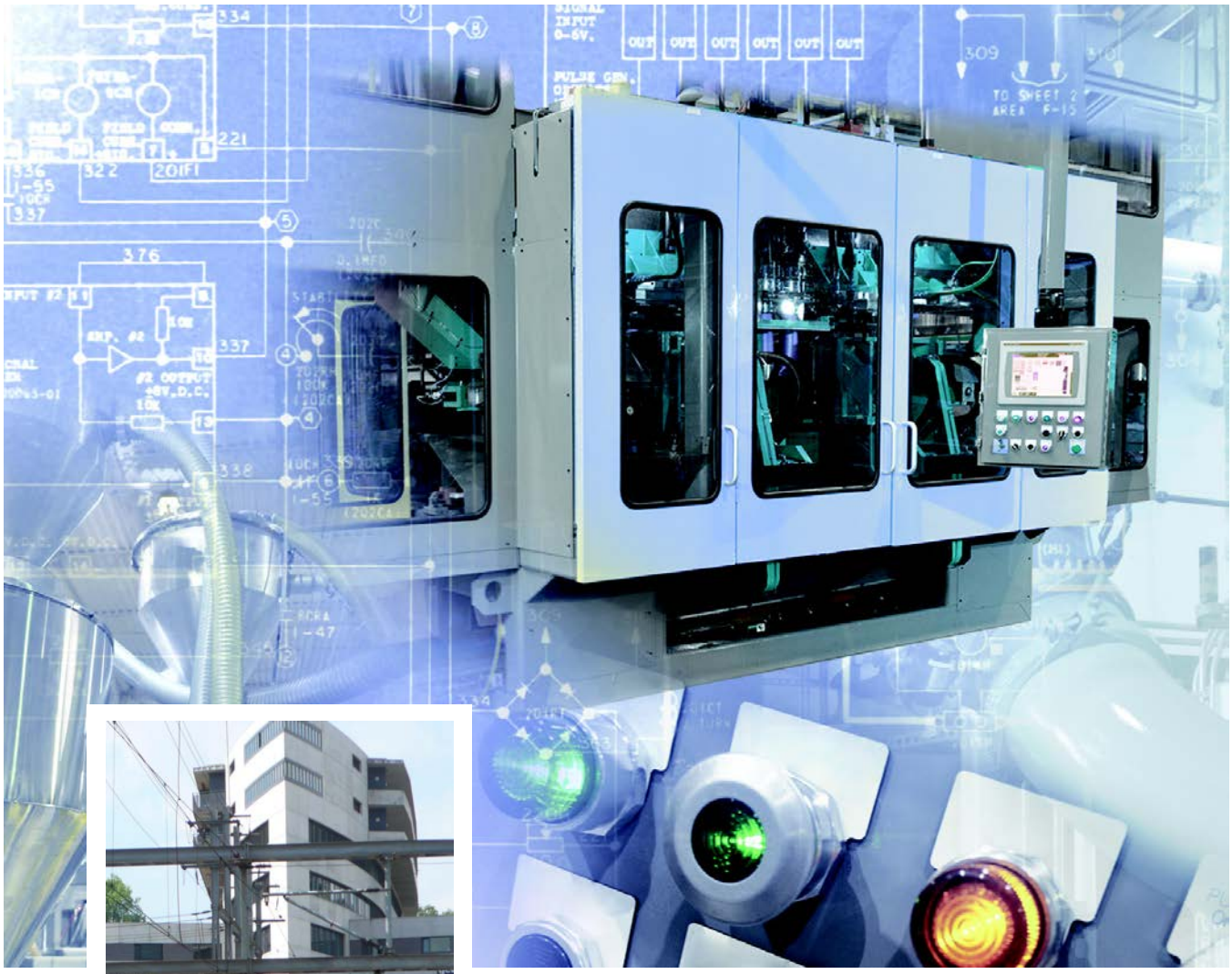
Selection Guide

Allen-Bradley

Switchgear for Railway Applications



Contactors

Contactor Relays

Motor Protection Circuit Breakers

Circuit Breakers

Bimetallic Overload Relays

LISTEN. THINK. SOLVE.®

Allen-Bradley • Rockwell Software

Rockwell Automation

Electric Switchgear for Rolling Stock Application

What's Inside

Rolling stock applications put high requirements on electrical protection and switching equipment. Reliable operation in cold Nordic winters, and in hot summers, is presumed to transport passengers and goods safely. Switchgear equipment must be able to withstand mechanical stress that is caused by operational vibrations and shocks, even under aggravated conditions – such as sinking control voltage supply. Rockwell Automation offers a comprehensive selection of electric protection and switching devices for the railway industry. These devices meet the standards for electrical equipment for rolling stock, IEC 60077, IEC 61373, EN 45545 and EN 50121-3-2 where applicable, besides the common low voltage switchgear standards. This document is a selection guide for the application of Allen-Bradley products for rolling stock equipment. Further technical documentation and the complete product portfolio can be found on https://www.rockwellautomation.com/global/literature-library/overview.page.

Note:

1) AC-1 ratings:
Values in this document are for rolling stock railway applications and derive from AC-1 ratings according IEC60947-4-1 due to the rolling stock 70 °C ambient temperature test requirement.

2) Mounting position:
In addition to the allowed mounting position for each product line it is good practice to install electrical switchgear products in a way that the travel direction of its contact system differs from the train travel direction.

3) Coil data:
Coil data and in particular coil pick-up values that are provided in this document are specific for coil codes that are listed in this document and for rolling stock applications.

Package Quantity (PQ)

All products without packaging information are single pack (PQ = 1). Orders must correspond to the multiple of the indicated packaging quantity. Packaging cannot be divided.

Terms and Conditions

General Terms and Conditions of Sale» can be found in publication «6500(EN) - January 2004». This publication is available as a PDF file (Adobe Acrobat) at: http://www.rockwellautomation.com/termsofsale

Contactors — 100-C

Product Selection

- Compact sizes from 4…55 kW/5…75 Hp (9…97 A)
- Common accessories for all contactor sizes
- Front and side mounting of auxiliary contacts
- Space-saving coil-mounted control modules
- Reversible coil terminations (line or load side)

Cat. No. 100-C

Cat. No. 100-CR

Rated Operational Current I_e [A]		Ratings for Switching AC Motors — AC-2, AC-3, AC-4										Auxiliary Contacts		Cat. No.
		3-Phase kW (50 Hz)				3-Phase Hp (60 Hz)								
		230V	400V/ 415V	500V	690V	1-Phase		3-Phase						
AC-3	AC-1					115V	230V	200V	230V	460V	575V	N.O.	N.C.	
Screw Terminals														
9	27	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	1	0	**100-C09⊗10**
												0	1	**100-C09⊗01**
12	27	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	1	0	**100-C12⊗10**
												0	1	**100-C12⊗01**
16	27	5.5	7.5	7.5	7.5	1	3	5	5	10	15	1	0	**100-C16⊗10**
												0	1	**100-C16⊗01**
23	27	7.5	11	13	10	2	3	5	7-1/2	15	15	1	0	**100-C23⊗10**
												0	1	**100-C23⊗01**
30	51	10	15	15	15	2	5	7-1/2	10	20	25	0	0	**100-C30⊗00**
37	51	11	18.5/20	20	18.5	3	5	10	10	25	30	0	0	**100-C37⊗00**
43	63	13	22	25	22	3	7-1/2	10	15	30	30	0	0	**100-C43⊗00**
55	63	15	30	30	22	5	10	15	20	40	40	0	0	**100-C55⊗00**
60	85	18.5	32	37	32	5	10	15	20	40	50	0	0	**100-C60⊗00**
72	85	22	40	45	40	5	15	20	25	50	60	0	0	**100-C72⊗00**
85	85	25	45	55	45	7-1/2	15	25	30	60	60	0	0	**100-C85⊗00**
97	97	30	55	55	55	10	20	30	30	75	75	0	0	**100-C97⊗00**
Spring Clamp Terminals														
9	21	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	1	0	**100-CR09⊗10**
												0	1	**100-CR09⊗01**
12	21	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	1	0	**100-CR12⊗10**
												0	1	**100-CR12⊗01**
16	21	5.5	7.5	7.5	7.5	1	3	5	5	10	15	1	0	**100-CR16⊗10**
												0	1	**100-CR16⊗01**

⊗ Coil Voltage Code

The Cat. No. as listed is incomplete. Select a coil voltage code from the following table to complete the Cat. No.
Example: 24V DC electronic coil; Cat. No. **100-C09⊗10** becomes Cat. No. **100-C09EJ10**.

DC Control for 100-C09…-C55	
Code	**Description**
EJ	24V DC electronic coil
EW	36-48V DC electronic coil (1)
EY	72V DC electronic coil (1)
ED	110V DC electronic coil (1)

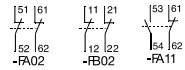
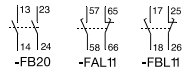
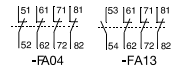
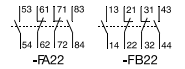
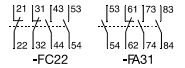
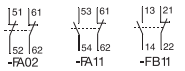
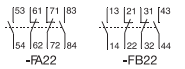
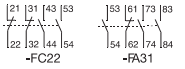
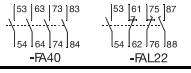
DC Control for 100-C60…-C97	
Code	**Description**
DJ	24V DC with integrated diode
DG	72V DC with integrated diode
DD	110V DC with integrated diode

AC Control for 100-C09…-C23	
Code	**Description**
KF	230V 50/60 Hz

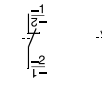
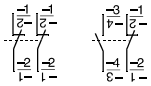
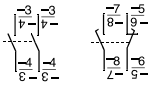
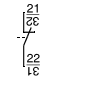
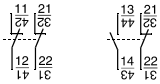
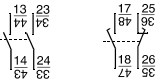
(1) Not available with spring clamp terminals.

Accessories

Auxiliary Contacts — 100-C / 100-CR

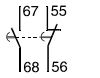
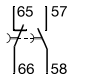
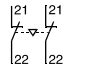
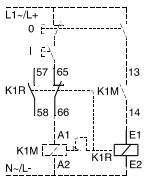
	Description	N.O.	N.C.	Connection Diagrams	For Use With	Standard Auxiliary Contact Cat. No.	Bifurcated Auxiliary Contact Cat. No.
Screw Terminals							
 	**Auxiliary Contact Blocks for Front Mounting** • 2- and 4-pole • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 5 mA • Mechanically linked performance between N.O. and N.C. poles and to the main contactor poles (except for L types) • Models with equal function with several terminal numbering choices • 1L = Late break N.C./early make N.O. • Bifurcated version for switching down to 5V, 3 mA also available	0	2	 -FA02 -FB02 -FA11	100-C	**100-FA02**	**100-FAB02**
					C30⊗00…C97⊗00	**100-FB02**	**100-FBB02**
		1	1	 -FB11 -FC11 -FA20	100-C	**100-FA11**	**100-FAB11**
					C30⊗00…C97⊗00	**100-FB11**	**100-FBB11**
					C09⊗10…C23⊗10	**100-FC11**	**100-FCB11**
		2	0	 -FB20 -FAL11 -FBL11	100-C	**100-FA20**	**100-FAB20**
					C30⊗00…C97⊗00	**100-FB20**	**100-FBB20**
		1L	1L		100-C	**100-FAL11**	—
				 -FA04 -FA13	C30⊗00…C97⊗00	**100-FBL11**	—
		0	4		100-C	**100-FA04**	**100-FAB04**
		1	3		100-C	**100-FA13**	**100-FAB13**
		2	2	 -FA22 -FB22	100-C	**100-FA22**	**100-FAB22**
					C30⊗00…C97⊗00	**100-FB22**	**100-FBB22**
					C09⊗10…C23⊗10	**100-FC22**	**100-FCB22**
		3	1	 -FC22 -FA31	100-C	**100-FA31**	**100-FAB31**
					C09⊗10…C23⊗10	**100-FC31**	**100-FCB31**
		4	0	 -FC31 -FA40 -FAL22	100-C	**100-FA40**	**100-FAB40**
		1+1L	1+1L		100-C	**100-FAL22**	—
Spring Clamp Terminals							
 	**Auxiliary Contact Blocks for Front Mounting** • 2- and 4-pole • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 5 mA • Mechanically linked performance between N.O. and N.C. poles and to the main contactor poles (except for L types) • Models with equal function with several terminal numbering choices • 1L = Late break N.C./early make N.O.	0	2	 -FA02 -FA11 -FB11	100-CR	**100-CRFA02**	—
		1	1			**100-CRFA11**	—
						100-CRFB11	—
		2	0	 -FC11 -FA20 -FBL11		**100-CRFC11**	—
						100-CRFA20	—
		1L	1L			**100-CRFBL11**	—
		2	2	 -FA22 -FB22	100-CR	**100-CRFA22**	—
						100-CRFC22	—
						100-CRFB22	—
		3	1	 -FC22 -FA31		**100-CRFA31**	—
		4	0	 -FA40 -FAL22		**100-CRFA40**	—
		1+1L	1+1L			**100-CRFAL22**	—

Auxiliary Contacts — 100-C

	Description	N.O.	N.C.	Connection Diagrams	For Use With	Cat. No.
	**Auxiliary Contact Blocks for Side Mounting without Sequence Terminal Designations** • 1- and 2-pole • Two-way numbering for right or left mounting on the contactor • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 10 mA • Mirror contact performance to the main contactor poles • 1L = Late break N.C./early make N.O.	0	1	 -SA01 -SA10	100-C	**100-SA01**
		1	0		100-C	**100-SA10**
		0	2	 -SA0 -SA11	100-C	**100-SA02**
		1	1		100-C	**100-SA11**
		2	0	 -SA20 -SAL11	100-C	**100-SA20**
		1L	1L		100-C	**100-SAL11**
	**Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations** • 1- and 2-pole • Two-way numbering for right or left mounting on the contactor • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 10 mA • Mirror contact performance to the main contactor poles • 1L = Late break N.C./early make N.O.	0	1	 -SB01 -SB10	100-C	**100-SB01**
		1	0		100-C (1)	**100-SB10**
		0	2	 -SB02 -SB11	100-C (1)	**100-SB02**
		1	1		100-C (1)	**100-SB11**
		2	0	 -SB20 -SBL11	100-C (1)	**100-SB20**
		1L	1L		100-C (1)	**100-SBL11**

(1) Double numbering — Left-side mounting only is recommended for Cat. No. **100-C09…100-C23** due to double numbering.

Control Modules — 100-C

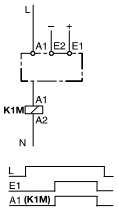
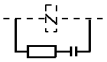
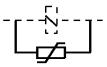
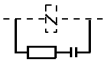
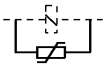
	Description		Connection Diagrams	For Use With	Cat. No.
	**Pneumatic Timing Modules (1)** • Pneumatic timing element contacts switch after the delay time. The contacts on the main control relay continue to operate without delay.	**On-delay** 0.3…30 s Range		100-C	**100-FPTA30**
		2…180 s Range			**100-FPTA180**
		Off-delay 0.3…30 s Range		100-C	**100-FPTB30**
		2…180 s Range			**100-FPTB180**
	**Mechanical Interlocks** • For interlocking of two contactors. • Common interlock for 100-C contactor sizes • Interlocking of different sizes possible • Mechanical and electrical interlocking possible in one module with integrated auxiliary contacts • 9 mm dovetail connector included	Mechanical only, without auxiliary contacts		100-C	**100-MCA00**
		Mechanical/ electrical interlock with 2 N.C. auxiliary contacts		100-C	**100-MCA02**
	**Mechanical Latch** • Following contactor latching, the contactor coil is immediately de-energized (off) by the N.C. auxiliary contact (65-66). • Electrical or manual release • 1 N.O. + 1 N.C. auxiliary contacts • Suitable for 100-C contactor sizes, 9…97 A	Maximum command duration 0.03…10 s	 L1~/L+ 0 I 57 65 13 K1R K1M 58 66 14 A1 E1 K1M K1R A2 E2 N~/L-	100-C	**100-FL11⊗**

(1) 100-FPT… with max. one side mounted auxiliary contact block 100-S…

⊗ Coil Voltage Code

The Cat. No. as listed is incomplete. Select coil voltage code **KF** (230V, 50/60 Hz) to complete the Cat. No.
Example: 230V, 50/60 Hz; Cat. No. **100-FL11**⊗ becomes Cat. No. **100-FL11KF**.

Control Modules — 100-C/100-CR

	Description		Voltage Range	Connection Diagrams	For Use With	Cat. No.
	**DC Interface (Electronic)** • Interface between the DC control signal (PLC) and the AC operating mechanism of the contactor • Requires no additional surge suppression on the relay coils		Input: 12V DC Output: 110…240V AC		100-C with AC coils 110…240V AC	**100-JE12**
			Input: 24V DC Output: 110…240V AC			**100-JE**
			Input: 48V DC Output: 110…240V AC			**100-JE48**
Screw Terminals						
	**Surge Suppressors** • For limitation of coil switching transients • Plug-in, coil mounted • Suitable for 100-C contactor sizes, 9…97 A • RC and varistor versions	**RC Module** AC operating mechanism	24…48V AC, 50/60 Hz		100-C with AC coils	**100-FSC48**
			110…280V AC, 50/60 Hz			**100-FSC280**
			380…480V AC, 50/60 Hz			**100-FSC480**
		Varistor Module AC/DC operating mechanism	12…55V AC/ 12…77V DC		100-C with AC coils	**100-FSV55**
			56…136V AC/ 78…180V DC			**100-FSV136**
			137…277V AC/ 181…350V DC			**100-FSV277**
			278…575V AC			**100-FSV575**
Spring Clamp Terminals						
	**Surge Suppressors** • For limitation of coil switching transients • Plug-in, coil mounted • Suitable for 100-C contactor sizes, 9…97 A • RC, varistor and diode versions	**RC Module** AC operating mechanism	24…48V AC, 50/60 Hz		100-CR	**100-CRFSC48**
			110…280V AC, 50/60 Hz			**100-CRFSC280**
			380…480V AC, 50/60 Hz			**100-CRFSC480**
		Varistor Module AC/DC operating mechanism	12…55V AC/ 12…77V DC		100-CR	**100-CRFSV55**
			56…136V AC/ 78…180V DC			**100-CRFSV136**
			137…277V AC/ 181…350V DC			**100-CRFSV277**
			278…575V AC			**100-CRFSV575**
		Diode Module DC operating mechanism	12…250V DC		100-CR	**100-CRFSD250**

Specifications

Standards Compliance — 100-C

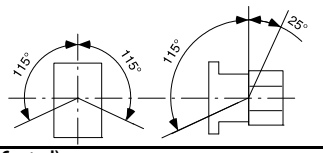
- IEC/EN 60947-1, 60947-4-1, 60947-5-1
- UL 60947-1, 60947-4-1, 60947-5-1
- CAN / CSA-C22.2 No. 60947-1, No. 60947-4-1, No. 60947-5-1
- IEC/EN 60077
- IEC/EN 61373
- EN 45545
- EN 50121-3-2 for 24, 36-48, 72 and 110 V DC electronic coil

Coil Data

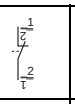
			100-C / 104-C											
			09	12	16	23	30	37	43	55	60	72	85	97
Operating Limits														
AC 50/60 Hz	pick-up	[x U_S]	0.7…1.25											
	dropout	[x U_S]	0.3…0.6											
DC (conventional)	pick-up	[x U_S]	—								0.7…1.25			
	dropout	[x U_S]	—								0.1…0.6			
DC (electronic)	pick-up	[x U_S]	0.7…1.25								—			
	dropout	[x U_S]	0.4								—			
Coil Consumption														
AC 50 Hz, 60 Hz, 50/60 Hz	pick-up	[VA/W]	75/55			105/65			135/95		235/120			400/240
	hold-in	[VA/W]	9.5/2.7			12.3/3.1			13.3/3.3		19/6.5			24/9
DC (conventional)	pick-up	[W]	—			—			—		200			325
	hold-in	[W]	—			—			—		4.5			5.5
DC (electronic) Coil code EJ	pick-up (avg/peak)	[W]	10/17						16/25		—			—
	hold-in	[W]	1.7						2.5		—			—
DC (electronic) Coil codes EW, EY	pick-up (avg/peak)	[W]	10/17						16/25		—			—
	hold-in	[W]	1.7/1.9						2.5/2.7		—			—
Coil code ED	pick-up (avg/peak)	[W]	12/19						16/26		—			—
	hold-in	[W]	2.0/2.1						2.7/2.8		—			—
Operating Times														
AC	closing delay	[ms]	15…30								20…40			20…40
	opening delay	[ms]	10…60								10…60			20…40
AC with RC module	opening delay	[ms]	10…60								10…60			20…40
DC (conventional)	closing delay	[ms]	—								20…40			20…40
	opening delay	[ms]	—								—			—
DC with integ. diode	opening delay	[ms]	—								20…35			20…35
DC (electronic)	closing delay	[ms]	25…50								—			—
	opening delay	[ms]	25…50								—			—
Max. Ripple			± 15 %								—			—
Min. OFF time		ms]	50								—			—

Device Combinations in Accordance with IEC 60947-1 / -4-1 and IEC 60077

Table valid for: AC/DC = 0.7…1.25 x U_s, $T_{amb.}$ = -40…+70 °C



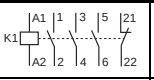
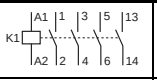
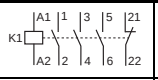
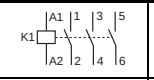
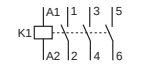
Mounting position with accessories (for AC and DC contactors)

Auxiliary Contact Blocks for Side Mounting		Contactors 100-C (AC and DC Control)						
		Control voltage code as per selection table	100-C09_⊗10 100-C12_⊗10 100-C16_⊗10	100-C09_⊗01 100-C12_⊗01 100-C16_⊗01	100-C23_⊗10	100-C23_⊗01	100-C30_⊗00 100-C37_⊗00	100-C43_⊗00 100-C55_⊗00 100-C60_⊗00 100-C72_⊗00 100-C85_⊗00 100-C97_⊗00
	Circuit Diagram	24V DC, 36-48V DC, 72V DC, 110V DC, 230V 50/60 Hz (1)						
No. of Auxiliary Contacts Without Auxiliary Contact Block			10 + 00 = 10	01 + 00 = 01	10 + 00 = 10	01 + 00 = 01	00 + 00 = 00	00 + 00 = 00
100-SA01			10 + 01 = 11	01 + 01 = 02	10 + 01 = 11	01 + 01 = 02	00 + 01 = 01	00 + 01 = 01
100-SA10			10 + 10 = 20	01 + 10 = 11	10 + 10 = 20	01 + 10 = 11	00 + 10 = 10	00 + 10 = 10
100-SA02			10 + 02 = 12	01 + 02 = 03	10 + 02 = 12	01 + 02 = 03	00 + 02 = 02	00 + 02 = 02
100-SA11			10 + 11 = 21	01 + 11 = 12	10 + 11 = 21	01 + 11 = 12	00 + 11 = 11	00 + 11 = 11
100-SA20			10 + 20 = 30	01 + 20 = 21	10 + 20 = 30	01 + 20 = 21	00 + 20 = 20	00 + 20 = 20
100-SAL11			10 + L11 = L21	01 + L11 = L12	10 + L11 = L21	01 + L11 = L12	00 + L11 = L11	00 + L11 = L11
100-SB01			10 + 01 = 11	01 + 01 = 02	10 + 01 = 11	01 + 01 = 02	00 + 01 = 01	00 + 01 = 01
100-SB10			10 + 10 = 20	01 + 10 = 11	10 + 10 = 20	01 + 10 = 11	00 + 10 = 10 (2)	00 + 10 = 10 (2)
100-SB02			10 + 02 = 12	01 + 02 = 03	10 + 02 = 12	01 + 02 = 03	00 + 02 = 02 (2)	00 + 02 = 02 (2)
100-SB11			10 + 11 = 21	01 + 11 = 12	10 + 11 = 21	01 + 11 = 12	00 + 11 = 11 (2)	00 + 11 = 11 (2)
100-SB20			10 + 20 = 30	01 + 20 = 21	10 + 20 = 30	01 + 20 = 21	00 + 20 = 20 (2)	00 + 20 = 20 (2)
100-SBL11			10 + L11 = L21	01 + L11 = L12	10 + L11 = L21	01 + L11 = L12	00 + L11 = L11 (2)	00 + L11 = L11 (2)

(1) 230V 50/60 Hz only 100-C09…-C23

(2) Double numbering - Left-side only is recommended for **100-C09 ****…**100-C23 **** due to double numbering

Table applicable for screwless products (code **R**), e.g. **100-CR09⊗10**

Auxiliary Contact Blocks for Front Mounting		Contactors 100-C (AC and DC Control)						
		Control voltage code as per selection table	100-C09_⊗10 100-C12_⊗10 100-C16_⊗10	100-C09_⊗01 100-C12_⊗01 100-C16_⊗01	100-C23_⊗10	100-C23_⊗01	100-C30_⊗00 100-C37_⊗00	100-C43_⊗00 100-C55_⊗00 100-C60_⊗00 100-C72_⊗00 100-C85_⊗00 100-C97_⊗00
	Circuit Diagram	24V DC, 36-48V DC, 72V DC, 110V DC, 230V 50/60 Hz (1)						
No. of Auxiliary Contacts Without Auxiliary Contact Block			10 + 00 = 10	01 + 00 = 01	10 + 00 = 10	01 + 00 = 01	00 + 00 = 00	00 + 00 = 00
100-FA02, 100-FAB02			10 + 02 = 12	01 + 02 = 03	10 + 02 = 12	01 + 02 = 03	(2)	(2)
100-FB02, 100-FBB02			(2)	(2)	(2)	(2)	00 + 02 = 02	00 + 02 = 02
100-FA11, 100-FAB11			10 + 11 = 21	01 + 11 = 12	10 + 11 = 21	01 + 11 = 12	(2)	(2)
100-FB11, 100-FBB11			(2)	(2)	(2)	(2)	00 + 11 = 11	00 + 11 = 11
100-FC11, 100-FCB11			10 + 11 = 21	01 + 11 = 12	10 + 11 = 21	01 + 11 = 12	(2)	(2)
100-FA20, 100-FAB20			10 + 20 = 30	01 + 20 = 21	10 + 20 = 30	01 + 20 = 21	(2)	(2)
100-FB20, 100-FBB20			(2)	(2)	(2)	(2)	00 + 20 = 20	00 + 20 = 20
100-FAL11			(2)	(2)	(2)	(2)	00 + L11 = L11	00 + L11 = L11
100-FBL11			(2)	(2)	(2)	(2)	00 + L11 = L11	00 + L11 = L11
100-FA04, 100-FAB04			10 + 04 = 14	—	10 + 04 = 14	—	00 + 04 = 04 (3)	00 + 04 = 04 (4)
100-FA13, 100-FAB13			10 + 13 = 23	01 + 13 = 14	10 + 13 = 23	01 + 13 = 14	00 + 13 = 13	00 + 13 = 13
100-FA22, 100-FAB22			(2)	(2)	(2)	(2)	00 + 22 = 22	00 + 22 = 22
100-FB22, 100-FBB22			(2)	(2)	(2)	(2)	00 + 22 = 22	00 + 22 = 22
100-FC22, 100-FCB22			10 + 22 = 32	01 + 22 = 23	10 + 22 = 32	01 + 22 = 23	(2)	(2)
100-FA31, 100-FAB31			(2)	(2)	(2)	(2)	00 + 31 = 31	00 + 31 = 31
100-FC31, 100-FCB31			10 + 31 = 41	01 + 31 = 32	10 + 31 = 41	01 + 31 = 32	(2)	(2)
100-FA40, 100-FAB40			10 + 40 = 50	01 + 40 = 41	10 + 40 = 50	01 + 40 = 41	00 + 40 = 40	00 + 40 = 40
100-FAL22			10 + L22 = L32	01 + L22 = L23	10 + L22 = L32	01 + L22 = L23	00 + L22 = L22	00 + L22 = L22

(1) 230V 50/60 Hz only 100-C09. . .-C23

(2) Combination possible but not recommended, due to repeating or not consecutive sequence numbering

(3) not allowed for control voltage 24V DC

(4) not allowed for control voltage 72V DC and 110V DC

Table applicable for screwless products (code **R**), e.g. **100-CR09⊗10**

Miniature Contactors — 100-K

Product Selection

- Compact size
- Full-voltage non-reversing and reversing contactors
- 5, 9, and 12 A contactors rated at 690V
- IP2X finger protection
- Optional integrated surge suppressor
- Compatible with Bulletin 193-K bimetallic overload relay
- Mirror contacts per IEC 60947-4-1 and mechanically linked contacts per IEC 60947-5-1 on main unit

Cat. No. 100-K

Cat. No. 100-KR

3-Pole Contactors

Rated Operational Current I_e [A]		Ratings for Switching AC Motors — AC-2, AC-3										Auxiliary Contacts		Pkg. Qty. (1)	Cat. No.
		3-Phase kW (50 Hz)				3-Phase Hp (60 Hz)									
		230V	400V/ 415V	500V	690V	1-Phase		3-Phase							
AC-3	AC-1					115V	230V	200V	230V	460V	575V	N.O.	N.C.		
Screw Terminals															
5	13.5	1.5	2.2	2.2	2.2	1/2	1	1-1/2	1-1/2	3	3	1	0	1	**100-K05⊗10**
												0	1	1	**100-K05⊗01**
9	13.5	3	4	4	4	1/2	1-1/2	2	2	5	5	1	0	1	**100-K09⊗10**
												0	1	1	**100-K09⊗01**
12	13.5	3	5.5	5.5	5.5	3/4	2	3	3	7-1/2	7-1/2	1	0	1	**100-K12⊗10**
												0	1	1	**100-K12⊗01**
Spring Clamp Terminals															
5	9	1.5	2.2	2.2	2.2	1/3	3/4	1-1/2	1-1/2	3	3	1	0	1	**100-KR05⊗10**
												0	1	1	**100-KR05⊗01**
9	9	2.2	4	4	4	1/3	1	2	2	5	5	1	0	1	**100-KR09⊗10**
												0	1	1	**100-KR09⊗01**

4-Pole Contactors

Rated Operational Current I_e [A]		Ratings for Switching AC Motors — AC-2, AC-3										Contact Configuration, Main Pole		Pkg. Qty. (1)	Cat. No.
		3-Phase kW (50 Hz)				3-Phase Hp (60 Hz)									
		230V	400V/ 415V	500V	690V	1-Phase		3-Phase							
AC-3	AC-1					115V	230V	200V	230V	460V	575V	N.O.	N.C.		
5	13.5	1.5	2.2	2.2	2.2	1/2	1	1-1/2	1-1/2	3	3	4	0	1	**100-K05⊗400**
												3	1	1	**100-K05⊗300**
												2	2	1	**100-K05⊗200**
9	13.5	3	4	4	4	1/2	1-1/2	2	2	5	5	4	0	1	**100-K09⊗400**
												3	1	1	**100-K09⊗300**
												2	2	1	**100-K09⊗200**
12	13.5	3	5.5	5.5	5.5	3/4	2	3	3	7-1/2	7-1/2	4	0	1	**100-K12⊗400**
												3	1	1	**100-K12⊗300**
												2	2	1	**100-K12⊗200**

(1) May be ordered in package quantities of 20. Add letter M to the end of the cat. no. Example: **100-K09ZJ400M**.

⊗ Coil Voltage Code

The Cat. No. as listed is incomplete. Select a coil voltage code from the following table to complete the Cat. No. Example: 24V DC; Cat. No. **100-K09⊗10** becomes Cat. No. **100-K09ZJ10**.

DC Control for 100-K05…-K12	
Code	**Description**
ZJ	24V DC
DJ	24V DC with integrated diode
ZG	72V DC (Screwtype only)
ZD	110V DC

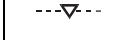
Accessories

Auxiliary Contact Blocks — 100-K / 100-KR

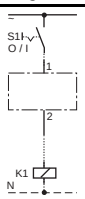
	Description	Connection Diagrams	N.O.	N.C.	For Use With	Pkg. Qty.(1)	Cat. No.
Screw Terminals							
	**Front-Mounted Auxiliary Contacts** • Auxiliary contact blocks • 2- and 4-pole versions • Choice of contact configurations • Snap on, no tools required • Electronic-compatible bifurcated contacts for signals down to 15V/2 mA • Mirror Contact performance per IEC 60947-4-1		1	1	100-K05…K12	1	**100-KFC11**
			2	0	100-K05…K12	1	**100-KFC20**
			1	3	100-K05…K12	1	**100-KFC13**
			2	2	100-K05…K12	1	**100-KFC22**
			4	0	100-K05…K12	1	**100-KFC40**
			1	1	100/104-K, 700-K	1	**100-KFA11E**
			2	0	100/104-K, 700-K	1	**100-KFA20E**
			1	3	100/104-K, 700-K	1	**100-KFA13E**
			4	0	100/104-K, 700-K	1	**100-KFA40E**
Spring Clamp Terminals							
	**Front-Mounted Auxiliary Contacts** • Auxiliary contact blocks • 2- and 4-pole versions • Choice of contact configurations • Snap on, no tools required • Electronic-compatible bifurcated contacts for signals down to 15V/2 mA • Mirror Contact performance per IEC 60947-4-1		1	1	100-K	1	**100-KRFC11**
			2	0	100-K05…K12	1	**100-KRFC20**
			1	3	100-K05…K12	1	**100-KRFC13**
			2	2	100-K05…K12	1	**100-KRFC22**
			4	0	100-K05…K12	1	**100-KRFC40**
			1	1	100/104-K, 700-K	1	**100-KRFA11E**
			2	0	100/104-K, 700-K	1	**100-KRFA20E**
			1	3	100/104-K, 700-K	1	**100-KRFA13E**
			4	0	100/104-K, 700-K	1	**100-KRFA40E**

(1) May be ordered in package quantities of 10. Add letter **M** to the end of the cat. no. Example: **100-KFC11M**.

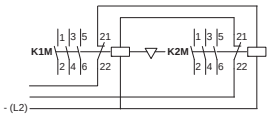
Control Modules

	Description			Connection Diagrams	For Use With	Pkg. Qty.	Cat. No.
	**Mechanical Interlock** • For interlocking of two adjacent contactors • No added width to contactor assembly • Front mount plug-in type • Optional auxiliary contacts and suppressor modules mount onto the interlock				100/104-K/-KR, 700-K/-KR	1	**100-KMCH**
	**Surge Suppressor** • Plug-in type • Limits surge voltage on coil drop-off	RC Suppressor	24…48V AC		100/104-K/-KR, 700-K/-KR	1 (2)	**100-KFSC50**
			110…280V AC			1 (2)	**100-KFSC280**
			380…480V AC			1 (2)	**100-KFSC480**
		MOV Suppressor	12…55V AC, 12…77V DC		100/104-K/-KR, 700-K/-KR	1 (2)	**100-KFSV55**
			56…136V AC, 78…180V DC			1 (2)	**100-KFSV136**
			137…277V AC, 181…250V DC			1 (2)	**100-KFSV277**
		Diode Suppressor	12…250V DC		100/104-K/-KR, 700-K/-KR	1 (2)	**100-KFSD250**

Timers — 100-K

	Description		Connection Diagrams	For Use With	Pkg. Qty.	Cat. No.
	**Solid-State Timing Element** • 110…250V AC or DC • Includes 35 mm Hat Rail adapter	On-Delay, 0.1…3 s		100/104-K, 700-K	10	**100-KT3S**
		On-Delay, 1…30 s				**100-KT30S**

Connecting Components

	Description		For Use With	Pkg. Qty.	Cat. No.
	**ECO Connecting Module — 12 A** • For DOL and reversing starters • Eco-starters mount on single DIN Rail (140M on DIN Rail) • Electrical and mechanical interconnection of 140M and 100-K contactors	**Connects:** 140M-C circuit breakers with 100-K contactors	140M-C to 100-K	1 (2)	**140M-C-PEK12**
	**Power Wiring Kit** • For Reversing and Star/Delta combinations • Star-point bridge not included • Min. interruption time 50 ms		100-K	1	**100-KPR**
	**Feeder Terminal for Compact Bus Bars** • Max. current 34 A	Supply of compact bus bars	100-K	1	**100-KWT**
	**Three-Phase Compact Bus Bars** • Max. current 34 A	For 100-K, 5…12 A contactors 45 mm spacing (3 connections) (1)	100-K	1	**100-KW453**
		For 100-K, 5…12 A contactors 45 mm spacing (4 connections) (1)	100-K	1	**100-KW454**

(1) Combinations possible. Example: For 6 contactor connections use one cat. no. 100-KW453 and one cat. no. 100-KW454.

(2) May be ordered in package quantities of 10. Add letter **M** to the end of the cat. no. Example: **140M-C-PEK12M**.

Specifications

Standards Compliance

IEC/EN 60947-1, 60947-4-1, 60947-5-1
UL 60947-1, 60947-4-1, 60947-5-1
CAN / CSA-C22.2 No. 60947-1, No. 60947-4-1, No. 60947-5-1
IEC/EN 60077
IEC/EN 61373
EN 45545

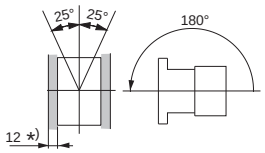
Coil Data

			100-K		
			05	09	12
Operating Limits					
DC	pick-up	[x Us]	0.7…1.25		
	dropout	[x Us]	0.1…0.6		
Coil Consumption					
DC	pick-up	[W]	cold 3.0, warm 2.6		
	hold-in	[W]	cold 3.0, warm 2.6		
Operating Times					
DC	closing delay	[ms]	18…40		
	opening delay	[ms]	6…12		
DC (with integ. diode)	opening delay	[ms]	8…12		
DC (with external diode)	opening delay	[ms]	35…50		

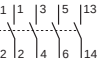
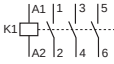
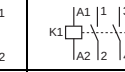
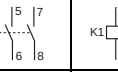
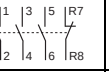
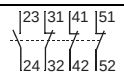
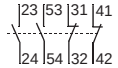
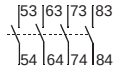
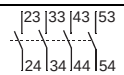
Device Combinations in Accordance with IEC 60947-1 / -4-1 and IEC 60077

Table valid for: AC/DC = 0.7…1.25 x U_s, $T_{amb.}$ = -40…+70 °C, mounting position with accessories

Mounting Position



*) -Minimum distance to grounded parts or walls

Auxiliary Contact Blocks for Front Mounting		Miniature Contactors 100-K (AC and DC Control)					
		Control voltage code as per selection table	100-K05⊗10 100-K09⊗10 100-K12⊗10	100-K05⊗01 100-K09⊗01 100-K12⊗01	100-K05⊗400 100-K09⊗400 100-K12⊗400	100-K05⊗300 100-K09⊗300 100-K12⊗300	100-K05⊗200 100-K09⊗200 100-K12⊗200
	Circuit Diagram	24V DC 72V DC 110V DC					
No. of Auxiliary Contacts Without Auxiliary Contact Block			10 + 00 = 10	01 + 00 = 01	00 + 00 = 00	00 + 00 = 00	00 + 00 = 00
100-KFA11E			(1)	01 + 11 = 12	(1)	(1)	—
100-KFC11			10 + 11 = 21	(1)	00 + 11 = 11	00 + 11 = 11	—
100-KFA20E			(1)	01 + 20 = 21	(1)	(1)	—
100-KFC20			10 + 20 = 30	(1)	00 + 20 = 20	00 + 20 = 20	—
100-KFC13			10 + 13 = 23 (2)	—	00 + 13 = 13 (2) (3)	—	—
100-KFC22			10 + 22 = 32 (2)	—	00 + 22 = 22 (2)	—	—
100-KFA40E			(1)	01 + 40 = 41	(1)	(1)	—
100-KFC40			10 + 40 = 50	(1)	00 + 40 = 40	00 + 40 = 40	—

(1) Combination possible but not recommended, due to repeating or non-consecutive sequence numbering
(2) not allowed for control voltage 24V DC
(3) not allowed for control voltage 72V DC
Table applicable for screwless products (code **R**), e.g. **100-KR05⊗10**

Contactor Relays — 700-CF

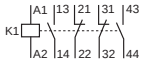
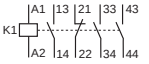
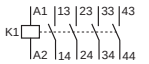
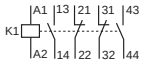
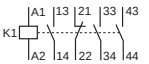
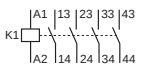
Product Selection

- Mechanically linked contact performance per IEC 60947-5-1
- Gold plated, bifurcated version for low level switching applications
- Master control relay version rated 15 A (AC-15)

Cat. No. 700-CF

Cat. No. 700-CRF

4-Pole AC and DC Coil Voltage (Ratings for 700-CF Only)

AC-12	AC-15							Connection Diagrams	Contacts		Standard Contacts	Gold Plated Bifurcated Contacts	Master Contacts
Ambient temperature 70 °C	I_e [A]												
I_{th} [A]	24/48V	120V	240V	400V	500V	600V	690V		N.O.	N.C.	Cat. No.	Cat. No. (1)	Cat. No. (1)
Screw Terminals													
17	10	10	10	6	2.5	1	1		2	2	700-CF220⊗		
8.5	3	3	3	2	1.2	0.7	0.7					700-CFB220⊗	
17	15	15	15	7.5	5	2	2						700-CFM220⊗
17	10	10	10	6	2.5	1	1		3	1	700-CF310⊗		
8.5	3	3	3	2	1.2	0.7	0.7					700-CFB310⊗	
17	15	15	15	7.5	5	2	2						700-CFM310⊗
17	10	10	10	6	2.5	1	1		4	0	700-CF400⊗		
8.5	3	3	3	2	1.2	0.7	0.7					700-CFB400⊗	
17	15	15	15	7.5	5	2	2						700-CFM400⊗
Spring Clamp Terminals													
17	10	10	10	6	2.5	1	1		2	2	700-CRF220⊗		
8.5	3	3	3	2	1.2	0.7	0.7					700-CRFB220⊗	
17	15	15	15	7.5	5	2	2						700-CRFM220⊗
17	10	10	10	6	2.5	1	1		3	1	700-CRF310⊗		
8.5	3	3	3	2	1.2	0.7	0.7					700-CRFB310⊗	
17	15	15	15	7.5	5	2	2						700-CRFM310⊗
17	10	10	10	6	2.5	1	1		4	0	700-CRF400⊗		
8.5	3	3	3	2	1.2	0.7	0.7					700-CRFB400⊗	
17	15	15	15	7.5	5	2	2						700-CRFM400⊗

(1) Ratings for 700-CFB and 700-CFM see page 18

⊗ Coil Voltage Codes for AC and DC Control

The cat. no. as listed is incomplete. Select a coil voltage code from the following table to complete the cat. no.
Example: Cat. No. **100-CF220**⊗ becomes Cat. No. **100-CF220EJ**.

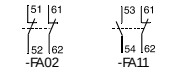
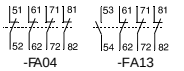
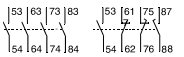
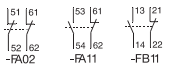
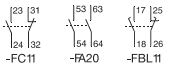
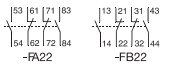
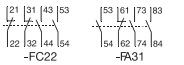
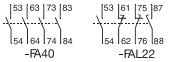
DC Control	
Code	Description
EJ	24V DC electronic coil
EW	36-48V DC electronic coil (2)
EY	72V DC electronic coil (2)
ED	110V DC electronic coil (2)

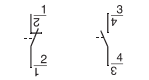
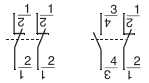
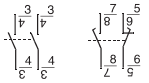
AC Control	
Code	Description
KF	230V 50/60 Hz

(2) Not available with spring clamp terminals.

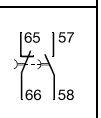
Accessories

Auxiliary Contacts — 700-CF / 700-CRF

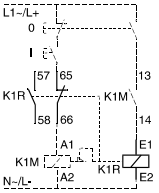
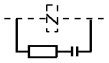
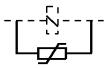
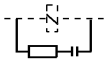
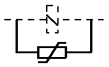
	Description	N.O.	N.C.	Connection Diagrams	For Use With	Standard Contacts Cat. No.	Bifurcated Contacts Cat. No.
Screw Terminals							
	**Auxiliary Contact Blocks for Front Mounting** • 2- and 4-pole • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 5 mA • Mechanically linked performance between N.O. and N.C. poles and to the main relay poles (except for L types) • Models with equal function with several terminal numbering choices • 1L = Late break N.C./early make N.O. • Bifurcated version for switching down to 5V, 3 mA	0	2		700-CF	**100-FA02**	**100-FAB02**
		1	1			**100-FA11**	**100-FAB11**
		2	0			**100-FA20**	**100-FAB20**
		1L	1L			**100-FAL11**	—
		0	4			**100-FA04**	**100-FAB04**
		1	3		700-CF	**100-FA13**	**100-FAB13**
		2	2			**100-FA22**	**100-FAB22**
		3	1			**100-FA31**	**100-FAB31**
		4	0			**100-FA40**	**100-FAB40**
		1+1L	1+1L			**100-FAL22**	—
Spring Clamp Terminals							
	**Auxiliary Contact Blocks for Front Mounting** • 2- and 4-pole • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 5 mA • Mechanically linked performance between N.O. and N.C. poles and to the main relay poles (except for L types) • Models with equal function with several terminal numbering choices • 1L = Late break N.C./early make N.O.	0	2		700-CRF	**100-CRFA02**	—
		1	1			**100-CRFA11**	—
		2	0			**100-CRFA20**	—
		2	2		700-CRF	**100-CRFA22**	—
		3	1			**100-CRFA31**	—
		4	0			**100-CRFA40**	—
		1+1L	1+1L			**100-CRFAL22**	—

	Description	N.O.	N.C.	Connection Diagrams	For Use With	Cat. No.
	**Auxiliary Contact Blocks for Side Mounting without Sequence Terminal Designations** • 1- and 2-pole • Two-way numbering for right or left mounting on the contactor • Quick and easy mounting without tools • Electronic-compatible contacts down to 17V, 10 mA • Mirror contact performance to the main relay poles • 1L = Late break N.C./early make N.O.	0	1		700-CF	**100-SA01**
		1	0			**100-SA10**
		0	2			**100-SA02**
		1	1			**100-SA11**
		2	0			**100-SA20**
		1L	1L			**100-SAL11**

Control Modules — 700-CF / 700-CRF

	Description	Connection Diagrams	Reset Time	Repeat Accuracy	Delay	For Use With	Cat. No.
	**Pneumatic Timing Modules ‡ ON-Delay** • Pneumatic timing element contacts switch after the delay time. • The contacts on the main control relay continue to operate without delay.		25…90 ms for AC coils, 47…85 ms for DC coils	+/- 10 %	0.3…30 s	700-CF (1)	**100-FPTA30**
					1.8…180 s		**100-FPTA180**
	Pneumatic Timing Modules OFF-Delay • Pneumatic timing element contacts switch after the delay time. • The contacts on the main control relay continue to operate without delay.				0.3…30 s		**100-FPTB30**
					1.8…180 s		**100-FPTB180**

(1) 100-FPT… with max. one side mounted auxiliary contact block 100-S…

	Description			Connection Diagrams	For Use With	Cat. No.
	**Mechanical Latch** • Following contactor latching, the contactor coil is immediately deenergized (off) by the N.C. auxiliary contact (65-66). • Electrical or manual release • 1 N.O. + 1 N.C. auxiliary contacts				700-CF with AC coils or DC electronic coils	**100-FL11⊗**
Screw Terminals						
	**Surge Suppressors** • For limitation of coil switching transients • Plug-in, coil mounted • Suitable for 100-C and 700-CF • RC and varistor versions	**RC Module** AC operating mechanism	24…48V AC, 50/60 Hz		700-CF with AC coils	**100-FSC48**
			110…280V AC, 50/60 Hz			**100-FSC280**
			380…480V AC, 50/60 Hz			**100-FSC480**
		Varistor Module AC/DC operating mechanism	12…55V AC / 12…77V DC		700-CF	**100-FSV55**
			56…136V AC / 78…180V DC			**100-FSV136**
			137…277V AC / 181…350V DC			**100-FSV277**
			278…575V AC			**100-FSV575**
Spring Clamp Terminals						
	**Surge Suppressors** • For limitation of coil switching transients • Plug-in, coil mounted • Suitable for 100-C and 700-CF • RC, varistor and diode versions	**RC Module** AC operating mechanism	24…48V AC, 50/60 Hz		700-CRF	**100-CRFSC48**
			110…280V AC, 50/60 Hz			**100-CRFSC280**
			380…480V AC, 50/60 Hz			**100-CRFSC480**
		Varistor Module AC/DC operating mechanism	12…55V AC / 12…77V DC		700-CRF	**100-CRFSV55**
			56…136V AC / 78…180V DC			**100-CRFSV136**
			137…277V AC / 181…350V DC			**100-CRFSV277**
			278…575V AC			**100-CRFSV575**
		Diode Module DC operating mechanism	12…250V DC		700-CRF	**100-CRFSD250**

⊗ Coil Voltage Code

The Cat. No. as listed is incomplete. Select a coil voltage code from the following table to complete the Cat. No. Example: 230V, 50/60 Hz; Cat. No. **100-FL11⊗** becomes Cat. No. **100-FL11KF**.

AC Control for 100-FL11_ _	
Code	**Description**
KF	230V 50/60 Hz

Specifications

Standards Compliance — 700-CF

- IEC/EN 60947-1, 60947-5-1
- UL 60947-1, 60947-5-1
- CAN / CSA-C22.2 No. 60947-1, No. 60947-5-1
- IEC/EN 60077
- IEC/EN 61373
- EN 45545
- EN 50121-3-2 for 24, 36-48, 72 and 110 V DC electronic coils

General

			Main Relay Cat. Nos. 700-CF, 700S-CF	Front Mounted Standard Auxiliary Contacts	Main Relay Cat. No. 700-CFB, 700S-CFB	Master Relay Cat. No. 700-CFM	Front Mounted Bifurcated Auxiliary Contacts	Side-mounted Auxiliary Contacts
Contact Ratings — NEMA			A600, P600	A600, Q600	A600, Q600	2 x A600, P600	A600, Q600	A600, Q600
Min. Contact Rating			17V, 10 mA	17V, 5 mA	8V, 5 mA	—	5V, 3 mA	17V, 10 mA
Contact Ratings — IEC AC-15 (solenoids, contactors) at rated voltage IEC 60947-5-1		24V	10 A	6 A	3 A	15 A	3 A	6 A
		48V	10 A	6 A	3 A	15 A	3 A	6 A
		120V	10 A	6 A	3 A	15 A	3 A	6 A
		240V	10 A	5 A	3 A	15 A	3 A	5 A
		400V	6 A	3 A	2 A	7.5 A	2 A	3 A
		480V/500V	2.5 A	1.6 A	1.2 A	5 A	1.2 A	1.6 A
		600V	1 A	1 A	0.7 A	2 A	0.7 A	1 A
		690V	1 A	1 A	0.7 A	2 A	0.7 A	1 A
DC-12 Switching DC Loads L/R < 1 ms, Resistive Loads IEC 60947-5-1		24V	15 A	10 A	6 A	20 A	6 A	6 A
		48V	10 A	9 A	3.2 A	20 A	3.2 A	3.2 A
		110V	6 A	3.5 A	1 A	8 A	1 A	1 A
		220V	1 A	0.7 A	0.5 A	1.5 A	0.5 A	0.5 A
		440V	0.4 A	0.2 A	0.2 A	0.4 A	0.2 A	0.2 A
DC-13 IEC 60947-5-1, Solenoids and contactors L/R = 100 ms		24V	5 A	5 A	2.5 A	5 A	2.5 A	5 A
		48V	3 A	3 A	1.5 A	3 A	1.5 A	2.5 A
		110V	1.2 A	1.2 A	0.6 A	1.2 A	0.6 A	0.6 A
		220V	0.6 A	0.6 A	0.3 A	0.6 A	0.3 A	0.3 A
		440V	0.3 A	0.15 A	0.15 A	0.3 A	0.15 A	0.15 A
AC-12 (Control of resistive loads) I_{th} [A]	70 °C	690V	17 A	5 A	8.5 A	17 A	5 A	5 A

General

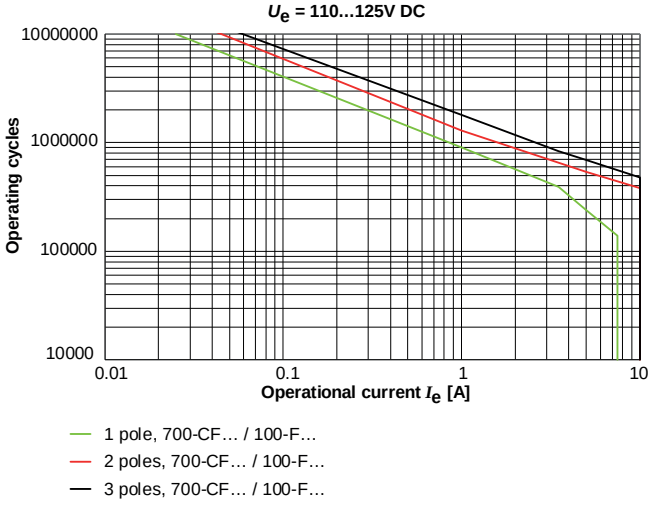
IEC 60947-5-1, DC-13 Switching Ratings
Main poles in Series
L/R = 100 ms

		1 pole	2 poles	3 poles
700-CF				
24V DC	[A]	5	—	—
48V DC	[A]	3	—	—
110V DC	[A]	1.2	2.2	3.5
220V DC	[A]	0.6	—	—
440V DC	[A]	0.3	—	—
100-FA				
24V DC	[A]	5	—	—
48V DC	[A]	3	—	—
110V DC	[A]	1.2	1.8	2.5
220V DC	[A]	0.6	—	—
440V DC	[A]	0.15	—	—

DC Switching Ratings
Main Poles in Series
(Resistive Load at 60 °C)

		1 pole	2 poles	3 poles
24/48V	[A]	25/20	25	25
125V	[A]	6	25	25
220V	[A]	1.5	8	25
440V	[A]	0.4	1	3

Control of electromagnetic loads
DC: L/R = 15 ms
U_e = 110...125V DC



IEC 60947-5-1, DC-13 Switching Ratings (1)
Main poles in Series
L/R = 100 ms

		1 pole	2 poles	3 poles
700-CF				
110V DC	[A]	2	—	—
100-FA				
110V DC	[A]	2	—	—

(1) Special Switching Cycles:

Number	Cycle Time
50	10 seconds
10	As fast as possible
990	10 seconds
5000	10 seconds

IEC 60947-5-1 Annex C, DC-13 Electrical Life-Load
Main poles in Series
L/R = 100ms

			1 pole	2 poles	3 poles
700-CF					
110V DC	0.3 A	[Ops]	1 100 000	—	—
	0.6 A	[Ops]	350 000	—	—
	1.0 A	[Ops]	—	400 000	—
	1.1 A	[Ops]	260 000	—	—
	2.0 A	[Ops]	150 000	—	—
	3.5 A	[Ops]	—	160 000	200 000
100-FA					
110V DC	1.0 A	[Ops]	—	—	400 000
	2.0 A	[Ops]	150 000	—	—
	2.5 A	[Ops]	—	150 000	230 000

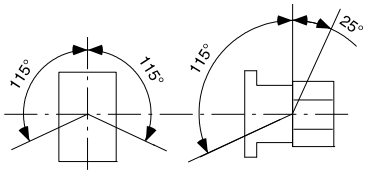
Control Circuit

			700-CF
Operating Limits			
AC 50/60 Hz	pick-up	[x Us]	0.7…1.25
	dropout	[x Us]	0.3…0.6
DC (electronic)	pick-up	[x Us]	0.7…1.25
	dropout	[x Us]	0.4
Coil Consumption			
AC 50 Hz, 60 Hz, 50/60 Hz	pick-up	[VA/W]	70/50
	hold-in	[VA/W]	8/2.6
DC (electronic) Coil code EJ	pick-up (avg/peak)	[W]	10/17
	hold-in	[W]	1.7
DC (electronic) Coil codes EW, EY	pick-up (avg/peak)	[W]	10/17
	hold-in	[W]	1.7/1.9
Coil code ED	pick-up (avg/peak)	[W]	12/19
	hold-in	[W]	2.0/2.1
Operating Times			
AC	closing delay	[ms]	15…30
	opening delay	[ms]	10…60
AC with RC module	opening delay	[ms]	10…60
DC (electronic)	closing delay	[ms]	25…50
	opening delay	[ms]	25…50
Max. Ripple			± 15 %
Min. OFF time		[ms]	50
Latch Attachment Release, 100-FL			
Coil Consumption	AC	[VA/W]	45/40
	DC	[W]	25
Contact Signal Duration		[min./max]	0.03…10 s

Device Combinations in Accordance with IEC 60947-1 / -4-1 and IEC 60077

Table valid for: AC/DC = 0.7…1.25 x U_s, $T_{amb.}$ = -40 °C…+70 °C, mounting position with accessories

Mounting Position (for AC and DC contactor relays)



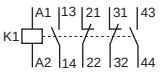
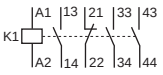
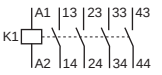
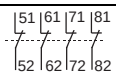
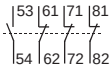
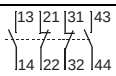
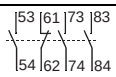
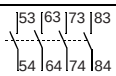
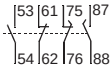
Auxiliary Contact Blocks for Front Mounting		Contactor Relays 700-CF			
		Control voltage code as per selection table	700-CF220⊗	700-CF310⊗	700-CF400⊗
	Circuit Diagram	24V DC, 36-48V DC, 72V DC, 110V DC, 230V 50/60 Hz			
No. of Auxiliary Contacts Without Auxiliary Contact Block			22E + 00 = 22E	31E + 00 = 31E	40E + 00 = 40E
100-FA02, 100-FAB02			22E + 02E = 24Y	31E + 02E = 33Y	40E + 02E = 42Y
100-FA11, 100-FAB11			22E + 11E = 33Y	31E + 11E = 42Y	40E + 11E = 51Y
100-FA20, 100-FAB20			22E + 20E = 42Y	31E + 20E = 51Y	40E + 20E = 60Y
100-FAL11			22E + 11E = 33Y	31E + 11E = 42Y	40E + 11E = 51Y
100-FA04, 100-FAB04			—	—	40E + 04E = 44Y
100-FA13, 100-FAB13			—	31E + 13E = 44Y	40E + 13E = 53Y
100-FA22, 100-FAB22			22E + 22E = 44Y	31E + 22E = 53Y	40E + 22E = 62Y
100-FA31, 100-FAB31			22E + 31E = 53Y	31E + 31E = 62Y	40E + 31E = 71Y
100-FA40, 100-FAB40			22E + 40E = 62Y	31E + 40E = 71Y	40E + 40E = 80Y
100-FAL22			22E + 22E = 44Y	31E + 22E = 53Y	40E + 22E = 62Y

Table applicable for screwless products (code **R**), e.g. **700-CFR220**⊗

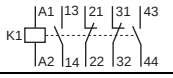
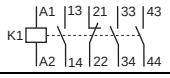
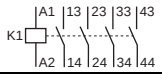
Auxiliary Contact Blocks for Side Mounting		Contactor Relays 700-CF			
		Control voltage code as per selection table	700-CF220⊗	700-CF310⊗	700-CF400⊗
	Circuit Diagram	24V DC, 36-48V DC, 72V DC, 110V DC, 230V 50/60 Hz			
No. of Auxiliary Contacts Without Auxiliary Contact Block			22E + 00 = 22E	31E + 00 = 31E	40E + 00 = 40E
100-SA01			22E + 01E = 23Y	31E + 01E = 32Y	40E + 01E = 41Y
100-SA10			22E + 10E = 32Y	31E + 10E = 41Y	40E + 10E = 50Y
100-SA02			22E + 02E = 24Y	31E + 02E = 33Y	40E + 02E = 42Y
100-SA11			22E + 11E = 33Y	31E + 11E = 42Y	40E + 11E = 51Y
100-SA20			22E + 20E = 42Y	31E + 20E = 51Y	40E + 20E = 60Y
100-SAL11			22E + 11E = 33Y	31E + 11E = 42Y	40E + 11E = 51Y

Table applicable for screwless products (code **R**), e.g. **700-CFR220**⊗

Miniature Contactor Relays — 700-K

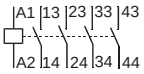
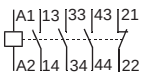
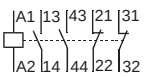
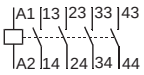
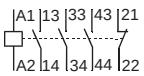
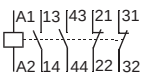
Product Selection

- IP2X Finger Protection
- Bifurcated contacts for low-level signals
- Optional integrated coil protection diode

Cat. No. 700-K

Cat. No. 700-KR

4-Pole AC or DC Coil Voltage

AC-12	AC-15 (B600)							Connection Diagrams	Contacts		Pkg. Qty.(1)	Cat. No.
Ambient temperature 70 °C	I_e [A]											
I_{th} [A]	24/48V	120V	240V	400V	500V	600V	690V		N.O.	N.C.		
Screw Terminals												
5	3	3	2	1.2	1	0.6	0.6		4	0	1	**700-K40E-⊗**
									3	1	1	**700-K31Z-⊗**
									2	2	1	**700-K22Z-⊗**
Spring Clamp Terminals												
5	3	3	2	1.2	1	0.6	0.6		4	0	1	**700-KR40E-⊗**
									3	1	1	**700-KR31Z-⊗**
									2	2	1	**700-KR22Z-⊗**

(1) May be ordered in package quantities of 20. Add letter **M** to the end of the cat. no. Example: **700-K40E-ZJM**.

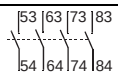
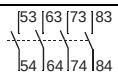
⊗ Coil Voltage Code

The Cat. No. as listed is incomplete. Select a coil voltage code from the following table to complete the Cat. No. Example: 24V DC; Cat. No. **700-K40E-**⊗ becomes Cat. No. **700-K40E-ZJ**.

DC Control for 700-K	
Code	**Description**
ZJ	24V DC
DJ	24V DC with integrated diode
ZG	72V DC (Screwtype only)
ZD	110V DC

Accessories

Auxiliary Contacts Blocks — 700-K / 700-KR

	Description	Connection Diagrams	N.O.	N.C.	For Use With	Pkg. Qty. (1)	Cat. No.
Screw Terminals							
	**Front-mounted auxiliary contacts** • Auxiliary Contact Blocks • 2- and 4-pole versions • Choice of contact configurations • Snap on, no tools required • Electronic-compatible bifurcated contacts for signals down to 15V/2 mA		1	1	100/104-K, 700-K	1	**100-KFA11E**
			2	0	100/104-K, 700-K	1	**100-KFA20E**
			4	0	100/104-K, 700-K	1	**100-KFA40E**
Spring Clamp Terminals							
	**Front-mounted auxiliary contacts** • Auxiliary Contact Blocks • 2- and 4-pole versions • Choice of contact configurations • Snap on, no tools required • Electronic-compatible bifurcated contacts for signals down to 15V/2 mA		1	1	100/104-KR, 700-KR	1	**100-KRFA11E**
			2	0	100/104-KR, 700-KR	1	**100-KRFA20E**
			4	0	100/104-KR, 700-KR	1	**100-KRFA40E**

Control Modules

	Description			Connection Diagrams	For Use With	Pkg. Qty. (1)	Cat. No.
	**Surge Suppressor** • Plug-in type • Limits surge voltage on coil drop-off	RC Suppressor	24…48V AC		100/104-K/-KR, 700-K/-KR	1	**100-KFSC50**
			110…280V AC			1	**100-KFSC280**
			380…480V AC			1	**100-KFSC480**
		MOV Suppressor	12…55V AC, 12…77V DC		100/104-K/-KR, 700-K/-KR	1	**100-KFSV55**
			56…136V AC, 78…180V DC			1	**100-KFSV136**
			137…277V AC, 181…250V DC			1	**100-KFSV277**
		Diode Suppressor	12…250V DC		100/104-K/-KR, 700-K/-KR	1	**100-KFSD250**

(1) May be ordered in package quantities of 10. Add letter **M** to the end of the cat. no. Example: **100-KFA11EM**.

Specifications

Standards Compliance — 700-K / 700-KR

- IEC/EN 60947-1, 60947-5-1
- UL 60947-1, 60947-5-1
- CAN / CSA-C22.2 No. 60947-1, No. 60947-5-1
- IEC/EN 60077, 61373
- EN 45545

General

			700-K / 700-KR
AC-12 Rated Thermal Current Ambient temperature 40°C			
I_{th}	24…240V	[A]	10
	230…500V	[A]	10
	230…690V	[A]	10
Ambient temperature 70 °C			
I_{th}	24…240V	[A]	5
	230…500V	[A]	5
	230…690V	[A]	5
AC-15/B600 Switching of Solenoids and Contactors			
I_e	24V	[A]	3
	48V	[A]	3
	120V	[A]	3
	230V	[A]	2
	240V	[A]	2
	400V	[A]	1.2
	480V	[A]	1
	500V	[A]	1
	600V	[A]	0.6
	690V	[A]	0.6
			700-K / 700-KR
DC-13/Q600			
1 pole	24V	[A]	2.3
	48V	[A]	1
	110V	[A]	0.55
	125V	[A]	0.55
	220V	[A]	0.27
	250V	[A]	0.27
	400V	[A]	0.15
	440V	[A]	0.15
	600V	[A]	0.1

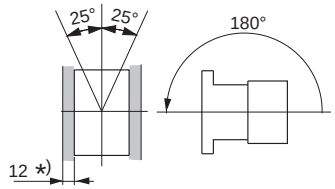
Coil Data

			700-K / 700-KR
Operating Limits			
DC	pick-up	[x Us]	0.7…1.25
	dropout	[x Us]	0.1…0.6
Coil Consumption			
DC	pick-up	[W]	cold 3.0, warm 2.6
	hold-in	[W]	cold 3.0, warm 2.6
Operating Times			
DC	closing delay	[ms]	18…40
	opening delay	[ms]	6…12

Device Combinations in Accordance with IEC 60947-1 / -4-1 and IEC 60077

Table valid for: AC/DC = 0.7…1.25 x U_s, $T_{amb.}$ = -40 °C…+70 °C, mounting position with accessories

Mounting Position



*) -Minimum distance to grounded parts or walls

Contactor Relays 700-K					
Auxiliary Contact Blocks for Front Mounting		**Control voltage code as per selection table**	**700-K22Z-⊗**	**700-K31Z-⊗**	**700-K40E-⊗**
	Circuit Diagram	**24V DC, 72V DC, 110V DC**	A1 13 43 21 31 / A2 14 44 22 32	A1 13 33 43 21 / A2 14 34 44 22	A1 13 23 33 43 / A2 14 24 34 44
No. of Auxiliary Contacts Without Auxiliary Contact Block			22Z + 00 = 22Z	31Z + 00 = 31Z	40E + 00 = 40E
100-KFA11E	53 61 / 54 62		—	31Z + 11E = 42Y	40E + 11E = 51Y
100-KFA20E	53 63 / 54 64		—	31Z + 20E = 51Y	40E + 20E = 60Y
100-KFA40E	53 63 73 83 / 54 64 74 84		—	31Z + 40E = 71Y	40E + 40E = 80Y

Table applicable for screwless products (code **R**), e.g. **700-KR31Z-⊗**

Motor Protection Circuit Breakers — 140M

Product Selection

- Short Circuit Protection — Standard Magnetic Trip (13…14 x I_e
- Motor Overload Protection — Trip Class 10

Cat. No. 140M-C

Cat. No. 140M-RC

Cat. No. 140M-D

Cat. No. 140M-F

Rated Operational Current (I_e)	Motor Current Adjustment Range	Magnetic Trip Current	Max. Short Circuit Current [kA]		Max. 3-phase Hp Ratings (1)				Max. kW, 3-Phase — AC-3 (1)				Cat. No.
			400V (I_{cu})	480V (group motor)	200V	230V	460V	575V	230V	400/ 415V	500V	690V	
[A]	[A]	[A]											
C-Frame with Screw Terminals													
0.16	0.10…0.16	2.1	100	65	—	—	—	—	—	0.02	0.06	0.06	**140M-C2E-A16**
0.25	0.16…0.25	3.3	100	65	—	—	—	—	—	0.04	0.09	0.09	**140M-C2E-A25**
0.4	0.25…0.40	5.2	100	65	—	—	—	0.25	0.06	0.09	0.12	0.18	**140M-C2E-A40**
0.63	0.40…0.63	8.2	100	65	—	—	0.25	0.33	0.09	0.18	0.18	0.25	**140M-C2E-A63**
1	0.63…1.0	13	100	65	—	—	0.5	0.75	0.18	0.25	0.37	0.55	**140M-C2E-B10**
1.6	1.0…1.6	21	100	65	0.25	0.33	1	1	0.25	0.55	0.75	1.1	**140M-C2E-B16**
2.5	1.6…2.5	33	100	65	0.5	0.75	1.5	2	0.37	0.75	1.1	1.8	**140M-C2E-B25**
4	2.5…4.0	52	100	65	1	1	3	3	0.75	1.5	2.2	3	**140M-C2E-B40**
6.3	4.0…6.3	82	100	65	1.5	2	5	5	1.5	2.2	3	4	**140M-C2E-B63**
10	6.3…10	130	100	65	3	3	7.5	10	2.2	4	6.3	7.5	**140M-C2E-C10**
16	10…16	208	65	30	5	5	10	15	4	7.5	10	13	**140M-C2E-C16**
20	14.5…20	260	50	30	5	7.5	15	20	5.5	10	11	17	**140M-C2E-C20**
25	18…25	325	15	25	7.5	7.5	20	20	5.5	11	15	22	**140M-C2E-C25**
29	24…29	406	15	25	7.5	10	20	25	7.5	13	18.5	25	**140M-C2E-C29**
32	27…32	448	15	25	7.5	10	25	30	7.5	15	20	25	**140M-C2E-C32**
D-Frame													
2.5	1.6…2.5	33	100	65	0.5	0.75	1.5	2	0.37	0.75	1.1	1.8	**140M-D8E-B25**
4	2.5…4.0	52	100	65	1	1	3	3	0.75	1.5	2.2	3	**140M-D8E-B40**
6.3	4.0…6.3	82	100	65	1.5	2	5	5	1.5	2.2	3	4	**140M-D8E-B63**
10	6.3…10	130	100	65	3	3	7.5	10	2.2	4	6.3	7.5	**140M-D8E-C10**
16	10…16	208	100	65	5	5	10	15	4	7.5	10	13	**140M-D8E-C16**
20	14.5…20	260	100	65	5	7.5	15	20	5.5	10	11	17	**140M-D8E-C20**
25	18…25	325	65	30	7.5	7.5	20	20	5.5	11	15	22	**140M-D8E-C25**
29	24…29	406	50	30	7.5	10	20	25	7.5	13	18.5	25	**140M-D8E-C29**
32	27…32	448	50	30	7.5	10	25	30	7.5	15	20	25	**140M-D8E-C32**
F-Frame													
10	6.3…10	130	100	65	3	3	7.5	10	2.2	4	6.3	7.5	**140M-F8E-C10**
16	10…16	208	100	65	5	5	10	15	4	7.5	10	13	**140M-F8E-C16**
20	14.5…20	260	100	65	5	7.5	15	20	5.5	10	11	17	**140M-F8E-C20**
25	18…25	325	100	65	7.5	10	20	25	6.3	11	15	22	**140M-F8E-C25**
32	23…32	416	65	65	7.5	10	25	30	7.5	15	20	30	**140M-F8E-C32**
45	32…45	585	65	65	10	15	30	40	13	22	30	40	**140M-F8E-C45**
C-Frame with Spring Clamp Terminals													
0.16	0.10…0.16	2.1	100	65	—	—	—	—	—	0.02	0.06	0.06	**140M-RC2E-A16**
0.25	0.16…0.25	3.3	100	65	—	—	—	—	—	0.04	0.09	0.09	**140M-RC2E-A25**
0.4	0.25…0.40	5.2	100	65	—	—	—	0.25	0.06	0.09	0.12	0.18	**140M-RC2E-A40**
0.63	0.40…0.63	8.2	100	65	—	—	0.25	0.33	0.09	0.18	0.18	0.25	**140M-RC2E-A63**
1	0.63…1.0	13	100	65	—	—	0.5	0.75	0.18	0.25	0.37	0.55	**140M-RC2E-B10**
1.6	1.0…1.6	21	100	65	0.25	0.33	1	1	0.25	0.55	0.75	1.1	**140M-RC2E-B16**
2.5	1.6…2.5	33	100	65	0.5	0.75	1.5	2	0.37	0.75	1.1	1.8	**140M-RC2E-B25**
4	2.5…4.0	52	100	65	1	1	3	3	0.75	1.5	2.2	3.0	**140M-RC2E-B40**
6.3	4.0…6.3	82	100	65	1.5	2	5	5	1.5	2.2	3.0	4.0	**140M-RC2E-B63**
10	6.3…10	130	100	65	3	3	7.5	10	2.2	4.0	6.3	7.5	**140M-RC2E-C10**
16	10…16	208	65	30	5	5	10	15	4.0	7.5	10	13	**140M-RC2E-C16**

(1) Horsepower/kW ratings shown in the table above are for reference. **The final selection of the MPCB depends on the actual motor full load current.**

High Inrush Motor Protection Circuit Breakers — 140M

- Short Circuit Protection — High Magnetic Trip (Fixed at 16…21 x I_e
- Motor Overload Protection — Trip Class 10

Cat. No. 140M-C

Cat. No. 140M-D

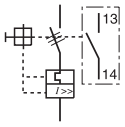
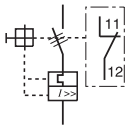
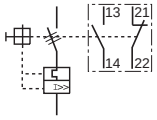
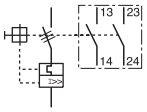
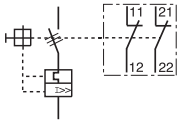
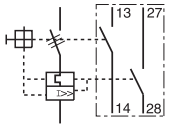
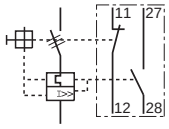
Cat. No. 140M-F

Rated Operational Current (I_e)	Motor Current Adjustment Range	Magnetic Trip Current	Max. Short Circuit Current [kA]		Max. 3-phase Hp Ratings (1)				Max. kW, 3-Phase — AC-3 (1)				Cat. No.
			400V (I_{cu})	480V (group motor)	200V	230V	460V	575V	230V	400/ 415V	500V	690V	
[A]	[A]	[A]											
C-Frame													
0.16	0.10…0.16	3.3	100	65	—	—	—	—	—	0.02	0.06	0.06	**140M-C2T-A16**
0.25	0.16…0.25	5.2	100	65	—	—	—	—	—	0.04	0.09	0.09	**140M-C2T-A25**
0.4	0.25…0.40	8.2	100	65	—	—	—	0.25	0.06	0.09	0.12	0.18	**140M-C2T-A40**
0.63	0.40…0.63	13	100	65	—	—	0.25	0.33	0.09	0.18	0.18	0.25	**140M-C2T-A63**
1	0.63…1.0	21	100	65	—	—	0.5	0.75	0.18	0.25	0.37	0.55	**140M-C2T-B10**
1.6	1.0…1.6	33	100	65	0.25	0.33	1	1	0.25	0.55	0.75	1.1	**140M-C2T-B16**
2.5	1.6…2.5	52	100	65	0.5	0.75	1.5	2	0.37	0.75	1.1	1.8	**140M-C2T-B25**
4	2.5…4	82	100	65	1	1	3	3	0.75	1.5	2.2	3	**140M-C2T-B40**
6.3	4…6.3	130	100	65	1.5	2	5	5	1.5	2.2	3	4	**140M-C2T-B63**
10	6.3…10	208	100	30	3	3	7.5	10	2.2	4	6.3	7.5	**140M-C2T-C10**
16	10…16	260	50	30	5	5	10	15	4	7.5	10	13	**140M-C2T-C16**
D-Frame													
16	10…16	260	100	65	5	5	10	15	4	7.5	10	13	**140M-D8T-C16**
20	14.5…20	325	65	30	5	7.5	15	20	5.5	10	11	17	**140M-D8T-C20**
F-Frame													
25	18…25	416	65	65	7.5	10	20	25	6.3	11	15	22	**140M-F8T-C25**
32	23…32	585	65	65	7.5	10	25	30	7.5	15	20	30	**140M-F8T-C32**

(1) Horsepower/kW ratings shown in the table above are for reference. **The final selection of the MPCB depends on the actual motor full load current.**

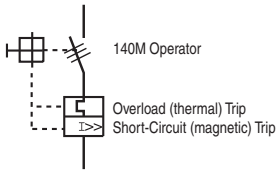
Accessories

With Screw Terminals — 140M

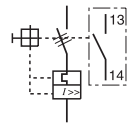
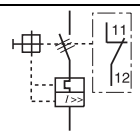
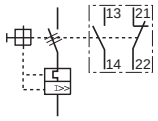
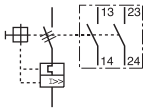
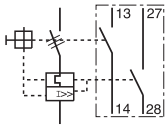
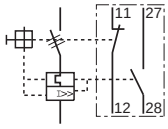
Description		Operator Position (1)			Term. No.	Description	Connection Diagram (2)	For Use With	Cat. No.
		OFF	ON	Tripped					
	**Front-Mounted Auxiliary Contact** • 1-pole or 2-pole • No additional space required • Only 1 per device	0	X	0	13-14	N.O. Aux		140M-C, D, F; 140U-D (UL489 only in combination with 140M-CAFC)	**140M-C-AFA10**
		X	0	X	11-12	N.C. Aux			**140M-C-AFA01**
		0	X	0	13-14	N.O. Aux		140M-C, D, F; 140U-D (UL489 only in combination with 140M-CAFC	**140M-C-AFA11**
		X	0	X	21-22	N.C. Aux			
		0	X	0	13-14	N.O. Aux			**140M-C-AFA20**
		0	X	0	23-24	N.O. Aux			
		X	0	X	11-12	N.C. Aux			**140M-C-AFA02**
		X	0	X	21-22	N.C. Aux			
	**Front-Mounted Trip Contact** • 2-pole • Indicates tripping of device • No additional space required	0	X	0	13-14	N.O. Aux		014M-C, D, F; 140U-D (UL489 only in combination with 140M-CAFC	**140M-C-AFAR10A10**
		0	0	X	27-28	N.O. Trip (Short-Circuit & Overload)			
		X	0	X	11-12	N.C. Aux			**140M-C-AFAR10A01**
		0	0	X	27-28	N.O. Trip (Short-Circuit & Overload)			

(1) X = Contact Closed; 0 = Contact Open

(2)

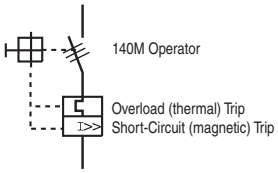


With Spring Clamp Terminals — 140M

Description		Operator Position (1)			Term. No.	Description	Connection Diagram (2)	For Use With	Cat. No.
		OFF	ON	Tripped					
		0	X	0	13-14	N.O. Aux		140M-C, D, F; 140M-RC	**140M-RC-AFA10**
		X	0	X	11-12	N.C. Aux			**140M-RC-AFA01**
	**Front-Mounted Auxiliary Contact** • 1-pole or 2-pole • No additional space required • Only 1 per device	0	X	0	13-14	N.O. Aux		140M-C, D, F; 140M-RC	**140M-RC-AFA11**
		X	0	X	21-22	N.C. Aux			
		0	X	0	13-14	N.O. Aux			**140M-RC-AFA20**
		0	X	0	23-24	N.O. Aux			
		0	X	0	13-14	N.O. Aux		140M-C, D, F; 140M-RC	**140M-RC-AFAR10A01**
	**Front-Mounted Trip Contact** • 2-pole • Indicates tripping of device • No additional space required	0	0	X	27-28	N.O. Trip (Short-Circuit & Overload)			
		X	0	X	11-12	N.C. Aux			**140M-RC-AFAR10A10**
		0	0	X	27-28	N.O. Trip (Short-Circuit & Overload)			

(1) X = Contact Closed; 0 = Contact Open

(2)



Connecting Components — 140M

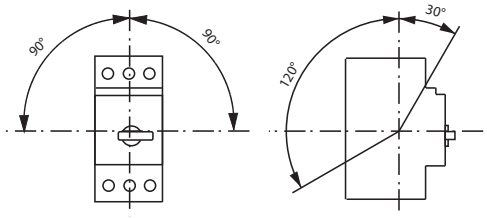
	Description		For Use With	Cat. No.
	**ECO Connecting Module — 12 A** • For DOL and reversing starters • Eco-starters mount on single DIN Rail (140M on DIN Rail) • Electrical and mechanical interconnection of 140M and 100-K contactors		140M-C to 100-K	**140M-C-PEK12**
	ECO Connecting Modules — 25 A • Eco-starters mount on single DIN Rail (140M on DIN Rail) • Electrical and mechanical interconnection of 140M MPCB and 100-C (with AC coils or 24V DC electronic coils) contactors		140M-C to 100-C09…C23	**140M-C-PEC23**
			140M-D to 100-C09…C23	**140M-D-PEC23**
	ECO Connecting Modules — 25 A • Eco-starters mount on single DIN Rail (100-C on DIN Rail) • Electrical and mechanical interconnection of 140M MPCB and 100-C (with conventional DC coils)		140M-C, 140M-D to 100-C09…C23	**140M-C-PEC23A**
	Connecting Modules — 25 and 45 A • Contactor and MPCB MUST BE mounted separately on (2) DIN Rails • Electrical interconnection of 140M and 100-C (with AC coils)		140M-C to 100-C09…C23	**140M-C-PNC23**
			140M-D to 100-C09…C23	**140M-D-PNC23**
			140M-D to 100-C30…C37	**140M-D-PNC37**
			140M-F to 100-C30…C37	**140M-F-PNC37**
			140M-F to 100-C43	**140M-F-PNC43**
	Coil Modules — 25 A and 45 A • For use with Bulletin 103T/107T 3-component starters		140M-C, -D to 100-C09…C23	**140M-C-PSC23**
			140M-D, -F to 100-C30…C43	**140M-F-PSC43**
	**Spacing Adapter** • Required for self-protected combination motor controller (Type E) applications of Bulletin 140M-C, -D, and -F MPCBs. Not for use with bus bars.		140M-C, -D	**140M-C-TE1**
			140M-F	**140M-F-TE**
	**Feeder Block for Compact Busbar** • Supply of compact busbars • Increases terminal capacity		140M-C	**140M-C-WBE**
			140M-F	**140M-F-WBE**
	**Feeder Terminal for Compact Busbar** • For supply of compact busbars • Top feed — overlaps compact busbar • Meets IEC spacing requirements		140M-C, -D	**140M-C-WTN**
	**Feeder Terminal for Compact Busbar** • For supply of compact busbars • Top feed — overlaps compact busbar • Meets UL Type E spacing requirements		140M-C, -D	**140M-C-WTEN**
			140M-F	**140M-F-WTE**
	**Three-Phase Compact Busbar for 32 A Motor Protection** • Circuit Breakers — 64 A Max. Continuous Current • 45 mm spacing • For use with front-mounted auxiliary contact	2 connections	140M-C, -D	**140M-C-W452N**
		3 connections		**140M-C-W453N**
		4 connections		**140M-C-W454N**
		5 connections		**140M-C-W455N**
	**Three-Phase Compact Busbar for 32 A Motor Protection Circuit Breakers — 64 A Max. Continuous Current** • 54 mm spacing • For use with side-mounted auxiliary contact	2 connections	140M-C, -D	**140M-C-W542N**
		3 connections		**140M-C-W543N**
		4 connections		**140M-C-W544N**
		5 connections		**140M-C-W545N**
	**Three-Phase Compact Busbar for 45 A Motor Protection Circuit Breakers — 115 A Max. Continuous Current** • 54 mm spacing • For use with front-mounted auxiliary contact	2 connections	140M-F	**140M-F-W542**
		3 connections		**140M-F-W543**
		4 connections		**140M-F-W544**
	Three-Phase Compact Busbar for 45 A Motor Protection Circuit Breakers — 115 A Max. Continuous Current • 63 mm spacing • For use with side-mounted auxiliary contact	2 connections	140M-F	**140M-F-W632**
		3 connections		**140M-F-W633**
		4 connections		**140M-F-W634**
	**Terminal Cover** • For covering of unused compact bus bar terminals • IP2X finger protection • Must be ordered in multiples of 10		140M-C, 140M-D	**140M-C-WSN**
			140M-F	**140M-F-WS**
	**Top Hat Rail Adapter — 10 mm** – Adjusts the depth of the 140M-C to the 140M-D – Allows the use of compact busbars across both frame sizes – Must be ordered in multiples of 10		140M-C	**140-KBH2**

Specifications

Standards Compliance — 140M

- IEC/EN 60947-1, 60947-2, 60947-4-1, 60947-5-1
- UL 60947-1, 60947-4-1, 60947-5-1
- CAN / CSA-C22.2 No. 60947-1, No. 60947-4-1, No. 60947-5-1
- IEC/EN 60204-1
- IEC/EN 60077
- IEC/EN 61373
- EN 45545

Mounting Position



Cat. No. 140M-C…, 140M-D…, 140M-F…

Circuit Breakers — 140U (30 A, D-Frame)

Product Selection

- D-Frame 30 A, Fixed Thermal / Fixed Magnetic
- 2-Pole Thermal-Magnetic
- 3-Pole Thermal-Magnetic

Cat. No. 140U-D6D3

Rated Current I_n	Thermal Trip (Fixed) $I_r = I_n$	Magnetic Trip $I_m =$	Breaking Capacity (50 Hz) [kA]								Interrupting Rating (60 Hz) [kA]			Cat. No. (1)
			230…240V		400…415V		525V		690V					
[A]	[A]	[A]	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}	240V AC	480Y/277V AC	600Y/347V AC	
2-Pole														
0.5	0.5	15…20 x I_n	100	100	100	65	65	65	50	50	100	100	50	**140U-D6D2-A50**
1	1	15…20 x I_n	100	100	100	65	65	65	50	50	100	100	50	**140U-D6D2-B10**
2	2	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D2-B20**
3	3	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D2-B30**
4	4	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D2-B40**
5	5	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D2-B50**
6	6	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D2-B60**
8	8	15…20 x I_n	100	100	100	65	65	65	10	6	100	100	50	**140U-D6D2-B80**
10	10	15…20 x I_n	100	100	100	65	65	65	10	6	100	100	50	**140U-D6D2-C10**
	12	15…20 x I_n	100	100	65	50	65	50	10	6	65	65	25	**140U-D6D2-B80**
15	15	15…20 x I_n	100	100	65	50	65	50	10	6	65	65	25	**140U-D6D2-C10**
20	20	15…20 x I_n	100	100	65	50	65	50	10	6	65	65	25	**140U-D6D2-C20**
25	25	15…20 x I_n	100	100	65	50	65	25	10	6	65	65	25	**140U-D6D2-C25**
30	30	15…20 x I_n	100	100	65	50	65	25	10	6	65	65	25	**140U-D6D2-C30**
3-Pole														
0.5	0.5	15…20 x I_n	100	100	100	65	65	65	50	50	100	100	50	**140U-D6D3-A50**
1	1	15…20 x I_n	100	100	100	65	65	65	50	50	100	100	50	**140U-D6D3-B10**
2	2	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D3-B20**
3	3	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D3-B30**
4	4	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D3-B40**
5	5	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D3-B50**
6	6	15…20 x I_n	100	100	100	65	65	65	18	10	100	100	50	**140U-D6D3-B60**
8	8	15…20 x I_n	100	100	100	65	65	65	10	6	100	100	50	**140U-D6D3-B80**
10	10	15…20 x I_n	100	100	100	65	65	65	10	6	100	100	50	**140U-D6D3-C10**
12	12	15…20 x I_n	100	100	65	50	65	50	10	6	65	65	25	**140U-D6D3-B80**
15	15	15…20 x I_n	100	100	65	50	65	50	10	6	65	65	25	**140U-D6D3-C10**
20	20	15…20 x I_n	100	100	65	50	65	50	10	6	65	65	25	**140U-D6D3-C20**
25	25	15…20 x I_n	100	100	65	50	65	25	10	6	65	65	25	**140U-D6D3-C25**
30	30	15…20 x I_n	100	100	65	50	65	25	10	6	65	65	25	**140U-D6D3-C30**

(1) Current limiting

Accessories

Connecting Components — 140U

	Description		For Use With	Cat. No.
	**Load terminal cover** • For UL489 compliance of front mount auxiliary contacts when installed on 140U-D • Must be ordered in multiples of 10	10 pcs/pkg	140M-C-AFA	**140M-C-AFC**
	**Three-Phase Compact Busbar 45 mm spacing** • Compliant with UL489 (UL508 Cat. NMTR) and IEC • 64 A max. continuous current • 45 mm spacing	2 connections	140U-D_ _3	**140U-D-W452**
		3 connections	140U-D_ _3	**140U-D-W453**
		4 connections	140U-D_ _3	**140U-D-W454**
		5 connections	140U-D_ _3	**140U-D-W455**
	**Feeder Terminal for compact busbar** • Compliant with UL489 (UL508 Cat. NMTR) and IEC • 64 A max. continuous current		140U-D-W	**140U-D-WTE**
	**Eco Connection Module — 25 A** • Eco-loadfeeders mount on single DIN Rail (140U on DIN Rail) • Electrical and mechanical interconnection of 140U and 100-C (with AC coils or 12V and 24V DC electronic coils) contactors		140U-D_ _3 to 100-C09…-C23	**140U-D-PEC23**
	**Flexible Wire Module — 32 A** • Contactor and 140U are separately mounted		140U-D_ _3 to 100-C09…-C43	**140U-D-PF**

Note: See page 29 for additional accessories suitable for Bul. 140U-D circuit breakers.

Specifications

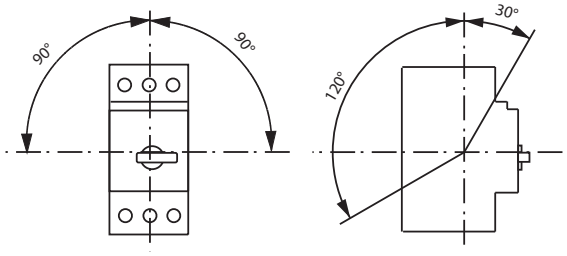
Standards Compliance — 140U-D

- IEC/EN 60947-1, 60947-2, 60947-5-1
- UL 489
- CSA C22.2, No. 5
- EN 45545

Ratings

- HACR

Mounting Position



Bimetallic Overload Relays — 193-T1

Product Selection

- Overload protection trip class 10 / 10A
- Phase loss protection
- Ambient temperature compensation
- Auxiliary contacts (1 N.O. and 1 N.C.)
- Manual/automatic reset mode selectable
- Test function for auxiliary contacts
- Stop button
- Trip indicator
- Optional remote reset solenoid and external reset accessories

Cat. No. 193-T1

For Use With (1)	Setting Range [A] (2) (3)	Max. Back-up fuse [A]			Cat. No.
		gL/gG		UL Class K5	
		50 kA, 690V AC		5 kA, 600V AC	
		IEC/EN 60947-4-1 Coordination		UL 508	
		Type 1	Type 2		
100-C09…100-C23	0.1…0.16	50	—	1	**193-T1AA16**
	0.16…0.25	50	—	1	**193-T1AA25**
	0.25…0.40	50	2	1	**193-T1AA40**
	0.35…0.50	50	2	2	**193-T1AA50**
	0.45…0.63	50	2	2	**193-T1AA63**
	0.55…0.80	50	4	3	**193-T1AA80**
	0.75…1.0	50	4	3	**193-T1AB10**
	0.90…1.3	50	6	4	**193-T1AB13**
	1.1…1.6	50	6	5	**193-T1AB16**
	1.4…2.0	50	10	8	**193-T1AB20**
	1.8…2.5	50	16	10	**193-T1AB25**
	2.3…3.2	50	16	12	**193-T1AB32**
	2.9…4.0	50	16	15	**193-T1AB40**
	3.5…4.8	50	16	15	**193-T1AB48**
	4.5…6.3	50	20	20	**193-T1AB63**
	5.5…7.5	50	25	25	**193-T1AB75**
	7.2…10	50	25	35	**193-T1AC10**
	9.0…12.5	50	35	50	**193-T1AC12**
100-C12…100-C23	11.3…16	50	35	60	**193-T1AC16**
100-C16…100-C23	15…20	80	40	80	**193-T1AC20**
	17.5…21.5	80	50	80	**193-T1AC21**
100-C23	21…25	80	50	100	**193-T1AC25**
100-C30…100-C37	15…20	80	40	80	**193-T1BC20**
	17.5…21.5	80	50	80	**193-T1BC21**
	21…25	80	50	100	**193-T1BC25**
	24.5…30	100	63	100	**193-T1BC30**
	29…36	125	63	125	**193-T1BC36**
100-C37	33…38	125	63	150	**193-T1BC38**
100-C43…100-C55	17…25	100	50	100	**193-T1CC25**
	24.5…36	125	80	125	**193-T1CC36**
	35…47	160	100	175	**193-T1CC47**
100-C55	45…60	160	100	175	**193-T1CC60**
100-C60…100-C97	35…47	160	100	175	**193-T1DC47**
	45…60	200	125	250 (4)	**193-T1DC60**
100-C72…100-C97	58…75	200	125	300 (4)	**193-T1DC75**
	72…90	250	160	350 (4)	**193-T1DC90**
Separate mounting required (Panel mounted device)	35…47	160	100	175	**193-T1DC47P**
	45…60	200	125	250 (4)	**193-T1DC60P**
	58…75	200	125	300 (4)	**193-T1DC75P**
	72…90	250	160	350 (4)	**193-T1DC90P**

(1) Bulletin 193-T1 overload relays shall not be used with 100-C09…100-C43 conventional DC coil-controlled contactors. Use electronic controlled DC coil versions.

(2) To select the setting range for use in Y-Δ Starters, multiply the rated operating current of the motor by a factor of 0.58.

(3) For motors with service factor of 1.15 or greater, use motor nameplate full load current. For motors with service factor of 1.0, use 90% of the motor nameplate full load current.

(4) Max. Back-up fuse [A], UL Class K5, 10 kA, 600V AC

Miniature Bimetallic Overload Relays — 193-K

Product Selection

- Standard motor protection for AC and DC motors
- Overload protection Trip Class 10A
- Auxiliary switch (1 N.O. and 1 N.C.)
- Phase loss sensitivity
- Manual/Auto reset button
- Test release
- Stop button
- Trip indicator
- Optional remote reset solenoid and external reset accessories

Cat. No. 193-K

Mounts to Contactor	Setting Range (1) (2)	Max. Current Rating of Backup Fuse [A]				Cat. No.
		IEC Coordination		UL 508		
	[A]	Type 1	Type 2	UL Class K5/RK5, 600V, 5 kA	UL Class CC, J, 600V, 50 kA	
100-K05…100-K12	0.10…0.16	35	1	1	1	**193-KA16**
	0.16…0.25	35	1	1	1	**193-KA25**
	0.25…0.40	35	2	1	1	**193-KA40**
	0.35…0.50	35	2	2	2	**193-KA50**
	0.45…0.63	35	2	2	2	**193-KA63**
	0.55…0.80	35	4	3	3	**193-KA80**
	0.75…1.0	35	4	3	3	**193-KB10**
	0.9…1.3	35	6	4	4	**193-KB13**
	1.1…1.6	35	6	5	5	**193-KB16**
	1.4…2.0	35	10	8	8	**193-KB20**
	1.8…2.5	35	20	10	10	**193-KB25**
	2.3…3.2	35	20	12	12	**193-KB32**
	2.9…4.0	35	20	15	15	**193-KB40**
	3.5…4.8	35	20	15	15	**193-KB48**
	4.5…6.3	35	20	20	20	**193-KB63**
100-K09…100-K12	5.5…7.5	35	20	25	25	**193-KB75**
	7.2…10.0	35	20	35	30	**193-KC10**
100-K12	9.0…12.5	35	20	50	30	**193-KC12**

(1) To select the setting range for use in Y-Δ Starters, multiply the rated operating current of the motor by a factor of 0.58.

(2) For motors with Service Factor of 1.15 or greater, use motor nameplate full load current. For motors with service factor of 1.0, use 90% of the motor nameplate full load current.

Accessories — 193-T1 / 193-K

Add-On Modules

	Description	For Use With	Pkg. Quantity (1)	Cat. No.
	**DIN Rail/Panel Mounting Adapter** • For separate mounting of overload relays • Snaps on to 35 mm top hat rail	193-T1AA, 193-T1AB, 193-T1AC, 193-T1BC	1	**193-T1APM**
	**Screw Adapter** • For screw fixing of the 193-T1APM panel adapter (1 required per adapter)	193-T1APM	10	**140M-C-N45**
	**Remote Reset Solenoid** • For remote reset of 193-K and 193-T1 overload relays	193-K, 193-T1 (not for 193-T1DC_P)	1	**193-T1R⊗**
	**External Reset Button** • For enclosed, through-the-door reset applications. • Metal construction, IP66, non-illuminated. • Refer to the 800F selection information for additional types.	193-K, 193-T1	1	**800FM-R611**
	Reset Rod • Length 142 mm, adjustable range 141…159 mm	193-K, 193-T1	1	**800F-ATR08**
	**Reset Adapter** • Expands the reset target area when using an external reset	193-K, 193-T1 (not for 193-T1DC_P)	1	**193-RA3**

(1) Must be ordered in multiples of package quantity.

⊗ Coil Voltage Codes for Remote Reset Solenoid

The cat. no. as listed is incomplete. Select a coil voltage code from the following table to complete the cat. no. Example: Cat. No. **193-T1R⊗** becomes Cat. No. **193-T1RZJ**.

DC Control	
Code	**Description**
ZJ	24V DC
ZD	110V DC

AC Control	
Code	**Description**
KF	220…240V 50/60 Hz

Standards Compliance — 193-T1 / 193-K

- IEC/EN 60947-1, 60947-4-1, 60947-5-1
- UL 60947-1, 60947-4-1, 60947-5-1
- CAN / CSA-C22.2 No. 60947-1, No. 60947-4-1, No. 60947-5-1
- IEC/EN 60077
- IEC/EN 61373
- EN 45545

Notes:

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/global/literature-library/.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication CMP-GL-SG004C-EN-E - March 2019
Supersedes publication CMP-GL-SG004B-EN-E- August 2016