3)	16.88 (428.8)	12.25 (311.2)	9.50 (241.3)	1.25 (31.8)	17.50 (444.5)	7.13 (181.1)	18.75 (476.3)	18.75 (476.3)	1.88 (47.8)	5.50 (139.7)	5.50 (139.7)	43 (20)	3/4-12
	1NC	7.25 (184.2)	22.88 (581.2)	18.88 (479.6)	12.25 (311.2)	9.88 (251.0)	1.25 (31.8)	22.00 (558.8)	7.25 (184.2)	22.88 (581.2)	22.88 (581.2)	1.88 (47.8)	5.50 (139.7)	5.50 (139.7)	66 (30)	
6A	1NO	7.63 (193.8)	18.75 (476.3)	18.75 (476.3)	12.25 (311.2)	9.50 (241.3)	1.25 (31.8)	17.50 (444.5)	7.63 (193.8)	18.75 (476.3)	18.75 (476.3)	1.88 (47.8)	5.50 (139.7)	5.50 (139.7)	45 (20)	3/4-12
8, 8A	1NO	9.50 (241.3)	24.00 (609.6)	22.5 (571.5)	17.00 (431.8)	14.88 (378.0)	7.00 (177.8)	10.00 (254.0)	9.50 (241.3)	24.00 (609.6)	24.00 (609.6)	2.00 (50.8)	8.00 (203.2)	10.0 (254.0)	130 (59)	1/2 hole
Definite Purpose Contactors																
260A	1NO	4.25 (108.0)	12.13 (308.1)	12.13 (308.1)	7.25 (184.2)	6.38 (162.1)	—	11.25 (285.8)	4.50 (114.3)	12.13 (308.1)	12.13 (308.1)	1.63 (41.4)	2.50 (63.5)	3.50 (88.9)	11 (5)	3/8-16
	1NC	4.25 (108.0)	13.63 (346.2)	13.63 (346.2)	7.25 (184.2)	5.63 (143.0)	—	12.75 (323.9)	5.00 (127.0)	13.63 (346.2)	13.63 (346.2)	1.63 (41.4)	2.50 (63.5)	3.50 (88.9)	13 (5.9)	
480A	1NO	5.13 (130.3)	16.88 (428.8)	16.88 (428.8)	10.00 (254.0)	8.00 (203.2)	1.25 (31.8)	16.00 (406.4)	5.13 (130.3)	16.88 (428.8)	16.88 (428.8)	1.88 (47.8)	3.00 (76.2)	4.00 (101.6)	26 (12)	1/2-13
	1NC	5.25 (133.4)	18.88 (479.6)	16.88 (428.8)	10.00 (254.0)	7.50 (190.5)	1.25 (31.8)	18.00 (457.2)	6.13 (155.7)	18.88 (479.6)	18.88 (479.6)	1.88 (47.8)	3.00 (76.2)	4.00 (101.6)	34 (15)	
960A	1NO	7.63 (193.8)	18.75 (476.3)	18.75 (476.3)	12.25 (311.2)	9.50 (241.3)	1.25 (31.8)	17.50 (444.5)	7.63 (193.8)	18.75 (476.3)	18.75 (476.3)	1.88 (47.8)	5.50 (139.7)	5.50 (139.7)	45 (20)	3/4-12

Notes

① May be reduced to 2.5 (63.5) for Size 3.

② May be reduced to 3.5 (88.9) for Size 3.

600V Contactors



Contents

Description	*Page*
DC Contactors—Type C80	**V5-T4-67**
600V Contactors	
Product Selection	**V5-T4-75**
Accessories	**V5-T4-76**
Renewal Parts	**V5-T4-77**
Dimensions	**V5-T4-77**
DPM 750V Contactor	**V5-T4-78**
AVD–Contactor	**V5-T4-81**
D–Contactor	**V5-T4-84**
Reversing/Assignment Contactor	**V5-T4-87**

600V Contactors

Product Description

These DC Contactors are designed to handle rugged DC applications. They provide durable service and easy installation and maintenance.

Application Description

- Applications including mining, milling, cranes and transportation
- These contactors utilize DC coils

Note: Be sure to utilize a rectifier module if the only control voltage source available is 120 Vac.

Features

- Sturdy glass polyester base
- Knife edge bearings that guarantee precise operation and minimal wear
- High contact pressure
- Vacuum impregnated magnetic coil

Benefits

- Able to mount on steel or panels of any material for maximum flexibility
- Front or rear mounting available for convenient installation and maintenance
- Rapid arc quenching to ensure long life
- Easily accessible contact tips to remove and replace

Product Selection

When Ordering Specify

- Catalog number with appropriate coil suffix
- Any required accessories

600V Contactor



600V Contactors

Size	Open 8 Hour Ampere Rating	Contact Arrangement	Provisions for Interlocks		Magnet Coil Voltage	Catalog Number
			Mechanical	Electrical		
Front Connected						
0	10	1NO	Yes	4	125 Vdc ①	**ME010C**
		2NO		2		**ME020C**
		1NO, 1NC		4		**ME011C**
		1NC		2		**ME001C**
1	25	1NO	Yes	4	125 Vdc ①	**ME110C**
		2NO		2		**ME120C**
		1NO, 1NC		4		**ME111C**
		1NC		2		**ME101C**
2	50	1NO	Yes	4	125 Vdc ①	**ME210C**
		2NO		2		**ME220C**
		1NO, 1NC		4		**ME211C**
		1NC		2		**ME201C**
3	100	1NO	Yes	4	125 Vdc ①	**ME310C**
		2NO		2		**ME320C**
		1NO, 1NC		4		**ME311C**
		1NC		2		**ME301C**
4	150	1NO	Yes	4	125 Vdc ①	**ME410C**
		2NO		2		**ME420C**
		1NO, 1NC		4		**ME411C**
		1NC		2		**ME401C**
Rear Connected						
0–4	10–150	—	—	—	—	**ME** ②

Notes

① Other coil voltages available, see **Page V5-T4-77**. Substitute suffix code of desired voltage for last digit in listed catalog number. Example: ME010**B**.

② For 10–150A rear connected contactors, order front connected ME contactor above and rear connection kit, catalog number 2184A10G08, (field installed only). See **Page V5-T4-77**.

Accessories

Auxiliary Contacts (Electrical Interlocks)—For Field Installation Only ①

Auxiliary Contact Type	Application	Contact Arrangement ②	Number of Auxiliary Contacts	Auxiliary Contacts Factory Installed ① Catalog Number	Auxiliary Contacts Unmounted Replacement Only Catalog Number	Mounting and Operating Hardware for New Applications Catalog Number
L46	ME01 only	NO–FC	1	**11A8713G10**	**11A8713G10**	None required
		NC–FC		**11A8713G09**	**11A8713G09**	None required
	ME10 only	NC–FC–OB	1	**487B878G01**	**487B878G01**	None required
	ME10, ME11, ME20, ME30, ME31, ME40 and ME41	NO–FC	1	**11A8713G09**	**11A8713G09**	None required
		NC–FC		**11A8713G10**	**11A8713G10**	None required
L66	ME10, ME11, ME20, ME30, ME31, ME40 and ME41	DB–FC–L	1	**659C301G04**	**659C301G04**	None required
		DB–FC–R		**659C301G05**	**659C301G05**	None required
	ME10 Only	DB–FC–L–OB	1	**487B878G06**	**487B878G06**	None required
		DB–FC–R–OB		**487B878G07**	**487B878G07**	None required

Standard Magnet Coil Suffix

Voltage	Suffix Code
65 Vdc (ME Size 0–4 only)	**A**
115 Vdc	**B**
125 Vdc	**C**
230 Vdc	**D**
250 Vdc	**E**
550 Vdc	**F**
Other	**G**

Rear Connector Kit for ME Contactors ③

Catalog Number
2184A10G08

Accessory Option

Description
Rectifier for AC Operation Order by description

Mechanical Interlocks, Unmounted

Type	Contactor Type	Size	Contacts	Catalog Number
M-25	ME	All	1NO, 1NO + 1NC	**878D400G01**
M-25	ME	All	2NO, 2NO + 1NC	**878D401G01**

Notes

① For factory installed electrical interlocks, consult factory.
② NO = Normally Open, NC = Normally Closed, DB = Delayed Break, FC = Front Connected, L = Left Hand, R = Right Hand, OB = Outboard (for single-pole, Size 2 frame).
③ Field installation only.

Renewal Parts

ME Series

Kits

	One NO Pole		Two NO Poles		One NC Pole		One NO/NC Pole	
Description	**Qty.**	**Part Number**	**Qty.**	**Part Number**	**Qty.**	**Part Number**	**Qty.**	**Part Number**
Contact kit	1	**2184A10G14**	2	**2184A10G14**	1	**2184A10G14**	2	**2184A10G14**
Arc box 10/25/50A	1	**2184A10G09**	2	**2184A10G09**	1	**2184A10G09**	2	**2184A10G09**
Arc box 100/150A	1	**2184A10G10**	2	**2184A10G10**	1	**2184A10G10**	2	**2184A10G10**
Shunt kit	1	**2184A10G21**	1	**2184A20G16**	1	**2084A01G07**	1	**2184A11G07**
Armature kit	1	**2184A10G19**	1	**2184A20G15**	1	**2084A01G06**	1	**2184A11G06**
Blowout Assembly								
10A	1	**2184A10G15**	1	**2184A20G11**	1	**2184A10G15**	2	**2184A10G15**
25A	1	**2184A10G16**	1	**2184A20G12**	1	**2184A10G16**	2	**2184A10G16**
50A	1	**2184A10G17**	1	**2184A20G13**	1	**2184A10G17**	2	**2184A10G17**
110/150A	1	**2184A10G18**	1	**2184A20G14**	1	**2184A10G18**	2	**2184A10G18**
Rear conn. kit	1	**2184A10G08**	1	**2184A10G08**	1	**2184A10G08**	1	**2184A10G08**

Coils

	Operating Coils	Holding Coils (Lower)—1NO-1NC Contactors Only ①	
	10/25/50/100/150 Ampere Sizes	10/25/50 Ampere Sizes	100/150 Ampere Sizes
Voltage	**Part Number**	**Part Number**	**Part Number**
65V	**30B4376G06**	**44A6366G10**	**30B4376G27**
90/92V	**30B4376G25**	**44A6366G12**	**427C048G16**
115V	**30B4376G07**	**44A6366G13**	**30B4376G01**
125V	**30B4376G08**	**44A6366G19**	**30B4376G26**
230/240V	**30B4376G09**	**44A6366G15**	**30B4376G02**
250V	**30B4376G10**	**44A6366G23**	**30B4376G17**
500V	**30B4376G14**	**N/A**	**N/A**
550V	**30B4376G11**	**44A6366G18**	**30B4376G03**

Dimensions

Approximate Dimensions in Inches (mm)

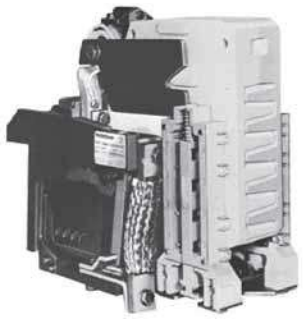
600V Contactors

Contactor Size	Contact Arrangement	Width	Height	Depth	Shipping Weight Lbs (kg)
Front Connected					
0–2	1NO	3.18 (80.8)	7.56 (192.0)	6.81 (173.0)	8.0 (3.6)
	2NO	5.53 (140.5)	6.75 (171.5)	6.81 (173.0)	10.0 (4.5)
	1NO, 1NC	3.67 (93.2)	12.44 (316.0)	6.81 (173.0)	12.0 (5.4)
	1NC	3.67 (93.2)	9.57 (243.1)	6.81 (173.0)	10.0 (4.5)
3–4	1NO	3.18 (80.8)	7.78 (197.6)	6.81 (173.0)	8.0 (3.6)
	2NO	5.53 (140.5)	7.44 (189.0)	6.81 (173.0)	10.0 (4.5)
	1NO, 1NC	3.67 (93.2)	12.88 (327.2)	6.81 (173.0)	12.0 (5.4)
	1NC	3.67 (93.2)	9.69 (246.1)	6.81 (173.0)	10.0 (4.5)

Note

① If lower coils are required, order separately.

DPM 750V Contactor



4

Contents

Description	*Page*
DC Contactors—Type C80	**V5-T4-67**
600V Contactors	**V5-T4-74**
DPM 750V Contactor	
Product Selection	**V5-T4-79**
Accessories	**V5-T4-79**
Renewal Parts	**V5-T4-79**
Technical Data and Specifications	**V5-T4-80**
Dimensions	**V5-T4-80**
AVD–Contactor	**V5-T4-81**
D–Contactor	**V5-T4-84**
Reversing/Assignment Contactor	**V5-T4-87**

DPM 750V Contactor

Product Description

The DPM 750 Vdc Definite Purpose Contactor has been designed to meet severe environmental and vibration conditions found in your worst applications. The contactor is of unit construction, assembled on a molded insulated base, providing maximum performance in minimum space.

Application Description

This rugged device was designed for applications such as railway equipment, offshore drilling, mining, off-road vehicles, marine, and so on.

Features

- Power circuit insulating barriers are molded from glass-polyester materials having high arc and track resisting qualities
- The DPM is designed to mount directly on a channel or angle frame, but may be adapted for mounting on a flat metal or insulated panel
- Available with or without an overcurrent latching mechanism to prevent opening under heavy overload currents. When the line current returns to normal, the overcurrent latch disengages

Benefits

- Saves panel space by locating the arc chute vents on the front of the unit. This eliminates the need for arcing clearance above the contactor
- All vital parts are removable from the front without having to disconnect line or load connections, allowing for easy maintenance
- Safety is a must. The mechanical interlock prevents the contactor from closing when the arc box has been removed or when it is not installed properly

Product Selection

When Ordering Specify

- Catalog number of contactor and any required accessories

750 Vdc Contactor



750 Vdc Contactors

Coil Operating Voltage ①	Over-Current Latch	Catalog Number
28 Vdc	Without	**2120A07G01** ②
	With	**2120A07G02** ②
36 Vdc	Without	**2120A07G03** ②
	With	**2120A07G04** ②
55 Vdc	Without	**2120A07G05** ②
	With	**2120A07G06** ②
74 Vdc	Without	**2120A07G09** ②
	With	**2120A07G10** ②
110 Vdc	Without	**2120A07G13** ②
	With	**2120A07G14** ②
125 Vdc	Without	**2120A07G17** ②
	With	**2120A07G18** ②

Accessories

Extra L-67 Auxiliary Contacts—Order Separately

Contact Combination Provided by One Auxiliary Contact Assembly		Field Installed Kit
Normally Open	Normally Closed	Catalog Number
0	4	**2087A40G11**
1	3	**2087A40G12**
2	2	**2087A40G13**
3	1	**2087A40G14**
4	0	**2087A40G15**

Mechanical Interlock Kit

Description	Catalog Number
Mechanical Horizontal Interlock Kit Includes mounting instructions and mounting hardware ③	**1954D13G01**

Renewal Parts

DPM Contactor

Description	Catalog Number
Contact Kit	**2131A94G10**
Arc Box	**2131A94G03**
Shunt	**3534C86G01**
Coils	
28 Vdc	**2114A92G04**
36 Vdc	**2114A92G05**
55 Vdc	**2114A92G06**
74 Vdc	**2114A92G09**
110/115 Vdc	**2114A92G14**
125 Vdc	**2114A92G15**
275 Vdc	**2114A92G16**
600 Vdc	**2114A92G20**

Notes

① For other coil operating voltages, contact Eaton Technical Resource Center.
② Includes factory installed 2NO/2NC auxiliary contacts.
③ When interlock kit is installed, only one L-67 auxiliary contact can be mounted on each DPM contactor.

Technical Data and Specifications

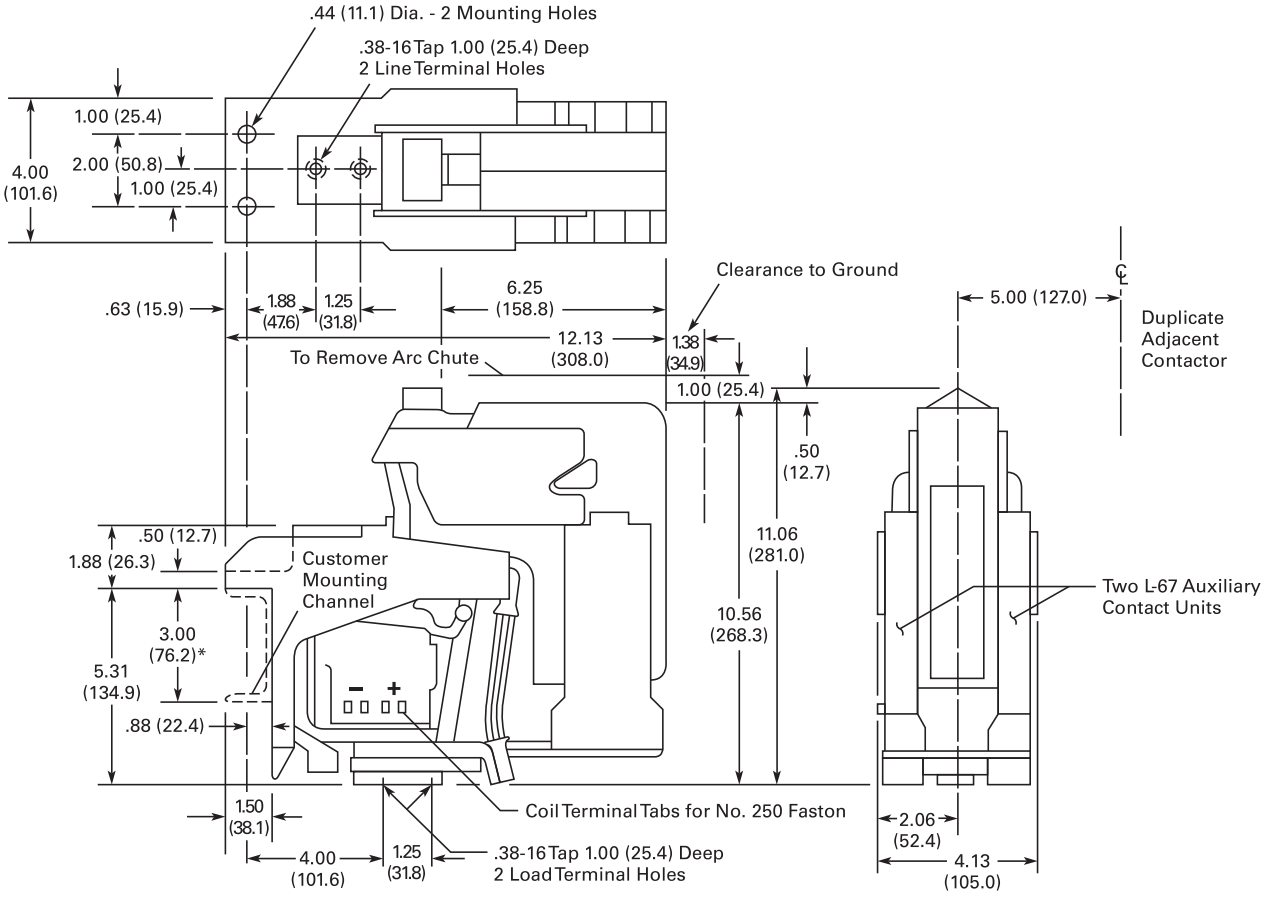
DPM Contactor

Description	Specification
Line voltage	750 Vdc
Continuous current rating	
Carrying and interrupting capacity	1250A
Operating coil	
Duty rating	Continuous
Operation	Will operate at 80–110% of rated voltage
Insulation between power circuit and operating coil	Rated 750 Vdc
Arcing and creepage distances	Meet or exceed NEMA standards for 750V equipment
Blowout coil	Rated for continuous duty

Dimensions

Approximate Dimensions in Inches (mm)

DPM Contactor



*This dimension must not be exceeded or flashover may occur.

Width	Height	Depth	Shipping Weight Lbs (kg)
4.13 (105)	11.06 (280.9)	12.12 (307.8)	30.5 (13.8)

AVD–Contactor



Contents

Description	*Page*
DC Contactors—Type C80	**V5-T4-67**
600V Contactors	**V5-T4-74**
DPM 750V Contactor	**V5-T4-78**
AVD–Contactor	
Product Selection	**V5-T4-82**
Accessories	**V5-T4-82**
Renewal Parts	**V5-T4-82**
Technical Data and Specifications	**V5-T4-83**
Dimensions	**V5-T4-83**
D–Contactor	**V5-T4-84**
Reversing/Assignment Contactor	**V5-T4-87**

AVD–Contactor

Product Description

The AVD–Contactor is a single-pole normally open, load break, bi-directional definite purpose DC contactor. The device is rated at 1400 amps continuous and is capable of switching up to 2000 Vdc loads.

Application Description

The AVD–Contactor was designed for the demanding environmental requirements of locomotive, rapid transit and off highway vehicle applications. This device is also applied in high horsepower DC drive applications including process lines and off shore oil drilling rigs.

Features

- Bi-directional interrupting capability
- 2000 Vdc switching in a compact design due to arc chute
- Any combination of up to four isolated NO or NC auxiliary contacts
- Panel mount design
- Continuous duty operating coil
- Continuous duty blow out coil

Product Selection

When Ordering—Contact Technical Resource Center

- Product specification: The AVD-contactor is a definite purpose DC contactor
- Please consult our Technical Resource Center for catalog numbers of other device configurations and application assistance

1400A Contactor



AVD–Contactor

Device Type	Auxiliary Contact Configuration	Coil Voltage	Catalog Number
1400A contactor	3NO/1NC	28	**6702ED667-4**
		37	**6702ED667-5**
		74	**6702ED667-6**
		100	**6702ED667-3**
		230	**6702ED667-7**

Accessories

Auxiliary Contacts

Contact Configuration	Terminal Configuration	Catalog Number
1NO/1NC	Fast-on	**10-3519-5**
2NO	Fast-on	**10-3519-6**
2NC	Fast-on	**10-3519-7**
1NO/1NC	Screw type	**10-6817**
2NO	Screw type	**10-6817-2**
2NC	Screw type	**10-6817-3**

Renewal Parts

Contacts

Description	Quantity Required per Contactor	Catalog Number
Stationary contact	1	**23-7253**
Movable contact	2	**23-7255**

Technical Data and Specifications

AVD-Contactor

Description	Specification
Current carrying capability at 55°C	1400A continuous
Electrical creepage and clearance distances	Up to 2000 Vdc applications
Mechanical life	2 million operations
Operating coil voltages (DC)	28, 37, 74, 100, 230 (others available)

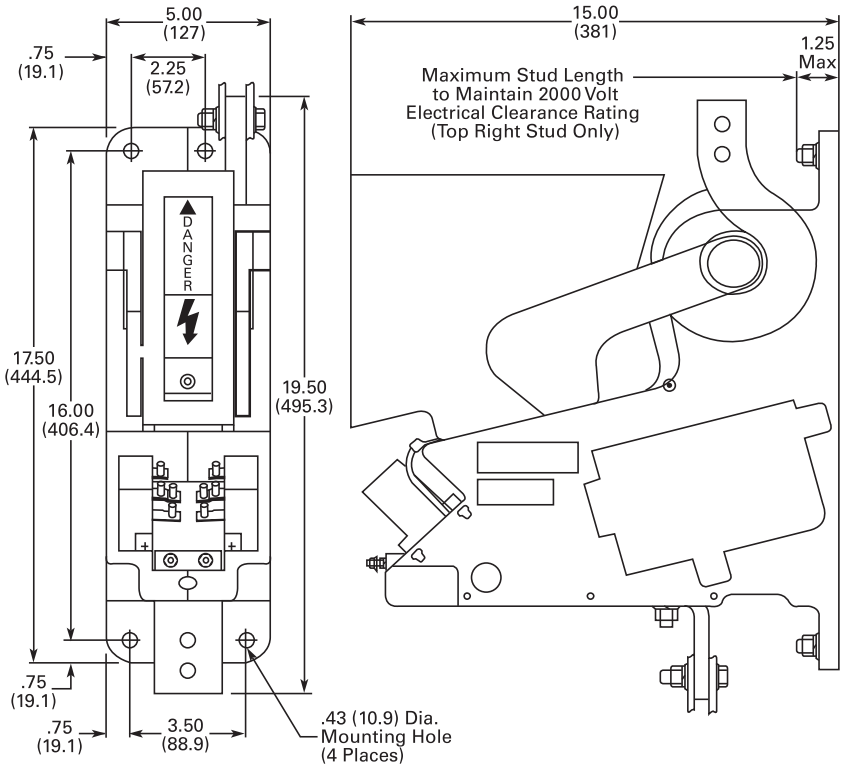
Operating Coil Characteristics

Coil Voltage	Current Draw at Nominal Voltage (±5% at 20°C)	Catalog Number
28	1.87	**9-3004-2**
37	1.58	**9-3004-3**
74	0.79	**9-3004-1**
100	0.62	**9-3004-5**
230	0.25	**9-3004-4**

Dimensions

Approximate Dimensions in Inches (mm)

AVD-Contactor



Width	Height	Depth	Shipping Weight Lbs (kg)
15.0 (381.0)	19.5 (495.3)	5.0 (127.0)	70 (31.8)

Arc Clearances

Front	Top	Sides
2 (51)	2 (51)	1 (25)

D–Contactor



Contents

Description	*Page*
DC Contactors—Type C80	**V5-T4-67**
600V Contactors	**V5-T4-74**
DPM 750V Contactor	**V5-T4-78**
AVD–Contactor	**V5-T4-81**
D–Contactor	
Product Selection	**V5-T4-85**
Accessories	**V5-T4-85**
Renewal Parts	**V5-T4-85**
Technical Data and Specifications	**V5-T4-86**
Dimensions	**V5-T4-86**
Reversing/Assignment Contactor	**V5-T4-87**

D–Contactor

Product Description

The D–Contactor is a single-pole normally open, load break, bi-directional definite purpose DC contactor. Two devices are available rated at 1800A and 3000A at 750 Vdc.

Application Description

The D–Contactor was designed for the demanding environmental requirements of locomotive, rapid transit and off highway vehicle applications. This device is also widely applied in high horsepower DC drive applications including process lines and off shore oil drilling rigs.

Features

- Bi-directional interrupting capability
- Compact design due to intermittent duty blowout coil and arc interruption circuit (not suitable for extremely high duty cycle or jogging applications)
- Any combination of up to eight isolated NO or NC auxiliary contacts
- Channel/angle frame mounting standard, optional panel mount kit available
- Continuous duty operating coil
- Screw type or fast-on control terminals

Product Selection

When Ordering—Contact Technical Resource Center

- Product specification: The D-contactor is a definite purpose DC contactor
- Please consult our Technical Resource Center for catalog numbers of other device configurations and application assistance

1800A Contactor



D–Contactor

Device Type	Auxiliary Contact Configuration	Coil Voltage	Catalog Number
1800A contactor	3NO/1NC	74 Vdc	**6702ED584**
	3NO/1NC	100 Vdc	**6702ED663**
	2NO/2NC	115 Vdc	**6702ED584-2**
3000A contactor	3NO/1NC	74 Vdc	**6702ED587-2**
	2NO/2NC	100 Vdc	**6702ED668**
	3NO/1NC	115 Vdc	**6702ED587-4**

Accessories

Auxiliary Contacts

Contact Configuration	Terminal Configuration	Catalog Number
1NO/1NC	Fast-on	**10-3519-5**
2NO	Fast-on	**10-3519-6**
2NC	Fast-on	**10-3519-7**
1NO/1NC	Screw type	**10-6817**
2NO	Screw type	**10-6817-2**
2NC	Screw type	**10-6817-3**

Panel Mounting Kit

Description	Catalog Number
Panel mounting kit	**99-3842**

Renewal Parts

Contact Kits

Device Rating	Main Contact Configuration	Contacts	Catalog Number
1800A	2-Main	Main contacts	**6-497**
1800A	2-Main	Arcing contacts	**23-5449**
3000A	4-Main	Main contacts	**6-496**
3000A	4-Main	Arcing contacts	**23-5448**

Technical Data and Specifications

D–Contactor

Description	Specification
Current carrying capability at 55°C	1800A and 3000A continuous
Resistive interrupt rating	5000A 750 Vdc
Electrical creepage and clearance distances	Up to 1500 Vdc applications
Mechanical life	2 million operations
Operating coil voltages (DC)	12, 24, 32, 48, 74, 100, 115, 230 (others available)

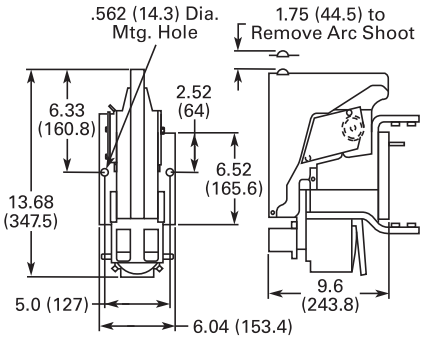
Operating Coil Characteristics

Coil Voltage	Current Draw at Nominal Voltage (±7.5% at 20°C)	Catalog Number
12	3.96	**9-1688-15**
24	2.00	**9-1688-7**
32	1.44	**9-1688-9**
48	1.00	**9-1688-12**
74	0.97	**9-2064-3**
100	0.45	**9-1688-8**
115	0.37	**9-1688-2**
230	0.20	**9-1688-1**

Dimensions

Approximate Dimensions in Inches (mm)

D–Contactor



Width	Height	Depth	Shipping Weight Lbs (kg)
9.6 (243.8)	13.68 (347.5)	6.04 (153.4)	43 (19.5)

Arc Clearances

	750V		
Type of Load	Front	Top	Sides
Resistive	4 (102)	2 (51)	3 (76)
Inductive	7 (178)	4 (102)	3 (76)

Reversing/Assignment Contactor



Contents

Description	*Page*
DC Contactors—Type C80	**V5-T4-67**
600V Contactors	**V5-T4-74**
DPM 750V Contactor	**V5-T4-78**
AVD–Contactor	**V5-T4-81**
D–Contactor	**V5-T4-84**
Reversing/Assignment Contactor	
Product Selection	**V5-T4-88**
Accessories	**V5-T4-88**
Renewal Parts	**V5-T4-88**
Technical Data and Specifications	**V5-T4-89**
Dimensions	**V5-T4-89**

Reversing/Assignment Contactor

Product Description

The Reversing/Assignment Contactor is a two-pole, double-throw non-load break definite purpose DC contactor. A three-position center-off and a two-position magnetically-latched configuration is available. The device is rated for 1100A, 1000 Vdc. The Reversing Contactor includes cross over busbars for DC motor reversing applications; the Assignment Contactor omits the cross over busbars for motor assignment applications. (See **Page V5-T4-89**.)

Application Description

The Reversing/Assignment Contactor was designed for the demanding environmental requirements of off highway vehicle applications. This device is also widely utilized with high horsepower DC drives for DC motor reversing and drive assignment applications.

Features

- Bi-directional current carrying capability (non-load break)
- Can replace four single-pole contactors in DC motor reversing applications
- Can replace two or four single-pole contactors in DC motor assignment applications
- Any combination of up to eight isolated NO or NC auxiliary contacts
- Panel mount design
- Continuous duty operating coil
- Screw type or fast-on control terminals

Product Selection

When Ordering—Contact Technical Resource Center

- Product specification: The Reversing/assignment contactor is a definite purpose DC contactor
- Please consult our Technical Resource Center for catalog numbers of other device configurations and application assistance

1000V Contactor



Reversing/Assignment Contactor (Three-Position, Center OFF)

Device Type	Auxiliary Contact Configuration	Coil Voltage	Catalog Number
Reverser	8NO	74	**6702ED615**
	4NO/4NC	125	**6702ED621-2**
		250	**6702ED622**
Assignment	4NO/4NC	74	**6702ED664-2**
		125	**6702ED621**
		250	**6702ED664-6**

Accessories

Auxiliary Contacts

Contact Configuration	Terminal Configuration	Catalog Number
1NO/1NC	Fast-on	**10-3519-5**
2NO	Fast-on	**10-3519-6**
2NC	Fast-on	**10-3519-7**
1NO/1NC	Screw type	**10-6817**
2NO	Screw type	**10-6817-2**
2NC	Screw type	**10-6817-3**

Renewal Parts

Contact Kits

Device	Configuration	Catalog Number
Reversing/assignment	Three-position	**6-602**
Reversing/assignment upgrade kit ①	Three-position	**6-602-3**
Magnetic latched reversing/assignment	Two-position	**6-602-5**

Note

① The 6-602-3 contact kit will upgrade the three-position, reversing/assignment device from the original design that incorporated a leaf spring contact structure to the present design that incorporates a coil spring contact structure. The 6-602 contact kit can then be used after the device has been upgraded for subsequent contact replacement.

Technical Data and Specifications

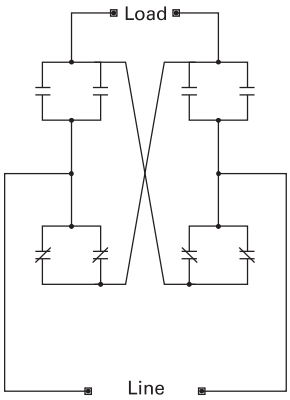
Reversing/Assignment Contactor

Description	Specification
Current carrying capability at 55°C	1100A continuous
Electrical creepage and clearance distances	For 1000 Vdc applications
Mechanical life	1 million operations
Operating coil voltages (DC)	24, 28, 36, 74, 110, 125, 250 (others available)

Operating Coil Characteristics

Coil Voltage	Current Draw at Nominal Voltage (±7.5% at 20°C)	Catalog Number
24	1.60	**9-1903-9**
28	1.30	**9-1903-1**
36	1.06	**9-1903-3**
74	0.49	**9-1903-7**
110	0.33	**9-1903-6**
125	0.33	**9-1903-4**
250	0.17	**9-1903-8**

Reversing Contactor Schematic Diagram

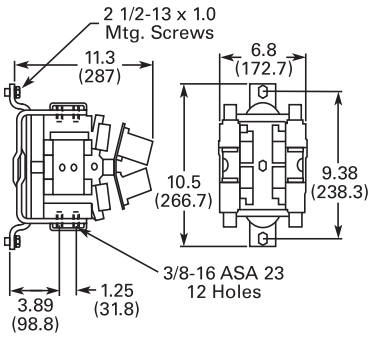


The reversing contactor includes the cross over busbars for DC motor reversing applications. The assignment contactor omits the cross over busbars for motor assignment applications.

Dimensions

Approximate Dimensions in Inches (mm)

Reversing Contactor



Width	Height	Depth	Shipping Weight Lbs (kg)
11.3 (287)	10.5 (266.7)	6.8 (172.7)	45 (20.4)

Ampere Rating of AC Motors

Ampere ratings of motors vary somewhat, depending upon the type of motor. The values given below are for drip-proof, Class B insulated (T Frame) where available, 1.15 service factor, NEMA Design B motors. These values represent an average full load motor current which was calculated from the motor performance data published by several motor manufacturers. In the case of high torque squirrel cage motors, the ampere ratings will be at least 10% greater than the values given below.

Caution—These average ratings could be high or low for a specific motor and therefore heater coil selection on this basis always involves risk. For fully reliable motor protection, select heater coils on the basis of full load current rating as shown on the motor nameplate.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor

hp ①	Syn. Speed RPM	Current in Amperes 200V	230V	380V ②	460V	575V	2200V
1/4	1800	1.09	0.95	0.55	0.48	0.38	—
	1200	1.61	1.4	0.81	0.7	0.56	—
	900	1.84	1.6	0.93	0.8	0.64	—
1/3	1800	1.37	1.19	0.69	0.6	0.48	—
	1200	1.83	1.59	0.92	0.8	0.64	—
	900	2.07	1.8	1.04	0.9	0.72	—
1/2	1800	1.98	1.72	0.99	0.86	0.69	—
	1200	2.47	2.15	1.24	1.08	0.86	—
	900	2.74	2.38	1.38	1.19	0.95	—
3/4	1800	2.83	2.46	1.42	1.23	0.98	—
	1200	3.36	2.92	1.69	1.46	1.17	—
	900	3.75	3.26	1.88	1.63	1.3	—
1	3600	3.22	2.8	1.7	1.4	1.12	—
	1800	4.09	3.56	2.06	1.78	1.42	—
	1200	4.32	3.76	2.28	1.88	1.5	—
	900	4.95	4.3	2.6	2.15	1.72	—
1-1/2	3600	5.01	4.36	2.64	2.18	1.74	—
	1800	5.59	4.86	2.94	2.43	1.94	—
	1200	6.07	5.28	3.2	2.64	2.11	—
	900	6.44	5.6	3.39	2.8	2.24	—
2	3600	6.44	5.6	3.39	2.8	2.24	—
	1800	7.36	6.4	3.87	3.2	2.56	—
	1200	7.87	6.84	4.14	3.42	2.74	—
	900	9.09	7.9	4.77	3.95	3.16	—
3	3600	9.59	8.34	5.02	4.17	3.34	—
	1800	10.8	9.4	5.7	4.7	3.76	—
	1200	11.7	10.2	6.2	5.12	4.1	—
	900	13.1	11.4	6.9	5.7	4.55	—
5	3600	15.5	13.5	8.2	6.76	5.41	—
	1800	16.6	14.4	8.74	7.21	5.78	—
	1200	18.2	15.8	9.59	7.91	6.32	—
	900	18.3	15.9	9.6	7.92	6.33	—

Notes

① To convert horsepower to kW, multiply horsepower by 0.7457.

② 380V 50 Hz.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor, continued

hp ①	Syn. Speed RPM	Current in Amperes 200V	230V	380V ②	460V	575V	2200V
7-1/2	3600	22.4	19.5	11.8	9.79	7.81	—
	1800	24.7	21.5	13	10.7	8.55	—
	1200	25.1	21.8	13.2	10.9	8.7	—
	900	26.5	23	13.9	11.5	9.19	—
10	3600	29.2	25.4	15.4	12.7	10.1	—
	1800	30.8	26.8	16.3	13.4	10.7	—
	1200	32.2	28	16.9	14	11.2	—
	900	35.1	30.5	18.5	15.2	12.2	—
15	3600	41.9	36.4	22	18.2	14.5	—
	1800	45.1	39.2	23.7	19.6	15.7	—
	1200	47.6	41.4	25	20.7	16.5	—
	900	51.2	44.5	26.9	22.2	17.8	—
20	3600	58	50.4	30.5	25.2	20.1	—
	1800	58.9	51.2	31	25.6	20.5	—
	1200	60.7	52.8	31.9	26.4	21.1	—
	900	63.1	54.9	33.2	27.4	21.9	—
25	3600	69.9	60.8	36.8	30.4	24.3	—
	1800	74.5	64.8	39.2	32.4	25.9	—
	1200	75.4	65.6	39.6	32.8	26.2	—
	900	77.4	67.3	40.7	33.7	27	—
30	3600	84.8	73.7	44.4	36.8	29.4	—
	1800	86.9	75.6	45.7	37.8	30.2	—
	1200	90.6	78.8	47.6	39.4	31.5	—
	900	94.1	81.8	49.5	40.9	32.7	—
40	3600	111	96.4	58.2	48.2	38.5	—
	1800	116	101	61	50.4	40.3	—
	1200	117	102	61.2	50.6	40.4	—
	900	121	105	63.2	52.2	41.7	—
50	3600	138	120	72.9	60.1	48.2	—
	1800	143	124	75.2	62.2	49.7	—
	1200	145	126	76.2	63	50.4	—
	900	150	130	78.5	65	52	—
60	3600	164	143	86.8	71.7	57.3	—
	1800	171	140	90	74.5	59.4	—
	1200	173	150	91	75	60	—
	900	177	154	93.1	77	61.5	—
75	3600	206	179	108	89.6	71.7	—
	1800	210	183	111	91.6	73.2	—
	1200	212	184	112	92	73.5	—
	900	222	193	117	96.5	77.5	—

Notes

① To convert horsepower to kW, multiply horsepower by 0.7457.

② 380V 50 Hz.

Ampere Ratings of Three-Phase, 60 Hz, AC Induction Motor, continued

hp ①	Syn. Speed RPM	Current in Amperes 200V	230V	380V ②	460V	575V	2200V
100	3600	266	231	140	115	92.2	—
	1800	271	236	144	118	94.8	23.6
	1200	275	239	145	120	95.6	24.2
	900	290	252	153	126	101	24.8
125	3600	—	292	176	146	116	—
	1800	—	293	177	147	117	29.2
	1200	—	298	180	149	119	29.9
	900	—	305	186	153	122	30.9
150	3600	—	343	208	171	137	—
	1800	—	348	210	174	139	34.8
	1200	—	350	210	174	139	35.5
	900	—	365	211	183	146	37
200	3600	—	452	257	226	181	—
	1800	—	458	265	229	184	46.7
	1200	—	460	266	230	184	47
	900	—	482	279	241	193	49.4
250	3600	—	559	338	279	223	—
	1800	—	568	343	284	227	57.5
	1200	—	573	345	287	229	58.5
	900	—	600	347	300	240	60.5
300	1800	—	678	392	339	271	69
	1200	—	684	395	342	274	70
400	1800	—	896	518	448	358	91.8
500	1800	—	1110	642	555	444	116

Notes

① To convert horsepower to kW, multiply horsepower by 0.7457.

② 380V 50 Hz.

Motor Protection Circuit Breaker



Manual Motor Protector



Overload Relay—C440



Overload Relays—C441 Motor Insight



Motor Management Relay—Power Xpert C445



5.1 Monitoring Relays

Product Overview—Monitoring Relays V5-T5-2
Current Monitoring Relays V5-T5-3
Phase Monitoring Relays V5-T5-5
Voltage Monitoring Relays V5-T5-13
Ground Fault Monitoring Relays V5-T5-24

5.2 Motor Protection Circuit Breakers

Motor Protection Circuit Breakers (MPCB) V5-T5-37

5.3 Manual Motor Protection

Manual Motor Protectors—XTPB, XTPR and XTPE V5-T5-38

5.4 Overload Relays

Product Overview V5-T5-40
XT IEC Overload Relays V5-T5-42
C306 Bimetallic Overload Relays V5-T5-46
C440/***XT*** Electronic Overload Relay V5-T5-47
C441 Overload Relays V5-T5-68
C445 Motor Management Relay V5-T5-90

Monitoring Relays



5

Contents

Description	*Page*
Monitoring Relays	
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Monitoring Relays	**V5-T5-24**

Product Overview—Monitoring Relays

Current Monitoring Relays

The CurrentWatch ECS and ECSJ Series from Eaton's Electrical Sector is a family of solid-state adjustable current switches, ideal for providing status information on electrical equipment.

Phase Monitoring Relays

The D65 Series Phase Monitoring Relays provide protection against premature equipment failure caused by voltage faults on three-phase systems. All D65 phase monitoring relays are compatible with most wye or delta systems. In wye systems, a connection to neutral is not required. Phase Monitoring relays protect against single-phasing regardless of any regenerative voltages.

Voltage Monitoring Relays

The D65 Series Voltage Monitoring Relays monitor either AC single-phase (50/60 Hz) or DC voltages to protect equipment against voltage fault conditions. No separate supply (input) voltage is required. All versions are available in a compact plug-in case using an 8-pin octal socket.

There are two styles of voltage monitoring relays:

- Over/Undervoltage Relays
- Voltage Band Relays

Ground Fault Monitoring Relays

Eaton offers two different series of ground fault monitoring relays:

D64R Series

- The D64R digital ground fault relays are microprocessor-based and replace the previous generation of analog-based devices
- Microprocessor-based D64R GFRs combine more selectable features into a single model, which makes easier model selection and reduces spares inventory requirements

D64L Series

- Type D64L ground fault monitors are designed to monitor ungrounded supplies on three-phase AC power systems up to 600 V. If an insulation fault develops anywhere on the system between the source and the load, the D64L will detect it and give an alarm or trip, depending on the adjustable field settings selected
- The D64L is ideally suited for systems supplied from the secondary of either an ungrounded delta or an ungrounded wye connected transformer

ECS Series CurrentWatch Current Switches



Contents

Description	*Page*
Current Monitoring Relays	
ECS Series CurrentWatch Current Switches	
ECSJ Series CurrentWatch Current Switches	**V5-T5-4**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Monitoring Relays	**V5-T5-24**

5

ECS Series CurrentWatch™ Current Switches

ECS Series

Product Description

The CurrentWatch™ ECS Series from Eaton's Electrical Sector is a family of solid-state adjustable current switches, ideal for providing status information on electrical equipment. The ECS is excellent for new installations, where the conductors run through the housing, requiring no cutting. These switches are also ideal for retrofits, since split-core models can be opened to fit around existing conductors. The current switch is accurate, reliable and easy to install.

The ECS can sense continuous currents from 1 to 150 A and does not require any supply voltage, as the power required is induced from the monitored conductor. The output is a non-polarity-sensitive solid-state contact for switching AC and DC circuits up to 240 Vac/Vdc. This switch also includes an LED indicating two states: on and below trip point, and above trip point with contacts energized. All ECS Series switches carry an unconditional five-year warranty.

Any change in current can be sensed with the ECS Series. A change in current may indicate motor failure, belt loss/slippage or mechanical failure. Any of these events can cause the current to drop significantly, tripping the switch and notifying the controller.

Standards and Certifications

- UL® Listed
- cUL® Listed
- CE Certified

UL Listed c UL Listed CE

Reference

Refer to **Volume 8—Sensing Solutions**, CA08100010E, Tab 7, section 7.2 for additional product information.

ECS Series CurrentWatch	*Tab Section*
Application Description	**7.2**
Product Selection	**7.2**
Accessories	**7.2**
Technical Data and Specifications	**7.2**
Wiring Diagrams	**7.2**
Dimensions	**7.2**

ECSJ Series CurrentWatch Current Switches



Contents

Description	*Page*
Current Monitoring Relays	
ECS Series CurrentWatch Current Switches	**V5-T5-3**
ECSJ Series CurrentWatch Current Switches	
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Monitoring Relays	**V5-T5-24**

ECSJ Series CurrentWatch Current Switches

ECSJ Series

Product Description

The CurrentWatch™ ECSJ Series current operated switches from Eaton's Electrical Sector provide the same dependable indication of status offered by the CurrentWatch ECS Series, but with the added benefit of increased setpoint precision. A choice of three, jumper-selectable input ranges allows the ECSJ Series to be tailored to an application, providing more precise control through improved setpoint resolution. Self-powering, isolated solid-state outputs, 1–6 A, 6–40 A and 40–200 A input ranges, and a choice of split- or solid-core enclosures are standard.

For typical applications of the CurrentWatch ECSJ Series, see listing on this page.

Application Description

Typical Applications

- **Electronic Proof of Flow**—Current operated switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electro-mechanical pressure or flow switches
- **Conveyors**—Detect jams and overloads
- **Lighting Circuits**—Easier to install and more accurate than photocells
- **Fans, Pumps and Heating Elements**—Faster response than temperature sensors
- **Critical Motors**
- **Ancillary Equipment**

Standards and Certifications

- UL Listed
- cUL Listed
- CE Certified
- UL 508 Industrial Equipment (USA and Canada)

UL Listed c UL Listed CE

Reference

Refer to **Volume 8—Sensing Solutions**, CA08100010E, Tab 7, section 7.3 for additional product information.

ECSJ Series CurrentWatch	*Tab Section*
Application Description	**7.3**
Product Selection	**7.3**
Accessories	**7.3**
Technical Data and Specifications	**7.3**
Wiring Diagrams	**7.3**
Dimensions	**7.3**

Phase Monitoring Relays



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	
Product Selection Guide	**V5-T5-6**
D65PLR Series—Phase Loss and Reversal	**V5-T5-7**
D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage	**V5-T5-9**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Monitoring Relays	**V5-T5-24**

5

Product Overview

The D65 Series Phase Monitoring Relays provide protection against premature equipment failure caused by voltage faults on three-phase systems. All D65 phase monitoring relays are compatible with most wye or delta systems. In wye systems, a connection to neutral is not required. Phase Monitoring relays protect against single-phasing regardless of any regenerative voltages.

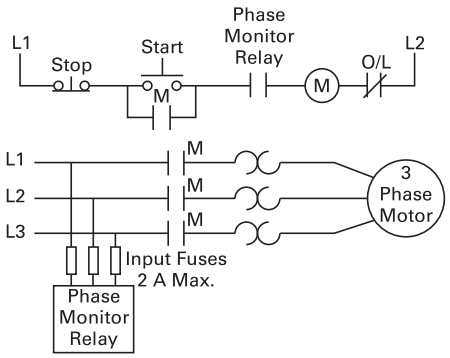
Application Description

Protection

Depending on the unit selected, it will protect three-phase equipment against:

- **Phase Loss**—total loss of one or more of the three phases. Also known as "single phasing." Typically caused by a blown fuse, broken wire or worn contact. This condition would result in a motor drawing locked rotor current during startup. In addition, a three-phase motor will continue to run after losing a phase, resulting in possible motor burn-out.
- **Phase Reversal**—reversing any two of the three phases will cause a three-phase motor to run in the opposite direction. This may cause damage to driven machinery or injury to personnel. The condition usually occurs as a result of mistakes made during routine maintenance or when modifications are made to the circuit.
- **Phase Imbalance—** imbalance of a three-phase system occurs when single-phase loads are connected such that one or two of the lines (phases) carry more or less of the load. This could cause motors to run at temperatures above published ratings.
- **Undervoltage**—when voltage in all three lines of a three-phase system drop simultaneously.
- **Overvoltage**—when voltage in all three lines of a three-phase system increase simultaneously.

Device Connection



Standards and Certifications

D65PLR Series

- cRUus listed
- RoHS recognized
- CE marked

D65VMLP Series

- cRUus listed
- RoHS recognized
- CE marked

D65VMLS Series

- cULus listed
- RoHS recognized
- CE marked

Listed

Product Selection Guide

D65 Series—Product Family Selection

Series	Mounting Style	Phase Reversal	Phase Loss and Reversal	Undervoltage	Overvoltage	Phase Imbalance	Time Delay on Undervoltage
D65PLR	Plug-in ①	3	3	—	—	—	—
D65VMLP	Plug-in ①	3	3	✓ (adjustable)	✓ (fixed)	3	0.1–20 sec
D65VMLS	Surface	3	3	✓ (adjustable)	✓ (fixed)	3	0.1–20 sec

Note

① In addition to the above approvals, all plug-in products are also UL Listed when used with the appropriate Eaton socket.

D65PLR Series—Phase Loss and Reversal



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	
Product Selection Guide	**V5-T5-6**
D65PLR Series—Phase Loss and Reversal	
Product Selection	**V5-T5-8**
Technical Data and Specifications	**V5-T5-8**
Dimensions	**V5-T5-8**
D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage	**V5-T5-9**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Monitoring Relays	**V5-T5-24**

D65PLR Series—Phase Loss and Reversal

Product Description

The D65PLR Series Monitoring Relays provide protection against phase loss and phase reversal in a compact plug-in design. These devices are designed to be compatible with most wye or delta systems. In wye systems, a connection to a neutral is not required. Phase monitoring relays protect against single-phasing regardless of any regenerative voltages.

A bi-color LED indicates NORMAL conditions with a green status, PHASE REVERSAL conditions with a steady red status, and PHASE LOSS conditions with a flashing red status. Re-energization is automatic upon correction of the fault condition.

Features

- Protects against phase loss and phase reversal
- True RMS voltage sensing for improved accuracy
- Continued operation through phase loss conditions
- Bi-color LED provides indication for both normal and fault conditions
- Compact plug-in case utilizing industry-standard 8-pin octal socket
- 10 A SPDT output contacts

Standards and Certifications

- cRUus
- UL listed ①
- RoHS compliant

c US Listed RoHS COMPLIANT

Note

① When used with appropriate Eaton socket.

Product Selection

D65PLR480



D65PLR Series, Phase Loss and Reversal

Mounting Style	Nominal Voltage 50/60 Hz	Catalog Number
Plug-in	190–500 V	**D65PLR480** ①

Accessories

D65PLR Series, Phase Loss and Reversal

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
Hold-down spring	10	**D65CHDS**

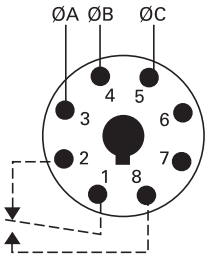
Technical Data and Specifications

D65PLR Series, Phase Loss and Reversal

Description	Specification
Phase loss	Unit trips on loss of any Phase A, B or C
Phase reversal	Unit trips if sequence of the three phases is anything other than A-B-C
Output contacts	10 A SPDT at 277 Vac, 1 hp at 250 Vac, 1/2 hp at 120 Vac. C300 pilot duty
Life	Full load—100,000 operations
Response times	
Operate	50 ms
Release	50 ms
Load (burden)	3 VA
Temperature	–20 to 150 °F (–28 to 65 °C)
Transient protection	10,000 volts for 20 microseconds
Mounting	Uses an 8-pin octal socket. Requires a 600 V rated socket when used on system voltages greater than 300 V
Indicator LED	Bi-color LED will be Green when NORMAL condition is present, Steady Red when PHASE REVERSAL condition is present, and Flashing Red when PHASE LOSS condition is present
Reset	Automatic upon correction of fault

Wiring Diagram

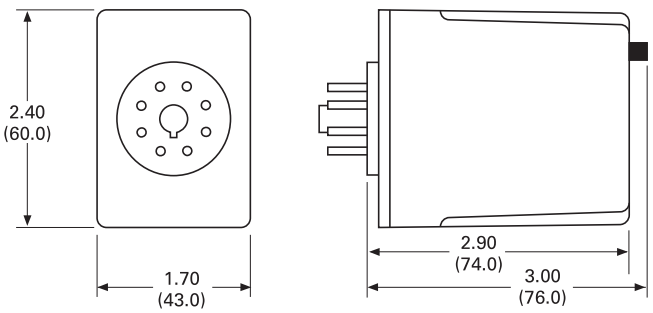
Wiring for 8-Pin Socket



Dimensions

Approximate Dimensions in Inches (mm)

D65PLR Series, Phase Loss and Reversal



Note

① Requires a 600 V rated socket when used on system voltages greater than 300 V.

D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	
Product Selection Guide	**V5-T5-6**
D65PLR Series—Phase Loss and Reversal	**V5-T5-7**
D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage	
Features	**V5-T5-10**
Product Selection	**V5-T5-11**
Technical Data and Specifications	**V5-T5-11**
Dimensions	**V5-T5-12**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Monitoring Relays	**V5-T5-24**

5

D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage

Product Description

Eaton's D65 Phase Monitoring Relay protects distribution systems supplying motor feeder or branch circuits against premature equipment failure caused by voltage faults on three-phase systems—wye or delta connected. Phase monitoring relays protect against voltage imbalance and single-phasing regardless of any regenerative voltages. The relay is energized when the phase sequence and all voltages are correct. Any of five abnormal conditions (phase loss, phase reversal, overvoltage, undervoltage or phase imbalance) will de-energize the relay. As standard, re-energization is automatic upon correction of the fault condition. The D65 can also be wired for manual reset.

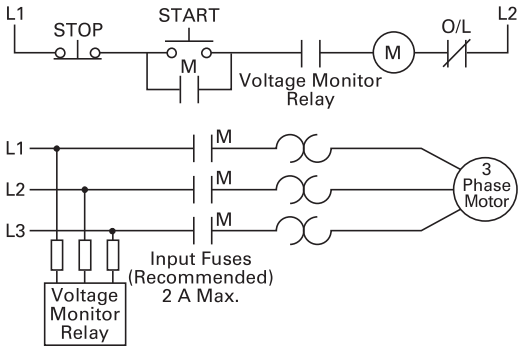
Application Description

Protective Functions

The D65 Series Relay makes separate trip decisions based on the status of the three-phase voltage inputs. Control power is derived from the three-phase voltage inputs. Separate control power is not required. The device will trip in response to any combination of the following conditions:

- **Undervoltage**—When voltage in all three lines of a three-phase system drops simultaneously. Undervoltage drop-out can be set at 80–95% of operating voltage. Unit trips when the average of all three lines is less than the adjusted set point for a period longer than the adjustable time delay drop-out (0.1–20 seconds). This time delay eliminates nuisance tripping caused by momentary voltage fluctuation.
- **Overvoltage**—Fixed at 110% of nominal, unit trips when the average of all three lines is greater than the fixed set point for a period longer than the time delay drop-out.
- **Phase Imbalance—** Imbalance of a three-phase system occurs when single-phase loads are connected such that one or two of the lines (phases) carry more or less of the load. This could cause motors to run at temperatures above published ratings. Unit trips when any one of the three lines is more than the adjusted set point below the average of all three lines. The percent phase imbalance is adjustable from 2–10% and also has a Disable setting for applications where poor voltage conditions could cause nuisance tripping.
- **Phase Loss (Single-Phasing)**—Total loss of one or more of the three phases. Typically caused by a blown fuse, broken wire or worn contact. This condition would result in a motor drawing locked rotor current during start-up. In addition, a three-phase motor will continue to run after losing a phase, resulting in potential motor burn-out. Unit trips on loss of any phase.
- **Phase Reversal—** Reversing any two of the three phases will cause a three-phase motor to run in the opposite direction. This may cause damage to machinery or injury to personnel. Unit trips if rotation (sequence) of the three phases is anything other than A-B-C.

Device Connection



Features

- Universal voltage range of 190–500 V provides the flexibility to cover a variety of applications (120 V and 600 V units also available)
- True RMS voltage sensing for improved accuracy
- Continued operation through phase loss conditions
- Automatic or manual reset after the fault condition is corrected
- Bi-color LED indicates normal condition and defines fault type for simpler troubleshooting
- D65VMLS can be mounted directly onto 35 mm DIN rail with no additional parts
- D65VMLP will plug into D3PA2 socket and mount on 35 mm DIN rail
- Small, compact size
- User-adjustable settings include nominal voltage, percent phase imbalance, undervoltage drop-out, time delay on undervoltage and time delay on restart after fault

Operation

The D65 provides protection against premature equipment failure caused by voltage faults on three-phase systems. The D65 is designed to be compatible with most wye or delta systems. In wye systems, a connection to a neutral is not required. D65 Phase Monitoring Relays protect against imbalanced voltages or single-phasing regardless of any regenerative voltages.

The relay is energized when the phase sequence and all voltages are correct. Any one of five fault conditions will de-energize the relay. Re-energization is automatic upon correction of the fault condition.

Manual reset is available if a NC switch is wired to the appropriate terminals. A bi-color LED indicates normal condition and also provides specific fault indication to simplify troubleshooting. The percent phase imbalance is adjustable from 2–10%, and the undervoltage drop-out can be set at 80–95% of operating voltage. The adjustable time delay drop-out on undervoltage (0.3–30 sec) eliminates nuisance tripping caused by momentary voltage fluctuations.

LED Operation

LED Status	Plug-In and Surface-Mount Indication
Green steady	Normal/relay ON
Green flashing	Power-up/restart delay
Red steady	Reversal
Red single flash ①	Loss/imbalance
Red double flash ②	Undervoltage
Red triple flash ③	Overvoltage

Notes

① Single flash = On 25 ms, Off 175 ms.
② Double flash = On 25 ms, Off 25 ms, On 25 ms, Off 125 ms.
③ Triple flash = On 25 ms, Off 25 ms, On 25 ms, Off 25 ms, On 25 ms, Off 75 ms.

Standards and Certifications

- CE (Low Voltage + EMC Directive EN60947-5-1)
- cULus listed (D65VMLS only)
- cRUus (D65VMLP only)
- RoHS compliant
- UL Listed ①

Product Selection

D65VM_





D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage ②

Mounting Style	Operating Voltage 50/60 Hz	Catalog Number
Surface-mount (DIN rail)	102–138 V	**D65VMLS120C**
	190–500 V	**D65VMLS480C**
	460–600 V	**D65VMLS600C**
Plug-in (DIN rail)	102–138 V	**D65VMLP120**
	190–500 V	**D65VMLP480** ③
	460–600 V	**D65VMLP600**
8-pin socket	—	**D3PA2**
8-pin IP20 rated socket	—	**D3PA6**

Technical Data and Specifications

D65VM Series—Phase Loss, Reversal, Imbalance and Under/Overvoltage

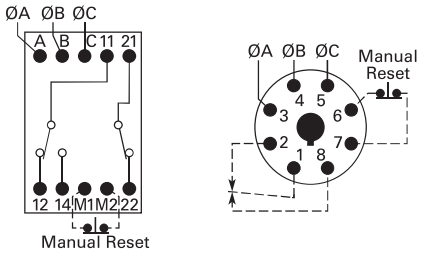
Description	Specification
Nominal voltages (50–60 Hz)	
For D65VMLS	102–138 V, 190–500 V, 460–600 V
For D65VMLP	102–138 V, 190–500 V, 460–600 V
Connections	Wye or delta
Output contacts	
For D65VMLS	DPDT: NO: 10 A resistive at 277 Vac/30 Vdc, 1/2 hp at 120/240 Vac, B300 pilot duty, R300 NC: 10 A resistive at 277 Vac/30 Vdc, 1/3 hp at 120/240 Vac, B300 pilot duty, R300
For D65VMLP	SPDT: 10 A SPDT at 277 Vac, 1 hp at 250 Vac, 1/2 hp at 120 Vac, C300 pilot duty
Dielectric	1000 V + (2 * nominal voltage rating) between input terminals and case or active circuitry
Operating temp.	–20 to 150 °F (–28 to 65 °C)
Response times	
Power up	1–300 seconds adjustable
Restart after fault	1–300 seconds adjustable
Dropout due to fault	100 ms fixed on phase loss and phase reversal; 0.3–30 sec adjustable for all other faults—unbalance, undervoltage, overvoltage
Mechanical life	10,000,000 operations
Electrical life	100,000 operations
Power consumption	40 VA
Hysteresis	2–3%

Notes

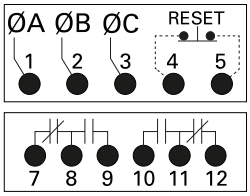
① When used with accompanying Eaton Socket (D65VMLP only).
② Additional models available. Please visit our Web site for the latest offering.
③ Requires a 600 V-rated socket when used on system voltages greater than 300 V. The D3PA2 socket is rated 10 A, 600 V.

Wiring Diagrams

Plug-In



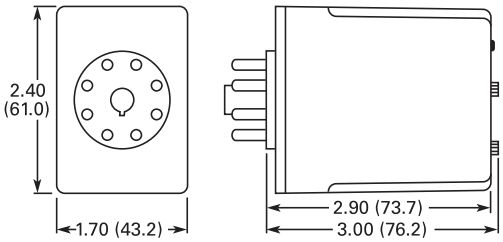
Surface-Mount



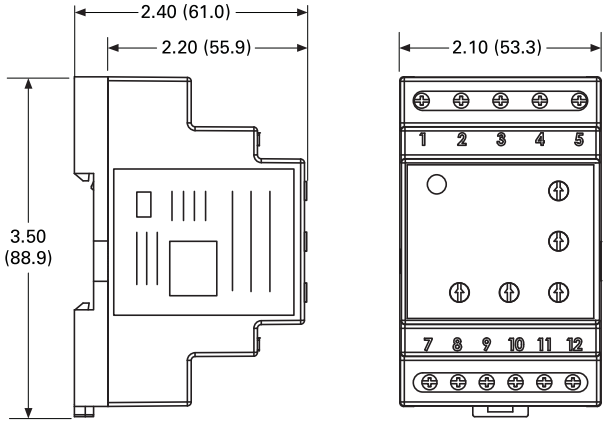
Dimensions

Approximate Dimensions in Inches (mm)

Plug-In



Surface-Mount



Voltage Monitoring Relays



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	
Product Selection Guide	**V5-T5-14**
D65VMRP Over/Undervoltage Relays (Fixed Time Delay)	**V5-T5-15**
D65VAKP Over/Undervoltage Relays	**V5-T5-18**
D65VWKP Voltage Band Relays	**V5-T5-21**
Ground Fault Monitoring Relays	**V5-T5-24**

5

Product Overview

Voltage Monitoring Relays monitor either AC single-phase (50/60 Hz) or DC voltages to protect equipment against voltage fault conditions. No separate supply (input) voltage is required. All versions are available in a compact plug-in case using an 8-pin octal socket.

There are two styles of voltage monitoring relays:

- Over/Undervoltage Relays
- Voltage Band Relays

Over/Undervoltage Relays

Over/Undervoltage Relays provide protection to equipment where either an over- or undervoltage condition is potentially damaging. Each relay can be used as either an overvoltage or an undervoltage relay, depending on the output contact used. When used as an undervoltage relay, it provides protection to equipment that is required to operate above a minimum voltage. When used as an overvoltage relay, it protects equipment against excessive voltage conditions. Over/undervoltage relays are designed to operate when the operating voltage reaches a preset value and drop out when the operating voltage drops to a level below the preset value.

Voltage Band Relays

Voltage Band Relays provide protection to equipment that is required to operate within an upper and lower voltage limit. As long as the operating voltage remains within an over- and undervoltage range, the internal relay stays energized. If the operating voltage falls outside this range, the relay will drop out.

Standards and Certifications

- CE
- cRUus listed
- UL listed ①
- RoHS recognized

Listed

Note

① When used with accompanying Eaton socket.

Product Selection Guide

D65V Product Family Selection—Over/Undervoltage Relays

Series	Pickup Voltage	Dropout Voltage	Time Delay Dropout	Fixed Time Delay for Over/Undervoltage Relays	Adjustable Time Delay Over/Undervoltage Relays
D65VMRP	Adjustable 75–125% nominal	Fixed at 95% of pickup	Fixed 500 ms ①	**Page V5-T5-16**	—
D65VAKP		Adjustable 75–95% of pickup	Adjustable 0.1–10 seconds	—	**Page V5-T5-19**

5

D65V Product Family Selection—Voltage Band Relays

Series	Pickup Voltage	Dropout Voltage	Time Delay Dropout	Voltage Band Relays
D65VWKP	Adjustable 75–125% nominal	Adjustable 75–95% of pickup	Adjustable 0.1–10 seconds	**Page V5-T5-22**

Note

① Fixed time delay eliminates nuisance tripping due to short voltage surges or drops.

D65VMRP—Fixed Time Delay Over/Undervoltage Relays



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	
Product Selection Guide	**V5-T5-14**
D65VMRP Over/Undervoltage Relays (Fixed Time Delay)	
Product Selection	**V5-T5-16**
Technical Data and Specifications	**V5-T5-16**
Dimensions	**V5-T5-17**
D65VAKP Over/Undervoltage Relays	**V5-T5-18**
D65VWKP Voltage Band Relays	**V5-T5-21**
Ground Fault Monitoring Relays	**V5-T5-24**

5

D65VMRP Over/Undervoltage Relays (Fixed Time Delay)

Product Description

The D65VMRP Over/Undervoltage Relays provide protection to equipment where either an over- or undercurrent condition is potentially damaging. They are designed to operate when the operating voltage reaches a preset value and drop out when the operating voltage drops to a level below the preset value.

The pickup voltage setting is user-adjustable from 75 to 125% of the nominal voltage rating. As standard, the D65VMRP Series has a dropout voltage setting fixed at 95% of the pickup voltage setting. The relay energizes when the monitored voltage is above the pickup setting. The relay de-energizes when the monitored voltage is below the dropout setting for a period longer than the drop-out time delay, which is fixed at 500 ms.

Application Description

Each relay can be used as either an overvoltage or an undervoltage relay, depending on the output contact used.

Overvoltage Relay

Provides protection to equipment that cannot handle excess voltages. Uses a normally closed contact (NC). As long as the monitored voltage remains below the maximum voltage the equipment can withstand (pickup setting), the relay remains energized and the NC contact remains closed, keeping the load energized. If the operating voltage increases beyond the maximum rating of the equipment, the relay energizes and the NC contact opens, turning off the load. When the voltage falls below the dropout settings (hysteresis), the relay de-energizes and the NC contact re-closes, turning on the load.

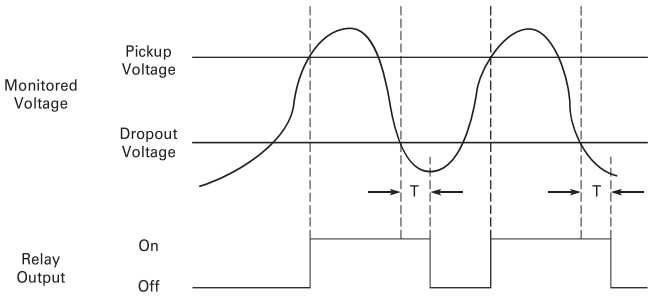
Undervoltage Relay

Provides protection to equipment that is required to operate above a certain minimum voltage. Uses a normally open contact (NO). As long as the monitored voltage is above the minimum value required (pickup setting), the relay will energize and the NO contact closes, turning on the load. If the voltage drops below the dropout setting (the minimum voltage required minus hysteresis), the relay will de-energize and the NO contact will re-open, turning off the load.

Features

- Monitors AC single-phase and DC voltages
- Wide range of user-adjustable pickup with fixed dropout settings
- Fixed time delay on dropout of 500 ms
- LED indicates output relay status
- Compact plug-in case using industry standard 8-pin socket
- 10 A DPDT output contacts

Fixed Time Delay Over/Undervoltage Current Monitoring



Product Selection

D65VM_



D65VMRP Series—Over/Undervoltage Relay ①, Adjustable Pickup, Fixed Dropout Settings ②

Nominal Voltage	Voltage Range Pickup	Dropout	Catalog Number
120 Vac	90–150 Vac	68–142 Vac	**D65VMRPA**

Accessories

D65VMRP Series—Over/Undervoltage Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
Hold-down spring	10	**D65CHDS**

Technical Data and Specifications

D65V Series—Fixed and Adjustable Time Delay Over/Undervoltage Relays

D65VMRP and D65VAKP Series, Over/Undervoltage Relays

Description	Specification
Voltage tolerance	±50% of nominal voltage; AC voltages are 50/60 Hz No supply (input) voltage is required
Load (burden)	Less than 2 VA (12–120 V); 30 VA (240 V and 480 V)
Current settings	
Pickup	Adjustable from 75 to 125% of nominal voltage
Dropout	Fixed at 95% of the pickup setting for D65VMRP Adjustable from 75 to 95% of the pickup setting for D65VAKP
Temperature	–20 to 131 °F (–28 to 65 °C)
Response times	
Pickup	500 ms
Dropout	Fixed 500 ms for D65VMRP Adjustable 0.1–10 seconds for D65VAKP
Output contacts	10 A at 240 Vac, 7 A at 30 Vdc, 1/4 hp at 120/240 Vac, C300
Mechanical life	10,000,000 operations
Electrical life	100,000 operations
Indicator LED	Red steady when relay is energized; green when relay is OFF
Transient protection	2000 V per IEC 61000-4-5 Level 3 (±2 kV)
Reset	Automatic
Mounting	Requires an 8-pin socket

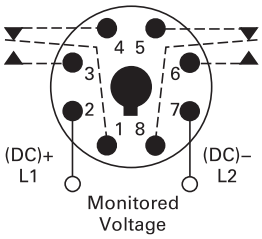
Notes

① Time delay on dropout fixed at 500 ms.

② Dropout voltage is fixed at 95% of the adjusted pickup setting.

Wiring Diagram

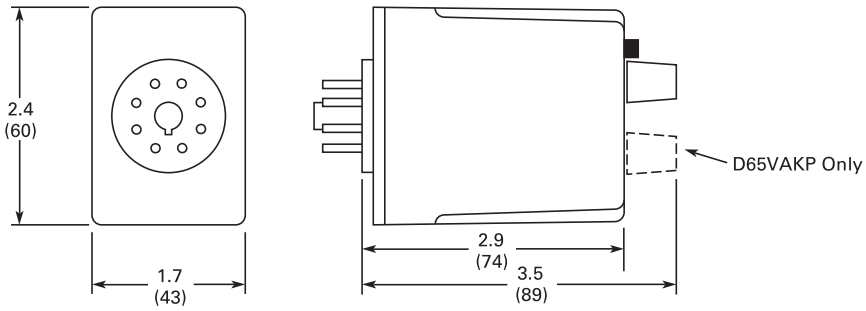
Wiring for 8-Pin Socket



Dimensions

Approximate Dimensions in Inches (mm)

D65V Series—Fixed and Adjustable Time Delay Over/Undervoltage Relays



D65VAKP—Adjustable Time Delay Over/Undervoltage Relays



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	
Product Selection Guide	**V5-T5-14**
D65VMRP Over/Undervoltage Relays (Fixed Time Delay)	**V5-T5-15**
D65VAKP Over/Undervoltage Relays (Adjustable Time Delay)	
Product Selection	**V5-T5-19**
Technical Data and Specifications	**V5-T5-20**
Dimensions	**V5-T5-20**
D65VWKP Voltage Band Relays	**V5-T5-21**
Ground Fault Monitoring Relays	**V5-T5-24**

5

D65VAKP Over/Undervoltage Relays (Adjustable Time Delay)

Product Description

The D65VAKP Over/Undervoltage Relays provide protection to equipment where either an over- or undercurrent condition is potentially damaging. They are designed to operate when the operating voltage reaches a preset value and drop out when the operating voltage drops to a level below the preset value.

The pickup voltage setting is user-adjustable from 75 to 125% of the nominal voltage rating. As standard, the D65VAKP has an adjustable dropout setting of 75–95%. The relay energizes when the monitored voltage is above the pickup setting. The relay de-energizes when the monitored voltage is below the dropout setting for a period longer than the dropout time delay, which is adjustable from 0.1 to 10 seconds. A fixed time delay of 500 ms is available with the D65VMP Series.

Application Description

Each relay can be used as either an overvoltage or an undervoltage relay, depending on the output contact used.

Overvoltage Relay

Provides protection to equipment that cannot handle excess voltages. Uses a normally closed contact (NC). As long as the monitored voltage remains below the maximum voltage the equipment can withstand (pickup setting), the relay remains energized and the NC contact remains closed, keeping the load energized. If the operating voltage increases beyond the maximum rating of the equipment, the relay energizes and the NC contact opens, turning off the load. When the voltage falls below the dropout settings (hysteresis), the relay de-energizes and the NC contact re-closes, turning on the load.

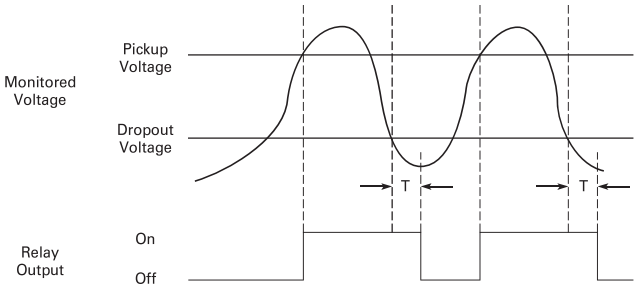
Undervoltage Relay

Provides protection to equipment that is required to operate above a certain minimum voltage. Uses a normally open contact (NO). As long as the monitored voltage is above the minimum value required (pickup setting), the relay will energize and the NO contact closes, turning on the load. If the voltage drops below the dropout setting (the minimum voltage required minus hysteresis), the relay will de-energize and the NO contact will re-open, turning off the load.

Features

- Monitors AC single-phase and DC voltages
- Wide range of user-adjustable pickup and dropout settings
- Adjustable time delay on dropout of 0.1–10 seconds
- LED indicates output relay status
- Compact plug-in case using industry standard 8-pin socket
- 10 A DPDT output contacts

Adjustable Time Delay Over/Undervoltage Current Monitoring



Product Selection

D65VA_



D65VAKP Series—Over/Undervoltage Relay ①, Adjustable Pickup and Dropout Settings ②

Nominal Voltage	Voltage Range Pickup	Dropout	Catalog Number
120 Vac	90–150 Vac	68–142 Vac	**D65VAKPA**
12 Vdc	9–15 Vdc	7–14 Vdc	**D65VAKPR1**
24 Vdc	18–30 Vdc	14–38 Vdc	**D65VAKPT1**
48 Vdc	36–60 Vdc	27–57 Vdc	**D65VAKPW1**
110 Vdc	83–138 Vdc	62–130 Vdc	**D65VAKPA1**
240 Vac	180–300 Vac	135–285 Vac	**D65VAKPA2**
480 Vac	360–600 Vac	270–570 Vac	**D65VAKPA3**

Accessories

D65VAKP Series—Over/Undervoltage Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
Hold-down spring	10	**D65CHDS**

Notes

① Time delay on dropout adjustable 0.1–10 sec.

② Dropout voltage is adjustable from 75 to 95% of the adjusted pickup setting.

Technical Data and Specifications

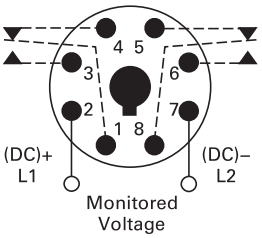
D65V Series—Fixed and Adjustable Time Delay Over/Undervoltage Relays

D65VMP and D65VAKP Series, Over/Undervoltage Relays

Description	Specification
Voltage tolerance	±50% of nominal voltage; AC voltages are 50/60 Hz No supply (input) voltage is required
Load (burden)	Less than 2 VA (12–120 V); 30 VA (240 V and 480 V)
Current settings	
Pickup	Adjustable from 75 to 125% of nominal voltage
Dropout	Fixed at 95% of the pickup setting for D65VMP Adjustable from 75 to 95% of the pickup setting for D65VAKP
Temperature	–18 to 149 °F (–28 to 65 °C)
Response times	
Pickup	500 ms
Dropout	Fixed 500 ms for D65VMP Adjustable 0.5–10 seconds for D65VAKP
Output contacts	10 A at 240 Vac, 7 A at 30 Vdc, 1/4 hp at 120/240 Vac, C300
Mechanical life	10,000,000 operations
Electrical life	100,000 operations
Indicator LED	Red steady when relay is energized; green when relay is OFF
Transient protection	2000 V per IEC 61000-4-5 Level 3 (±2 kV)
Reset	Automatic
Mounting	Requires an 8-pin socket

Wiring Diagram

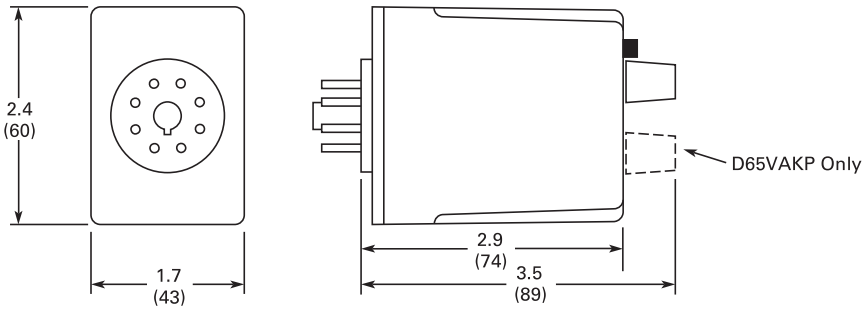
Wiring for 8-Pin Socket



Dimensions

Approximate Dimensions in Inches (mm)

D65V Series—Fixed and Adjustable Time Delay Over/Undervoltage Relays



D65VWKP Voltage Band Relays



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	
Product Selection Guide	**V5-T5-14**
D65VMRP Over/Undervoltage Relays (Fixed Time Delay)	**V5-T5-15**
D65VAKP Over/Undervoltage Relays (Adjustable Time Delay)	**V5-T5-18**
D65VWKP Voltage Band Relays	
Product Selection	**V5-T5-22**
Technical Data and Specifications	**V5-T5-22**
Dimensions	**V5-T5-23**
Ground Fault Monitoring Relays	**V5-T5-24**

5

D65VWKP Voltage Band Relays

Product Description

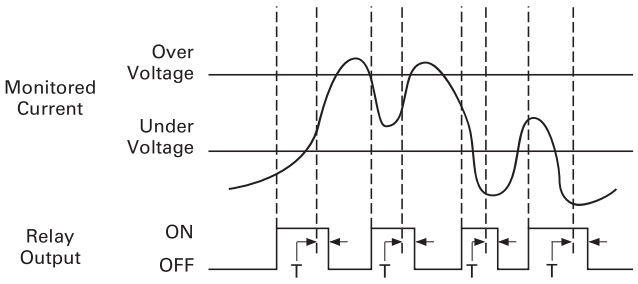
The D65VWKP Series Voltage Band Relays provide protection to equipment that is required to operate within an upper and lower voltage limit. As long as the operating voltage remains within an over- and undervoltage range, the internal relay stays energized. If the operating voltage falls outside this range, the relay will drop out.

When nominal operating voltage is applied, the internal relay will energize (pickup). If the operating voltage falls outside the preset over trip point (adjustable 75–125% of nominal), or under trip point (adjustable 75–95% of pickup), for a period longer than the dropout time delay, the relay will de-energize (dropout). When the voltage returns to normal (within the preset over- and undervoltage trip points), the unit automatically resets and the relay energizes. The D65VWP has a 0.1–10 second dropout time.

Features

- Monitors AC single-phase and DC voltages
- Provides voltage band (window) protection
- Wide range of user-adjustable overvoltage and undervoltage settings
- Adjustable time delay on dropout from 0.1 to 10 seconds
- LED indicates output relay status
- Compact plug-in case using industry standard 8-pin octal socket
- 10 A DPDT output contacts

Voltage Band Relay Current Monitoring



Product Selection

D65VW_



D65VWKP Voltage Band Relays
Adjustable Dropout Time Delay (0.1–10 Seconds)

Nominal Voltage	Voltage Range Over	Under	Catalog Number
120 Vac	90–150 Vac	68–142 Vac	**D65VWKPA**

Accessories

D65VWKP Voltage Band Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
Hold-down spring	10	**D65CHDS**

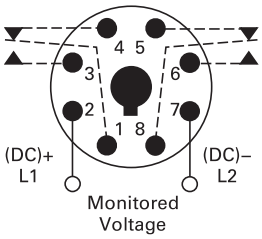
Technical Data and Specifications

D65VWKP Series, Voltage Band Relays

Description	Specification
Voltage tolerance	±50% of nominal voltage; AC voltages are 50/60 Hz No separate supply (input) voltage is required
Load (burden)	Less than 2 VA (12–120 V); 30 VA (240 V and 480 V)
Voltage settings	
Overvoltage	75–125% of nominal voltage
Undervoltage	75–95% of pickup voltage
Temperature	–18 to 149 °F (–28 to 65 °C)
Indicator LED	Red steady when relay is energized; green when relay is OFF
Reset	Automatic Contact Eaton for information on how to order a unit with manual reset
Response times	
Operate	500 ms
Release	Adjustable 0.1–10 seconds
Output contacts	10 A at 240 Vac, 7 A at 30 Vdc, 1/4 hp at 120/240 Vac, C300
Mechanical life	10,000,000 operations
Electrical life	100,000 operations
Transient protection	2000 V per IEC 61000-4-5 Level 3 (±2 kV)

Wiring Diagram

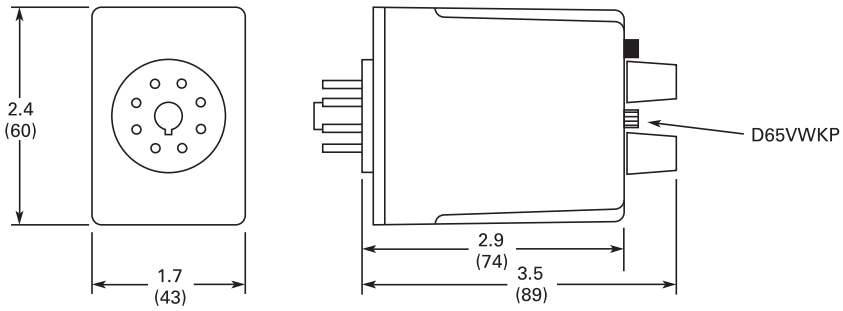
Wiring for 8-Pin Socket



Dimensions

Approximate Dimensions in Inches (mm)

D65VWKP Series, Voltage Band Relays



Ground Fault Relays and Monitors



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Relays and Monitors	
D64R Series—Digital Ground Fault Relays	**V5-T5-25**
D64L Series—Ground Fault Monitors	**V5-T5-35**

Product Overview

D64R Series—Digital Ground Fault Relays

The new D64R digital ground fault relays are microprocessor-based and replace the previous generation of analog-based devices.

Microprocessor-based D64R GFRs combine more selectable features into a single model, which makes easier model selection and reduces spares inventory requirements.

These devices are designed to provide reliable detection of ground fault conditions on three-phase AC resistance grounded or solidly grounded electrical distribution systems.

D64L Series—Ground Fault Monitors

Type D64L ground fault monitors are designed to monitor ungrounded supplies on three-phase AC power systems up to 600 V. If an insulation fault develops anywhere on the system between the source and the load, the D64L will detect it and give an alarm or trip, depending on the adjustable field settings selected.

The D64L is ideally suited for systems supplied from the secondary of either an ungrounded delta or an ungrounded wye connected transformer.

Because D64L has high immunity from the effects of voltage transients and cable capacitance, it may be applied in automotive, sub-sea, mobile lighting, portable generators, sensitive equipment and other installations where ungrounded systems are used extensively.

The user is able to individually set the alarm level and the trip level from 20%–80% of the maximum leakage current limit of the D64L selected. Any leakage current above the alarm level will activate the alarm relay and light the alarm LED. Should the leakage current rise above the trip level, the trip relay and trip LED will activate.

D64R Series—Digital Ground Fault Relays



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Relays and Monitors	
D64R Series—Digital Ground Fault Relays	
Features	**V5-T5-26**
Options	**V5-T5-26**
Standards and Certifications	**V5-T5-26**
Product Selection	**V5-T5-27**
Accessories	**V5-T5-28**
Technical Data and Specifications	**V5-T5-29**
Wiring Diagrams	**V5-T5-30**
Dimensions	**V5-T5-32**
D64L Series—Ground Fault Monitors	**V5-T5-35**

5

D64R Series—Digital Ground Fault Relays

Product Description

The new D64R digital ground fault relays are microprocessor-based and replace the previous generation of analog-based devices.

Microprocessor-based D64R GFRs combine more selectable features into a single model, which makes easier model selection and reduces spares inventory requirements.

These devices are designed to provide reliable detection of ground fault conditions on three-phase AC resistance grounded or solidly grounded electrical distribution systems.

Application Description

D64R ground fault relays feature adjustable trip settings for both trip current and trip time. This allows the user to set the ground fault trip current just above the "charging" current of the system. This prevents nuisance tripping and provides meaningful protection of additional ground fault leakage currents.

Every system has a "charging" current that can cause nuisance tripping if the trip current is set too low. The "charging" current is caused by the capacitance-to-ground effect of phase conductors in a system and will vary depending on:

- The overall length of the cables
- The types of loads
- The quality of the insulation on the phase conductors
- Surrounding equipment grounding, cable trays, junction boxes, and so on
- Type and size of transformer

A "rule-of-thumb" for systems 600 V and lower: the "charging" current is 0.5 A per 1000 kVA of transformer capacity.

Features

Standard Models

- Built-in current sensor (zero sequence CT)
- Run and trip indicating LEDs
- Built-in harmonic filtering for variable frequency drives or standard 50/60 Hz applications (see **Page V5-T5-29** for frequency response range)
- DIN rail or panel mounting
- Rugged epoxy encapsulated construction
- Pull-apart terminal block connectors
- Form "Z" (4 terminal) NO and NC output contacts, 5 amps at 250 Vac
- Pulsed (trip) auto reset mode

The pulsed (trip) auto reset mode is designed for applications where the output relay is operating a shunt trip device. The D64R relay resets automatically, three seconds after the ground fault current is interrupted by the tripping action of the circuit breaker. This opens the output contact wired to the shunt trip coil and prevents damage to the internal mechanism of the circuit breaker in the event that the operator tries to reset the circuit breaker.

- Suitable for use on 600 V systems—may be applied on higher voltages by using separate CTs with power conductors insulated for the system voltage
- Built-in test circuitry—no external power or additional wiring is necessary—tests trip time and current settings
- Communications port (standard RJ-10 jack) for connection to optional remote display (D64D1) and door mounted units (on D64RPB100 models only)
- Fail-safe selectable mode (on D64RPB100 models only)

In the fail-safe mode, the relay is energized when control voltage is applied and will trip when either:

- a ground fault trip is detected or,
- there is a loss of control power.

Service Protection Models

- Service protection models require C311CT 10,000:1 ratio CTs
- Trip current range of 50 to 1200 A
- Green LED indicates "Power On"
- Circuit breaker toggle position indicates "Normal" or "Tripped" condition
- Form "C" (3 terminal) NO-NC output contacts, 3 amps at 250 Vac
- Frequency response range of 40 to 200 Hz
- Zone interlocking feature with green LED to indicate "Grading Input Active" and DIP switch array for zone grading backup delay and block signal override (on D64RPBH15 model only)
- Test button to invoke test at 20 A trip current—tests external CT, electronics and circuit breaker trip
- Fail-safe selectable mode (see above for description)
- Inhibit selectable mode—this allows the relay to differentiate between normal ground fault trip levels and short circuit conditions

The trip inhibit function is useful when the relay is being used to trip a contactor or motor starter on a solidly grounded system. Under a bolted fault condition, the relay would trip and could cause the contactor or motor starter to interrupt the high fault current with harmful results. By inhibiting the trip, the ground fault relay will not trip on bolted faults and will allow the upstream protective device to clear the fault instead.

- Through-the-door or rear panel mounting

Options

- Other ranges of trip currents and times
- Fixed trip current and times
- Other control voltages
- Custom packaging for volume OEM requirements
- Separate outputs for alarming vs trip
- Relays for neutral grounding resistance monitoring
- Relays for ground fault detection on DC power systems
- Other sizes of current transformers

Standards and Certifications

- UL 1053
  - Ground Fault Sensing and Relaying Equipment, Class 1 (UL File # E195341)
- CSA® C22.2 No. 144-M91
  - Ground Fault Circuit Interrupters (CSA File # 700103)
- CE Mark—Declaration of Conformity
- IEC 60755
  - General Requirements for residual current operated protective devices
- EN 50081-1
  - Electromagnetic compatibility (radiated emission), "household" directive

D64R ground fault relays are UL listed as Class 1 devices designed to protect electrical equipment against extensive damage from arcing ground faults.

Product Selection

Standard Models

When Ordering, Specify

- Catalog number of relay from tables
- Catalog number of zero sequence current transformers, if or when required, remote digital display or remote indicator units

Ground Fault Relay with Built-In Current Sensor

	Control Power	Trip Current Range	Current Transformer Selection	Catalog Number
D64RP18 without Plug-In 	24–240 Vac/Vdc	30 mA–6 A	Built-in 1.1 in CT ① If external CT is required for specific application, select 500:1 ratio CT ②	**D64RP18**
D64RPB100 Full-Featured Ground Fault Relay 	24–240 Vac/Vdc	30 mA–9 A	Built-in 2.0 in CT ③ If external CT is required for specific application, select 500:1 ratio CT ②	**D64RPB100_**
		3–900 A	Select 500:5 ratio CT ④	**D64RPB100_**
		30–9000 A	Select 5000:5 ratio CT ④	**D64RPB100_**
D64RPB30 without Internal CT 	24–240 Vac/Vdc	30 mA–9 A	Requires use of applicable C331CT, see **Page V5-T5-28**.	**D64RPB30**

Service Protection Models

When Ordering, Specify

- Catalog number of relay from tables
- Catalog number of zero sequence current transformers, if or when required, remote digital display or remote indicator units

D64RPBH15 Ground Fault Relay with Zone Interlocking


Ground Fault Relay

Control Power	Zone Interlocking Feature	Trip Current Range	Current Transformer Selection	Catalog Number
120 Vac	No	50 A–1200 A	Select 10,000:1 ratio CT ⑤	**D64RPBH13**
120 Vac	Yes	50 A–1200 A	Select 10,000:1 ratio CT ⑤	**D64RPBH15**

Notes

① Maximum allowable continuous current through built-in CT is 100 amps.
② For 500:1 ratio CTs, select from Protective Relays in **Volume 3—Power Distribution and Control Assemblies**, CA08100004E. Tab 9, section 9.3.
③ Maximum allowable continuous current through built-in CT is 200 amps.
④ For 500:5 or 5000:5 ratio CTs, select any commercially available 5 amp secondary CT with the same ratio.
⑤ For 10,000: 1 ratio CTs, select from Protective Relays in **Volume 3—Power Distribution and Control Assemblies**, CA08100004E. Tab 9, section 9.3.

Accessories

Zero Sequence Current Transformers

- A complete size range of zero sequence CTs designed specifically for use with D64R relays provide excellent coupling to the monitored circuit. This means accurate ground fault leakage current detection over the full setting range of the relay with no saturation
- Built-in back-to-back zeners across the output terminals of all 500:1 and 10,000:1 CTs provide personnel safety should the secondary circuit be opened
- Rectangular split core CTs make retro-fitting easy
- All CTs are epoxy potted, panel mounted and come with either secondary screw terminals or threaded studs
- The core is very high grade silicon iron to give superior coupling characteristics and to withstand high shock and vibration
- All CTs are 600 Volt class. They may be used on higher voltage circuits provided that power conductors are insulated for the system voltage

Zero Sequence Current Transformers for D64RP18 and D64RPB100 Relay ①②③

C311CT9



Toroidal

Description/Window Size	Ratio 500:1 CTs ④ Catalog Number
1.1 in (28 mm)	**C311CT8**
1.8 in (46 mm)	**C311CT1**
2.5 in (65 mm)	**C311CT9**
3.5 in (90 mm)	**C311CT2**
5.7 in (144 mm)	**C311CT5**
9.5 in (240 mm)	**C311CT6**

Split Core (Rectangular/Square)

Description/Window Size	Ratio 500:1 CTs ④ Catalog Number
5.9 x 6.7 in (150 x 170 mm)	**C311CT3**
4.0 x 13.8 in (100 x 350 mm)	**C311CT4**
11.8 x 11.8 in (300 x 300 mm)	**C311CT7**

Zero Sequence Current Transformers for D64RPBH13 and D64RPBH15 Relays

Toroidal

Description/Window Size	Ratio 10,000:1 CTs ⑤ Catalog Number
2.5 in (65 mm)	**C311CT11**
5.7 in (144 mm)	**C311CT12**
9.5 in (240 mm)	**C311CT13**

Notes

① D64RP18 relays use 500:1 ratio CTs if needed.
② D64RPB100 relays can use 500:1 ratio CTs when needed for 30 mA–9 A, 500:5 ratio for 3 A–900 A and 5000:5 ratio for 30 A–9000 A trip current ranges.
③ For 500:5 or 5000:5 ratio CTs, select any commercially available 5 Amp secondary CT with the same ratio.
④ The maximum allowable continuous current through CTs is 1000 A.
⑤ The maximum allowable continuous current through 10,000:1 ratio CTs is 10,000 A.

D64D1 Digital Display Unit

The D64D1 digital display unit is connected to the D64RPB100 by up to 30 ft (10m) of standard four-wire telephone type cable. It is supplied with door-mounting hardware. It provides the following remote indications and functions:

- Continuous reading of actual ground fault current, employing auto ranging
- Display of the pre-trip ground fault current, after a trip has occurred (flashing display)
- Display of the trip current setting, after a Test Trip has been activated
- Green RUN LED, red TRIP LED
- TEST and RESET pushbuttons. The RESET button must be held pressed before the TEST is pressed to invoke the test procedure. The function of this button can be enabled/disabled by inserting the interconnecting cable from the D64RPB100 relay into one of two sockets, TEST ON or TEST OFF, on the right side of the display
- Pushing VERIFY pushbutton shows if D64RPB100 tripped due to a ground fault prior to loss of its control voltage—red TRIP LED lights, or if there was no ground fault trip—green RUN LED lights. This indication will remain available for at least ten hours
- The Numerical LCD window displays actual ground fault current in amps. When a 5000:5 ratio interposing CT is used, all displayed values are to be interpreted as kA rather than amps

D64D1



Remote Display Unit for D64RPB100

Description	Catalog Number
Remote digital display with numerical LCD, RUN and TRIP LEDs, TEST, RESET and VERIFY pushbuttons: C/W 3 ft (1 m) of cable.	**D64D1**

Technical Data and Specifications

D64R Series—Digital Ground Fault Relays

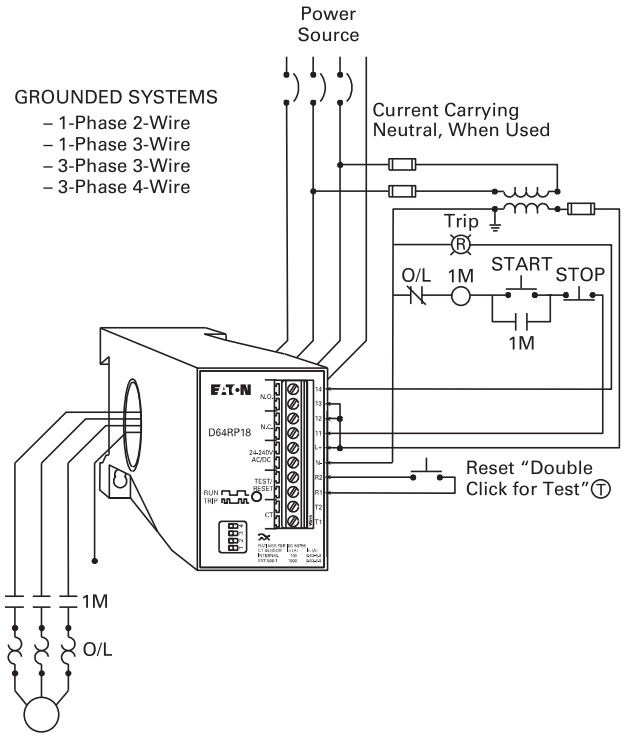
Catalog Number	Control Power Volts)	Frequency Response (Hz)	Trip Current Range		Trip Time Delay Range		Built-In Current Sensor	External Current Transformer		Test/Reset Provision	
			Min.	Max.	Min.	Max.		Required	Ratio	Pushbutton on Cover	Remote
D64RP18	24–240 Vac/Vdc non-isolated	45–450 Hz	30 mA	6 A	20 ms	500 ms	1.1 in	Optional	500:1	No	Pushbutton
D64RPB100	24–240 Vac/Vdc isolated	45–450 Hz	30 mA	9 A	20 ms	5 sec	2.0 in	Optional	500:1	Yes	Pushbutton or RJ-11 Communications port
			3 A	900 A				Required	500:5		
			30 A	9000 A				Required	5000:5		
D64RPBH13	120 Vac	45–200 Hz	50 A	1200 A	35 ms	1 sec	None	Required	10000:1	Yes	Pushbutton
D64RPBH15 ①	120 Vac	40–200 Hz	50 A	1200 A	35 ms	1 sec	None	Required	10000:1	Yes	Pushbutton

Note

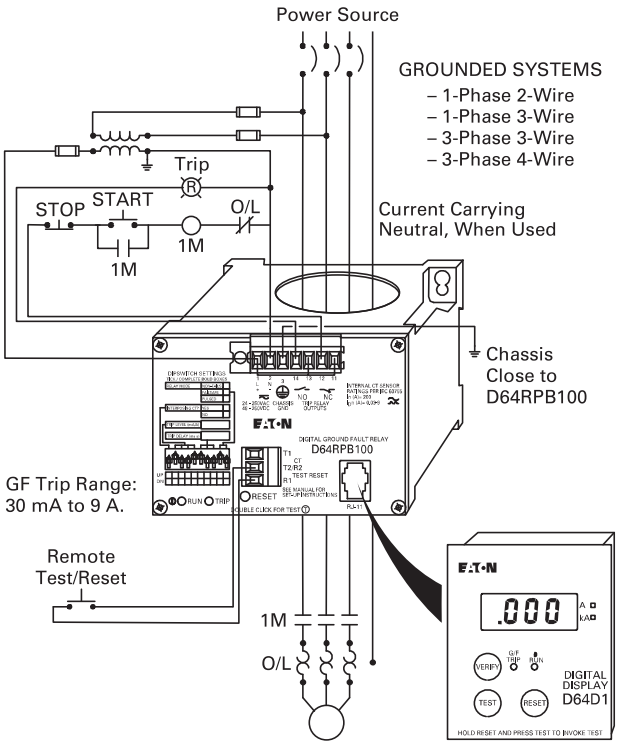
① With zone interlocking feature.

Wiring Diagrams

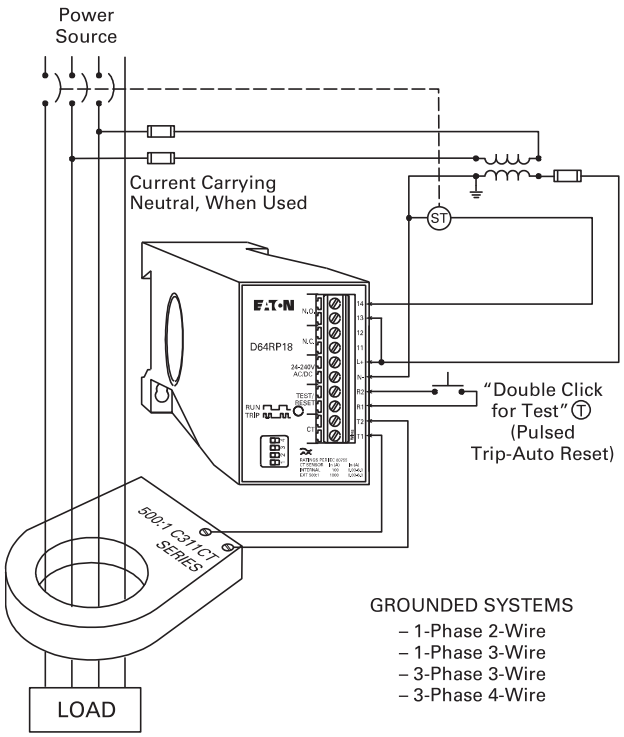
Typical Field Connection of D64RP18 Using Built-In Current Transformer



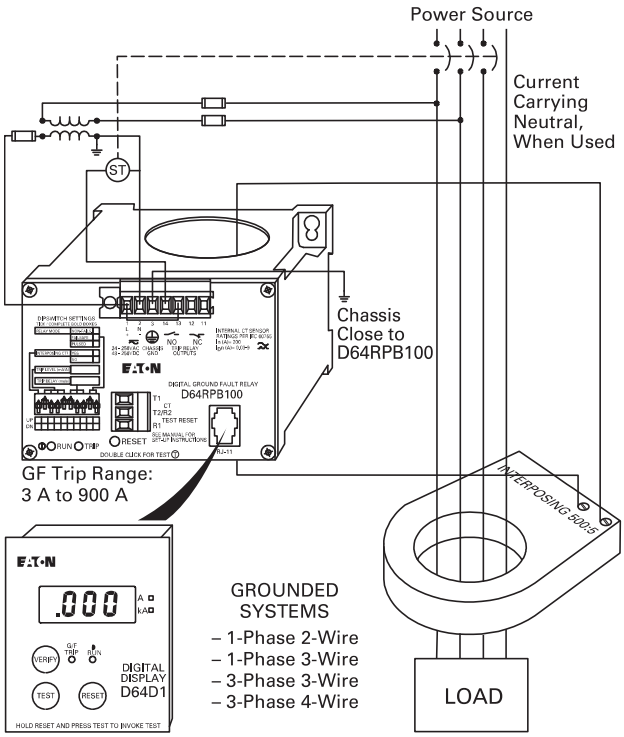
Typical Field Connection of D64RPB100 Using Built-In Current Transformer and Remote Test/Reset



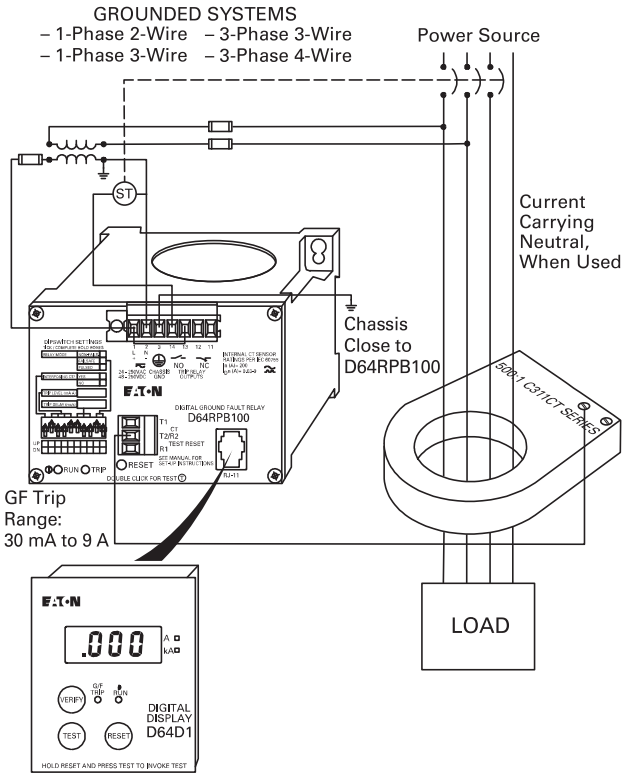
Typical Field Connection of D64RP18 with External 500:1 Current Transformer and Pulsed Trip-Auto Reset



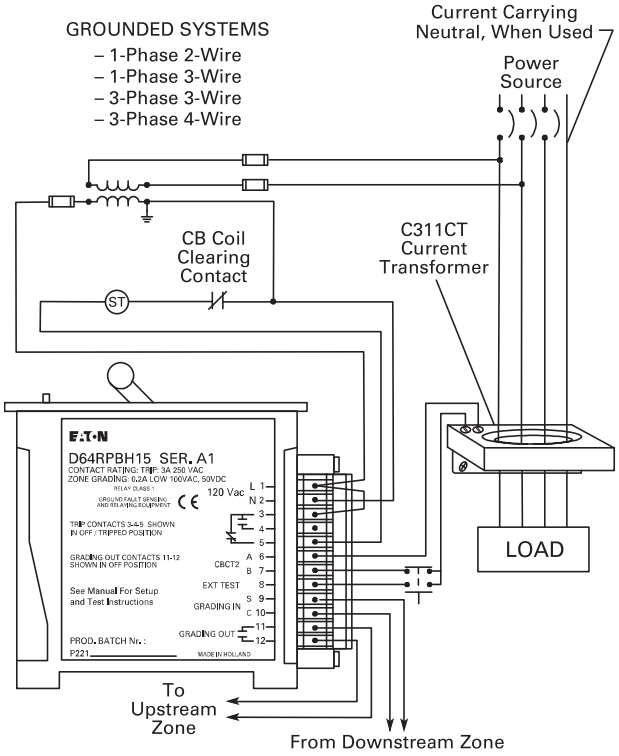
Typical Field Connection of D64RPB100 with Interposing 500:5 Current Transformer, Pulsed Trip-Auto Reset for Shunt Trip Breaker



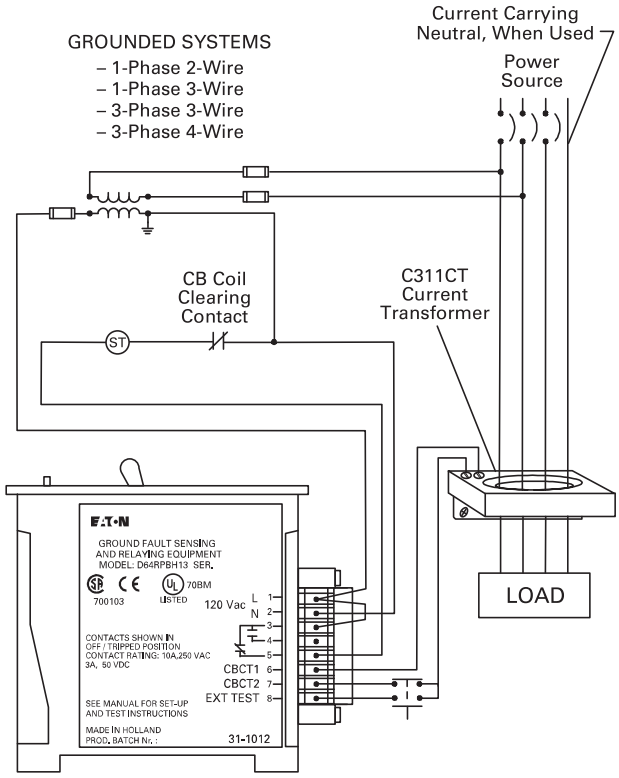
Typical Field Connection of D64RPB100 with External 500:1 Current Transformer (C311CT Series) Pulsed Trip-Auto Reset for Shunt Trip Breaker



D64RPBH15 Typical Field Connection



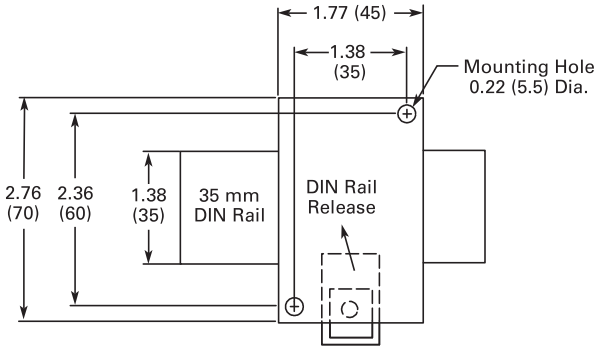
D64RPBH13 Typical Field Connections



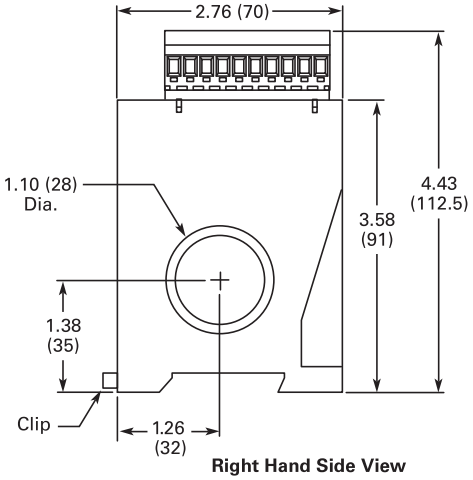
Dimensions

Approximate Dimensions in Inches (mm)

D64RP18

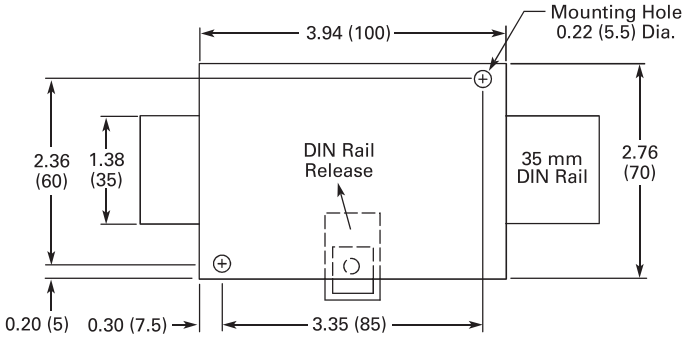


Rear Panel Mounting DIN Rail or Two Screw

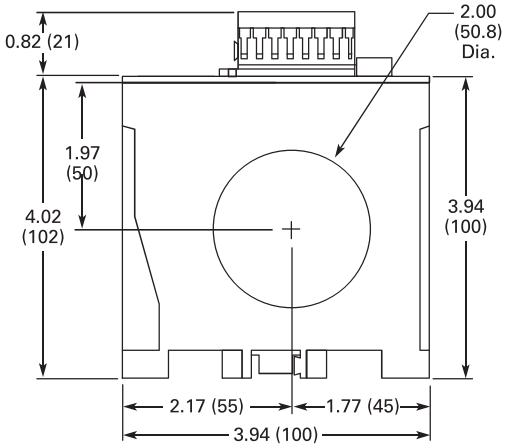


Right Hand Side View

D64RPB100



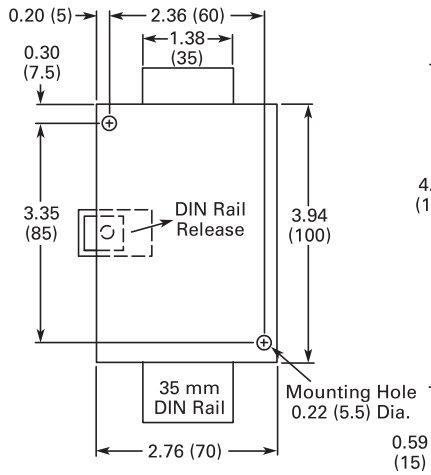
Rear Panel Mounting DIN Rail or Two Screw



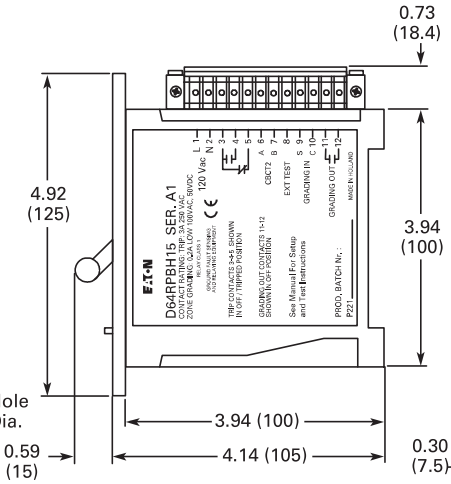
Bottom Side View

Approximate Dimensions in Inches (mm)

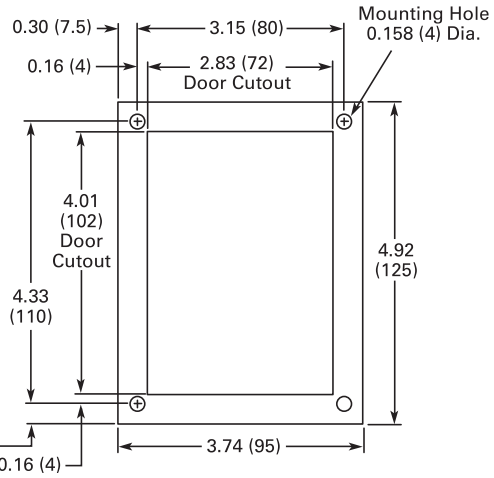
D64RPBH13 and D64RPBH15



Rear Panel Mounting DIN Rail or Two Screw

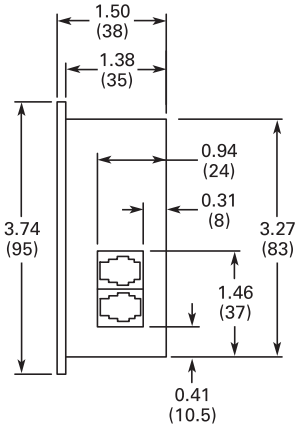


Right Side View

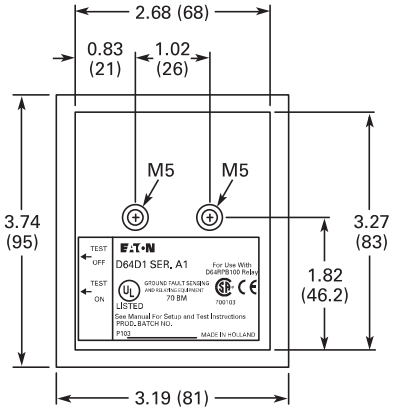


Through-the-Door Mounting

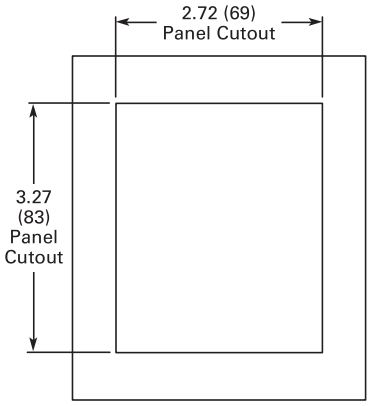
D64D1 and D64D2



Right Side View



Rear View



Through-the-Panel Mounting

Approximate Dimensions in Inches (mm)

C311CT Series

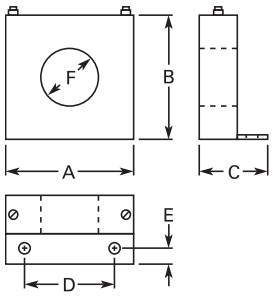


Figure A

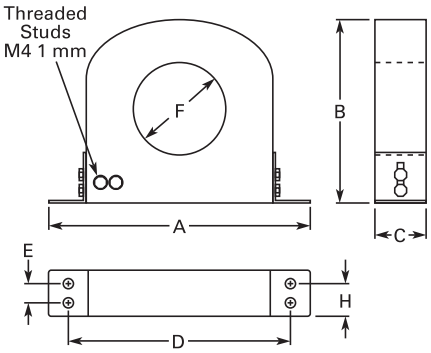


Figure B

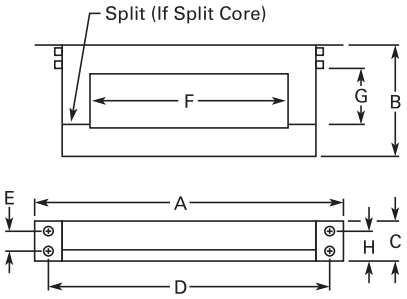


Figure C

Note: All Mounting Holes Are 0.25 (6.4) Dia.

Catalog Number	Figure	Wide A	High B	Deep C	Mounting D	Mounting E	F	G	H
C311CT1	A	3.35 (85)	3.35 (85)	1.57 (40)	0.98 (25)	0.39 (10)	1.81 (46)	—	—
C311CT2	B	7.30 (185)	5.50 (140)	1.20 (30)	6.42 (163)	0.59 (15)	3.54 (90)	—	0.89 (22.5)
C311CT3	C	13.58 (345)	8.75 (222)	1.57 (40)	12.80 (325)	0.59 (15)	6.70 (170)	5.90 (150)	0.89 (22.5)
C311CT4	C	20.87 (530)	7.87 (200)	1.57 (40)	20.08 (510)	0.59 (15)	13.78 (350)	3.94 (100)	0.89 (22.5)
C311CT5	B	10.12 (257)	8.27 (210)	1.46 (37)	9.33 (237)	0.59 (15)	5.70 (145)	—	0.89 (22.5)
C311CT6	B	13.86 (352)	11.89 (302)	1.46 (37)	13.07 (332)	0.59 (15)	9.45 (240)	—	0.89 (22.5)
C311CT8	A	2.17 (55)	2.56 (65)	2.20 (56)	0.98 (25)	0.59 (15)	1.10 (28)	—	—
C311CT9	B	6.68 (167)	4.84 (123)	1.18 (30)	5.78 (147)	0.59 (15)	2.56 (65)	—	0.89 (22.5)
C311CT11	B	6.68 (167)	4.84 (123)	1.18 (30)	5.78 (147)	0.59 (15)	2.56 (65)	—	0.89 (22.5)
C311CT12	B	10.12 (257)	8.27 (210)	1.85 (47)	9.33 (237)	0.59 (15)	5.70 (145)	—	0.89 (22.5)
C311CT13	B	13.86 (352)	11.89 (302)	1.85 (47)	13.07 (332)	0.59 (15)	9.45 (240)	—	0.89 (22.5)

D64L Series—Ground Fault Monitors



Contents

Description	*Page*
Current Monitoring Relays	**V5-T5-3**
Phase Monitoring Relays	**V5-T5-5**
Voltage Monitoring Relays	**V5-T5-13**
Ground Fault Relays and Monitors	
D64R Series—Digital Ground Fault Relays	**V5-T5-25**
D64L Series—Ground Fault Monitors	
Product Selection	**V5-T5-36**
Wiring Diagram	**V5-T5-36**
Dimensions	**V5-T5-36**

5

D64L Series—Ground Fault Monitors

Product Description

Type D64L ground fault monitors are designed to monitor ungrounded supplies on three-phase AC power systems up to 600 V. If an insulation fault develops anywhere on the system between the source and the load, the D64L will detect it and give an alarm or trip, depending on the adjustable field settings selected.

The D64L is ideally suited for systems supplied from the secondary of either an ungrounded delta or an ungrounded wye connected transformer.

Because D64L has high immunity from the effects of voltage transients and cable capacitance, it may be applied in automotive, sub-sea, mobile lighting, portable generators, sensitive equipment and other installations where ungrounded systems are used extensively.

The user is able to individually set the alarm level and the trip level from 20%–80% of the maximum leakage current limit of the D64L selected. Any leakage current above the alarm level will activate the alarm relay and light the alarm LED. Should the leakage current rise above the trip level, the trip relay and trip LED will activate.

Features

- Adjustable leakage current limit setting (20 mA, 35 mA or 50 mA). Factory set at 20 mA
- Built-in RESET button on all models
- Selectable fail-safe/ non-fail-safe operation
- Auto reset after alarm condition
- Selectable auto/manual reset after trip
- Three LEDs for POWER ON, ALARM and TRIP
- Three LEDs to indicate which phase is faulted
- Adjustable alarm setting 20%–80% of leakage current limit
- Adjustable trip setting 20%–80% of leakage current limit
- 70 ms response time for alarm and trip level. Resample time—2 seconds
- Minimum alarm signal duration—70 ms
- 110/120 V or 220/240 V 50/60 Hz control power, 4 VA
- Isolated voltage free Form Z NO and NC contacts on both alarm and trip relays, 5 A at 250 Vac
- 30 A 600 V screw terminals, 12 AWG capacity, for phase and ground connections
- 10 A 300 V screw clamp terminals, 12 AWG capacity for relay outputs and control supply
- CSA certified
- 35 mm DIN rail or two screw mounting

Suggested Fuse Block and Fuses

- DIN rail mounting
  - 1–C350BD3C61 600 V 30 A three-pole fuse block
  - 3–Class CC 600 V 5 A fuses

Product Selection

When Ordering, Specify

- Catalog number of ground fault monitor
- Catalog number of fuse block and fuses as required

Fuse Block

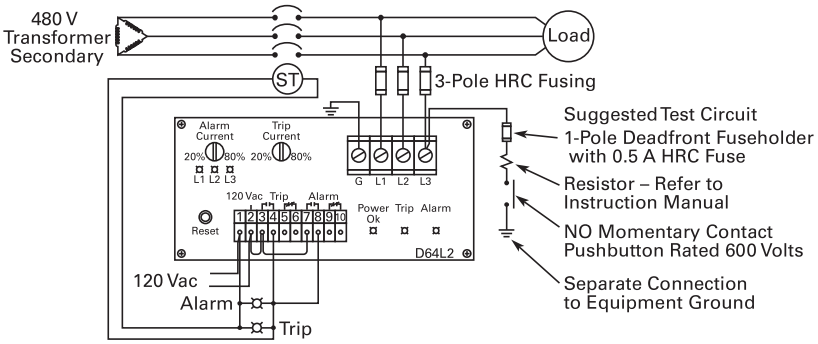
Mounting Type	Fuse Holder Rating	Fuse Type	Catalog Number
DIN rail	600 V 30 A three-pole	Class CC 600 V 5 A	**WMR633G**

Line Insulation Monitors

Line Voltage Range 50/60 Hz	Fuse Type	Catalog Number
380–600 V	110/120 V 50/60 Hz	**D64L2A**
	220/240 V 50/60 Hz	**D64L2B**

Wiring Diagram

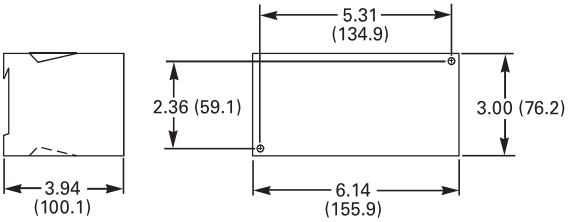
D64L Series—Ground Fault Monitors



Dimensions

Approximate Dimensions in Inches (mm)

D64L Series—Ground Fault Monitors



Motor Protection Circuit Breakers



Contents

Motor Protection Circuit Breakers (MPCB)

Motor Protection Circuit Breakers (MPCB)

Product Description

- Eliminates need for separate overload relay

Application Description

- Can be used with contactor to eliminate need for overload relay and still create manual motor control
- Meets requirement for motor branch protection, including:
  - Disconnecting means
  - Branch circuit short circuit protection
  - Overload protection

Features and Benefits

- Phase imbalance protection
- Phase loss protection
- Hot trip/cold trip
- High load alarm
- Pre-detection trip relay option
- Class 10, 15, 20, 30 protection

Standards and Certifications

- IEC 60947-2
- UL 489 100% rated
- UL 508
- CSA C22.2

Listed

Reference

Refer to **Volume 4—Circuit Protection**, CA08100005E, Tab 2, section 2.2 for additional product information.

Motor Protection Circuit Breakers	*Tab Section*
Product Selection	**2.2**
Technical Data and Specifications	**2.2**

Manual Motor Protection



5

Contents

Description	*Page*
Manual Motor Protection	
Features and Benefits	**V5-T5-39**
Catalog Number Selection	**V5-T5-39**
Reference	**V5-T5-39**

Manual Motor Protectors—XTPB, XTPR and XTPE

Product Description

Eaton's new ***XT*** family of manual motor protectors (MMPs) features a pushbutton or rotary ON/OFF manual disconnect, Class 10 adjustable bimetallic overload relay and fixed magnetic short-circuit trip capability in one compact unit. Two frame sizes are available: Frame B (45 mm) for motors with FLA ratings up to 32 A and Frame D (55 mm) covers motor FLA ratings up to 65 A.

Application Description

The XTPB and XTPR MMPs can be used in the following applications.

Motor Protective Circuit Breaker

In many countries outside of the United States and Canada, especially Europe, the MMPs are tested and classified as thermal-magnetic circuit breakers for use in motor branch circuits. This can be an important consideration for all companies who export their equipment and machines internationally. Both the XTPB and XTPR conform to IEC/EN 60947 and have the CE Mark.

Manual Motor Protectors

The XTPB and XTPR MMPs are UL listed under UL 508 as manual motor protectors. They provide an economical solution for applications requiring simple manual starting and stopping of motors. When used as a manual starter, they are typically installed in an enclosure. Many enclosures are offered as accessories for the MMPs. Separate short-circuit protective devices, such as circuit breakers or fuses, are wired ahead of the MMPs. The short-circuit protective device should be sized per the NEC and should not exceed 400% of the maximum FLA dial setting of the MMP.

Individual Branch Motor Applications

A UL 508 Type E self-protected manual combination starter/motor controller consists of a single device possessing four essential elements: disconnect, short circuit protection, motor controller, and motor overload protection. Some MMPs require use of a lineside adapter for this type of approval. When tested as an official combination by UL, this device takes the place of a fuse-starter or breaker-starter, ***XT*** Type E MMPs are self-protected, meaning they do not need additional short circuit protection of a fuse or breaker. Type E devices can also be used with a contactor or other types of UL approved controllers. If tested with a contactor, the combination motor controller becomes a Type F device. See Tab 1 of this volume, section 1.1 for XTFC Type F devices.

Features and Benefits

- ON/OFF rotary handle with lockout provision
- Visible trip indication
- Class 10 overload protection
- Phase loss sensitivity
- Ambient temperature compensation to IEC/EN 60947, VDE 0660
- Fixed short-circuit trip—14 times maximum setting of overload FLA dial
- Type 2 coordination per IEC 947
- Identification markers standard on starter faceplate
- Motor applications from 0.1 A to 65 A
- Built-in heater and magnetic trip elements to protect the motor
- Adjustment dial for setting motor FLA
- DIN rail mount
- Terminal types available:
  - Screw terminals
  - Screw (line) and spring cage (load) terminals
  - Spring cage terminals
- Accessories include:
  - Front and side auxiliary contacts
  - Trip indicating contacts
  - Tamperproof cover for OLR dial
  - Undervoltage release
  - Shunt trip
  - Through-the-door operators
  - Enclosures
  - Three-phase line side connecting links

Standards and Certifications

- CE approved
- UL listed File No. E245398
- UL 508 group motor and Type E compliant
- IEC/EN 60947
- CSA File 229767, Class 3211-05
- DIN VDE 0660 Part 100, Part 101 and Part 102

Catalog Number Selection

XT Manual Motor Protectors

XT PR 012 B C1

Designation
XT = ***XT*** IEC power control

Type	
PB	= Manual motor protector—pushbutton
PR	= Manual motor protector—rotary
PM	= Manual motor protector—magnetic only
PT	= Manual transformer protector (high mag.)

Current Ratings	
Frame B	**Frame D**
P16 = 0.16 A	**016** = 16 A
P25 = 0.25 A	**025** = 25 A
P40 = 0.40 A	**032** = 32 A
P63 = 0.63 A	**040** = 40 A
001 = 1 A	**050** = 50 A
1P6 = 1.6 A	**058** = 58 A
2P5 = 2.5 A	**063** = 63 A
004 = 4 A	
6P3 = 6.3 A	
010 = 10 A	
012 = 12 A	
016 = 16 A	
020 = 20 A	
025 = 25 A	
032 = 32 A	

Frame Size	
B	= 45 mm
D	= 55 mm

Trip Class	
C1	= Class 10
Blank	= Magnetic only (no thermal trip)

Reference

Refer to Tab 1 of this volume, section 1.1 for additional product information.

Manual Motor Protectors	*Tab Section*
Product Identification	**1.1**
Product Selection	**1.1**
Accessories	**1.1**
Technical Data and Specifications	**1.1**
Dimensions	**1.1**

Overload Relays



Contents

Description	*Page*
Overload Relays	
XT IEC Overload Relays	**V5-T5-42**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	**V5-T5-47**
C441 Overload Relays	**V5-T5-68**
C445 Motor Management Relay	**V5-T5-90**

Product Overview

Mini and Thermal Overload Relays

XT IEC—Miniature

Product Description

Eaton's line of ***XT*** miniature controls includes non-reversing and reversing mini contactors, mini overload relays and snap-on accessories. A wide range of applications is possible, including small electrical motors from fractional to 5 hp (460 Vac) or up to 4 kW (400 Vac).

Features

- Phase failure sensitivity
- Direct mount to XTMC and XTMF mini contactors
- Trip Class 10
- 11 settings to cover 0.1 to 12 A
- Ambient temperature compensated –5 to 50 °C [23 to 122 °F]
- Manual and automatic reset by selector switch
- One make (NO) or one break (NC) auxiliary contact as standard
- Test/Off button
- Trip-free release

XT IEC—Thermal

Product Description

The ***XT*** line of IEC motor thermal overload relays provides an efficient motor protection solution, available up to 630 A. XTOB units can be directly mounted to the contactor or mounted separately.

Features

- Direct connect up to 250 A
- Stand alone and CT type up to 630 A
- Large thermal overcurrent range
- Test button
- Manual/automatic selectable reset
- NO-NC auxiliary as standard
- Class 10A (to 250 A)
- Class 30 (CT type)

C306—Bimetallic

Product Description

C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144 A.

Features

- Selectable manual or automatic reset operation
- Interchangeable heater packs adjustable ±24% to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32 A overload relay will mount in 75 A overload relay—useful in derating applications such as jogging
- Class 10 or 20 heater packs
- Load lugs built into relay base
- Bimetallic, ambient compensated operated. Trip free mechanism
- Overload trip indication

C400 Series Advanced Motor Protection

Eaton's C400 series of advanced motor protection features three easy-to-use products with varying levels of capability. From basic monitoring and protection to advanced motor management, the C400 series has the exact solution to meet the needs of your application.

C440 Overload Relay

Product Description

Compact and fully featured for a basic overload relay—C440 provides a lower cost option for small or less critical motors in motor control centers. It is also ideal for stand-alone panels of any size used in HVAC or commercial applications.

Range: 0.3–1500 A
Up to 690 Vac (50/60 Hz)

Features

- Selectable trip class (10A, 10, 20, 30), ground fault and phase imbalance protections
- Flexible communication options for both monitoring and control
- 5:1 FLA range

Benefits

- Extends the life of plant assets with selectable motor protection features
- Status LED provides added assurance that valuable assets are protected by indicating the overload operational status
- Industry-leading FLA range reduces part numbers required

C441 Motor Insight™

Product Description

The addition of power monitoring and protection detects under-loaded conditions like a dead-headed pump. Combined with a simple user interface for setup and monitoring, C441 is ideal for stand-alone pump or fan panels in industries such as mining and irrigation.

Range: 1–540 A
Up to 600 Vac (50/60 Hz)

Features

- Highly configurable line (voltage), load (power) and motor (current) monitoring and protection
- Optional remote user interface allows user to configure and monitor without opening a panel door
- All-in-one design reduces inventory costs by covering 1–540 A applications with only two SKU numbers

Benefits

- Advanced diagnostics allow for quick and accurate identification of the root source of motor, pump or power quality faults
- Configurable low-power trip capability provides superior protection for smaller motors, slow speed motors and lightly loaded large motors

Power Xpert™ C445 Motor Management Relay

Product Description

Advanced motor management, extensive communications and superior diagnostics and protection make C445 ideal for critical motors in motor control centers where uptime is key. An intuitive interface allows users to access C445 safely from outside the MCC door.

Range: 0.3–800 A
Up to 690 Vac (20–80 Hz)
Up to 4160 Vac w/PTs

Features

- Full line, load and motor system coverage using advanced monitoring and protection algorithms
- Easy commissioning and monitoring tools include a remote-mount user interface, free software tool and web pages
- Multiple predefined operating modes with corresponding control station options

Benefits

- Extensive current, voltage, power and system operating data plus real-time clock functionality enhances user understanding of their application
- Multiple embedded fieldbus options allow integration into widest range of PLC and DCS control systems without additional modules or supply power
- User interface provides advanced monitoring, parameter setting, fault diagnostics and optional control with no specialty tools or knowledge required
- Motor management relay operation modes reduce control wiring and complexity

Miniature Overload Relays



Contents

Description	*Page*
XT IEC Overload Relays	
Miniature Overload Relays	
Catalog Number Selection	**V5-T5-43**
Reference	**V5-T5-43**
An Eaton Green Solution	
Thermal Overload Relays	**V5-T5-44**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	**V5-T5-47**
C441 Overload Relays	**V5-T5-68**
C445 Motor Management Relay	**V5-T5-90**

XT IEC Overload Relays

Miniature Overload Relays

Product Description

Eaton's new line of ***XT*** miniature controls includes non-reversing and reversing mini contactors, mini overload relays and snap-on accessories. A wide range of applications is possible, including small electrical motors from fractional to 5 hp (460 Vac) or up to 4 kW (400 Vac).

Application Description

Due to its compact size, the ***XT*** line of mini controls is best suited to be applied in light-duty loads, such as hoisting, packaging, material handling, heating, lighting and automation systems. ***XT*** mini contactors are a particularly compact, economic and environmentally friendly solution wherever control of small motors or loads is required.

Features

Mini Overload Relays—Bimetallic Type XTOM

- Phase failure sensitivity
- Direct mount to XTMC and XTMF mini contactors
- Trip Class 10
- 11 settings to cover 0.1 to 12 A
- Ambient temperature compensated –5 to 50 °C [23 to 122 °F]
- Manual and automatic reset by selector switch
- One make (NO) or one break (NC) auxiliary contact as standard
- Test/Off button
- Trip-free release

Standards and Certifications

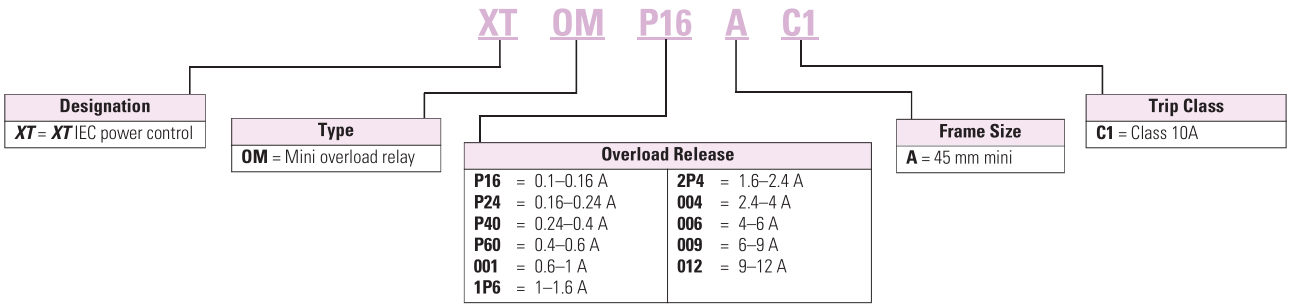
- IEC EN 60947
- CE approved
- UL
- CSA
- CCC
- ATEX

Instructional Leaflets

Pub51219	XTMC, XTMF Mini Contactors, XTRM Mini Control Relay and Accessories
Pub51243	XTOM Mini Overload Relays
Pub51206	Mini Reversing Link Kits
MN03402002E	XTOM Mini Overload Relays Installation and User Manual

Catalog Number Selection

XT IEC Miniature Overload Relays



Mini Overload Relay Settings (A)

Setting	Starting
A: I_N x 0.58 Motor protection in the Y and delta configurations.	≤15 sec
B: I_N x 1 Only partial motor protection in star position	15–40 sec
C: I_N x 0.58 Motor not protected in star position.	>40 sec
Timing relay set to approximately 10 sec.	

Note

Depending on the coordination type required (that is, Type 1 or Type 2) it must be established whether the fuse protection and the input wiring for the main and delta contactors are to be common or separate.

Reference

Refer to Tab 1 of this volume, section 1.1 for additional product information.

Miniature Overload Relays	*Tab Section*
Product Selection	**1.1**
Accessories	**1.1**
Technical Data and Specifications	**1.1**
Wiring Diagrams	**1.1**
Dimensions	**1.1**

Thermal Overload Relays



Contents

Description	*Page*
XT IEC Overload Relays	
Miniature Overload Relays	**V5-T5-42**
Thermal Overload Relays	
Catalog Number Selection	**V5-T5-45**
Reference	**V5-T5-45**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	**V5-T5-47**
C441 Overload Relays	**V5-T5-68**
C445 Motor Management Relay	**V5-T5-90**

5

Thermal Overload Relays

Product Description

The ***XT*** line of IEC motor thermal overload relays provides an efficient motor protection solution, available up to 630 A. XTOB units can be directly mounted to the contactor or mounted separately.

Features and Benefits

- Direct connect up to 250 A
- Stand alone and CT type up to 630 A
- Large thermal overcurrent range
- Test button
- Manual/automatic selectable reset
- NO-NC auxiliary as standard
- Class 10A (to 250 A)
- Class 30 (CT type)

Standards and Certifications

- IEC EN 60947
- CE approved
- UL
- CSA
- ATEX
- RoHS

Instructional Leaflets

Pub51221	XTOB, D Frame overload relays (inside of packaging)
Pub51222	XTOB, B–C Frame overload relays (inside of packaging)

Notes

Short-circuit protection: Observe the maximum permissible fuse of the contactor with direct device mounting. See MN03402001E for more information on overload relays for Frames B–G.

Trip Class: 10A

Suitable for protection of EEx e-motors. EC prototype test certificate available upon request.

See manuals MN03402001E and MN03407001E, Page 135.

Catalog Number Selection

XT IEC Overload Relays

XT OB P16 B C1 S

Device Type
XT = ***XT*** line of IEC control

Type
OB = Bimetallic overload relay
OT = Current transformer overload relay

Overload Release

Frame B
P16 = 0.1–0.16 A
P24 = 0.16–0.24 A
P40 = 0.24–0.4 A
P60 = 0.4–0.6 A
001 = 0.6–1 A
1P6 = 1.0–1.6 A
2P4 = 1.6–2.4 A
004 = 2.4–4 A
006 = 4–6 A
010 = 6–10 A
012 = 9–12 A
016 = 12–16 A

Frame C
P16 = 0.1–0.16 A
P24 = 0.16–0.24 A
P40 = 0.24–0.4 A
P60 = 0.4–0.6 A
001 = 0.6–1 A
1P6 = 1.0–1.6 A
2P4 = 1.6–2.4 A
004 = 2.4–4 A
006 = 4–6 A
010 = 6–10 A
016 = 12–16 A
024 = 16–24 A
032 = 24–32 A

Frame D
010 = 6–10 A
016 = 12–16 A
024 = 16–24 A
040 = 24–40 A
057 = 40–57 A
065 = 50–65 A
075 = 65–75 A

Frame F
035 = 25–35 A
050 = 35–50 A
070 = 50–70 A
100 = 70–100 A

Frame G
035 = 25–35 A
050 = 35–50 A
070 = 50–70 A
100 = 70–100 A
125 = 95–125 A
150 = 120–150 A
175 = 145–175 A

Frame L
070 = 50–70 A
100 = 70–100 A
125 = 95–125 A
160 = 120–160 A
220 = 160–220 A
250 = 200–250 A

Frame M
063 = 42–63 A
090 = 60–90 A
125 = 85–125 A
160 = 110–160 A
240 = 160–240 A
290 = 190–290 A
400 = 170–400 A
540 = 360–540 A

Frame N
063 = 42–63 A
090 = 60–90 A
125 = 85–125 A
160 = 110–160 A
240 = 160–240 A
290 = 190–290 A
400 = 170–400 A
540 = 360–540 A
630 = 420–630 A

Frame Size Designation
B = 45 mm
C = 45 mm
D = 55 mm
G = 90 mm
L = 140 mm
Blank = XTOT only

Trip Class
C1 = Class 10A
C3 = Class 30

Mounting
Blank = Direct to contactor
S = Separate mount

5

Reference

Refer to Tab 1 of this volume, section 1.1 for additional product information.

Thermal Overload Relays	***Tab Section***
Product Selection	**1.1**
Accessories	**1.1**
Technical Data and Specifications	**1.1**
Dimensions	**1.1**

32 A Overload—C306DN3B



Contents

Description	*Page*
XT IEC Overload Relays	**V5-T5-42**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	**V5-T5-47**
C441 Overload Relays	**V5-T5-68**
C445 Motor Management Relay	**V5-T5-90**

5

C306 Bimetallic Overload Relays

Product Description

C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144 A.

Features

- Selectable manual or automatic reset operation
- Interchangeable heater packs adjustable ±24% to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32 A overload relay will mount in 75 A overload relay—useful in derating applications such as jogging
- Class 10 or 20 heater packs
- Load lugs built into relay base
- Bimetallic, ambient compensated operated. Trip free mechanism
- Electrically isolated NO-NC contacts (pull RESET button to test). (Electrical ratings see tables in Tab 2 of this volume, section 2.1)
- Overload trip indication
- Shrouded or fingerproof terminals to reduce possibility of electrical shock

Standards and Certifications

- Meets UL 508 single-phasing requirements
- UL listed, CSA certified and NEMA compliance

Reference

Refer to Tab 2 of this volume, section 2.1 for additional product information.

C306 Bimetallic Overload Relays	*Tab Section*
Product Selection	**2.1**
Accessories	**2.1**
Modifications	**2.1**
Replacement Parts	**2.1**
Technical Data and Specifications	**2.1**
Dimensions	**2.1**

C440/*XT* Electronic Overload Relay



Contents

Description	*Page*
XT IEC Overload Relays	**V5-T5-42**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	
Standards and Certifications	**V5-T5-48**
Catalog Number Selection	**V5-T5-49**
Product Selection	**V5-T5-51**
Accessories	**V5-T5-56**
Technical Data and Specifications	**V5-T5-58**
Dimensions	**V5-T5-64**
C441 Overload Relays	**V5-T5-68**
C445 Motor Management Relay	**V5-T5-90**

5

C440/*XT* Electronic Overload Relay

Product Description

Eaton's C440/***XT*** electronic overload relay is the most compact, high-featured, economical product in its class. Designed on a global platform, it covers the entire power control spectrum including NEMA, IEC and DP contactors. The NEMA and DP versions are offered with the *C440* designation while the IEC offering has the ***XT*** designation. The electronic design provides reliable, accurate and value driven protection and communications capabilities in a single compact device. It is the flexible choice for any application requiring easy-to-use, reliable protection.

C440 is a self-powered electronic overload relay available up to 175 A as a self contained unit. With external CTs, C440 can protect motor up to 1500 FLA. Available add-on accessories include remote reset capability and communication modules for Modbus RTU, DeviceNet, PROFIBUS, Modbus TCP, EtherNet/IP and HTTP web services all with I/O options.

Features and Benefits

Features

- Reliable, accurate, electronic motor protection
- Easy to select, install and maintain
- Compact size
- Flexible, intelligent design
- Global product offering—available with NEMA, IEC and DP power control

Size/Range

- Broad FLA range (0.33–1500 A)
- Selectable trip class (10A, 10, 20, 30)
- Direct mounting to NEMA, IEC and DP contactors
- Most compact electronic overload in its class

Motor Control

- Two B600 alarm (NO) and fault (NC) contacts
- Test/Trip button

Motor Protection

- Thermal overload
- Phase loss
- Selectable (ON/OFF) phase imbalance
- Selectable (ON/OFF) ground fault

User Interface

- Large FLA selection dial
- Trip status indicator
- Operating mode LED
- DIP switch selectable trip class, phase imbalance and ground fault
- Selectable Auto/Manual reset

Feature Options

- Remote reset
  - 120 Vac
  - 24 Vac
  - 24 Vdc
- Tamper-proof cover
- Communications modules
  - Modbus RTU RS-485
  - DeviceNet with I/O
  - PROFIBUS with I/O
  - Modbus RTU with I/O
  - Ethernet IP with I/O
  - Modbus TCP with I/O

Benefits

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 imbalance 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

- Available with NEMA, IEC and DP contactors
- 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
- Available as an open component and in enclosed control and motor control center assemblies

Monitoring Capabilities

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

Safety

- IP 20 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

Standards and Certifications

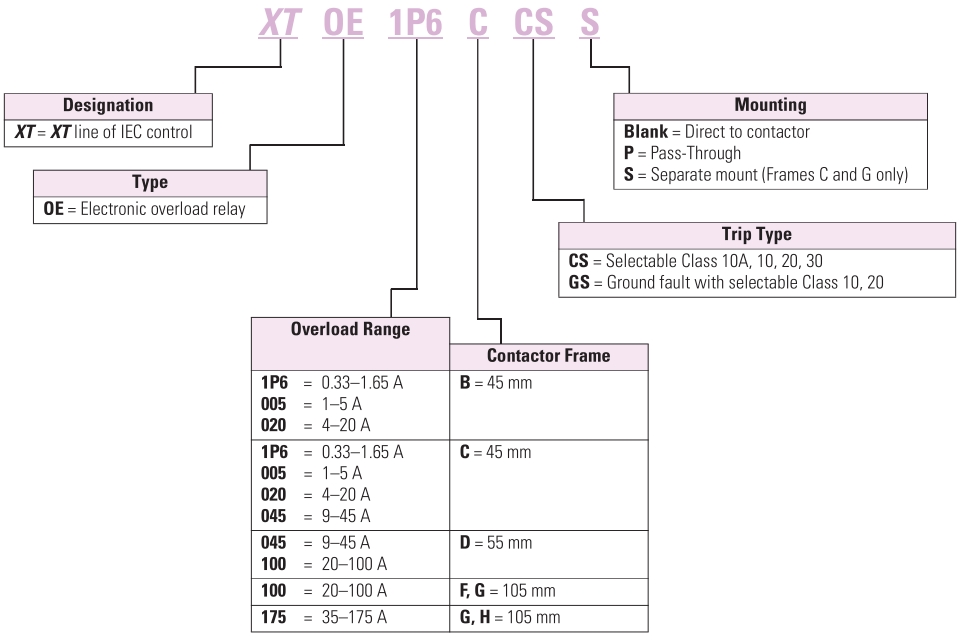
- UL
- CSA
- CE
- NEMA
- IEC/EN 60947 VDE 0660
- ISO® 13849-1 (EN954-1)
- RoHS
- ATEX directive 94/9/EC
- Equipment Group 2, Category 2

Electronic Overload Education

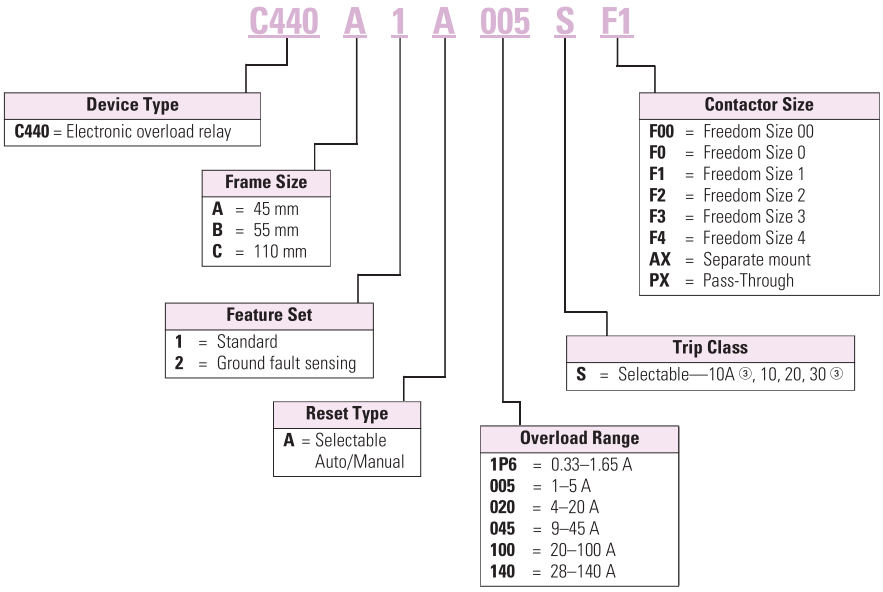
Description	Definition	Cause	Effect if not Protected	C440/*XT* Protection
Motor Protection				
Thermal overload	Overload is a condition in which current draw exceeds 115% of the full load amperage rating for an inductive motor.	• An increase in the load or torque that is being driven by the motor. • A low voltage supply to the motor causes the current to go high to maintain the power needed. • A poor power factor causing above normal current draw.	• Increase in current draw leads to heat and insulation breakdown, which can cause system failure. • Increase in current can increase power consumption and waste valuable energy.	• Thermal trip behavior is defined by UL, CSA and IEC standards. • Trip class is settable from 10A, 10, 20, 30
Ground fault	A line to ground fault.	A current leakage path to ground.	An undetected ground fault can burn through multiple insulation windings, ultimately leading to motor failure, not to mention risk to equipment or personnel	Fixed protective setting that takes the starter offline if ground fault current exceeds 50% of the FLA dial setting, that is, if the FLA dial is set to 12A, the overload relay will trip if the ground current exceeds 6A.
Imbalanced phases (voltage and current)	Uneven voltage or current between phases in a three-phase system.	When a three-phase load is powered with a poor quality line, the voltage per phase may be imbalanced.	Imbalanced voltage causes large imbalanced currents and as a result this can lead to motor stator windings being overloaded, causing excessive heating, reduced motor efficiency and reduced insulation life.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.
Phase loss—current (single-phasing)	One of the three-phase voltages is not present.	Multiple causes, loose wire, improper wiring, grounded phase, open fuse, and so on.	Single-phasing can lead to unwanted motor vibrations in addition to the results of imbalanced phases as listed above.	Fixed protective setting that takes the starter offline if a phase drops below 50% of the other two phases.

Catalog Number Selection

XT Electronic Overload Relay—IEC ①



C440 Electronic Overload Relay—NEMA ②



Notes

① See **Page V5-T5-51** for Product Selection.
② See **Page V5-T5-53** for Product Selection.
③ On non-GF version only.

Freedom Series NEMA Starters with C440 Electronic Overload Relays ①

A N 1 9 A N 0 A 5E 005

Device Type
A = Starter

Standard
N = NEMA

Device Assembly Configuration
1 = Non-reversing
5 = Reversing

OLR Type
9 = Starter w/C440 EOLR

Contactor Frame Size

	NEMA Size	Continuous Amperes
A =	00	9
B =	0	18
C =	1C	27
D =	1	27
G =	2	45
K =	3	90
M =	4C	135
N =	4	135
S =	5	270

NEMA Enclosure
N = Open

For Starters

Starter Mounting Option
0 = Horizontal

C440 OLR Designation (FVNR and FVR only)
5E = Standard feature set
SEL Reset, SEL Class (10A, 10, 20, 30)
5G = Ground fault feature set
SEL Reset, SEL Class (10, 20)

AC Coil Suffix

Suffix	Volts and Hertz
A=	120/60 or 110/50
B=	240/60 or 220/50
C=	480/60 or 440/50
D=	600/60 or 550/50
E=	208/60
H=	277/60
J=	208–240/60 ②
K=	240/50
L=	380–415/50
N=	550/50
T=	24/60, 24/50 ③
U=	24/50
V=	32/50
W=	48/60
Y=	48/50

C440 FLA Range (FVNR and FVR only)

NEMA Size 00
1P6 = 0.33–1.65 A
005 = 1–5 A
020 = 4–20 A

NEMA Size 0
1P6 = 0.33–1.65 A
005 = 1–5 A
020 = 4–20 A

NEMA Size 1/1C
1P6 = 0.33–1.65 A
005 = 1–5 A
020 = 4–20 A
045 = 9–45 A

NEMA Size 2
005 = 1–5 A
020 = 4–20 A
045 = 9–45 A

NEMA Size 3
100 = 20–100 A

NEMA Size 4/4C
140 = 28–140 A

NEMA Size 5 ④
300 = 60–300 A

Notes

① See **Page V5-T5-54** for Product Selection.
② NEMA Sizes 00 and 0 only.
③ NEMA Sizes 00 and 0 only. Sizes 1–3 are 24/60 only.
④ NEMA Size 5 starter available with 60–300 A panel mounted CTs. Starter shipped as an assembled unit with 1–5 A C440 overload relay (C440A1A005SELAX or C440A2A005SELAX).

Product Selection

XT Electronic Overload Relays

45 mm *XT* for Direct Mount



XT Electronic Overload Relays for Direct Mount to *XT* Contactors

For Use with *XT* Contactor Frame	For Use with Contactor	Overload Range (Amps)	Contact Sequence	Frame Size	Auxiliary Contact Configuration	Type	Catalog Number
B	XTCE007B…, XTCE009B…, XTCE012B…, XTCE015B…	0.33–1.65	97 95 / 2 4 6 98 96	45 mm	NO-NC	ZEB12-1,65	**XTOE1P6BCS**
		1–5				ZEB12-5	**XTOE005BCS**
		4–20				ZEB12-20	**XTOE020BCS**
C	XTCE018C…, XTCE025C…, XTCE032C	0.33–1.65	97 95 / 2 4 6 98 96	45 mm	NO-NC	ZEB32-1,65	**XTOE1P6CCS**
		1–5				ZEB32-5	**XTOE005CCS**
		4–20				ZEB32-20	**XTOE020CCS**
		9–45				ZEB32-45	**XTOE045CCS**
D	XTCE040D…, XTCE050D…, XTCE065D…, XTCE072D…	9–45	97 95 / 2 4 6 98 96	45 mm	NO-NC	ZEB65-45	**XTOE045DCS**
		20–100		55 mm		ZEB65-100	**XTOE100DCS**
F	XTCE080F…, XTCE095F…, XTCE115G…, XTCE150G…, XTCE170G…	20–100	97 95 / 2 4 6 98 96	55 mm	NO-NC	ZEB150-100	**XTOE100GCS**
G	XTCE115G…, XTCE150G…, XTCE170G…	20–100	97 95 / 2 4 6 98 96	55 mm	NO-NC	ZEB150-100	**XTOE100GCS**
		35–175		110 mm		ZEB150-175	**XTOE175GCS**
H	XTCE185H…	35–175	97 95 / 2 4 6 98 96	110 mm	NO-NC	ZEB225-175	**XTOE175HCS**

45 mm *XT* for Direct Mount with Ground Fault



XT Electronic Overload Relays with Ground Fault for Direct Mount to *XT* Contactors

For Use with *XT* Contactor Frame	For Use with Contactor	Overload Range (Amps)	Contact Sequence	Frame Size	Auxiliary Contact Configuration	Type	Catalog Number
B	XTCE007B…, XTCE009B…, XTCE012B…, XTCE015B…	0.33–1.65	97 95 / 2 4 6 98 96	45 mm	NO-NC	ZEB12-1,65-GF	**XTOE1P6BGS**
		1–5				ZEB12-5-GF	**XTOE005BGS**
		4–20				ZEB12-20-GF	**XTOE020BGS**
C	XTCE018C…, XTCE025C…, XTCE032C	0.33–1.65	97 95 / 2 4 6 98 96	45 mm	NO-NC	ZEB32-1,65-GF	**XTOE1P6CGS**
		1–5				ZEB32-5-GF	**XTOE005CGS**
		4–20				ZEB32-20-GF	**XTOE020CGS**
		9–45				ZEB32-45-GF	**XTOE045CGS**
D	XTCE040D…, XTCE050D…, XTCE065D…, XTCE072D…	9–45	97 95 / 2 4 6 98 96	45 mm	NO-NC	ZEB65-45-GF	**XTOE045DGS**
		20–100		55 mm		ZEB65-100-GF	**XTOE100DGS**
F	XTCE080F…, XTCE095F…, XTCE115G…, XTCE150G…, XTCE170G…	20–100	97 95 / 2 4 6 98 96	55 mm	NO-NC	ZEB150-100-GF	**XTOE100GGS**
G	XTCE115G…, XTCE150G…, XTCE170G…	20–100	97 95 / 2 4 6 98 96	55 mm	NO-NC	ZEB150-100-GF	**XTOE100GGS**
		35–175		110 mm		ZEB150-175-GF	**XTOE175GGS**
H	XTCE185H…	35–175	97 95 / 2 4 6 98 96	110 mm	NO-NC	ZEB225-175-GF	**XTOE175HGS**

1–6 A OL with CTs



XT Electronic Overload Relays for use with Large Frame *XT* Contactors (L–R) ①

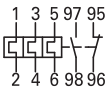
Use CTs and 1–5 A ***XT*** overload relay. CT kit does not include overload relay (order separately).

XT Contactor Frame	For Use with IEC Contactor Amp Range (AC-3)	CT Range (Amps)	Description	CT Kit Catalog Number	Terminal Size	Overload Relay Catalog Number
L, M	185–500 A	60-300	300: 5 panel-mount CT kit with integrated lugs	**ZEB-XCT300**	750 kcmil (2) 250 kcmil 3/0 Cu/Al	**XTOE005CCSS**
M, N	300–820 A	120-600	600: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT600**	(2) 750 kcmil 3/0 Cu/Al	**XTOE005CCSS**
N	580–1000 A	200-1000	1000: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1000**	(3) 750 kcmil 3/0 Cu/Al	**XTOE005CCSS**
R	1600 A	300-1500	1500: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1500**	(4) 750 kcmil 1/0 Cu/Al	**XTOE005CCSS**

45 mm *XT* for Separate Mount

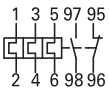


XT Electronic Overload Relays for Separate Mount

Overload Range (Amps)	Frame Size	Contact Sequence	Type	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
0.33–1.65	45 mm		ZEB32-1.65/KK	**XTOE1P6CCSS**	**XTOE1P6CGSS**
1–5			ZEB32-5/KK	**XTOE005CCSS**	**XTOE005CGSS**
4–20			ZEB32-20/KK	**XTOE020CCSS**	**XTOE020CGSS**
9–45			ZEB32-45/KK	**XTOE045CCSS**	**XTOE045CGSS**
20–100	55 mm		ZEB150-100/KK	**XTOE100GCSS**	**XTOE100GGSS**
35–175	110 mm		ZEB150-175/KK	**XTOE175GCSS**	**XTOE175GGSS**

XT Electronic Overload Relay for Pass-Through Design

Pass-through design does not include any lugs to land wires.
Terminate motor leads directly on contactor.

Overload Range (Amps)	Frame Size	Contact Sequence	Type	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
35–175	110 mm		ZEB150-175/PT	**XTOE175GCSP**	**XTOE175GGSP**

C440 Electronic Overload Relays

45 mm C440 for Direct Mount



C440 Electronic Overload Relays for Direct Mount to Freedom Series Contactors

For Use with Freedom NEMA Contactor Size	For Use with Contactor ①	Overload Range (Amps)	Standard Feature Set Catalog Number	Standard Feature Set with Ground Fault Catalog Number
00	CN15AN3_B	0.33–1.65	**C440A1A1P6SF00**	**C440A2A1P6SF00**
		1–5	**C440A1A005SF00**	**C440A2A005SF00**
		4–20	**C440A1A020SF00**	**C440A2A020SF00**
0	CN15BN3_B	0.33–1.65	**C440A1A1P6SF0**	**C440A2A1P6SF0**
		1–5	**C440A1A005SF0**	**C440A2A005SF0**
		4–20	**C440A1A020SF0**	**C440A2A020SF0**
1	CN15DN3_B	0.33–1.65	**C440A1A1P6SF1**	**C440A2A1P6SF1**
		1–5	**C440A1A005SF1**	**C440A2A005SF1**
		4–20	**C440A1A020SF1**	**C440A2A020SF1**
		9–45	**C440A1A045SF1**	**C440A2A045SF1**
2	CN15GN3_B	1–5	**C440A1A005SF2**	**C440A2A005SF2**
		4–20	**C440A1A020SF2**	**C440A2A020SF2**
		9–45	**C440A1A045SF2**	**C440A2A045SF2**
3	CN15KN3_	20–100	**C440B1A100SF3**	**C440B2A100SF3**
4	CN15NN3_	28–140	**C440C1A140SF4**	**C440C2A140SF4**

1–5 A OL with CTs



C440 Electronic Overload Relays for use with NEMA Contactors Sizes 5–8

Use CTs and 1–5 A C440 overload relay. CT kit does not include overload relay (order separately).

For Use with NEMA Contactor Size	CT Range (Amps)	Description	CT Kit Catalog Number ②	Terminal Size	Overload Relay Catalog Number
5	60–300	300: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT300**	750 kcmil (2) 250 kcmil 3/0 Cu/Al	**C440A1A005SAX**
6	120–600	600: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT600**	(2) 750 kcmil 3/0 Cu/Al	**C440A1A005SAX**
7	200–1000	1000: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1000**	(3) 750 kcmil 3/0 Cu/Al	**C440A1A005SAX**
8	300–1500	1500: 5 panel-mount CT kit with integrated, pass through holes	**ZEB-XCT1500**	(4) 750 kcmil 1/0 Cu/Al	**C440A1A005SAX**

45 mm C440 for Separate Mount



C440 Electronic Overload Relays for Separate Mount

Overload Range	Frame Size	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
0.33–1.65	45 mm	**C440A1A1P6SAX**	**C440A2A1P6SAX**
1–5		**C440A1A005SAX**	**C440A2A005SAX**
4–20		**C440A1A020SAX**	**C440A2A020SAX**
9–45		**C440A1A045SAX**	**C440A2A045SAX**
20–100	55 mm	**C440B1A100SAX**	**C440B2A100SAX**
28–140	110 mm	**C440C1A140SAX**	**C440C2A140SAX**

C440 Electronic Overload Relays for Pass-Through Design

Overload Range	Frame Size	Overload Relay Catalog Number	Overload Relay with Ground Fault Catalog Number
28–140	110 mm	**C440C1A140SPX**	**C440C2A140SPX**
35–175		**XTOE175GCSP**	**XTOE175GGSP**

Notes

① CN15 contactor listed is non-reversing with a 120 Vac coil. For more options, see Tab 2 in this volume, section 2.1.

② ZEB kits are not recommended for use with C440 overload relays with ground fault option.

Type AN19/59 Freedom Series Starters

Type AN19/59 Freedom Series Starters with C440 Electronic Overload Relays

NEMA Starter



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115 V	Single-Phase 230 V	Three-Phase 208 V	Three-Phase 240 V	Three-Phase 480 V	Three-Phase 600 V	Three-Pole Non-Reversing ①② Catalog Number	Three-Pole Reversing ①② Catalog Number
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN19AN0_5E _**	**AN59AN0_5E _**
0	18	21	1	2	3	3	5	5	**AN19BN0_5E _**	**AN59BN0_5E _**
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN19DN0_5E _**	**AN59DN0_5E _**
2	45	52	3	7-1/2	10	15	25	25	**AN19GN0_5E _**	**AN59GN0_5E _**
3	90	104	—	—	25	30	50	50	**AN19KN0_5E _**	**AN59KN0_5E _**
4	135	156	—	—	40	50	100	100	**AN19NN0_5E _**	**AN59NN0_5E _**
5 ③	270	311	—	—	75	100	200	200	**AN19SN0_5E _**	**AN59SN0_5E _**

Type AN19/59 Freedom Series Starters with C440 with Ground Fault Electronic Overload Relays

NEMA Starter with Ground Fault



Non-Reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115 V	Single-Phase 230 V	Three-Phase 208 V	Three-Phase 240 V	Three-Phase 480 V	Three-Phase 600 V	Three-Pole Non-Reversing ①② Catalog Number	Three-Pole Reversing ①② Catalog Number
00	9	11	1/3	1	1-1/2	1-1/2	2	2	**AN19AN0_5G _**	**AN59AN0_5G _**
0	18	21	1	2	3	3	5	5	**AN19BN0_5G _**	**AN59BN0_5G _**
1	27	32	2	3	7-1/2	7-1/2	10	10	**AN19DN0_5G _**	**AN59DN0_5G _**
2	45	52	3	7-1/2	10	15	25	25	**AN19GN0_5G _**	**AN59GN0_5G _**
3	90	104	—	—	25	30	50	50	**AN19KN0_5G _**	**AN59KN0_5G _**
4	135	156	—	—	40	50	100	100	**AN19NN0_5G _**	**AN59NN0_5G _**
5 ③	270	311	—	—	75	100	200	200	**AN19SN0_5G _**	**AN59SN0_5G _**

Coil Suffix Codes

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

C440 FLA Range (FVNR and FVR Starters Only)

NEMA Size	OLR Code	FLA Range	OLR Code	FLA Rating
00	**1P6**	0.33–1.65 A	**020**	4.0–20 A
	005	1.0–5.0 A	**—**	—
0	**1P6**	0.33–1.65 A	**020**	4.0–20 A
	005	1.0–5.0 A	**—**	—
1	**1P6**	0.33–1.65 A	**020**	4.0–20 A
	005	1.0–5.0 A	**045**	9.0–45 A
2	**005**	1.0–5.0 A	**045**	9.0–45 A
	020	4.0–20 A	**—**	—
3	**100**	20–100 A	**—**	—
4	**140**	28–140 A	**—**	—
5 ③	**300**	60–300 A	**—**	—

Notes

① Underscore (_) indicates coils suffix required, see Coil Suffix table above.

② Underscore (_) indicates OLR designation required, see C440 FLA Range table above.

③ NEMA Size 5 starter available with 60–300 A panel mounted CTs. Starter shipped as an assembled unit with 1–5 A C440 overload relay (C440A1A005SELAX or C440A2A005SELAX).

Compact NEMA Size 1 and 4 Starters

New Compact NEMA Size 1 and 4 starters—available with electronic overload relay **only**.

Non-Reversing

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower Single-Phase 115 V	Single-Phase 230 V	Three-Phase 208 V	Three-Phase 240 V	Three-Phase 480 V	Three-Phase 600 V	Three-Pole Non-Reversing Catalog Number
Standard Fault Overload									
1C	27	32	2	3	7.5	7.5	10	10	**AN19CN0_5E_**
4C	135	156	—	—	40	50	100	100	**AN19MN0_5E_**
Ground Fault Overload									
1C	27	32	2	3	7.5	7.5	10	10	**AN19CN0_5G_**
4C	135	156	—	—	40	50	100	100	**AN19MN0_5G_**

Electrical Life at Rated Continuous Current

NEMA Size	Rated Current (Amperage) AC3/AC4	Operations
1C	27/150	2,500,000/40,000
1	27/153	5,000,000/110,000
4C	135/516	500,000/40,000
4	135/822	800,000/70,000

Accessories

CT Kits

Accessories

Description	Catalog Number
Safety Cover	
Clear Lexan cover that mounts on top of the FLA dial and DIP switches when closed.	**ZEB-XSC**
Reset Bar	
Assembles to the top of the overload to provide a larger target area for door mounted reset operators.	**ZEB-XRB**
Remote Reset	
Remote reset module (24 Vdc) ①	**C440-XCOM**
Remote reset module (120 Vac) ①	**ZEB-XRR-120**
Remote reset module (24 Vac) ①	**ZEB-XRR-24**

Safety Cover



Reset Bar



Remote Reset



Communication

The C440/XTOE is provided with two levels of communication capability.

Basic Communication via Expansion Module—Monitoring Only

Basic communication on the C440 is accomplished using an expansion module (C440-XCOM). The expansion module plugs into the expansion bay on the C440 overload relay, enabling communications with the overload via their Modbus RTU (RS-485) network. No additional cards or modules are required. See figure below.

Advanced Communication—Monitoring and Control

C440 also has the ability to communicate on industrial protocols such as Modbus RTU, DeviceNet, PROFIBUS, Modbus TCP, and EtherNet/IP while providing control capability using I/O.

An expansion module (C440-XCOM) combined with a communication module allows easy integration onto the customer's network. See figure below.

C440 communication modules, wired to the C440-XCOM give C440 control capability via communications. The communication modules offer flexible mounting options (DIN rail or panel) along with four inputs (24 Vdc or 120 Vac) and two outputs as standard.



Basic Communication—Modbus



Advanced Communication—Communication Module

Note

① Customer can wire remote mounted button to reset module (that is, 22 mm pushbutton, catalog number M22-D-B-GB14-K10).

The following information can be viewed using the communication option:

- Motor status—running, stopped, tripped or resetting
- Individual rms phase currents (A, B, C)
- Average of three-phase rms current
- Percent thermal capacity
- Fault codes (only available prior to reset)
- Percent phase unbalance
- Ground fault current and percent
- Overload relay settings—trip class, DIP switch selections, reset selections
- Modbus address (can be set over the network)

Features and Benefits

Ethernet modules

- Single device supports both EtherNet/IP, Modbus TCP
- Internal switch with two Ethernet ports allows linear or ring network configurations
- Embedded web-services for easy configuration and monitoring with Internet Explorer

DeviceNet

- I/O assemblies with the same size and layout as the legacy Advantage (WPONIDNA) and ***IT.*** (DSNAP) Starter platforms for seamless upgrades to C441 technology with no program changes
- Communication uses only one DeviceNet MAC ID

PROFIBUS

- Capable of baud rates up to 12 Mb
- Intuitive configuration with common PROFIBUS tools

Modbus

- Modbus address and baud rate can be changed easily with C441's user interface (C441M only)

Terminals

- Unique locking mechanism provides easy removal of terminal block with field wiring installed
- Marked terminals for ease of wiring and troubleshooting

On-board I/O assemblies

- Modules offer 4 IN / 2 OUT of network programmable I/O
- 24 Vdc or 120 Vac signal options
- Optical isolation protects the I/O and communication circuits from possible damage due to transients and ground loops
- Inputs feature user-definable debounce, which limits the effects of transients and electrical noise
- Outputs feature a user-definable state for loss of communication: hold last state, ON or OFF

Communication Accessories

Communication modules mount on their own to be used as stand-alone network based I/O or be wired to the C440-XCOM. Parts are available for purchase individually (see "consists of" below) or as part of a kit for C440 communications.

Expansion Module



Description	Catalog Number
Expansion Module	
Expansion module (Remote Reset/Modbus RTU, RS-485 Communication)	**C440-XCOM**

Ethernet with I/O Module



Communication Modules	
DeviceNet communication module kit—120 V I/O (consists of C440-XCOM + C441KS)	**C440-DN-120**
DeviceNet communication module kit—24 Vdc I/O (consists of C440-XCOM + C441LS)	**C440-DN-24**
PROFIBUS communication module kit—120 V I/O (consists of C440-XCOM + C441SS)	**C440-DP-120**
PROFIBUS communication module kit—24 V I/O (consists of C440-XCOM + C441QS)	**C440-DP-24**
Modbus communication module kit—120 V I/O (consists of C440-XCOM + C441NS)	**C440-MOD-120**
Modbus communication module kit—24 Vdc I/O (consists of C440-XCOM + C441PS)	**C440-MOD-24**
Modbus TCP/Ethernet IP communication module kit—120 V I/O (consists of C440-XCOM + C441U)	**C440-ET-120**
Modbus TCP/Ethernet IP communication module kit—24 V I/O (consists of C440-XCOM + C441V)	**C440-ET-24**

Technical Data and Specifications

Electronic Overload Relays up to 1500 A

Description	Specification 45 mm	55 mm	110 mm
Electrical Ratings	**Range**	**Range**	**Range**
Operating voltage (three-phase) and frequency	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)	690 Vac (60/50 Hz)
FLA Range			
	0.33–1.65 A 1–5 A 4–20 A 9–45 A	20–100 A	28–140 A (NEMA) 35–175 A (IEC)
Use with Contactors			
XT IEC frames	B, C, D	F, G	G, H
Freedom NEMA sizes	00, 0, 1, 2	3	4
Trip Class			
	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable	10A, 10, 20, 30 Selectable
Motor Protection			
Thermal overload setting	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip	1.05 x FLA: does not trip 1.15 x FLA: overload trip
Feature	**Range**	**Range**	**Range**
Phase loss	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Phase unbalance (selectable: enable/disable)	Fixed threshold 50%	Fixed threshold 50%	Fixed threshold 50%
Ground fault (selectable: enable/disable)	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec	50% of FLA dial setting >150% = 2 sec >250% = 1 sec
Reset	Manual/automatic	Manual/automatic	Manual/automatic
Indicators			
Trip status	Orange flag	Orange flag	Orange flag
Mode LED	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip	One flash: Overload operating properly Two flashes: Current is above FLA dial setting—pending trip
Options			
Remote reset	Yes	Yes	Yes
Reset bar	Yes	Yes	Yes
Communication expansion module	Yes	Yes	Yes
Capacity			
Load terminals			
Terminal capacity	12–10 AWG (4–6 mm^2) 8–6 AWG (6–16 mm^2)	6–1 AWG (16–50 mm^2)	8–4/0 AWG (10–95 mm^2)
Tightening torque	20–25 lb-in (2.3–2.8 Nm) 25–30 lb-in (2.8–3.4 Nm)	25–30 lb-in (2.8–3.4 Nm)	124 lb-in (14 Nm)
Input, auxiliary contact and remote reset terminals			
Terminal capacity	2 x (18–12) AWG	2 x (18–12) AWG	2 x (18–12) AWG
Tightening torque	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)	7–11 lb-in (0.8–1.2 Nm)
Voltages			
Insulation voltage U_i (three-phase)	690 Vac	690 Vac	690 Vac
Insulation voltage U_i (control)	500 Vac	500 Vac	500 Vac
Rated impulse withstand voltage	6000 Vac	6000 Vac	6000 Vac
Overvoltage category/pollution degree	III/3	III/3	III/3

Electronic Overload Relays up to 1500 A, continued

Description	Specification 45 mm	55 mm	110 mm
Auxiliary and Control Circuit Ratings			
Conventional thermal continuous current	5 A	5 A	5 A
Rated operational current—IEC AC-15			
Make contact (1800 VA)			
120 V	15 A	15 A	15 A
240 V	15 A	15 A	15 A
415 V	0.5 A	0.5 A	0.5 A
500 V	0.5 A	0.5 A	0.5 A
Break contact (180 VA)			
120 V	1.5 A	1.5 A	1.5 A
240 V	1.5 A	1.5 A	1.5 A
415 V	0.9 A	0.9 A	0.9 A
500 V	0.8 A	0.8 A	0.8 A
IEC DC-13 (L/R F 15 ms1)			
0–250 V	1.0 A	1.0 A	1.0 A
Rated operational current—UL B600			
Make contact (3600 VA)			
120 V	30 A	30 A	30 A
240 V	15 A	15 A	15 A
480 V	7.5 A	7.5 A	7.5 A
600 V	6 A	6 A	6 A
Break contact (360 VA)			
120 V	3 A	3 A	3 A
240 V	1.5 A	1.5 A	1.5 A
480 V	0.75 A	0.75 A	0.75 A
600 V	0.6 A	0.6 A	0.6 A
R300—Vdc ratings (28 VA)			
0–120 V	0.22 A	0.22 A	0.22 A
250 V	0.11 A	0.11 A	0.11 A
Short-Circuit Rating without Welding			
Maximum fuse	6 A gG/gL	6 A gG/gL	6 A gG/gL
Environmental Ratings			
Ambient temperature (operating)	–13 to 149 °F (–25 to 65 °C)	–13 to 149 °F (–25 to 65 °C)	–13 to 149 °F (–25 to 65 °C)
Ambient temperature (storage)	–40 to 185 °F (–40 to 85 °C)	–40 to 185 °F (–40 to 85 °C)	–40 to 185 °F (–40 to 85 °C)
Operating humidity UL 991 (H3)	5% to 95% non-condensing	5% to 95% non-condensing	5% to 95% non-condensing
Altitude (no derating) NEMA ICS1	2000 m	2000 m	2000 m
Shock (IEC 600068-2-27)	15 g any direction	15 g any direction	15 g any direction
Vibration (IEC 60068-2-6)	3 g any direction	3 g any direction	3 g any direction
Pollution degree per IEC 60947-4-1	3 for product (2 for pcb)	3 for product (2 for pcb)	3 for product (2 for pcb)
Ingress protection	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 536)	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Mounting position	Any	Any	Any
Climatic proofing	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30	Damp heat, constant to IEC 60068-2-30

Electronic Overload Relays up to 1500 A, continued

Description	Specification 45 mm	55 mm	110 mm
Electrical/EMC			
Radiated emissions IEC 60947-4-1-Table 15 EN 55011 (CISPIR 11) Group 1, Class A, ISM	30 MHz to 1000 MHz	30 MHz to 1000 MHz	30 MHz to 1000 MHz
Conducted emissions IEC 60947-4-1-Table 14 EN 55011 (CISPIR 11) Group 1; Class ISM	0.15 MHz to 30 MHz	0.15 MHz to 30 MHz	0.15 MHz to 30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact	±8 kV air, ±6 kV contact
Radiated immunity IEC 60947-4-1 IEC 61000-4-3	10 V/m 80 MHz–1000 MHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 MHz–1000 MHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80 MHz–1000 MHz 3 V/m from 1.4 to 2.7 gHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1, IEC 61000-4-6	140 dub (10 V rms) 150 kHz–100 MHz	140 dub (10 V rms) 150 kHz–100 MHz	140 dub (10 V rms) 150 kHz–100 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method	±4 kV using direct method with accessory installed in expansion bay ±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 a Class 4	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±4 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)	With accessory installed in expansion bay: ±2 kV line-to-line (DM) –>1.2/50 us; 2 kV line-to-earth, 1 kV line-to-line ±4 kV line-to-ground (CM)
Power freq. magnetic field immunity IEC 60947-4-1, IEC 61000-4-8	30 A/m, 50 Hz	30 A/m, 50 Hz	30 A/m, 50 Hz
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m	10 V/m	10 V/m
Distortion IEEE 519	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.	5% THD max., 5th harmonic 3% max.
Electrostatic discharge (ESD) IEC 61000-4-2, EN 61131-2	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge	4 kV contact 8 kV air discharge
Electrical fast transient (EFT) IEC 61000-4-4, EN 61131-2	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 61000-4-5, EN 61131-2	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)	±2 kV line-to-ground (CM)

Communication Modules

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
Electrical/EMC				
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz	30–1000 MHz	30–1000 MHz	30–1000 MHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 6100-4-4	±2 kV using direct method	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication	±2 kV supply and control, ±1 kV communication
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 3	User IO and communication lines ①: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)	User IO and communication lines: ±0.5 kV line-to-line (DM) ±1 kV line-to-ground (CM)
Electromagnetic field ① IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m	10 V/m	10 V/m	10 V/m
Environmental Ratings				
Ambient temperature (operating)	–4 to 122 °F (–20 to 50 °C)	–13 to 122 °F (–25 to 50 °C)	–13 to 122 °F (–25 to 50 °C)	–13 to 122 °F (–25 to 50 °C)
Ambient temperature (storage)	–40 to 185 °F (–40 to 85 °C)	–40 to 185 °F (–40 to 85 °C)	–40 to 185 °F (–40 to 85 °C)	–40 to 185 °F (–40 to 85 °C)
Operating humidity	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing	5–95% noncondensing
Altitude (no derating)	2000 m	2000 m	2000 m	2000 m
Shock (IEC 600068-2-27)	15 G any direction	15 G any direction	15 G any direction	15 G any direction
Vibration (IEC 60068-2-6)	3 G any direction	3 G any direction	3 G any direction	3 G any direction
Pollution degree per IEC 60947-1	3	3	3	3
Degree of protection	IP20	IP20	IP20	IP20
Overvoltage category per UL 508	III	III	III	III
DeviceNet				
DeviceNet connections	—	Group 2, polling, bit strobe, explicit, no UCMM	—	—
DeviceNet baud rate	—	125 K, 250 K, 500 K	—	—
Ethernet				
Ethernet connections	—	—	—	Integrated two-port switch with dual RJ45 Ethernet connections
Ethernet type	—	—	—	Ethernet 10/100 Mbs, AutoMDX, Auto Negotiation
PROFIBUS				
PROFIBUS connections	—	—	Group 2, polling, bit strobe, explicit, no UCMM	—
PROFIBUS baud rate	—	—	9.6 K, 19.2 K, 45.45 K, 93.75 K, 187.5 K, 500 K, 1.5 M, 3 M, 6 M, 12 M	—

Note

① Relates to C441M only.

Communication Modules, continued

Description	Modbus	DeviceNet	PROFIBUS	Ethernet
C441_ 24 Vdc Input				
Nominal input voltage	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Operating voltage	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
Number of inputs	4	4	4	4
Signal delay	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)	5 ms (programmable to 65 sec)
OFF-state voltage	<6 Vdc	<6 Vdc	<6 Vdc	<6 Vdc
ON-state voltage	>18 Vdc	>18 Vdc	>10 Vdc	>18 Vdc
Nominal input current	5 mA	5 mA	5 mA	5 mA
Isolation	1500 V	1500 V	1500 V	1500 V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
24 V source current	50 mA	50 mA	50 mA	50 mA
Operating Voltage Range—DC Input Modules				
OFF state	0–6 Vdc	0–6 Vdc	0–6 Vdc	0–6 Vdc
Transition region	6–18 Vdc	6–18 Vdc	6–18 Vdc	6–18 Vdc
ON state	18–30 Vdc	18–30 Vdc	18–30 Vdc	18–30 Vdc
C441_ 120 Vac Input				
Nominal input voltage	120 Vac	120 Vac	120 Vac	120 Vac
Operating voltage	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Number of inputs	4	4	4	4
OFF-state voltage	<30 Vac	<30 Vac	<20 Vac	<30 Vac
ON-state voltage	>80 Vac	>80 Vac	>70 Vac	>80 Vac
Nominal input current	15 mA	15 mA	15 mA	15 mA
Signal delay	1/2 cycle	1/2 cycle	1/2 cycle	1/2 cycle
Isolation	1500 V	1500 V	1500 V	1500 V
Terminal screw torque	7–9 in-lb	7–9 in-lb	7–9 in-lb	7–9 in-lb
Operating Voltage Range—AC Input Modules				
OFF state	0–30 Vac	0–30 Vac	0–30 Vac	0–30 Vac
Transition region	30–80 Vac	30–80 Vac	30–80 Vac	30–80 Vac
ON state	80–140 Vac	80–140 Vac	80–140 Vac	80–140 Vac
Output Modules				
Nominal voltage	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc	120 Vac 24 Vdc
Number of outputs	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C	(2) 1NO Form A 1NO/NC Form C
Relay OFF time	3 ms	3 ms	3 ms	3 ms
Relay ON time	7 ms	7 ms	7 ms	7 ms
Max. current per point ①	5 A (B300 rated)	5 A (B300 rated)	5 A (B300 rated)	5 A (B300 rated)
Electrical life	100,000 cycles	100,000 cycles	100,000 cycles	100,000 cycles
Mechanical life	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles

Note

① Resistive current at 55 °C ambient.

Short Circuit Ratings (North America CSA, cUL)

Changes to UL 508A and NEC in recent years have brought a focus to control panel safety with regard to short-circuit current ratings (SCCR). Eaton's C440 electronic overload relays combined with ***XT*** series IEC and Freedom Series NEMA contactors provide a wide variety of SCCR solutions needed for a variety of applications. The SCCR data in this document reflects the latest information as of April 2010.

C440/*XT* Standalone Overload Relays (*XT*, C440)

		Standard-Fault Short Circuit Data			High-Fault Short Circuit Data					
					Fuses (RK5, J, CC)			Thermal-Magnetic Circuit Breakers		
Overload FLA Range	Maximum Operating Voltage	600 V (kA)	Maximum Fuse Size (A) (RK5)	Maximum Breaker Size (A)	480 V (kA)	600 V (kA)	Maximum Fuse Size	480 V (kA)	600 V (kA)	Maximum Breaker Size
0.33–1.65A	600 Vac	1	6	15	—	—	—	—	—	—
1–5 A	600 Vac	5	20	20	100	100	30	100	35	20
4–20 A	600 Vac	5	80	80	100	100	100	100	35	80
9–45 A	600 Vac	5	175	175	100	100	100	100	35	100/175 (480/600)
20–100 A	600 Vac	10	400	400	100	100	200	150	35	250/400 (480/600)
28–140 A	600 Vac	10	450	500	100	100	400	100	65	400
35–175 A	690 Vac	10	500 (gG)	350 (690 Vac) 320 (415 Vac)	100	100	500 (gG)	100 (415 Vac)	—	350 (LGC3350) 320 (NZMH3)

NEMA Freedom Series Starters with C440 Electronic Overload Relays

		High-Fault Short Circuit Data			Thermal-Magnetic Circuit Breakers		
		Fuses (RK5, J, CC)					
NEMA Size	Maximum Operating Voltage	480 V	600 V	Maximum Fuse Size	480 V	600 V	Maximum Breaker Size
00	0.33–1.65 A	100	100	30	—	—	—
	1–5 A	100	100	30	100	35	35
	4–20 A	100	100	30	100	35	35
0	0.33–1.65 A	100	100	60	—	—	—
	1–5 A	100	100	60	100	35	70
	4–20 A	100	100	60	100	35	70
1	0.33–1.65 A	100	100	100	—	—	—
	1–5 A	100	100	100	100	35	100
	4–20 A	100	100	100	100	35	100
	9–45 A	100	100	100	100	35	100
2	1–5 A	100	100	100	100	35	175
	4–20 A	100	100	100	100	35	175
	9–45 A	100	100	100	100	35	175
3	20–100 A	100	100	200	50	50	250
4	28–140 A	100	100	400	100	65	300

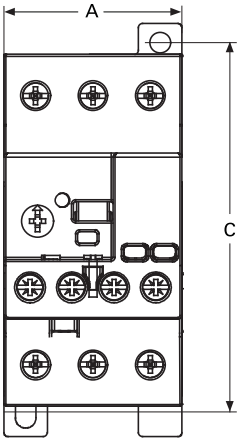
IEC *XT* Starters with *XT* Electronic Overload Relays

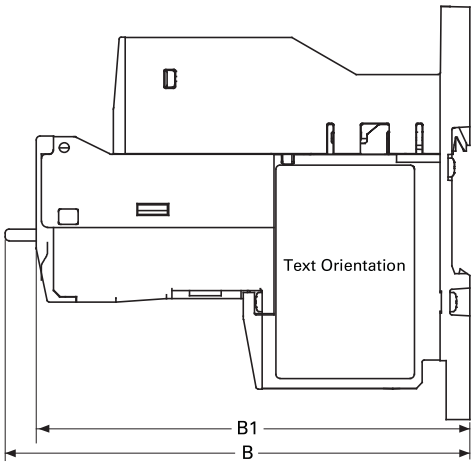
		High-Fault Short Circuit Data			Thermal-Magnetic Circuit Breakers		
		Fuses (RK5, J, CC)					
Contactor Frame Size	Maximum Operating Voltage	480 V	600 V	Maximum Fuse Size	480 V	600 V	Maximum Breaker Size
B	1–5 A	100	100	30	—	—	—
	4–20 A	100	100	30	—	—	—
C	1–5 A	100	100	60	—	—	—
	4–20 A	100	100	60	—	—	—
	9–45 A	100	100	60	—	—	—
D	9–45 A	100	100	200	65	35	175
	20–100 A	100	100	200	65	35	175
F	20–100 A	100	100	200	65	65	350
G	20–100 A	100	100	200	65	65	350
	35–175 A	100	100	400	65	30	250 (480 Vac) 350 (600 Vac)
H	35–175 A	100	100	400	65	30	400

Dimensions

Approximate Dimensions in Inches (mm)

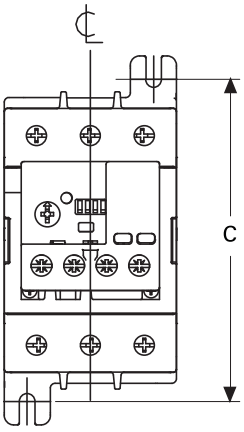
45 mm C440/*XT* Electronic Overload Relays

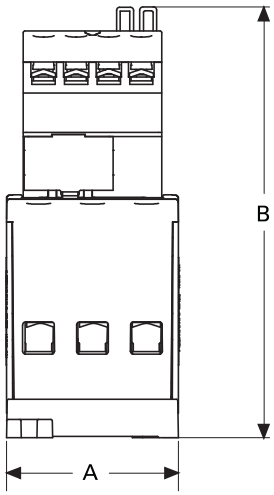


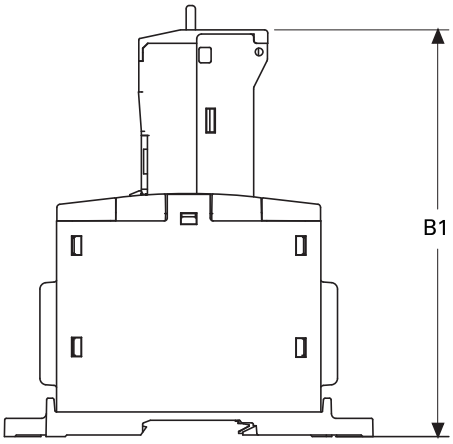


	Width A	Depth B1	Depth to Reset B	Mounting Hole (Height) C
NEMA Starter Size				
00–2	1.80 (45.0)	4.32 (109.7)	4.63 (117.5)	—
***XT* IEC Frame Size**				
B, C, D	1.80 (45.0)	4.32 (109.7)	4.30 (109.2)	—
Standalone				
0.35–45 A	1.80 (45.0)	4.32 (109.7)	4.63 (117.5)	3.68 (93.5)

55 mm C440/*XT* Electronic Overload Relays



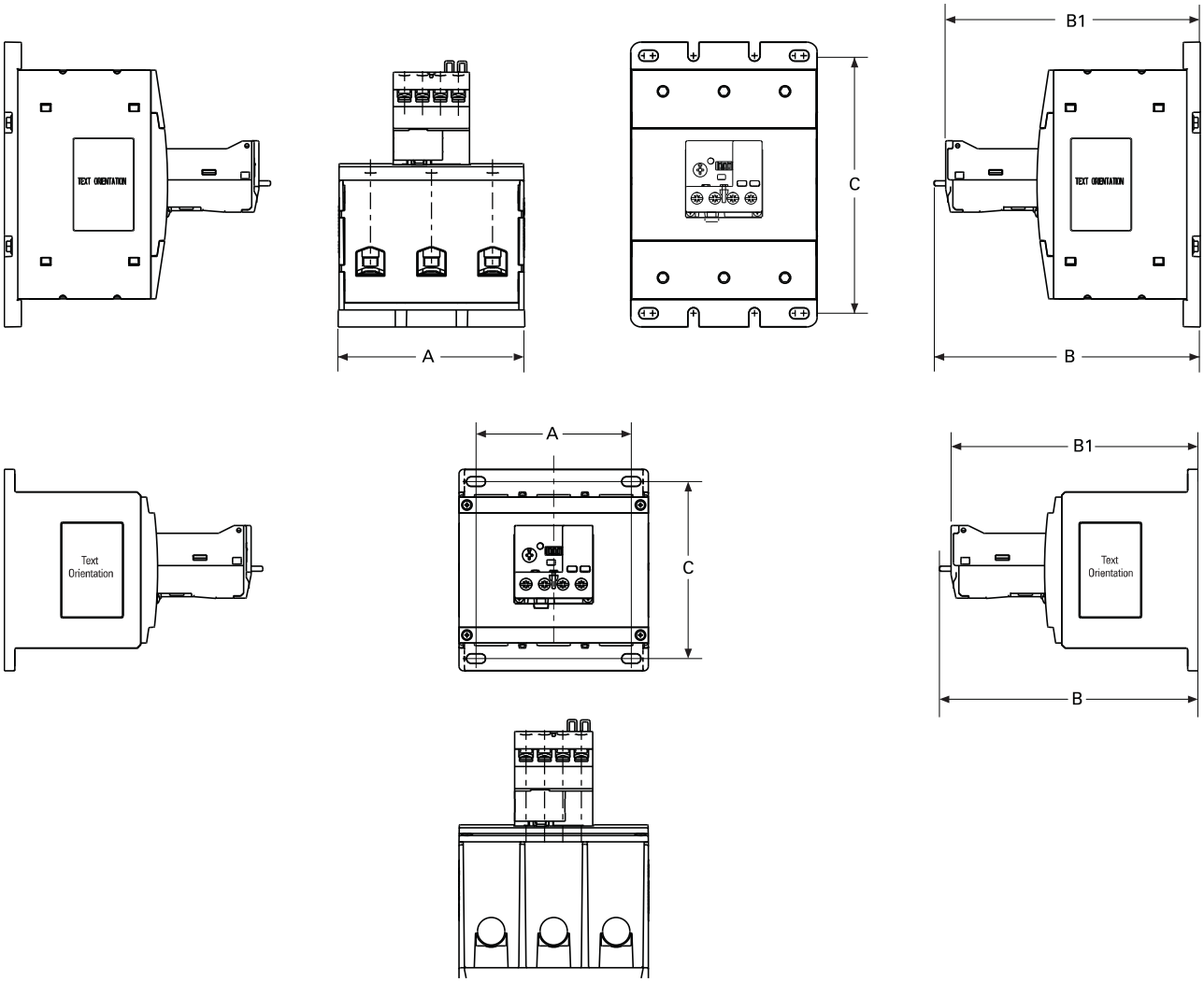




	Width A	Depth to Reset B	Depth B1	Mounting Hole (Height) C
NEMA Starter Size				
3	2.21 (55.0)	5.52 (140.2)	5.21 (132.4)	4.13 (104.8)
***XT* IEC Frame Size**				
D, F, G	2.21 (55.0)	5.52 (140.2)	5.21 (132.4)	4.13 (104.8)
Standalone				
20–100 A	2.21 (55.0)	5.52 (140.2)	5.21 (132.4)	4.13 (104.8)

Approximate Dimensions in Inches (mm)

110 mm C440/*XT* Electronic Overload Relays

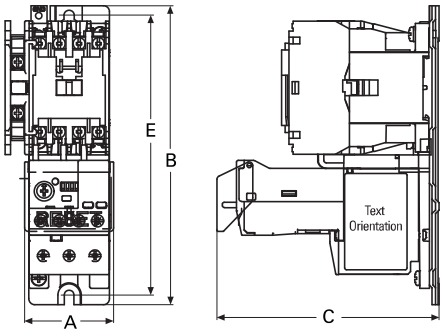


	Width A	Height To Reset B	B1	Mounting Depth C
NEMA Starter Size				
4	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
***XT* IEC Frame Size**				
G	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
H	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
Standalone				
	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)
Pass-Through				
	4.33 (110.0)	6.20 (157.0)	5.90 (150.0)	6.00 (152.0)

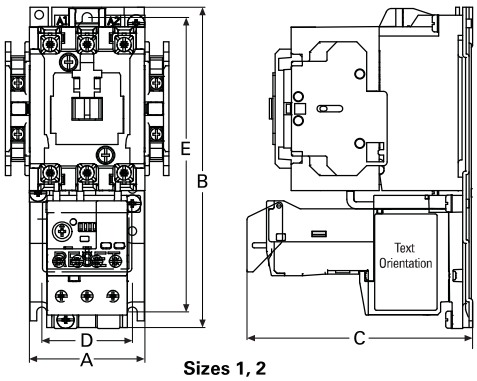
Approximate Dimensions in Inches (mm)

NEMA Starters

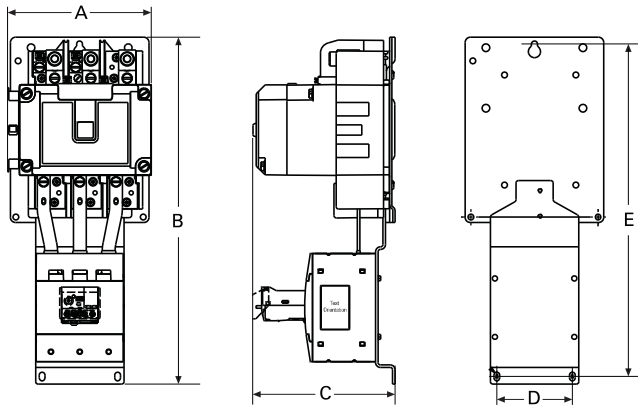
Full Voltage Non-Reversing Starters



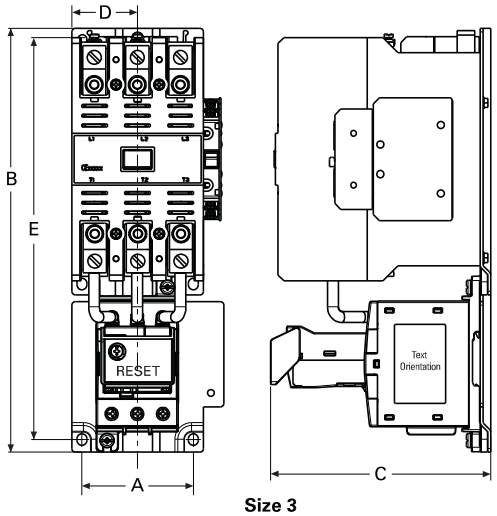
Sizes 00, 0



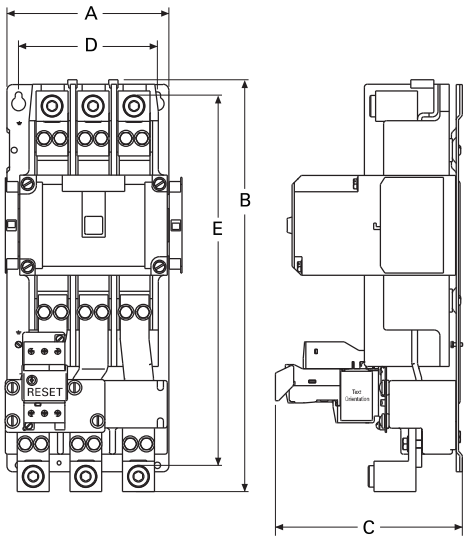
Sizes 1, 2



Size 4



Size 3

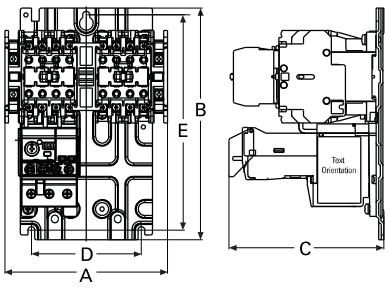


Size 5

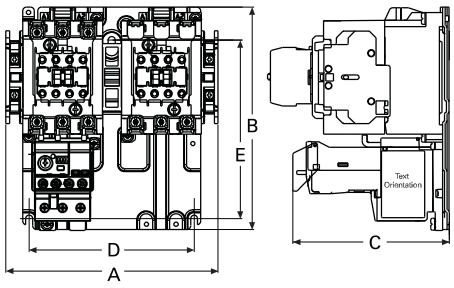
NEMA Size	A	B	C	D	E
00, 0	1.97 (50.0)	6.60 (167.6)	4.90 (124.5)	—	6.18 (157.0)
1, 2	2.60 (65.0)	7.10 (180.0)	4.98 (126.5)	2.00 (50.8)	6.50 (165.0)
3	4.09 (103.8)	11.40 (289.6)	5.92 (150.3)	1.77 (44.9)	10.81 (274.6)
4	7.10 (179.0)	17.00 (432.0)	7.00 (177.0)	3.70 (94.0)	16.30 (415.0)
5	7.00 (177.8)	17.81 (452.3)	8.08 (205.2)	6.00 (152.4)	16.01 (406.6)

Approximate Dimensions in Inches (mm)

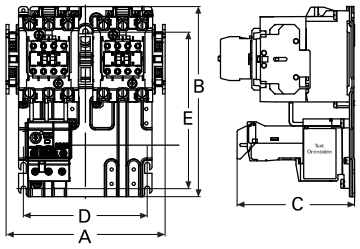
Full Voltage Reversing Starters



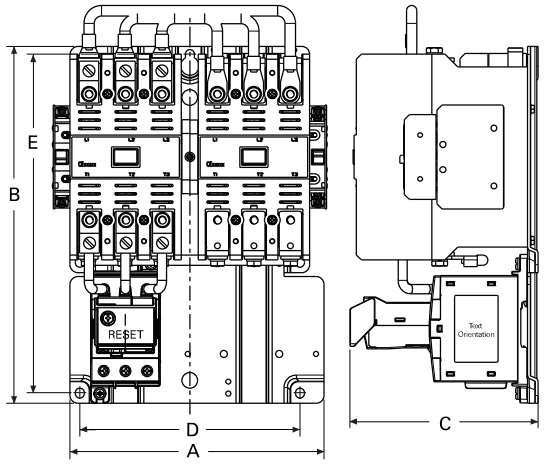
Sizes 00, 0



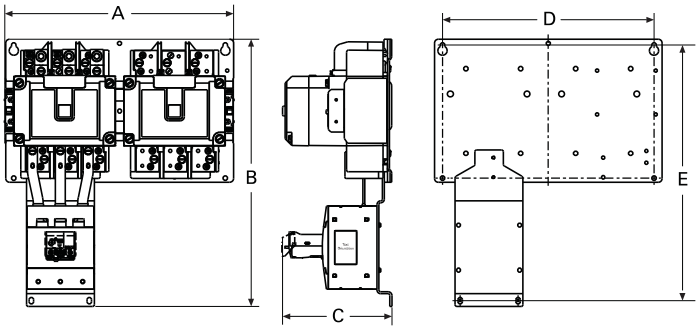
Size 1



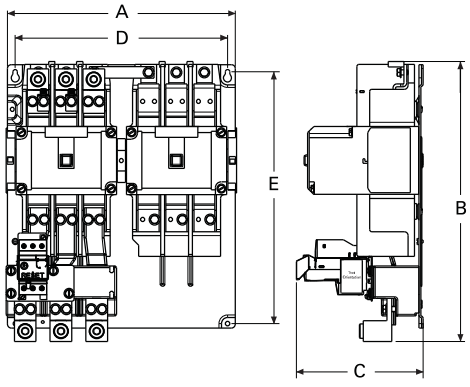
Size 2



Size 3



Size 4



Size 5

NEMA Size	A	B	C	D	E
00, 0	5.20 (132.0)	7.40 (187.0)	4.90 (125.0)	3.50 (89.0)	6.90 (174.0)
1	6.70 (171.0)	7.10 (180.0)	4.98 (126.5)	5.25 (133.0)	5.70 (144.0)
2	6.70 (171.0)	8.10 (205.0)	4.98 (126.5)	5.25 (133.0)	6.70 (170.0)
3	8.08 (205.2)	11.35 (288.3)	6.00 (152.0)	7.00 (177.8)	10.77 (273.6)
4	14.60 (371.0)	17.10 (433.0)	7.00 (177.0)	13.50 (343.0)	16.30 (145.0)
5	14.50 (368.3)	17.81 (452.3)	8.06 (204.8)	13.50 (342.9)	16.00 (406.6)

Motor Insight Overload and Monitoring Relay



Contents

Description	*Page*
XT IEC Overload Relays	**V5-T5-42**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	**V5-T5-47**
C441 Overload Relays	
Features and Benefits	**V5-T5-69**
Catalog Number Selection	**V5-T5-70**
Product Selection	**V5-T5-71**
Accessories	**V5-T5-73**
Technical Data and Specifications	**V5-T5-75**
Dimensions	**V5-T5-87**
C445 Motor Management Relay	**V5-T5-90**

C441 Overload Relays

Product Description

Eaton's Motor Insight overload relay offers configurable motor, load and line protection. The addition of power monitoring and protection detects under-loaded conditions like a dead-headed pump. With a simple user interface for setup and monitoring and just two part numbers covering 1–90 A applications, C441 is ideal for stand-alone pump or fan panels used in industries such as mining and irrigation. C441 is also offered in complete pump panel designs as part of Eaton's Enclosed Control offering. See Volume 10—Enclosed Control, CA08100012E, Tab 6 for more information.

Motor Insight is available in either a line-powered or 120 Vac control powered design, capable of monitoring voltages up to 660 Vac. Each of these units is available in a 1–9 amp or a 5–90 amp FLA model. With external CTs, Motor Insight can protect motors up to 540 amps FLA. Available add-on accessories include communication modules for Modbus RTU, DeviceNet, PROFIBUS, Modbus TCP, EtherNet/IP and HTTP web services all with I/O options. For ease-of-use and operator safety, Motor Insight offers a remote display that mounts easily with two 30 mm knockouts.

The Motor Insight family also offers a high voltage relay option, capable of providing overload and current protection on systems up to 1200 Vac.

Features and Benefits

Features

Size/Range
- Broad FLA range of 1–540 A
- Selectable trip class (5–30)
- Four operating voltage options
  - Line-powered from 240 Vac, 480 Vac, 600 Vac
  - Control-powered from 120 Vac

Motor Control
- Two output relays
  - One B300 Form C fault relay and one B300 ground fault shunt relay
  - Other relay configurations are available, including one Form A and one Form B SPST (fault and auxiliary relays) allowing programmable isolated relay behavior and unique voltages
- One external remote reset terminal
- Trip status indicator

Motor Protection
- Thermal overload
- Jam protection
- Current imbalance
- Current phase loss
- Ground fault
- Phase reversal

Load Protection
- Under current
- Low power (kW)
- High power (kW)

Line Protection
- Over voltage
- Under voltage
- Voltage imbalance
- Voltage phase loss

Monitoring Capabilities
- Current—average and phase rms
- Voltage—average and phase rms
- Power—motor kW
- Power factor
- Frequency
- Thermal capacity
- Run hours
- Ground fault current
- Current imbalance %
- Voltage imbalance %
- Motor starts
- Motor run hours

Options
- Type 1, 12 remote display
- Type 3R remote display kit
- Communication modules
  - Modbus
  - Modbus with I/O
  - DeviceNet with I/O
  - PROFIBUS with I/O
  - Modbus TCP with I/O
  - EtherNet/IP with I/O

Benefits

Reliability and Improved Uptime
- Advanced diagnostics allows for quick and accurate identification of the root source of a motor, pump or power quality fault; reducing trouble-shooting time and the loss of productivity, reducing repeat faults due to misdiagnosis, and increasing process output and profitability
- Provides superior protection of motors and pumps before catastrophic failure occurs
- Increases profitability with greater process uptime and throughput, reduced costs per repair, reduced energy consumption and extended equipment life
- Adjustments to overload configuration can be made at any time

Safety
- IP20 rated terminal blocks
- Terminal blocks are set back from the display to reduce operator shock hazard
- Remote display (optional) does not require that the operator open the panel to configure the device

Flexibility
- Communications modules
  - Offered in a variety of configurations
  - External snap-on modules provide support for multiple communications protocols
- Advanced power, voltage and current monitoring capabilities
- Communications modules and remote display can be used simultaneously
- Highly configurable fault and reset characteristics for numerous applications
- Fully programmable isolated fault and auxiliary relays

Ease of Use
- Bright LED display with easy-to-understand setting and references
- Powered from line voltage or 120 Vac control power
- Remote display powered from base unit
- Full word descriptions and units on user interface

Standards and Certifications
- cULus listed NKCR, NKCR7, 508
- UL® 1053 applicable sections for ground fault detection
- CSA® certified (Class 3211-02)
- CE
- NEMA®
- IEC EN 60947-4-1
- RoHS

Catalog Number Selection

Motor Insight Overload Relays

C441 B A NOUI

Device Type
C441 = Motor Insight overload relay

Overload Relay Power Source Voltage
B = 240 Vac (170–264 Vac)
C = 480 Vac (323–528 Vac)
D = 600 Vac (487–660 Vac)
Blank = 120 Vac control power (170–660 Vac)

Overload Relay Current Rating
A = 1–9 A (1–540 A refer to **Page V5-T5-72**)
B = 5–90 A (5–90 A refer to **Page V5-T5-72**)
0109 = 120 Vac control power (0–660 Vac, 1–9 A)
0590 = 120 Vac control power (0–660 Vac, 5–90 A)

Internal User Interface
Blank = With user interface (line powered models)
NOUI = Without user interface (120 Vac control models)

Motor Insight High Voltage Overload Relays

C441 P3309 NOUI HVR

Device Type
C441 = Motor Insight overload relay

Current Rating and Power Source
P3309 = 0.33–9 A (120 Vac control power)
0590 = 5–90 A (120 Vac control power)

Internal User Interface
NOUI = Without user interface

Line Voltage Rating
HVR = 0–1200 Vac ①

Motor Insight Overload Relays—Communications Modules and Accessory Types

C441 K

Device Type
C441 = Motor Insight overload relay

Communication Module
K = DeviceNet module 4IN/2OUT 120 Vac
L = DeviceNet module 4IN/2OUT 24 Vdc
M = Modbus RTU module
N = Modbus RTU module 4IN/2OUT 120 Vac
P = Modbus RTU module 4IN/2OUT 24 Vdc
Q = PROFIBUS module 4IN/2OUT 24 Vdc
R = Modbus TCP / EtherNet/IP module 4IN/2OUT 120 Vac
S = PROFIBUS module 4IN/2OUT 120 Vac
T = Modbus TCP / EtherNet/IP module 4IN/2OUT 24 Vdc

Accessory Type
1 = Type 1 and 12 remote mounted display
3 = Type 3R kit for remote display
CMP1 = Conversion plate

Note

① The C441 High Voltage Relay (-HVR models) can be used on systems up to 1200 Vac to provide overload and current based protections. Voltage and power based protections and monitoring listed in this catalog for C441 Motor Insight are not available in -HVR models. Please consult IL04209007E-HVR for technical information on -HVR models.

Product Selection

Motor Insight





Motor Insight

Power Source	Monitoring Range	Current Range	Catalog Number
240 Vac (170–264)	170–264 Vac	1–9 A	**C441BA**
		5–90 A	**C441BB**
480 Vac (323–528)	323–528 Vac	1–9 A	**C441CA**
		5–90 A	**C441CB**
600 Vac (489–660)	489–660 Vac	1–9 A	**C441DA**
		5–90 A	**C441DB**
120 Vac (93.5–132)	170–660 Vac	1–9 A	**C4410109NOUI**
		5–90 A	**C4410590NOUI**
120 Vac (93.5–132)	0–1200 Vac ①	0.33–9 A	**C441P3309NOUI-HVR**
		5–90 A	**C4410590NOUI-HVR**

Note

① Rating only—does not provide voltage monitoring/protection.

Motor Insight CT Multiplier and Wire Wrap Schedule

Catalog Number ①	Motor FLA	Number of Loops	Number of Conductors Through CT Primary	CT Multiplier Setting	External CT Kit Catalog Number ②
Current Range: 5–90 A					
C441_B and C4410590NOUI	5–22.5 A	3	4	4	—
	6.67–30 A	2	3	3	—
	10–45 A	1	2	2	—
	20–90 A	0	1	1	—
Current Range: 1–9 A					
C441_A and C4410109NOUI	1–5 A	1	2	2	—
	2–9 A	0	1	1	—
	60–135 A	0	1	150–(150:5)	**C441CTKIT150**
	120–270 A	0	1	300–(300:5)	**C441CTKIT300**
	240–540 A	0	1	600–(600:5)	**C441CTKIT600**
Current Range: 5–90A					
C4410590NOUI-HVR	5–22.5 A	3	4	4	—
	6.67–30 A	2	3	3	—
	10–45 A	1	2	2	—
	20–90 A	0	1	1	—
Current Range: 0.33–9 A					
C441P3309NOUI-HVR	0.33–1.5 A	5	6	6	—
	0.4–1.8 A	4	5	5	—
	0.5–2.25 A	3	4	4	—
	0.67–3.0 A	2	3	3	—
	1–5 A	1	2	2	—
	2–9 A	0	1	1	—
	60–135 A	0	1	150–(150:5)	**C441CTKIT150**
	120–270 A	0	1	300–(300:5)	**C441CTKIT300**
	240–270 A	0	1	600–(600: 5)	**C441CTKIT600**

Notes

① Underscore indicates Operating Voltage Code required.
Operating Voltage Codes:

Code	Voltage
B	240 Vac
C	480 Vac
D	600 Vac
<empty>	120 Vac Control Power

② Any manufacturer's CTs may be used.

Accessories

Communication Modules

Motor Insight Communication Modules mount to the side of the device to provide communication, monitoring and control over a variety of networks.

Features and Benefits

Ethernet Modules

- Single device supports both EtherNet/IP, Modbus TCP
- Internal switch with two Ethernet ports allows linear or ring network configurations
- Embedded web-services for easy configuration and monitoring with Internet Explorer

DeviceNet

- I/O assemblies with the same size and layout as the legacy Advantage (WPONIDNA) and ***IT.*** (DSNAP) Starter platforms for seamless upgrades to C441 technology with no program changes
- Communication uses only one DeviceNet MAC ID

PROFIBUS

- Capable of baud rates up to 12 Mb
- Intuitive configuration with common PROFIBUS tools

Modbus

- Modbus address and baud rate can be changed easily with C441's user interface (C441M only)

Terminals

- Unique locking mechanism provides easy removal of terminal block with field wiring installed
- Marked terminals for ease of wiring and troubleshooting

On-board I/O assemblies (all modules)

- Modules offer 4 IN / 2 OUT of network programmable I/O
- 24 Vdc or 120 Vac signal options
- Optical isolation protects the I/O and communication circuits from possible damage due to transients and ground loops
- Inputs feature user-definable debounce, which limits the effects of transients and electrical noise
- Outputs feature a user-definable state for loss of communication: hold last state, ON or OFF

Communication Modules









Communications Modules

Description	I/O	Catalog Number
Ethernet		
Modbus TCP / EtherNet/IP Communication Module 4IN/2OUT	120 Vac	**C441R**
Modbus TCP / EtherNet/IP Communication Module 4IN/2OUT	24 Vdc	**C441T**
DeviceNet		
DeviceNet Communication Module	120 Vac	**C441K**
DeviceNet Communication Module	24 Vdc	**C441L**
PROFIBUS		
PROFIBUS Communication Module 4IN/2OUT	120 Vac	**C441S**
PROFIBUS Communication Module 4IN/2OUT	24 Vdc	**C441Q**
Modbus		
Modbus Communication Module	None	**C441M**
Modbus Communication Module 4IN/2OUT	120 Vac	**C441N**
Modbus Communication Module 4IN/2OUT	24 Vdc	**C441P**

Type 3R Kit with Remote Display Mounted Inside

Motor Insight offers several accessories for the customer's ease of use and safety:

- Types 1 and 12 remote display
- Type 3R remote display kit
- Conversion mounting plate for upgrading from the legacy Eaton 777 model with no new holes required

Features and Benefits

- Remote display unit:
  - Same user interface as the overload relay
  - Enhanced operator safety—operator can configure the overload without opening the enclosure door
- Type 3R kit mounts with standard 30 mm holes
- Mounting plate for retrofit in existing installations

Type 3R Kit with Remote Display Mounted Inside

	Description	Catalog Number
C4411 	Remote display Types 1 and 12 (UL 508)	**C4411**
C4413 	Type 3R kit for remote display (UL 508)	**C4413**
	Conversion mounting plate (not shown)	**C441CMP1**

Communication Cables

The Remote Display requires a communication cable to connect to the Motor Insight overload relay:

Communication Cable Lengths

Length in Inches (meters)	Catalog Number
9.8 (0.25)	**D77E-QPIP25**
39.4 (1.0)	**D77E-QPIP100**
78.7 (2.0)	**D77E-QPIP200**
118.1 (3.0)	**D77E-QPIP300**

Current Transformer Kits

Description	Catalog Number
Three 150:5 CTs to be used with Motor Insight	**C441CTKIT150**
Three 300:5 CTs to be used with Motor Insight	**C441CTKIT300**
Three 600:5 CTs to be used with Motor Insight	**C441CTKIT600**

Technical Data and Specifications

Motor Insight

Description	Specification C441B_	C441C_	C441D_	C441_ _ _ _NOUI	
Electrical Ratings					
Feature	**Range**				
Operating voltage (three-phase) and frequency	170–264 Vac 50/60 Hz	323–528 Vac 50/60 Hz	489–660 Vac 50/60 Hz	170–660 Vac 50/60 Hz	
Trip Class					
5–30	Selectable	Selectable	Selectable	Selectable	
FLA Range					
C441_A and C4410109NOUI	1–9 A	Up to 540 A with external CTs Refer to **Page V5-T5-72** for CT multiplier and wire wrap schedule.	Up to 540 A with external CTs Refer to **Page V5-T5-72** for CT multiplier and wire wrap schedule.	Up to 540 A with external CTs Refer to **Page V5-T5-72** for CT multiplier and wire wrap schedule.	
C441_B and C4410590NOUI	5–90 A				
Monitoring Capabilities					
Feature	**Value**				
Current	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%) Ground fault current, 10% accuracy	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%) Ground fault current, 10% accuracy	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%) Ground fault current, 10% accuracy	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%) Ground fault current, 10% accuracy	
Voltage	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%)	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%)	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%)	Per phase rms (1A, 1B, 1C), 2% accuracy Average rms, 2% accuracy Imbalance percent (0–100%)	
Power	Motor kW, 5% accuracy Motor power factor, inductive 0–1.0, 1% accuracy	Motor kW, 5% accuracy Motor power factor, inductive 0–1.0, 1% accuracy	Motor kW, 5% accuracy Motor power factor, inductive 0–1.0, 1% accuracy	Motor kW, 5% accuracy Motor power factor, inductive 0–1.0, 1% accuracy	
Thermal capacity	0% cold, 100% trip	0% cold, 100% trip	0% cold, 100% trip	0% cold, 100% trip	
Motor run hours	0–65,535 hours	0–65,535 hours	0–65,535 hours	0–65,535 hours	
Frequency	47–63 Hz, 1% accuracy	47–63 Hz, 1% accuracy	47–63 Hz, 1% accuracy	47–63 Hz, 1% accuracy	
Motor Protection					
Thermal overload setting	1.05 x FLA: Does not trip 1.15 x FLA: Overload trip	1.05 x FLA: Does not trip 1.15 x FLA: Overload trip	1.05 x FLA: Does not trip 1.15 x FLA: Overload trip	1.05 x FLA: Does not trip 1.15 x FLA: Overload trip	
Feature	**Range**				**Fault Delay Setting**
Jam	150–400% of motor FLA, OFF	150–400% of motor FLA, OFF	150–400% of motor FLA, OFF	50–400% of motor FLA, OFF	1–20 seconds
Current imbalance	1–30%, OFF	1–30%, OFF	1–30%, OFF	1–30%, OFF	1–20 seconds
Current phase loss	Fixed threshold 60%	Fixed threshold 60%	Fixed threshold 60%	Fixed threshold 60%	1–20 seconds
Ground fault current					
C441_A and C4410109NOUI 1–9 A	0.3–2.0 A with one pass through the CTs ①	0.3–2.0 A with one pass through the CTs ①	0.3–2.0 A with one pass through the CTs ①	0.3–2.0 A with one pass through the CTs ①	<150%, 1–60 seconds >150%, 2 seconds >250%, 1 second
C441_B and C4410590NOUI 5–90 A	3.0–20 A with one pass through the CTs ①	3.0–20 A with one pass through the CTs ①	3.0–20 A with one pass through the CTs ①	3.0–20 A with one pass through the CTs ①	<150%, 1–60 seconds >150%, 2 seconds >250%, 1 second
Phase reversal	OFF = Ignore, 1 = ACB, 2 = ABC	OFF = Ignore, 1 = ACB, 2 = ABC	OFF = Ignore, 1 = ACB, 2 = ABC	OFF = Ignore, 1 = ACB, 2 = ABC	
Fault reset delay	2–500 minutes, auto ②	2–500 minutes, auto ②	2–500 minutes, auto ②	2–500 minutes, auto ②	
Fault reset attempts	0–4 restarts allowed or automatic reset ②	0–4 restarts allowed or automatic reset ②	0–4 restarts allowed or automatic reset ②	0–4 restarts allowed or automatic reset ②	

Notes

① Lower levels are achievable with multiple passes.

② Motor fault reset characteristics can be programmed as a group or for motor overloads only. Reference the user manual for more detailed information.

Motor Insight, continued

Description	Specification C441B_	C441C_	C441D_	C441_ _ _ _NOUI	
Load Protection					
Feature	**Range**				**Fault Delay Setting**
Under current	50–90% of motor FLA	50–90% of motor FLA	50–90% of motor FLA	50–90% of motor FLA	1–60 seconds
Low power (kW)	20–80% of rated kW	20–80% of rated kW	20–80% of rated kW	20–80% of rated kW	1–60 seconds
High power (kW)	50–110% of rated kW	50–110% of rated kW	50–110% of rated kW	50–110% of rated kW	1–60 seconds
Load reset delay	2–500 minutes, auto	2–500 minutes, auto	2–500 minutes, auto	2–500 minutes, auto	
Load reset attempts	0–4, auto	0–4, auto	0–4, auto	0–4, auto	
Supply Protection					
Feature	**Range**				**Fault Delay Setting**
Over voltage	170–264 Vac	323–528 Vac	489–660 Vac	0–660 Vac	1–20 seconds
Under voltage	170–264 Vac	323–528 Vac	489–660 Vac	0–660 Vac	1–20 seconds
Voltage imbalance	1–20% imbalance	1–20% imbalance	1–20% imbalance	1–20% imbalance	1–20% imbalance
Restart delay setting	1–500 seconds	1–500 seconds	1–500 seconds	1–500 seconds	1–500 seconds
Electrical/EMC					
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz	30–1000 MHz	30–1000 MHz	30–1000 MHz	30–1000 MHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz	0.15–30 MHz
ESD immunity IEC 60947-4-1 (Table 13)	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz	140 dBuV (10 V rms) 150 kHz–80 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method	±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	Three-phase power inputs: ±2 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±2 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±2 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±2 kV line-to-line (DM) ±4 kV line-to-ground (CM)	Three-phase power inputs: ±2 kV line-to-line (DM) ±4 kV line-to-ground (CM)
	IEC 61000-4-5 Class 3 User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	IEC 61000-4-5 Class 3 User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	IEC 61000-4-5 Class 3 User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	IEC 61000-4-5 Class 3 User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	IEC 61000-4-5 Class 3 User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)
Voltage variations immunity IEC 60947-4-1	30% dip, at 100 ms 60% dip at 10 ms >95% interrupt at 5 ms	30% dip, at 100 ms 60% dip at 10 ms >95% interrupt at 5 ms	30% dip, at 100 ms 60% dip at 10 ms >95% interrupt at 5 ms	30% dip, at 100 ms 60% dip at 10 ms >95% interrupt at 5 ms	30% dip, at 100 ms 60% dip at 10 ms >95% interrupt at 5 ms
Electromagnetic field IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m	10 V/m	10 V/m	10 V/m	10 V/m
Ground fault	UL 508, UL 1053 Sections 21 and 27	UL 508, UL 1053 Sections 21 and 27	UL 508, UL 1053 Sections 21 and 27	UL 508, UL 1053 Sections 21 and 27	UL 508, UL 1053 Sections 21 and 27

Motor Insight, continued

Description	Specification C441B_	C441C_	C441D_	C441_ _ _ _NOUI
Environmental Ratings				
Feature	**Range**			
Ambient temperature (operating)	–4 to 122 °F (–20 to 50 °C)	–4 to 122 °F (–20 to 50 °C)	–4 to 122 °F (–20 to 50 °C)	–4 to 122 °F (–20 to 50 °C)
Ambient temperature (storage)	–40 to 85 °C	–40 to 85 °C	–40 to 85 °C	–40 to 85 °C
Operating humidity	5% to 95% noncondensing	5% to 95% noncondensing	5% to 95% noncondensing	5% to 95% noncondensing
Altitude (no derating)	2000 m	2000 m	2000 m	2000 m
Shock (IEC 60068-2-27)	15 G any direction	15 G any direction	15 G any direction	15 G any direction
Vibration (IEC 60068-2-6)	3 G any direction	3 G any direction	3 G any direction	3 G any direction
Pollution degree per IEC 60947-1	3	3	3	3
Ingress protection	IP20	IP20	IP20	IP20
Capacity				
Input, auxiliary contact and external reset terminals				
Terminal capacity	18–12 AWG	18–12 AWG	18–12 AWG	18–12 AWG
Tightening torque	5.3 lb-in (0.6 Nm)	5.3 lb-in (0.6 Nm)	5.3 lb-in (0.6 Nm)	5.3 lb-in (0.6 Nm)
Voltages				
Monitoring voltage	170–264 Vac 50/60Hz	323–528 Vac 50/60Hz	489–660 Vac 60Hz	0–660 Vac 50/60Hz
Insulation voltage U_i (three-phase voltage)	600 Vac	600 Vac	600 Vac	600 Vac
Insulation voltage U_i (control)	240 Vac	240 Vac	240 Vac	240 Vac
Impulse withstand U_{imp} (main/control)	6 kV	6 kV	6 kV	6 kV
Expected Life				
Mechanical/electrical	10 years	10 years	10 years	10 years
Output Contact Ratings				
Two output relays One Form C SPDT (fault relay) One Form A SPST (ground fault relay) C441_ _ _ _NOUI models: One Form A SPST One Form B SPST	B300 pilot duty 5 A thermal continuous current 30 A make 3.00 A break at 120 Vac and 15 A make 1.50 A break at 240 Vac	B300 pilot duty 5 A thermal continuous current 30 A make 3.00 A break at 120 Vac and 15 A make 1.50 A break at 240 Vac	B300 pilot duty 5 A thermal continuous current 30 A make 3.00 A break at 120 Vac and 15 A make 1.50 A break at 240 Vac	B300 pilot duty 5 A thermal continuous current 30 A make 3.00 A break at 120 Vac and 30 A make 1.50 A break at 240 Vac ①
External remote reset terminal	Isolated 120 Vac digital input IEC 61131-2 Section 5 Type 1	Isolated 120 Vac digital input IEC 61131-2 Section 5 Type 1	Isolated 120 Vac digital input IEC 61131-2 Section 5 Type 1	Isolated 120 Vac digital input IEC 61131-2 Section 5 Type 1
Indications				
Trip	Fault	Fault	Fault	Fault
Reset	Ready	Ready	Ready	Ready
Autoreset	Trip faulted/Ready flashing	Trip faulted/Ready flashing	Trip faulted/Ready flashing	Trip faulted/Ready flashing
Power Consumption				
Maximum	5W	5W	5W	5W
Options				
Remote display	Type 1, 12 and Type 3R kit	Type 1, 12 and Type 3R kit	Type 1, 12 and Type 3R kit	Type 1, 12 and Type 3R kit
Communications modules	Modbus, DeviceNet and PROFIBUS with I/O	Modbus, DeviceNet and PROFIBUS with I/O	Modbus, DeviceNet and PROFIBUS with I/O	Modbus, DeviceNet and PROFIBUS with I/O

Note

① In this model, there are two isolated relays: one Form A and one Form B SPST. One is the fault relay, and one is a programmable auxiliary relay.

Motor Insight Short Circuit Ratings (North America CSA and UL)

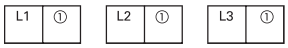
Overload FLA Range	Maximum Operating Voltage	Standard-Fault Short Circuit Data: Withstand Rating	Maximum Fuse (RK5)	Maximum Thermal-Magnetic Circuit Breaker	Maximum Withstand Rating	Maximum Fuse (RK5)	Eaton Thermal-Magnetic Circuit Breaker	Catalog Number
1–9 A	264 Vac	5000 A at 240 Vac	35 A	35 A	100 kA at 240 Vac	35 A	—	**C441BA**
					100 kA at 240 Vac	—	FDC3035L	
1–9 A	528 Vac	5000 A at 480 Vac	35 A	35 A	100 kA at 480 Vac	35 A	—	**C441CA**
					100 kA at 480 Vac	—	FDC3035L	
1–9 A	660 Vac	5000 A at 600 Vac	35 A	35 A	100 kA at 600 Vac	35 A	—	**C441DA**
					35 kA at 600 Vac	—	FDC3035L	
1–9 A	660 Vac	5000 A at 600 Vac	35 A	35 A	100 kA at 240 Vac	35 A	—	**C4410109NOUI**
					100 kA at 240 Vac	—	FDC3035L	
					100 kA at 480 Vac	35 A	—	
					100 kA at 480 Vac	—	FDC3035L	
					100 kA at 600 Vac	35 A	—	
					35 kA at 600 Vac	—	FDC3035L	
5–90 A	264 Vac	10,000 A at 240 Vac	350 A	350 A	100 kA at 240 Vac	350 A	—	**C441BB**
					100 kA at 240 Vac	—	KDC3350	
5–90 A	528 Vac	10,000 A at 480 Vac	350 A	350 A	100 kA at 480 Vac	350 A	—	**C441CB**
					100 kA at 480 Vac	—	KDC3350	
5–90 A	660 Vac	10,000 A at 600 Vac	350 A	350 A	100 kA at 600 Vac	350 A	—	**C441DB**
					65 kA at 600 Vac	—	KDC3350	
5–90 A	660 Vac	10,000 A at 600 Vac	350 A	350 A	100 kA at 240 Vac	350 A	—	**C4410590NOUI**
					100 kA at 240 Vac	—	KDC3350	
					100 kA at 480 Vac	350 A	—	
					100 kA at 480 Vac	—	KDC3350	
					100 kA at 600 Vac	350 A	—	
					35 kA at 600 Vac	—	KDC3350	

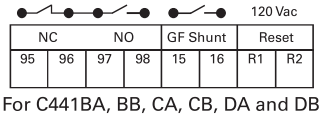
Line Powered Models

Terminal Connection Diagram

Use 75C CU wire only

18–12 AWG; Torque 5.3 lb-in/0.6 Nm
B300 Pilot Duty Only





For C441BA, BB, CA, CB, DA and DB

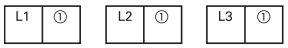


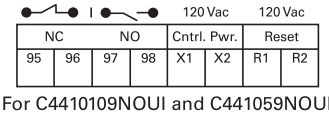
Terminal Connection Specifications

Name	Designation	Input	Description
Line voltage	L1, L2, L3	Line voltage	Three-phase line voltage input L1, L2, L3 connections must correspond to the respective CT1, CT2, CT3 current leads
Fault relay	95/96 96/97 (common) 97/98	B300 UL 508	Form C contact: 95/96 Contact opens when the unit is faulted or unpowered 97/98 Contact closes when the unit is faulted or unpowered
GF shunt	15 16	B300 UL 508	Form A contact: Contact closes when a ground fault is active
Reset input	R1, R2	120 Vac	Fault reset input IEC 61131-2 Type 1

Control Powered Models

Terminal Connection Diagram





For C4410109NOUI and C441059NOUI



Terminal Connection Specifications

Name	Designation	Input	Description
Line voltage	L1, L2, L3	Line voltage	Three-phase line voltage input L1, L2, L3 connections must correspond to the respective CT1, CT2, CT3 current leads Terminal provided for wiring control power transformer (9A maximum capacity)
Control power	X1, X2	110–120 Vac 50–60Hz (+10/–15%)	Control power option for C441_ _ _ _NOUI
Fault relay For C441_ _ _ _NOUI, the fault relay and auxiliary relay are isolated and do not share a common. By default they will behave like a Form C, but they can be programmed to act independently from one another.	95/96 96/97 (isolated) 97/98	B300 UL 508	Form C contact: 95/96 Contact opens when the unit is faulted or unpowered 97/98 Contact closes when the unit is faulted or unpowered Can be programmed to act independently of the 95/96 only in the C441_ _ _ _NOUI models
GF shunt This relay does not exist on the C441_ _ _ _NOUI models. Instead, this functionality is available in the fully programmable 97/98 auxiliary relay.	97/98	B300 UL 508	Form A contact: Contact closes when a ground fault is active Separate GF control can still be achieved by programming auxiliary relay 97/98 to act independently of the 95/96 relay
Reset input	R1, R2	120 Vac	Fault reset input IEC 61131-2 Type 1

Note

① No motor loads, 9 A maximum.

Modbus Communication Modules

Description	Specification	
Electrical/EMC		
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz	
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz	
ESD immunity IEC 60947-4-1 (Table 13) IEC 61000-4-2	±8 kV air, ±4 kV contact	
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave	
Conducted immunity IEC 60947-4-1	140 dBuV (10 V rms) 150 kHz–80 MHz	
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±2 kV using direct method	
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 3	User IO and communication lines ①: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)	
Electromagnetic field ① IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m	
Environmental Ratings		
Ambient temperature (operating)	–20 to 50 °C	
Ambient temperature (storage)	–40 to 85 °C	
Operating humidity	5 to 95% noncondensing	
Altitude (no derating)	2000 m	
Shock (IEC 60068-2-27)	15 G any direction	
Vibration (IEC 60068-2-6)	3 G any direction	
Pollution degree per IEC 60947-1	3	
Degree of protection	IP20	
Over voltage category per UL 508	III	
C441P 24 Vdc Input		
Nominal input voltage	24 Vdc	
Operating voltage	18–30 Vdc	
Number of inputs	4	
Signal delay	5 ms (programmable to 65 sec)	
OFF-state voltage	<6 Vdc	
ON-state voltage	>18 Vdc	
Nominal input current	5 mA	
Isolation	1500 V	
Terminal screw torque	7–9 in-lb	
24 Vdc source current	50 mA	
Operating Voltage Range—DC Input Modules		
OFF State	**Transition Region**	**ON State**
0–6 Vdc	6–18 Vdc	18–30 Vdc
C441N 120 Vac Input		
Nominal input voltage	120 Vac	
Operating voltage	80–140 Vac	
Number of inputs	4	
OFF-state voltage	<30 Vac	
ON-state voltage	>80 Vac	
Nominal input current	15 mA	
Signal delay	1/2 cycle	
Isolation	1500 V	
Terminal screw torque	7–9 in-lb	

Note

① Relates to C441M only.

Modbus Communication Modules, continued

Description	Specification	
Operating Voltage Range—AC Input Modules		
OFF State	**Transition Region**	**ON State**
0–30 Vac	30–80 Vac	80–140 Vac
Output Modules		
Nominal voltage	120 Vac 24 Vdc	
Number of outputs	(2) 1NO Form A 1NO/NC Form C	
Relay OFF time	3 ms	
Relay ON time	7 ms	
Max. current per point ①	5 A (B300 rated)	
Electrical life	100,000 cycles	
Mechanical life	1,000,000 cycles	

DeviceNet Communication Modules

Description	Specification
Electrical/EMC	
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz
ESD immunity IEC 60947-4-1 (Table 13) IEC 61000-4-2	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10 V rms) 150 kHz–80 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 2	User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)
Electromagnetic field IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m
Environmental Ratings	
Ambient temperature (operating)	–20 to 50 °C
Ambient temperature (storage)	–40 to 85 °C
Operating humidity	5–95% noncondensing
Altitude (no derating)	2000 m
Shock (IEC 60068-2-27)	15 G any direction
Vibration (IEC 60068-2-6)	3 G any direction
Pollution degree per IEC 60947-1	3
Degree of protection	IP20
DeviceNet	
DeviceNet connections	Group 2, polling, bit strobe, explicit, no UCMM
DeviceNet baud rate	125 K, 250 K, 500 K

Note

① Resistive current at 55 °C ambient.

DeviceNet Communication Modules, continued

Description	Specification	
C441L 24 Vdc Input		
Nominal input voltage	24 Vdc	
Operating voltage	18–30 Vdc	
Number of inputs	4	
Signal delay	5 ms (programmable to 65 sec)	
OFF-state voltage	<6 Vdc	
ON-state voltage	>18 Vdc	
Nominal input current	5 mA	
Isolation	250 V	
Terminal screw torque	7–9 in-lb	
24 V source current	50 mA	
Operating Voltage Range—DC Input Modules		
OFF State	**Transition Region**	**ON State**
0–6 Vdc	6–18 Vdc	18–30 Vdc
C441K 120 Vac Input		
Nominal input voltage	120 Vac	
Operating voltage	80–140 Vac	
Number of inputs	4	
OFF-state voltage	<30 Vac	
ON-state voltage	>80 Vac	
Nominal input current	15 mA	
Signal delay	1/2 cycle	
Isolation	250 V	
Terminal screw torque	7–9 in-lb	
Operating Voltage Range—AC Input Modules		
OFF State	**Transition Region**	**ON State**
0–30 Vac	30–80 Vac	80–140 Vac
Output Modules		
Nominal voltage	120 Vac 24 Vdc	
Number of outputs	(2) 1NO Form A 1NO/NC Form C	
Relay OFF time	3 ms	
Relay ON time	7 ms	
Max. current per point ①	5 A (B300 rated)	
Electrical life	100,000 cycles	
Mechanical life	1,000,000 cycles	

Note

① Resistive current at 55 °C ambient.

PROFIBUS Communication Modules

Description	Specification
Electrical/EMC	
Radiated emissions IEC 60947-4-1—Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz
Conducted emissions IEC 60947-4-1—Table 14, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz
ESD immunity IEC 60947-4-1 (Table 13) IEC 61000-4-2	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1 Table 13, IEC 61000-4-3	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10 V rms) 150 kHz–80 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 2	User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)
Environmental Ratings	
Ambient temperature (operating)	–20 to 50 °C
Ambient temperature (storage)	–40 to 85 °C
Operating humidity	5–95% noncondensing
Altitude (no derating)	2000 m
Shock (IEC 60068-2-27)	15 G any direction
Vibration (IEC 60068-2-6)	3 G any direction
Pollution degree per IEC 60947-1	3
Degree of protection	IP20
PROFIBUS	
PROFIBUS connections	Group 2, polling, bit strobe, explicit, no UCMM
PROFIBUS baud rate	9.6 K, 19.2 K, 45.45 K, 93.75 K, 187.5 K, 500 K, 1.5 M, 3 M, 6 M, 12 M
C441Q 24 Vdc Input	
Nominal input voltage	24 Vdc
Operating voltage	18–30 Vdc
Number of inputs	4
Signal delay	5 ms (programmable to 65 sec)
OFF-state voltage	<6 Vdc
ON-state voltage	>10 Vdc
Nominal input current	5 mA
Isolation	1500 V
Terminal screw torque	7–9 in-lb
24 V source current	50 mA

PROFIBUS Communication Modules, continued

Description	Specification	
Operating Voltage Range—DC Input Modules		
OFF State	**Transition Region**	**ON State**
0–6 Vdc	6–18 Vdc	18–30 Vdc
C441S 120 Vac Input		
Nominal input voltage	120 Vac	
Operating voltage	80–140 Vac	
Number of inputs	4	
OFF-state voltage	<20 Vac	
ON-state voltage	>70 Vac	
Nominal input current	15 mA	
Signal delay	1/2 cycle	
Isolation	1500 V	
Terminal screw torque	7–9 in-lb	
Operating Voltage Range—AC Input Modules		
OFF State	**Transition Region**	**ON State**
0–30 Vac	30–80 Vac	80–140 Vac
Output Modules		
Nominal voltage	120 Vac 24 Vdc	
Number of outputs	(2) 1NO Form A 1NO/NC Form C	
Relay OFF time	3 ms	
Relay ON time	7 ms	
Max. current per point ①	5 A (B300 rated)	
Electrical life	100,000 cycles	
Mechanical life	1,000,000 cycles	

Note

① Resistive current at 55 °C ambient.

Ethernet (Modbus TCP / EtherNet/IP) Communication Modules

Description	Specification
Electrical/EMC	
Radiated emissions IEC 60947-4-1, Table 15, EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz
Conducted emissions IEC 60947-4-1, Table 15, EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz
ESD immunity IEC 60947-4-1 (Table 13) IEC 61000-4-2	±8 kV air, ±4 kV contact
Radiated immunity IEC 60947-4-1 (Table 13) IEC 61000-4-3	10 V/m 80–1000 MHz 80% amplitude modulated 1 kHz sine wave
Conducted immunity IEC 60947-4-1	140 dBuV (10 V rms) 150 kHz to 80 MHz
Fast transient immunity IEC 60947-4-1 (Table 13) IEC 61000-4-4	±2 kV using direct method
Surge immunity IEC 60947-4-1 (Table 13) IEC 61000-4-5 Class 2	User IO and communication lines: ±1 kV line-to-line (DM) ±2 kV line-to-ground (CM)
Environmental Ratings	
Ambient temperature (operating)	–20 to 50 °C
Ambient temperature (storage)	–40 to 85 °C
Operating humidity	5–95% noncondensing
Altitude (no derating)	2000 m
Shock (IEC 60068-2-27)	15 G any direction
Vibration (IEC 60068-2-6)	3 G any direction
Pollution degree per IEC 60947-1	3
Degree of protection	IP20
Ethernet	
Ethernet connections	Integrated two-port switch with dual RJ45 Ethernet connections
Ethernet type	Ethernet 10/100 Mbs, AutoMDX, Auto Negotiation
C441T 24 Vdc Input	
Nominal input voltage	24 Vdc
Operating voltage	18–30 Vdc
Number of inputs	4
Signal delay	5 ms (programmable to 65 sec)
OFF-state voltage	<6 Vdc
ON-state voltage	>18 Vdc
Nominal input current	5 mA
Isolation	1500 V
Terminal screw torque	7–9 in-lb
24 V source current	50 mA

Ethernet (Modbus TCP / EtherNet/IP) Communication Modules, continued

Description	Specification	
Operating Voltage Range—DC Input Modules		
OFF State	**Transition Region**	**ON State**
0–6 Vdc	6–18 Vdc	18–30 Vdc
C441R 120 Vac Input		
Nominal input voltage	120 Vac	
Operating voltage	80–140 Vac	
Number of inputs	4	
OFF-state voltage	<30 Vac	
ON-state voltage	>80 Vac	
Nominal input current	15 mA	
Signal delay	1/2 cycle	
Isolation	1500 V	
Terminal screw torque	7–9 in-lb	
Operating Voltage Range—AC Input Modules		
OFF State	**Transition Region**	**ON State**
0–30 Vac	30–80 Vac	80–140 Vac
Nominal voltage	120 Vac 24 Vdc	
Number of outputs	(2) 1NO Form A 1NO/NC Form C	
Relay OFF time	3 ms	
Relay ON time	7 ms	
Maximum current per point ①	5 A (B300 rated)	
Electrical life	100,000 cycles	
Mechanical life	1,000,000 cycles	

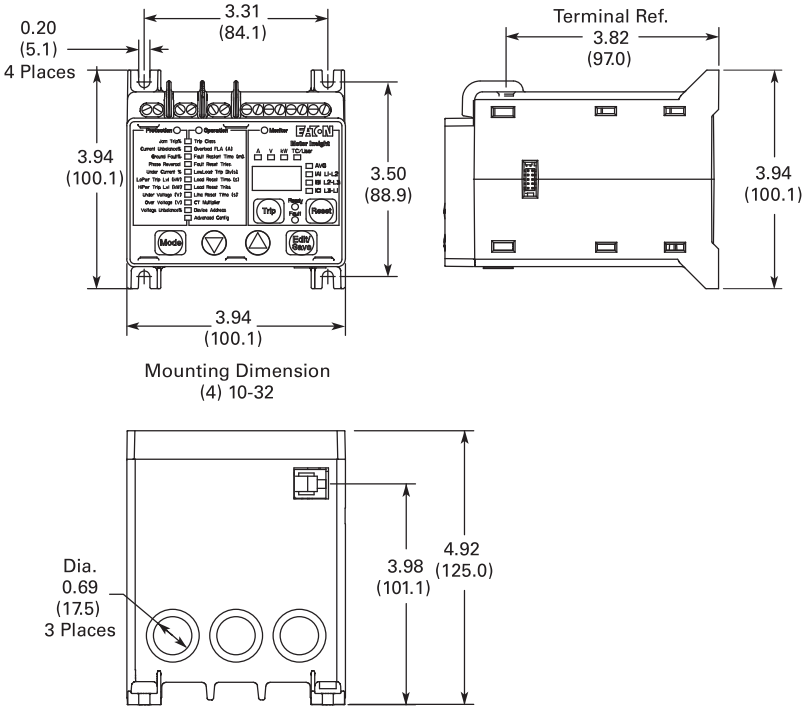
Note

① Resistive current at 55 °C ambient.

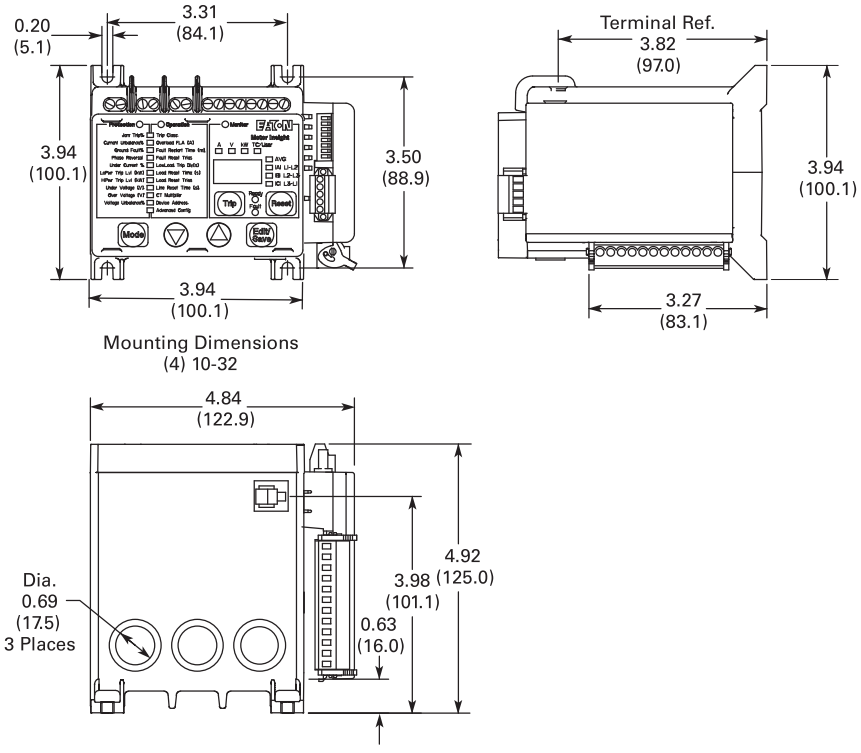
Dimensions

Approximate Dimensions in Inches (mm)

Motor Insight Overload Relay

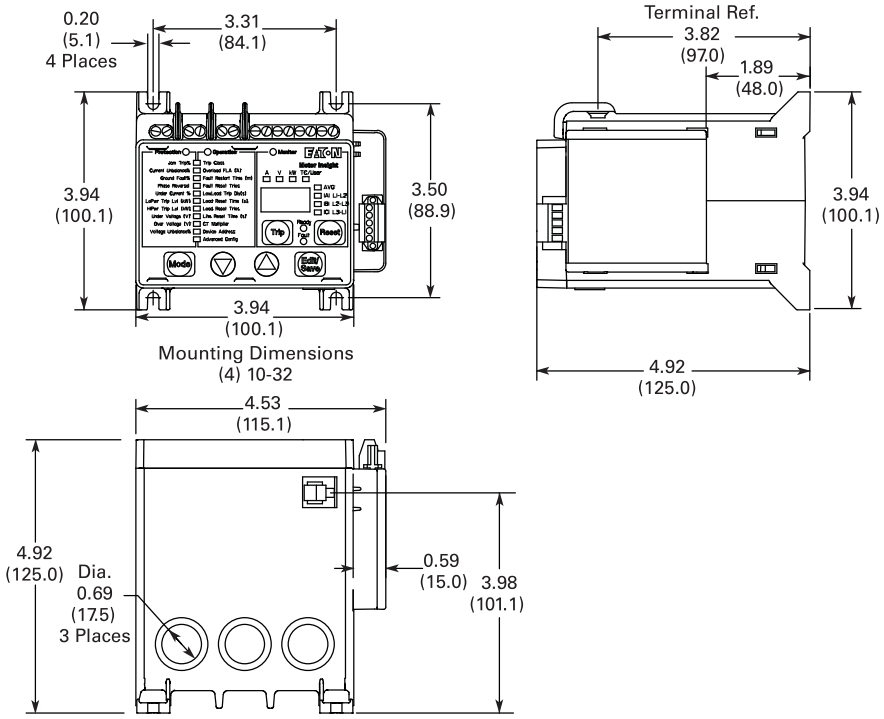


Motor Insight with Mounted DeviceNet, PROFIBUS or Modbus with I/O Communication Module

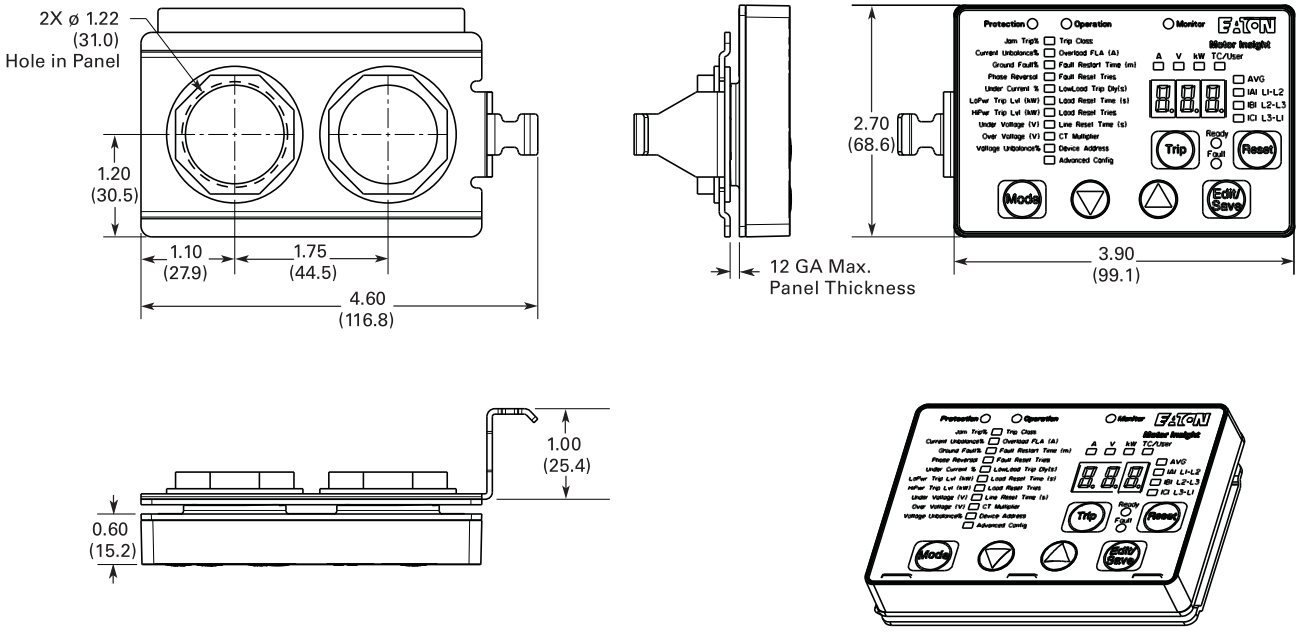


Approximate Dimensions in Inches (mm)

Motor Insight with Mounted Modbus Communication Module

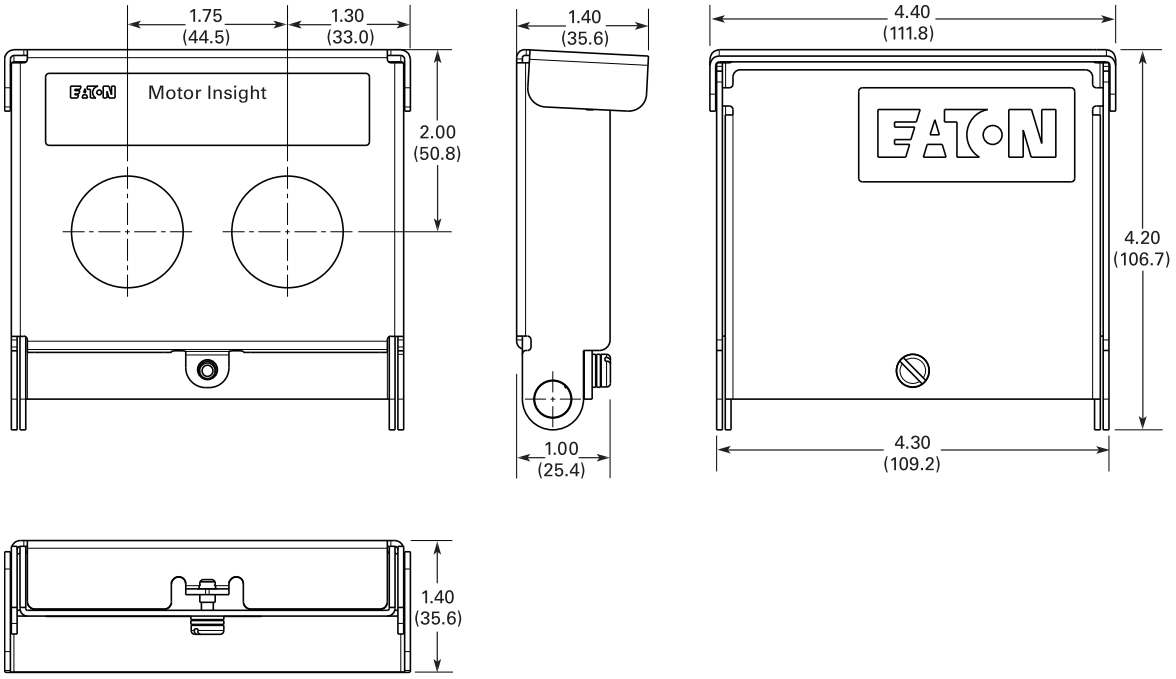


Motor Insight Remote Display

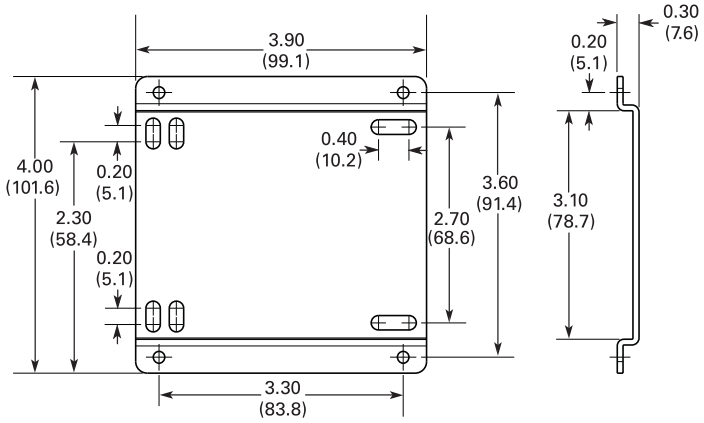


Approximate Dimensions in Inches (mm)

Motor Insight Cover Assembly



Conversion Mounting Plate



Power Xpert C445 Motor Management Relay



Contents

Description	*Page*
XT IEC Overload Relays	**V5-T5-42**
C306 Bimetallic Overload Relays	**V5-T5-46**
C440/***XT*** Electronic Overload Relay	**V5-T5-47**
C441 Overload Relays	**V5-T5-68**
C445 Motor Management Relay	
Features and Benefits	**V5-T5-91**
Standards and Certifications	**V5-T5-91**
Catalog Number Selection	**V5-T5-97**
Product Selection	**V5-T5-99**
Accessories	**V5-T5-102**
Technical Data and Specifications	**V5-T5-105**
Dimensions	**V5-T5-108**

Power Xpert C445 Motor Management Relay

Product Description

The Power Xpert C445 global motor management relay is Eaton's most advanced offering in the C400 series. Customizable control functionality, extensive on-board communications and superior diagnostics and protection make C445 ideal for critical applications where uptime is key. An intuitive interface allows users to safely access all that C445 has to offer—including fault diagnostics, motor system monitoring, ground fault monitoring, on-board function block programming logic, expansion I/O and parameter viewing or setting.

C445 is fully configurable, providing the highest level of monitoring accuracy and protection for the entire power system—from the incoming power source feeding the motor all the way to the individual pump or load. By utilizing integrated energy and power usage analytics, users can save energy costs through increased awareness of energy use at the individual load level.

Due to its unrivaled compact size and modular format, the C445 allows for easy integration into NEMA and IEC motor control centers as well as OEM control panels. By separating the monitoring and control functionality into separate modules, users can customize mounting to their individual application. The combined mounting option provides a complete system just 45 mm wide and 80 mm high for applications up to 45 amps.

Unlike a traditional overload relay, a motor management relay can both control and protect the motor. This eliminates the need to wire dedicated circuits to achieve desired control functionality. Based on this smaller size and flexible control capability, users can reduce costs and improve system flexibility through simplified wiring, smaller enclosure footprint and seamless field modifications as systems evolve over time.

C445 was designed with ease of use and user safety in mind. Users can monitor and configure data parameters without opening the door by using a variety of communication network options, web pages, a free software tool or the easy user interface.

C445 can be integrated into almost any PLC and DCS system through integrated EtherNet/IP, ModbusTCP, PROFIBUS and Modbus Serial. Free tools like Add On Instructions and EIP-Assist make adding C445 to EtherNet/IP networks fast and error free. For non-fieldbus users, C445's intelligence is still easy to leverage with the user interface or free Power Xpert *in*Control software.

Features and Benefits

Features

Product Range

- 0.3–800 A
- Up to 690 Vac
- 4160 Vac with PT ratios
- 20–80 Hz operation
- Selectable trip class (5–40)

Product Hardware

- Modular design with multiple options:
  - Base control module: protections, monitoring, communications, I/O
  - Measurement module: sensing capability to 136 A
  - Optional combined mounting for systems up to 45 A for a compact offering just 45 mm wide by 80 mm high
  - Easy user interface provides monitoring and programming LCD display with optional control
- AC (120/240) or DC (24) control-power options
- Function block programming and expansion I/O
- Pulsing ground fault detection
- High resistance ground—zero sequence detection
- 2% monitoring accuracy on current and voltage values
- On-board I/O available for control, protection and general purpose use
  - (4) DI (AC or DC options)
  - (3) Relay out
    - 2 Form A (NO)
    - 1 Form C (NO/NC) latching or non-latching
- Optional expansion I/O
  - 16 total I/O cards, 8 of which can be analog or temperature
- Superior motor protection solutions, including:
  - Motor (current)
  - Line (voltage)
  - Load (power)
- Ground fault detection:
  - Residual ground fault detection
  - Pulse detection
  - Zero sequence
- Advanced monitoring algorithms
- Pre-configured operation modes
  - Overload only
  - Direct (FVNR)
  - Reverser (FVR)
  - Star/delta
  - Two speed pole changing
  - Two speed Dahlander
  - Auto transformer
  - Solenoid valve
  - HMCP/MCCB actuation
  - Contactor feeder
  - General purpose input/output
- Flexible on-board communication options
  - Modbus Serial
  - Modbus TCP
  - EtherNet/IP
  - PROFIBUS
  - Web pages
- Real-time clock and memory backup module
- Integrated USB communication port
- Power Xpert *in*Control software tool
  - Configuration
  - Monitoring
  - Diagnostics

Benefits

Intelligence Made Easy

- Advanced fault diagnostics give users complete fault descriptions, a fault snap-shot and queue immediately on the user interface or over the network
- Motor management capabilities save space, time and wiring by eliminating the need for dedicated hardwired control circuits
- Greater system coverage through line-, load- and motor-based protections
- User interface provides easy motor monitoring and immediate delivery of fault diagnostics
- Voltage loss restart functionality allows for automatic revival after outages from voltage loss without the need for user intervention
- On-board I/O meets needs of most communication requirements without the need for additional modules
- Seamless integration into EtherNet/IP networks via EIP-Assist tool
- Pre-programmed operation modes support fast, easy installation for most applications

Flexibility

- Modular format with scalable options allows for customization to exact needs of application
- Widest range of communications for easy integration into majority of PLC/DCS systems
- Fully programmable output relays
- Fully programmable trip and alarm thresholds and time delays

Standards and Certifications

- CE, cULus
- IEC EN 60947-4-1

CE cULus Listed

System Overview

The Power Xpert C445 Motor Management Relay is a solid-state motor management relay designed to protect single- or three-phase AC electric induction motors from 0.3 to 800 A. C445 provides intelligent monitoring, protection and efficiency calculations for motor, load and line conditions. It's ideal for oil and gas, water treatment, mining, utility and industrial motor control applications. C445 offers a modular pass-through design, breaking the sensing, protection, and control into separate modules. This allows the user to select the appropriate options for each module and combine them to meet the exact needs of their application. Together, these modules provide a fully configurable and industry-leading intelligent motor protection solution for the entire system.

Base Control Module

The base control module is the core of the C445 system, providing the various monitoring, protection and control algorithms. Equipped with native I/O connections, communication card options and USB connectivity, the base control module provides users with real-time data on the health and status of their application. Various pre-configured operation modes are available that simplify the wiring and logic requirements for the user.



Measurement Module

The measurement module is a pass-through device that samples the system current and voltage. Optionally the residual ground current and pulse detection can be sampled. This data is continuously transmitted back to the base control module for analysis. Various frame sizes are available for applications up to 800 A, with voltage measurement and positive temperature coefficient (PTC) protection options.



User Interface

The C445 user interface unlocks advanced functionality in an intuitive format.

- It provides a quick start wizard, advanced system monitoring, complete parameter viewing and editing, fault diagnostics and optional control
- It is ideal for maintenance users who need easy-to-access local information with or without using a network or PC
- The user interface also has micro-USB port for connection to Power Xpert *in*Control for users who are not connecting over Modbus TCP



Ground Fault Module

The optional ground fault module can be used to detect zero sequence grounds on direct and high resistance grounded systems. The sensitivity between 30 mA and 10 A.



Protection Summary [1]

Current-Based Protection Summary

	Trip	Alarm	Trip Level Range	Trip Default Level	Trip Delay Range (Seconds)	Trip Default Level (Seconds)	Alarm Level Range	Alarm Default Level	Alarm Delay Range (Seconds)	Alarm Default Level (Seconds)
Thermal overload	X	X	0.3–800 A	Low end of FLA range	Trip Class 5–40	Trip Class 5	1–100%	90%	Instantaneous	Instantaneous
Instantaneous overcurrent	X	X	50–400% FLA	400%	0.001–2.000	2	50–400% FLA	400%	0.2–5.0	2
Jam	X	X	50–400% FLA	400%	1–60	10	50–400% FLA	400%	0.2–5.0	2
Stall	X	—	50–400% FLA	200%	Instantaneous	Instantaneous	—	—	—	—
Undercurrent	X	X	10–90% FLA	50%	1–60	20	10–90% FLA	50%	0.2–5.0	2
Current unbalance	X	X	1–60%	15%	1–60	15	1–60%	15%	0.2–5.0	2
Current phase loss	X	—	60%	60%	2	2	—	—	—	—
Ground (earth) fault	X	X	[2]	[2]	1–60	5	[2]	[2]	0.2–5.0	2
PTC (requires option)	X	X	Overtemperature Shorted Open	OFF	—	—	Overtemperature Shorted Open	OFF	—	—

Voltage-Based Protection Summary [3]

	Trip	Alarm	Trip Level Range	Trip Default Level	Trip Delay Range (Seconds)	Trip Default Level (Seconds)	Alarm Level Range	Alarm Default Level	Alarm Delay Range (Seconds)	Alarm Default Level (Seconds)
Phase rotation	X	—	ABC, ACB	ABC	Instantaneous	Instantaneous	—	—	—	—
Voltage phase loss	X	—	70%	70%	2	2	—	—	—	—
Overvoltage	X	X	90–150%	110%	1–60	20	90–150%	110%	0.2–5.0	2
Undervoltage	X	X	10–100%	90%	1–60	20	10–100%	90%	0.2–5.0	2
Voltage unbalance	X	X	2–20%	6%	1–20	20	1–20%	6%	0.2–5.0	2
Frequency deviation (slow)	X	X	0.1–5 Hz	0.1 Hz	1–60	20	0.1–5 Hz	0.1 Hz	0.2–5.0	2
Frequency deviation (fast)	X	X	0.02–2 Hz	0.1 Hz	0.02–60	1	0.02–2 Hz	0.1 Hz	0.2–5.0	2

Power-Based Protection Summary [3]

	Trip	Alarm	Trip Level Range	Trip Default Level	Trip Delay Range (Seconds)	Trip Default Level (Seconds)	Alarm Level Range	Alarm Default Level	Alarm Delay Range (Seconds)	Alarm Default Level (Seconds)
Low power	X	X	–200 to 200%	50%	1–60	20	–200 to 200%	50%	1–60	2
High power	X	X	–200 to 200%	110%	1–60	20	–200 to 200%	110%	1–60	2
Power factor deviation (low)	X	X	–100 to 100%	0%	1–60	20	–100 to 100%	0	1–60	2
Power factor deviation (high)	X	X	–100 to 100%	100%	1–60	20	–100 to 100%	100%	1–60	2

Advanced Protection Summary [3]

	Trip	Alarm	Trip Level Range	Trip Default Level	Trip Delay Range (Seconds)	Trip Default Level (Seconds)	Alarm Level Range	Alarm Default Level	Alarm Delay Range (Seconds)	Alarm Default Level (Seconds)
Voltage loss restart [4]	—	—	—	—	—	—	—	—	—	—
Peak demand alarm	—	X	User settable [5]	—	—	—	—	—	—	—

Notes

[1] Not all trips/alarms are enabled by default. Consult C445 user manual for further information.
[2] Sensing level depends on Measurement Module frame size and amperage range. Consult C445 user manual for further information.
[3] Voltage, Power and Advanced Protections require voltage option on the measurement module.
[4] Voltage loss restart is a control functionality used for reacceleration schemes after power loss. Consult C445 user manual for further information.
[5] Consult C445 user manual for further information.

Monitoring Summary

Current-Based Monitoring

Parameter Name	Range / Units	Description
IA (L1) float	Depends on frame size (amps)	Phase A (L1) motor current; 2% accuracy within 30–125% of FLA
IB (L2) float	Depends on frame size (amps)	Phase B (L2) motor current; 2% accuracy within 30–125% of FLA
IC (L3) float	Depends on frame size (amps)	Phase C (L3) motor current; 2% accuracy within 30–125% of FLA
I Average float	Depends on frame size (amps)	Average motor current; 2% accuracy within 30–125% of FLA
I Unbalance percent	0–100%	Motor current unbalance percent
I Average % of FLA (nominal current)	0–720% of FLA (amps)	Average motor current as a percentage of FLA
Maximum start current floating point	Depends on frame size (amps)	Maximum motor starting current
Motor residual GF RMS	Depends on frame size (amps), scaled via fieldbus	Motor residual ground fault current RMS; Accuracy meets UL 1053 / IEC Class II-B

Voltage-Based Monitoring ①

Parameter Name	Range / Units	Description
Voltage AB (L1-L2)	0–690 V; max. 4,160 V with PT ratios	Supply line-to-line voltage AB (L1-L2); 2% accuracy up to 690 Vac
Voltage BC (L2-L3)	0–690 V; max. 4,160 V with PT ratios	Supply line-to-line voltage BC (L2-L3); 2% accuracy up to 690 Vac
Voltage CA (L3-L1)	0–690 V; max. 4,160 V with PT ratios	Supply line-to-line voltage CA (L3-L1); 2% accuracy up to 690 Vac
Average line-to-line voltage	0–690 V; max. 4,160 V with PT ratios	Supply line-to-line voltage average; 2% accuracy up to 690 Vac
Line frequency x 100	20–80 Hz (Centi-Hz)	Supply Frequency in centi-Hz
Voltage phase order	0: unknown; 1: ABC (L1-L2-L3); 2: ACB (L1-L3-L2)	Reports phase sequence of the line voltage
Voltage unbalance percent	0–100%	Supply voltage unbalance percentage

Power-Based Monitoring ①

Parameter Name	Range / Units	Description
Total watts	Depends on frame size (Watts)	Total Real Power; 5% accuracy
Total VA	Depends on frame size (Volt-Amps)	Total Apparent Power; 5% accuracy
Total VARs	Depends on frame size (VARs)	Total Reactive Power; 5% accuracy
Power factor	0–100%, Scaled by 0.01% via fieldbus	Apparent power factor in percentage; 1% accuracy
Motor speed RPM	Depends on motor (RPM)	Motor speed in RPM
Motor torque	Depends on motor (Nm)	Motor torque
Motor efficiency percent	PC Tool in %, Scaled by 0.01% via fieldbus	Motor efficiency in percentage
Real energy	Depends on frame size (0.1 kWh)	Real energy scaled; 5% accuracy
Real energy (resettable)	Depends on frame size (0.1 kWh)	Real energy (resettable) scaled; 5% accuracy
Apparent energy	Depends on frame size (0.1 kVAh)	Apparent energy scaled; 5% accuracy
Apparent energy (resettable)	Depends on frame size (0.1 kVAh)	Apparent energy (resettable) scaled; 5% accuracy
Reactive energy	Depends on frame size (0.1 kVARh)	Reactive energy scaled; 5% accuracy
Reactive energy (resettable)	Depends on frame size (0.1 kVARh)	Reactive energy (resettable) scaled; 5% accuracy
Current demand value	Depends on frame size (Watts)	Latest estimate of the demand; 5% accuracy
Demand (resettable)	Depends on frame size (Watts)	Peak demand, user resettable; 5% accuracy
Peak demand time stamp	Time in seconds	Peak demand time stamp (in Unix time)
Demand window duration	Time in minutes	Demand window duration

Note

① Voltage option must be selected for the measurement module.

System Monitoring

Parameter Name	Range / Units	Description
Motor state (current based)	0: Stopped; 1: Accelerating; 2: Running	Current Based motor state (independent of command)
Motor control status	Various	Present motor control status bits
Number of operating seconds	Time in seconds	Number of operating seconds
Operating seconds (resettable)	Time in seconds	Number of operating seconds (resettable)
Time to trip overload	Time in seconds	Time for overload to reach trip threshold (100%)
Time to reset overload	Time in seconds	Time for overload to reach reset threshold (thermal memory must drop below 75%)
PTC status	Various	PTC status
Digital input status	0/1	ON/OFF status of digital inputs
Base control module relay status	0/1	Base control module relay status (output status)
Total motor run time	Time in seconds	Total motor run time in seconds
Total motor run time (resettable)	Time in seconds	Total run time user (resettable)
Last measured starting time	Time in seconds	The amount of time the motor took to reach up to speed on the last start.
Number of starts	Number	Total number of motor starts
Number of starts (resettable)	Number	Number of starts (resettable)
Number of contactor operations last hour	Number	Number of contactor operations during the last hour
Latest run time	Time in seconds	Duration in seconds of the last start-to-stop motor run time
Thermal memory percent	0–250%	Thermal memory in percent—overload trip occurs at 100%

Faults and Events

Parameter Name	Range / Units	Description
Active fault	Various	Provides reason for trip
Active warning	Various	Provides reason for warning
Active inhibit	Various	Provides reason for inhibit
Fault queue—event order	Various	A list of the last 10 faults shown in the order they occurred. Most recent at top
Trip snapshot	Various	Time-stamp log of (12) parameters at time of trip

Ground Faults

Parameter Name	Range / Units
Pulse detection	1 to 8 A pulse
Zero sequence	30 mA to 10 A
High resistance ground	30 mA to 10 A

Advanced Protection Education

Motor-Based Protections

Definition	Source	Result	Power Xpert C445 Protection
Thermal Overload			
Overload is a condition in which current draw to a motor exceeds 115% of the full load amperage rating over a period of time for an inductive motor.	An increase in the load or torque that is being driven by the motor. A low voltage supply to the motor would cause the current to go high to maintain the power needed. A poor power factor would cause above normal current draw.	Increase in current draw. Current leads to heat and insulation breakdown, which can cause system failure. Additionally, an increase in current can increase power consumption and waste valuable energy.	Thermal trip behavior is defined by UL, CSA and IEC standards. Trip class is settable from 5–40 by 1. Provides power factor monitoring and low voltage protection features.
Jam			
Jam is similar to thermal overload in that it is a current draw on the motor above normal operating conditions.	Mechanical stall, interference, jam or seizure of the motor or motor load.	The motor attempts to drive the load, which has more resistive force due to the mechanical interference. In order to drive the load, the motor draws an abnormal amount of current, which can lead to insulation breakdown and system failure.	Provides a configurable Jam setting that is active during "motor run state" to avoid nuisance trips. Trip Threshold 50–400% of FLA. Trip Delay 1–20 seconds.
Ground Fault			
A line to ground fault.	A current leakage path to ground.	An undetected ground fault can burn through multiple insulation windings, ultimately leading to motor failure.	The C445 has three methods for detecting ground fault. 1) Residual current ground fault function is part of the original design for the C445. 2) Pulse ground fault detection function works with a system that has a pulser installed and can detect pulses from 1 to 8 A. 3) Zero sequence—this uses the C445XG-MOD and CTs to detect a ground fault that occurs on a high resistance ground or direct connected ground. This system will detect ground currents between 30 mA and 10 A.
Imbalanced Phases (voltage and current)			
Uneven voltage or currents between phases in a three-phase system.	When a three-phase load is powered with a poor quality line, the voltage per phase may be imbalanced.	Imbalanced voltage causes large imbalanced currents and as a result this can lead to motor stator windings being overloaded, causing excessive heating, reduced motor efficiency and reduced insulation life.	Provides two protection settings that address this problem. The user can choose to set current imbalance thresholds or voltage imbalance thresholds, each of which can trip the starter. Additionally, both of these may be monitored through C445's advanced monitoring capabilities, allowing the customer to notice in real-time when and where a condition is present.
Phase Loss—Current (single-phasing)			
One of the three-phase current is not present.	Multiple causes, loose wire, improper wiring, grounded phase, open fuse, and so on.	Single-phasing can lead to unwanted motor vibrations in addition to the results of imbalanced phases as listed above.	Fixed protective setting that takes the starter offline if a phase drops below 60% of the other two phases.
Phase Rotation (phase-reversal)			
Improper wiring, leading to phases being connected to the motor improperly.	A miswired motor. Inadvertent phase-reversal by the utility.	Phase-reversal can cause unwanted directional rotation of a motor. In the event that the load attached to the motor can only be driven in one direction, the result could be significant mechanical failure and/or injury to an operator.	Configurable phase protection, allowing the user to define the phase sequencing intended for that application. If no phase sequence is required, the user has the ability to disable this feature.
Frequency Variance			
When line frequency is inconsistent.	Malfunctioning alternator speed regulator, or poor line quality caused by an overload of a supply powered by individual sources.	Variations in frequency can cause increases in losses, decreasing the efficiency of the motor. In addition, this can result in interference with synchronous devices.	Advanced monitoring capabilities allow the user to monitor frequency in real time. Users can also optionally set an alarm or trip threshold for frequency variations from 70–110%.

Load-Based Protections

Definition	Source	Result	Power Xpert C445 Protection
Under Current or Low Power			
Average rms current provided to the motor falls below normal operating conditions.	Under current is usually associated with a portion of the user's load disappearing. Examples of this would be a broken belt, a dry-pump (low suction head) or a dead-headed centrifugal pump.	If under current goes undetected, a mechanical failure can and has occurred. In the case of a pump, running a pump dry or running a pump in a dead-headed condition can cause excessive heating, damaging expensive seals and breaking down desired fluid properties.	C445 has two protection settings to detect this: under current and low power. Low power is a more consistent way of ensuring detection as power is linear with motor load, where as current is not. An unloaded motor may draw 50% of its rated current, but the power draw will be less than 10% of rated power due to a low power factor.
High Power			
The motor load is drawing more power than it should at normal operating conditions.	This is typical of batch processing applications where several ingredients flow into a mixer. When a substance's consistency changes and viscosity increases from what is expected, the motor may use more power to blend the mixture. Out-of-tolerance conditions can be detected using the High Power and Low Power settings.	If a high-power fault goes undetected, the result may be a batch of material that does not meet specification.	Monitors the three-phase real power. If the real power value is estimated above the set threshold for the set length of time, a fault is detected and the overload will trip the starter. Additionally, power can be monitored in real-time.

Line-Based Protections

Definition	Source	Result	Power Xpert C445 Protection
Overvoltage			
When the line voltage to the motor exceeds the specified rating.	Poor line quality.	An overvoltage condition leads to a lower than rated current draw and a poor power factor. A trip limit of 110% of rated voltage is recommended. Over voltage can also lead to exceeding insulation ratings.	Monitors the maximum rms value of the three-phase voltages. If the rms value rises above the set threshold for the set length of time, a fault is detected and the overload can trip the starter or send and display an alarm of the condition. All line-related faults have an "alarm-no-trip" mode.
Undervoltage			
When the line voltage to the motor is below the specified rating.	Poor line quality.	An undervoltage condition leads to excessive current draw. This increases the heating of the motor windings and can shorten insulation life. A trip limit set to 90% of rated voltage is recommended.	Monitors the minimum rms value of the three-phase voltages. If the rms value drops below the set threshold for the set length of time, a fault is detected and the overload can trip the starter or send and display an alarm of the condition. All line-related faults have an "alarm-no-trip" mode.

Catalog Number Selection

Build your system based on parts list below. C445 offers flexible options that can be combined to build your ideal system. Common combinations are stocked and others can be custom built if needed. Stock statuses are included below (note, this can change over time with usage—always contact EatonCare or refer to Vista for the latest stock information).

C445 System Parts

Part Description	Part Number	Required?	Notes
Base control module	**C445B…**	Required	System protection
Measurement module	**C445M…**	Required	System measurement
Connection cable 1	**D77E-QPIP…**	Required	Connects C445B… to C445M…
User interface	**C445U…**	Optional	Remote-mount control, diagnostics, monitoring
Connection cable 2	**D77E-QPIP…**	Depends ①	Connects C445B… to C445U…
Communication card	**C445XC…**	Optional	PROFIBUS, EtherNet/IP, Modbus TCP
RTC/memory backup module	**C445XO-RTC**	Optional	Time stamping and configuration backup
USB programming cable	**C445XS-USBMICRO**	Optional	Power Xpert *in*Control USB cable (not needed when using Modbus TCP)
External CTs (3)	**XCT…**	Depends ②	For systems greater than 136 A up to 800 A
Ground fault module	**C445XG-MOD**	Optional	Ground fault module to be used with C445XG-CT…
Zero sequence CT	**C445XG-CT…**	Optional	Zero sequence CT must be used with C445S

Notes

① Required if using user interface.
② Required for systems >136 A.

Relay

C445 B —

Family	Module	Options
C445 = Power Xpert C445 global motor management relay	**B** = Base control module **M** = Measurement module **U** = User interface **X** = Accessory	Options depend on module selected

5

Base Control Module

C445 B A – S A N M

Family	Module	Supply Voltage	Version	Inputs	Output 3 (Form C) Options	Options ①②
C445 = Power Xpert C445 global motor management relay	**B** = Base control module	**A** = 120–240 Vac **D** = 24 Vdc	**S** = Standard (stocked)	**A** = 120 Vac **D** = 24 Vdc	**L** = Latching *(non-stock)* **N** = Non-latching (stocked)	**N** = None *(non-stock)* **M** = On-board Modbus Serial (stocked)

Measurement Module

C445 M A – 005 A

Family	Module	Frame Size	Inputs ③	Sensing Capability
C445 = Power Xpert C445 global motor management relay	**M** = Measurement module	**A** = 45 mm (0.3–45 A) **B** = 55 mm (9–72 A) **C** = 90 mm (17–136 A)	**45 mm** **2P4** = 0.3–2.4 A **005** = 1–5 A **032** = 4–32 A **045** = 6–45 A **55 mm** **072** = 9–72 A **90 mm** **090** = 11–90 A **136** = 17–136 A	**I** = Current only *(non-stock)* **V** = Current and voltage (stocked) **A** = Current, voltage and PTC (stocked)

User Interface

C445 U M

Family	Module	Type
C445 = Power Xpert C445 global motor management relay	**U** = User interface	**M** = Monitoring

Notes

① For other communication protocol options, see Accessories chart on **Page V5-T5-99**.
② If a real-time clock and memory backup module are required, see Accessories chart on **Page V5-T5-99**.
③ For applications above 136 A, see Accessories chart on **Page V5-T5-99**.

Power Xpert C445 Global Motor Management Relay

Accessories

C445 X C – E

Family
C445 = Power Xpert C445 global motor management relay

Module
X = Accessory

Type
C = Communication card
G = Ground fault accessory
O = Option module
S = Spare parts and accessory kits

Options	
Communication Module Options	**MOD** = Ground fault module
E = EtherNet/IP and Modbus TCP	**CT2** = Zero sequence current transformer 25 mm aperture
P = PROFIBUS	**CT3** = Zero sequence current transformer 52 mm aperture
Option Modules	**CT4** = Zero sequence current transformer 63 mm aperture
RTC = Real-time clock and memory backup module	**CT7** = Zero sequence current transformer 80 x 175 mm aperture
Spare Parts and Cables	
TERM = Spare terminal connectors kit	
USBMICRO = Standard USB male to micro USB male	
USBRJ12 = Standard USB male to RJ12	
USBLEADS = Standard USB male to loose leads	

Product Selection

Power Xpert C445 Global Motor Management Relay—Stocked Catalog Numbers

C445B_





Base Control Module

Power Source	Voltage Range ②	Digital Inputs	Relay Outputs	On-board Communications	Catalog Number
120/240 Vac	0–690 Vac	(4) 120 Vac	(2) Form A, (1) Form C (non-latching)	Modbus Serial	**C445BA-SANM**
		(4) 24 Vdc	(2) Form A, (1) Form C (non-latching)	Modbus Serial	**C445BA-SDNM**
24 Vdc	0–690 Vac	(4) 24 Vdc	(2) Form A, (1) Form C (non-latching)	Modbus Serial	**C445BD-SDNM**

C445M_







Measurement Module

Frame Size	Current Range (A)	Current (I) Sensing	Voltage (V) Sensing	PTC Sensing	Catalog Number
45 mm	0.3–2.4	Yes	Yes	—	**C445MA-2P4V**
		Yes	Yes	Yes	**C445MA-2P4A**
	1–5	Yes	Yes	—	**C445MA-005V**
		Yes	Yes	Yes	**C445MA-005A**
	4–32	Yes	Yes	—	**C445MA-032V**
		Yes	Yes	Yes	**C445MA-032A**
	6–45 ③	Yes	Yes	—	**C445MA-045V**
		Yes	Yes	Yes	**C445MA-045A**
55 mm	9–72	Yes	Yes	—	**C445MB-072V**
		Yes	Yes	Yes	**C445MB-072A**
90 mm	11–90	Yes	Yes	—	**C445MC-090V**
		Yes	Yes	Yes	**C445MC-090A**
	17–136	Yes	Yes	—	**C445MC-136V**
		Yes	Yes	Yes	**C445MC-136A**

Notes

① C445XX-P only.
② Can be used for 4160 Vac applications with PT ratios.
③ The 45 mm frame is capable of 6 AWG wire maximum with the exception of insulation types RHH, RHW and RHW-2. If these insulation types are being used, use the 55 mm frame.

Embedded Logic Engine and Expansion I/O

The C445 is designed to allow function block programming to increase the logic capability of the C445. This logic allows a user to continue the current process logic or use logic that is configured locally. The logic engine can access the control parameters and I/O of the C445. The logic engine will access external expansion I/O. The C445 allows digital input up to 64 and digital output up to 64, plus up to 8 analog I/O cards. The analog I/O includes thermal measurement input modules. The expansion I/O utilizes the Modbus 485 connection on the C445 and the ELC-CARS485 communications module to communicate to the expansion I/O.

The following Expansion Modules are available: Communication module ELC-CARS485 plus I/O modules.

ELC-EX_



Embedded Logic Engine and Expansion I/O

Power	Input Unit Point	Type	Output Unit Point	Type	Digital I/O Model
Dimensions W x H x D (mm): 25.2 x 90 x 60					
24 Vdc	8	120 Vac	0	—	**ELC-EX08NNAN**
	8	DC sink or source	0	—	**ELC-EX08NNDN**
	0		8	Relay	**ELC-EX08NNNR**
	0		8	Transistor	**ELC-EX08NNNT**
	0		6	High current relay	**ELC-EX06NNNI**
	4		4	Relay	**ELC-EX08NNDR**
	8		8		**ELC-EX16NNDR**
	4		4	Transistor	**ELC-EX08NNDT**
	8		8		**ELC-EX16NNDT**

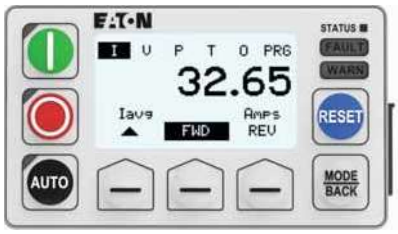
Power	Input Unit Point	Type	Output Unit Point	Type	Analog I/O Model
Dimensions W x H x D (mm): 25.2 x 90 x 60					
24 Vdc	0	—	2	0 mA to +20 mA 0 V to +10 V	**ELC-AN02NANN**
	0		4		**ELC-AN04NANN**
	4	–20 mA to +20 mA –10 V to +10 V	2		**ELC-AN06AANN**
	4		0	—	**ELC-AN04ANNN**
	4	Platinum temp.	0		**ELC-PT04ANNN**
	4	Thermocouple	0		**ELC-TC04ANNN**

User Interface

Catalog Number: **C445UM**

Features—powerful but simple

- Intuitive navigation
- Safe, remote mounting on panel door
- Large font current, voltage, power, thermal and system monitoring
- Simple Setup Wizard
- Easy parameter setting
- Fault/event notification with full description and diagnostics
- Bright fault and warning LEDs
- Control status LEDs indicate starting, running, stopped, inhibited, auto
- Password protection option
- LED color, control button and screen idle behavior customization
- USB-Micro connects to free Power Xpert *in*Control software



Monitoring Menus: Press <MODE/BACK> to toggle through

	I (Current)	**V** (Voltage)	**P** (Power)	**T** (Thermal)	**O** (Other)
Data in menu **Use ▲ to scroll**	Avg Current (Iavg) Avg Voltage (Vavg) Iavg % of FLA (I%FLA) Current Unbalance (IUnb) Ground Fault Current (IGF) I Phase A (IA) I Phase B (IB) I Phase C (IC)	Watts Total (P Watts) Voltage Unbalance (VUnb) Phase Order (Ph Ord) Voltage L1-L2 (L1-L2) Voltage L2-L3 (L2-L3) Voltage L3-L1 (L3-L1)	Thermal Memory % (TM%) Power Factor (PF) VA Total (P VA) VARs Total (P VARS) Real Energy ① (P kWh)	Run Time ① (Run Time) Time to Reset (T to Rst) Thermal Capacity % (TC%) PTC state (PTC)	# Motor starts (#Starts) Max Starting I (MaxStart) Last Start Time (LastStart) Frequency (Freq) RTC Time (RTC Time) IP Address (IP Addr) Operating Sec ① (Op Time) Contactor Ops Last Hr (Ctr Ops) Speed RPM (Speed)

Program (PRG) Menu Groups

	Control	**Wiring Config**	**Protections**	**User Interface Settings**
	See active control source Control relay outputs View digital input status View relay output status	Set single phase/3-phase Set CT ratios Set PT ratios	Enable/disable trips/warnings Customize protection thresholds and delays	Set screen idle behavior Contrast/brightness Set control button delays Change LED colors
	Monitor	**Operation Mode**	**Real Time Clock**	**Security**
Go here to …	Monitor voltage, current, power, system data (all monitoring values, not just favorites) Clear resettable monitor values	Select operation mode, local/remote control sources Set comm loss/idle behavior Select output functions	Set time and time zone	Set passwords (local, admin, USB)
			Communications	**Services**
			Configure Ethernet and Modbus settings (addresses, baud rate, advanced, etc.)	Factory Reset Soft Reset Re-pair modules Launch Setup Wizard
	Motor Configuration	**Faults and Events**	**System View**	
	Set/view motor nameplate data (also in Setup Wizard)	View active fault/warning/inhibit View or clear fault queue and trip snapshot	View product details (serial number, firmware version, etc.)	

Note

① Resettable parameter—users can reset to zero in PRG menu.

Accessories

XCT_



External Current Transformers

Use external CTs on systems greater than 136A with the 1–5 Amp Measurement Module (Part Numbers C445MA-005_). Catalog numbers are for one single-phase CT. Order three CTs for a three-phase system.

CT Range (A)	Description	Terminal Size	Measurement Module	Catalog Number
17–300	300:5 single-phase CT, 1.25 inch dia hole, UL and CSA ANSI/IEEE C57.13, 50–400 Hz, 600 Vac, 10 kV, relay class C50, accuracy 0.3% B0.1	(2) 8–32 brass terminals, comes with mounting bracket kit	**C445MA-005_**	**XCT300-5**
75–600	600:5 single-phase CT, 2.00 inch dia hole, UL and CSA ANSI/IEEE C57.13, 50–400 Hz, 600 Vac, 10 kV, relay class C50, accuracy 0.3% B0.1	(2) 8–32 brass terminals, comes with mounting bracket kit	**C445MA-005_**	**XCT600-5**
100–800	800:5 single-phase CT, 2.50 inch dia hole, UL and CSA ANSI/IEEE C57.13, 50–400 Hz, 600 Vac, 10 kV, relay class C50, accuracy 0.3% B0.1	(2) 8–32 brass terminals, comes with mounting bracket kit	**C445MA-005_**	**XCT800-5**

C445X_



Communication and Option Modules

Description	Catalog Number
EtherNet/IP and Modbus TCP card with 2-port switch	**C445XC-E**
PROFIBUS DPV0 and DVP1 card	**C445XC-P**
Real-time clock and memory backup module	**C445XO-RTC**

C445XG-MOD



Ground fault module	**C445XG-MOD**

C445XG-CT2



Zero sequence current transformer 25 mm aperture	**C445XG-CT2**

C445XG-CT3



Zero sequence current transformer 52 mm aperture	**C445XG-CT3**

C445XG-CT4



Zero sequence current transformer 63 mm aperture	**C445XG-CT4**

C445XG-CT7



Zero sequence current transformer 80 x 175 mm aperture	**C445XG-CT7**

Cables, Wiring Harnesses and Spare Parts

Connection Cables and Accessories

D77E connection cables are required to connect the base control module to the measurement module and to the user interface. Order the appropriate lengths for each connection.

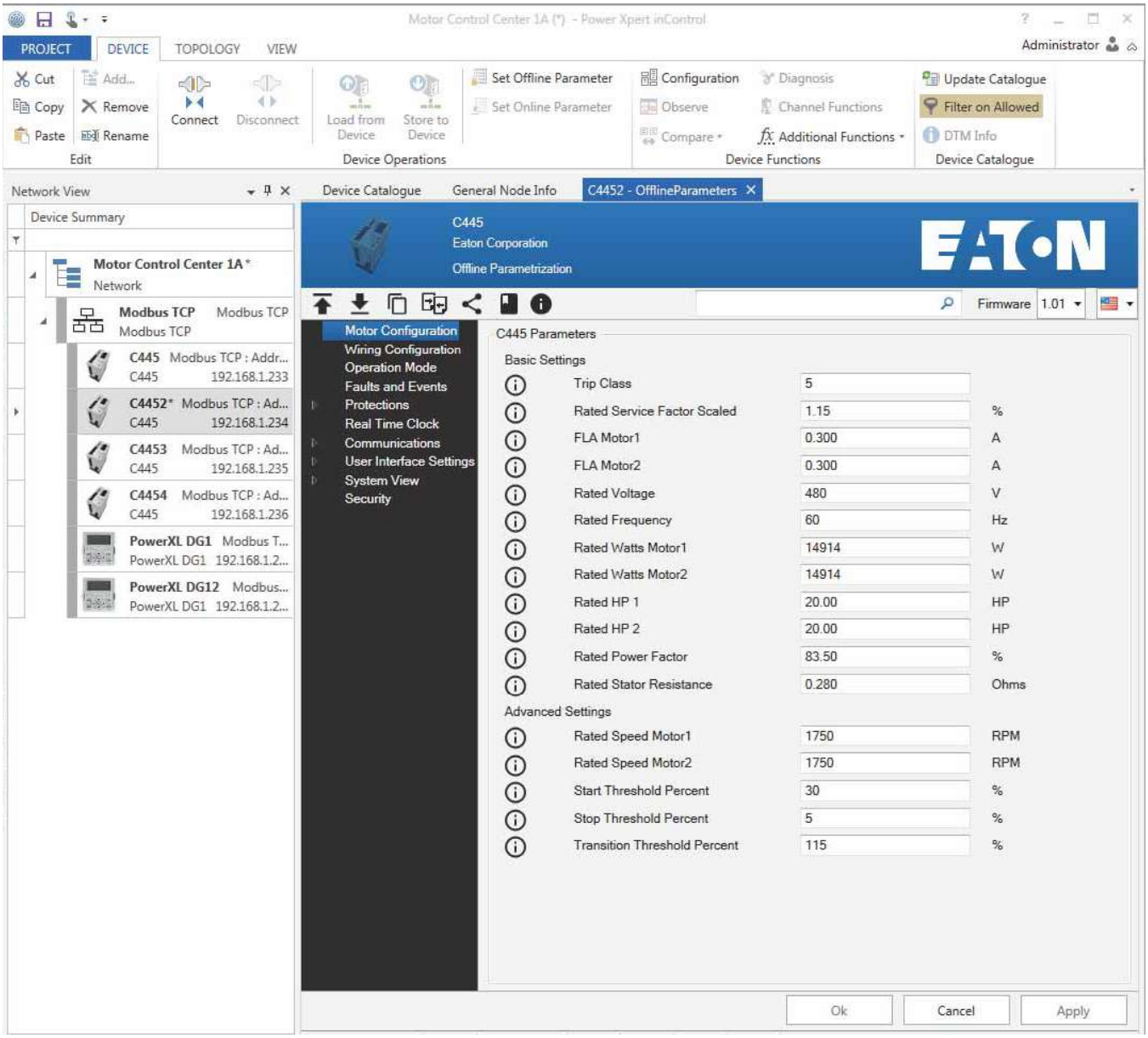
C445XS-USBMICRO can be used to connect to Power Xpert *in*Control over USB if the Ethernet option is not used. C445XS-USBLEADS or C445XS-USBRJ12 are used for firmware updates.

Description	Catalog Number
Connection cable (base control module to measurement module or user interface), 13 cm length	**D77E-QPIP13**
Connection cable (base control module to measurement module or user interface), 25 cm length	**D77E-QPIP25**
Connection cable (base control module to measurement module or user interface), 100 cm length	**D77E-QPIP100**
Connection cable (base control module to measurement module or user interface), 200 cm length	**D77E-QPIP200**
Connection cable (base control module to measurement module or user interface), 300 cm length	**D77E-QPIP300**
Spare parts kit—terminal connectors, mounting feet	**C445XS-TERM**
Standard USB A male to micro USB male cable	**C445XS-USBMICRO**
Standard USB A male to loose leads cable (used with Modbus Serial terminal for firmware upgrades)	**C445XS-USBLEADS**
Standard USB A male to RJ-12 cable (for firmware upgrades)	**C445XS-USBRJ12**

Power Xpert inControl Software

The Power Xpert *in*Control software tool is designed for easy commissioning of Eaton control products such as Power Xpert C445 and the Power XL DG1 drive. While users may configure C445 locally with the monitoring user interface, *in*Control is a great tool for motor control centers with multiple devices as users may save and re-use configuration files. The easiest way to connect to Power Xpert *in*Control is over Modbus TCP (C445XC-E required). This option allows you to see all connected devices in one window via their IP address. Users without Ethernet may also connect directly to the C445 micro-USB port located on the user interface or base module using a USB-to-USB micro cable (C445XS-USBMICRO).

Power Xpert *in*Control is available for download free of charge at www.eaton.com/C445. Refer to Power Xpert *in*Control User Manual MN040013EN for more information.



Technical Data and Specifications

Power Xpert C445 Motor Management Relay Short Circuit Ratings (North American CSA and UL) ①

		Standard-Fault Short Circuit Data				High-Fault Short Circuit Data			
						Fuses (RK5)			Thermal-Magnetic Circuit Breakers
Measurement Module Frame	Overload FLA Range	480 V (kA)	600 V (kA)	Max. Fuse Size (A) (RK5)	Max. Breaker Size (A)	480 V (kA)	600 V (kA)	Max. Fuse Size (A) (RK5)	480 V (kA)	600 V (kA)	Max. Breaker Size (A)
45 mm	0.3–2.4 A	5	5	6 A	15 A	100	100	6 A	100	35	15 A
45 mm	1–5 A	5	5	20 A	20 A	100	100	20 A	100	35	20 A
45 mm	4–32 A	5	5	125 A	125 A	100	100	125 A	100	35	125 A
45 mm	6–45 A	5	5	175 A	175 A	100	100	175 A	100	35	175 A
55 mm	9–72 A	10	10	250 A	250 A	100	100	250 A	100	35	250 A
90 mm	11–90 A	10	10	360 A	360 A	100	100	360 A	100	50	360 A
90 mm	17–136 A	10	10	400 A	400 A	100	100	400 A	100	50	400 A

Power Xpert C445 Motor Management Relay Short Circuit Ratings (IEC) ①

		Standard-Fault Short Circuit Data					High-Fault Short Circuit Data			Thermal-Magnetic Circuit Breakers			
							Fuses (gG)						
Measurement Module Frame	Overload FLA Range	480 V (kA)	690 V (kA)	Max. Fuse Size (A) (gG)	Max. Breaker Size (A) 480 V	Max. Breaker Size (A) 690 V	480 V (kA)	690 V (kA)	Max. Fuse Size (A) (gG)	480 V (kA)	690 V (kA)	Max. Breaker Size (A) 480 V	Max. Breaker Size (A) 690 V
45 mm	0.3–2.4 A	1	1	16 A	15 A	N/A	100	100	10 A	100	N/A	15 A	N/A
45 mm	1–5 A	1	1	20 A	20 A	20 A	100	100	20 A	100	80	20 A	20 A
45 mm	4–32 A	3	3	125 A	125 A	125 A	100	100	125 A	100	80	125 A	125 A
45 mm	6–45 A	3	3	200 A	175 A	160 A	100	100	125 A	100	80	175 A	160 A
55 mm	9–72 A	5	5	250 A	250 A	250 A	100	100	160 A	100	80	250 A	250 A
90 mm	11–90 A	5	5	360 A	360 A	360 A	100	100	360 A	100	80	360 A	360 A
90 mm	17–136 A	10	10	400 A	400 A	400 A	100	100	400 A	100	80	400 A	400 A

Power Xpert C445 Technical Data and Specifications

Description	Specification
Electrical, Motor/Load Ratings	
Operating voltage	110–690 Vac 4160 Vac with Potential Transformer (PT) ratios between 35:1 and 6:1 (purchased separately) (PT)
Trip class	5–40, selectable in 5 step increments
Operating current (FLA) range	Varies by measurement module frame. See below.
45 mm measurement module	0.3–2.4 A; 1.0–5.0 A; 4.0–32.0 A; 6–45 A
55 mm measurement module	9.0–72.0 A
90 mm measurement module	11.0–90.0 A; 17.0–136.0 A
Rated frequency	47–63 Hz
Application(s)	Single-phase, three-phase
Accuracy	Current: 2% within 30–125% of FLA; 3% ≤ 500% of FLA Voltage: 2% within 110 Vac, 690 Vac Power: 5%
Rated supply voltage	120/240 Vac (or) 24 Vdc
Operating supply voltage range	94–264 Vac (or) 18–30 Vdc
Overvoltage category	24 Vdc = III 120/240 = II
Maximum power consumption	Less than 8 W—varies by module, see below
Base control module + measurement module	Less than 5 W
User interface	Less than 1.5 W
Communication card	Less than 2 W

Note

① Short circuit protective device (SCPD) sizing per NEC: Max = 400% of FLA under 100 A, 300% of FLA over 100 A.

Power Xpert C445 Technical Data and Specifications, continued

Description	Specification
Environmental Ratings	
Ambient temperature (operating)	–40 to 60 °C (–40 to 140 °F)
Ambient temperature (storage)	–40 to 85 °C (–40 to 185 °F)
Operating humidity [UL991 (H3)]	5–95% noncondensing
Altitude NEMA ICS1	2000 meters (6600 feet)
Shock IEC 60068-2-27	15 g any direction for 11 milliseconds, non-operating
Vibration IEC 60068-2-6	5 g non-operating and 3 g operating in any direction
Pollution degree per IEC 60947-4-1	3
Ingress protection	IP20 (Base Control Module / Measurement Module) IP54 (User Interface)
Mean time between failures (MTBF)	20 years at 50 °C
Safety	
Thermal overload protection	Per UL 60947-4-1, IEC 60947-4-1
Binary PTC protection	IEC 60947-8
Safety integrity level	SIL 1 (reference 50495)
Electrical / EMC	
Radiated emissions IEC/EN 60947-4-1, Table 15 EN 55011 (CISPIR 11) Group 1, Class A	30–1000 MHz
Conducted emissions IEC/EN 60947-4-1, Table 14 EN 55011 (CISPIR 11) Group 1, Class A	0.15–30 MHz
ESD immunity per IEC 61000-4-2	± 8 kV air, ± 4 kV contact
Radiated immunity per IEC 61000-4-3	10 V/m 80–1000 MHz 80% amplitude modulation 1 kHz sine wave
Fast transient per IEC 61000-4-4	± 2 kV power ± 1 kV signals, data and control
Surge per IEC 61000-4-5	± 1 kV line-to-line ± 2 kV line-to-ground
Conducted immunity per IEC 61000-4-6	10 V, 0.15–80 MHz 80% amplitude modulation 1 kHz sine wave
Magnetic field per IEC 61000-4-8	30 A 50/60 Hz
Voltage dips per IEC 61000-4-11	Class 2, 110 Vac 60 Hz, 230 Vac 50 Hz 0% during 1/2 cycle 0% during 1 cycle 70% during 25/30 cycles Note: 70% refers to 70% of nominal operating voltage, 0% refers to 0% of operating voltage, 25/30 cycles correlates to 50/60 Hz.
Output Relay Ratings (Base Control Module)	
Three mono-stable output relays One Form C (NO/NC) Two Form A (NO)	 B300 pilot duty on all relays R300 pilot duty on NO relays only
Rated operating current	3 A at 120 Vac, 1.5 A at 240 Vac 1.5 A at 24 Vdc, 0.22 A at 125 Vdc, 0.1 A at 250 Vdc
Utilization category	AC-15; DC-13

Power Xpert C445 Technical Data and Specifications, continued

Description	Specification						
Input Ratings (Base Control Module)							
Supply voltage	24 Vdc	120 Vac					
Number of inputs	4	4					
Type of inputs	Digital	Digital					
On-state voltage	15–20 Vdc	79–132 Vac					
Off-state voltage	0–5 Vdc	0–30 Vac					
Overvoltage category	III	II					
Input/Output Terminal Blocks							
Wire capacity	30–12 AWG ①						
Screw torque requirement	3.5–4.4 in-lb (0.4–0.5 Nm)						
Measurement Module Current Pass Through							
Measurement module size (current range)	45 mm (0.3–2.4 A)	45 mm (1–5 A)	45 mm (4–32 A)	45 mm (6–45 A)	55 mm (9–72 A)	90 mm (11–90 A)	90 mm (17–136 A)
Supported conductor NA 600 V (AWG) EMEA 690 V (mm^2)	 6 AWG 16 mm^2	 6 AWG 16 mm^2	 6 AWG 16 mm^2	 6 AWG 16 mm^2	 3 AWG 25 mm^2	 2/0 AWG 70 mm^2	 2/0 AWG 70 mm^2
Voltage Terminals							
Terminal screw torque requirement	3.5–4.4 in-lb (0.4–0.5 Nm)						
Maximum wire capacity (for voltage input terminals)	12–26 AWG solid 0.13 to 3.31 mm^2						

PTC Specifications

Description	Specification
Standard	EN 60947-8/A1:2006 "Mark A Control Unit"
Compatible thermal detectors	Mark A type (abrupt characteristic change) as described in EN 60947-8/A1:2006 Annex A wired in series
Terminals	Marked T1 and T2 12–30 AWG solid (0.13–4 mm^2)
Cold resistance	≤1500 ohms
Measuring voltage	≤2.5 V for resistance ≤1330 ohms ≤7.5 V for resistance ≤4 kohms ≤9.0 V open circuit
Temperature rise response	3600 ohms ±10%
Over temperature reset	1500 ohms ±10%
Short-circuit response	Between 10 and 20 ohms
Short-circuit reset	Between 20 and 40 ohms
Wire break response	20 k to 40 kohms
Isolation	U_{imp} = 4 kV

Ground Fault Module and Current Transformer Specifications

Description	Specification
Environmental Rating	
Operating temperature	–40 to 70 °C
Humidity	5–95% noncondensing
Vibration	3 G
Shock	15 G
Electrical Rating	
CT ratio	500:01:00
Current range	30 mA to 10 A
Nominal system voltage	690 Vac
Frequency	50/60 Hz
Accuracy	1% with 1.5 ohm burden

Note

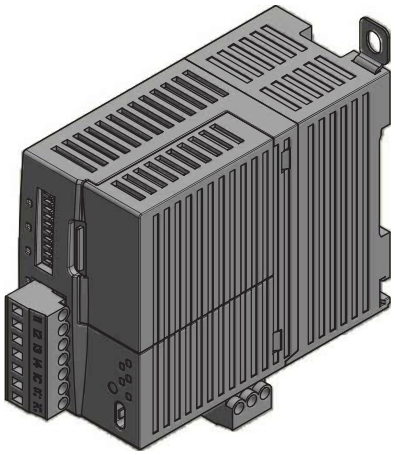
① Use only UL Listed or recognized conductors. Copper wire rated 75C for all field wiring terminals and main conductor wiring.

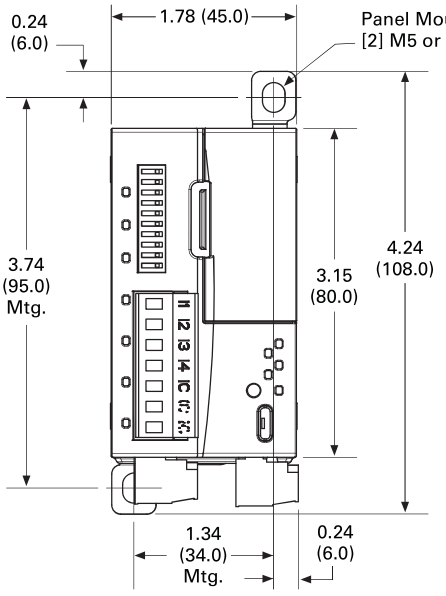
Dimensions

Power Xpert C445 Motor Management Relay

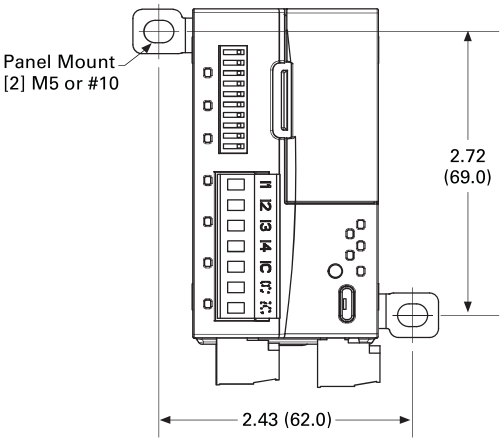
Approximate Dimensions in Inches (mm)

Base Control Module

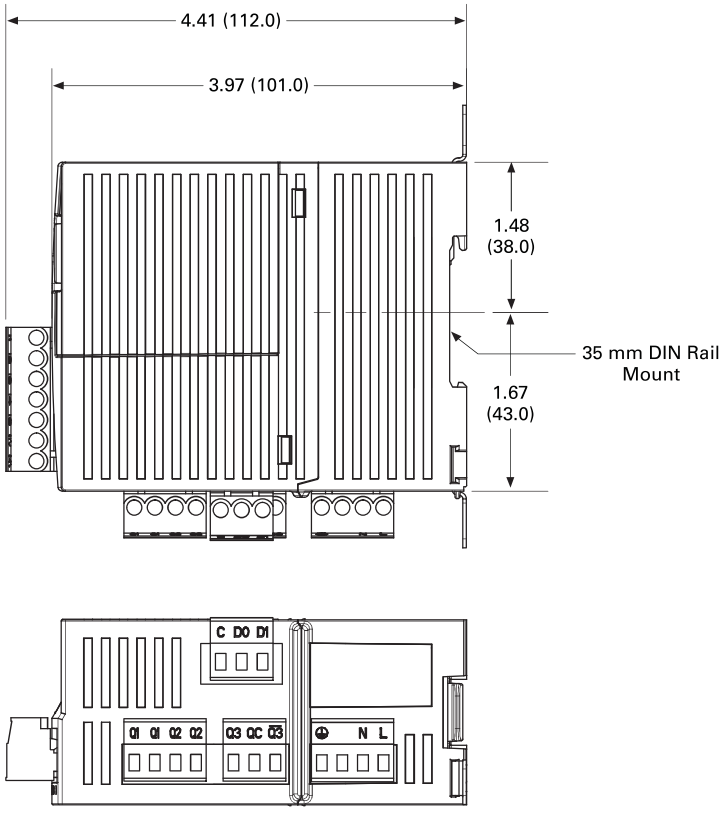




Panel Mount Option 1

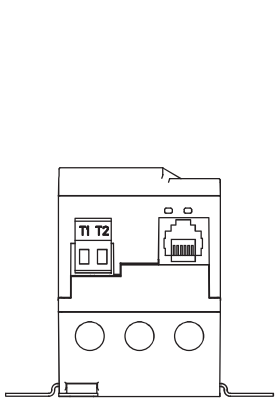


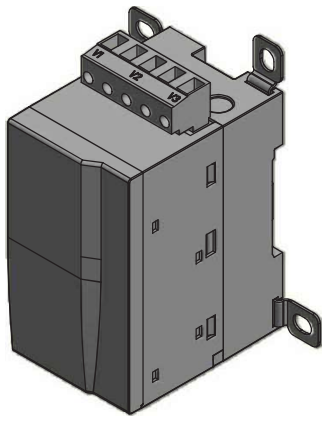
Panel Mount Option 2

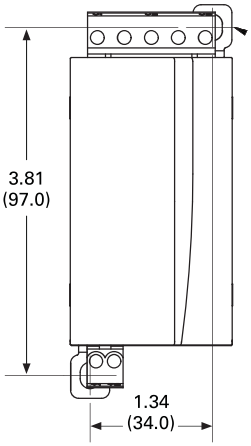


Approximate Dimensions in Inches (mm)

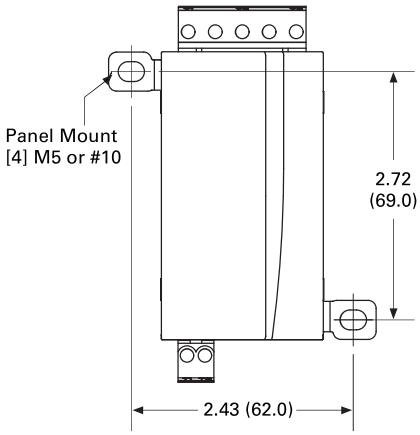
Measurement Module—45 mm Frame



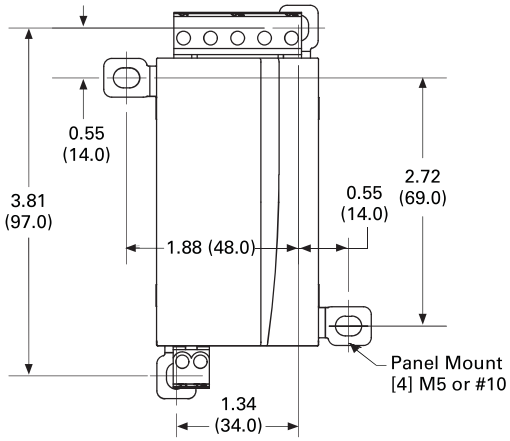




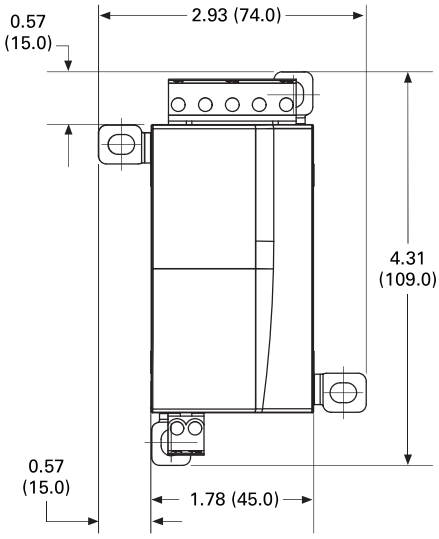
Panel Mount Option 1

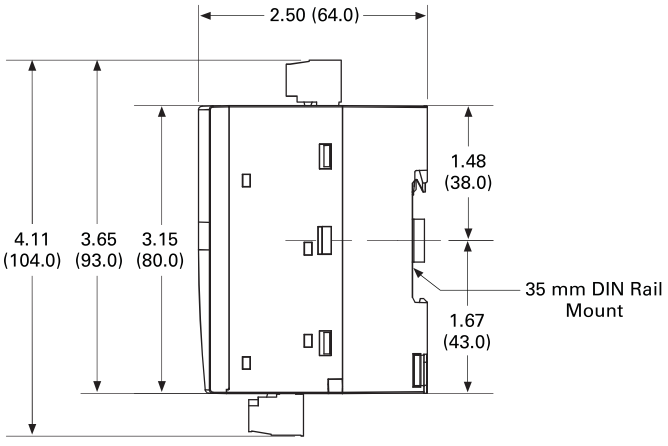


Panel Mount Option 2



Panel Mount Option 3



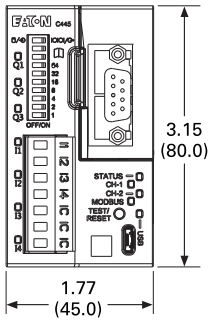


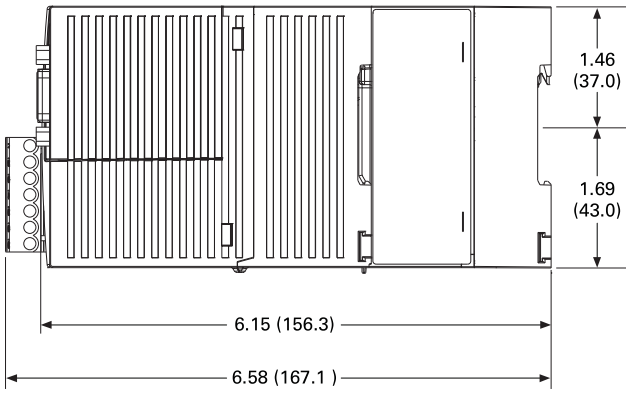
DIN Mount Option 4

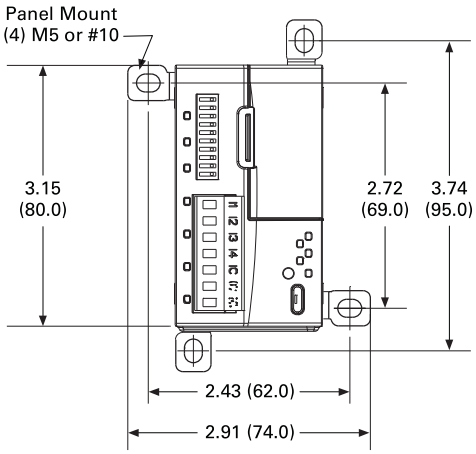
Note: Measurement Module part shown has factory-installed terminals for all measurement options (current, voltage and PTC).

Approximate Dimensions in Inches (mm)

Stacked Mounting of Base Control Module and 45 mm Frame Measurement Module



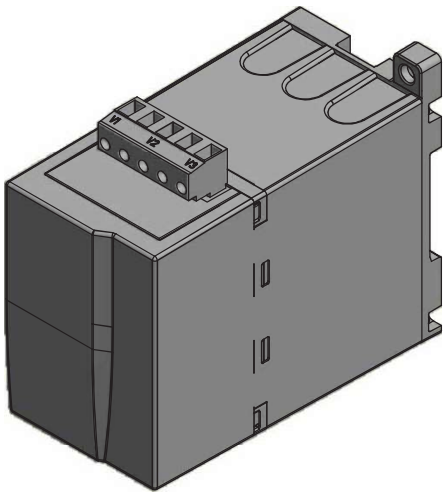


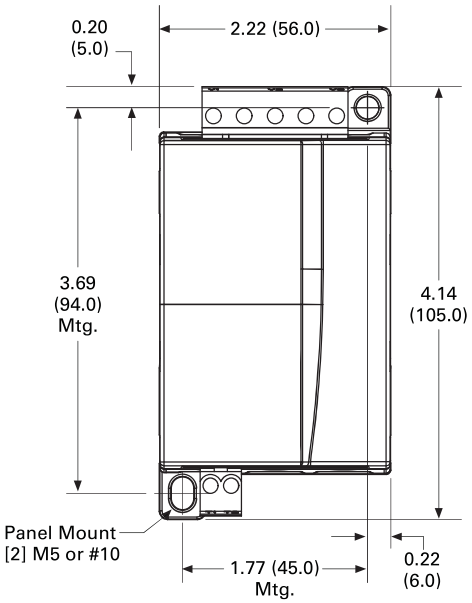


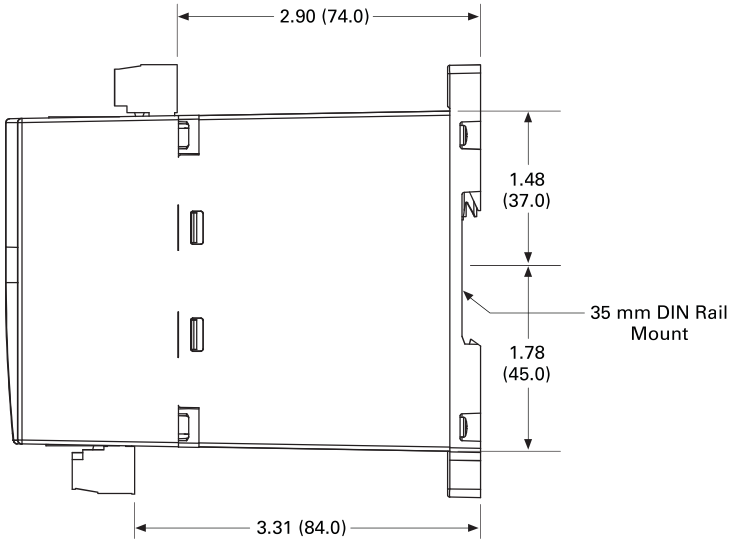
Panel Mount (Option 3)

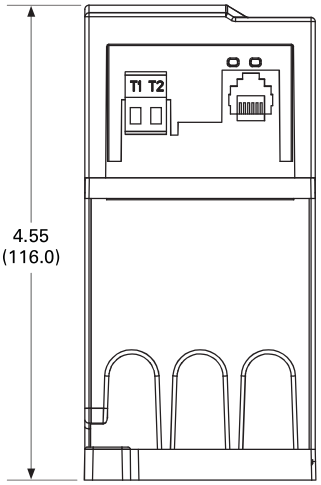
Approximate Dimensions in Inches (mm)

Measurement Module—55 mm Frame





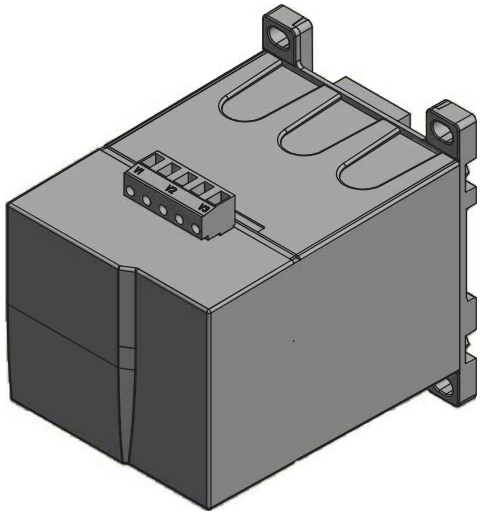


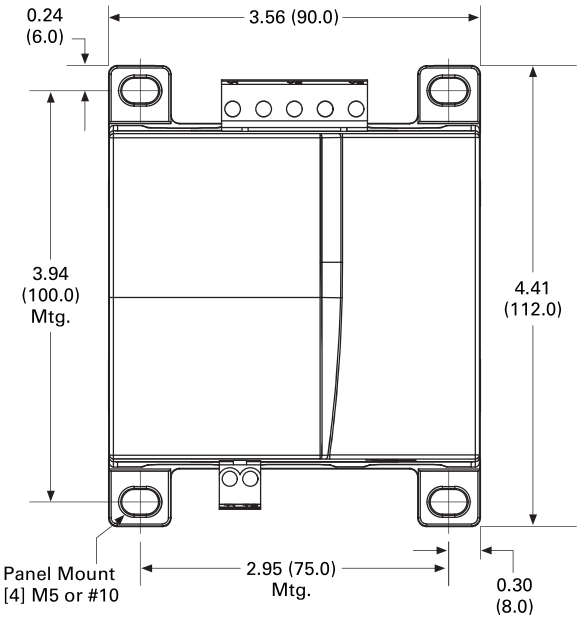


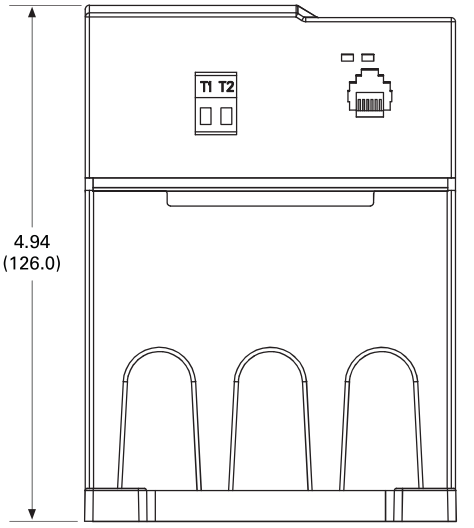
Note: Measurement Module part shown has factory-installed terminals for all measurement options (current, voltage and PTC).

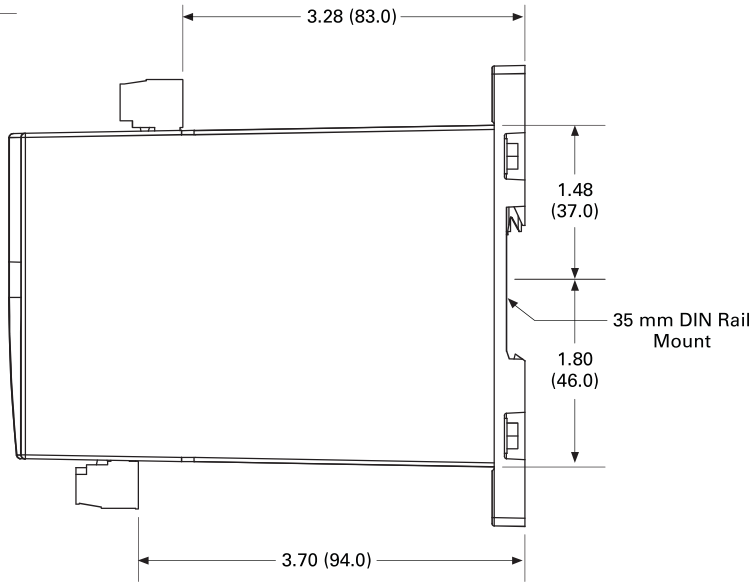
Approximate Dimensions in Inches (mm)

Measurement Module—90 mm Frame





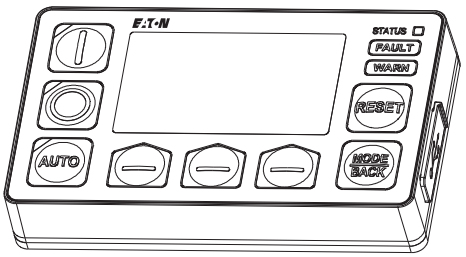


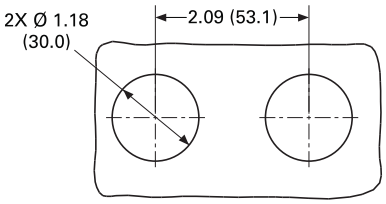


Note: Measurement Module part shown has factory-installed terminals for all measurement options (current, voltage and PTC).

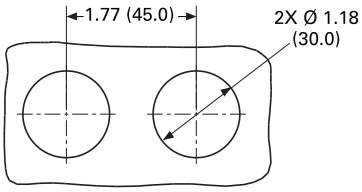
Approximate Dimensions in Inches (mm)

User Interface—Monitoring Version



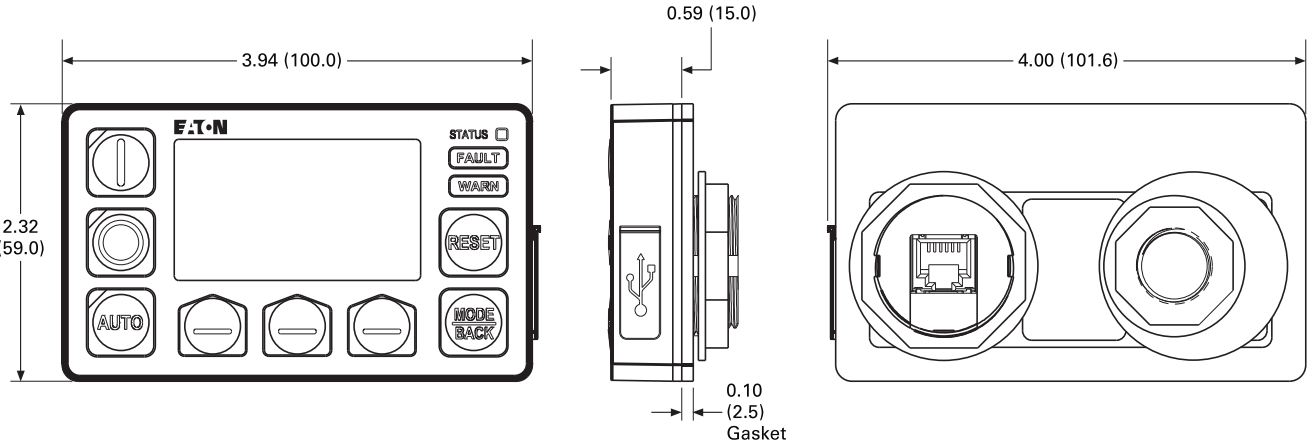


Option 1



Option 2

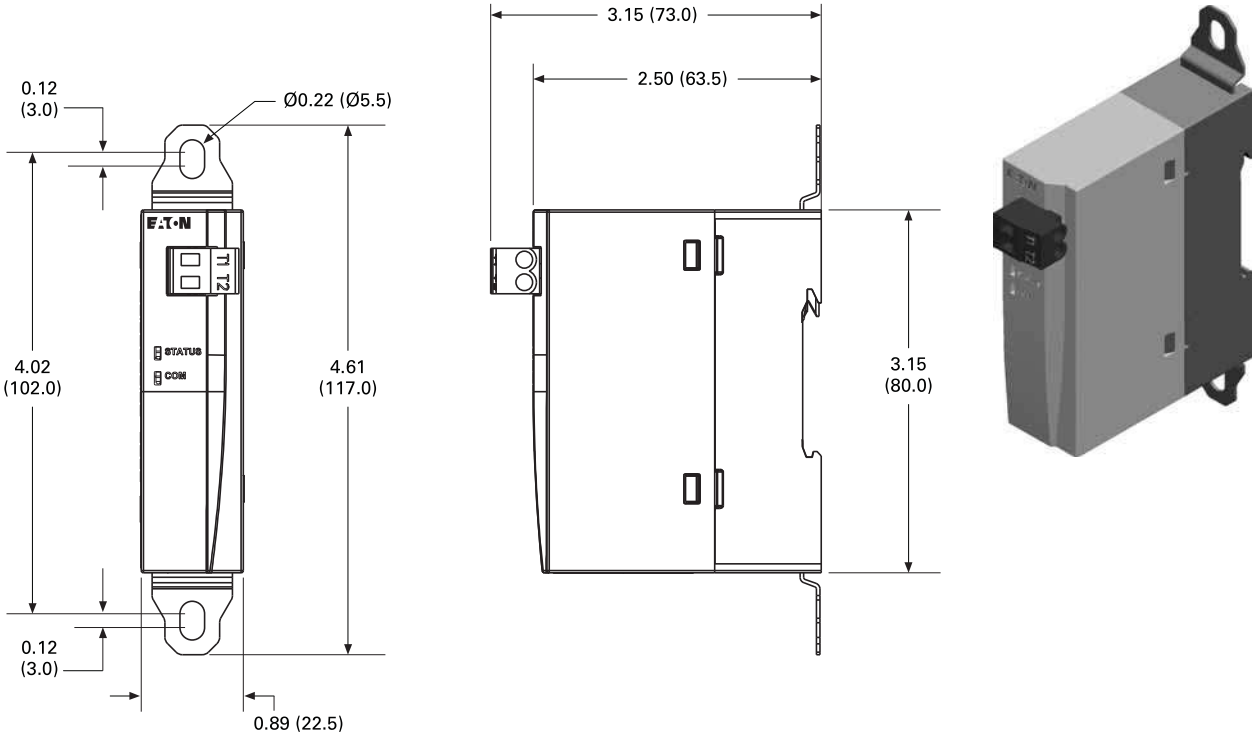
Note: Backwards compatible with C4411 Motor Insight display cutout.



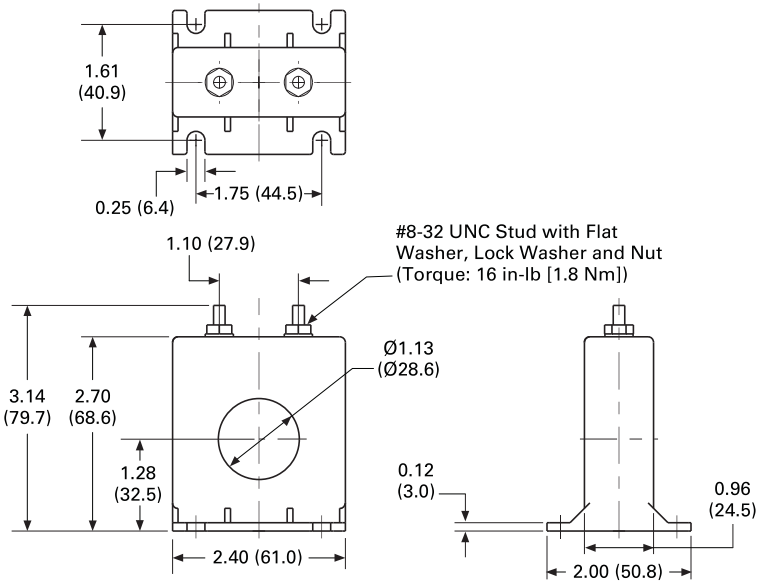
Grounding Faults

Approximate Dimensions in Inches (mm)

C445XG-MOD

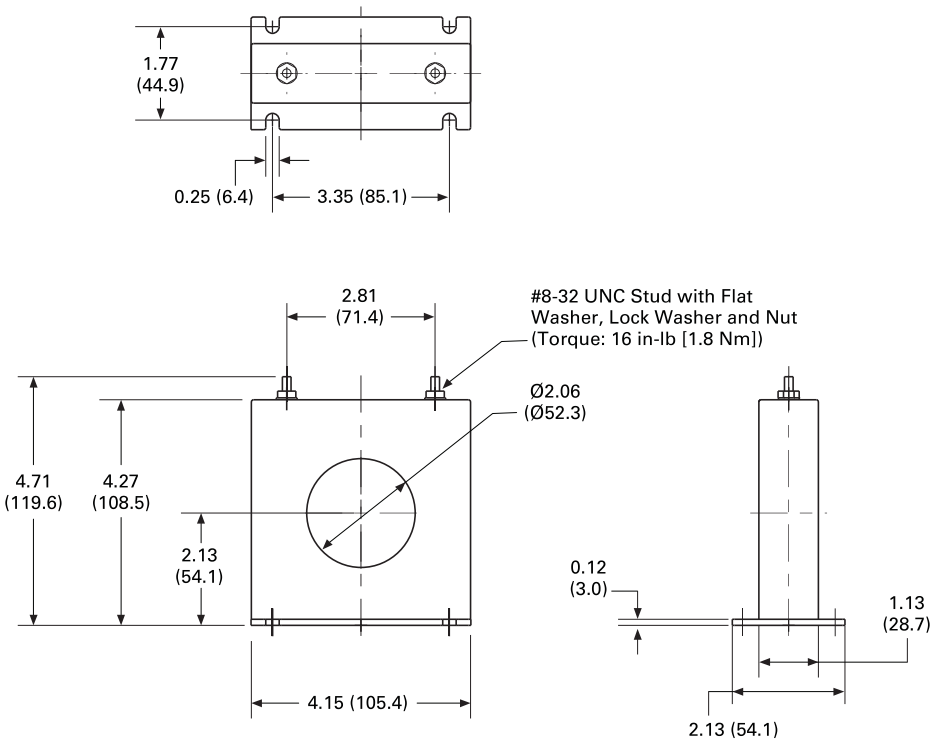


C445XG-CT2

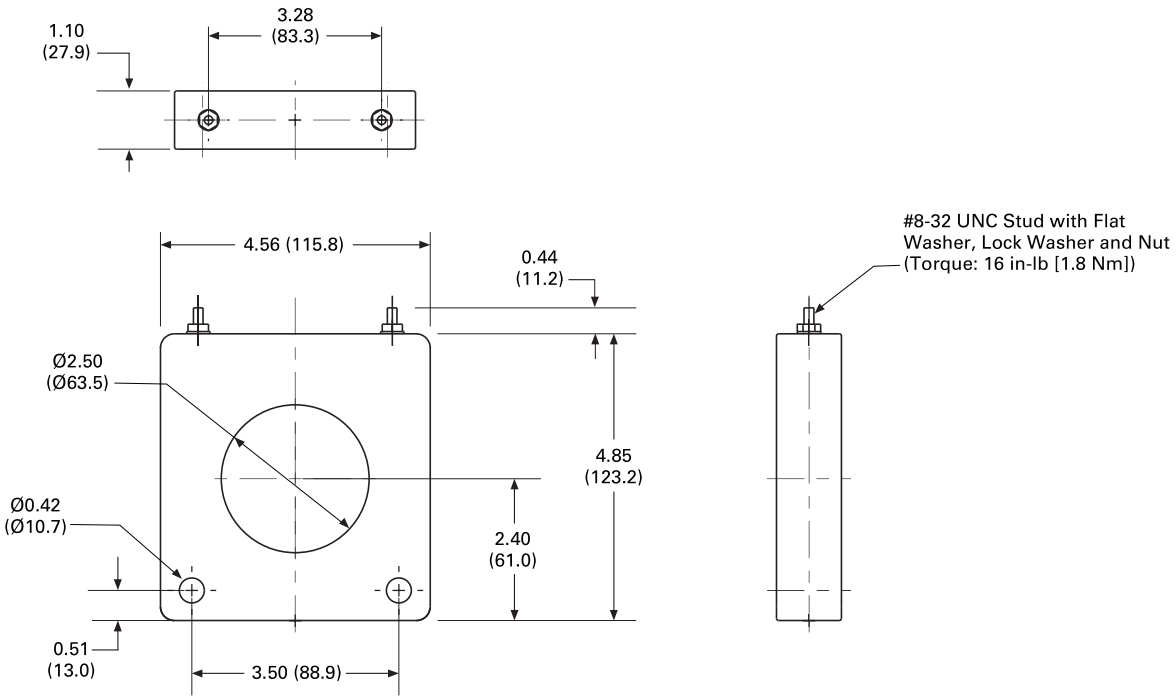


Approximate Dimensions in Inches (mm)

C445XG-CT3

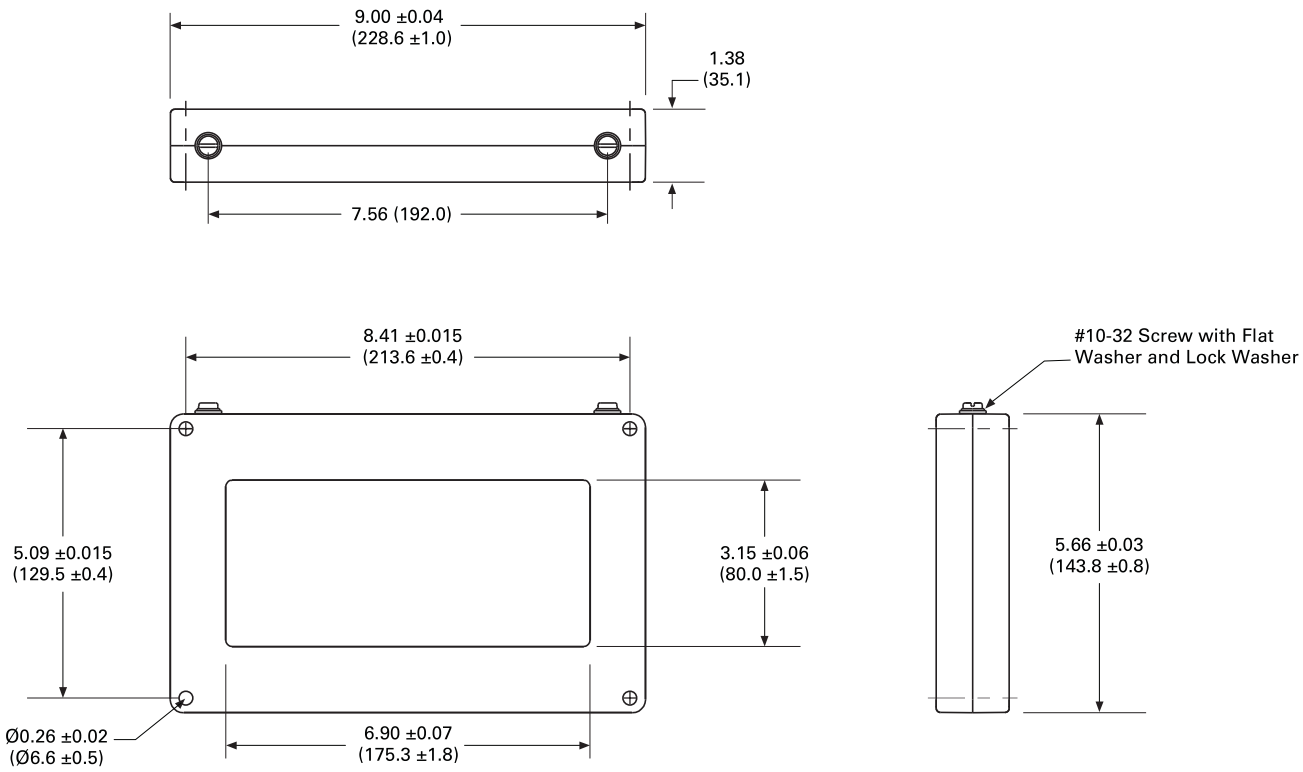


C445XG-CT4



Approximate Dimensions in Inches (mm)

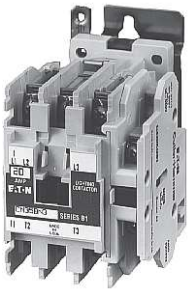
C445XG-CT7



C30CN Mechanically and Electrically Held



CN35 Electrically Held



A202 Magnetically Latched



6.1 Open Control

Product Overview V5-T6-2

C30CN Mechanically and Electrically Held

- Product Description V5-T6-3
- Application Description V5-T6-3
- Features V5-T6-4
- Standards and Certifications V5-T6-4
- Instructional Leaflets V5-T6-4
- Catalog Number Selection V5-T6-5
- Product Selection V5-T6-6
- Components V5-T6-10
- Replacement Parts V5-T6-11
- Technical Data and Specifications V5-T6-12
- Wiring Diagrams V5-T6-14
- Dimensions V5-T6-15

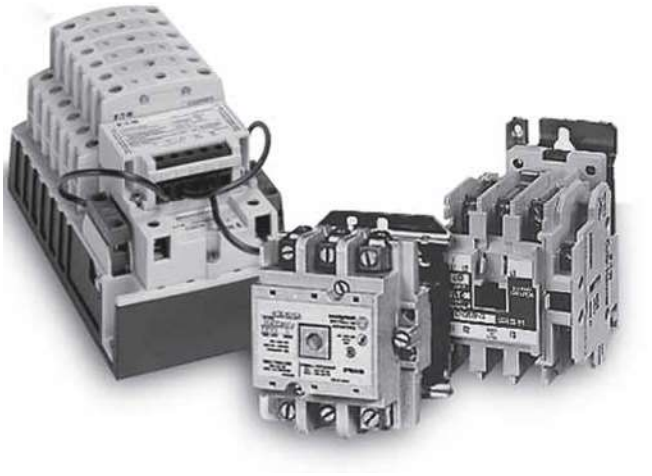
CN35 Electrically Held

- Product Description V5-T6-16
- Application Description V5-T6-16
- Features V5-T6-16
- Standards and Certifications V5-T6-16
- Instructional Leaflets V5-T6-16
- Product Selection V5-T6-17
- Accessories V5-T6-18
- Renewal Parts V5-T6-20
- Dimensions V5-T6-21

A202 Magnetically Latched

- Product Description V5-T6-23
- Application Description V5-T6-23
- Features V5-T6-23
- Standards and Certifications V5-T6-23
- Instructional Leaflets V5-T6-23
- Product Selection V5-T6-24
- Accessories V5-T6-24
- Renewal Parts V5-T6-25
- Technical Data and Specifications V5-T6-26
- Wiring Diagrams V5-T6-26
- Dimensions V5-T6-27

Lighting Contactors-Open Control



Contents

Description	*Page*
Open Control	
C30CN Mechanically and Electrically Held	**V5-T6-3**
CN35 Electrically Held	**V5-T6-16**
A202 Magnetically Latched	**V5-T6-23**

Product Overview

C30CN Mechanically and Electrically Held

Electrically and Mechanically Held C30CN Lighting Contactor by Eaton Electrical delivers unprecedented versatility in application, simplicity in configuration, and performance in operation. With a revolutionary design, rugged construction and expansive feature set, the C30CN is the right solution for effectively controlling tungsten (incandescent filament), ballast (fluorescent and mercury arc), High Intensity Discharge (HID), and non-motor AC resistive loads.

Application Description

Magnetically Latched—A202

Used in applications where it is critical that the contactor will not switch to an off position during control power failure.

30–200A contactors use an electrically energized and de-energized permanent magnet, while the 300 and 400A contactors use a mechanical latch to hold contacts closed during the operation (no continuous control current).

Electrically Held CN35

Use in applications where it is not critical that contacts stay closed with loss of control power.

- Control power is applied continuously during operation
- 10–400A, 600 volt maximum rating
- 12 poles maximum for 20 and 30A devices

C30CNM Mechanically and Electrically Held



Contents

Description	*Page*
C30CN Mechanically and Electrically Held	
Standards and Certifications	**V5-T6-4**
Instructional Leaflets	**V5-T6-4**
Product Selection	**V5-T6-6**
Components	**V5-T6-10**
Replacement Parts	**V5-T6-11**
Technical Data and Specifications	**V5-T6-12**
Wiring Diagrams	**V5-T6-14**
Dimensions	**V5-T6-15**
CN35 Electrically Held	**V5-T6-16**
A202 Magnetically Latched	**V5-T6-23**

C30CN Mechanically and Electrically Held

Product Description

The C30CNM 30A Mechanically Held Lighting Contactors from Eaton's Electrical Sector are designed for industrial, commercial and outdoor lighting applications where efficient control is required. The mechanically held operation ensures that the contactor will not switch to OFF during control power failure. It also ensures the removal of coil from the circuit for noise-free operation and the elimination of all coil losses after the contactor is latched. The control module microprocessor validates the control signal before operation, so it will not respond to momentary voltage spikes of noise. The operation command has a built-in 0.4 second delay to avoid multiple short-term commands that can cause contact fatigue or failure. Also, the feedback loop prevents the contactor from getting out of sequence with switches, even after power failures.

Application Description

The mechanically held lighting contactor provides effective control in applications such as office buildings, industrial plants, hospitals, stadiums, airports, and so on.

They are ideal for applications that require quiet, energy-efficient operation.

Designed to handle different load types:

- Tungsten (incandescent filament)
- Ballast (fluorescent and mercury arc)
- High intensity discharge (HID)
- Non-motor AC resistive
- Single- and three-phase motor ratings

Operation

Three-wire control is the choice for use with momentary devices allowing operation from multiple locations. A momentary pulse of energy operates the contactor while a second pulse on an alternate leg returns the contactor to its original state.

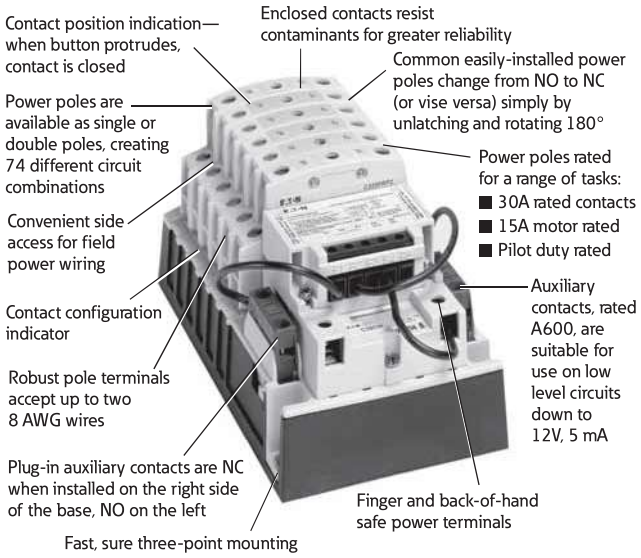
Two-wire control is the choice for single output automatic operation or for operation from single-pole devices. When voltage is applied to the input terminals the contactor is latched into position (coil is removed from the circuit while control voltage is continuously supplied). When control voltage is removed, the latch is disengaged and the contactor is returned to its original state.

Features

See figure below.

- 30A power pole rating
- Up to 12 poles maximum
- Power poles latch easily onto the base, and designating them as NO or NC is a simple matter of left or right positioning. Additional poles, either NO or NC, may be easily added at any time
- Low magnetic noise results in quiet operation
- Low input VA permits long wire runs
- Come in a wide range of input voltages and with coils from 24 Vac to 277 Vac and 12 Vac to 24 Vdc

C30CNM Features



Standards and Certifications

- UL listed File E1491, UL Category Code/ Guide NLDX/NLDX7
- cUL
- CE
- Designed and built to NEMA ICS-2 Standards

Listed Listed

Instructional Leaflets

50765 C30CN Lighting Contactor Series

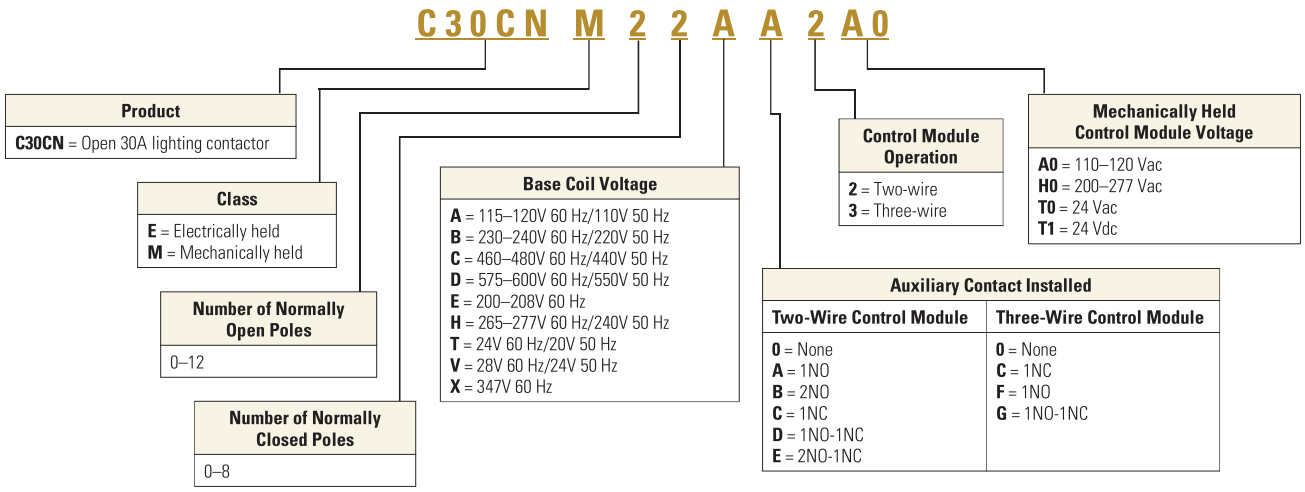
50766 Coil Kit for C30CN Lighting Contactors

50767 Power Pole Kit for C30CN Lighting Contactors

50768 Control Module Kit for C30CN Lighting Contactors

Catalog Number Selection

Type C30CN Lighting Contactors



Sample Catalog Number:	C	3	0	C	N	M	2	2	A	A	2	A	0
Digit Position:	1	2	3	4	5	6	7	8	9	10	11	12	13

Product Selection

Two-Wire Mechanically Held Lighting Contactors—Standard Assembled Forms

The Standard Assembled Forms in tables on **Pages V5-T6-6** and **V5-T6-7** are two-wire open mechanically held 30A lighting contactors with 120V 60 Hz/110V 50 Hz base coil voltage, 120V control module voltage, and no additional auxiliary contacts. To change the base coil voltage, auxiliary contact options or control module voltage, refer to tables on **Page V5-T6-7**.

C30CN_



Two-Wire Mechanically Held Lighting Contactors—Standard Assembled Forms

Number of Poles	NO	NC	Catalog Number ①②③
2	0	2	**C30CNM02A02A0**
	1	1	**C30CNM11A02A0**
	2	0	**C30CNM20A02A0**
3	0	3	**C30CNM03A02A0**
	1	2	**C30CNM12A02A0**
	2	1	**C30CNM21A02A0**
	3	0	**C30CNM30A02A0**
4	0	4	**C30CNM04A02A0**
	1	3	**C30CNM13A02A0**
	2	2	**C30CNM22A02A0**
	3	1	**C30CNM31A02A0**
	4	0	**C30CNM40A02A0**
5	0	5	**C30CNM05A02A0**
	1	4	**C30CNM14A02A0**
	2	3	**C30CNM23A02A0**
	3	2	**C30CNM32A02A0**
	4	1	**C30CNM41A02A0**
	5	0	**C30CNM50A02A0**
6	0	6	**C30CNM06A02A0**
	1	5	**C30CNM15A02A0**
	2	4	**C30CNM24A02A0**
	3	3	**C30CNM33A02A0**
	4	2	**C30CNM42A02A0**
	5	1	**C30CNM51A02A0**
	6	0	**C30CNM60A02A0**
7	0	7	**C30CNM07A02A0**
	1	6	**C30CNM16A02A0**
	2	5	**C30CNM25A02A0**
	3	4	**C30CNM34A02A0**
	4	3	**C30CNM43A02A0**
	5	2	**C30CNM52A02A0**
	6	1	**C30CNM61A02A0**
	7	0	**C30CNM70A02A0**
8	0	8	**C30CNM08A02A0**
	1	7	**C30CNM17A02A0**
	2	6	**C30CNM26A02A0**
	3	5	**C30CNM35A02A0**
	4	4	**C30CNM44A02A0**
	5	3	**C30CNM53A02A0**
	6	2	**C30CNM62A02A0**
	7	1	**C30CNM71A02A0**
	8	0	**C30CNM80A02A0**

Notes

① To change the base coil voltage, replace the content of Position 9 with the appropriate code suffix from the table on **Page V5-T6-7**.

② To change auxiliary contact options, replace the content of Position 10 with the appropriate code suffix from the table on **Page V5-T6-7**.

③ To change the control module voltage, replace the content of Positions 12-13 with the appropriate code suffix from the table on **Page V5-T6-7**.

Two-Wire Mechanically Held Lighting Contactors—Standard Assembled Forms, continued

Number of Poles	NO	NC	Catalog Number ①②③
9	1	8	**C30CNM18A02A0**
	2	7	**C30CNM27A02A0**
	3	6	**C30CNM36A02A0**
	4	5	**C30CNM45A02A0**
	5	4	**C30CNM54A02A0**
	6	3	**C30CNM63A02A0**
	7	2	**C30CNM72A02A0**
	8	1	**C30CNM81A02A0**
	9	0	**C30CNM90A02A0**
10	2	8	**C30CNM28A02A0**
	3	7	**C30CNM37A02A0**
	4	6	**C30CNM46A02A0**
	5	5	**C30CNM55A02A0**
	6	4	**C30CNM64A02A0**
	7	3	**C30CNM73A02A0**
	8	2	**C30CNM82A02A0**
	9	1	**C30CNM91A02A0**
	10	0	**C30CNM100A02A0**
11	3	8	**C30CNM38A02A0**
	4	7	**C30CNM47A02A0**
	5	6	**C30CNM56A02A0**
	6	5	**C30CNM65A02A0**
	7	4	**C30CNM74A02A0**
	8	3	**C30CNM83A02A0**
	9	2	**C30CNM92A02A0**
	10	1	**C30CNM101A02A0**
	11	0	**C30CNM110A02A0**
12	4	8	**C30CNM48A02A0**
	6	6	**C30CNM66A02A0**
	8	4	**C30CNM84A02A0**
	10	2	**C30CNM102A02A0**
	12	0	**C30CNM120A02A0**

Base Coil Voltage (Digit 9) ④

Voltage	Code Suffix
115–120V 60 Hz/110V 50 Hz	**A**
230–240V 60 Hz/220V 50 Hz	**B**
460–480V 60 Hz/440V 50 Hz	**C**
575–600V 60 Hz/550V 50 Hz	**D**
200–208V 60 Hz	**E**
265–277V 60 Hz/240V 50 Hz	**H**
24V 60 Hz/20V 50 Hz	**T**
28V 60 Hz/24V 50 Hz	**V**
347V 60 Hz	**X**

Auxiliary Contact Installed (Digit 10)

Control Module	Circuit	Code Suffix
Two-wire	None	**0**
	1NO	**A**
	2NO	**B**
	1NC	**C**
	1NO-1NC	**D**
	2NO-1NC	**E**

Control Module Voltage (Digit 12-13)

Coil Module	Code Suffix
110–120 Vac	**A0**
200–277 Vac	**H0**
24 Vac	**T0**
12–24 Vdc	**T1**

Notes

① To change the base coil voltage, replace the content of Position 9 with the appropriate code suffix from the table above.

② To change auxiliary contact options, replace the content of Position 10 with the appropriate code suffix from the table above.

③ To change the control module voltage, replace the content of Positions 12-13 with the appropriate code suffix from the table above.

④ If coil supply is greater than 277V, use CPT.

Three-Wire Mechanically Held Lighting Contactors—Standard Assembled Forms

The Standard Assembled Forms in the table on **Page V5-T6-8** are three-wire open mechanically held 30A lighting contactors with 120V 60 Hz/110V 50 Hz base coil voltage, 120V control module voltage, and no additional auxiliary contacts. To change the base coil voltage, auxiliary contact options or control module voltage, refer to the tables on **Page V5-T6-9**.

Three-Wire Mechanically Held Lighting Contactors—Standard Assembled Forms

Number of Poles	NO	NC	Catalog Number ①②③
2	0	2	**C30CNM02A03A0**
	1	1	**C30CNM11A03A0**
	2	0	**C30CNM20A03A0**
3	0	3	**C30CNM03A03A0**
	1	2	**C30CNM12A03A0**
	2	1	**C30CNM21A03A0**
	3	0	**C30CNM30A03A0**
4	0	4	**C30CNM04A03A0**
	1	3	**C30CNM13A03A0**
	2	2	**C30CNM22A03A0**
	3	1	**C30CNM31A03A0**
	4	0	**C30CNM40A03A0**
5	0	5	**C30CNM05A03A0**
	1	4	**C30CNM14A03A0**
	2	3	**C30CNM23A03A0**
	3	2	**C30CNM32A03A0**
	4	1	**C30CNM41A03A0**
	5	0	**C30CNM50A03A0**
6	0	6	**C30CNM06A03A0**
	1	5	**C30CNM15A03A0**
	2	4	**C30CNM24A03A0**
	3	3	**C30CNM33A03A0**
	4	2	**C30CNM42A03A0**
	5	1	**C30CNM51A03A0**
	6	0	**C30CNM60A03A0**
7	0	7	**C30CNM07A03A0**
	1	6	**C30CNM16A03A0**
	2	5	**C30CNM25A03A0**
	3	4	**C30CNM34A03A0**
	4	3	**C30CNM43A03A0**
	5	2	**C30CNM52A03A0**
	6	1	**C30CNM61A03A0**
	7	0	**C30CNM70A03A0**
8	0	8	**C30CNM08A03A0**
	1	7	**C30CNM17A03A0**
	2	6	**C30CNM26A03A0**
	3	5	**C30CNM35A03A0**
	4	4	**C30CNM44A03A0**
	5	3	**C30CNM53A03A0**
	6	2	**C30CNM62A03A0**
	7	1	**C30CNM71A03A0**
	8	0	**C30CNM80A03A0**

Notes

① To change the base coil voltage, replace the content of Position 9 with the appropriate code suffix from the table on **Page V5-T6-9**.
② To change auxiliary contact options, replace the content of Position 10 with the appropriate code suffix from the table on **Page V5-T6-9**.
③ To change the control module voltage, replace the content of Positions 12-13 with the appropriate code suffix from the table on **Page V5-T6-9**.

Three-Wire Mechanically Held Lighting Contactors—Standard Assembled Forms, continued

Number of Poles	NO	NC	Catalog Number ①②③
9	1	8	**C30CNM18A03A0**
	2	7	**C30CNM27A03A0**
	3	6	**C30CNM36A03A0**
	4	5	**C30CNM45A03A0**
	5	4	**C30CNM54A03A0**
	6	3	**C30CNM63A03A0**
	7	2	**C30CNM72A03A0**
	8	1	**C30CNM81A03A0**
	9	0	**C30CNM90A03A0**
10	2	8	**C30CNM28A03A0**
	3	7	**C30CNM37A03A0**
	4	6	**C30CNM46A03A0**
	5	5	**C30CNM55A03A0**
	6	4	**C30CNM64A03A0**
	7	3	**C30CNM73A03A0**
	8	2	**C30CNM82A03A0**
	9	1	**C30CNM91A03A0**
	10	0	**C30CNM100A03A0**
11	3	8	**C30CNM38A03A0**
	4	7	**C30CNM47A03A0**
	5	6	**C30CNM56A03A0**
	6	5	**C30CNM65A03A0**
	7	4	**C30CNM74A03A0**
	8	3	**C30CNM83A03A0**
	9	2	**C30CNM92A03A0**
	10	1	**C30CNM101A03A0**
	11	0	**C30CNM110A03A0**
12	4	8	**C30CNM48A03A0**
	6	6	**C30CNM66A03A0**
	8	4	**C30CNM84A03A0**
	10	2	**C30CNM102A03A0**
	12	0	**C30CNM120A03A0**

Base Coil Voltage (Digit 9) ④

Voltage	Code Suffix
115–120V 60 Hz/110V 50 Hz	**A**
230–240V 60 Hz/220V 50 Hz	**B**
460–480V 60 Hz/440V 50 Hz	**C**
575–600V 60 Hz/550V 50 Hz	**D**
200–208V 60 Hz	**E**
265–277V 60 Hz/240V 50 Hz	**H**
24V 60 Hz/20V 50 Hz	**T**
28V 60 Hz/24V 50 Hz	**V**
347V 60 Hz	**X**

Auxiliary Contact Installed (Digit 10)

Control Module	Circuit	Code Suffix
Three-wire	None	**0**
	1NC	**C**
	1NO	**F**
	1NO-1NC	**G**

Control Module Voltage (Digit 12-13)

Coil Module	Code Suffix
110–120 Vac	**A0**
200–277 Vac	**H0**
24 Vac	**T0**
12–24 Vdc	**T1**

Notes

① To change the base coil voltage, replace the content of Position 9 with the appropriate code suffix from the table above.

② To change auxiliary contact options, replace the content of Position 10 with the appropriate code suffix from the table above.

③ To change the control module voltage, replace the content of Positions 12-13 with the appropriate code suffix from the table above.

④ If coil supply is greater than 277V, use CPT.

Components

Electrically Held Base Contactor

The C30CNE20_0 Electrically Held Base Contactor contains a 2NO power pole as standard and will allow the addition of power poles to build an electrically held contactor up to 12 poles maximum. A mechanically held module kit can also be added to convert the electrically held contactor into a mechanically held contactor in the field.

Electrically Held Base Contactor



Electrically Held Base Contactor

Power Poles	Catalog Number ①
2NO	**C30CNE20_0**

Electrically Held Lighting Contactors ②

Number of Poles	NO	NC	Catalog Number
2	2	0	**C30CNE20_0**
	1	1	**C30CNE11_0**
	0	2	**C30CNE02_0**
4	4	0	**C30CNE40_0**
	2	2	**C30CNE22_0**
	0	4	**C30CNE04_0**
6	6	0	**C30CNE60_0**
8	8	0	**C30CNE80_0**
	4	4	**C30CNE44_0**
	0	8	**C30CNE08_0**

Coil Base Voltage (Digit 8)

Voltage (Digit 8)	Code Suffix
115–120V 60 Hz/110V 50 Hz	**A**
230–240V 60 Hz/220V 50 Hz	**B**
460–480V 60 Hz/440V 50 Hz	**C**
575–600V 60 Hz/550V 50 Hz	**D**
200–208V 60 Hz	**E**
265–277V 60 Hz/240V 50 Hz	**H**
24V 60 Hz/20V 50 Hz	**T**
28V 60 Hz/24V 50 Hz	**V**
347V 60 Hz	**X**

Power Poles

The C30CNM contactor accepts up to a maximum six single- or two-pole (or combinations) power poles. These can be used to form up to:

- 12 NO poles maximum when six two-poles are used in NO positions (1–6) or
- 8 NC poles maximum with four two-poles in the NC position (1–4) and 4 NO poles with two two-poles in the 2 NO positions (5–6)

Power Poles



Power Poles

Power Poles	Catalog Number
Single-pole	**C320PRP1**
Two-pole	**C320PRP2**

Mechanically Held Module Kits

These kits are for converting electrically held contactors to mechanically held units. Kits include control module, latch, latch cover and auxiliary contacts plus installation instructions. Conversion kits are suitable for coil voltages of 277V and below.

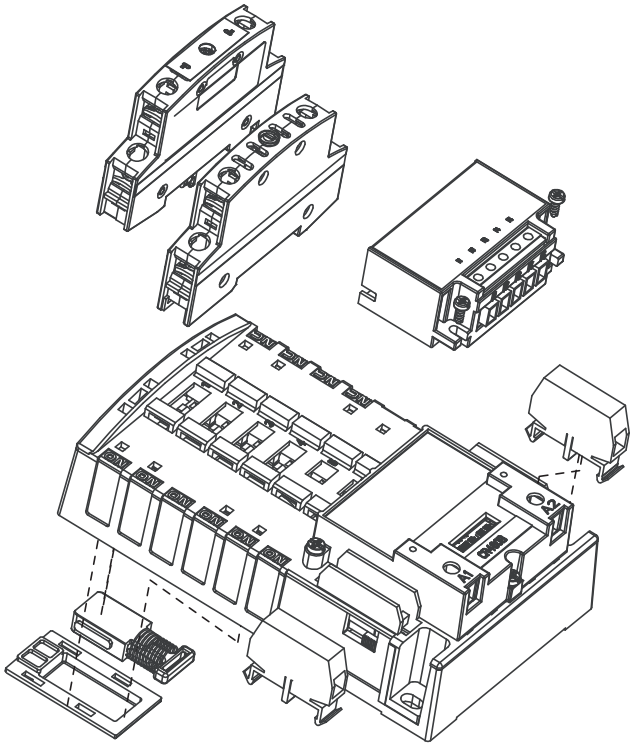
Conversion Kits



Mechanically Held Module Kits

Coil Volts	Control Volts	Catalog Number
Two-Wire		
24–277 Vac	110–120 Vac	**C320MH2WA0**
	200–277 Vac	**C320MH2WH0**
	24 Vac	**C320MH2WT0**
	12–24 Vdc	**C320MH2WT1**
Three-Wire		
24–277 Vac	110–120 Vac	**C320MH3WA0**
	200–277 Vac	**C320MH3WH0**
	24 Vac	**C320MH3WT0**
	12–24 Vdc	**C320MH3WT1**

C30CNM Components—Exploded View



Notes

① When ordering, select required contactor by catalog number and replace the magnet coil alpha designation in the catalog number (_) with the proper code suffix from the Coil Base Voltage table on this page.

② A number of other power pole configurations are also available using the single-pole and two-pole power poles. Electrically held units can be purchased with up to 12-pole configurations with a maximum of 8NO and 4NC power poles.

Auxiliary Contacts

A mechanically held contactor with a two-wire control module uses 1NC auxiliary contact as standard for the control wiring circuit. The mechanically held contactor with a three-wire control module uses 1NO-1NC auxiliary contacts as standard for the control wiring circuit. See table below for possible additional auxiliary contact configurations.

Auxiliary Contacts



Auxiliary Contacts

Auxiliary Block	Catalog Number
Single-pole	**C320AMH1**
Two-pole	**C320AMH2**

Auxiliary Contact Configurations

Two-Wire	Three-Wire
None	1NC (two-pole)
1NO (single-pole)	1NO (two-pole)
2NO (two-pole)	1NO-1NC (two-pole)
1NC (two-pole)	—
1NO-1NC (NO single-pole, NC two-pole)	—
2NO-1NC (two-pole)	—

Replacement Parts

Magnetic Coils



Magnet Coils for Base Contactors

Coil Voltage	Catalog Number
115–120V 60 Hz/110V 50 Hz	**9-3242-1**
230–240V 60 Hz/220V 50 Hz	**9-3242-2**
460–480V 60 Hz/440V 50 Hz	**9-3242-3**
575–600V 60 Hz/550V 50 Hz	**9-3242-4**
200–208V 60 Hz	**9-3242-5**
265–277V 60 Hz/240V 50 Hz	**9-3242-6**
24V 60 Hz/20V 50 Hz	**9-3242-7**
28V 60 Hz/24V 50 Hz	**9-3242-8**
347V 60 Hz	**9-3242-9**

Technical Data and Specifications

Main Power Poles

Maximum AC Voltage and Ampere Ratings

Load Type	Amps Continuous	Poles Single-Phase	Three-Phase
Ballast	30	347 Vac	600 Vac
General use	30	600 Vac	600 Vac
Tungsten	20	277 Vac	480 Vac
AC resistive	30	600 Vac	600 Vac

Maximum Horsepower Rating

Normal Starting Duty Volts	Horsepower
Single-Pole, Single-Phase	
110–120V	1
220–240V	2
Three-Pole, Three-Phase	
200–208V	3
220–240V	5
440–480V	10
550–600V	15

Control Circuit Characteristics

Coil

Description	VA
Inrush	248 VA
Sealed	28 VA

Control Module

Input Voltage	Steady State Current at Rated Voltage (mA)	Maximum VA
12–24 Vdc	42	2
24 Vac	80	5
115–120 Vac	83	12
200–277 Vac	91	30

Other Control Module Characteristics

Description	Specification
Minimum pulse duration (three-wire control module)	250 ms
Maximum allowable leakage current	1.8 mA
EMI	35 V/m
Surge transient peak	6 kV
Frequency range	40–70 Hz

Auxiliary Contacts Rating

A600, 24 Vdc, 24 Vac

Ambient Temperature

–13 to 104°F (–25 to 40°C)

Mounting Position

Vertical 3-point mounting only

Wire Size

Wire Specifications

Component	Number of Cables	Wire Range (Solid or Stranded)	Wire Temperature
Power poles	1	14–8 AWG	75°C Cu
	2	14–8 AWG ①	75°C Cu
Coil	1 or 2	18–14 AWG	60°/75°C Cu
Control module	1	22–12 AWG	60°/75°C Cu
Auxiliary contacts	1 or 2	22–12 AWG	60°/75°C Cu

Note

① 8 AWG stranded only.

Non-Combination C30 Lighting Contactors SCCR Charts

Circuit Breakers

AC Service Voltage	Breaker Size	Circuit Breaker Design	Enclosure Type (Standard Size Enclosure) Type 1	SCCR Value	Enclosure Type (Standard Size Enclosure) Type 12	SCCR Value	Enclosure Type (Standard Size Enclosure) Type 3R	SCCR Value
240 V	30 A	Eaton T-mag ①	Eaton Box 2 or UL Listed equivalent ②	14 kA	Eaton Box 5 or UL Listed equivalent ②	14 kA	Eaton Box 5A or UL Listed equivalent ②	14 kA
	40 A	Eaton T-mag ①		10 kA		10 kA		10 kA
277 V	30 A	Eaton T-mag ①		10 kA		10 kA		10 kA
480 V	40 A	Eaton T-mag ①		5 kA		5 kA		5 kA
600 V	40 A	Eaton T-mag ①		5 kA		5 kA		5 kA

Circuit Breakers

AC Service Voltage	Breaker Size	Circuit Breaker Design	Enclosure Type (Oversized Enclosure) Type 1	SCCR Value	Enclosure Type (Oversized Enclosure) Type 12	SCCR Value	Enclosure Type (Oversized Enclosure) Type 3R	SCCR Value
240 V	40 A	Eaton T-mag ①	Eaton Box F or UL Listed equivalent ②	22 kA	Eaton Box I or UL Listed equivalent ②	22 kA	Eaton Box L or UL Listed equivalent ②	22 kA
277 V	40 A	Eaton T-mag ①		14 kA		14 kA		14 kA
480 V	40 A	Eaton T-mag ①		10 kA		10 kA		10 kA

Fuses

AC Service Voltage ③	Fuse Size and Class	Fuse Vendor	Enclosure Type (Standard Size Enclosure) Type 1	SCCR Value	Enclosure Type (Standard Size Enclosure) Type 12	SCCR Value	Enclosure Type (Standard Size Enclosure) Type 3R	SCCR Value
600 V	30 A, Class J	Eaton (Bussmann)	Eaton Box 2 or UL Listed equivalent ②	100 kA	Eaton Box 5 or UL Listed equivalent ②	100 kA	Eaton Box 5A or UL Listed equivalent ②	100 kA
600 V	30 A, Class RK1 or K	Eaton (Bussmann)		50 kA		50 kA		50 kA
600 V	30 A, Class H	Eaton (Bussmann)		10 kA		10 kA		10 kA

Fuses

AC Service Voltage ③	Fuse Size and Class	Fuse Vendor	Enclosure Type (Oversized Enclosure) Type 1	SCCR Value	Enclosure Type (Oversized Enclosure) Type 12	SCCR Value	Enclosure Type (Oversized Enclosure) Type 3R	SCCR Value
600 V	30 A, Class RK5 or K	Eaton (Bussmann)	Eaton Box F or UL Listed equivalent ②	100 kA	Eaton Box I or UL Listed equivalent ②	100 kA	Eaton Box L or UL Listed equivalent ②	100 kA
600 V	30 A, Class H	Eaton (Bussmann)		10 kA		10 kA		10 kA
600 V	40 A, Class J or RK1	Eaton (Bussmann)		100 kA		100 kA		100 kA

Notes

① Any Eaton UL Listed thermal-magnetic circuit breaker may be used provided the breaker interrupting rating meets or exceeds the SCCR values shown above.

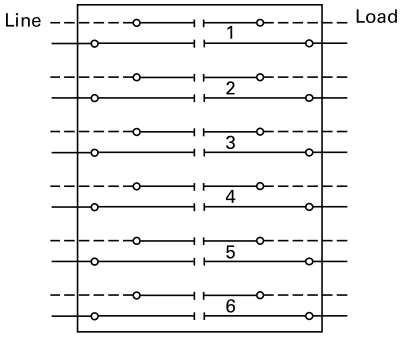
② Any UL Listed enclosure may be used that meets or exceeds the size of the specified Eaton enclosure.

③ 600 V covers all lower voltage values (200 to 600 Vac). Fuse interrupting rating must meet or exceed SCCR value shown above.

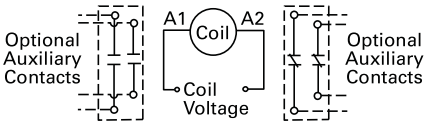
Wiring Diagrams

C30CNE

C30CNE Electrically Held

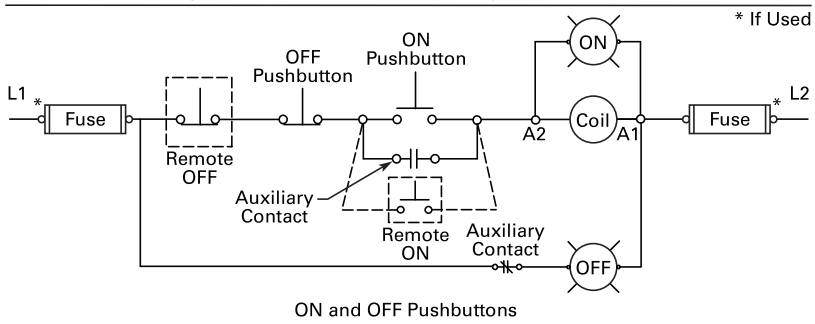


View A

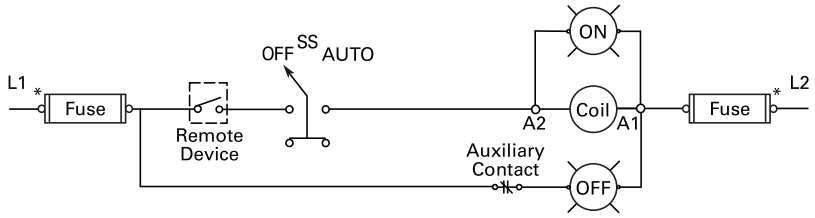


CONTROL
Refer to View "B" for Control Connections

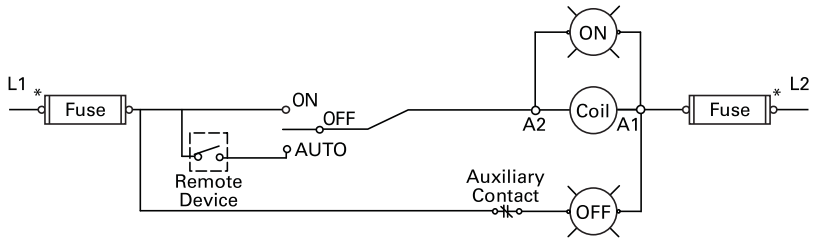
View B
Optional Pilot Devices for Electrically Held Contactor



ON and OFF Pushbuttons

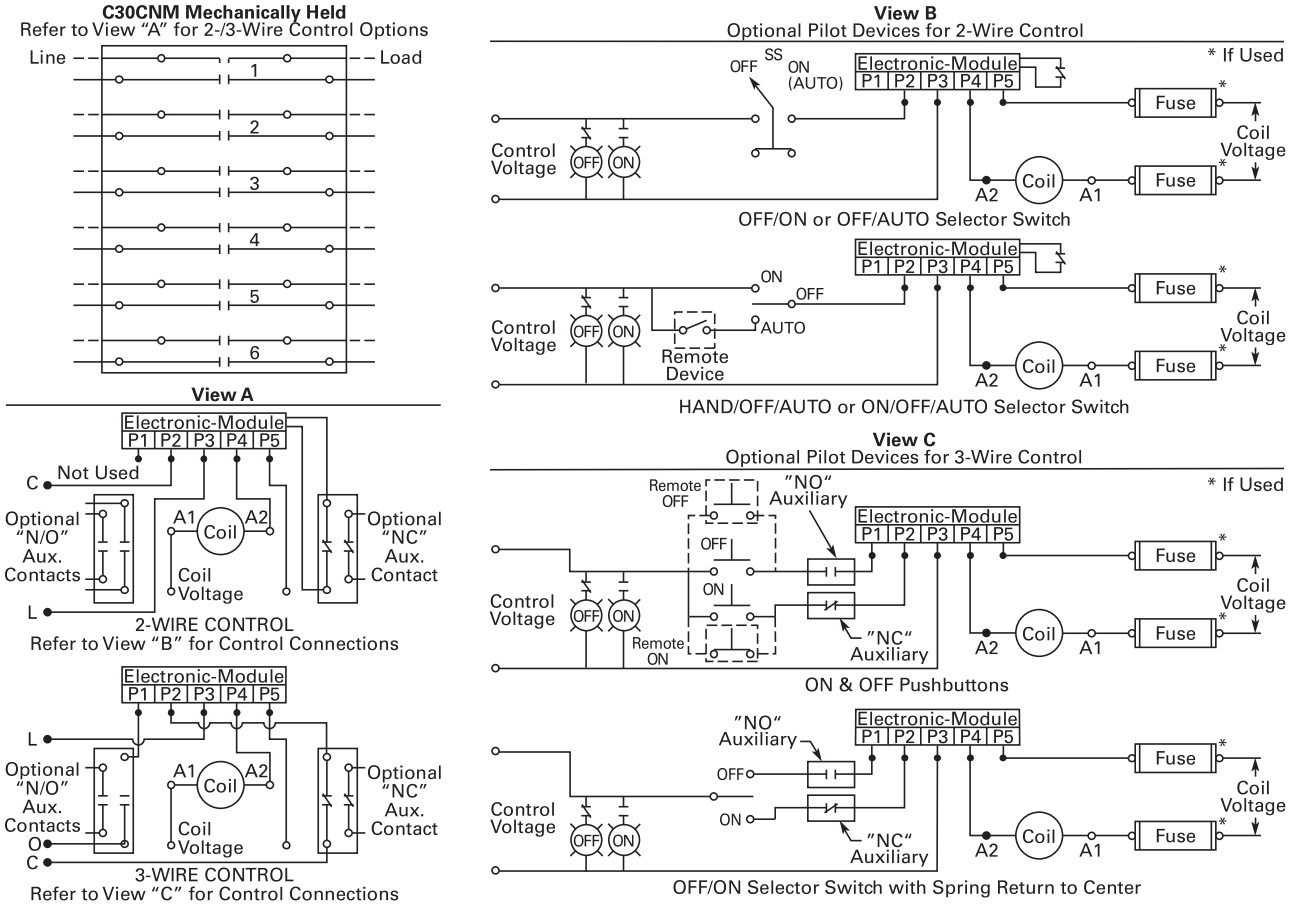


OFF/ON or OFF/AUTO Selector Switch



OFF/ON/AUTO or HAND/OFF/AUTO Selector Switch

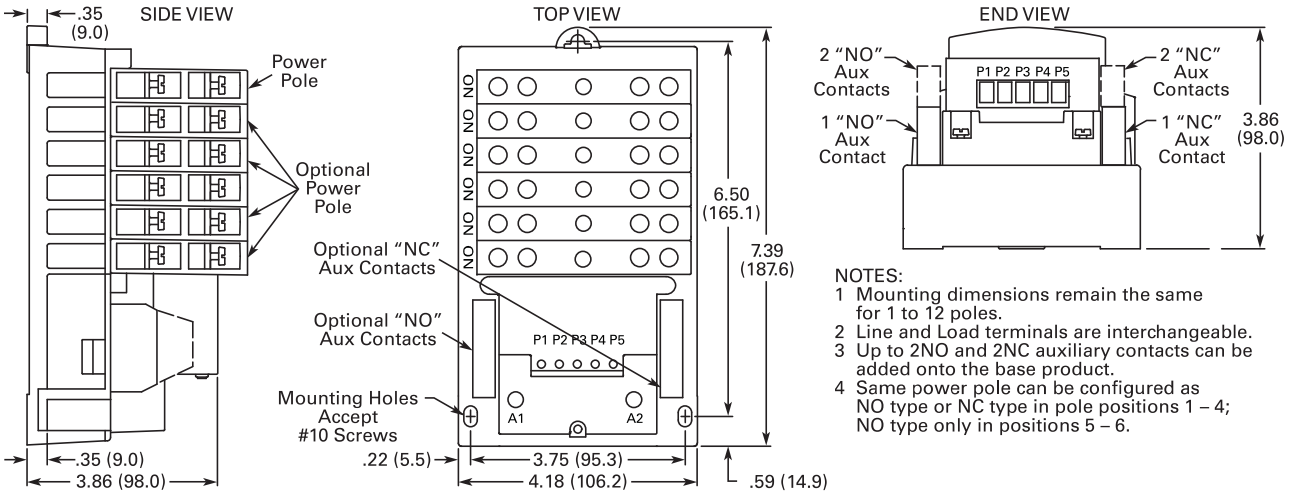
C30CNM



Dimensions

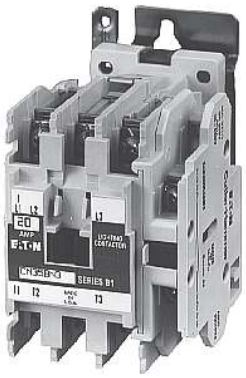
Approximate Dimensions in Inches (mm)

C30CN



NOTES:
1 Mounting dimensions remain the same for 1 to 12 poles.
2 Line and Load terminals are interchangeable.
3 Up to 2NO and 2NC auxiliary contacts can be added onto the base product.
4 Same power pole can be configured as NO type or NC type in pole positions 1 – 4; NO type only in positions 5 – 6.

CN35 Electrically Held



Contents

Description	*Page*
C30CN Mechanically and Electrically Held	**V5-T6-3**
CN35 Electrically Held	
Product Selection	**V5-T6-17**
Accessories	**V5-T6-18**
Renewal Parts	**V5-T6-20**
Dimensions	**V5-T6-21**
A202 Magnetically Latched	**V5-T6-23**

CN35 Electrically Held

Product Description

Type CN35 Electrically Held Lighting Contactors from Eaton's Electrical Sector are designed to handle the switching of tungsten (incandescent) or ballast (fluorescent and mercury arc) lamp loads as well as other non-motor (resistive) loads.

Application Description

- Ideal applications include industrial plants, stadiums, parks and any new construction requiring lighting control
- Ballast lamps equate to fluorescent, mercury vapor, sodium vapor and quartz loads and will operate at a maximum of 600V
- Filament lamps equate to incandescent, infrared, sodium iodine and heating loads and will operate at a maximum of 480V
- Resistance heating equates to radiant and convection heating, furnace and oven loads

Features

- Designed and tested specifically for lighting and resistive loads
- Easy to install and maintain
- Full line of Freedom snap-on accessories
- Standard with 1NO auxiliary contact (the 10A two- and three-pole ship standard with the auxiliary in the fourth power pole position with no increase in width)
- Top and side mounted auxiliary contacts available for 10–60A devices; side mounted auxiliaries only available on 100A and greater
- Straight-through wiring

Standards and Certifications

- UL File No. E37317, Guide LR353
- CSA File No. LR353
- Designed and built to NEMA ICS-2 Standards

Listed

Instructional Leaflets

19225 CN35AN (2-, 3-, 4-Pole)

19227 CN35BN (2-, 3-Pole)

24829 CN35BN (4-, 5-Pole)

24840 CN35BN (6-, 9-, 12-Pole)

19227 CN35DN (2-, 3-Pole)

19229 CN35GN (2-, 3-Pole)

19874 CN35GN (4-, 5-Pole)

20218 CN35KN (2-, 3-Pole)

20171 CN35NN (2-, 3-Pole)

20172 CN35SN (2-, 3-Pole)

20172 CN35TN (2-, 3-Pole)

Product Selection

When Ordering Specify

- Catalog number including the coil suffix code from the Magnet Coil Selection table
- Any required accessories

CN35GN5A



CN35 AC Lighting Contactors—Electrically Held

Maximum Ampere Rating ①	Number of Poles	Open Type Catalog Number ③
10	2	**CN35AN2_B**
	3	**CN35AN3_B**
	4	**CN35AN4_B**
20	2	**CN35BN2_B**
	3	**CN35BN3_B**
	4	**CN35BN4_B**
	6	**CN35BN6_B**
	9	**CN35BN9_B**
	12	**CN35BN12_B**
30	2	**CN35DN2_B**
	3	**CN35DN3_B**
	4	**CN35DN4_B**
	5	**CN35DN5_B**
	6	**CN35DN6_B**
	9	**CN35DN9_B**
	12	**CN35DN12_B**
60	2	**CN35GN2_B**
	3	**CN35GN3_B**
	4 ②	**CN35GN4_B**
	5 ②	**CN35GN5_B**
100	2	**CN35KN2_**
	3	**CN35KN3_**
200	2	**CN35NN2_**
	3	**CN35NN3_**
300	2	**CN35SN2_**
	3	**CN35SN3_**
400 ④	2	**CN35TN2_**
	3	**CN35TN3_**

Magnet Coil Selection

Coil Voltage and Hertz ⑤	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208–240/60 ⑥	**J**
240/50	**K**
380–415/60	**L**
550/50	**N**
24/60, 24/50 ⑦	**T**
24/50	**U**
32/50	**V**
48/60	**W**
48/50	**Y**

Notes

① The listed ampere ratings are based on a maximum load voltage of 480V for tungsten lamp applications and 600V for ballast or mercury vapor type applications.
② Additional power poles mounted on side(s) of contactor.
③ Underscore (_) indicates missing code letter for magnet coil—see Magnet Coil Selection table.
④ UL ballast and resistive ratings only.
⑤ For **DC Magnet Coils**, see NEMA Contactors and Starters, Tab 2 in this volume.
⑥ For 10, 20 and 30A sizes only. Sizes 60–400A are 24V/60 Hz only.
⑦ For 10, 20 and 30A sizes only.

Accessories

Transient Suppressor Kits

10–60A Contactors

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil. There are three separate suppressors for use on 24–120V, 240V or 480V coils respectively.

These devices mount directly to the coil terminals of lighting contactors 10–60A.

C320TS2



Kits for 10–60A

Description	Coil Voltage	Catalog Number
Transient suppressor	24 –120V	**C320TS1**
	240V	**C320TS2**
	480V	**C320TS3**

100–300A Contactors

This device mounts on top of any side mounted auxiliary contact on lighting contactors 100–300A. It connects across coil terminals on any 120V contactor magnet coil.

Limits high voltage transients produced in the circuit when power is removed from the coil.

C320AS1



Kits for 100–300A

Description	Coil Voltage	Catalog Number
Transient suppressor	120V	**C320AS1**

Auxiliary Contacts

CN35 Lighting Contactors include a 1NO maintaining auxiliary contact mounted on right hand side (on 10A, two- and three-pole devices, auxiliary contact occupies 4th power pole position—no increase in width). The 10–60A devices will accept additional auxiliary contacts on the top and/or sides.

Auxiliary contact blocks are designed for snap-on installation—fast, easy installation (no tools required up to 60A).

All auxiliary contacts are of the bifurcated design with parallel circuit paths. This redundant path provides very high reliability. Auxiliary contacts can be snapped on the side (up to two circuits—per auxiliary contact) and on the top (up to four circuits). Auxiliary contacts for larger contactors, 100–400A sizes, will accept side mounted auxiliaries only and easily attach to the side of the contactor with two screws.

Side Mounted



Top Mounted



Auxiliary Contacts—10–60A Contactors

Description	Contact Configuration Code ①	Catalog Number
Side Mounted		
1NO	10	**C320KGS1**
1NC	01	**C320KGS2**
1NO-1NC	11	**C320KGS3**
2NO	20	**C320KGS4**
2NC	02	**C320KGS5**
Top Mounted ②		
1NO	10	**C320KGT1**
1NC	01	**C320KGT2**
1NO-1NC	11	**C320KGT3**
2NO	20	**C320KGT4**
2NC	02	**C320KGT5**
3NO	30	**C320KGT9**
2NO-1NC	21	**C320KGT10**
1NO-2NC	12	**C320KGT11**
3NC	03	**C320KGT12**
4NO	40	**C320KGT13**
3NO-1NC	31	**C320KGT14**
2NO-2NC	22	**C320KGT15**
1NO-3NC	13	**C320KGT16**
4NC	04	**C320KGT17**

Notes

① For reference only—not part of catalog number. See **Page V5-T6-19.**

② Cannot be added to contactors or starters mounted in Box 1 (NEMA Type 1).

Auxiliary Contacts—100–400A Contactors

Base Auxiliary Contact—C320KGS42



Auxiliary Contact—C320KGS22



Circuit	Contact Configuration Code ①	100A Contactors Catalog Number	200 and 300A Contactors Catalog Number
Base Auxiliary Contacts			
NO	10	**C320KGS31**	**C320KGS41**
NO-NC	11	**C320KGS32**	**C320KGS42**
Auxiliary Contacts			
NO	10	**C320KGS20**	
NC	01	**C320KGS21**	
NO-NC ②	11	**C320KGS22**	

Auxiliary Contact Ratings (Amperes)

Current	AC Volts 120V	240V	480V	600V
NEMA A600				
Make and interrupting	60.0	30.0	15.0	12.0
Break	6.0	3.0	1.5	1.0
Continuous	10.0	10.0	10.0	10.0
NEMA P300				
Continuous thermal rating: 5A				
DC Volts	**Make/Break Amperes**			
125	1.10			
250	0.55			

Contact Configuration Code

This 2-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

Auxiliary Contact Location

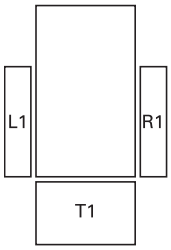
Auxiliary Contacts—Mounting Positions

The sketches below illustrate the maximum number of auxiliary contacts that can be assembled to a contactor and their locations in standard enclosures.

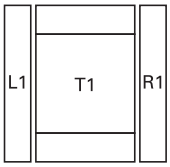
Auxiliary Contact Mounting Positions

Size	Poles	Available Mounting Positions ③④⑤ Open Type	NEMA 1	NEMA 3R, 4X, 12
10A	2–4	T1, L1, R1	L1	L1, T1
20–60A	2–3	T1, L1	L1	L1, T1
60A	4	T1, L1	—	L1, T1
60A	5	T1, L1	—	L1, T1
100A	2–3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3
200A	2–3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3
300A	2–3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3
400A	2–3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3	R2, R3, L1, L2, L3

10–60A Contactors

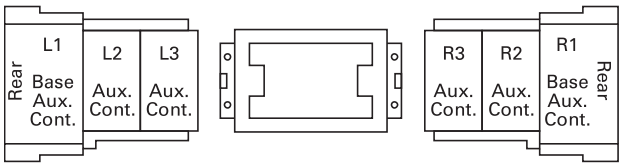


Top View



Front View

100–400A Contactors



Left Side of Contactor | Front of Contactor | Right Side of Contactor

Notes

① For reference only—not part of catalog number.
② NO-NC occupies two positions—L2 and L3 or R2 and R3.
③ Available positions on contactors or starters other than what is factory installed.
④ When a pneumatic timer is mounted on contactor, only side mounted auxiliary contact positions are available. The solid-state timer, when added, takes up side mounted auxiliary contact position.
⑤ For 100–400A contactors, a base auxiliary contact must be added in position L1 before additional contacts can be mounted.

Pneumatic Timers—Top Mounted

Attachment mounts on top of 10–60A lighting contactors (top mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has DPST timed contacts—circuits in each pole must be the same polarity. Units are convertible from OFF to ON delay or vice-versa.

Pneumatic Timer



Pneumatic Timers

Timing Range	Catalog Number
0.1 to 30 seconds	**C320TP1**
10 to 180 seconds	**C320TP2**

Solid-State Timers

Solid-State ON DELAY Timer—Side Mounted on CN35 Freedom Series Lighting Contactors through 60A

This timer is designed to be **wired in SERIES with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON DELAY timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.

Mounted Timer



Mounted Timer

Timing Range	Catalog Number ①②③
0.1–1.0 seconds	**C320TDN1_**
1–30 seconds	**C320TDN30_**
30–300 seconds	**C320TDN300_**
5–30 minutes	**C320TDN3000_**

Maximum Ampere Ratings

	Volts AC			
Description	**120**	**240**	**480**	**600**
Make	30.0	15.0	7.5	6.0
Break	3.0	1.5	0.75	0.6

Renewal Parts

CN35 Lighting Contactors

Description		10A Series C1 Part No.	20A, 30A Series C1 Part No.	60A Series B1 Part No.	100A Part No.	200A Part No.	300A Series B1 Part No.
Contact Kits							
Two-pole		④	④	**6-65-7**	**6-43-5**	**6-44**	**6-45**
Three-pole		④	④	**6-65-8**	**6-43-6**	**6-44-2**	**6-45-2**
Four-pole		④	④	**6-65-15**	—	—	—
Five-pole		④	④	**6-65-16**	—	—	—
Magnet Coils	**Coil Suffix**						
120V 60 Hz or 110V 50 Hz	**A**	**9-2875-1**	**9-2876-1**	**9-2703-1**	**9-2756-1**	**9-1891-1**	**9-1891-1**
240V 60 Hz or 220V 50 Hz	**B**	**9-2875-2**	**9-2876-2**	**9-2703-2**	**9-2756-2**	**9-1891-2**	**9-1891-2**
480V 60 Hz or 440V 50 Hz	**C**	**9-2875-3**	**9-2876-3**	**9-2703-3**	**9-2756-3**	**9-1891-3**	**9-1891-3**
600V 60 Hz or 550V 50 Hz	**D**	**9-2875-4**	**9-2876-4**	**9-2703-4**	**9-2756-4**	**9-1891-4**	**9-1891-4**
208V 60 Hz	**E**	**9-2875-5**	**9-2876-5**	**9-2703-9**	**9-2756-5**	**9-1891-13**	**9-1891-13**
277V 60 Hz	**H**	**9-2875-12**	**9-2876-12**	**9-2703-7**	**9-2756-9**	**9-1891-26**	**9-1891-26**
208/240V 60Hz	**J**	**9-2875-37**	**9-2876-37**	—	—	—	—
240V 50 Hz	**K**	**9-2875-11**	**9-2876-11**	**9-2703-14**	**9-2756-13**	**9-1891-20**	**9-1891-20**
380–415V 50 Hz	**L**	**9-2875-6**	**9-2876-6**	**9-2703-8**	—	—	—
380V 50 Hz	**L**	—	—	—	**9-2756-12**	**9-1891-14**	**9-1891-14**
415V 50 Hz	**M**	—	—	—	**9-2756-8**	**9-1891-21**	**9-1891-21**
550V 50 Hz	**N**	—	—	—	**9-2756-14**	**9-1891-8**	**9-1891-8**
24V 60 Hz–24V 50 Hz	**T**	**9-2875-36**	**9-2876-36**	—	—	—	—
24V 60 Hz	**T**	—	—	**9-2703-6**	**9-2756-6**	**9-1891-15**	**9-1891-15**
24V 50 Hz	**U**	**9-2875-36**	**9-2876-13**	**9-2703-12**	**9-2756-11**	**9-1891-16**	**9-1891-16**
32V 50 Hz	**V**	**9-2875-16**	**9-2876-16**	**9-2703-10**	**9-2756-10**	—	—
48V 60 Hz	**W**	**9-2875-8**	**9-2876-8**	**9-2703-11**	**9-2756-15**	—	—
48V 50 Hz	**Y**	**9-2875-9**	**9-2876-9**	**9-2703-13**	**9-2756-7**	**9-1891-18**	**9-1891-18**

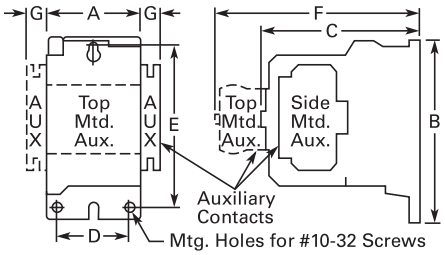
Notes

① Add operating voltage suffix to catalog number. **A** = 120V, **B** = 240V, **E** = 208V
② Rated 0.5A pilot duty—not to be used on larger contactors.
③ Terminal connections are quick connects only. Two per side.
④ Replace with complete contactor.

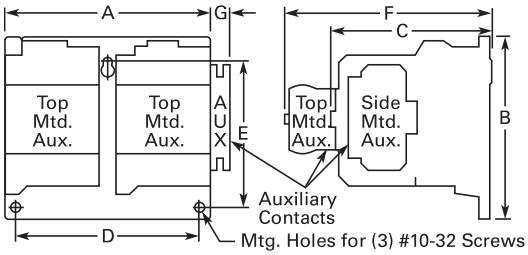
Dimensions

Approximate Dimensions in Inches (mm)

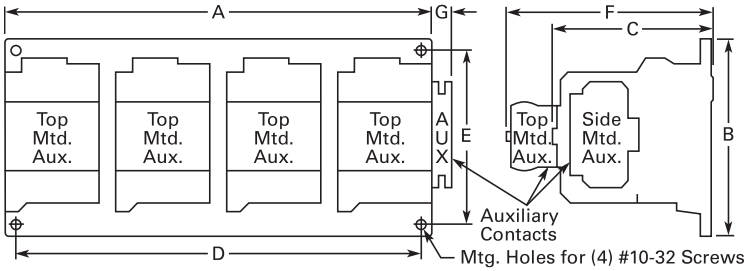
Open Type—10A, Two- to Four-Pole; 20–30A, Two- to Three-Pole



Open Type—20–30A, Four- to Six-Pole



Open Type—20–30A, Nine- to 12-Pole



Dimensions and Shipping Weights

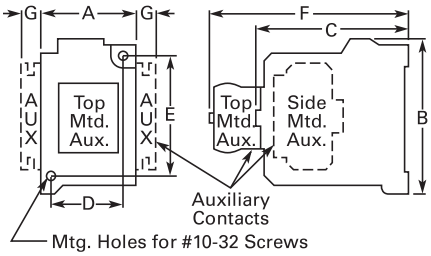
Ampere Rating	Number of Poles	Wide A	High B	Deep C	Mounting D ①	E	F	G	Shipping Weight Lbs (kg)
Open Type									
10	2–4	2.00 (50.8)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1)	3.38 (85.9)	4.90 (124.5)	0.54 (13.7)	1.4 (0.6)
20–30	2–3	2.00 (50.8)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1)	3.38 (85.9)	4.90 (124.5)	0.54 (13.7)	1.5 (0.7)
20–30	4–6	4.20 (106.7)	4.35 (110.5)	3.52 (89.4)	3.50 (88.9)	3.86 (98.0)	4.90 (124.5)	0.54 (13.7)	2.9 (1.3)
20–30	9	10.50 (266.7)	5.75 (146.1)	4.52 (114.8)	4.50 (114.3)	5.00 (127.0)	—	—	4.4 (2.0)
20–30	12	10.50 (266.7)	5.75 (146.1)	4.52 (114.8)	4.50 (114.3)	5.00 (127.0)	—	—	5.8 (2.6)
60	2–3	2.56 (65.0)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8)	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.5 (1.6)
60	4	3.46 (87.9)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8)	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.5 (1.6)
60	5	4.36 (110.7)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8)	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.5 (1.6)
100	2–3	3.54 (89.9)	7.17 (182.1)	5.94 (150.9)	3.00 (76.2)	6.63 (168.4)	—	0.54 (13.7)	9.0 (4.1)
200	2–3	7.05 (179.1)	9.11 (231.4)	7.25 (184.2)	6.00 (152.4)	8.50 (215.9)	—	—	20.0 (9.1)
300	2–3	7.05 (179.1)	13.12 (333.2)	7.78 (197.6)	6.00 (152.4)	12.50 (317.5)	—	—	23.0 (10.4)

Note

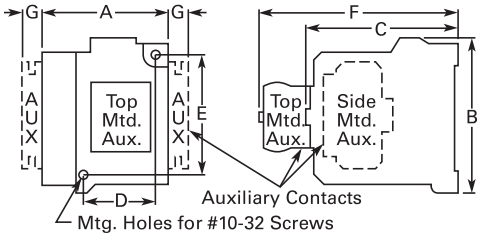
① Center mounting slot at bottom on 10–30A sizes only.

Approximate Dimensions in Inches (mm)

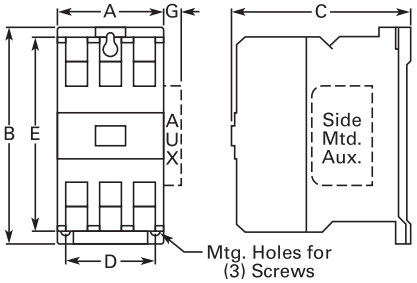
60A, Two- to Three-Pole



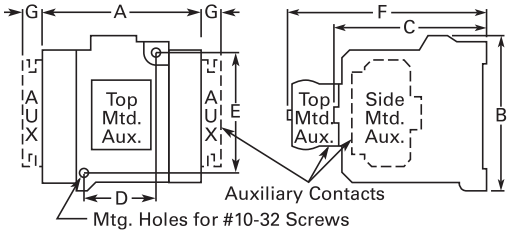
60A, Four-Pole



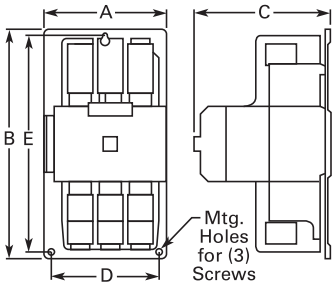
100A, Two- to Three-Pole



60A, Five-Pole



200–300A, Two- to Three-Pole



Dimensions and Shipping Weights

Ampere Rating	Number of Poles	Wide A	High B	Deep C	Mounting D ①	E	F	G	Shipping Weight Lbs (kg)
Open Type									
10	2–4	2.00 (50.8)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1)	3.38 (85.9)	4.90 (124.5)	0.54 (13.7)	1.4 (0.6)
20–30	2–3	2.00 (50.8)	3.88 (98.6)	3.49 (88.6)	1.50 (38.1)	3.38 (85.9)	4.90 (124.5)	0.54 (13.7)	1.5 (0.7)
20–30	4–6	4.20 (106.7)	4.35 (110.5)	3.52 (89.4)	3.50 (88.9)	3.86 (98.0)	4.90 (124.5)	0.54 (13.7)	2.9 (1.3)
20–30	9	10.50 (266.7)	5.75 (146.1)	4.52 (114.8)	4.50 (114.3)	5.00 (127.0)	—	—	4.4 (2.0)
20–30	12	10.50 (266.7)	5.75 (146.1)	4.52 (114.8)	4.50 (114.3)	5.00 (127.0)	—	—	5.8 (2.6)
60	2–3	2.56 (65.0)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8)	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.5 (1.6)
60	4	3.46 (87.9)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8)	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.5 (1.6)
60	5	4.36 (110.7)	5.05 (128.3)	4.44 (112.8)	2.00 (50.8)	4.50 (114.3)	5.80 (147.3)	0.54 (13.7)	3.5 (1.6)
100	2–3	3.54 (89.9)	7.17 (182.1)	5.94 (150.9)	3.00 (76.2)	6.63 (168.4)	—	0.54 (13.7)	9.0 (4.1)
200	2–3	7.05 (179.1)	9.11 (231.4)	7.25 (184.2)	6.00 (152.4)	8.50 (215.9)	—	—	20.0 (9.1)
300	2–3	7.05 (179.1)	13.12 (333.2)	7.78 (197.6)	6.00 (152.4)	12.50 (317.5)	—	—	23.0 (10.4)

Note

① Center mounting slot at bottom on 10–30A sizes only.

A202 Mechanically Latched



Contents

Description	*Page*
C30CN Mechanically and Electrically Held	**V5-T6-3**
CN35 Electrically Held	**V5-T6-16**
A202 Magnetically Latched	
Product Selection	**V5-T6-24**
Accessories	**V5-T6-24**
Renewal Parts	**V5-T6-25**
Technical Data and Specifications	**V5-T6-26**
Wiring Diagrams	**V5-T6-26**
Dimensions	**V5-T6-27**

A202 Magnetically Latched

Product Description

The A202 Lighting Contactor from Eaton's Electrical Sector provides a safe and convenient means for local or remote switching of relatively large tungsten, fluorescent or mercury arc lamp loads.

Application Description

- The magnetically latched lighting contactors are designed to withstand the large initial inrush currents of tungsten lamp loads without contact welding
- The A202 contactors are fully rated devices that do not require de-rating similar to standard motor control contactors
- The magnetically latched lighting contactor provides effective control in applications such as office buildings, industrial plants, hospitals, stadiums, airports, and so on

Features

- Designed and tested specifically for lighting and resistive loads
- Easy to install and maintain
- No control power necessary to maintain contact closure

Operation

A permanent magnet is built into the contactor structure that will maintain the contactor in its energized state indefinitely without using control power. When energized, a DC current is applied to the latch coil, producing a magnetic field that reinforces the polarity of the permanent magnet, pulling in the contactor. The coil clearing interlock disconnects the current to the coil. In order to drop out the contactor, it is necessary to apply a field through the STOP coil in the reverse direction to the permanent magnet. This momentarily cancels the magnetic attraction and the contactor drops out.

Standards and Certifications

- UL Listed File No. E44424, Guide NRNT
- CSA Certified File No. LR39402, Class 3231-01
- Designed and built to NEMA ICS-2 Standards

Listed

Instructional Leaflets

IL16965 30A (2-, 3-, 4-, 5-Poles)

IL16966 60A (2-, 3-, 4-, 5-Poles)

IL17509 100–200A

Product Selection

When Ordering Specify

- Catalog number with coil suffix code from the Magnet Coil Selection table
- Any required accessories

A202K_



Latched AC Lighting Contactors ①②

Holding Circuit Auxiliary Contact or Pushbutton Station Not Included

Continuous Amperes (Enclosed)	Number of Poles	Open Type Catalog Number ③
30	2	**A202K1B_M**
	3	**A202K1C_M**
	4	**A202K1D_M**
	5	**A202K1E_M**
	6	**A202K1F_M**
	8	**A202K1G_M**
	10	**A202K1H_M**
	12	**A202K1K_M**
60	2	**A202K2B_M**
	3	**A202K2C_M**
	4	**A202K2D_M**
	5	**A202K2E_M**
	6	**A202K2F_M**
	8	**A202K2G_M**
	10	**A202K2H_M**
	12	**A202K2K_M**
100	2	**A202K3B_M**
	3	**A202K3C_M**
	4	**A202K3D_M**
	5	**A202K3E_M**
	6	**A202K3F_M**
	8	**A202K3G_M**
	10	**A202K3H_M**
	12	**A202K3K_M**
200	2	**A202K4B_M**
	3	**A202K4C_M**
	4	**A202K4D_M**
	5	**A202K4E_M**
	6	**A202K4F_M**
	8	**A202K4G_M**
	10	**A202K4H_M**
	12	**A202K4K_M**
300	2	**A202K5B_M**
	3	**A202K5C_M**
400	2	**A202K6B_M**
	3	**A202K6C_M**

Magnet Coil Selection

Coil Voltage	Catalog Number Suffix
120V, 60 Hz	**A**
208V, 60 Hz	**B**
277V, 60 Hz	**Z**
440V/50, 480V/60	**X**
600V, 60 Hz	**E**
120V/60, 110V/50	**A**
220V/50, 240V/60	**W**
24V, 60 Hz	**I** ④

Accessories

See A200 NEMA Contactor Accessories, Tab 2, section 2.2 in this volume.

Notes

① Lighting contactors are not available with DC coils.
② Contactors rated 300A and 400A are mechanically latched.
③ Underscore (_) indicates missing code letter for magnet coil selection—see Magnet Coil Selection table.
④ Available on two- to five-pole, 30 and 60A devices and on two- to three-pole 100 and 200A devices.

Renewal Parts

AC Coil, A202—Magnetically Latched

30A

Voltage	Hz	Two-, Three-, Four-Pole Part Number	Five-Pole Part Number
110/120	50/60	**7874A93G01**	**7874A89G01**
208/240	50/60	**7874A93G02**	**7874A89G02**
277	50/60	**7874A93G03**	**7874A89G03**
440/480	50/60	**7874A93G04**	**7874A89G04**
575	50/60	**7874A93G05**	**7874A89G05**

60A

Voltage	Hz	Two-, Three-Pole Part Number	Four-, Five-Pole Part Number
110/120	50/60	**7874A93G01**	**7874A87G01**
208/240	50/60	**7874A93G02**	**7874A87G02**
277	50/60	**7874A93G03**	**7874A87G03**
440/480	50/60	**7874A93G04**	**7874A87G04**
575	50/60	**7874A93G05**	**7874A87G05**

100 and 200A

Voltage	Hz	Two-, Three-Pole Part Number	Four-, Five-Pole Part Number
110/120	50/60	**7874A85G01**	**7874A83G01**
208/240	50/60	**7874A85G02**	**7874A83G02**
277	50/60	**7874A85G03**	**7874A83G03**
440/480	50/60	**7874A85G04**	**7874A83G04**
550/575	50/60	**7874A85G05**	**7874A83G05**

Terminals (Line and Load)

Two-Pole Part Number	Three-Pole Part Number	Four-Pole Part Number	Five-Pole Part Number
30A			
N/A	N/A	N/A	N/A
60A			
179C755G17	**179C755G16**	**179C755G17** ①	**179C755G16**
			179C755G17 ②
100A			
179C755G19	**179C755G18**	**179C755G19** ①	**179C755G18**
			179C755G19 ②
200A Model K Electrically Held			
179C755G28	**179C755G27**	**179C755G28** ①	**179C755G27**
			179C755G28 ②
200A Model J Magnetically Latched			
179C755G31	**179C755G30**	**179C755G31** ①	**179C755G30**
			179C755G31 ②

Other Accessories

Description	Size	Part Number
Control module (rectifier)	30–200A	**3915B98G01**
1NO, 1NC CC auxiliary contact ③	30–200A	**J1C**

Arc boxes, upper base assemblies and cross bars are equivalent to the A201 Series. See Tab 2, section 2.1 in this volume.

Contact kits are equivalent to the A201 Model J series, with the exception of the magnetically latched 200A unit. It uses Catalog Number 672B788G07 for the three-pole device. For other poles, consult factory.

Notes

① Order quantity of two for four-pole design.

② Group members for the five-pole terminal represent the combination of the two- and three-pole number.

③ CC is coil clearing.

Technical Data and Specifications

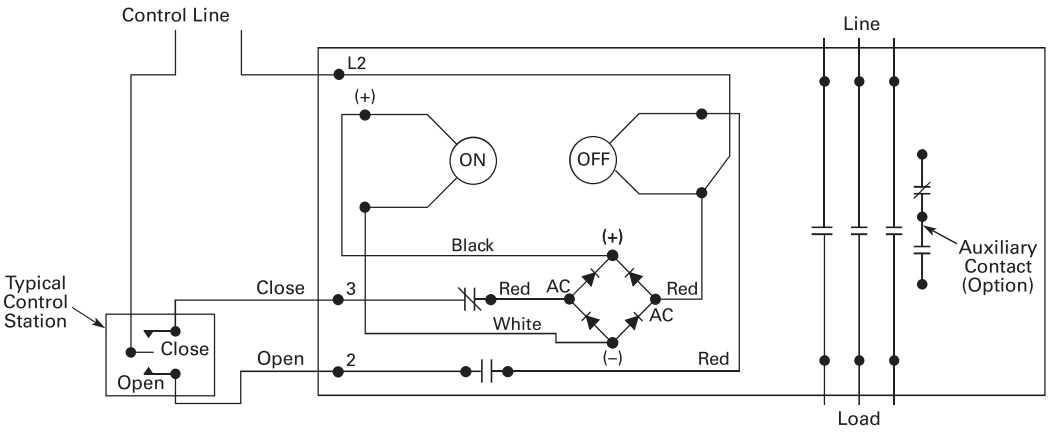
A202 Contactors

Description	Specification
Terminals	
All except 30A devices	Cu/Al
30A devices	Cu only
Ballast load	600 AC, breaking all lines
Tungsten lamp loads, maximum volts	
Line-to-line	480 Vac
Line-to-neutral	277 Vac

Wiring Diagrams

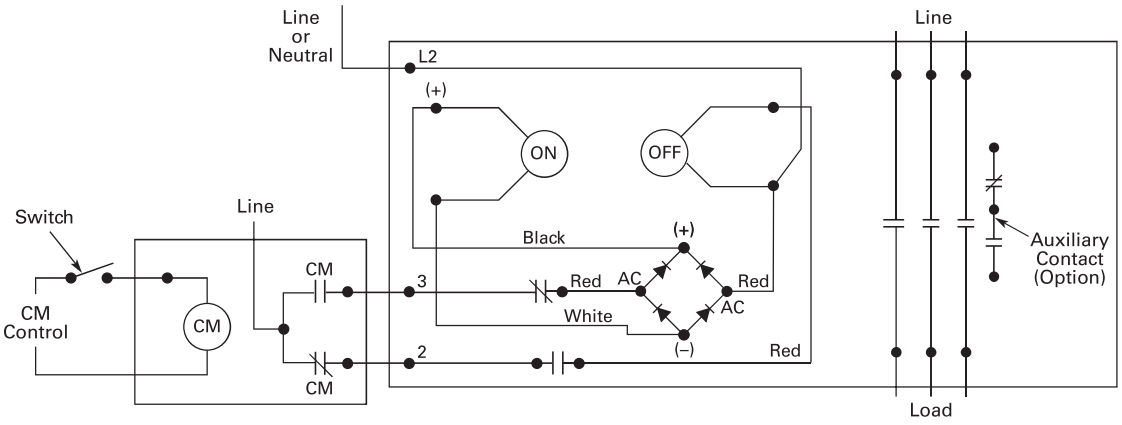
Standard Wiring

The standard wiring of an A202 contactor can be controlled by a separate customer supplied single-pole double-throw controlling station.



Two-Wire Control

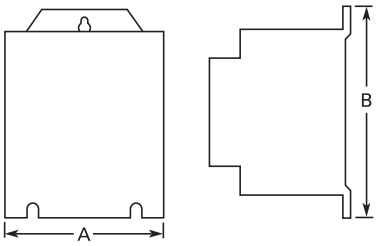
Two-wire control can be accomplished with a customer supplied relay with 1NO/1NC auxiliary contacts, wire as shown.



Dimensions

Approximate Dimensions in Inches (mm)

Open Type



Non-Combination Open Lighting Contactors—Two- to 12-Pole

			Open Type	
Continuous Amperes	**Number of Poles**	**Pole Configuration**	**Wide A**	**High B**
30	2–4	—	3.31 (84.1)	4.38 (111.3)
	5	—	4.19 (106.4)	4.38 (111.3)
	6	3 x 3	7.13 (181.1)	4.46 (113.3)
	8	4 x 4	7.13 (181.1)	4.46 (113.3)
	10	5 x 5	10.63 (270.0)	4.46 (113.3)
	12	4 x 4 x 4	12.38 (314.5)	6.88 (174.8)
60	2, 3	—	3.31 (84.1)	4.38 (111.3)
	4, 5	—	4.19 (106.4)	4.38 (111.3)
	6	3 x 3	7.13 (181.1)	4.46 (113.3)
	8	4 x 4	10.63 (270.0)	4.46 (113.3)
	10	5 x 5	10.63 (270.0)	4.46 (113.3)
	12	5 x 5 x 2	15.00 (381.0)	6.88 (174.8)
100	2, 3	—	4.63 (117.6)	6.63 (168.4)
	4, 5	—	7.25 (184.2)	6.63 (168.4)
	6	3 x 3	9.75 (247.7)	6.88 (174.8)
	8	5 x 3	12.38 (314.5)	6.88 (174.8)
	10	5 x 5	15.00 (381.0)	6.88 (174.8)
	12	5 x 5 x 2	34.13 (866.9)	27.50 (698.5)
200	2, 3	—	4.63 (117.6)	6.63 (168.4)
	4, 5	—	7.25 (184.2)	6.63 (168.4)
	6	3 x 3	9.75 (247.7)	6.88 (174.8)
	8	5 x 3	12.38 (314.5)	6.88 (174.8)
	10	5 x 5	15.00 (381.0)	6.88 (174.8)
	12	5 x 5 x 2	34.13 (866.9)	27.50 (698.5)

Size 4 Vacuum Contactor



7.1 NEMA, Special Purpose and Mining Rating

Product Description V5-T7-2
Application Description V5-T7-2
Operation V5-T7-2
Features V5-T7-2
Benefits V5-T7-2
Standards and Certifications V5-T7-2
Product Selection V5-T7-3
Accessories V5-T7-4
Replacement Parts V5-T7-6
Technical Data and Specifications V5-T7-7
Wiring Diagrams V5-T7-9
Dimensions V5-T7-10

NEMA, Special Purpose and Mining Rating



Contents

Description	*Page*
NEMA, Special Purpose and Mining Rating	
Product Selection	**V5-T7-3**
Accessories	**V5-T7-4**
Replacement Parts	**V5-T7-6**
Technical Data and Specifications	**V5-T7-7**
Wiring Diagrams	**V5-T7-9**
Dimensions	**V5-T7-10**

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 600 Vac, Special Purpose rated devices up to 1500 Vac and Mining rated devices rated up to 1500 Vac. Each device is tested to different standards to serve its 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 representative.

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.

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

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

Listed

Product Selection

When Ordering Specify

- Catalog number
- Heater pack if ordering a starter, order in quantities of three
- Any required accessories

Size 4 Vacuum Contactor



NEMA Rated Vacuum Contactors and Starters

NEMA Size	Ampere Rating	Motor Voltage	Maximum Horsepower Rating	Magnet Coil Voltage ①	Contactor Non-Reversing Catalog Number	Contactor Reversing Catalog Number	Starter Non-Reversing Catalog Number ②
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**

160 A Vacuum Contactor



Special Purpose Vacuum Contactors and Starters

Ampere Rating	Motor Voltage	Maximum Horsepower Rating	Magnet Coil Voltage ①	Contactor Non-Reversing Catalog Number	Contactor Reversing Catalog Number	Starter Non-Reversing Catalog Number ②	Starter Reversing Catalog Number ②
160	200 230 380 460 575 800 1000 1500	50 60 100 125 150 200 250 400	110/120	**V201KRCJ**	**V211KRCJ**	—	—
			220/240	**V201KRCK**	**V211KRCK**	—	—
			380/415	**V201KRCH**	**V211KRCH**	—	—
			440/480	**V201KRCU**	**V211KRCU**	—	—
320	200 230 380 460 575 800 1000 1500	100 125 200 250 300 450 500 900	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	200 230 380 460 575 1000 1500	150 200 300 400 500 1000 1250	110/120	**V201KVCJZ1**	**V211KVCJZ1**	**V200MVCJ**	**V210MVCJ**
			220/240	**V201KVCKZ1**	**V211KVCKZ1**	**V200MVCK**	**V210MVCK**
			380/415	**V201KVCHZ1**	—	**V200MVCH**	—
			440/480	**V201KVCUZ1**	—	**V200MVCU**	—
610	200 230 380 460 575 800 1000 1500	200 200 300 450 500 800 1000 1600	110/120	**V201KZCJZ1**	**V211KZCJZ1**	—	—
			220/240	**V201KZCKZ1**	**V211KZCKZ1**	—	—
			380/415	**V201KZCHZ1**	—	—	—
			440/480	**V201KZCUZ1**	—	—	—

Notes

① Coils are rated for 50/60 Hz applications.

② Starters use Type B overload relay. Refer to Heater Coil Selection table on **Page V5-T7-6**. Starters do not include heater packs.

160 A Mining Vacuum Contactor



Mining Rated Vacuum Contactors and Starters

Ampere Rating	Motor Voltage	Maximum Horsepower Rating	Magnet Coil Voltage ①	Contactor Non-Reversing Catalog Number
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	200 230 380 460 575 800 1500	100 125 200 250 300 450 900	110/120	**VM320CJZ1**
			220/240	**VM320CKZ1**
			440/480	**VM320CUZ1**
610	200 230 380 460 575 800 1500	150 200 300 400 500 800 1600	110/120	**VM610CJZ1**
			220/240	**VM610CKZ1**
			440/480	**VM610CUZ1**

Accessories

Lug Sizes

- Size 4—12–4/0
- NEMA Size 5 and 6 and 320 A, 540 A and 610 A—supplied without line or load lugs.

Lug Kits—Consist of Six Lugs

Size	Description	Catalog Number
5 and 320 A	1/0–500 kcmil	**C325KAL8**
6, 540 A and 610 A	1/0–500 kcmil double barrel	**C325KAL9**
610 A	1/0–600 kcmil double 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 600 V, 10 A 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 600 V, 10 A contacts for use in control circuits.

Auxiliary Electrical Contacts

Contact Arrangement	Catalog Number
1NO, 1NC	**J11**
1NO, 1NC CC ②	**J1CV**
2NO	**J20**
2NC	**J02**

Horizontal Mechanical Interlock

Size	Catalog Number
4	**180C113G04**
5	**180C113G16**
5	**180C113G17**

Notes

① Coils are rated for 50/60 Hz applications.
② Used with Size 4 only. CC is coil clearing.

AEGIS Powerline Filters



Ideal for applications that utilize 120 Vac or 240 Vac 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.

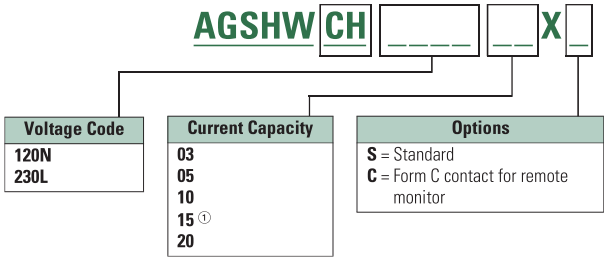
AEGIS Powerline Filters Protect Against the Full Spectrum of Transient Disturbances

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.

Catalog Numbering System

AEGIS-HW (Hard Wire Application)

230 V applies to 220 V and 240 V applications.



AEGIS Powerline Filters

Catalog Number ②	Catalog Number ②
AGSHWCH120N03XC	AGSHWCH230L03XC
AGSHWCH120N03XS	AGSHWCH230L03XS
AGSHWCH120N05XC	AGSHWCH230L05XC
AGSHWCH120N05XS	AGSHWCH230L05XS

Notes

① Model tested at 15 A UL/CSA = 16 A CE.

② See AEGIS Powerline Filters in **Volume 3—Power Distribution and Control Assemblies**, CA08100004E, Tab 2.

7

Heater Coils

Heater Coils for Type B Overload Relay ①

Open Starter Ambient Compensated Overload Relay	Heater Catalog Number ②
Size 4 and 160 A	
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**

Open Starter Ambient Compensated Overload Relay	Heater Catalog Number ②
Size 5 and 320 A 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 540 A 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**

Replacement Parts

Vacuum Contactor—Replacement Coils

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

Notes

① Motor full load current in amperes for use with three heaters only.
② Three are required per overload relay.
③ 125 Vdc can be directly applied to the Size 5 and 6 coil rated for 120 Vac/60 Hz (cannot be applied to Size 4).
④ 250 Vdc can be directly applied to the Size 5 and 6 coil rated for 240 Vac/60 Hz (cannot be applied to Size 4).

Technical Data and Specifications

NEMA, Special Purpose and Mining Rating

	NEMA			Special Purpose			
Description	**Size 4 V201K4_**	**Size 5 V201K5_**	**Size 6 V201K6_**	**160 A V201KR_**	**320 A V201KT_**	**540 A V201KV_**	**610 A V201KZ_**
Poles	3	3	3	3	3	3	3
Maximum voltage rating	600 V	600 V	600 V	1500 V	1500 V	1500 V	1500 V
Ampere rating	135 A	270 A	540 A	160 A	320 A	540 A	610 A
Frequency, Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Maximum closing current	1600 A	3000 A	6000 A	1600 A	3000 A	6000 A	6000 A
Maximum interrupting current	1600 A	3000 A	6000 A	1600 A	3000 A	6000 A	6000 A
Short time current							
1 second	2400 A RMS	4500 A RMS	9000 A RMS	2400 A RMS	4500 A RMS	9000 A RMS	9000 A RMS
2 second	1600 A RMS	3000 A RMS	6000 A RMS	1600 A RMS	3000 A RMS	6000 A RMS	6000 A RMS
Dielectric strength	2200 Vac	5375 Vac	5375 Vac	2200 Vac	5375 Vac	5375 Vac	5375 Vac
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 hp at:							
200 V	40 hp	75 hp	150 hp	50 hp	100 hp	150 hp	200 hp
230 V	50 hp	100 hp	200 hp	60 hp	125 hp	200 hp	200 hp
380 V	75 hp	150 hp	300 hp	100 hp	200 hp	300 hp	300 hp
460 V	100 hp	200 hp	400 hp	125 hp	250 hp	400 hp	450 hp
575 V	100 hp	200 hp	400 hp	150 hp	300 hp	500 hp	500 hp
800 V	—	—	—	200 hp	450 hp	—	800 hp
1000 V	—	—	—	250 hp	500 hp	1000 hp	1000 hp
1500 V	—	—	—	400 hp	900 hp	1250 hp	1600 hp
Three-phase capacitive switching (kVAR):							
230 V	0 kVAR	80 kVAR	160 kVAR	50 kVAR	80 kVAR	160 kVAR	176 kVAR
460 V	80 kVAR	160 kVAR	320 kVAR	100 kVAR	160 kVAR	320 kVAR	356 kVAR
600 V	100 kVAR	200 kVAR	400 kVAR	125 kVAR	200 kVAR	400 kVAR	400 kVAR
1500 V	—	—	—	205 kVAR	500 kVAR	—	1000 kVAR
Transformer switching (kVA) ① single-phase, two-pole:							
120 V	6.8 kVA	14 kVA	27 kVA	8 kVA	14 kVA	27 kVA	27 kVA
240 V	14 kVA	27 kVA	54 kVA	16 kVA	27 kVA	54 kVA	54 kVA
480 V	27 kVA	54 kVA	108 kVA	32 kVA	54 kVA	108 kVA	108 kVA
600 V	34 kVA	68 kVA	135 kVA	40 kVA	68 kVA	135 kVA	135 kVA
Three-phase, three-pole:							
240 V	23 kVA	47 kVA	94 kVA	27 kVA	47 kVA	94 kVA	94 kVA
480 V	47 kVA	94 kVA	188 kVA	55 kVA	94 kVA	188 kVA	188 kVA
600 V	59 kVA	117 kVA	234 kVA	70 kVA	117 kVA	234 kVA	234 kVA

Note

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

Electrical Characteristics—NEMA and Special Purpose Types

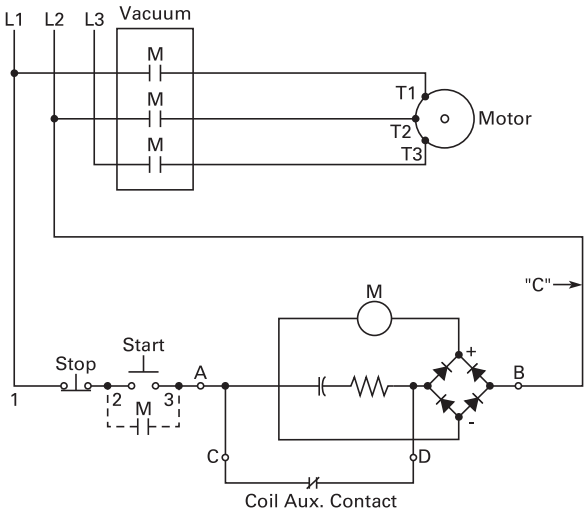
Description	Size 4 (160 A)	5 (320 A)	6 (540 A and 610 A)
DC coil data—burden: (AC supply rectified)			
Open VA	300 VA	500 VA	1450 VA
Closed VA	30 VA	25 VA	32 VA
Closed watts	6 W	20 W	30 W
Pick-up volts	70% of rated coil volts	70% of rated coil volts	70% of rated coil volts
Drop-out volts	50% of rated coil volts	50% of rated coil volts	50% of rated coil volts
Pick-up time in Hz	1.5–2 Hz	1.5–2 Hz	1.5–2 Hz
Drop-out time in Hz	6–6.15 Hz	6–6.15 Hz	6–6.15 Hz
Maximum voltage rating	600 V	600 V	600 V
Maximum closing current	1600 A	3000 A	6000 A
Maximum interrupting current	1600 A	3000 A	6000 A
Short time current:			
1 second	2400 A RMS	4500 A RMS	9000 A RMS
2 second	1600 A RMS	3000 A RMS	6000 A RMS

Electrical Characteristics Coil Data (AC Supply Rectified)

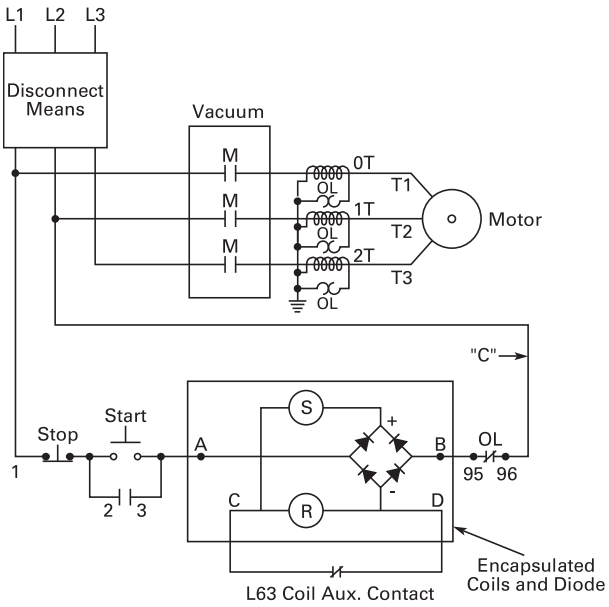
Burden	Size 4 (160 A)	Size 5 (320 A)	Size 6 (540 A and 610 A)
Inrush VA	300	600	1700
Sealed VA	30	20	28
Sealed watts	6	20	28
Pick-up volts	70% of rated coil volts	70% of rated coil volts	70% of rated coil volts
Drop-out volts	50% of rated coil volts	50% of rated coil volts	50% of rated coil volts
Pick-up 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

Size 4 Contactor



Sizes 5 and 6 Starter

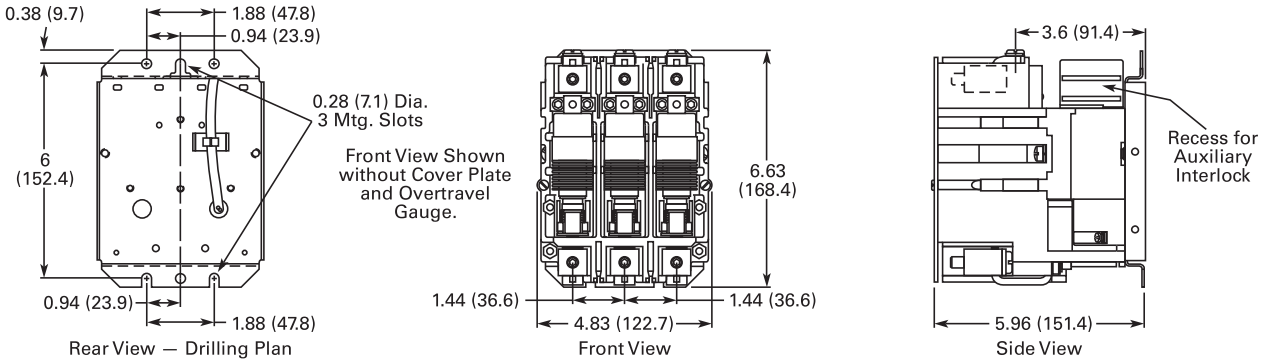


Dimensions

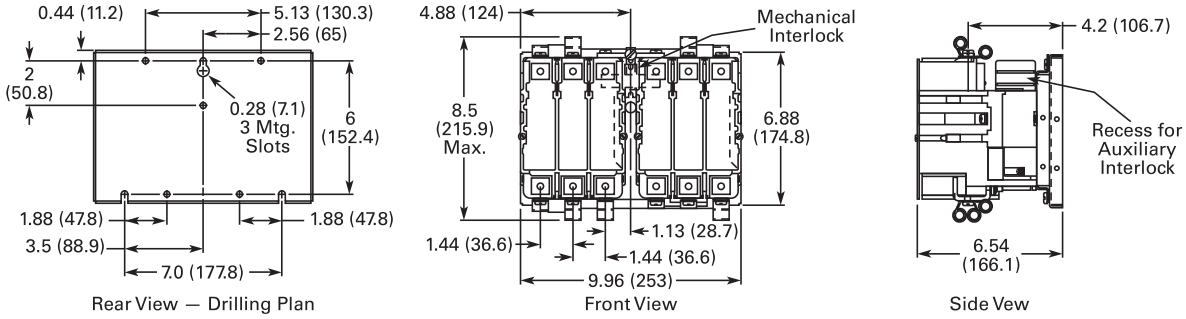
Approximate Dimensions in Inches (mm)

Open Type Contactors and Starters—Size 4 and 160 A

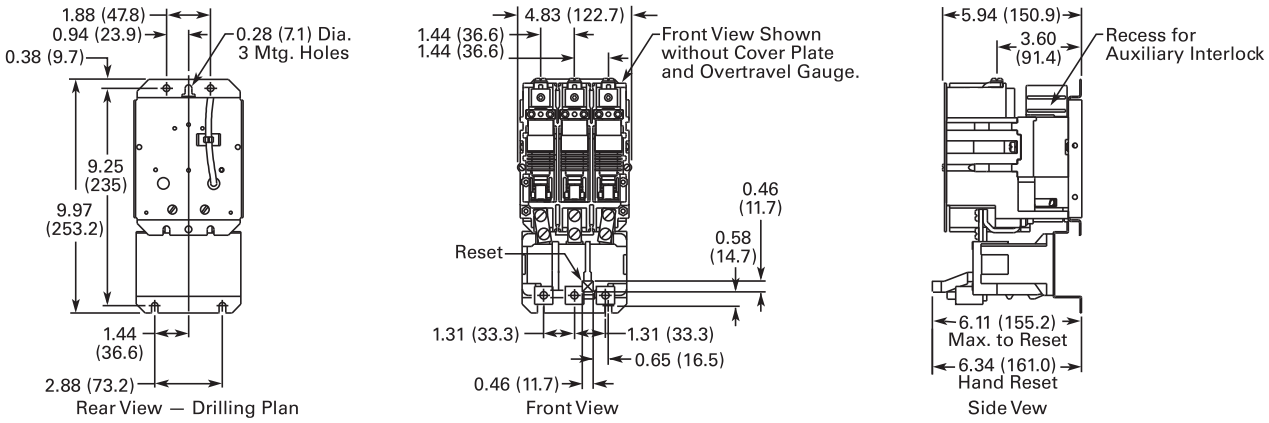
Size and 160 A Non-Reversing Contactor



Size 4 and 160 A Reversing Contactor



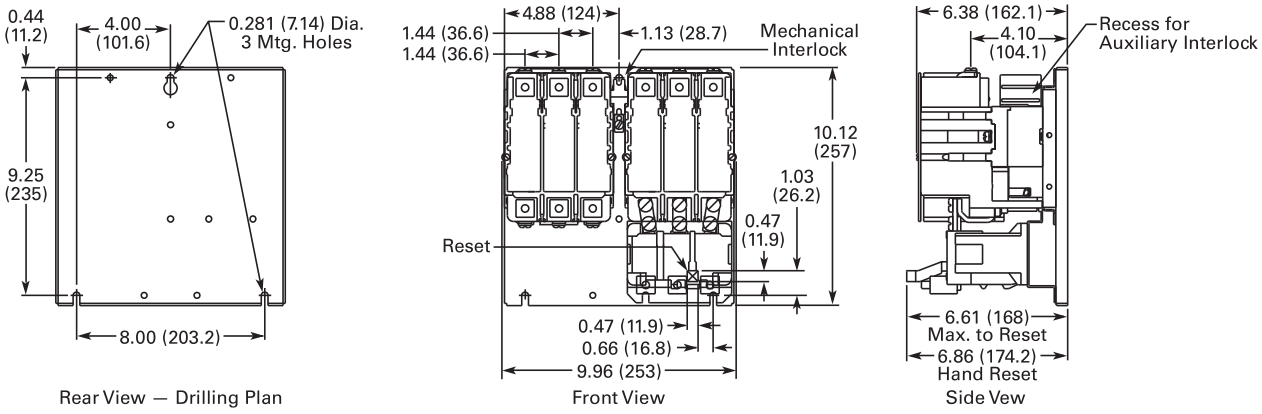
Size 4 Non-Reversing Starter



Approximate Dimensions in Inches (mm)

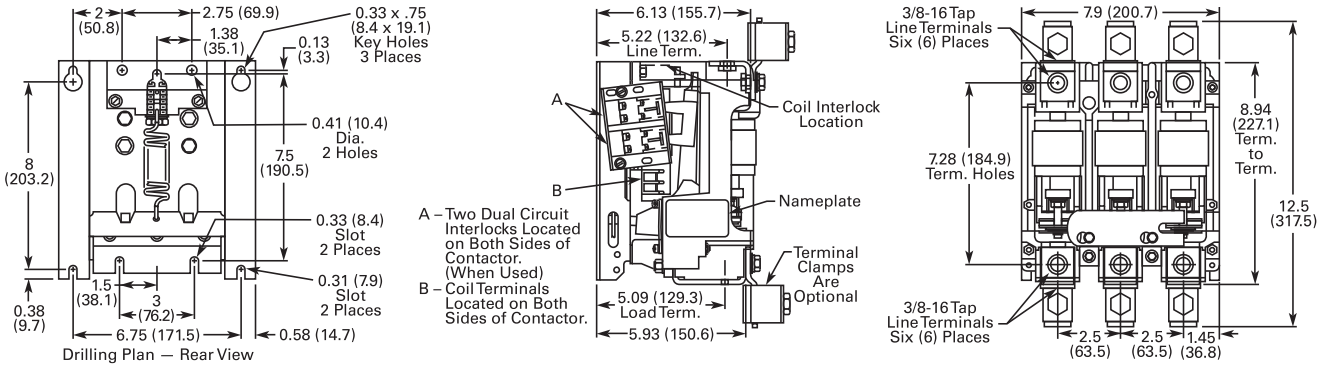
Open Type Contactors and Starters—Size 4 and 160 A, continued

Size 4 Reversing Starter

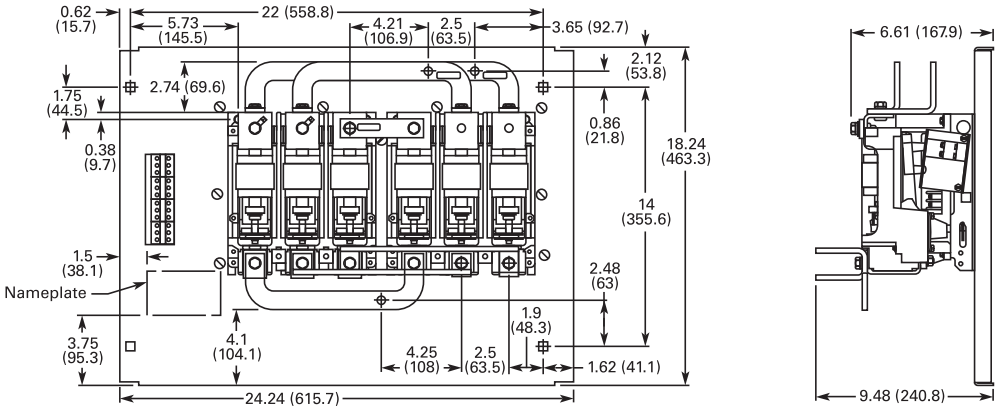


Open Type Contactors and Starters—Size 5 and 320 A

Size 5 and 320 A Non-Reversing Contactor



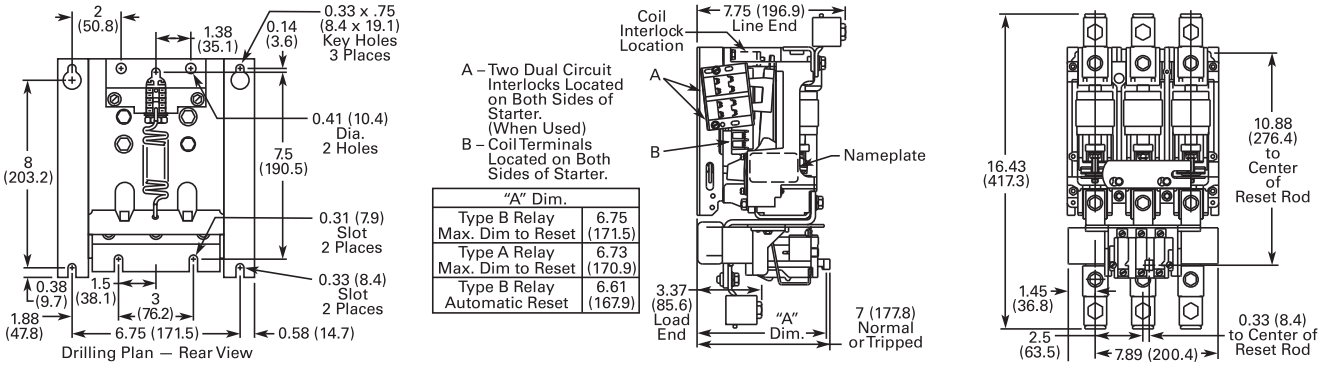
Size 5 and 320 A Reversing Contactor



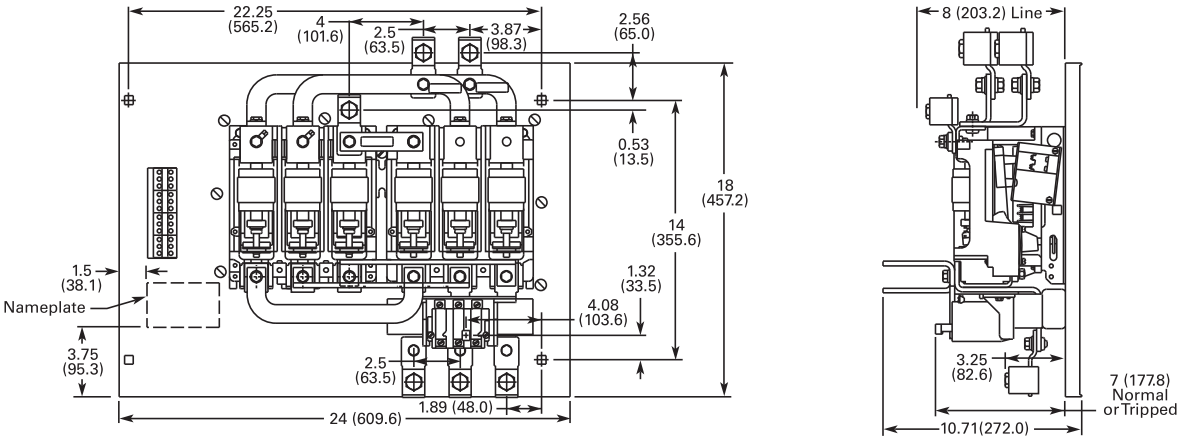
Approximate Dimensions in Inches (mm)

Open Type Contactors and Starters—Size 5 and 320 A, continued

Size 5 and 320 Non-Reversing Starter



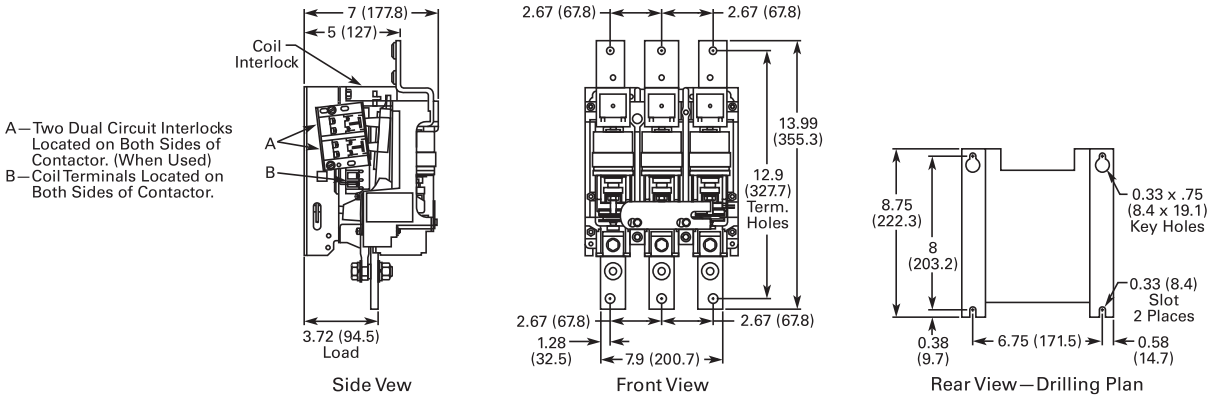
320 Reversing Starter



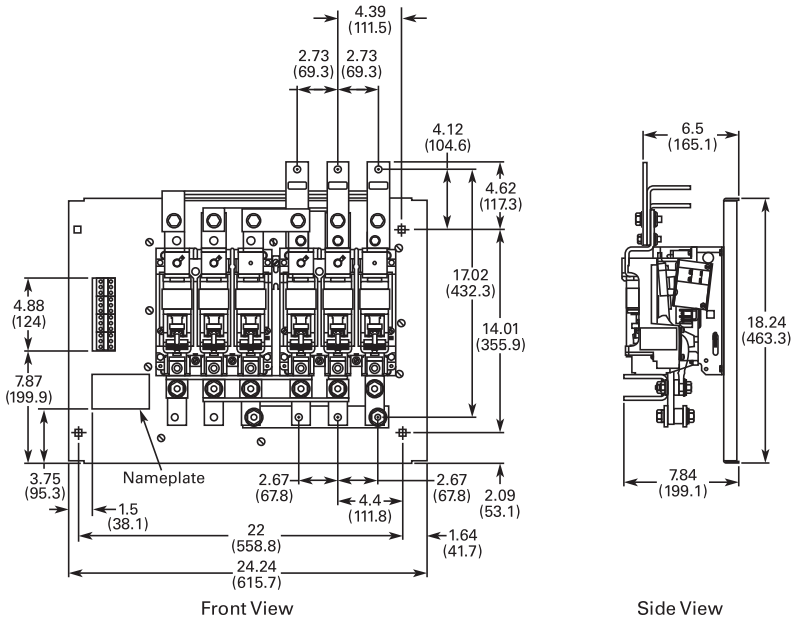
Approximate Dimensions in Inches (mm)

Open Type Contactors and Starters—Size 6, 540 A and 610 A

Size 6, 540 A and 610 A Non-Reversing Contactor



Size 6, 540 A and 610 A Reversing Contactor

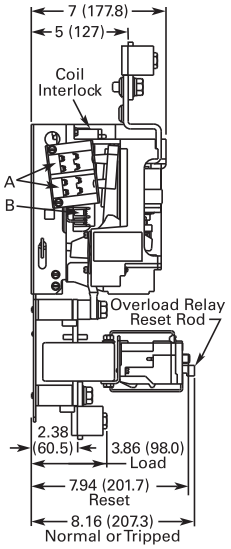


Approximate Dimensions in Inches (mm)

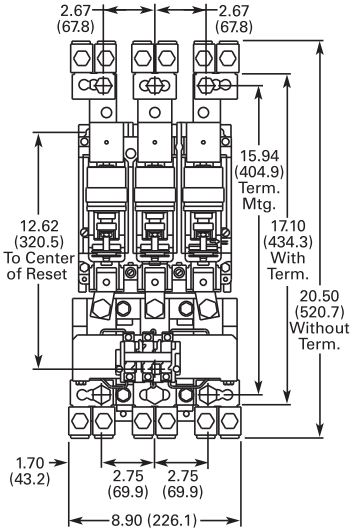
Open Type Contactors and Starters—Size 6, 540 A and 610 A, continued

Size 6 and 540 A Non-Reversing Starter

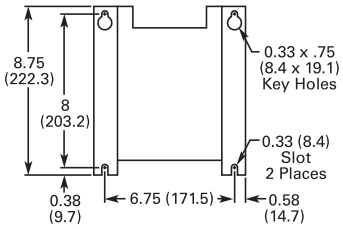
A—Two Dual Circuit Interlocks Located on Both Sides of Starter. (When Used)
B—Coil Terminals Located on Both Sides of Starter.



Side View

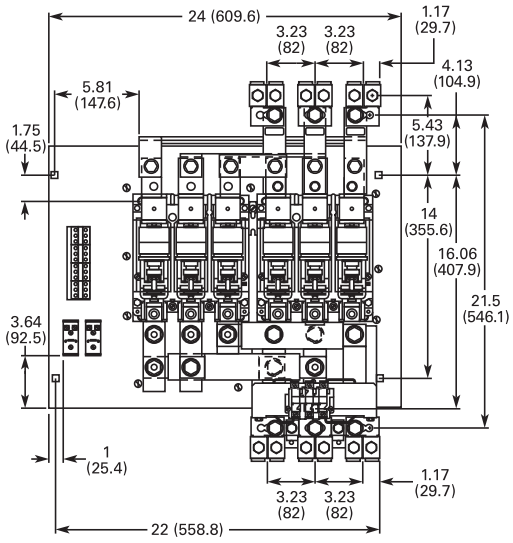


Front View

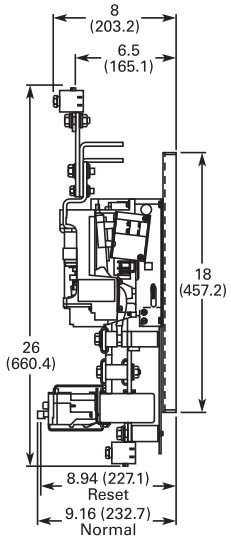


Rear View—Drilling Plan

540 A Reversing Starter



Front View



Side View

Rotary Disconnects



8.1 Introduction

UL/CSA Standards for Disconnect Switches V5-T8-2
UL Standards for Electrical Machinery V5-T8-2
Eaton Solutions for UL 508A and NFPA 79 . . . . . V5-T8-3

8.2 R5 Series (UL 508) Non-Fusible 16–100A

Product Description V5-T8-5
Features, Benefits and Functions V5-T8-5
Standards and Certifications V5-T8-5
Product Identification V5-T8-5
Product Selection V5-T8-6
Accessories V5-T8-6
Technical Data and Specifications V5-T8-10
Dimensions V5-T8-11

8.3 R9 Series (UL 98)

Non-Fusible 30–100A Compact V5-T8-12
Non-Fusible 100–1200A V5-T8-18
Fusible 30–800A V5-T8-26
DC Rated Disconnects V5-T8-45

8.4 MTS—Manual Transfer/Double Throw Switches

Product Description V5-T8-52
Standards and Certifications V5-T8-52
Product Identification V5-T8-52
Product Selection V5-T8-53
Accessories V5-T8-54
Technical Data and Specifications V5-T8-56
Dimensions V5-T8-57

Learn Online

Rotary Disconnects



Contents

Description	*Page*
Introduction	
Eaton Solutions for UL 508 and NFPA 79	**V5-T8-3**

UL/CSA Standards for Disconnect Switches

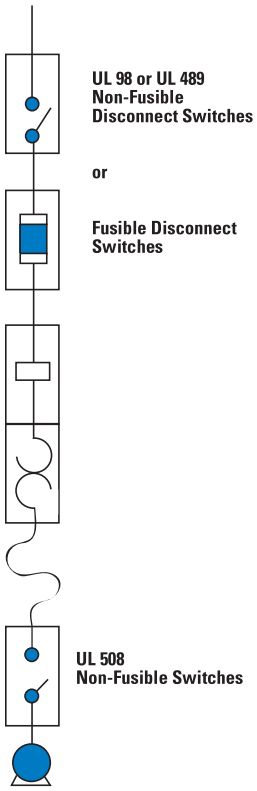
UL 98—Enclosed and Deadfront Switches (CSA C22.2 No. 4)

These requirements cover enclosed or deadfront switches, with or without provision for fuses, at 600V or less. These products are used as disconnecting means without restrictions; they are heavy-duty products requiring 2.00 inches (50.0 mm) minimum of creepage distance between phases, which gives maximum safety for users and installation. The short-circuit withstand of those products goes up to 200 kA.

UL 489—Molded Case Switches (CSA C22.22 No. 5)

These requirements cover molded case circuit breakers, molded case switches and fused molded case switches, rated at 600V or less and 6000A or less.

Typical Control Panel



UL Standards for Electrical Machinery

UL 508—Industrial Control Equipment (CSA C22.2 No. 14)

These requirements cover manual, magnetic and solid-state starters and controllers, overload relays, pushbuttons, selector switches and control lights.

These products are smaller, requiring only a creepage distance between phases of 0.50 inch (12.7 mm). Their use as a disconnecting means is limited to local disconnection of motors. These products can be used as a disconnect means only when they have been additionally tested "suitable as motor disconnect." This additional testing ensures that the switch has a proper closing capacity on a short circuit. UL® 508 devices cannot be used as main disconnect of an electrical panel, for example, at the entrance of control panels.

A manual motor controller marked "suitable as motor disconnect" shall be installed only on the load side of the branch circuit protective device [UL 508A 30.33 and NEC® 430.109 (6)].

NFPA 79 Electrical Standard for Industrial Machinery

The following types of machines are identified as industrial machinery:

- Metalworking machine tools, including machines that cut or form metal
- Plastics machinery
- Wood machinery, including woodworking, laminating and sawmill machines
- Assembly machines
- Material handling machines, including industrial robots and transfer machines
- Inspection and testing machines, including coordinate measuring and in-process gauging machines

Eaton Solutions for UL 508A and NFPA 79

The changes in UL 508A and NFPA® 79 impact the design and construction of your equipment. Important modifications concern major safety issues, the disconnect means and the interlocking of the enclosure door.

The disconnect shall be operable independent of the door position.

The disconnect must be operable, by qualified persons, independent of the door position without the use of accessory tools or devices.

Note: NFPA 79; Paragraph 5.3.3.1 (5) T.

An operating mechanism for the disconnecting means shall be operable independent of the door position without the use of accessory tools or devices.

Note: UL 508A; Paragraph 66.6.3 c.

Operable independent of the position of the door



Door closed: operation with the external handle through the door.



Door open: A robust optional kit with a handle directly fitted on the shaft of the switch allows the operation when the door is open.

8

The disconnect means is not closable with the enclosure door open, unless an interlock is operated by deliberate action.

The interlocking means shall fulfill the following requirement: Prevent closing of the disconnect means while the enclosure door is open, unless an interlock is operated by deliberate action.

Note: NFPA 79; Paragraph 6.2.3.1.2.

The disconnecting means is not closable with the enclosure door open, unless an interlock is operated by deliberate action.

Note: UL 508A; Paragraph 66.1.5.

Operated by a deliberate action



① Push

Door open: It is necessary to push the handle from OFF to ON. This deliberate action permits the operator to turn and switch ON. This action is necessary as in most cases there is no padlock on the switch when somebody opens the door of an enclosure.



② Turn

ON to OFF action permits the operator to turn and switch ON. That is a major safety issue; switching ON directly without any other action is extremely dangerous. The use of a padlock does not comply with the request of the standard; when the panel door is opened, there is generally no padlock, and anybody can turn the switch ON.

The disconnect means shall be able to be locked in the OPEN position independent of the door position.

The circuit disconnecting device shall be provided with a permanent means, permitting it to be locked in the OFF position only independent of the door position. When locked, remote as well as local closing shall be prevented.

Note: NFPA 79; Paragraph 5.3.3.1 (3).

An operating mechanism for the disconnecting means shall be able to be locked in the OFF position independent of the door position. When locked, closing of the disconnect is not possible.

Note: UL 508A; Paragraph 66.6.3 d.

Locked in the open position independent of the door position



Door close: The external through-the-door handle is padlocked when locked closing of the disconnect is not possible.



Door open: A strong metallic padlock kit allows up to three padlocks. The padlocking means is easily accessible, when locked closing of the disconnect is not possible.

The interlocking of the enclosure door shall be provided with means to defeat the interlock without removing the power.

The interlocking means required by 66.1.5 shall be provided with all of the following:

- Means to defeat the interlock without removing power, and requires the use of a tool to operate
- Reactivated automatically when all the doors are closed

Note: Added 66.1.5.1 effective March 1, 2007. UL 508A; Paragraph 66.1.5.1.

NFPA 79; Paragraph 6.2.3.1.2 states that the [enclosure] interlocking means shall meet the following requirements:

- Use a device or tool to allow qualified persons to defeat the interlock
- Be reactivated automatically when the door is closed

Defeat the interlock without removing the power



A tool allows defeat of the interlock without removing power. The interlocking is reactivated automatically when the door is closed.

R5 Series Non-Fusible 16–100A



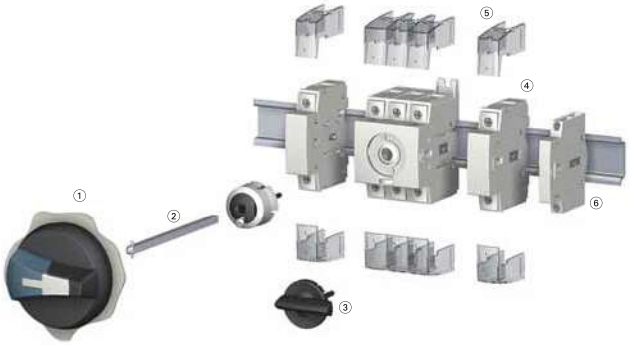
Contents

Description	*Page*
R5 Series Non-Fusible 16–100A	
Product Selection	**V5-T8-6**
Accessories	**V5-T8-6**
Technical Data and Specifications	**V5-T8-10**
Dimensions	**V5-T8-11**

Product Description

R5 Series (UL 508 listed) products are manually operated modular switches. Load break switching and isolation provide safety solutions for any low voltage circuit, particularly for machine and control circuits. The R5 Series products are manual motor controllers suitable as motor disconnect.





Features, Benefits and Functions

- Up to 65 kAIC short-circuit rating
- Direct or external operation
- Compact footprint
- DIN rail or base mount
- Wide range of accessories
- Up to eight-pole or four-pole MTS
- Open and enclosed devices
- Modular design
- Integrated terminals for additional safety
- Padlockable design (direct, toggle and external handles)
- Product can be reverse fed



Product Identification

① External front handle
② Shaft extension for external handle
③ Direct handle
④ Switched fourth-pole module
⑤ Terminal shroud
⑥ Auxiliary contacts

Note: For further details, please see the installation instructions supplied with each device.

Standards and Certifications

Conformity to Standards

- UL 508 listed, Guide NLRV, File E165150
- CSAT C22.2 No.14, File 217736
- IEC 60947-3, EN 60947-3
- CCC
- CE

Product Selection

Direct Operation



Switch body + Direct handle

External Operation



Switch body + Shaft + External handle

R5 Series





Ampere Rating	Three-Pole Toggle Switch Only ①	Three-Pole Rotary Switch Only	Direct Handle	Front and Right External Handle SH00 (Choose one)	Front and Right External Handle SH0 (Choose one)	Three-Position Front External Handle SH00 (Black) ②	Front and Right External Handle SH1 (Choose one)	Shaft for SH0 and SH00—5 x 5 mm— In (mm)	Shaft for SH1—5 x 5 mm— In (mm)
16	—	**R5A3016U**	**DHR5**	SH00 Black 3R, 12 **SHB00N12**	SH0 Black 3R, 12 **SHB0N12**	SH00 4, 4X I–0–II Open transition **SHB00MTSOT**	SH1 Black 4, 4X **SHB1N4X**	2.20 (55.5) **SF55SH5X5**	7.90 (200.0) **SF200SH5X5SH1**
25	—	**R5A3025U**							
30	**T5A3030U**	**R5A3030U**						3.50 (90.0) **SF90SH5X5**	12.60 (320.0) **SF320SH5X5SH1**
40	**T5A3040U**	**R5A3040U**		SH00 Red 3R, 12 **SHR00N12**	SH0 Red 3R, 12 **SHR0N12**		SH1 Red 4, 4X **SHR1N4X**	5.90 (150.0) **SF150SH5X5**	15.70 (400.0) **SF400SH5X5SH1**
60	**T5B3060U**	**R5B3060U**						7.90 (200.0) **SF200SH5X5**	
80	**T5B3080U**	**R5B3080U**		SH00 Black 4, 4X **SHB00N4X**	SH0 Black 4, 4X **SHB0N4X**			12.60 (320.0) **SF320SH5X5**	
100	—	**R5B3100U**		SH00 Red 4, 4X **SHR00N4X**	SH0 Red 4, 4X **SHR0N4X**				

Accessories



Ampere Rating	Switched Fourth-Pole Module	Unswitched Neutral Module	Protective Earth Module	Auxiliary Contacts (Choose one)	Terminal Shrouds	Conversion Kit (Choose one)	Door Mounting Kit ③
16	**S4PR516**	**UNMR5A**	**PEMR5A**	1NO + 1NC **AC1NONC**	1P **TS1R5A**	6/8 pole **CKR568**	**DMK**
25	**S4PR525**						
30	**S4PR530**				3P **TS3R5A**	Changeover switch Open transition I–0–II **MTSCKR5OT**	
40	**S4PR540**			2NO **AC2N0**			
60	—	**UNMR5B**	**PEMR5B**		1P **TS1R5B**		
80							
100					3P **TS3R5B**		

Notes

① Toggle version includes direct handle.
② For use with conversion kits on **Page V5-T8-9**.
③ Includes shaft and accessory cap.

Handles

Direct Handle



Direct Handle

Ampere Rating	Handle Color	Catalog Number
16–100	Black	**DHR5**

Size 00 Handle



Size 0 Handle



Size 1 Handle ②



Door Interlocked External Handle (Defeatable) ①

Ampere Rating	Handle Color	Handle Size	NEMA Type Rating	Catalog Number
Front and Right Side Operation I–0				
16–100	Black	SH00	3R, 12	**SHB00N12**
16–100	Black	SH00	4, 4X	**SHB00N4X**
16–100	Red/Yellow	SH00	3R, 12	**SHR00N12**
16–100	Red/Yellow	SH00	4, 4X	**SHR00N4X**
16–100	Black	SH0	3R, 12	**SHB0N12**
16–100	Black	SH0	4, 4X	**SHB0N4X**
16–100	Red/Yellow	SH0	3R, 12	**SHR0N12**
16–100	Red/Yellow	SH0	4, 4X	**SHR0N4X**
16–100	Black	SH1	4, 4X	**SHB1N4X**
16–100	Red/Yellow	SH1	4, 4X	**SHR1N4X**
For R5 Series Changeover Switches—Front Operation I–0–I				
16–100	Black	SH00	4, 4X	**SHB00MTSOT**

Shafts

Shaft 5 x 5



Shaft Extensions for External Handle

Description	Ampere Rating	Use with Handle Type	Shaft Length In (mm)	Catalog Number
Standard lengths: 55 mm, 90 mm, 150 mm, 200 mm, 320 mm	16–100	SH00/SH0	2.17 (55.0)	**SF55SH5X5**
	16–100	SH00/SH0	3.54 (90.0)	**SF90SH5X5**
For 3/4-pole switches: shafts are for external front and side handle	16–100	SH00/SH0	5.91 (150.0)	**SF150SH5X5**
	16–100	SH00/SH0	7.87 (200.0)	**SF200SH5X5**
For 6/8-pole switches and changeover switches: shafts are for external front and side handle	16–100	SH00/SH0	12.60 (320.0)	**SF320SH5X5**
	16–100	SH1	7.87 (200.0)	**SF200SH5X5SH1**
	16–100	SH1	12.60 (320.0)	**SF320SH5X5SH1**
	16–100	SH1	15.70 (400.0)	**SF400SH5X5SH1**



Guide Cone

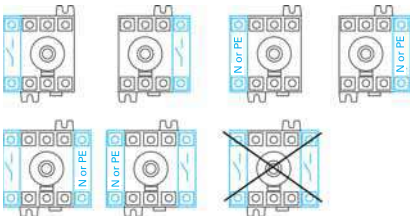
Description	Ampere Rating	Use with Handle Type	Catalog Number
The guide cone facilitates an easier connection between the shaft and a Size 00 or Size 0 external selector handle. It allows the shaft up to 10 mm of vertical play when making the connection	16–100	SH00 and SH0	**SFGAB**

Notes

① Allows door to be opened when switch is in the ON position.

② Contains all metal internal parts.

Additional Pole Configurations



Switched Fourth-Pole Module



Switched Fourth-Pole Module

Description	Ampere Rating	Number of Poles	Type	Catalog Number
Add one or two poles and transform: • Three-pole R5 Series load break switch into a four-pole • Six-pole R5 Series switch into an eight-pole • Three-pole changeover switch into a four-pole	16	1	Switched	**S4PR516**
	25	1	Switched	**S4PR525**
	30	1	Switched	**S4PR530**
	40	1	Switched	**S4PR540**

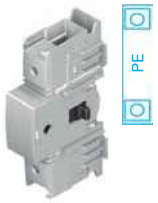
Unswitched Neutral Module



Unswitched Neutral Module

Description	Ampere Rating	Number of Poles	Type	Catalog Number
Transforms a three-pole switch into a three-pole + solid neutral	16–40	1	Unswitched	**UNMR5A**
	60–100	1	Unswitched	**UNMR5B**

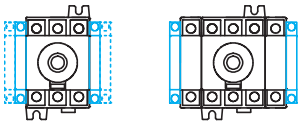
Protective Earth Module



Protective Earth Module

Description	Ampere Rating	Number of Poles	Catalog Number
Adds 1 protective earth module pole to the disconnect	16–40	1	**PEMR5A**
	60–100	1	**PEMR5B**

Auxiliary Contact Configurations



Auxiliary Contact Module



Description	Ampere Rating	Type	Catalog Number
Early-break/same-make and signalization of positions 0 and I by NO + NC or 2NO auxiliary contacts. They can be mounted on the left or on the right side of the device. Two modules maximum.	16–100	1NO + NC	**AC1N0NC**
	16–100	2NO	**AC2NO**

Terminal Shrouds



Description	Ampere Rating	Number of Poles	Position	Catalog Number
Line and load protection against direct contact with the terminals or connection parts: single- or three-pole. Advantage: Perforations allowing thermographic inspection.	16–40	1	Line and load	**TS1R5A**
	16–40	3	Line and load	**TS3R5A**
	60–100	1	Line and load	**TS1R5B**
	60–100	3	Line and load	**TS3R5B**

Conversion Kits ①②

Conversion Kit to Create a Six- or Eight-Pole Load Break Switch



Description	Ampere Rating	Type	Catalog Number
This accessory kit enables the assembly of two three-pole switches plus additional poles in order to achieve: • Six- or eight-pole load break switches • Direct handle included	16–100	6/8-pole load break switches	**CKR568**

Conversion Kit to Create Three- or Four-Pole Changeover/ Transfer Switch



Description	Ampere Rating	Type	Catalog Number
This accessory kit enables the assembly of two three-pole switches to create a changeover (transfer) switch. R5 Series changeover switches ensure switching, transfer of sources (I–0–I) with the continuity of power supply. • Direct handle included	16–100	Changeover switches (I–0–II) Open transition	**MTSCKR50T**

Door/Panel Mounting Kit



Description	Ampere Rating	Number of Poles	Catalog Number
This kit enables direct mounting of the switch on the door panel. Moreover, the connection clamps of the switch are always accessible. The external handle is quick and easy to install due to an internal locking nut mounted on the inside of the enclosure.	16–100	3 and 4	**DMK** ③

Notes

① When external handle is required, please see options on **Page V5-T8-7**.

② For use with two three-pole R5 Series switches (plus optional fourth-pole, if desired).

③ Includes shaft and accessory cap.

Technical Data and Specifications

UL 508 (CSA 22.2 No. 14) Manual Motor Controller "Suitable as Motor Disconnect" from 16–80A

General Use Rating	16A	25A	30A	40A	60A	80A	100A
Approvals	UL 508/ CSA 22.2 No. 14	UL 508/ CSA 22.2 No. 14	UL 508/ CSA 22.2 No. 14	UL 508/ CSA 22.2 No. 14	UL 508/ CSA 22.2 No. 14	UL 508/ CSA 22.2 No. 14	UL 508/ CSA 22.2 No. 14
Short-circuit rating at 600 Vac (kA) ①	10/65	10/65	10/65	10/65	50/65	50/65	50
Branch circuit fuse type	J	J	J	J	J	J	J
Maximum fuse rating	60/30A	60/30A	60/30A	60/30A	100/60A	100/60A	100A
Maximum UL Horsepower Ratings/Maximum Motor FLA Current, Three-Phase							
208 Vac	3/10.6	7.5/24.2	7.5/24.2	7.5/24.2	15/46.2	15/46.2	15/46.2
220–240 Vac	5/15	7.5/22	7.5/22	7.5/22	15/42	20/54	20/54
440–480 Vac	10/14	15/21	15/21	20/27	30/40	40/52	40/52
600 Vac	10/11	20/22	20/22	25/27	30/32	40/41	40/41
Connection							
Wire range (AWG), solid, single cable	#14–#10	#14–#10	#14–#10	#14–#10	#14–#10	#14–#10	#14–#10
Wire range (AWG), solid, two cables	2x #12	2x #12	2x #12	2x #12	2x #12	2x #12	2x #12
Wire range (AWG), stranded, single cable	#14–#4	#14–#4	#14–#4	#14–#4	#14–#1	#14–#1	#14–#1
Wire range (AWG), stranded, two cables	2x (#14–#12)	2x (#14–#12)	2x (#14–#12)	2x (#14–#12)	2x (#10–#6)	2x (#10–#6)	2x (#10–#6)
Mechanical Characteristics							
Endurance, number of mechanical cycles	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Operating torque (lb-in/Nm)	7/0.8	7/0.8	7/0.8	7/0.8	8.9/1	8.9/1	8.9/1
Auxiliary Contacts							
Electrical characteristics	A300	A300	A300	A300	A300	A300	A300

IEC 60947-3 Characteristics

General Use Rating		16A	25A	32A	40A	63A	80A	100A
Rated Operational Currents I_e (A)								
Rated Voltage	**Load Duty Category**	**A/B** ②	**A/B** ②	**A/B** ②	**A/B** ②	**A/B** ②	**A/B** ②	**A/B** ②
415 Vac	AC-23 A/AC-23 B	16/16	25/25	32/32	40/40	63/63	80/80	80/80
500 Vac	AC-22 A/AC-22 B	16/16	25/25	32/32	40/40	63/63	80/80	—
500 Vac	AC-23 A/AC-23 B	16/16	25/25	25/25	25/25	63/63	63/63	—
690 Vac	AC-21 A/AC-21 B	16/16	25/25	32/32	40/40	63/63	80/80	100/100
690 Vac	AC-22 A/AC-22 B	16/16	25/25	32/32	32/40	40/63	63/80	—
690 Vac	AC-23 A/AC-23 B	16/16	25/25	25/25	25/25	40/40	40/40	—
Thermal Current I_{th} at 40°C (A)								
Thermal current I_{th} (40°C) ④		16	25	32	40	63	80	100
Rated insulation voltage U_i (V)		800	800	800	800	800	800	800
Rated impulse withstand voltage U_{imp} (kV)		8	8	8	8	8	8	8
Operational Power in AC-23 (kW)								
At 400 Vac without prebreaking AC in AC-23 (kW) ②③		7.5	11	15	18.5	30	37	—
At 500 Vac without prebreaking AC in AC-23 (kW) ②③		7.5	11	15	15	30	37	—
At 690 Vac without prebreaking AC in AC-23 (kW) ②③		7.5	15	18.5	18.5	30	37	—
Fuse Protected Short-Circuit Withstand (kA rms Prospective)								
Prospective short-circuit current (kA rms) ⑤		50	50	50	50	50	50	25
Associated fuse rating (A) ⑤		16	25	32	40	63	80	100
Overload Capacity (U_e 415 Vac)								
Rated short-time withstand current 0.3 s. I_{CW} (kA rms) ⑤		2.5	2.5	2.5	2.5	3	3	1.5
Rated short-circuit making capacity Icm (kA peak) ⑤		6	6	6	6	9	9	2.1
Connection								
Minimum Cu cable cross section (mm^2)		1.5	1.5	1.5	1.5	2.5	2.5	2.5
Maximum Cu cable section (mm^2)		16	16	16	16	35	35	35
Tightening torque minimum/maximum (Nm)		2/2.2	2/2.2	2/2.2	2/2.2	3.5/3.85	3.5/3.85	3.5/3.85

Notes

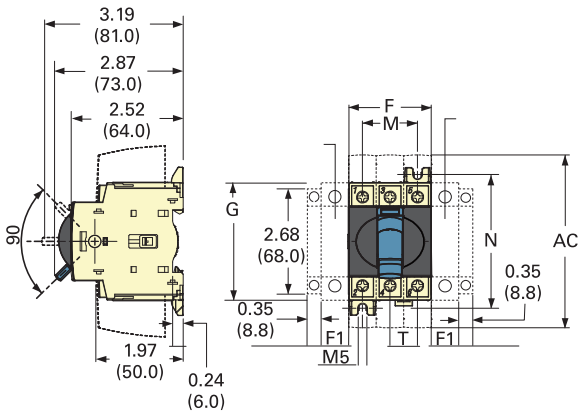
① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
② A/B: Category with index A = frequent operation; category with index B = infrequent operation.
③ The power value is given for information only; the current values vary from one manufacturer to another.
④ De-rate 1% per °C above 40°C, max. 70°C.
⑤ For a rated operating voltage, U_e = 400 Vac.

Dimensions

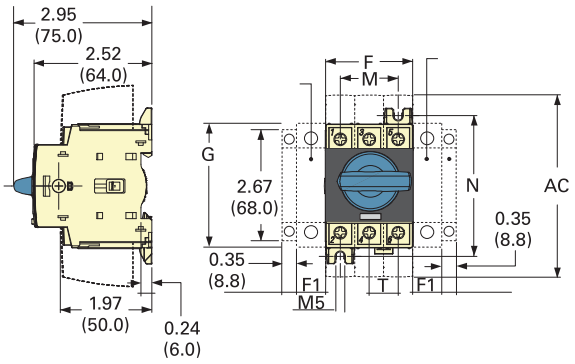
Approximate Dimensions in Inches (mm)

R5 Series 16–100A

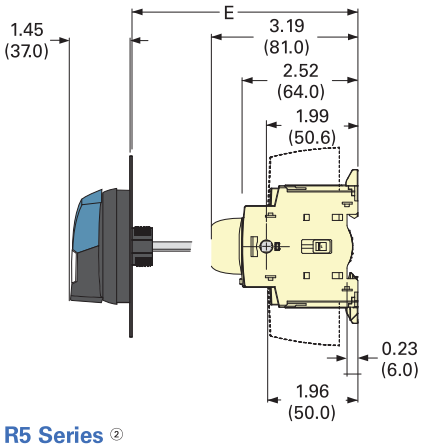
Toggle Operation



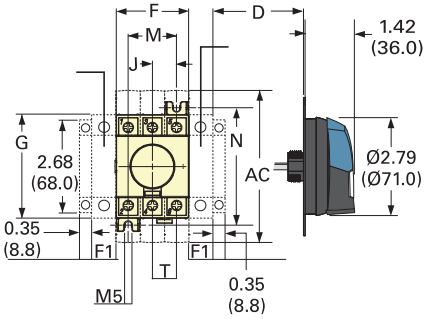
Direct Operation with Handle



External Front Operation



External Side Operation

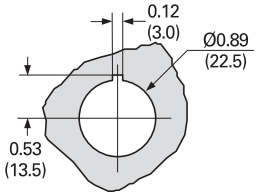


R5 Series ②

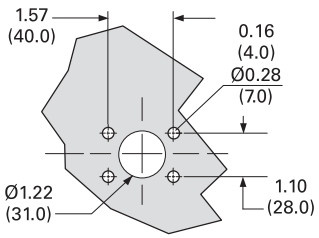
Ampere Rating	Overall Dimensions D Min.	D Max.	E Min.	E Max.	Terminal Shrouds AC	Switch Body F	F1	G	J	Switch Mounting M	N	Connection Terminal T
16–40	1.18 (30.0)	9.25 (235.0)	3.94 (100.0)	14.65 (372.0)	4.33 (110.0)	1.77 (45.0)	0.59 (15.0)	2.68 (68.0)	0.59 (15.0)	1.18 (30.0)	2.95 (75.0)	0.59 (15.0)
63–100	1.18 (30.0)	9.25 (235.0)	3.94 (100.0)	14.65 (372.0)	4.33 (110.0)	2.06 (52.5)	0.69 (17.5)	2.99 (76.0)	0.69 (17.5)	1.38 (35.0)	3.35 (85.0)	0.69 (17.5)

Door Drilling—SH00/SH0

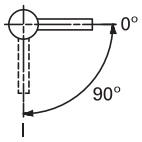
With Fixing Nut



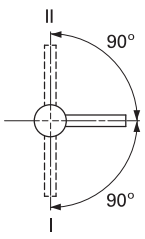
With Four Fixing Screws



Front and Right Side Operation



Front Operation for R5 Changeover Switches I–0–II or I–I+II–II



Notes

① One switched fourth-pole module (one per device maximum) or one unswitched neutral pole or one auxiliary contact.

② Maximum four additional blocks.

Operating Handle—SH00/SH0

Non-Fusible 30–100A Compact



Contents

Description	*Page*
Non-Fusible 30–100A Compact	
Product Selection	**V5-T8-13**
Technical Data and Specifications	**V5-T8-16**
Dimensions	**V5-T8-17**
Non-Fusible 100–1200A	**V5-T8-18**
Fusible 30–800A	**V5-T8-26**
DC Rated Disconnects	**V5-T8-45**

8

Non-Fusible 30–100A Compact

Product Description

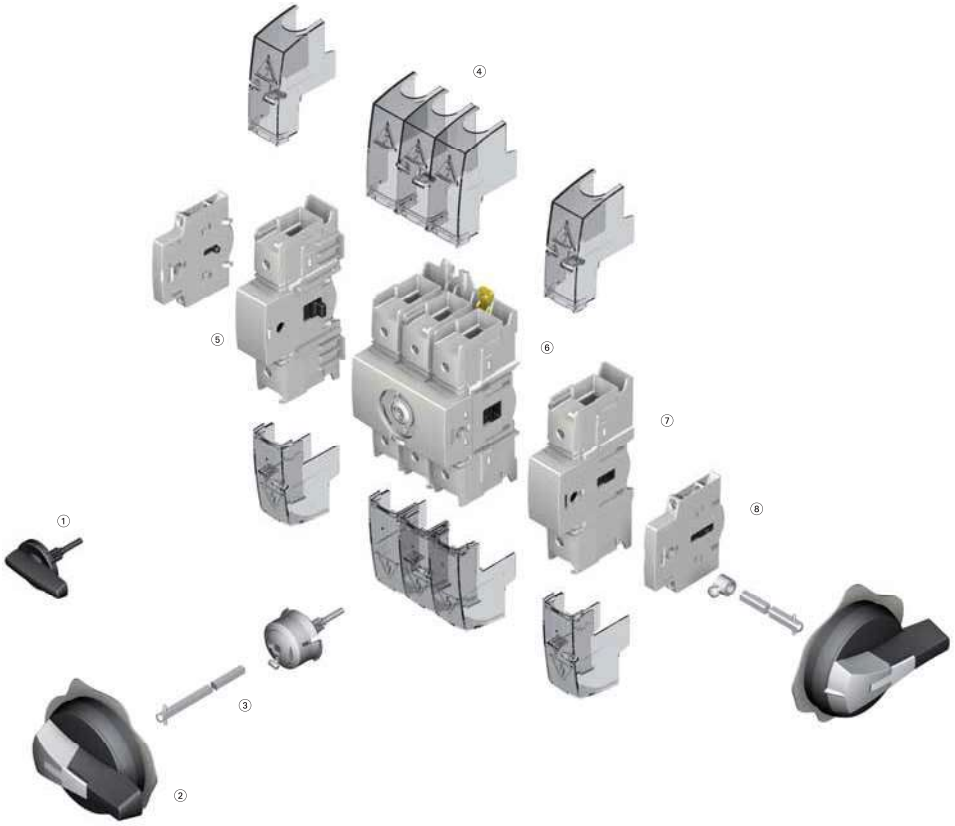
The R9 Series (UL 98 listed) non-fusible 30–100A compact range ensures making or breaking on load and safety isolation for low voltage electrical circuits, particularly for machine control circuits up to 600V.

Features, Benefits and Functions

- Rating three-pole from 30A to 100A
- Direct or external operation handle (padlockable in ON position)
- Double breaking per phase

Standards and Certifications

- UL 98, File E222859
- CSAT 22.2 No. 4, File 217736
- IEC 60947-3
- EN 60947-3
- CE



Product Identification

① Direct handle
② Door interlocked external handle
③ Shaft extension
④ Terminal shrouds
⑤ Unswitched neutral pole
⑥ Switch body
⑦ Switched fourth-pole module
⑧ Modular type auxiliary contacts

Note: For further details, please see the installation instructions supplied with each device.

Product Selection

Direct Operation


Switch body + Direct handle

External Operation


Switch body + Shaft + External handle

R9 Series 30–100A










Ampere Rating (Frame)	Number of Poles	Switch Body Only	Direct Handle	Front and Right External Handle SH00 (Choose one)	Front and Right External Handle SH0 (Choose one)	Shaft for SH0 and SH00 Handles—In (mm) (Choose one)	Shaft for SH1—5 x 5 mm—In (mm)	Switched Fourth-Pole Module	Auxiliary Contacts (Choose one)	Terminal Shrouds (Choose one)
30 (C-Frame)	3	**R9C3030U**	**DHR9**	SH00 Black 3R, 12 **SHB00N12**	SH0 Black 3R, 12 **SHB0N12**	2.20 (55.5) **SF55SH5X5**	7.90 (200.0) **SF200SH5X5SH1**	**S4PR930**	1NO + 1NC **AC1NONC**	1P **TS1R9**
60 (C-Frame)	3	**R9C3060U**				3.50 (90.0) **SF90SH5X5**	12.60 (320.0) **SF320SH5X5SH1**	**S4PR960**	2NO **AC2N0**	3P **TS3R9CV**
100 (C-Frame)	3	**R9C3100U**		SH00 Red 3R, 12 **SHR00N12**	SH0 Red 3R, 12 **SHR0N12**	5.91 (150.0) **SF150SH5X5**	15.70 (400.0) **SF400SH5X5SH1**	**S4PR9100**		
						7.87 (200.0) **SF200SH5X5**				
				SH00 Black 4, 4X **SHB00N4X**	SH0 Black 4, 4X **SHB0N4X**	12.60 (320.0) **SF320SH5X5**				
				SH00 Red 4 4X **SHR00N4X**	SH0 Red 4 4X **SHR0N4X**					

Handles

Direct Handle

Direct Handle



Ampere Rating	Handle Color	Catalog Number
30–100	Black	**DHR9**

Door Interlocked External Handle ①

Size 00 Handle



Size 0 Handle



Size 1 Handle ②



Ampere Rating	Handle Color	Handle Size	NEMA Type Rating	Catalog Number
Front and Right External Handle				
30–100	Black	SH00	3R, 12	**SHB00N12**
30–100	Black	SH00	4, 4X	**SHB00N4X**
30–100	Red	SH00	3R, 12	**SHR00N12**
30–100	Red	SH00	4, 4X	**SHR00N4X**
30–100	Black	SH0	3R, 12	**SHB0N12**
30–100	Black	SH0	4, 4X	**SHB0N4X**
30–100	Red	SH0	3R, 12	**SHR0N12**
30–100	Red	SH0	4, 4X	**SHR0N4X**
16–100	Black	SH1	4, 4X	**SHB1N4X**
16–100	Red/Yellow	SH1	4, 4X	**SHR1N4X**

Shafts

Shaft Extensions for External Handle

Shaft 5 x 5



Description	Ampere Rating	Use with Handle Type	Shaft Length In (mm)	Catalog Number
Standard lengths: 55 mm, 90 mm, 150 mm, 200 mm, 320 mm Shafts are for external front and right side handles	30–100	SH00/SH0	2.20 (55.5)	**SF55SH5X5**
	30–100	SH00/SH0	3.50 (90.0)	**SF90SH5X5**
	30–100	SH00/SH0	5.91 (150.0)	**SF150SH5X5**
	30–100	SH00/SH0	7.87 (200.0)	**SF200SH5X5**
	30–100	SH00/SH0	12.60 (320.0)	**SF320SH5X5**
	16–100	SH1	7.87 (200.0)	**SF200SH5X5SH1**
	16–100	SH1	12.60 (320.0)	**SF320SH5X5SH1**
	16–100	SH1	15.70 (400.0)	**SF400SH5X5SH1**

Guide Cone

SFGAB

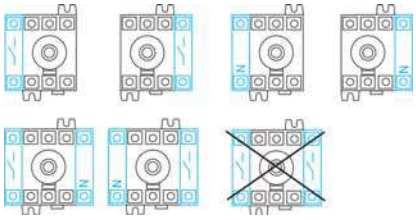


Description	Ampere Rating	Use with Handle Type	Catalog Number
The guide cone facilitates an easier connection between the shaft and a Size 00 or Size 0 external selector handle. It allows the shaft up to 10 mm of vertical play when making the connection	16–80	SH00 and SH0	**SFGAB**

Notes

① Allows door to be opened when switch is in the ON position.
② Contains all metal internal parts.

Additional Pole Configurations

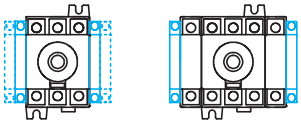


Switched Fourth-Pole Module



Description	Ampere Rating	Number of Poles	Type	Catalog Number
Transforms a three-pole, R9 Series load break switch into a four-pole	30	1	Switched	**S4PR930**
	60	1	Switched	**S4PR960**
	100	1	Switched	**S4PR9100**

Auxiliary Contact Configurations



Auxiliary Contacts



Description	Ampere Rating	Type	Catalog Number
Early-break/same-make and signalization of positions 0 and I by NO + NC or 2NO auxiliary contacts. They can be mounted on the left or on the right side of the device. Maximum four auxiliary contacts (two modules)	30–100	1NO + 1NC	**AC1N0NC**
	30–100	2NO	**AC2NO**

Terminal Shrouds



Description	Ampere Rating	Number of Poles	Position	Catalog Number
Line and load protection against direct contact with the terminals or connection parts: single- or three-pole Advantage: Perforations allowing thermographic inspection	30–100	1	Line and load	**TS1R9**
	30–100	3	Line and load	**TS3R9CV**

Technical Data and Specifications

UL and CSA Characteristics

UL 98/CSA 22.2 No. 4

Technical Characteristics	30A	60A	100A
Short-circuit rating at 480 Vac (kA) ①	100 kA	100 kA	100 kA
Short-circuit rating at 600 Vac (kA) ①	100 kA	100 kA	25 kA
Fuse type	J	J	J
Maximum fuse rating (A)	30	60	100
Maximum Horsepower Rating/Maximum Motor FLA Three-Phase			
220–240 Vac	10/28	20/54	20/54
440–480 Vac	20/27	40/52	50/65
600 Vac	25/27	50/52	50/52
Maximum Horsepower Rating/Maximum Motor FLA Single-Phase			
120 Vac	2/24	3/34	5/56
240 Vac	5/28	10/50	10/50
Connection			
Solid, 1 wire	#12–10	#12–10	#12–10
Stranded, 1 wire	#12–2/0	#12–2/0	#12–2/0
Auxiliary Contacts			
Electrical characteristic	A300	A300	A300

IEC 60647-3 Characteristics

Technical Characteristics		32A	63A	100A
Thermal Current I_{th} at 40°C (A)				
Thermal current I_{th} (40°C)		30	60	100
Rated insulation voltage U_i (V)		800	800	800
Rated impulse withstand voltage U_{imp} (kV)		8	8	8
Rated Operation Currents I_e (A)				
Load Duty Category	**Rated Voltage**	**A** ②	**A** ②	**A** ②
400 Vac	AC-22A	32	63	100
400 Vac	AC-23A	32	63	100
690 Vac	AC-22A	32	63	80
690 Vac	AC-23A	32	63	63
Operational Power in AC-23 (kW)				
At 400 Vac without prebreak AC in AC-23 (kW) ③④		15	30	45
At 500 Vac without prebreak AC in AC-23 (kW) ③④		15	30	45
At 690 Vac without prebreak AC in AC-23 (kW) ③④		18.5	30	45
Overload Capacity (U_e 415 Vac)				
Rated short-time making capacity I_{cm} (kA peak) ⑤		12	12	12
Connection				
Minimum Cu cable cross section (mm^2)		2.5	2.5	10
Maximum Cu cable section (mm^2)		70	70	70

Notes

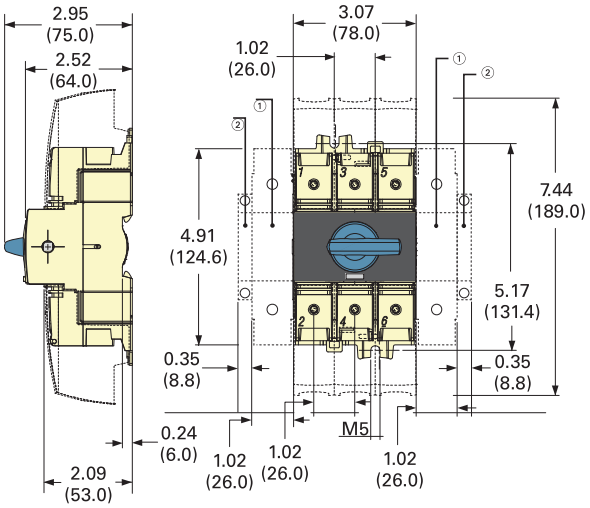
① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
② Category with index A = frequent operation.
③ A/B: Category with index A = frequent operation; category with index B = infrequent operation.
④ The power value is given for information only; the current values vary from one manufacturer to another.
⑤ For a rated operating voltage, U_e = 400 Vac.

Dimensions

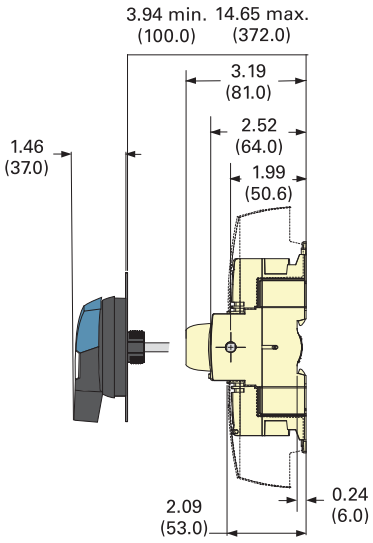
Approximate Dimensions in Inches (mm)

R9 Series 30–100A Compact

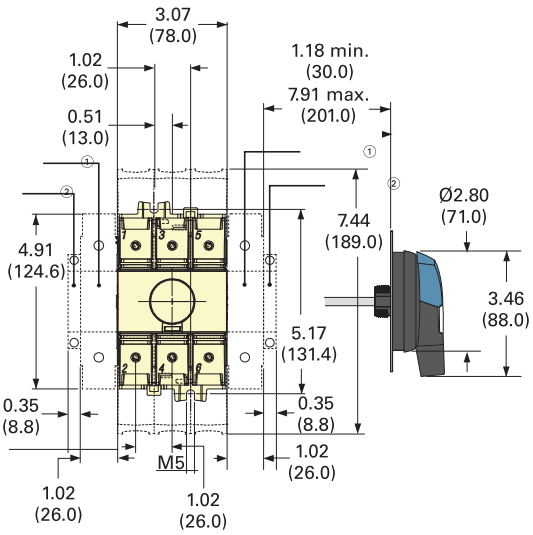
Direct Operation



External Front Operation

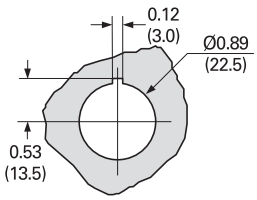


External Side Operation

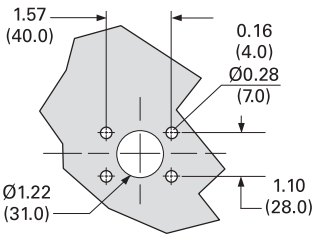


Door Drilling—SH00/SH0

With Fixing Nut

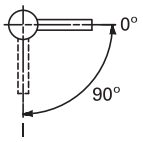


With Four Fixing Screws



Operating Handle—SH00/SH0

Front and Right Side Operation



Notes

① One switched fourth-pole module (one per device maximum) and/or one unswitched neutral pole.

② Auxiliary contact.

Non-Fusible 100–1200A



Contents

Description	*Page*
Non-Fusible 30–100A Compact	**V5-T8-12**
Non-Fusible 100–1200A	
Product Selection	**V5-T8-19**
Accessories	**V5-T8-20**
Technical Data and Specifications	**V5-T8-22**
Dimensions	**V5-T8-23**
Fusible 30–800A	**V5-T8-26**
DC Rated Disconnects	**V5-T8-45**

Non-Fusible 100–1200A

Product Description

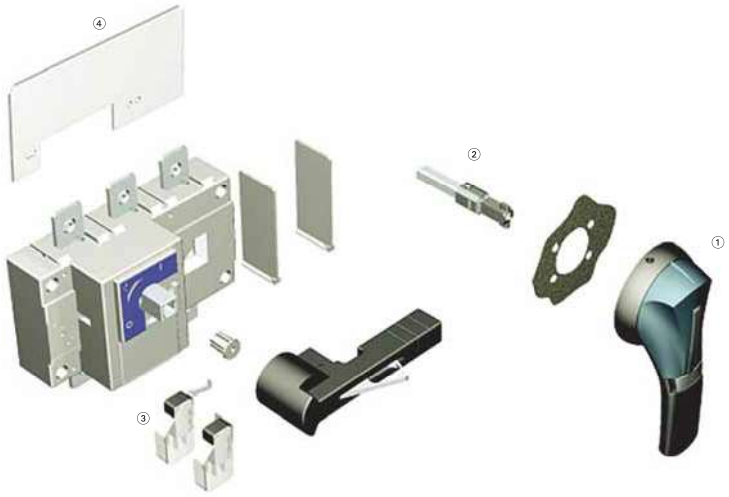
The R9 Series (UL 98 listed) non-fusible 100–1200A are manually operated multipole load-break switches. Quick-make, quick-break design provides safety isolation for any low voltage circuit.

Features, Benefits and Functions

- High thermal and dynamic withstand ratings
- Arduous categories of applications
- High electrical and mechanical endurances

Standards and Certifications

- UL 98, File E222859
- CSAT 22.2 No. 4, File 217736
- IEC 60947-3
- EN 60947-3



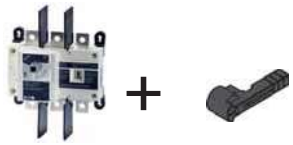
Product Identification

① External front handle
② Shaft extensions for external handle
③ Configurable U-type ACs, for pre-break and signalling or TEST
④ Terminal Screens

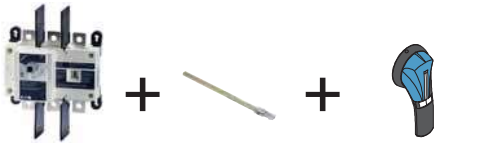
Note: For further details, please see the installation instructions supplied with each device.

Product Selection

Direct Operation



External Operation



R9 Series Non-Fusible 100–1200A








Ampere Rating (Frame)	Number of Poles	Switch Body Only	Direct Handle	Door Interlocked External Pistol Handle (Choose one)	Shaft Extensions for External Handle—In (mm) (Choose one)	Auxiliary Contacts	Terminal Screens (Choose one)	Terminal Lugs ③
100 (D-Frame)	3	**R9D3100U**	**DHR9DE**	Size 2, Black 1, 3R, 12 Defeatable **PHB2N12F**	7.90 (200.0) **SF200PH10X10**	1NO + 1NC **AC1N0NCDE** **AC1N0NCDELL**	3-pole, Line side only **TS3R9DT**	**LK3R9DL**
	4	**R9D4100U**						**LK4R9DL**
200 (D-Frame)	3	**R9D3200U**		Size 2, Red 1, 3R, 12 Defeatable **PHR2N12F**	12.60 (320.0) **SF320PH10X10**	2NO + 2NC **AC2N0NCDE** **AC2N0NCDELL**	3-pole, Load side only **TS3R9DB**	**LK3R9DL**
	4	**R9D4200U**						**LK4R9DL**
400 (E-Frame)	3	**R9E3400U**		Size 2, Black 4, 4X Defeatable **PHB2N4XF**	15.70 (400.0) **SF400PH10X10**		4-pole, Line or load side **TS4R9DTB**	**LK3R9EM**
	4	**R9E4400U**		Size 2, Red 4, 4X Defeatable **PHR2N4XF**	19.70 (500.0) **SF500PH10X10**		3-pole, Line side only **TS3R9ET**	**LK4R9EM**
							3-pole, Load side only **TS3R9EB**	
							4-pole, Line or load side **TS4R9ETB**	
600 (F-Frame)	3	**R9F3600U**	**DHR9FG**	Size 3, Black 4, 4X Defeatable **PHB3N4XF**	7.90 (200.0) **SF200PH15X12**	1NO AC U Type **AC1N0R9** ②	**TS3R9F** ①	**LK3R9FN**
	4	**R9F4600U**					**TS4R9F** ①	**LK4R9FN**
800 (G-Frame)	3	**R9G3800U**		Size 3, Red 4, 4X Defeatable **PHR3N4XF**	12.60 (320.0) **SF320PH15X12**	1NC AC U Type **AC1NCR9** ②	**TS3R9FFS** ④	**LK6R9G**
	4	**R9G4800U**					**TS3R9G** ①	**LK8R9G**
1000 (G-Frame)	3	**R9G31000U**		Size 4, Black 4, 4X Defeatable **PHB4N4XF**	1.70 (400.0) **SF400PH15X12**		**TS4R9G** ①	
	4	**R9G41000U**					**TS3R9GFS** ④	
1200 (G-Frame)	3	**R9G31200U**		Size 4, Red 4, 4X Defeatable **PHR4N4XF**				
	4	**R9G41200U**						

Notes

① Top (line side) supplied as standard.
② Auxiliary contact requires holder (catalog number ACHFG) when used on F and G-Frame switches (non-fusible 600–1200A).
③ Each catalog number is for line or load side. For both line and load, please order two sets.
④ FS suffix = Finger Safe.

Accessories

Direct Handle



Direct Handle

Description	Ampere Rating	Handle Color	Catalog Number
Front operation	100–400	Black	**DHR9DE**
	600–1200	Black	**DHR9FG**

PH2 and PH3 Types



PH4 Type



Door Interlocked External Handle—Front Operation

Description	Ampere Rating	Switch Frame	Handle Type	Handle Color	NEMA Type	Defeatable ①	Catalog Number
The door interlocked external handle includes one lockable handle and one escutcheon. For Dimensions, see **Page V5-T8-23.**	100–400	D/E	PH2	Black	1,3R,12	Yes	**PHB2N12F**
	100–400	D/E	PH2	Red	1,3R,12	Yes	**PHR2N12F**
	100–400	D/E	PH2	Black	4,4X	Yes	**PHB2N4XF**
	100–400	D/E	PH2	Red	4,4X	Yes	**PHR2N4XF**
	600–1200	F/G	PH3	Black	4,4X	Yes	**PHB3N4XF**
	600–1200	F/G	PH3	Red	4,4X	Yes	**PHR3N4XF**
	600–1200	F/G	PH4	Black	4,4X	Yes	**PHB4N4XF**
	600–1200	F/G	PH4	Red	4,4X	Yes	**PHR4N4XF**

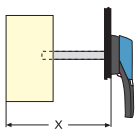
Shaft Extensions



Shaft Extensions for External Front Handle

Front Operation

Use	Ampere Rating (Frame)	Handle Type	Shaft Length In (mm)	Catalog Number
Standard lengths: 200 mm, 320 mm, 400 mm, 500 mm	100–400 (D-, E-Frame)	PH2	7.90 (200.0)	**SF200PH10X10**
	100–400 (D-, E-Frame)	PH2	12.60 (320.0)	**SF320PH10X10**
	100–400 (D-, E-Frame)	PH2	15.70 (400.0)	**SF400PH10X10**
	100–400 (D-, E-Frame)	PH2	19.70 (500.4)	**SF500PH10X10**
	600–1200 (F-, G-Frame)	PH3/PH4	7.90 (200.0)	**SF200PH15X12**
	600–1200 (F-, G-Frame)	PH3/PH4	12.60 (320.0)	**SF320PH15X12**
	600–1200 (F-, G-Frame)	PH3/PH4	15.70 (400.0)	**SF400PH15X12**



Shaft Length Minimum Dimensions (X)—Inches (mm)

Description	Ampere Rating (Frame)	X	Length	Catalog Number
Standard lengths: • 7.90 (200.6) • 12.60 (320.0) • 5.70 (398.8)	100–400 (D-, E-Frame)	5.31–10.43 (135.0–265.0)	7.90 (200.6)	**SF200PH10X10**
		5.31–10.43 (135.0–385.0)	12.60 (320.0)	**SF320PH10X10**
		5.31–10.43 (135.0–465.0)	15.70 (398.8)	**SF400PH10X10**
		5.31–22.20 (135.0–565.0)	19.70 (500.4)	**SF500PH10X10**
	600–1200 (F-, G-Frame)	8.70–13.50 (221.0–343.0)	7.90 (200.6)	**SF200PH15X12**
		8.70–18.23 (221.0–463.0)	12.60 (320.0)	**SF320PH15X12**
		8.70–21.38 (221.0–543.0)	15.70 (398.8)	**SF400PH15X12**

Note

① Allow the door to be opened when the switch is in 1 (ON) position.

Auxiliary Contacts ①



Description	Ampere Rating (Frame)	Number of AC	AC Type	Catalog Number
100–200A, up to two ACs max.	100–400 (D-, E-Frame)	1NO / 1NC	Standard	**AC1NONCDE**
400A, up to two ACs max.		1NO / 1NC	Low Level ②	**AC1NONCDELL**
		2NO / 2NC	Standard	**AC2NONCDE**
		2NO / 2NC	Low Level ②	**AC2NONCDELL**
600–1200A, up to four ACs max.	600–1200 (F-, G-Frame)	1NO	Standard	**AC1NOR9** ③
		1NC	Standard	**AC1NCR9** ③
Auxiliary contact holder (for use with AC1NOR9 and AC1NCR9)	600–1200 (F-, G-Frame)	—	—	**ACHFG**

Terminal Screens



Description	Maximum Ampere Rating (Frame)	Number of Poles	Line/Load Side	Catalog Number
Line and load protection against direct contact with terminals or connection parts. Line side terminal shrouds are included standard on 600–1200A non-fusible switches. Shrouds are not included on the 100–400A.	100–200 (D-Frame)	3	Line	**TS3R9DT**
		3	Load	**TS3R9DB**
		4	Line or load	**TS4R9DTB**
	400 (E-Frame)	3	Line	**TS3R9ET**
		3	Load	**TS3R9EB**
	600 (F-Frame)	4	Line or load	**TS4R9ETB**
		3	Line or load	**TS3R9F**
	800–1200 (G-Frame)	4	Line or load	**TS4R9F**
		3	Line or load	**TS3R9G**
		4	Line or load	**TS4R9G**

Line and Load Terminal Lugs



Description	Maximum Ampere Rating (Frame)	Number of Poles	Number of Lugs/Pole	Lug Capacity/Phase	Cable Type	Catalog Number
Connection of copper cables on to the terminals (no spade lugs). Each kit includes lugs for line or load side. For line and load side, order two kits. For Dimensions, see **Page V5-T8-23**.	100–200 (D-Frame)	3	1	#6–300 kcmil	Cu/Al	**LK3R9DL**
		4	1	#6–300 kcmil	Cu/Al	**LK4R9DL**
	400 (E-Frame)	3	1	#2–600 kcmil	Cu/Al	**LK3R9EM** ④
		4	1	#2–600 kcmil	Cu/Al	**LK4R9EM** ④
	600 (F-Frame)	3	1	(2) #2–600 kcmil	Cu/Al	**LK3R9FN**
		4	1	(2) #2–600 kcmil	Cu/Al	**LK4R9FN**
	800–1200 (G-Frame)	3	2	2x (2) #2–600 kcmil	Cu/Al	**LK6R9G**
		4	2	2x (2) #2–600 kcmil	Cu/Al	**LK8R9G**

Notes

① Early-break/same-make.
② Gold plated for minimal resistance—for PLC applications.
③ Requires use of ACHFG auxiliary contact holder for F- and G-Frame switches.
④ For two-hole lug, consult factory.

Technical Data and Specifications

UL and CSA Characteristics

Technical Characteristics		100A	200A	400A	600A	800A	1000A	1200A
Short circuit rating at 600 Vac (kA) ①		200 kA	200 kA	200 kA	200 kA	200 kA	100 kA	100 kA
Fuse type		J	J	J	J	L	L	L
Maximum fuse rating (A)		100	200	400	600	800	1000	1200
Maximum Horsepower Rating/Maximum Motor FLA Three-Phase								
220–240 Vac		30/80	75/192	125/312	200/480	200/480	200/480	200/480
440–480 Vac		75/96	150/180	250/302	400/477	500/590	500/590	500/590
600 Vac		100/99	200/192	350/336	350/336	500/472	500/472	500/472
Maximum Horsepower Rating/Maximum Motor FLA Direct Current								
125 Vdc	Two-pole in series	10/76	15/112	20/148	20/148	—	—	—
250 Vdc	Three-pole in series	15/55	15/55	50/173	50/173	—	—	—
Connection								
Minimum connection section/AWG		#6	#6	#2	2 x #2	2 x #2	4 x #2	4 x #2
Maximum connection section/AWG		300 kcmil	300 kcmil	600 kcmil	2 x 600 kcmil	2 x 600 kcmil	4 x 600 kcmil	4 x 600 kcmil
Auxiliary Contacts								
Electrical characteristics		A300	A300	A300	A600	A600	A600	A600

IEC 60947-3 Characteristics

Technical Characteristics		100A	200A	400A	600A	800A	1000A	1200A
Rated insulation voltage U_i (V)		1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp} (kV)		8	8	8	12	12	12	12
Rated Operational Currents I_e (A)								
Rated Voltage	**Load Duty Category**	**A** ②	**A** ②	**A** ②	**A** ②	**A** ②	**A** ②	**A** ②
400 Vac	AC-22A	100	200	400	630	800	1000	1200
400 Vac	AC-23A	100	200	400	630	800	1000	1000
690 Vac	AC-22A	100	200	400	500	630	630	630
690 Vac	AC-23A	100	200	315	200	400	400	400
Connection								
Minimum Cu cable cross section (mm^2)		35	70	185	2 x 150	2 x 185	2 x 240	—
Minimum Cu busbar section (mm^2)		—	—	—	2 x 30 x 5	2 x 40 x 5	2 x 50 x 5	2 x 60 x 5
Operational Power in AC-23 (kW)								
At 400 Vac without prebreaking AC in AC23 (kW) (2 x 3)		51	100	220	355	450	560	560
At 500 Vac without prebreaking AC in AC23 (kW) (2 x 3)		63	140	280	450	560	560	560
At 690 Vac without prebreaking AC in AC23 (kW) (2 x 3)		90	185	185	185	400	400	400
Overload Capacity (U_e 415 Vac)								
Rated short-circuit making capacity Icm (kA peak) ③		17.6	32	48	48	75	48	75

Notes

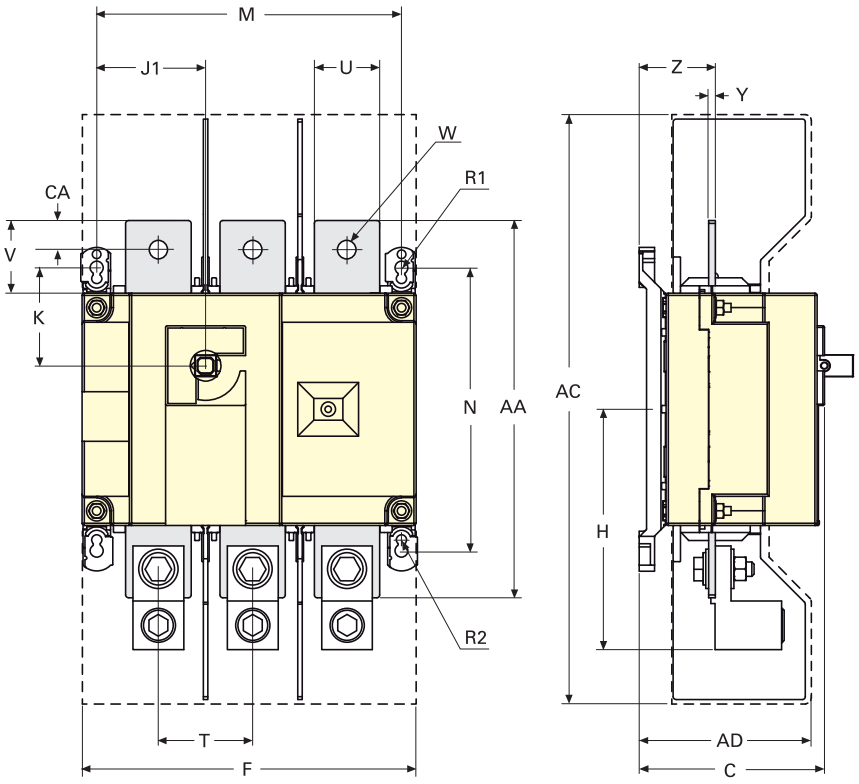
① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
② Category with index A = frequent operation.
③ For a rated operating voltage, U_i = 400 Vac.

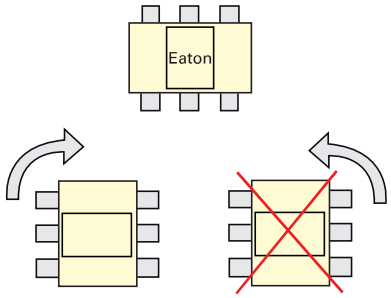
Dimensions

Approximate Dimensions in Inches (mm)

Front Operation—D- and E-Frames

R9 Series Non-Fusible 100–400A





The switch will operate correctly when rotated clockwise 90 degrees.

The switch will not operate correctly when rotated counterclockwise 90 degrees.

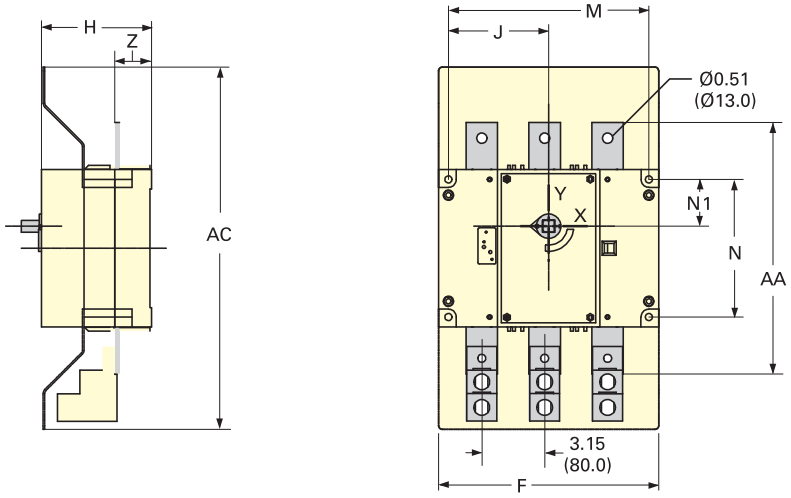
Ampere Rating (A)	Overall Dimensions	Terminal Shrouds AC	Terminal Shrouds AD	Switch Body F 3P	Switch Body F 4P	H	J1 3P	J1 4P	K
100	3.72 (94.6)	10.10 (256.0)	3.05 (77.5)	7.09 (180.0)	9.06 (230.0)	4.22 (107.0)	2.17 (55.0)	4.13 (105.0)	1.80 (45.6)
200	3.72 (94.6)	10.10 (256.0)	3.05 (77.5)	7.09 (180.0)	9.06 (230.0)	4.22 (107.0)	2.17 (55.0)	4.13 (105.0)	1.80 (45.6)
400	4.92 (128.0)	16.00 (406.0)	4.15 (115.0)	9.05 (230.0)	11.40 (290.0)	6.53 (166.0)	2.95 (75.0)	5.31 (135.0)	2.65 (67.5)

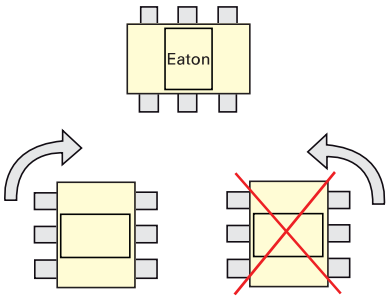
Ampere Rating (A)	Switch Mounting M 3P	Switch Mounting M 4P	N	R1	R2	Connection T	U	V	W	Y	Z	AA	AC
100	6.30 (160.0)	8.27 (210.0)	5.31 (135.0)	0.35 (9.0)	0.27 (7.0)	1.97 (50.0)	0.98 (25.0)	1.18 (30.0)	0.43 (11.0)	0.14 (3.5)	1.35 (34.4)	6.30 (160.0)	0.60 (15.0)
200	6.30 (160.0)	8.27 (210.0)	5.31 (135.0)	0.35 (9.0)	0.27 (7.0)	1.97 (50.0)	0.98 (25.0)	1.18 (30.0)	0.43 (11.0)	0.14 (3.5)	1.35 (34.4)	6.30 (160.0)	0.60 (15.0)
400	8.26 (210.0)	10.60 (270.0)	7.67 (195.0)	0.35 (9.0)	0.27 (7.0)	2.56 (65.0)	1.77 (45.0)	1.97 (50.0)	0.43 (13.0)	0.20 (5.0)	2.08 (53.0)	10.20 (260.0)	0.80 (20.0)

Approximate Dimensions in Inches (mm)

Front Operation—F- and G-Frames

R9 Series Non-Fusible 600A



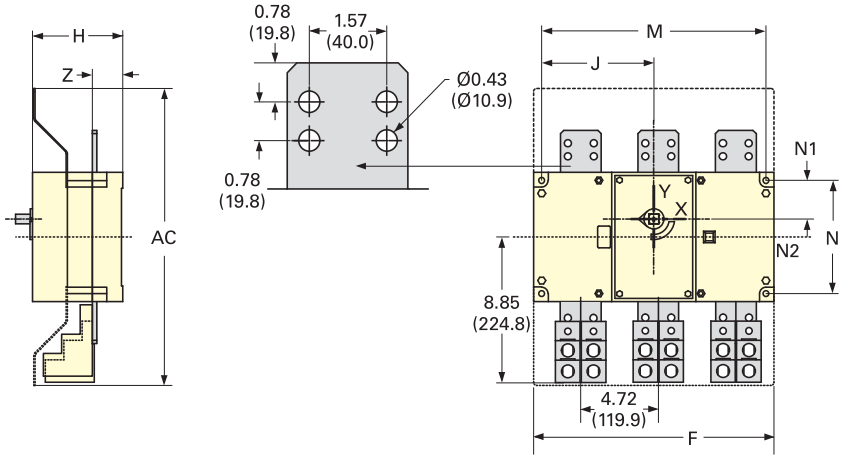


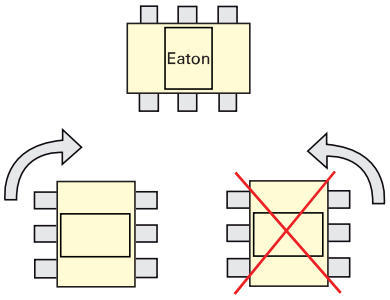
The switch will operate correctly when rotated clockwise 90 degrees.

The switch will not operate correctly when rotated counterclockwise 90 degrees.

Terminal Screens		Switch Body					Switch Mounting			Connection Terminals	
AC	F 3P	F 4P	H	J 2P	J 4P	M 4P	M 4 P	N	N1	AA	Z
18.11 (460.0)	11.02 (280.0)	14.17 (360.0)	5.51 (140.0)	5.00 (127.5)	6.59 (167.5)	10.03 (255.0)	13.19 (335.0)	6.89 (175.0)	2.34 (59.5)	12.6 (320.0)	1.85 (47.0)

R9 Series Non-Fusible 800–1200A





The switch will operate correctly when rotated clockwise 90 degrees.

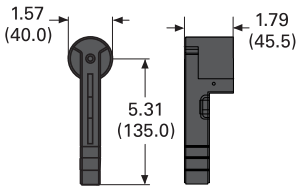
The switch will not operate correctly when rotated counterclockwise 90 degrees.

Terminal Screens		Switch Body					Switch Mounting			Connection Terminals	
AC	F 3P	F 4P	H	J 3P	J 4P	M 3P	M 4P	N	N1	N2	Z
18.12 (460.0)	14.64 (372.0)	19.37 (492.0)	5.51 (140.0)	6.83 (173.5)	9.19 (233.5)	13.66 (347.0)	18.38 (467.0)	6.89 (175.0)	2.34 (59.5)	1.10 (28.0)	1.85 (47.0)

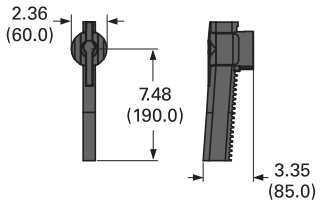
Approximate Dimensions in Inches (mm)

Direct Handle—Front Operation

R9 Series Non-Fusible 400A

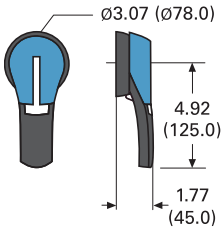


R9 Series Non-Fusible 600–1200A

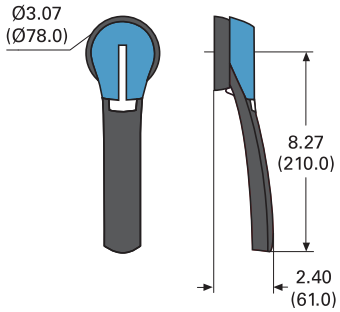


Door Interlocked External Handle

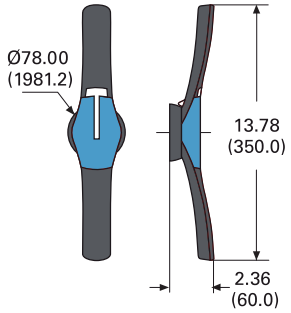
PH2 Type Handle



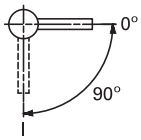
PH3 Type Handle

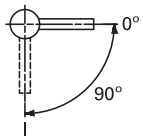


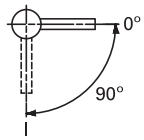
PH4 Type Handle



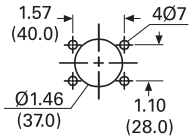
Direction of Operation

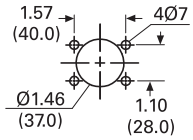


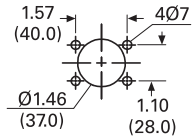




Door Drilling Templates

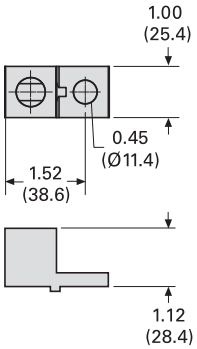




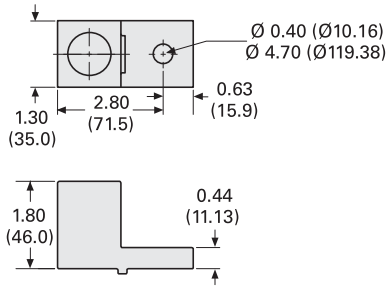


Top and Bottom Terminal Lugs

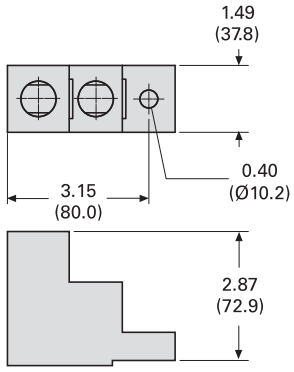
R9 Series Non-Fusible 100–200A



R9 Series Non-Fusible 400A



R9 Series Non-Fusible 600–1200A



Fusible 30–800A



Contents

Description	*Page*
Non-Fusible 30–100A Compact	**V5-T8-12**
Non-Fusible 100–1200A	**V5-T8-18**
Fusible 30–800A	
Product Identification	**V5-T8-27**
Product Selection	**V5-T8-28**
Accessories	**V5-T8-32**
Technical Data and Specifications	**V5-T8-37**
Dimensions	**V5-T8-39**
DC Rated Disconnects	**V5-T8-45**

Fusible 30–800A

Product Description

R9 Series (UL 98 listed) Fusible 30–800A manual operated multi-pole fusible disconnect switches use double break contacts per pole that ensure complete isolation of the fuse when the switch is in the OFF position.

When installed with fuses, they provide protection for low voltage electrical installations against short circuit and overload.

Features, Benefits and Functions

- Load break functionality
- Double break contacts
- Up to 200 kA short-circuit rating with Class CC, J or L fuses
- Compact footprints
- The optional TEST position function (up to 400A) enables testing of the control circuit auxiliaries without switching the main contacts. This function provides a simple alternative to a separately wired pushbutton
- Defeatable pistol handles automatically re-latch when the panel door is closed
- Front or side operation
- Flange operation
- NFPA 79 compliant kits
- Two-, three- and four-pole devices

Standards and Certifications

- UL 98, File E222859 for 30 to 800A ratings
- UL 489, File E305341 for H-Frame switches
- CSA® 22.2 No. 4, File 217736
- CSA 22.2 No. 5, File 217736, H-Frame only
- IEC 60947-1, EN 60947-1
- IEC 60947-3, EN 60947-3
- NFPA 79

Product Identification

R9 Fusible 30A/CC and 30A/J H-Frame—Direct and External Operation



① External front handles
② Direct handle
③ Shaft extensions for external handles
④ Configurable U Type ACs, for pre-break and signaling or TEST

R9 Fusible 30A/J–800A/L (I–N-Frames)—Direct and External Operation



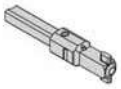
① External front handles
② External right side handle (not applicable for N-Frame 600/800A)
③ Direct handle
④ Shaft extensions for external handles
⑤ Configurable U Type ACs, for pre-break and signaling or TEST
⑥ Side auxiliary contacts
⑦ Terminal shrouds

Product Selection

Direct Operation

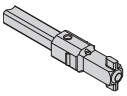

Switch body + 
Direct handle

External Operation


Switch body + 
Shaft + 
External handle

Front and Right Side Operation



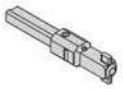


Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Direct Handle	External Selector Handle (Choose one)	Shaft Extension for Selector Handle Only (Choose one)	External Front Pistol Handle	External Right Side Pistol Handle
30 ① Compact (H-Frame) (CC)	3	**R4H3030FCC**	**DHR9HC**	Black 1,3R,12 **SHB0N12HV**	7.90 (200.0) **SF200SH5X5H**	Black 1,3R,12 **PHB1N12F**	—
30 ① (H-Frame) (CC)	3 + switched neutral	**R4H3030FCCSN**		Red 1,3R,12 **SHR0N12HV**	12.60 320.0) **SF320SH5X5H**	Red 1,3R,12 **PHR1N12F**	
30 ① Compact (H-Frame) (J)	3	**R4H3030FJ**	**DHR9HJ**	Black 4,4X **SHB0N4XHV**	15.70 (400.0) **SF400SH5X5H**	Black 4,4X **PHB1N4XF**	
30 ① (H-Frame) (J)	3 + switched neutral	**R4H3030FJSN**		Red 4,4X **SHR0N4XHV**		Red 4,4X **PHR1N4XF**	
30 (I-Frame) (CC)	3	**R9I3030FCC**	**DHR9J2M**	—	—		
	4	**R9I4030FCC**					
30 (J-Frame) (J)	2	**R9J2030FJ**				Black 4,4X (w/ TEST Position) **PHB1N4XFT**	Black 4, 4X **PHB1N4XS**
	3	**R9J3030FJ**					
	4	**R9J4030FJ**					
60 ① (J-Frame) (J)	2	**R9J2060FJ**				Red 4,4X (w/ TEST Position) **PHR1N4XFT**	Red 4, 4X **PHR1N4XS**
	3	**R9J3060FJ**					
	4	**R9J4060FJ**					

Note

① 100 kA short-circuit rating.

Front and Right Side Operation, continued



Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Shaft Extensions for Pistol Handle Only In (mm) (Choose one)	NFPA 79 Kit	Auxiliary Contacts (Choose one)	S Type Auxiliary Contacts (Choose one)	Terminal Shrouds
30 Compact (H-Frame) (CC)	3	**R4H3030FCC**	7.90 (200.0) **SF200PH5X5**	**NFPA79H**	1 AC NO **AC1NOR9**	—	Integral to switch
30 (H-Frame) (CC)	3 + switched neutral	**R4H3030FCCSN**	12.60 (320.0) **SF320PH5X5**		1 AC NC **AC1NCR**		
30 Compact (H-Frame) (J)	3	**R4H3030FJ**	15.70 (400.0) **SF400PH5X5**				
30 (H-Frame) (J)	3 + switched neutral	**R4H3030FJSN**					
30 (I-Frame) (CC)	3	**R9I3030FCC**	7.90 (200.0) **SF200PH10X10**	**NFPA79JKL**		1 AC NO + NC **AC1NO1NCJ2N**	
	4	**R9I4030FCC**					
30 (J-Frame) (J)	2	**R9J2030FJ**	12.60 (320.0) **SF320PH10X10**			2 AC NO + NC **AC2NO2NCJ2N**	
	3	**R9J3030FJ**					
	4	**R9J4030FJ**	15.70 (400.0) **SF400PH10X10**				
60 ① (J-Frame) (J)	2	**R9J2060FJ**				1 AC NO + NC w/ TEST **AC1NO1NCJ2NT**	
	3	**R9J3060FJ**	19.70 (500.0) **SF500PH10X10**				
	4	**R9J4060FJ**				2 AC NO + NC w/ TEST **AC2NO2NCJ2NT**	

Note

① 100 kA short-circuit rating.

8

Front and Right Side Operation, continued





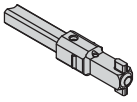

Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Direct Handle (Black)	External Front Pistol Handle (Choose one)	External Right Side Pistol Handle (Choose one)
60 ① (K-Frame) (J)	2	**R9K2060FJ**	**DHR9J2M**	Black 1,3R,12 **PHB2N12F**	Black 4, 4X **PHB2N4XS**
	3	**R9K3060FJ**			
	4	**R9K4060FJ**		Red 1,3R,12 **PHR2N12F**	Red 4, 4X **PHR2N4XS**
100 (K-Frame) (J)	2	**R9K2100FJ**			
	3	**R9K3100FJ**			
	4	**R9K4100FJ**		Black 4,4X **PHB2N4XF**	
200 (L-Frame) (J)	2	**R9L2200FJ**			
	3	**R9L3200FJ**			
	4	**R9L4200FJ**		Red 4,4X **PHR2N4XF**	—
400 (M-Frame) (J)	3	**R9M3400FJ**			
	4	**R9M4400FJ**		Black 4,4X (w/ TEST Position) **PHB2N4XFT** ②	
				Red 4,4X (w/ TEST Position) **PHR2N4XFT** ②	
600 (N-Frame) (J)	2	**R9N2600FJ**	**DHR9N**	Black 4, 4X **PHB3N4XF**	
	3	**R9N3600FJ**			
	4	**R9N4600FJ**		Red 4,4X **PHR3N4XF**	
800 (N-Frame) (L)	2	**R9N2800FL**			
	3	**R9N3800FL**			
	4	**R9N4800FL**			

Notes

① 200 kA short-circuit rating.

② Requires test handle.

Front and Right Side Operation, continued




Ampere Rating (Frame) (Fuse Class)	Number of Poles	Switch Body Only	Shaft Extensions for External Handle In (mm) (Choose one)	NFPA 79 Kit	Auxiliary Contacts (Choose one)	Auxiliary Contacts (Choose one)	Terminal Shrouds
60 ① (K-Frame) (J)	2	**R9K2060FJ**	7.90 (200.0) Pistol **SF200PH10X10**	**NFPA79JKL**	1 AC NO **AC1NOR9**	1 AC NO + NC **AC1NO1NCJ2N**	Integral to switch
	3	**R9K3060FJ**					
	4	**R9K4060FJ**	12.60 (320.0) Pistol **SF320PH10X10**		1 AC NC **AC1NCR9**	2 AC NO + NC **AC2NO2NCJ2N**	
100 (K-Frame) (J)	2	**R9K2100FJ**					
	3	**R9K3100FJ**					
	4	**R9K4100FJ**	15.70 (400.0) Pistol **SF400PH10X10**			1 AC NO + NC w/ TEST **AC1NO1NCJ2NT** ②	**TSR9L2**
200 (L-Frame) (J)	2	**R9L2200FJ**					**TSR9L3**
	3	**R9L3200FJ**					
	4	**R9L4200FJ**	19.70 (500.0) Pistol **SF500PH10X10**				**TSR9L4**
400 (M-Frame) (J)	3	**R9M3400FJ**				2 AC NO + NC w/ TEST **AC2NO2NCJ2NT** ②	**TSR9M3**
	4	**R9M4400FJ**					**TSR9M4**
600 (N-Frame) (J)	2	**R9N2600FJ**	7.90 (200.0) Pistol **SF200PH12X12**	**NFPA79N**		1 AC NO + NC **AC1NO1NCJ2N**	**TSR9N2**
	3	**R9N3600FJ**					**TSR9N3**
	4	**R9N4600FJ**	12.60 (320.0) Pistol **SF320PH12X12**				**TSR9N4**
800 (N-Frame) (L)	2	**R9N2800FL**				2 AC NO + NC **AC2NO2NCJ2N**	**TSR9N2**
	3	**R9N3800FL**					**TSR9N3**
	4	**R9N4800FL**	15.70 (400.0) Pistol **SF400PH12X12**				**TSR9N4**
			19.70 (500.0) Pistol **SF500PH12X12**				

Notes

① 200 kA short-circuit rating.

② Requires test handle.

8

Accessories

NFPA 79 Compliant

"Flange" Handle for Flange-Operated Switches



Description	Ampere Rating (Frame)	Handle Type	NEMA Type	Catalog Number
For side-operated switches only. Provides heavy-duty flange style operation. Meets both UL 508A and NFPA 79 requirements. Please order cable or rod link between handle and switch.	30–400 (J-, K-, L-, M-Frame)	Standard handle	1, 3, 3R, 4, 12	**FHS** ①
	30–400 (J-, K-, L-, M-Frame)	Chrome-plated handle	1, 3, 3R, 4, 4X, 12	**FHCP** ①

Cable Operator



Mechanism for Flange Handle



Description	Ampere Rating (Frame)	NEMA Type	Cable Length In (mm)	Catalog Number
Link between "Flange" handle and side-operated switches. Please order mechanism and "Flange" handle.	30–400 (J-, K-, L-, M-Frame)	Mechanism for "Flange" handle	—	**CFM1**
			36.00 (914.4)	**CFC36**
			60.00 (1524.0)	**CFC60**
			120.00 (3048.0)	**CFC120**

Rod Operator



Description	Ampere Rating (Frame)	For Enclosure Depth In (mm)	Catalog Number
Link between "Flange" handle and side-operated switches. Mechanism included. Please order "Flange" handle.	30–400 (J-, K-, L-, M-Frame)	8.00–24.00 (203.2–609.6)	**RFM1**

NFPA 79 "Through the Door" Kit



Description	Ampere Rating (Frame)	Catalog Number
For front-operated switches only. Meets both UL 508A and NFPA 79 requirements. Kit includes mechanism, shaft and internal handle. Please also order a "PH" type external pistol handle.	30 (H-Frame)	**NFPA79H**
	30–400 (J-, K-, L-, M-Frame)	**NFPA79JKL**
	600–800 (N-Frame)	**NFPA79N**

Shaft Support



Description	Ampere Rating (Frame)	Catalog Number
Front operation shaft support accessory—This support maintains shaft position for extension shafts greater than 320 mm in length.	30–400 (J-, K-, L-, M-Frame)	**SSRJ2M**

Note

① Defeatable.

Direct Handle



Description	Ampere Rating (Frame)	Fuse	Catalog Number
Front operation. Black.	30 (H-Frame)	CC	**DHR9HC**
	30 (H-Frame)	J	**DHR9HJ**
	30 (I-Frame)	CC	**DHR9J2M**
	30–400 (J-, K-, L-, M-Frame)	J	**DHR9J2M**
	600–800 (N-Frame)	J/L	**DHR9N**

Door Interlocked External Front Handles

SO Type Handle



PH1 Type Handle



PH2 Type Handle



PH3 Type Handle



Description	Ampere Rating (Frame)	Handle Type	NEMA Type	Color	Standard Catalog Number
The handle locking function of the front external operation handle prevents the user from opening the door of the enclosure when the switch is in the ON position, and when the switch is padlocked in the OFF position (PH1, PH2 and PH3 type handles only). Opening the door when the switch is in the OFF position is possible by defeating the locking function with the use of a tool (authorized persons only). The locking function is restored when the door is closed back.	30 (H-Frame)	SO	1, 3R, 12	Black	**SHB0N12HV**
	30 (H-Frame)	SO	1, 3R, 12	Red/yellow	**SHR0N12HV**
	30 (H-Frame)	SO	4, 4X	Black	**SHB0N4XHV**
	30 (H-Frame)	SO	4, 4X	Red/yellow	**SHR0N4XHV**
	30–60 (H-,I-, J-Frame)	PH1	1, 3R, 12	Black	**PHB1N12F**
	30–60 (H-,I-, J-Frame)	PH1	1, 3R, 12	Red/yellow	**PHR1N12F**
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Black	**PHB1N4XF**
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Red/yellow	**PHR1N4XF**
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Black	**PHB1N4XFT** ①
	30–60 (H-,I-, J-Frame)	PH1	4, 4X	Red/yellow	**PHR1N4XFT** ①
	60–400 (K-, L-, M-Frame)	PH2	1, 3R, 12	Black	**PHB2N12F**
	60–400 (K-, L-, M-Frame)	PH2	1, 3R, 12	Red/yellow	**PHR2N12F**
	60–400 (K-, L-, M-Frame)	PH2	4, 4X	Black	**PHB2N4XF**
	60–400 (K-, L-, M-Frame)	PH2	4, 4X	Red/yellow	**PHR2N4XF**
	60–400 (K-, L-, M-Frame)	PH2	4, 4X	Black	**PHB2N4XFT** ①
	60–400 (K-, L-, M-Frame)	PH2	4, 4X	Red/yellow	**PHR2N4XFT** ①
	600–800 (N-Frame)	PH3	4, 4X	Black	**PHB3N4XF**
	600–800 (N-Frame)	PH3	4, 4X	Red/yellow	**PHR3N4XF**

Right Side External Handles

Ampere Rating (Frame)	Handle Type	NEMA Type	Color	Standard Catalog Number
30–60 (J-Frame)	PH1	4, 4X	Black	**PHB1N4XS**
30–60 (J-Frame)	PH1	4, 4X	Red/yellow	**PHR1N4XS**
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Black	**PHB2N4XS**
60–400 (K-, L-, M-Frame)	PH2	4, 4X	Red/yellow	**PHR2N4XS**

Note

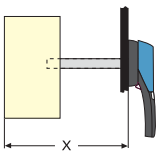
① Includes TEST position.

Shaft Extensions for External Handles



Ampere Rating (Frame)	Handle Type	Shaft Length In (mm)	Catalog Number
30 (H-Frame)	SH0	7.90 (200.0)	**SF200SH5X5H**
30 (H-Frame)	SH0	12.60 (320.0)	**SF320SH5X5H**
30 (H-Frame)	SH0	15.70 (400.0)	**SF400SH5X5H**
30 (H-Frame)	PH1	7.90 (200.0)	**SF200PH5X5**
30 (H-Frame)	PH1	12.60 (320.0)	**SF320PH5X5**
30 (H-Frame)	PH1	15.70 (400.0)	**SF400PH5X5**
30–400 (I-, J-, K-, L-, M-Frame)	PH2	7.90 (200.0)	**SF200PH10X10**
30–400 (I-, J-, K-, L-, M-Frame)	PH2	12.60 (320.0)	**SF320PH10X10**
30–400 (I-, J-, K-, L-, M-Frame)	PH2	15.70 (400.0)	**SF400PH10X10**
30–400 (I-, J-, K-, L-, M-Frame)	PH3	19.70 (500.0)	**SF500PH10X10**
600–800 (N-Frame)	PH3	7.90 (200.0)	**SF200PH12X12**
600–800 (N-Frame)	PH3	12.60 (320.0)	**SF320PH12X12**
600–800 (N-Frame)	PH3	15.70 (400.0)	**SF400PH12X12**
600–800 (N-Frame)	PH3	19.70 (500.0)	**SF500PH12X12**

Handle Types SH and PH, X Minimum Dimensions



Ampere Rating (Frame)	Dimensions X In (mm)	Handle Type	Shaft Length In (mm)	Catalog Number
30 (H-Frame)	4.02–9.65 (102.0–245.0)	SH0	7.90 (200.0)	**SF200SH5X5H**
30 (H-Frame)	4.02–14.37 (102.0–365.0)	SH0	12.60 (320.0)	**SF320SH5X5H**
30 (H-Frame)	4.02–17.52 (102.0–445.0)	SH0	15.70 (400.0)	**SF400SH5X5H**
30 (H-Frame)	4.02–9.65 (102.0–245.0)	PH1	7.90 (200.0)	**SF200PH5X5**
30 (H-Frame)	4.02–14.37 (102.0–365.0)	PH1	12.60 (320.0)	**SF320PH5X5**
30 (H-Frame)	4.02–17.52 (102.0–445.0)	PH1	15.70 (400.0)	**SF400PH5X5**
30–100 (I-, J-, K-Frame)	5.30–9.06 (135.0–230.0)	PH2, PH3	7.90 (200.0)	**SF200PH10X10**
200 (L-Frame)	5.70–9.06 (145.0–230.0)	PH2, PH3	7.90 (200.0)	**SF200PH10X10**
400 (M-Frame)	7.87–10.24 (200.0–260.0)	PH2, PH3	7.90 (200.0)	**SF200PH10X10**
30–100A (I-, J-, K-Frame)	5.30–13.78 (135.0–350.0)	PH2, PH3	12.60 (320.0)	**SF320PH10X10**
200 (L-Frame)	5.70–13.78 (145.0–350.0)	PH2, PH3	12.60 (320.0)	**SF320PH10X10**
400 (M-Frame)	7.87–14.96 (200.0–380.0)	PH2, PH3	12.60 (320.0)	**SF320PH10X10**
30–100 (I-, J-, K-Frame)	5.30–16.93 (135.0–430.0)	PH2, PH3	15.70 (400.0)	**SF400PH10X10**
200 (L-Frame)	5.70–16.93 (145.0–430.0)	PH2, PH3	15.70 (400.0)	**SF400PH10X10**
400 (M-Frame)	7.87–18.10 (200.0–460.0)	PH2, PH3	15.70 (400.0)	**SF400PH10X10**
30–100 (I-, J-, K-Frame)	5.30–20.87 (135.0–530.0)	PH2, PH3	19.70 (500.0)	**SF500PH10X10**
200 (L-Frame)	5.70–20.87 (145.0–530.0)	PH2, PH3	19.70 (500.0)	**SF500PH10X10**
400 (M-Frame)	7.87–22.05 (200.0–560.0)	PH2, PH3	19.70 (500.0)	**SF500PH10X10**
600–800 (N-Frame)	10.63–11.97 (270.0–304.0)	PH3	12.60 (320.0)	**SF320PH12X12**
600–800 (N-Frame)	10.63–16.69 (270.0–424.0)	PH3	12.60 (320.0)	**SF320PH12X12**
600–800 (N-Frame)	10.63–19.84 (270.0–504.0)	PH3	15.70 (400.0)	**SF400PH12X12**
600–800 (N-Frame)	10.63–23.78 (270.0–604.0)	PH3	19.70 (50.00)	**SF500PH12X12**

Auxiliary Contacts—NO + NC ①





Description	Ampere Rating (Frame)	Number of ACs	Operating Current I_e (Amperes) Nominal Current (Amperes)	Catalog Number
For the R9 Series Fusible 30–800A, indication of the O and I positions by 1 to 4 NO + NC auxiliary contacts. Electrical principle: Cabling by terminal cage with #16 AWG maximum. High electrical characteristics: A600/D600	600–800 (N-Frame)	1NO + 1NC	10	**AC1NO1NCJ2N** ②
	600–800 (N-Frame)	2NO + 2NC	10	**AC2NO2NCJ2N** ②
	30–400 (I–M-Frame)	1NO + 1NC (w/ TEST)	10	**AC1NO1NCJ2NT**
	30–400 (I–M-Frame)	2NO + 2NC (w/ TEST)	10	**AC2NO2NCJ2NT**

Auxiliary Contacts—NO or NC ③



Description	Ampere Rating (Frame)	Number of ACs	Catalog Number
The different functions (pre-break, 0 and 1 indication, TEST feature) are easily configurable with pegs (one or two pegs per position). Two superposed auxiliary contacts maximum. For 30A/CC (H-Frame), maximum of four ACs. For 30A/J (H-Frame), maximum of two ACs. For 30 to 100A/J (I, J and K-Frame), maximum of four ACs. For 200 to 600A/J (L and M-Frame), maximum of eight ACs. Cabling to the control circuit by terminals with a maximum section of 2 x 2.5 mm^2. Electrical characteristics: A300	**NO Auxiliary Contact**		
	30–600 (H–M-Frame)	1	**AC1NOR9**
	NC Auxiliary Contact		
	30–600 (H–M-Frame)	1	**AC1NCR9**

Characteristics for Pre-Break Auxiliary Contacts

Ampere Rating	Contact Type	Nominal Current Amperes	Operating Current I_e (Amperes) 250 Vac AC-13	400 Vac AC-13	24 Vdc DC-13	48 Vdc DC-13
30–800	NO + NC	10	6	4	5	3

Terminal Shrouds



Terminal Shrouds

Description	Ampere Rating (Frame)	Number of Poles	Catalog Number
Line or load side protection against direct contact with terminals or the connection parts	30–100 (H-, I-, J-, K-Frame)	2/3/4	Integral to switch
	200 (L-Frame)	2	**TSR9L2**
	200 (L-Frame)	3	**TSR9L3**
	200 (L-Frame)	4	**TSR9L3**
	400 (M-Frame)	2	**TSR9M2** ④
	400 (M-Frame)	3	**TSR9M3** ④
	400 (M-Frame)	4	**TSR9M4** ④
	600–800 (N-Frame)	2	**TSR9N2**
	600–800 (N-Frame)	3	**TSR9N3**
	600–800 (N-Frame)	4	**TSR9N4**

Notes

① Same-make/same-break auxiliary contacts.
② Auxiliary contacts without "Test" cannot be used on I–M-Frame switches.
③ Early-break/same-make auxiliary contacts.
④ For replacement only. Both line and load side terminal shrouds are included with 400A switch.

Line and Load Terminal Lugs



Description	Ampere Rating (Frame)	Fuse	Number of Lugs	Lug Capacity/ Phase	Cable Type	Catalog Number
Connection of bare copper cables on to the terminals (no spade lugs).	30 (H-, I-Frame)	CC/J	—	#14–#10	Cu	Integral to switch
	30 (H-, I-Frame)	CC/J	—	#14–#10	Cu	Integral to switch
	30–60 (J-Frame)	J	—	#10–#6	Cu	Integral to switch
	60–100 (K-Frame)	J	—	#12–#1	Cu	Integral to switch
	200 (L-Frame)	J	2	#6–300 kcmil	Cu/Al	**LK2R9DL**
	200 (L-Frame)	J	3	#6–300 kcmil	Cu/Al	**LK3R9DL**
	200 (L-Frame)	J	4	#6–300 kcmil	Cu/Al	**LK4R9DL**
	400 (M-Frame)	J	3	(2) #2–600 kcmil	Cu/Al	**LK3R9FN**
	400 (M-Frame)	J	4	(2) #2–600 kcmil	Cu/Al	**LK4R9FN**
	600–800 (N-Frame)	J/L	2	(2) #2–600 kcmil	Cu/Al	**LK2R9FN**
	600–800 (N-Frame)	J/L	3	(2) #2–600 kcmil	Cu/Al	**LK3R9FN**
	600–800 (N-Frame)	J/L	4	(2) #2–600 kcmil	Cu/Al	**LK4R9FN**

Shorting Links



Ampere Rating (Frame)	Fuse	Pack Quantity	Catalog Number
60 (J-,K-Frame)	J	3	**SLJK360**
100 (K-Frame)	J	3	**SLK3100**
200 (L-Frame)	J	3	**SLL3**
400 (M-Frame)	J	3	**SLM3**
600–800 (N-Frame)	J/L	3	**SLN3**

Technical Data and Specifications

UL and CSA Characteristics

R9 Series Fusible 30–800A

Description	30A	30A	30A	30A	60A	60A	100A
General Use Ratings							
Switch frame	H	H	I	J	J	K	K
600 Vac (A)	30	30	30	30	60	60	100
600 Vdc (A)	—	—	—	—	—	—	—
Short-Circuit Ratings							
Short-circuit rating at 600 Vac (kA)	100	100	100	200	100	200	200
Fuse type	CC	J	CC	J	J	J	J
Maximum fuse rating (A)	30	30	30	30	60	60	100
Maximum Horsepower Rating/Maximum Motor FLA Three-Phase							
220–240 Vac	7.5/22	7.5/22	7.5/22	7.5/22	15/42	15/42	30/80
440–480 Vac	15/21	15/21	15/21	15/21	30/40	30/40	60/77
600 Vac	20/22	20/22	20/22	20/22	50/52	50/52	75/77
Maximum Horsepower Rating/Maximum Motor FLA Single-Phase							
220–240 Vac	—	—	3/17	3/17	10/50	10/50	10/50
440–480 Vac	—	—	7.5/21	7.5/21	10/26	10/26	10/26
600 Vac	—	—	10/20	10/20	10/20	10/20	10/20
Maximum Horsepower Rating/Maximum Motor FLA DC							
125 Vdc ①	3/25	3/25	3/25	3/25	5/40	5/40	7.5/58
250 Vdc ②	5/20	5/20	5/20	5/20	10/38	10/38	20/72
Mechanical Characteristics							
Endurance (number of operating cycles)	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Terminal Lugs							
Type	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
Minimum conn. section	#14	#14	#14	#10	#10	#12	#12
Maximum conn. section	#10	#10	#10	#6	#6	#1	#1

Notes

① Two-pole in series.
② Three-pole in series.

8

R9 Series Fusible 30–800A, continued

Description	200A	400A	600A	800A
General Use Ratings				
Switch Frame	L	M	N	N
600 Vac (A)	200	400	600	800
600 Vdc (A)	—	—	600 ②	800 ②
Short-Circuit Ratings				
Short-circuit rating at 600 Vac (kA)	200	200	200	200
Fuse type	J	J	J	L
Maximum fuse rating (A)	200	400	600	800
Maximum Horsepower Rating/Maximum Motor FLA Single-Phase				
220–240 Vac	—	—	—	—
440–480 Vac	—	—	—	—
600 Vac	—	—	—	—
Maximum Horsepower Rating/Maximum Motor FLA Three-Phase				
220–240 Vac	60/154	125/312	200/480	200/480
440–480 Vac	125/156	250/302	500/590	500/590
600 Vac	150/144	350/336	500/472	500/472
Maximum Horsepower Rating/Maximum Motor FLA DC				
125 Vdc ①	—	20/148	—	—
250 Vdc ②	—	50/173 ②	—	—
Mechanical Characteristics				
Endurance (number of operating cycles)	8000	6000	5000	5000
Terminal Lugs				
Type	Option	Option	Option	Option
Minimum conn. section	#6	#2	2x#2	2x#2
Maximum conn. section	3/0	300 kcmil	2 x 600 kcmil	2 x 600 kcmil

Notes

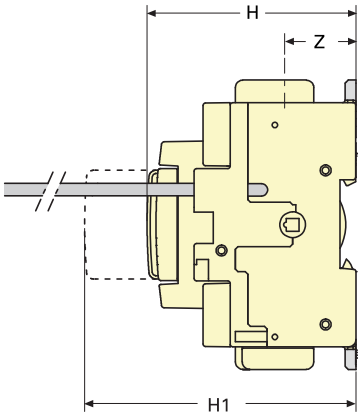
① Two-pole in series.
② Three-pole in series.

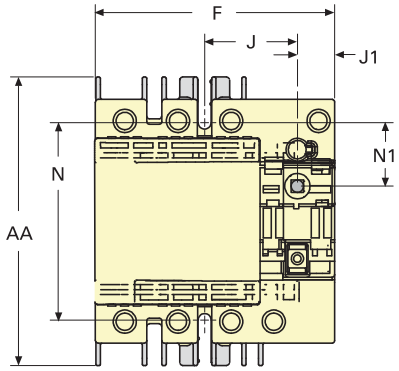
Dimensions

Approximate Dimensions in Inches (mm)

Front Operation

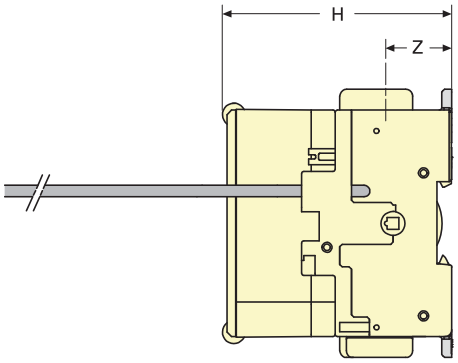
R9 Series Fusible 30A/CC—H-Frame

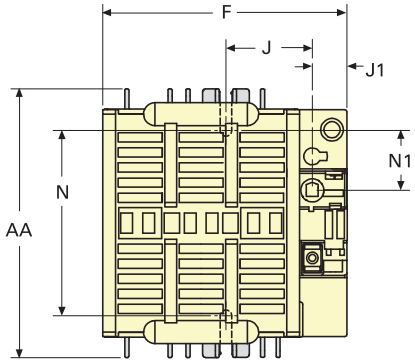




	Switch Body				Switch Mounting		Connection Terminals	
F	H	H1	J	J1	N	N1	AA	Z
3.78 (96.0)	3.28 (83.3)	5.19 (131.8)	1.47 (37.3)	0.59 (15.0)	3.13 (79.5)	1.00 (25.4)	4.56 (115.8)	1.12 (28.4)

R9 Series Fusible 30A/J—H-Frame

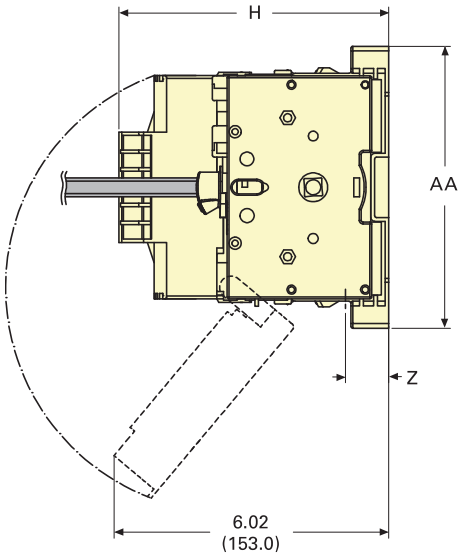


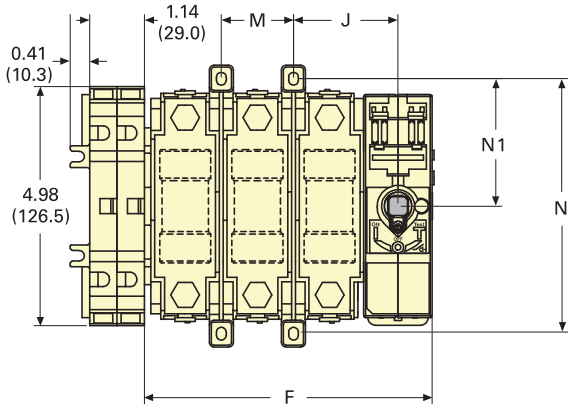


	Switch Body			Switch Mounting		Connection Terminals	
F	H	J	J1	N	N1	AA	Z
4.13 (104.9)	3.89 (98.8)	1.47 (37.3)	0.59 (15.0)	3.30 (83.8)	1.00 (25.4)	4.56 (115.8)	1.12 (28.4)

Approximate Dimensions in Inches (mm)

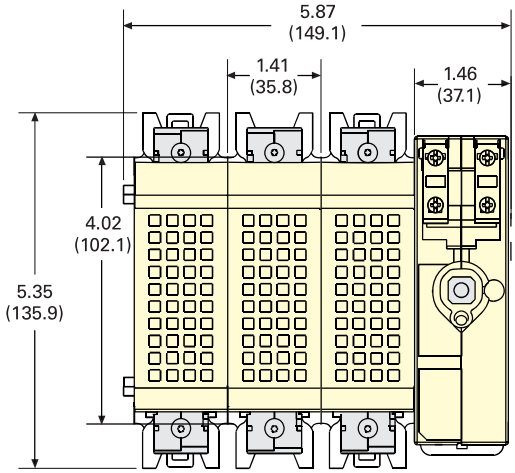
R9 Series Fusible 30A/CC—I-Frame

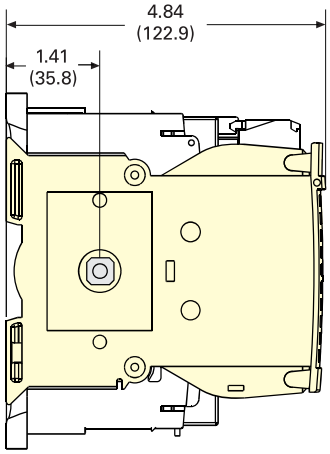




Ampere Rating (Fuse)	Switch Body					Switch Mounting		Connection Terminals	
	F 3P	F 4P	H	J	M	N	N1	AA	Z
30 (CC)	4.92 (125.0)	6.06 (154.0)	3.89 (99.0)	1.77 (45.0)	1.14 (29.0)	5.31 (135.0)	2.63 (66.5)	5.87 (149.0)	1.21 (31.0)

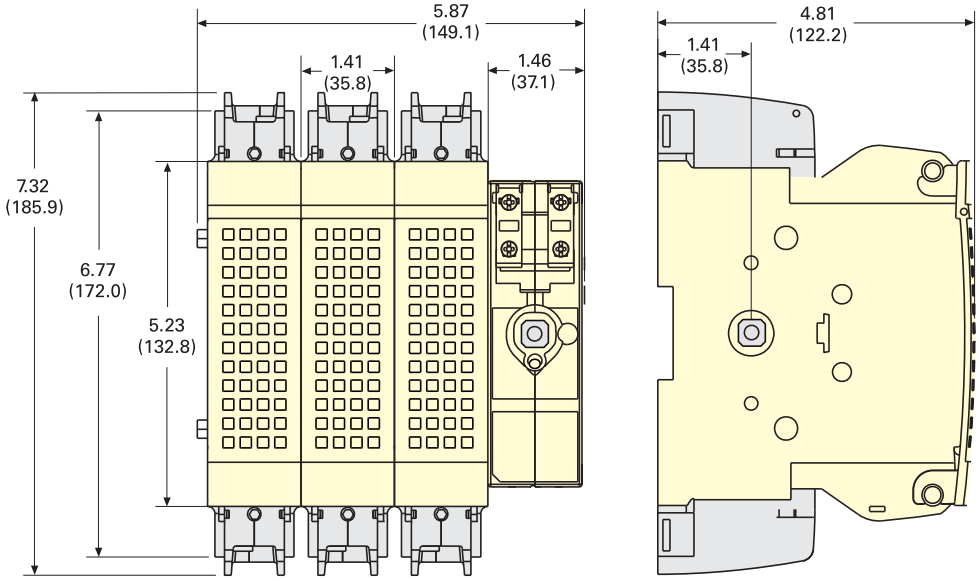
R9 Series Fusible 30A/J and 60A/J (100 kA)—J-Frame



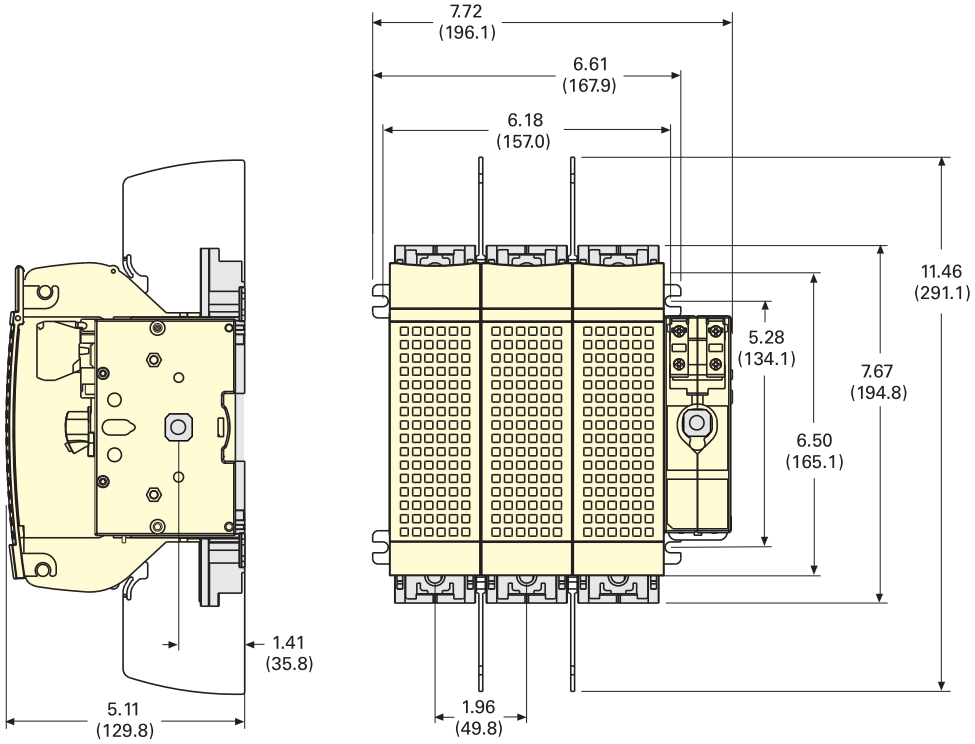


Approximate Dimensions in Inches (mm)

R9 Series Fusible 60A/J (200 kA) and 100A/J—K-Frame

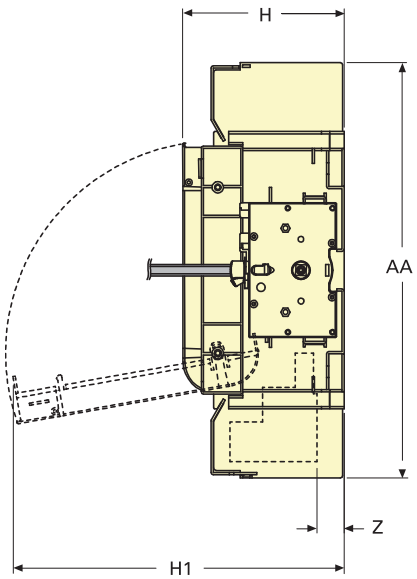


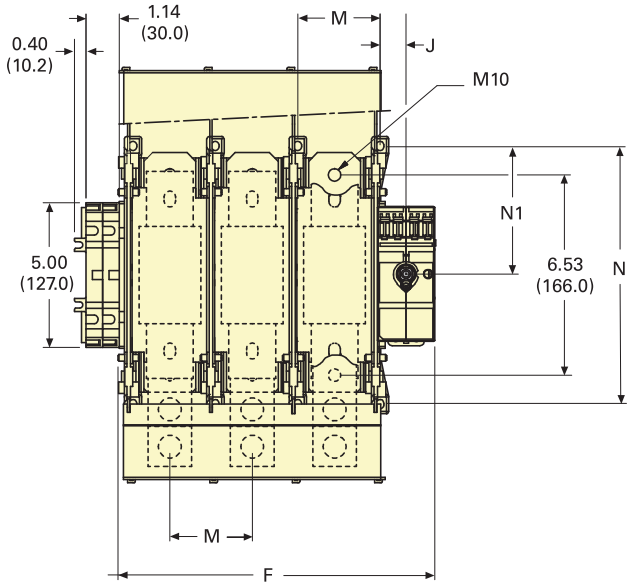
R9 Series Fusible 200A/J—L-Frame



Approximate Dimensions in Inches (mm)

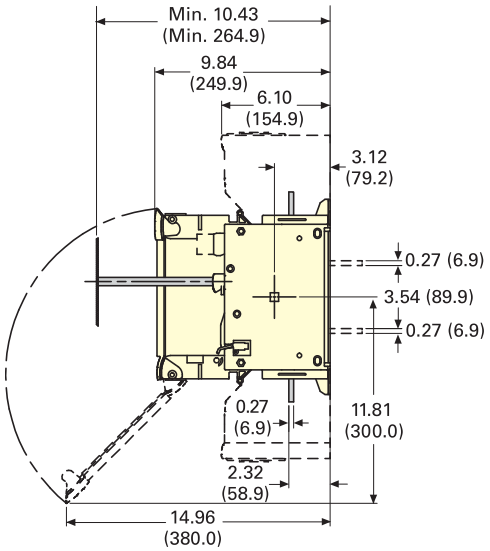
R9 Series Fusible 400A/J—M-Frame

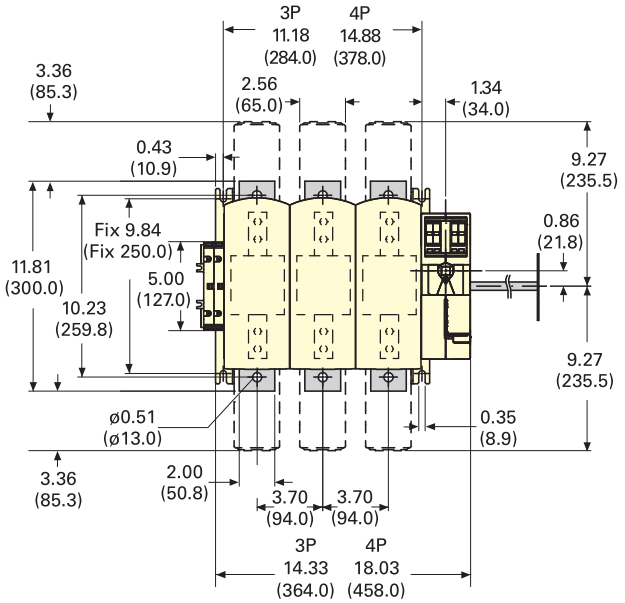




Switch Body						Switch Mounting		Connection Terminals	
F 3P	F 4P	H	H1	J	M	N	N1	AA	Z
10.80 (276.0)	13.70 (348.0)	5.56 (141.5)	11.41 (290.0)	0.88 (22.5)	2.84 (72.0)	8.83 (224.0)	4.41 (112.0)	14.31 (363.5)	1.06 (27.0)

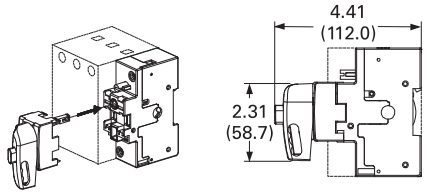
R9 Series Fusible 600–800A J/L—N-Frame



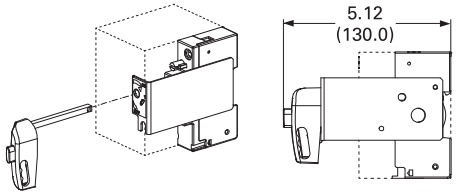


Approximate Dimensions in Inches (mm)

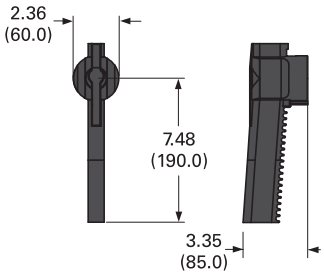
30CC (H-Frame)



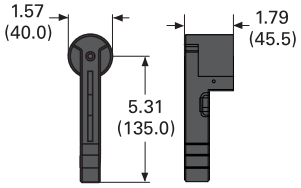
30J (H-Frame)



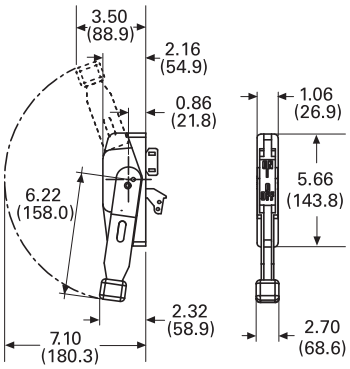
30J to 400J

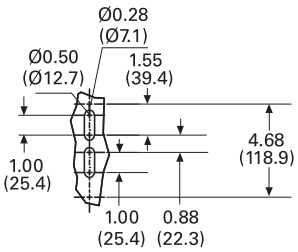


600J and 800L



Flange Handle

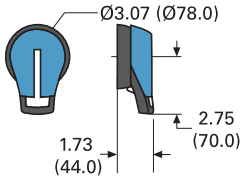




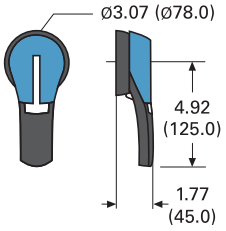
Approximate Dimensions in Inches (mm)

Door Interlocked External Handle

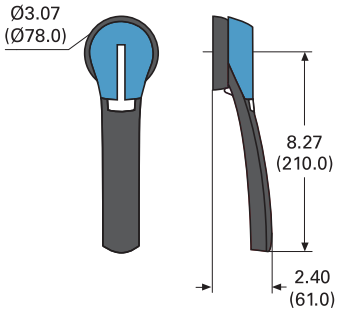
PH1 Type Handle



PH2 Type Handle

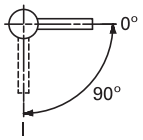


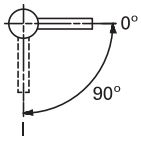
PH3 Type Handle

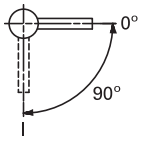


8

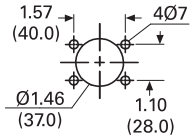
Direction of Operation

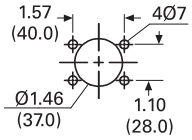


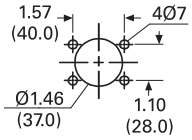




Door Drilling Template

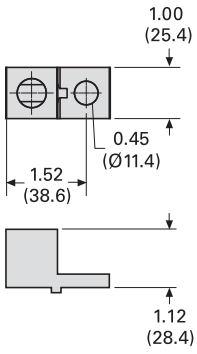




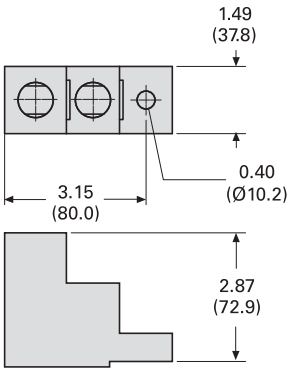


Line and Load Side Lugs

200A (L-Frame)



400–800A (M- and N-Frames)



DC Rated Disconnects



Contents

Description	*Page*
Non-Fusible 30–100A Compact	**V5-T8-12**
Non-Fusible 100–1200A	**V5-T8-18**
Fusible 30–800A	**V5-T8-26**
DC Rated Disconnects	
Product Selection	**V5-T8-46**
Accessories	**V5-T8-47**
Technical Data and Specifications	**V5-T8-49**
Dimensions	**V5-T8-50**

8

DC Rated Disconnects

Product Description

UL listed disconnect switches 600 Vdc for photovoltaic applications 100 to 400A

R9 Series (UL 98 listed) DC rated disconnects are manually operated multi-pole load break switches. They provide safety isolation for any low voltage circuit in a photovoltaic application.

Features, Benefits and Functions

- Switching technology
- Up to 600 Vdc according to UL 98 / CSA
- Up to 1000 Vdc according to IEC 947-3

Application Description

In three- and four-pole versions from 100 to 400A



Standards and Certifications

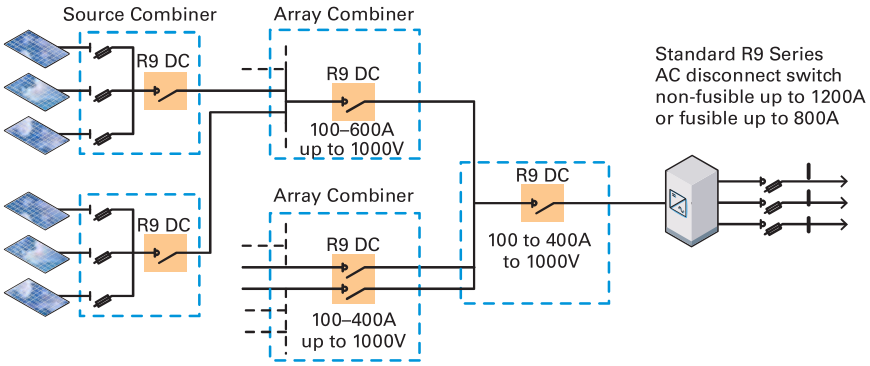
- UL 98, cULus®, File E222859
- CSA 22.2 No. 4, File 217736 ①
- IEC 60947-3
- EN 60947-3
- IEC 60-364-7-712 (Rules for the installations and sites special—photovoltaic applications)

Listed

Note

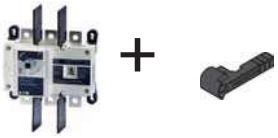
① Q4 2010

Simplified Large Photovoltaic System Layout

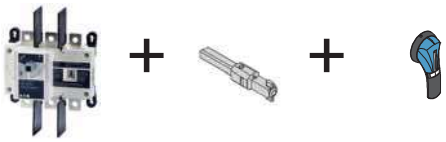


Product Selection

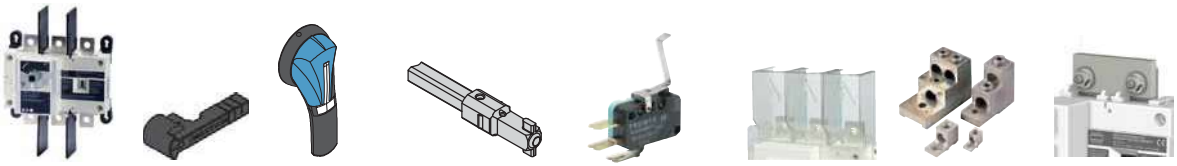
Direct Operation



External Operation



Front Operation—Three- and Four-Pole



Ampere Rating	Number of Poles	Switch Body	Direct Handle	External Handle (Choose one)	Shaft for External Handle In (mm) (Choose one)	Auxiliary Contacts (Choose one)	Terminals Shroud	Terminal Lugs	Jumpers for Connecting Poles in Series
100	3	**R9D3100UDC**	**DHR9DE**	S2 Type Black 1, 3R, 12 ① **PHB2N12F**	7.90 (200.0) **SF200PH10X10**	C Type 1st Contact NO+NC **AC1NONCDE**	3P ② **TS3R9DT**	3P ④ **LK3R9DL**	2 pieces **DCJUMPD2**
	4	**R9D4100UDC**							
200	3	**R9D3200UDC**		Red/Yellow 1, 3R, 12 ① **PHR2N12F**	12.60 (320.0) **SF320PH10X10**		3P ③ **TS3R9DB**	4P ④ **LK4R9DL**	3 pieces **DCJUMPD3**
	4	**R9D4200UDC**			15.7 0 (400.0) **SF400PH10X10**	C Type 2nd Contact NO+NC **AC2NONCDE**	4P ④ **TS4R9DTB**		
				Black 4, 4X ① **PHB2N4XF**					
400	3	**R9E3400UDC**		Red/Yellow 4, 4X ① **PHR2N4XF**			3P ② **TS3R9ET**	3P ④ **LK3R9EM**	2 pieces **DCJUMPE2**
	4	**R9E4400UDC**					3P ③ **TS3R9EB**	4P ④ **LK4R9EM**	3 pieces **DCJUMPE3**
							4P ④ **TS4R9ETB**		

Notes

① Defeatable handle.
② Top (line side).
③ Bottom (load side).
④ Top or bottom (line or load side).

Accessories

Direct Handle

Direct Handle



Description	Ampere Rating	Handle Color	Catalog Number
Front operation	100–400	Black	**DHR9DE**

Door Interlocked External Handle Front Operation—I–0, Three- and Four-Pole

PH2 Type Handle



Ampere Rating	Handle	Handle Color	NEMA Type	Catalog Number
100–400	PH2 Type	Black	1, 3R, 12	**PHB2N12F** ①
100–400	PH2 Type	Red/yellow	1, 3R, 12	**PHR2N12F** ①
100–400	PH2 Type	Black	4, 4X	**PHB2N4XF** ①
100–400	PH2 Type	Red/yellow	4, 4X	**PHR2N4XF** ①

Auxiliary Contacts



Description	Ampere Rating	Number of AC	Type	Catalog Number
Early-break/same-make and signaling of positions 0 and 1: 1 to 2NO/NC auxiliary contacts 1 to 2 low level NO/NC auxiliary contacts Characteristics: NO/NC AC: IP2 with front and side operation Connection to the control circuit: By 6.35 mm fast-on terminal Electrical characteristics: 30,000 operations; A300	**NO/NC Contact for Three and Four Poles**			
	100–400	1 AC NO + NC	C Type	**AC1NONCDE**
	100–400	2 AC NO + NC	C Type	**AC2NONCDE**
	Low Level NO/NC Contact for Three and Four Poles			
	100–400	1 AC NO + NC	C Type	**AC1NONCDELL**
	100–400	2 AC NO + NC	C Type	**AC2NONCDELL**

Terminal Screens



Description	Ampere Rating	Number of Poles	Position	Catalog Number
Line or load side protection against direct contact with terminals or connection parts	**Three- and Four-Pole**			
	100–200	3	Top (line)	**TS3R9DT**
	100–200	3	Bottom (load)	**TS3R9DB**
	100–200	4	Top or bottom (line or load)	**TS4R9DTB**
	400	3	Top (line)	**TS3R9ET**
	400	3	Bottom (load)	**TS3R9EB**
	400	4	Top or bottom (line or load)	**TS4R9ETB**

Note

① Order two sets for line and load sides.

Line and Load Terminal Lugs

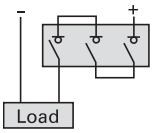
Line and Load Terminal Lugs

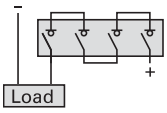


Description	Ampere Rating	Connection Type	Number of Cables per Terminal	Lugs per Kit	Cable Type	Catalog Number
Connection of bare copper cables onto the terminals	100–200	6–300 kcmil	1	2	Cu/Al	**LK2R9DL**
	100–200	6–300 kcmil	1	4	Cu/Al	**LK4R9DL**
	400	2–600 kcmil	1	2	Cu/Al	**LK2R9EM**
	400	2–600 kcmil	1	4	Cu/Al	**LK4R9EM**

Jumpers for Connecting Poles in Series

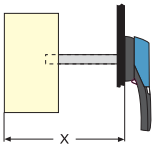
Description	Ampere Rating	Kit of	Figure	Number of Poles in Series	Catalog Number
The jumpers will make easy the connection of the poles in series, allowing the following configurations: ①	100–200	2 pieces	1	3	**DCJUMPD2**
	100–200	3 pieces	2	4	**DCJUMPD3**
	400	2 pieces	1	3	**DCJUMPE2**
	400	3 pieces	2	4	**DCJUMPE3**





Shaft Extensions for External Front Dimensions (X)—Inches (mm)





Description	Ampere Rating	Dimension X	Handle	Shaft Length	Catalog Number
Standard lengths: 7.9 inches/200 mm 12.6 inches/320 mm 15.7 inches/400 mm	**For Three- and Four-Pole**				
	100–400	135–265 (3429.0–6731.0)	PH2 Type	7.90 (200.0)	**SF200PH10X10**
	100–400	135–385 (3429.0–9779.0)	PH2 Type	12.60 (320.0)	**SF320PH10X10**
	100–400	135–465 (3429.0–11811.0)	PH2 Type	15.70 (400.0)	**SF400PH10X10**

Note

① For other connections, refer to installation instructions.

Technical Data and Specifications

100–400A

Characteristics According to UL 98

		Ampere Rating		
Thermal Current I_{th} at 40°C (A)		**100**	**200**	**400**
General Use Purpose Ampere Rating				
Rated voltage	In series	A	A	A
600 Vdc	3P	100	200	400
Overload Capacity				
Prospective short-circuit current (kA rms)		20	20	20
Type of fuse		A70P100	A70P200	LDC
Fuse rating		100	200	400
Connection Terminals				
Minimum connection section/AWG		#6	#6	#2
Maximum connection section/AWG		300 kcmil	300 kcmil	600 kcmil
Auxiliary Contacts				
Electrical characteristics		A300	A300	A300

Characteristics According to IEC 60947-3

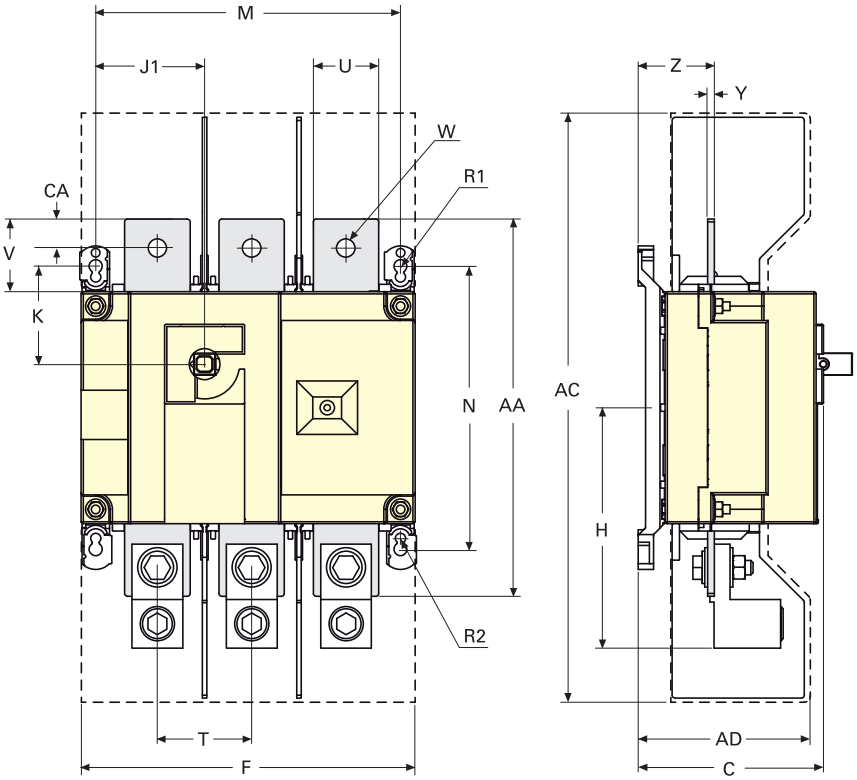
		Ampere Rating		
Thermal Current I_{th} at 40°C (A)		**160**	**250**	**630**
Rated Operational Currents I_e (A), DC-22 B				
Rated voltage	In series	A	A	A
750 Vdc	3P	160	250	400
750 Vdc	4P	—	—	—
1000 Vdc	4P	160	250	400

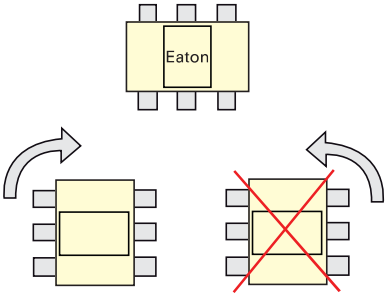
Dimensions

Approximate Dimensions in Inches (mm)

R9 Series DC Rated Disconnects 100–400A

Front Operation





The switch will operate correctly when rotated clockwise 90 degrees.

The switch will not operate correctly when rotated counterclockwise 90 degrees.

R9 Series DC Rated Disconnects

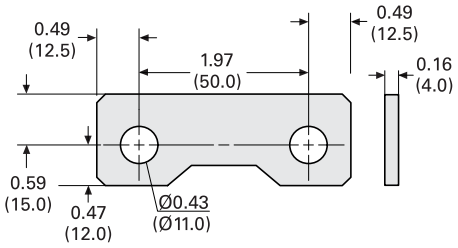
Ampere Rating	C	AC	AD	F 3P	F 4P	H	J1 3P	J1 4P	K	M 3P	M 4P
100–200	3.72 (94.5)	10.10 (256.5)	3.05 (77.5)	7.09 (180.1)	9.06 (230.0)	4.22 (107.2)	2.17 (55.1)	4.13 (104.9)	1.80 (45.7)	6.30 (160.0)	8.27 (210.1)
400	4.92 (125.0)	16.00 (406.4)	4.51 (114.5)	9.05 (230.0)	11.40 (290.0)	6.53 (166.0)	2.95 (75.7)	5.31 (134.9)	2.65 (67.3)	8.26 (209.8)	10.60 (269.2)

Ampere Rating	N	R1	R2	T	U	V	W	Y	Z	AA	CA
100–200	5.31 (135.0)	0.35 (8.9)	0.27 (6.9)	1.97 (50.0)	0.98 (24.9)	1.18 (30.0)	0.43 (10.9)	0.14 (3.6)	1.35 (34.3)	6.30 (160.0)	0.60 (15.2)
400	7.60 (193.0)	0.35 (8.9)	0.27 (6.9)	2.56 (65.0)	1.77 (45.0)	1.97 (50.0)	0.43 (10.9)	0.20 (5.1)	2.08 (52.8)	10.20 (259.1)	0.80 (20.3)

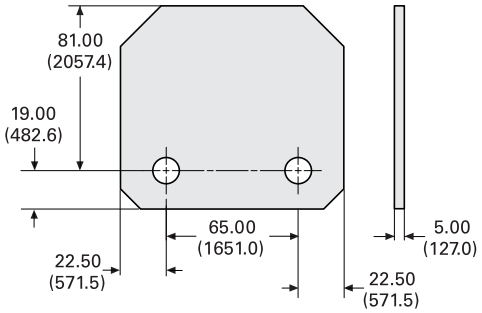
Approximate Dimensions in Inches (mm)

Jumpers

100–200A

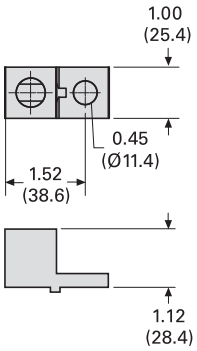


400A

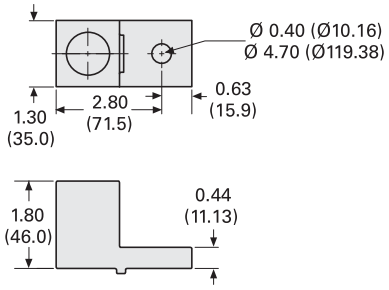


Terminal Lugs

100–200A

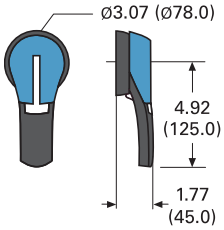


400A

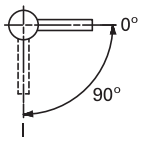


Door Interlocked External Handle—100 to 400A, Three- and Four-Pole

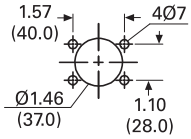
PH2 Type Handle



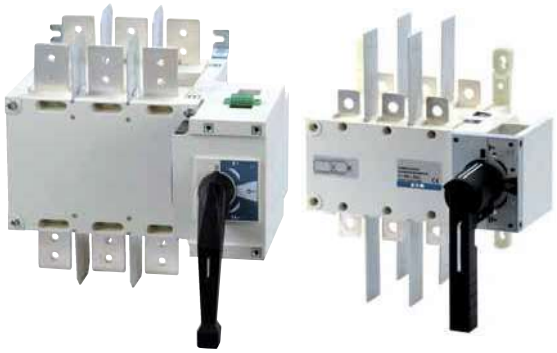
Direction of Operation



Door Drilling Template



Manual Transfer Switches



Contents

Description	*Page*
Manual Transfer/Double Throw Switches	
Product Selection	**V5-T8-53**
Accessories	**V5-T8-54**
Technical Data and Specifications	**V5-T8-56**
Dimensions	**V5-T8-57**

8

Product Description

R9 Series (UL 98 listed) non-fusible disconnects are heavy-duty manual transfer switches, they transfer load manually between two low voltage circuits and provide safety disconnection.

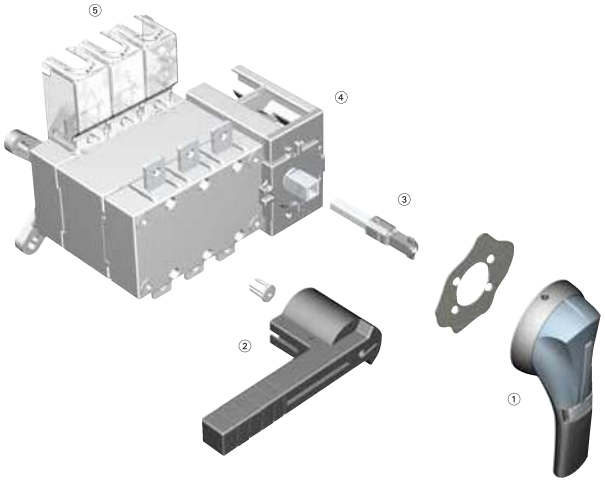
These switches are extremely durable and are tested and approved for use in the most demanding applications as resistive load or total system applications.

- Three load break positions (I, 0, II)
- On load switching
- Direct or external handle
- 480 Vac total system
- 600 Vac resistive load

Standards and Certifications

- UL 98, cULus, File E222859
- UL1008 (600–1200A)
- CSA 22.2 No. 4, File 217736
- IEC 60947-3
- EN 60947-3
- CE

Listed

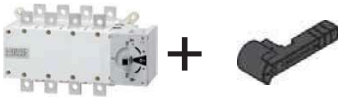


Product Identification

① External front handle
② Direct handle
③ Shaft extension for external handle
④ Pre-break ACs (standard on 600–1200A)
⑤ Terminal screen

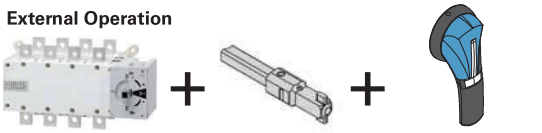
Product Selection

Direct Operation



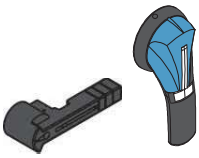
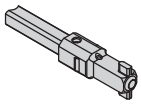
Switch body + Direct handle

External Operation



Switch body + Shaft + External handle

Manual Transfer/Double Throw Switches—UL 98 Standard ①




Ampere Rating	Number of Poles	Switch Body Only ①	Direct Handle (Black)	External Three-Position Handle (Choose one)	Shaft Extensions for External Handle In (mm) (Choose one)	Bridging Bars	Auxiliary Contacts	Terminal Screens ②
100	3	**RMTS3100U**	**DHMTSSL**	Size 2, Black I–0–II Type 4/4X **PHB2N4X3P**	7.90 (200.6) **SF200PH10X10**	3P **BB3P200**	NO/NC **AC1NONCMTS400**	3P **TS3MTS200TB**
	4	**RMTS4100U**						
200	3	**RMTS3200U**			12.60 (320.0) **SF320PH10X10**	4P **BB4P200**	Low level **AC1NONCMTS400LL** ③	4P **TS4MTS200TB**
	4	**RMTS4200U**		Size 2, Red I–0–II Type 4/4X **PHR2N4X3P**	15.70 (398.8) **SF400PH10X10**			
400	3	**RMTS3400U**		Size 3, Black I–0–II Type 4/4X **PHB3N4X3P**	7.90 (200.6) **SF200PH15X12**	3P **BB3P400**		3P **TS3MTS400TB**
	4	**RMTS4400U**			12.60 (320.0) **SF320PH15X12**	4P **BB4P400**		4P **TS4MTS400TB**
				Size 3, Red I–0–II Type 4/4X **PHR3N4X3P**	15.70 (398.8) **SF400PH15X12**			
600	3	**RMTS3600U**	Not Available	Size 4, Black I–0–II Type 4/4X **PHB4N4X3P**		3P **BB3P600**	NO/NC contact standard	3P **TS3MTS600**
	4	**RMTS4600U**				4P **BB4P600**		4P **TS4MTS600**
800	3	**RMTS3800U**	**DHMTSDLM**	Size 4, Red I–0–II Type 4/4X **PHR4N4X3P**		3P **BB3P1200**		3P **TS3MTS1200**
	4	**RMTS4800U**						
1200	3	**RMTS31200U**				4P **BB4P1200**		4P **TS4MTS1200**
	4	**RMTS41200U**						

Notes

① All ratings, 100–1200A, are UL 98 listed. Switches rated 600–1200A are UL 1008 listed as well.
② Line or load (top or bottom); for both line and load, order two kits.
③ Low level auxiliary contact—gold plated for minimal resistance—for PLC applications.

Accessories

Direct Handle



Ampere Rating	Handle Color	Handle Type	Catalog Number
100–400	Black	Single lever	**DHMTSSL**
600	Black	Double lever	Not Available
800–1200	Black	Double lever	**DHMTSDLM**

External Handle

PH2 and PH3 Type



PH4 Type



Description	Ampere Rating	Handle Type	Handle Color	NEMA Type	Lockable in the "3" Positions	Catalog Number
The handle locking function prevents the user from opening the door of the enclosure when the switch is in the "ON" position. Opening the door when the switch is in the "ON" position is possible by defeating the locking function with the use of a tool (authorized persons only). The locking function is restored when the door is once again closed.	100–200	PH2	Black	4, 4X	Yes	**PHB2N4X3P**
	100–200	PH2	Red/Yellow	4, 4X	Yes	**PHR2N4X3P**
	400	PH3	Black	4, 4X	Yes	**PHB3N4X3P**
	400	PH3	Red/Yellow	4, 4X	Yes	**PHR3N4X3P**
	600–1200	PH4	Black	4, 4X	Yes	**PHB4N4X3P**
	600–1200	PH4	Red/Yellow	4, 4X	Yes	**PHR4N4X3P**

Shaft Extension



Ampere Rating	Handle Type	Length In (mm)	Catalog Number
100–800	PH1	7.90 (200.6)	**SF200PH10X10**
125–800	PH1	12.60 (320.0)	**SF320PH10X10**
100–200	PH2	15.70 (398.8)	**SF400PH10X10**
630–1200	PH2, PH3	7.90 (200.6)	**SF200PH15X12**
600–1200	PH2, PH3	12.60 (320.0)	**SF320PH15X12**
400–1200	PH2, PH3	15.70 (398.8)	**SF400PH15X12**
800–1200	V1	12.60 (320.0)	**SF320V1**
800–1200	V1	15.70 (398.8)	**SF400V1**

Bridging Bars



Description	Ampere Rating	Number of Bridging Bars	Catalog Number
Creation of a common point, above or below the switch, between positions I and II.	100 –200	3	**BB3P200**
	100–200	4	**BB4P200**
	400	3	**BB3P400**
	400	4	**BB4P400**
	600	3	**BB3P600**
	600	4	**BB4P600**
	800–1200	3	**BB3P1200**
	800–1200	4	**BB4P1200**

Terminals Protection Screen



Description	Ampere Rating	Number of Poles	Catalog Number
Top or bottom (line or load) protection against direct contacts with terminal or connecting parts.	100–200	3	**TS3MTS200TB**
	100–200	4	**TS4MTS200TB**
	400	3	**TS3MTS400TB**
	400	4	**TS4MTS400TB**
	600	6	**TS3MTS600**
	600	4	**TS4MTS600**
	800–1200	3	**TS3MTS1200**
	800–1200	4	**TS4MTS1200**

Mounting Spacers



Description	Ampere Rating	Number of Poles	Catalog Number
Raises the device's terminals 10 mm away from the bottom of the enclosure or frame on which the device is mounted.	100–400	1 set of 2 spacers	**MSP400**

Auxiliary Contacts



Description	Ampere Rating	Contact(s)	Catalog Number
Early-break/same-make and signalization per position 1 and 2. Electrical characteristics: A300.	100–400	1NO/NC per position 1 and 2	**AC1NONCMTS400**
	100–400	1NO/NC per position 1 and 2 low level	**AC1NONCMTS400LL** ①
	600–1200	1NO/NC per position 1 and 2	Standard

Line and Load Terminal Lugs



Description	Ampere Rating	Connection Type	Number of Poles	Number of Cables/Lug	Lugs per Kit	Cable Type	Catalog Number
Connection of bare copper cables onto the terminals (without spade lugs).	100–200	6–300 kcmil	3	1	3	Cu/Al	**LK3R9DL**
	100–200	6–300 kcmil	4	1	4	Cu/Al	**LK4R9DL**
	400	4–600 kcmil	3	1	3	Cu/Al	**LK3R9EM**
	400	4–600 kcmil	4	1	4	Cu/Al	**LK4R9EM**
	600	2x (#2–600 kcmil)	3	2	3	Cu/Al	**LK3R9FN**
	600	2x (#2–600 kcmil)	4	2	4	Cu/Al	**LK4R9FN**
	800–1200	2x (#2–600 kcmil)	3	2	6	Cu/Al	**LK6R9G**
	800–1200	2x (#2 –600 kcmil)	4	2	8	Cu/Al	**LK8R9G**

Note

① Gold plated for minimal resistance—for PLC applications.

Technical Data and Specifications

UL 1008 Characteristics

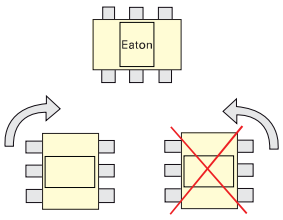
Description	100A	200A	400A	600A	800A	1200A
Operation voltage	600	600	600	600	600	600
Short-circuit rating at 600 Vac (kA) ①	100	100	65	100	100	100
Type of fuse	J	J	J	L	L	L
Maximum fuse rating (A)	200	400	600	800	1000	1600
Short-circuit rating with circuit breaker (kA/ms)	10/25	10/25	14/50	35/50	35/50	35/50
Operational Power/Current Maximum Operational Three-Phase						
240 Vac total system (A)	100	100	250	400	700	700
240 Vac resistive load (A)	100	200	400	600	800	1200
480 Vac total system (A)	100	100	125	350	600	600
480 Vac resistive load (A)	100	200	400	600	800	1200
600 Vac resistive load (A)	100	200	400	400	800	1200
Mechanical Endurance						
Endurance (number of operating cycles)	6050	6050	6050	6050	3550	3550
Connection Terminals						
Minimum connection section/AWG	#6	#6	#4/2 x #6	2x #2	4x #2	4x #2
Maximum connection section/AWG	300 kcmil	300 kcmil	600 kcmil/2x 350 kcmil	2x 600 kcmil	4x 600 kcmil	4x 600 kcmil

UL 98/CSA 22.2 No. 4 Characteristics

Description	100A ②	200A ②	400A ②	600A	800A	1200A
Short-circuit rating at 600 Vac (kA)	200	200	200	200	100	100
Type of fuse	J	J	J	J	L	L
Maximum fuse rating (A)	100	200	400	600	800	1200
Maximum Motor, hp/FLA Three-Phase Motor Maximum						
220–240 Vac	30/80	75/192	125/312	200/480	200/480	200/480
440–480 Vac	75/96	180/180	250/302	400/477	500/590	500/590
600 Vac	100/99	200/192	350/336	350/336	500/472	500/472
Maximum Motor Power, hp/DC FLA Motor Maximum						
125 Vdc ③	7.5/58	15/112	20/148	20/148	—	—
250 Vdc ④	20/72	40/140	50/173	50/173	—	—
Mechanical Characteristics						
Endurance (number of operating cycles)	10,000	8000	6000	6000	3500	3500
Operating torque (lbs.in/Nm)	88.5/10	88.5/10	128.3/14.5	327.5/37	442.5/50	442.5/50
Auxiliary Contacts						
Electrical characteristics	A300	A300	A300	A300	A300	A300

Notes

① Short-circuit rating achieved when used with respective fuse type and maximum fuse rating.
② Only UL 98 listed. For UL 1008 availability, contact Eaton.
③ Two-pole in series.
④ Three-pole in series.



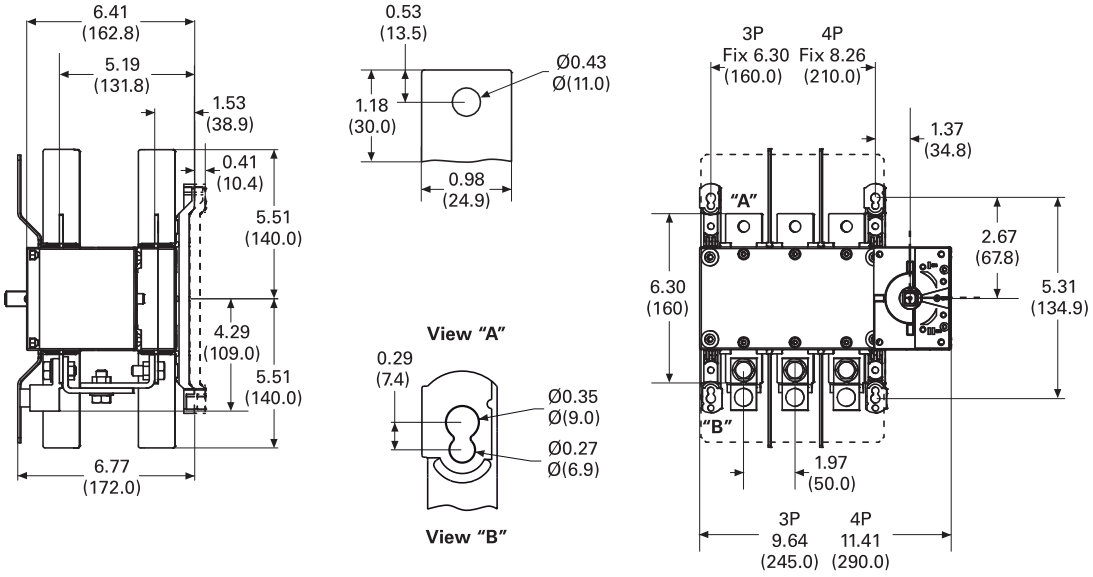
The switch will operate correctly when rotated clockwise 90 degrees.

The switch will not operate correctly when rotated counterclockwise 90 degrees.

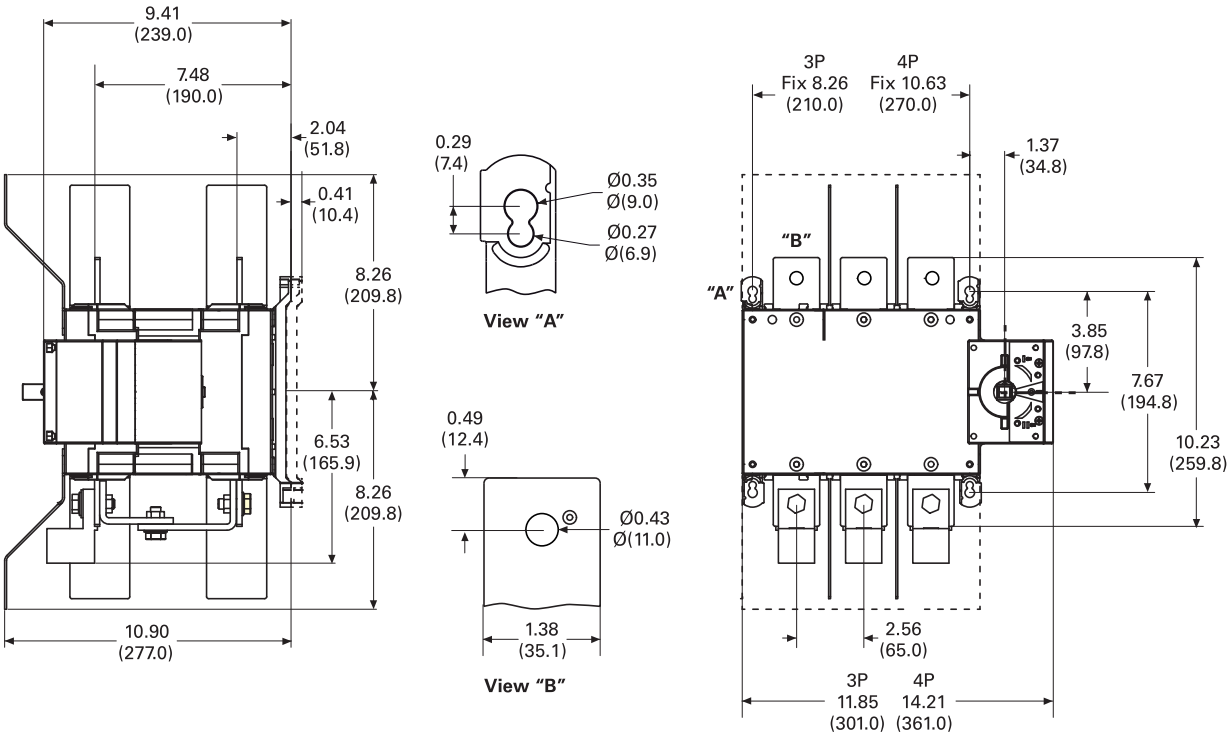
Dimensions

Approximate Dimensions in Inches (mm)

100 to 200A

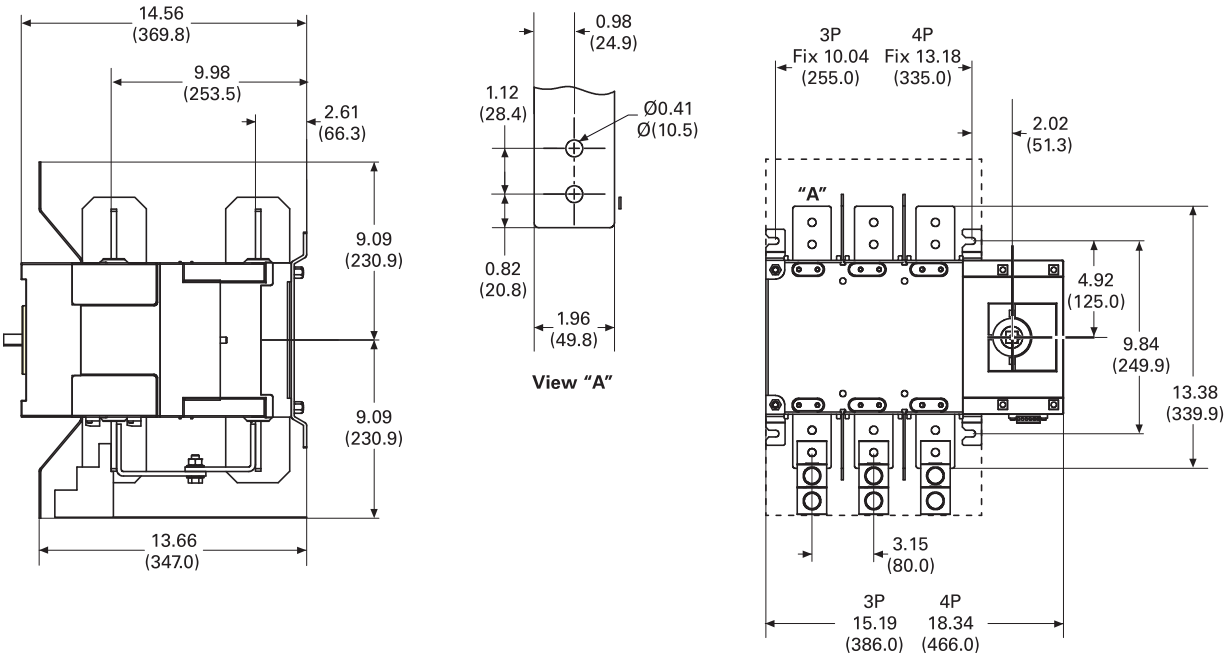


400A

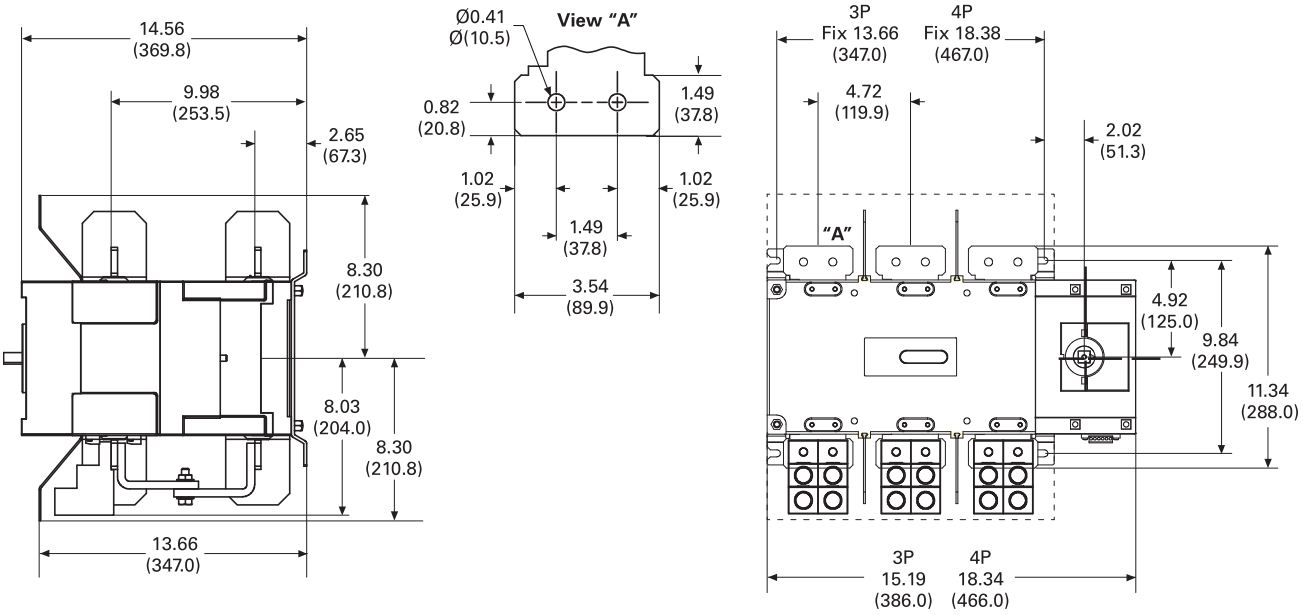


Approximate Dimensions in Inches (mm)

600A



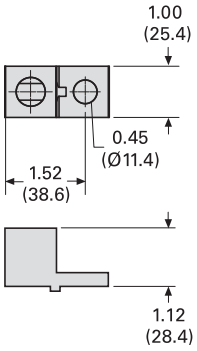
800 to 1200A



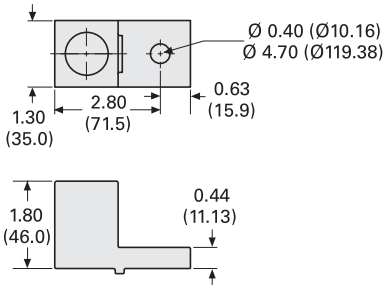
Approximate Dimensions in Inches (mm)

Terminal Lugs

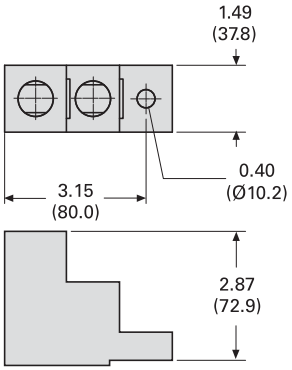
100–200A



400A

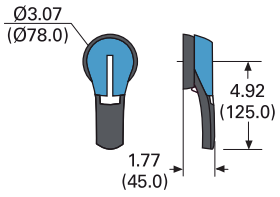


600–1200A

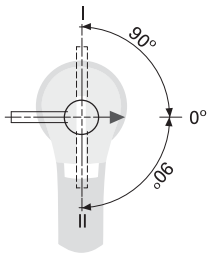


100–200A

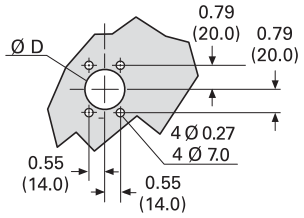
PH2 Type



Direction of Operation

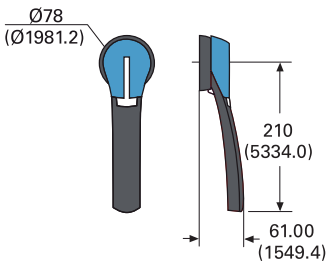


Door Drilling Template

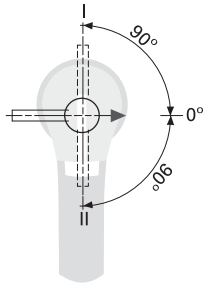


400A

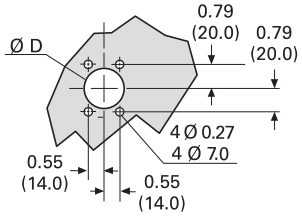
PH3 Type



Direction of Operation

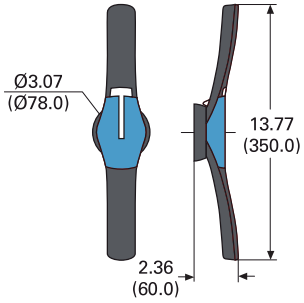


Door Drilling Template

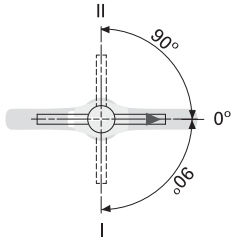


600–1200A

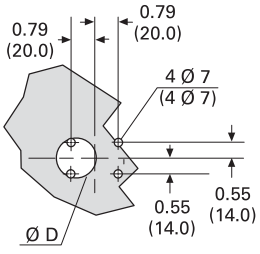
PH4 Type



Direction of Operation

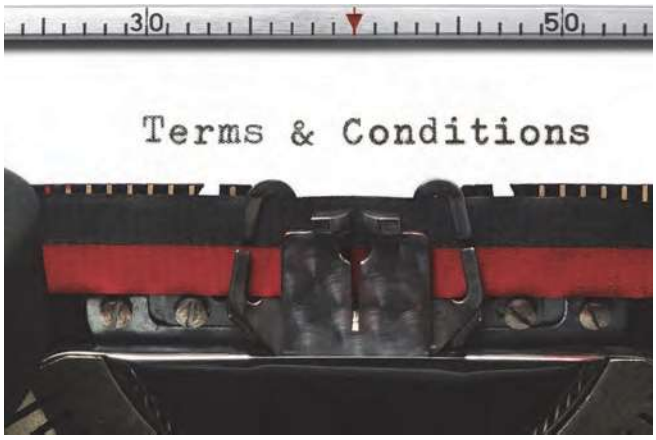


Door Drilling Template



Effective Date: November 1, 2017

Eaton Terms & Conditions



Contents

Description	*Page*
Terms and Conditions of Sale	**V5-A1-1**
Terms of Payment	**V5-A1-2**
Freight	**V5-A1-3**
Warranty	**V5-A1-3**

Selling Policy (Supersedes Selling Policy 25-000, dated November 1, 2008)

Terms and Conditions of Sale

The Terms and Conditions of Sale set forth herein, and any supplements which may be attached hereto, constitute the full and final expression of the contract for the sale of products or services (hereinafter referred to as Product(s) or Services by Eaton Corporation (hereinafter referred to as Seller) to the Buyer, and supersedes all prior quotations, purchase orders, correspondence or communications whether written or oral between the Seller and the Buyer. Notwithstanding any contrary language in the Buyer's purchase order, correspondence or other form of acknowledgment, Buyer shall be bound by these Terms and Conditions of Sale when it sends a purchase order or otherwise indicates acceptance of this contract, or when it accepts delivery from Seller of the Products or Services.

THE CONTRACT FOR SALE OF THE PRODUCTS OR SERVICES IS EXPRESSLY LIMITED TO THE TERMS AND CONDITIONS OF SALE STATED HEREIN. ANY ADDITIONAL OR DIFFERENT TERMS PROPOSED BY BUYER ARE REJECTED UNLESS EXPRESSLY AGREED TO IN WRITING BY SELLER. No contract shall exist except as herein provided.

Complete Agreement

No amendment or modification hereto nor any statement, representation or warranty not contained herein shall be binding on the Seller unless made in writing by an authorized representative of the Seller. Prior dealings, usage of the trade or a course of performance shall not be relevant to determine the meaning of this contract even though the accepting or acquiescing party had knowledge of the nature of the performance and opportunity for objection.

Quotations

Written quotations are valid for 30 days from its date unless otherwise stated in the quotation or terminated sooner by notice.

Verbal quotations, unless accepted, expire the same day they are made.

A complete signed order must be received by Seller within 20 calendar days of notification of award, otherwise the price and shipment will be subject to re-negotiation.

Termination and Cancellation

Products

Any order may be terminated by the Buyer only by written notice and upon payment of reasonable termination charges, including all progress billings and all incurred direct manufacturing costs.

Services

Any order may be terminated by the Buyer only by written notice and upon payment of reasonable termination charges including all costs plus profit.

Seller shall have the right to cancel any order at any time by written notice if Buyer breaches any of the terms hereof, becomes the subject of any proceeding under state or federal law for the relief of debtors, or otherwise becomes insolvent or bankrupt, generally does not pay its debts as they become due or makes an assignment for the benefit of creditors.

Appendix 1—General Terms and Conditions of Sale

Effective Date: November 1, 2017

Prices

All prices are subject to change without notice. In the event of a price change, the effective date of the change will be the date of the new price or discount sheet, letter or telegram. All quotations made or orders accepted after the effective date will be on the new basis. For existing orders, the price of the unshipped portion of an order will be the price in effect at time of shipment.

Price Policy—Products and Services

When prices are quoted as firm for quoted shipment, they are firm provided the following conditions are met:

1. The order is released with complete engineering details.
2. Shipment of Products are made, and Services purchased are provided within the quoted lead time.
3. When drawings for approval are required for any Products, the drawings applicable to those Products must be returned within 30* calendar days from the date of the original mailing of the drawings by Seller. The return drawings must be released for manufacture and shipment and must be marked "APPROVED" or "APPROVED AS NOTED." Drawing re-submittals which are required for any other reason than to correct Seller errors will not extend the 30-day period.

   * 60 days for orders through contractors to allow time for their review and approval before and after transmitting them to their customers.

If the Buyer initiates or in any way causes delays in shipment, provision of Services or return of approval drawings beyond the periods stated above, the price of the Products or Services will be increased 1% per month or fraction thereof up to a maximum of 18 months from the date of the Buyer's order. For delays resulting in shipment or provision of Services beyond 18 months from the date of the Buyer's order, the price must be renegotiated.

Price Policy—BLS

Refer to Price Policy 25-050.

Minimum Billing

Orders less than $1,000 will be assessed a shipping and handling charge of 5% of the price of the order, with a minimum charge of $25.00 unless noted differently on Product discount sheets.

Taxes

The price does not include any taxes. Buyer shall be responsible for the payment of all taxes applicable to, or arising from the transaction, the Products, its sale, value, or use, or any Services performed in connection therewith regardless of the person or entity actually taxed.

Terms of Payment

Products

Acceptance of all orders is subject to the Buyer meeting Seller's credit requirements. Terms of payment are subject to change for failure to meet such requirements. Seller reserves the right at any time to demand full or partial payment before proceeding with a contract of sale as a result of changes in the financial condition of the Buyer. Terms of Payment are either Net 30 days from the date of invoice of each shipment or carry a cash discount based on Product type. Specific payment terms for Products are outlined in the applicable Product discount schedules.

Services

Terms of payment are net within 30 days from date of invoice for orders amounting to less than $50,000.00.

Terms of payment for orders exceeding $50,000.00 shall be made according to the following:

1. Twenty percent (20%) of order value with the purchase order payable 30 days from date of invoice.
2. Eighty percent (80%) of order value in equal monthly payments over the performance period payable 30 days from date of invoice.

Except for work performed (i) under a firm fixed price basis or (ii) pursuant to terms of a previously priced existing contract between Seller and Buyer, invoices for work performed by Seller shall have added and noted on each invoice a charge of 3% (over and above the price of the work) which is related to Seller compliance with present and proposed environmental, health, and safety regulations associated with prescribed requirements covering hazardous materials management and employee training, communications, personal protective equipment, documentation and record keeping associated therewith.

Adequate Assurances

If, in the judgment of Seller, the financial condition of the Buyer, at any time during the period of the contract, does not justify the terms of payment specified, Seller may require full or partial payment in advance.

Delayed Payment

If payments are not made in accordance with these terms, a service charge will, without prejudice to the right of Seller to immediate payment, be added in an amount equal to the lower of 1.5% per month or fraction thereof or the highest legal rate on the unpaid balance.

Freight

Freight policy will be listed on the Product discount sheets, or at option of Seller one of the following freight terms will be quoted.

F.O.B.—P/S—Frt./Ppd. and Invoiced

Products are sold F.O.B. point of shipment freight prepaid and invoiced to the Buyer.

F.O.B.—P/S—Frt./Ppd. and Allowed

Products sold are delivered F.O.B. point of shipment, freight prepaid and included in the price.

F.O.B. Destination—Frt./Ppd. and Allowed

At Buyer's option, Seller will deliver the Products F.O.B. destination freight prepaid and 2% will be added to the net price.

The term "freight prepaid" means that freight charges will be prepaid to the accessible common carrier delivery point nearest the destination for shipments within the United States and Puerto Rico unless noted differently on the Product discount sheets. For any other destination, contact Seller's representative.

Shipment and Routing

Seller shall select the point of origin of shipment, the method of transportation, the type of carrier equipment and the routing of the shipment.

If the Buyer specifies a special method of transportation, type of carrier equipment, routing, or delivery requirement, Buyer shall pay all special freight and handling charges.

When freight is included in the price, no allowance will be made in lieu of transportation if the Buyer accepts shipment at factory, warehouse, or freight station or otherwise supplies its own transportation.

Risk of Loss

Risk of loss or damage to the Products shall pass to Buyer at the F.O.B. point.

Concealed Damage

Except in the event of F.O.B. destination shipments, Seller will not participate in any settlement of claims for concealed damage.

When shipment has been made on an F.O.B. destination basis, the Buyer must unpack immediately and, if damage is discovered, must:

1. Not move the Products from the point of examination.
2. Retain shipping container and packing material.
3. Notify the carrier in writing of any apparent damage.
4. Notify Seller representative within 72 hours of delivery.
5. Send Seller a copy of the carrier's inspection report.

Witness Tests/Customer Inspection

Standard factory tests may be witnessed by the Buyer at Seller's factory for an additional charge calculated at the rate of $2,500 per day (not to exceed eight (8) hours) per Product type. Buyer may final inspect Products at the Seller's factory for $500 per day per Product type.

Witness tests will add one (1) week to the scheduled shipping date. Seller will notify Buyer fourteen (14) calendar days prior to scheduled witness testing or inspection. In the event Buyer is unable to attend, the Parties shall mutually agree on a rescheduled date. However, Seller reserves the right to deem the witness tests waived with the right to ship and invoice Products.

Held Orders

For any order held, delayed or rescheduled at the request of the Buyer, Seller may, at its sole option (1) require payment to be based on any reasonable basis, including but not limited to the contract price, and any additional expenses, or cost resulting from such a delay; (2) store Products at the sole cost and risk of loss of the Buyer; and/or (3) charge to the Buyer those prices under the applicable price policy. Payment for such price, expenses and costs, in any such event, shall be due by Buyer within thirty (30) days from date of Seller's invoice. Any order so held delayed or rescheduled beyond six (6) months will be treated as a Buyer termination.

Drawing Approval

Seller will design the Products in line with, in Seller's judgment, good commercial practice. If at drawing approval Buyer makes changes outside of the design as covered in their specifications, Seller will then be paid reasonable charges and allowed a commensurate delay in shipping date based on the changes made.

Drawing Re-Submittal

When Seller agrees to do so in its quotation, Seller shall provide Buyer with the first set of factory customer approval drawing(s) at Seller's expense. The customer approval drawing(s) will be delivered at the quoted delivery date. If Buyer requests drawing changes or additions after the initial factory customer approval drawing(s) have been submitted by Seller, the Seller, at its option, may assess Buyer drawing charges. Factory customer approval drawing changes required due to misinterpretation by Seller will be at Seller's expense. Approval drawings generated by Bid Manager are excluded from this provision.

Warranty

Warranty for Products

Seller warrants that the Products manufactured by it will conform to Seller's applicable specifications and be free from failure due to defects in workmanship and material for one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

In the event any Product fails to comply with the foregoing warranty, Seller will, at its option, either (a) repair or replace the defective Product, or defective part or component thereof, F.O.B. Seller's facility freight prepaid, or (b) credit Buyer for the purchase price of the Product. All warranty claims shall be made in writing.

Seller requires all non-conforming Products be returned at Seller's expense for evaluation unless specifically stated otherwise in writing by Seller.

This warranty does not cover failure or damage due to storage, installation, operation or maintenance not in conformance with Seller's recommendations and industry standard practice or due to accident, misuse, abuse or negligence. This warranty does not cover reimbursement for labor, gaining access, removal, installation, temporary power or any other expenses, which may be incurred in connection with repair or replacement.

This warranty does not apply to equipment not manufactured by Seller. Seller limits itself to extending the same warranty it receives from the supplier.

Effective Date: November 1, 2017

Extended Warranty for Products

If requested by the Buyer and specifically accepted in writing by Seller, the foregoing standard warranty for Products will be extended from the date of shipment for the period and price indicated below:

- 24 months—2% of Contract Price
- 30 months—3% of Contract Price
- 36 months—4% of Contract Price

Special Warranty (In and Out) for Products

If requested by the Buyer and specifically accepted in writing by Seller, Seller will, during the warranty period for Products, at an additional cost of 2% of the contract price, be responsible for the direct cost of:

1. Removing the Product from the installed location.
2. Transportation to the repair facility and return to the site.
3. Reinstallation on site.

The total liability of Seller for this Special Warranty for Products is limited to 50% of the contract price of the particular Product being repaired and excludes expenses for removing adjacent apparatus, walls, piping, structures, temporary service, etc.

Warranty for Services

Seller warrants that the Services performed by it hereunder will be performed in accordance with generally accepted professional standards.

The Services, which do not so conform, shall be corrected by Seller upon notification in writing by the Buyer within one (1) year after completion of the Services.

Unless otherwise agreed to in writing by Seller, Seller assumes no responsibility with respect to the suitability of the Buyer's, or its customer's, equipment or with respect to any latent defects in equipment not supplied by Seller. This warranty does not cover damage to Buyer's, or its customer's, equipment, components or parts resulting in whole or in part from improper maintenance or operation or from their deteriorated condition. Buyer will, at its cost, provide Seller with unobstructed access to the defective Services, as well as adequate free working space in the immediate vicinity of the defective Services and such facilities and systems, including, without limitation, docks, cranes and utility disconnects and connects, as may be necessary in order that Seller may perform its warranty obligations. The conducting of any tests shall be mutually agreed upon and Seller shall be notified of, and may be present at, all tests that may be made.

Warranty for Power Systems Studies

Seller warrants that any power systems studies performed by it will conform to generally accepted professional standards. Any portion of the study, which does not so conform, shall be corrected by Seller upon notification in writing by the Buyer within six (6) months after completion of the study. All warranty work shall be performed in a single shift straight time basis Monday through Friday. In the event that the study requires correction of warranty items on an overtime schedule, the premium portion of such overtime shall be for the Buyer's account.

Limitation on Warranties for Products, Services and Power Systems Studies

THE FOREGOING WARRANTIES ARE EXCLUSIVE EXCEPT FOR WARRANTY OF TITLE. SELLER DISCLAIMS ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

CORRECTION OF NON-CONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE SELLER'S SOLE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR FAILURE OF SELLER TO MEET ITS WARRANTY OBLIGATIONS, WHETHER CLAIMS OF THE BUYER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE.

Asbestos

Federal Law requires that building or facility owners identify the presence, location and quantity of asbestos containing material (hereinafter "ACM") at work sites. Seller is not licensed to abate ACM. Accordingly, for any contract which includes the provision of Services, prior to (i) commencement of work at any site under a specific Purchase Order, (ii) a change in the work scope of any Purchase Order, the Buyer will certify that the work area associated with the Seller's scope of work includes the handling of Class II ACM, including but not limited to generator wedges and high temperature gaskets which include asbestos materials. The Buyer shall, at its expense, conduct abatement should the removal, handling, modification or reinstallation, or some or all of them, of said Class II ACM be likely to generate airborne asbestos fibers; and should such abatement affect the cost of or time of performance of the work, then Seller shall be entitled to an equitable adjustment in the schedule, price and other pertinent affected provisions of the contract.

Compliance with Nuclear Regulation

Seller's Products are sold as commercial grade Products not intended for application in facilities or activities licensed by the United States Nuclear Regulatory Commission for atomic purposes. Further certification will be required for use of the Products in any safety-related application in any nuclear facility licensed by the U.S. Nuclear Regulatory Commission.

Returning Products

Authorization and shipping instructions for the return of any Products must be obtained from Seller before returning the Products.

When return is occasioned due to Seller error, full credit including all transportation charges will be allowed.

Product Notices

Buyer shall provide the user (including its employees) of the Products with all Seller supplied Product notices, warnings, instructions, recommendations, and similar materials.

Force Majeure

Seller shall not be liable for failure to perform or delay in performance due to fire, flood, strike or other labor difficulty, act of God, act of any governmental authority or of the Buyer, riot, embargo, fuel or energy shortage, car shortage, wrecks or delays in transportation, or due to any other cause beyond Seller's reasonable control. In the event of delay in performance due to any such cause, the date of delivery or time for completion will be extended by a period of time reasonably necessary to overcome the effect of such delay.

Liquidated Damages

Contracts which include liquidated damage clauses for failure to meet shipping or job completion promises are not acceptable or binding on Seller, unless such clauses are specifically accepted in writing by an authorized representative of the Seller at its headquarters office.

Patent Infringement

Seller will defend or, at its option, settle any suit or proceeding brought against Buyer, or Buyer's customers, to the extent it is based upon a claim that any Product or part thereof, manufactured by Seller or its subsidiaries and furnished hereunder, infringes any United States patent, other than a claim of infringement based upon use of a Product or part thereof in a process, provided Seller is notified in reasonable time and given authority, information and assistance (at Seller's expense) for the defense of same. Seller shall pay all legal and court costs and expenses and court-assessed damages awarded therein against Buyer resulting from or incident to such suit or proceeding. In addition to the foregoing, if at any time Seller determines there is a substantial question of infringement of any United States patent, and the use of such Product is or may be enjoined, Seller may, at its option and expense: either (a) procure for Buyer the right to continue using and selling the Product; (b) replace the Product with non-infringing apparatus; (c) modify the Product so it becomes non-infringing; or (d) as a last resort, remove the Product and refund the purchase price, equitably adjusted for use and obsolescence. In no case does Seller agree to pay any recovery based upon its Buyer's savings or profit through use of Seller's Products whether the use be special or ordinary. The foregoing states the entire liability of Seller for patent infringement.

The preceding paragraph does not apply to any claim of infringement based upon: (a) any modification made to a Product other than by Seller; (b) any design and/or specifications of Buyer to which a Product was manufactured; or (c) the use or combination of Product with other products where the Product does not itself infringe. As to the above-identified claim situations where the preceding paragraph does not apply, Buyer shall defend and hold Seller harmless in the same manner and to the extent as Seller's obligations described in the preceding paragraph. Buyer shall be responsible for obtaining (at Buyer's expense) all license rights required for Seller to be able to use software products in the possession of Buyer where such use is required in order to perform any Service for Buyer.

With respect to a Product or part thereof not manufactured by Seller or its subsidiaries, Seller will attempt to obtain for Buyer, from the supplier(s), the patent indemnification protection normally provided by the supplier(s) to customers.

Compliance with OSHA

Seller offers no warranty and makes no representation that its Products comply with the provisions or standards of the Occupational Safety and Health Act of 1970, or any regulation issued thereunder. In no event shall Seller be liable for any loss, damage, fines, penalty or expenses arising under said Act.

Limitation of Liability

THE REMEDIES OF THE BUYER SET FORTH IN THIS CONTRACT ARE EXCLUSIVE AND ARE ITS SOLE REMEDIES FOR ANY FAILURE OF SELLER TO COMPLY WITH ITS OBLIGATIONS HEREUNDER.

NOTWITHSTANDING ANY PROVISION IN THIS CONTRACT TO THE CONTRARY, IN NO EVENT SHALL SELLER BE LIABLE IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE FOR DAMAGE TO PROPERTY OR EQUIPMENT OTHER THAN PRODUCTS SOLD HEREUNDER, LOSS OF PROFITS OR REVENUE, LOSS OF USE OF PRODUCTS, COST OF CAPITAL, CLAIMS OF CUSTOMERS OF THE BUYER OR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, REGARDLESS OF WHETHER SUCH POTENTIAL DAMAGES ARE FORESEEABLE OR IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THE TOTAL CUMULATIVE LIABILITY OF SELLER ARISING FROM OR RELATED TO THIS CONTRACT WHETHER THE CLAIMS ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE, SHALL NOT EXCEED THE PRICE OF THE PRODUCT OR SERVICES ON WHICH SUCH LIABILITY IS BASED.

A

AA V5-**T2**-130
AE16 . . . . . V5-**T2**-27
AE56 . . . . . V5-**T2**-27
AGSH V5-**T7**-5
AN V5-**T2**-130
AN13 . . . . . V5-**T2**-65
AN16 . . . . . V5-**T2**-11, V5-**T2**-27
AN19 . . . . . V5-**T2**-51, V5-**T2**-52
AN53 . . . . . V5-**T2**-65
AN56 . . . . . V5-**T2**-11, V5-**T2**-27
AN59 . . . . . V5-**T2**-51
AN700 . . . . . V5-**T2**-12
A20 . . . . . V5-**T2**-99, V5-**T2**-105
A202 . . . . . V5-**T6**-24
A21 . . . . . V5-**T2**-100, V5-**T2**-106
A25 . . . . . V5-**T2**-100, V5-**T2**-106, V5-**T4**-24, V5-**T4**-50
A27 . . . . . V5-**T4**-31, V5-**T4**-53
A96 . . . . . V5-**T2**-107
A97 . . . . . V5-**T2**-107
A98 . . . . . V5-**T2**-107

B

BA V5-**T2**-127
BN16 . . . . . V5-**T2**-16
B1A V5-**T3**-12
B1B V5-**T3**-12
B100 . . . . . V5-**T3**-11
B230 . . . . . V5-**T3**-4
B25 . . . . . V5-**T4**-24, V5-**T4**-50
B27 . . . . . V5-**T4**-32, V5-**T4**-53
B3NO V5-**T2**-108, V5-**T2**-127
B330 . . . . . V5-**T3**-4

C

CE15 . . . . . V5-**T2**-27
CE55 . . . . . V5-**T2**-27
CN13 . . . . . V5-**T2**-64, V5-**T2**-66
CN15 . . . . . V5-**T2**-5, V5-**T2**-6, V5-**T2**-27
CN35 . . . . . V5-**T2**-27, V5-**T6**-17
CN53 . . . . . V5-**T2**-64
CN55 . . . . . V5-**T2**-5, V5-**T2**-27
C25 . . . . . V5-**T4**-5, V5-**T4**-9, V5-**T4**-47, V5-**T4**-59
C30CN V5-**T6**-6–V5-**T6**-10
C306 . . . . . V5-**T2**-32, V5-**T2**-33, V5-**T2**-40, V5-**T2**-44, V5-**T2**-46
C311 . . . . . V5-**T5**-28
C32 . . . . . V5-**T4**-11, V5-**T4**-12, V5-**T4**-26, V5-**T4**-55
C320 . . . . . V5-**T2**-22–V5-**T2**-26, V5-**T2**-28, V5-**T2**-44, V5-**T6**-10, V5-**T6**-11, V5-**T6**-18–V5-**T6**-20
C321 . . . . . V5-**T2**-21, V5-**T2**-22, V5-**T2**-29
C325 . . . . . V5-**T7**-4
C335 . . . . . V5-**T2**-28
C350 . . . . . V5-**T2**-21, V5-**T4**-18
C440 . . . . . V5-**T1**-148, V5-**T1**-149, V5-**T2**-34, V5-**T2**-54, V5-**T2**-83, V5-**T2**-84, V5-**T5**-53, V5-**T5**-56, V5-**T5**-57
C441 . . . . . V5-**T5**-71–V5-**T5**-74
C445 . . . . . V5-**T5**-99–V5-**T5**-101
C65 . . . . . V5-**T4**-21
C799 . . . . . V5-**T4**-12, V5-**T4**-26
C81 . . . . . V5-**T4**-71

D

DPCK V5-**T4**-64, V5-**T4**-65
D3PA V5-**T5**-8, V5-**T5**-11, V5-**T5**-16, V5-**T5**-19, V5-**T5**-22
D64D V5-**T5**-29
D64L V5-**T5**-36
D64R V5-**T5**-27
D65C V5-**T5**-8, V5-**T5**-16, V5-**T5**-19, V5-**T5**-22
D65V V5-**T5**-11
D77E V5-**T5**-74, V5-**T5**-101

E

EMS V5-**T1**-233

F

FH V5-**T2**-135, V5-**T2**-136, V5-**T3**-11, V5-**T3**-12, V5-**T7**-6
FT1 . . . . . V5-**T2**-133
FT2 . . . . . V5-**T2**-133
FT3 . . . . . V5-**T2**-133
FT4 . . . . . V5-**T2**-133

H

H20 . . . . . V5-**T2**-41, V5-**T2**-42, V5-**T2**-44, V5-**T4**-27, V5-**T4**-56
H21 . . . . . V5-**T2**-43, V5-**T4**-26, V5-**T4**-56

I

ID89 . . . . . V5-**T7**-6
IQ50 . . . . . V5-**T2**-138

L

LK V5-**T3**-12

M

MC382 . . . . . V5-**T2**-23
ME V5-**T4**-75
MS V5-**T3**-7–V5-**T3**-9
M-3 . . . . . V5-**T2**-108

P

PKE-SWD V5-**T1**-228
PNC V5-**T2**-109
PNO V5-**T2**-109

S

SS56 . . . . . V5-**T4**-64
SS-56 . . . . . V5-**T2**-108

V

VM160 . . . . . V5-**T7**-4
VM320 . . . . . V5-**T7**-4
VM610 . . . . . V5-**T7**-4
V200 . . . . . V5-**T7**-3
V201 . . . . . V5-**T7**-3
V210 . . . . . V5-**T7**-3
V211 . . . . . V5-**T7**-3

W

WMR V5-**T5**-36

X

XCT V5-**T5**-101
XTAE V5-**T1**-50, V5-**T1**-51
XTAR V5-**T1**-52
XTCC V5-**T1**-63, V5-**T1**-64
XTCE V5-**T1**-7–V5-**T1**-10, V5-**T1**-39–V5-**T1**-44, V5-**T1**-55–V5-**T1**-61, V5-**T1**-64, V5-**T1**-65, V5-**T1**-67–V5-**T1**-77, V5-**T1**-235, V5-**T2**-67–V5-**T2**-70
XTCF V5-**T1**-45
XTCR V5-**T1**-47, V5-**T1**-48
XTCS V5-**T1**-42, V5-**T1**-43, V5-**T1**-60, V5-**T1**-77
XTFC V5-**T1**-199–V5-**T1**-202
XTFCE V5-**T1**-222
XTFR V5-**T1**-199–V5-**T1**-202
XTMC V5-**T1**-6, V5-**T1**-8, V5-**T1**-9, V5-**T1**-20, V5-**T1**-22, V5-**T1**-24–V5-**T1**-26, V5-**T1**-65
XTMF V5-**T1**-20
XTMR V5-**T1**-21
XTMT V5-**T1**-11
XTOB V5-**T1**-55–V5-**T1**-60, V5-**T1**-132–V5-**T1**-135, V5-**T4**-33
XTOE V5-**T1**-146, V5-**T1**-147, V5-**T2**-81, V5-**T2**-82, V5-**T5**-51–V5-**T5**-53
XTOM V5-**T1**-23
XTOT V5-**T1**-60, V5-**T1**-61, V5-**T1**-134
XTPA V5-**T1**-165–V5-**T1**-171, V5-**T1**-173–V5-**T1**-175, V5-**T1**-206
XTPAX V5-**T1**-223–V5-**T1**-228
XTPB V5-**T1**-163, V5-**T1**-167, V5-**T1**-172, V5-**T1**-173
XTPE V5-**T1**-221, V5-**T1**-222
XTPEX V5-**T1**-221, V5-**T1**-226
XTPR V5-**T1**-164, V5-**T1**-165
XTRE V5-**T1**-5
XTRM V5-**T1**-5
XTSC V5-**T1**-195–V5-**T1**-198
XTSR V5-**T1**-195–V5-**T1**-198
XTTR V5-**T1**-11, V5-**T1**-22, V5-**T1**-55–V5-**T1**-61

Z

ZEB-X V5-**T1**-147, V5-**T1**-148, V5-**T2**-34, V5-**T2**-83, V5-**T5**-52, V5-**T5**-53, V5-**T5**-56

Numerics

10-35 . . . . . V5-**T4**-82, V5-**T4**-85, V5-**T4**-88
10370 . . . . . V5-**T2**-141
10-65 . . . . . V5-**T2**-32
10-68 . . . . . V5-**T4**-82, V5-**T4**-85, V5-**T4**-88
10-71 . . . . . V5-**T4**-25
10923 . . . . . V5-**T4**-70
11A8 . . . . . V5-**T4**-76
1250 . . . . . V5-**T2**-112, V5-**T2**-113
1254 . . . . . V5-**T4**-65
1255 . . . . . V5-**T2**-114
1264 . . . . . V5-**T4**-64
1266 . . . . . V5-**T4**-65
1268 . . . . . V5-**T2**-112
17-1 . . . . . V5-**T2**-31
17-8 . . . . . V5-**T2**-31
179C V5-**T6**-25
180C V5-**T4**-64, V5-**T4**-65, V5-**T7**-4
1954 . . . . . V5-**T4**-79
2050 . . . . . V5-**T2**-109, V5-**T2**-114, V5-**T2**-115
2057 . . . . . V5-**T2**-110
2066 . . . . . V5-**T2**-114
2084 . . . . . V5-**T4**-77
2114 . . . . . V5-**T4**-79
2119 . . . . . V5-**T2**-110
2120 . . . . . V5-**T4**-79
2131 . . . . . V5-**T4**-79
2184 . . . . . V5-**T4**-76, V5-**T4**-77
23-54 . . . . . V5-**T4**-85
23-72 . . . . . V5-**T4**-82
30B4 . . . . . V5-**T4**-77
3354 . . . . . V5-**T2**-111
3463 . . . . . V5-**T2**-109
3534 . . . . . V5-**T4**-79
371B V5-**T2**-112
372B V5-**T2**-113
373B V5-**T2**-112
38A7 . . . . . V5-**T2**-111
3915 . . . . . V5-**T6**-25
42-35 . . . . . V5-**T2**-32, V5-**T2**-33
427C V5-**T4**-77
438C V5-**T2**-115
44A6 . . . . . V5-**T4**-77
461A V5-**T2**-114
477B V5-**T2**-114
48-1 . . . . . V5-**T2**-31
48-10 . . . . . V5-**T2**-32
487B V5-**T4**-76
503C V5-**T2**-112, V5-**T2**-113
505C V5-**T2**-112, V5-**T2**-114
511H V5-**T2**-144, V5-**T2**-145
5250 . . . . . V5-**T2**-113, V5-**T2**-114
5264 . . . . . V5-**T2**-111, V5-**T2**-114, V5-**T2**-115
550D V5-**T2**-111
567D V5-**T2**-109
578D V5-**T2**-109, V5-**T2**-113

6-26 . . . . . V5-**T2**-32
626B V5-**T2**-113
6379 . . . . . V5-**T2**-110
640C V5-**T2**-114
6-43 . . . . . V5-**T2**-31, V5-**T6**-20
6-44 . . . . . V5-**T2**-32, V5-**T6**-20
6-45 . . . . . V5-**T2**-32, V5-**T6**-20
646C V5-**T2**-114
6-496 . . . . . V5-**T4**-85
6-497 . . . . . V5-**T4**-85
650C V5-**T2**-114
655C V5-**T2**-114
6-57 . . . . . V5-**T2**-33
659C V5-**T4**-76
6-60 . . . . . V5-**T2**-32
6-602 . . . . . V5-**T4**-88
6-61 . . . . . V5-**T2**-33
6-64 . . . . . V5-**T2**-32
6-65 . . . . . V5-**T2**-31, V5-**T6**-20
6702 . . . . . V5-**T4**-82, V5-**T4**-85, V5-**T4**-88
6714 . . . . . V5-**T2**-112, V5-**T2**-113
672B V5-**T2**-112, V5-**T2**-113
673B V5-**T4**-65
7856 . . . . . V5-**T2**-113
7858. . . . . V5-**T2**-110
7864. . . . . V5-**T2**-109, V5-**T2**-113
7874. . . . . V5-**T6**-25, V5-**T7**-6
80-19 . . . . . V5-**T7**-4
818D V5-**T2**-109
831D V5-**T2**-114
843D V5-**T2**-109, V5-**T2**-113
878D V5-**T4**-76
9084. . . . . V5-**T2**-109, V5-**T2**-113
9085. . . . . V5-**T7**-6
9-18 . . . . . V5-**T2**-32, V5-**T4**-61, V5-**T6**-20
9-20 . . . . . V5-**T2**-28
9-26 . . . . . V5-**T2**-32–V5-**T2**-35
9-27 . . . . . V5-**T2**-32, V5-**T2**-35, V5-**T4**-61, V5-**T6**-20
9-28 . . . . . V5-**T2**-30, V5-**T6**-20
9-29 . . . . . V5-**T2**-28
9-30 . . . . . V5-**T2**-28, V5-**T2**-32, V5-**T4**-61
9-31 . . . . . V5-**T4**-59, V5-**T4**-60, V5-**T4**-62
9-32 . . . . . V5-**T2**-31, V5-**T4**-60, V5-**T4**-62, V5-**T6**-11
9441. . . . . V5-**T3**-16
9917. . . . . V5-**T2**-114
99-38 . . . . . V5-**T4**-85
9944. . . . . V5-**T2**-109

A

A200 Series Contactors
- Non-Reversing V5-**T2**-99
- Reversing V5-**T2**-100

A200 Series Starters
- Non-Reversing V5-**T2**-105
- Reversing V5-**T2**-106, V5-**T2**-107

Accessories
- A202 Magnetically Latched Contactors V5-**T6**-24
- C440/***XT*** Electronic Overload Relays V5-**T5**-56
- C441 Overload Relays V5-**T5**-73
- CN35 Electrically Held Contactors V5-**T6**-18
- D65 Phase Monitoring Relays
  - D65PLR Series V5-**T5**-8
- D65 Voltage Monitoring Relays
  - D65VAP and D65VAKP V5-**T5**-19
  - D65VMRP and D65VMKP V5-**T5**-16
  - D65VWP and D65VWKP V5-**T5**-22
- Definite Purpose Contactors
  - 15–360A, Two-, Three- and Four-Pole V5-**T4**-11
  - 600V V5-**T4**-76
  - AVD–Contactor V5-**T4**-82
  - D–Contactor V5-**T4**-85
  - DPM 1000V V5-**T4**-79
  - Heavy-Duty Special Purpose V5-**T4**-64
  - Reversing/Assignment V5-**T4**-88
- Definite Purpose Contactors and Starters
  - NEMA Type 1 Enclosed V5-**T4**-55
- Definite Purpose Starters V5-**T4**-26
- Digital Ground Fault Relays
  - D64R Series V5-**T5**-28
- IEC
  - C440/***XT*** Electronic Overload V5-**T1**-148
  - Combination Motor Controllers V5-**T1**-205
  - Manual Motor Protectors V5-**T1**-166–V5-**T1**-175
  - Miniature Controls V5-**T1**-24–V5-**T1**-26
  - Relays and Timers, ***XT*** V5-**T1**-6–V5-**T1**-11
  - Thermal Overload Relays V5-**T1**-135
  - ***XT*** Electronic Manual Motor Protection V5-**T1**-223
  - XTCE Contactors and Starters V5-**T1**-65–V5-**T1**-75
- NEMA
  - A200, Non-Reversing and Reversing . . V5-**T2**-108–V5-**T2**-110
  - A200, Thermal Type B V5-**T2**-127
  - Freedom Contactors and Starters V5-**T2**-21–V5-**T2**-30
  - Freedom Three-Phase Starters V5-**T2**-13
  - Freedom, C440/***XT*** Electronic Overload Relays V5-**T2**-53
  - Freedom, Contactors and Starters V5-**T2**-6
  - Freedom, Thermal Overload Relays V5-**T2**-44
  - Space-Savings Series V5-**T2**-66
- Power Xpert C445 Relay V5-**T5**-101
- Switching Devices, Manual Transfer Switches
  - Auxiliary Contacts V5-**T8**-55
  - Bridging Bars V5-**T8**-55
  - Direct Handle V5-**T8**-54
  - External Handle V5-**T8**-54
  - Line and Load Terminal Lugs V5-**T8**-55
  - Mounting Spacers V5-**T8**-55
  - Shaft Extension V5-**T8**-54
  - Terminals Protection Screen V5-**T8**-55

Accessories, continued
- Switching Devices, R5 Series (UL 508) Non-Fusible 16–80A
  - Auxiliary Contacts V5-**T8**-6, V5-**T8**-21
  - Direct Handle V5-**T8**-20
  - Door Interlocked External Handle—Front Operation V5-**T8**-20
  - Door Mounting Kit V5-**T8**-6
  - Line and Load Terminal Lugs V5-**T8**-21
  - Shaft Extensions for External Front Handle V5-**T8**-20
  - Switched Fourth-Pole Module V5-**T8**-6
  - Terminal Screens V5-**T8**-21
  - Terminal Shrouds V5-**T8**-6
- Switching Devices, R9 Series (UL 98) DC Rated Disconnects
  - Auxiliary Contacts V5-**T8**-47
  - Direct Handle V5-**T8**-47
  - Door Interlocked External Handle Front Operation . . V5-**T8**-47
  - Jumpers for Connecting Poles in Series V5-**T8**-48
  - Line and Load Terminal Lugs V5-**T8**-48
  - Shaft Extensions for External Front V5-**T8**-48
  - Terminal Screens V5-**T8**-47
- Switching Devices, R9 Series (UL 98) Fusible 30–800A
  - Auxiliary Contacts—NO + NC V5-**T8**-35
  - Auxiliary Contacts—NO or NC V5-**T8**-35
  - Cable Operator V5-**T8**-32
  - Direct Handle V5-**T8**-33
  - Door Interlocked External Front Handles V5-**T8**-33
  - Flange Handle for Flange-Operated Switches V5-**T8**-32
  - Line and Load Terminal Lugs V5-**T8**-36
  - NFPA 79 “Through the Door” Kit V5-**T8**-32
  - Right Side External Handles V5-**T8**-33
  - Rod Operator V5-**T8**-32
  - Shaft Extensions for External Handles V5-**T8**-34
  - Shorting Links V5-**T8**-36
  - Terminal Shrouds V5-**T8**-35
- Vacuum Contactors and Starters V5-**T7**-4
- XTOE/***XT*** Electronic Overload Relays V5-**T2**-83

Adapter to DIN Rail Mount, Freedom NEMA V5-**T2**-23

Add-On Power Pole Kit, Freedom NEMA V5-**T2**-24

Adhesive Dust Cover, Freedom NEMA V5-**T2**-24

Auxiliary Contacts
- C30CN Mechanically and Electrically Held Contactors V5-**T6**-11
- CN35 Electrically Held V5-**T6**-18
- Definite Purpose Contactor
  - Side Mounted V5-**T4**-11
  - Top Mounted V5-**T4**-12
- Freedom, NEMA V5-**T2**-25–V5-**T2**-27
- Manual Motor Protectors, IEC V5-**T1**-166, V5-**T1**-223
- Miniature Controls, IEC V5-**T1**-24
- Relays and Timers, IEC V5-**T1**-6
- Switching Devices, Manual Transfer Switches Accessories V5-**T8**-54
- Switching Devices, R5 Series (UL 508) Non-Fusible 16–80A Accessories V5-**T8**-6, V5-**T8**-20
- Switching Devices, R9 Series (UL 98) DC Rated Disconnects Accessories V5-**T8**-47
- Vacuum Contactors and Starters V5-**T7**-4
- ***XT*** Electronic Manual Motor Protection V5-**T1**-223
- XTCE Contactors and Starters, IEC V5-**T1**-65

Appendix 3—Alphabetical Product Index

Auxiliary Contacts—NO + NC
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-35

Auxiliary Contacts—NO or NC
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-35

B

Bimetallic Overload Starters
Freedom V5-**T2**-15
XTCE, Non-Reversing V5-**T1**-50
XTCE, Reversing V5-**T1**-52

Bridging Bars
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-55

C

C306 Thermal Overload Relays V5-**T2**-40
Heater Selection V5-**T2**-41

Cable Operator
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-32

Circuit Breakers
Motor Protection (MPCB) V5-**T5**-37

Combination Motor Controllers
XT, IEC V5-**T1**-193
XTFC and XTFR, (CMC) V5-**T1**-199, V5-**T1**-202
XTSC and XTSR, (MMC) V5-**T1**-195

Communication Modules
DeviceNet
C440/***XT*** Electronic Overload Relays . . V5-**T1**-150, V5-**T2**-54, V5-**T2**-84, V5-**T5**-57
C441 Overload Relays V5-**T5**-73
Ethernet
C441 Overload Relays V5-**T5**-73
Modbus
C440/***XT*** Electronic Overload Relays . . V5-**T1**-150, V5-**T2**-54, V5-**T2**-84, V5-**T5**-57
C441 Overload Relays V5-**T5**-73
PROFIBUS
C440/***XT*** Electronic Overload Relays . . V5-**T1**-150, V5-**T2**-54, V5-**T2**-84, V5-**T5**-57
C441 Overload Relays V5-**T5**-73

Competitive Mounting Plates, Freedom NEMA V5-**T2**-29

Components
C30CN Mechanically and Electrically Held Contactors V5-**T6**-10

Contactors
A200 Series, Non-Reversing and Reversing V5-**T2**-97
Freedom Series, Magnet Coils—AC and DC . V5-**T2**-5, V5-**T2**-6
Freedom Series, Non-Reversing and Reversing V5-**T2**-4
Freedom Series, Three-Pole V5-**T2**-5
Freedom Series, Two-, Four- and Five-Pole V5-**T2**-6
Lighting
A202 Magnetically Latched V5-**T6**-23
C30CN Mechanically and Electrically Held V5-**T6**-3
CN35 Electrically Held V5-**T6**-16

Contactors and Starters
A200 Series V5-**T2**-97
Definite Purpose V5-**T4**-2
Freedom Series V5-**T2**-2
IEC, Reference Data V5-**T1**-236–V5-**T1**-256
NEMA Space-Savings Series V5-**T2**-63
NEMA, Reference Data V5-**T2**-148–V5-**T2**-153
Shoe Brakes—AC and DC Magnetic V5-**T2**-143
Solenoids—Alternating Current V5-**T2**-140
Vacuum V5-**T7**-2
XT DC Contactors V5-**T1**-234
XT Electronic Manual Motor Protection V5-**T1**-219
XT IEC Power Control V5-**T1**-2
XTCE V5-**T1**-35

Control Circuit Fuse Block, Freedom NEMA V5-**T2**-23

Current Monitoring Relays
CurrentWatch
ECS Series V5-**T5**-3
ECSJ Series V5-**T5**-4

D

DC Magnet Coils, Freedom NEMA V5-**T2**-28

Definite Purpose Contactors V5-**T4**-4–V5-**T4**-22
15–360A, Two-, Three- and Four-Pole—C25 . . . . . V5-**T4**-8
15–40A, Three-Pole Fuse Block V5-**T4**-17
15–75A, Reversing and Two-Speed—C65 . . . . . V5-**T4**-20
20–40A, Compact Single- and Two-Pole—C25 . . . . . V5-**T4**-4
Direct Current Contactors V5-**T4**-67–V5-**T4**-89
Heavy-Duty Special Purpose V5-**T4**-63–V5-**T4**-66
Ratings V5-**T4**-90

Definite Purpose Contactors (Direct Current)
600V V5-**T4**-74
AVD–Contactor V5-**T4**-81
D–Contactor V5-**T4**-84
Reversing/Assignment V5-**T4**-87
Type C80 . . . . . V5-**T4**-67

Definite Purpose Contactors (Enclosed)
15–60A Contactors—C25 . . . . . V5-**T4**-46

Definite Purpose Contactors and Starters
NEMA Type 1 Enclosed Control V5-**T4**-46–V5-**T4**-62

Definite Purpose Starters V5-**T4**-23–V5-**T4**-45
15–45A, Single- and Three-Phase—A27, B27 . . . . . V5-**T4**-30
15–75A, Single- and Three-Phase—A29, B29 . . . . . V5-**T4**-38
25–60A, Single- and Three-Phase—A25, B25 . . . . . V5-**T4**-23
Overload Relay V5-**T4**-25

Definite Purpose Starters (Enclosed)
15–45A Starters—A27, B27 . . . . . V5-**T4**-52
25–60A Starters—A25, B25 . . . . . V5-**T4**-49

DIN Rail Mount Adapter, Freedom NEMA V5-**T2**-23

DIN Rail Mounting Channel, Freedom NEMA V5-**T2**-23

Direct Handle
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-54
Switching Devices, R5 Series (UL 508) Non-Fusible
Accessories V5-**T8**-20
Switching Devices, R9 Series (UL 98) DC Rated Disconnects
Accessories V5-**T8**-47

Direct Handle, continued
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-33
Door Interlocked External Front Handles
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-33
Door Interlocked External Handle Front Operation
Switching Devices, R5 Series (UL 508) Non-Fusible
Accessories V5-**T8**-20
Switching Devices, R9 Series (UL 98) DC Rated Disconnects
Accessories V5-**T8**-47
Door Mounting Kit
Switching Devices, R5 Series (UL 508) Non-Fusible 16–80A
Accessories V5-**T8**-6

E

Eaton Terms & Conditions
Freight V5-**A1**-3
Limitation of Liability V5-**A1**-5
Terms and Conditions of Sale V5-**A1**-1
Terms of Payment V5-**A1**-2
Warranty V5-**A1**-3
Electrical Life
Freedom NEMA V5-**T2**-38
XTCE Contactors and Starters V5-**T1**-111
Enclosed Circuit Breakers
Enclosure Only V5-**T8**-8, V5-**T8**-9
External Handle
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-54

F

Finger Protection Shields
Freedom NEMA V5-**T2**-23
Flange Handle for Flange-Operated Switches
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-32
Fuse Block Kits
Freedom, IEC and NEMA V5-**T2**-21

G

Ground Fault Monitoring Relays
D64L Series V5-**T5**-35
Digital
D64R Series V5-**T5**-25

H

Heater Selection
A200 Series V5-**T2**-135
C306 Thermal Overload Relays V5-**T2**-41

I

Identification Markers, Freedom NEMA V5-**T2**-23
IEC
Accessories
Miniature Controls V5-**T1**-24–V5-**T1**-26
Relays and Timers, ***XT*** V5-**T1**-6–V5-**T1**-11
C440/***XT*** Electronic Overload Relay V5-**T1**-143
Combination Motor Controllers V5-**T1**-193
Contactors and Starters
Reference Data V5-**T1**-236–V5-**T1**-256
IEC, continued
Manual Motor Protectors V5-**T1**-159
XT DC Contactors V5-**T1**-234
XT Electronic Manual Motor Protection V5-**T1**-219
IEC Power Control
EMS Electronic Motor Starter V5-**T1**-232

J

Jumpers for Connecting Poles in Series
Switching Devices, R9 Series (UL 98) DC Rated Disconnects
Accessories V5-**T8**-48

K

Kits
Auxiliary Contacts
Definite Purpose Contactors V5-**T4**-11, V5-**T4**-12
C440/***XT*** Electronic Overload Relays
CT V5-**T5**-56
CT Kits V5-**T1**-148, V5-**T2**-53, V5-**T2**-83
C441 Overload Relays
Type 3R V5-**T5**-74
CN35 Electrically Held Contactors V5-**T6**-18
IEC
Combination Connection V5-**T1**-205
NEMA
Add-On Power Pole V5-**T2**-24
Field Modification, A200 . . . . . V5-**T2**-116
Freedom Contactors and Starters V5-**T2**-21–V5-**T2**-30
Freedom Three-Phase Starters V5-**T2**-13
Freedom, Contactors and Starters V5-**T2**-6
Mechanical Interlock and Reversing V5-**T2**-21
Shorting Bar V5-**T2**-22
Three-Pole Top Mounted Fuse Block V5-**T2**-21
Transient Suppressor V5-**T2**-24
Vacuum Contactors and Starters V5-**T7**-4
XT Electronic Manual Motor Protection V5-**T1**-227

L

Lighting Contactors
A202 Magnetically Latched V5-**T6**-23
C30CN Components V5-**T6**-10
C30CN Mechanically and Electrically Held V5-**T6**-3
CN35 Electrically Held V5-**T6**-16
Three-Wire Mechanically Held V5-**T6**-8
Two-Wire Mechanically Held V5-**T6**-6

Line and Load Terminal Lugs
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-55
Switching Devices, R5 Series (UL 508) Non-Fusible
Accessories V5-**T8**-21
Switching Devices, R9 Series (UL 98) DC Rated Disconnects
Accessories V5-**T8**-48
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-36
Line Side Adapters
IEC. V5-**T1**-205
Locking Cover, C306 Overload Relay V5-**T2**-22

M

Magnet Coils—AC and DC
Contactors, Freedom Series V5-**T2**-5, V5-**T2**-6
Three-Phase Starters, Freedom Series V5-**T2**-11
Manual Motor Protectors
XT Electronic Manual Motor Protection V5-**T1**-219
XT, IEC V5-**T1**-159
XTPB, XTPR and XTPE V5-**T5**-38
Manual Motor Starter V5-**T1**-163
Manual Transfer Switches
Switching Devices. V5-**T8**-52
Mechanical Interlock Kits, Freedom NEMA V5-**T2**-21
Miniature Contactors
Full Voltage
Non-Reversing V5-**T1**-20
Reversing V5-**T1**-21
Mini Overload Relays V5-**T1**-23
Star-Delta (Wye-Delta). V5-**T1**-22
Miniature Controls
XT IEC Power Control. V5-**T1**-18
Modifications
A200, Non-Reversing and Reversing V5-**T2**-116
Freedom, Thermal Overload Relays V5-**T2**-44
Monitoring Relays V5-**T5**-2–V5-**T5**-36
Current V5-**T5**-3, V5-**T5**-4
Ground Fault V5-**T5**-24–V5-**T5**-36
Phase V5-**T5**-5–V5-**T5**-12
Voltage V5-**T5**-13–V5-**T5**-23
Motor Management Relay
Power Xpert C445. . . . . V5-**T5**-90
Motor Protection
Overload Relays
C306 Bimetallic V5-**T5**-46
C440/***XT*** Electronic V5-**T5**-47
C441 . . . . . V5-**T5**-68
XT IEC, Miniature. V5-**T5**-42
XT IEC, Thermal V5-**T5**-44
Motor Protection and Monitoring
Mini and Thermal Overload Relays V5-**T5**-40–V5-**T5**-111
Motor Protection Circuit Breakers (MPCB) V5-**T5**-37
Mounting Spacers
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-55

N

NEMA
Accessories
A200, Non-Reversing and Reversing . . V5-**T2**-108–V5-**T2**-110
A200, Thermal Type B V5-**T2**-127
Freedom Contactors and Starters. V5-**T2**-21–V5-**T2**-30
Freedom Three-Phase Starters. V5-**T2**-13
Freedom, C440/***XT*** Electronic Overload Relays V5-**T2**-53
Freedom, Thermal Overload Relays V5-**T2**-44
Contactors and Starters
Reference Data. V5-**T2**-148–V5-**T2**-153
NEMA Space-Savings Series
Contactors and Starters. V5-**T2**-63
NEMA, Special Purpose and Mining Rating
Vacuum Contactors and Starters. V5-**T7**-2
NFPA 79 "Through the Door" Kit
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories. V5-**T8**-32

O

Options
Definite Purpose Contactors
15–360A, Two-, Three- and Four-Pole. V5-**T4**-13
20–40A, Compact Single- and Two-Pole—C25. . . . . V5-**T4**-6
Definite Purpose Contactors and Starters
NEMA Type 1 Enclosed V5-**T4**-57
Overload Relays
C306 Bimetallic V5-**T5**-46
C440/***XT*** Electronic V5-**T5**-47
C441 . . . . . V5-**T5**-68
XT IEC, Miniature V5-**T5**-42
XT IEC, Thermal V5-**T5**-44
XTOE/***XT*** Electronic. V5-**T2**-78

P

Phase Monitoring Relays
D65 . . . . . V5-**T5**-5
D65PLR Series V5-**T5**-7
D65VM Series. V5-**T5**-9
Pneumatic Timers, Freedom NEMA V5-**T2**-22
Power Xpert C445
Base Control Module. V5-**T5**-99
Measurement Module. V5-**T5**-99
Monitoring Summary. V5-**T5**-94
Protection Summary V5-**T5**-93
Power Xpert inControl Software V5-**T5**-102
Pushbuttons
Manual Transfer/Double Throw Switches V5-**T8**-52
R5 Series Non-Fusible 16–80A V5-**T8**-5
R9 Series (UL 98)
DC Rated Disconnects V5-**T8**-45
Fusible 30–800A V5-**T8**-26
Non-Fusible 100–1200A V5-**T8**-18
Non-Fusible 30–100A Compact V5-**T8**-12

R

R5 Series (UL 508) Non-Fusible 16–80A
Switching Devices V5-**T8**-5

R9 Series (UL 98) DC Rated Disconnects
Switching Devices V5-**T8**-45

R9 Series (UL 98) Fusible 30–800A
Switching Devices V5-**T8**-26

R9 Series (UL 98) Non-Fusible 100–1200A
Switching Devices V5-**T8**-18

R9 Series (UL 98) Non-Fusible 30–100A Compact
Switching Devices V5-**T8**-12

Relays
A200 Series
Current Sensing Protective V5-**T2**-137
Heater Selection V5-**T2**-135
Thermal and Fast Trip V5-**T2**-124
Thermal Type A V5-**T2**-129, V5-**T2**-130
Thermal Type B V5-**T2**-126, V5-**T2**-127
Type FT Fast Trip V5-**T2**-132
Current Monitoring V5-**T5**-3
Freedom Series, NEMA
C306 Thermal Overload Relays V5-**T2**-40
C440/***XT*** Electronic Overload Relays V5-**T2**-48
Thermal Overload Relays V5-**T2**-39
Type AN19/59 Freedom Series Starters V5-**T2**-51
Ground Fault Monitoring V5-**T5**-24
IEC
C440/***XT*** Electronic Overload V5-**T1**-143
Thermal Overload V5-**T1**-130
Motor Management
Power Xpert C445 . . . . . V5-**T5**-90
Overload
C306 Bimetallic V5-**T5**-46
C440/***XT*** Electronic V5-**T5**-47
C441 . . . . . V5-**T5**-68
XT IEC, Miniature V5-**T5**-42
XT IEC, Thermal V5-**T5**-44
XTOE/***XT*** Electronic V5-**T2**-78
Phase Monitoring V5-**T5**-5
Voltage Monitoring V5-**T5**-13

Relays and Timers
EMS Electronic Motor Starterl V5-**T1**-232
XT IEC Power Control V5-**T1**-3

Renewal Parts
A200, Non-Reversing and Reversing . . . V5-**T2**-111–V5-**T2**-115
A202 Magnetically Latched Contactors V5-**T6**-25
CN35 Electrically Held Contactors V5-**T6**-20
Definite Purpose Contactors
600V V5-**T4**-77
AVD–Contactor V5-**T4**-82
D–Contactor V5-**T4**-85
DPM 1000V V5-**T4**-79
Heavy-Duty Special Purpose V5-**T4**-65
Reversing/Assignment V5-**T4**-88
Definite Purpose Contactors and Starters
NEMA Type 1 Enclosed V5-**T4**-59
Definite Purpose Starters V5-**T4**-33

Renewal Parts, continued
Freedom Contactors and Starters V5-**T2**-30–V5-**T2**-35
Freedom Three-Phase Starters V5-**T2**-13
XTCE Contactors and Starters V5-**T1**-76

Replacement Parts
C30CN Mechanically and Electrically Held Contactors V5-**T6**-11
Freedom, Thermal Overload Relays V5-**T2**-44
Vacuum Contactors and Starters V5-**T7**-6

Right Side External Handles
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-33

Rod Operator
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-32

Rotary Disconnects V5-**T8**-1–V5-**T8**-59

S

Shaft Extension
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-54

Shaft Extensions for External Front
Switching Devices, R9 Series (UL 98) DC Rated Disconnects
Accessories V5-**T8**-48

Shaft Extensions for External Front Handle
Switching Devices, R5 Series (UL 508) Non-Fusible
Accessories V5-**T8**-20

Shaft Extensions for External Handles
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-34

Shoe Brakes—AC and DC Magnetic V5-**T2**-144
Brake Selection V5-**T2**-145

Shorting Bar Kits, Freedom NEMA V5-**T2**-22

Shorting Links
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-36

Solenoids—Alternating Current V5-**T2**-141

Solid-State Timers
Freedom, IEC and NEMA V5-**T2**-22

Space-Savings Series
Contactors and Starters V5-**T2**-63
XTOE/***XT*** Electronic Overload Relays V5-**T2**-78

Special Modifications, Freedom NEMA V5-**T2**-30

Star-Delta (Wye-Delta)
Miniature Contactors V5-**T1**-22
XTCE Starters V5-**T1**-55

Starters
A200 Series, Non-Reversing and Reversing V5-**T2**-103
Freedom Series, NEMA
Single-Phase Non-Reversing, Bimetallic Overload . . V5-**T2**-15
Three-Phase Non-Reversing and Reversing V5-**T2**-10
Manual
Fractional Horsepower V5-**T3**-7

Switched Fourth-Pole Module
Switching Devices, R5 Series (UL 508) Non-Fusible 16–80A
Accessories V5-**T8**-6

Switching Devices
Manual Transfer Switches V5-**T8**-52–V5-**T8**-59
R5 Series (UL 508)
Non-Fusible 16–80A V5-**T8**-5–V5-**T8**-11
R9 Series (UL 98)
DC Rated Disconnects V5-**T8**-45–V5-**T8**-51
R9 Series (UL 98)
Fusible 30–800A V5-**T8**-26–V5-**T8**-44
R9 Series (UL 98)
Non-Fusible 100–1200A V5-**T8**-18–V5-**T8**-25
R9 Series (UL 98)
Non-Fusible 30–100A Compact V5-**T8**-12–V5-**T8**-17

T

Terminal Screens
Switching Devices, R5 Series (UL 508) Non-Fusible
Accessories V5-**T8**-21
Switching Devices, R9 Series (UL 98) DC Rated Disconnects
Accessories V5-**T8**-47
Terminal Shrouds
Switching Devices, R5 Series (UL 508) Non-Fusible 16–80A
Accessories V5-**T8**-6
Switching Devices, R9 Series (UL 98) Fusible 30–800A
Accessories V5-**T8**-35
Terminals Protection Screen
Switching Devices, Manual Transfer Switches
Accessories V5-**T8**-55
Three-Phase Starters
Freedom Series, Magnet Coils—AC and DC V5-**T2**-11
Two-Speed Selective Control V5-**T2**-12
Transient Suppressor Kits, Freedom NEMA V5-**T2**-24
Type AN19/59 Freedom Series Starters V5-**T2**-51

V

Vacuum Contactors and Starters
NEMA, Special Purpose and Mining Rating. V5-**T7**-2
Voltage Monitoring Relays
D65 . . . . . V5-**T5**-13
D65VMRP V5-**T5**-15
D65VWKP V5-**T5**-21
D65VAKP V5-**T5**-18

X

XT IEC Power Control V5-**T1**-2
Miniature Controls V5-**T1**-18
Relays and Timers V5-**T1**-3
XTCE Contactors
Full Voltage
Non-Reversing V5-**T1**-39
Reversing V5-**T1**-47
XTCE Starters
Full Voltage
Non-Reversing, Bimetallic Overload V5-**T1**-50
Reversing, Bimetallic Overload V5-**T1**-52
Star-Delta (Wye-Delta) V5-**T1**-55
XTOE/***XT*** Electronic Overload Relays V5-**T2**-78