

Assignment of Contacts

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

Auxiliary Contact Blocks		Control Relays 700-CF (AC and DC Control)			
Circuit Diagram	Control	700-CF \otimes 220	700-CF \otimes 310	700-CF \otimes 400	
Front Mounting \star					
100-FA02		AC/DC	22E + 02E = 24Y	31E + 02E = 33Y	40E + 02E = 42Y
100-FA11		AC/DC	22E + 11E = 33Y	31E + 11E = 42Y	40E + 11E = 51Y
100-FA20		AC/DC	22E + 20E = 42Y	31E + 20E = 51Y	40E + 20E = 60Y
100-FA22		AC/DC	22E + 22E = 44Y	31E + 22E = 53Y	40E + 22E = 62Y
100-FA31		AC/DC	22E + 31E = 53Y	31E + 31E = 62Y	40E + 31E = 71Y
100-FA40		AC/DC	22E + 40E = 62Y	31E + 40E = 71Y	40E + 40E = 80Y
100-FAL22		AC/DC	22E + L22E = L44Y	31E + L22E = L53Y	40E + L22E = L62Y

\star Control relay and auxiliary contact block AC/DC max. 4 N. C.

700-CF (AC and DC electronic coils), vertical mounting, 60 $^{\circ}$ C \blacklozenge

Cat. No. 700...	Max. N.O. Side Aux.	Max. N.C. Side Aux.	Max. N.O. Front Aux.	Max. N.C. Front Aux.	Max. N.O. Front + Side Aux.	Max. N.C. Front + Side Aux.	Max. N.O. + N.C. Front + Side Aux.
CF400	2	4	4	4	6	7	8
CF310	2	4 \clubsuit	4	4 \triangle	6	5	8
CF220	4	4 \clubsuit	4	2	8	5	8
CF040	2	2	4	0	6	2	6

\clubsuit With no front auxiliary contacts installed. Otherwise 3 N.C. Maximum

\triangle With no side auxiliary contacts installed. Otherwise 3 N.C. Maximum

\blacklozenge For other operating conditions, please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

700-CF (DC conventional coils), vertical mounting, 60 $^{\circ}$ C \blacklozenge

Cat. No. 700...	Max. N.O. Side Aux.	Max. N.C. Side Aux.	Max. N.O. Front Aux.	Max. N.C. Front Aux.	Max. N.O. Front + Side Aux.	Max. N.C. Front + Side Aux.	Max. N.O. + N.C. Front + Side Aux.
CF400	2	2	4	4 \triangle	6	5	8
CF310	2	2	4	4 \triangle	6	5	8
CF220	2	2	4	2	6	4	8

\triangle With no side auxiliary contacts installed. Otherwise 3 N.C. Maximum

\blacklozenge For other operating conditions, please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

		Cat. No. 100-JE	Cat. No. 100-JE12	Cat. No. 100-JE48	
Electrical					
Input Voltage		24V DC	12V DC	48V DC	
Input Voltage Range		18...30V DC	6...12V DC	35...48V DC	
Output Voltage		110...240V AC	110...240V AC	110...240V AC	
Power Consumption		0.1...0.4 W	0.02...0.12 W	0.2...0.5 W	
Minimum Actuation		5V DC, 2 mA DC	5V DC, 2 mA DC	5V DC, 2 mA DC	
Mechanical					
Finger Protection		IP20	IP20	IP20	
Pickup Time		0...10 ms + pickup time of the contactor	0...10 ms + pickup time of the contactor	0...10 ms + pickup time of the contactor	
Dropout Time		0...10 ms + dropout time of the contactor	0...10 ms + dropout time of the contactor	0...10 ms + dropout time of the contactor	
Max. Cycles Per Second		2★	2★	2★	
Isolation/Breakdown Voltage		In: 50V, Out: 250V	In: 50V, Out: 250V	In: 50V, Out: 250V	
Rated Impulse Withstand Voltage		4 kV	4 kV	4 kV	
Environmental					
Ambient Temperature Range		-25...60 °C	-25...60 °C	-25...60 °C	
Storage Temperature Range		-50...+80 °C	-50...+80 °C	-50...+80 °C	
Operating Life		100+ million ops	100+ million ops	100+ million ops	
Construction					
Wire Size Range	Flexible wire	1 Wire	0.5...2.5 mm ²	0.5...2.5 mm ²	0.5...2.5 mm ²
		2 Wire	0.75...2.5 mm ²	0.75...2.5 mm ²	0.75...2.5 mm ²
	Solid wire	1 Wire	1.0...2.5 mm ²	1.0...2.5 mm ²	1.0...2.5 mm ²
		2 Wire	1.0...2.5 mm ²	1.0...2.5 mm ²	1.0...2.5 mm ²
	Solid and Stranded		18...14 AWG	18...14 AWG	18...14 AWG
Tightening Torque		1...1.5 N•m/7...15 lb•in	1...1.5 N•m/7...15 lb•in	1...1.5 N•m/7...15 lb•in	
Type of Light		LED	LED	LED	

★ To consider the maximum operations/hour of the relays.

Coils

	AC Coil Code	AC Voltages			Cat. No. 700-CF	DC Coil Code	DC Voltages	Cat. No. 700-CF
		50Hz	60Hz	50/60Hz				
	Q	—	12V	—	TA006	ZR	9V	TA766
	R	12V	—	—	TA404	ZQ	12V	TA708
	J	—	24V	—	TA013	DJ	24V Diode	TA714M
	K	24V	—	—	TA407	ZJ	24V	TA714
	KJ	—	—	24V	TA855	ZW	36V	TA719
	V	32V	36V	—	TA481	ZY	48V	TA724
	W	36V	—	—	TA410	ZZ	60V	TA774
	X	42V	48V	—	TA482	ZB	64V	TA727
	Y	48V	—	—	TA414	ZG	72V	TA728
	KY	—	—	48V	TA860	ZE	80V	TA729
	KP	100V	100 - 110V	100V	TA861	ZD	110V	TA733
	D	110V	120V	—	TA473	ZP	115V	TA734
	KD	—	—	110V	TA856	ZS	125V	TA737
	P	120V	—	—	TA425	ZA	220V	TA747
	S	127V	—	—	TA428	ZF	230V	TA749
	KG	200V	200 - 220V	200V	TA862	ZT	250V	TA751
	H	—	208V	—	TA049	—	—	—
	L	200 - 220V	208 - 240V	—	TA296	—	—	—
	KL	—	—	200 - 230V	TA864	—	—	—
	A	220V	240V	—	TA474	—	—	—
	F	220 - 230V	260V	—	TA441	—	—	—
	KF	—	—	230V	TA851	—	—	—
	VA	230 - 240V	—	—	TA440	—	—	—
	T	240V	277V	—	TA480	—	—	—
	KA	—	—	240V	TA858	—	—	—
	I	—	347V	—	TA065	—	—	—
	E	—	380V	—	TA067	—	—	—
	N	380 - 400V	440V	—	TA071	—	—	—
	KN	—	—	400V	TA863	—	—	—
	G	400-415V	—	—	TA457	—	—	—
	B	440V	480V	—	TA475	—	—	—
	KB	—	—	440V	TA859	—	—	—
	M	500V	—	—	TA479	—	—	—
	C	550V	600V	—	TA476	—	—	—



Utilization Category Table from EN 60947-5-1

Verification of Making and Breaking Capacities of Switching Elements Under Normal Conditions Corresponding to the Utilization Categories‡

Utilization Category	Normal Condition of Use								
	Make§			Break§			Number and Rate of Making and Breaking operations		
	I/I_e	U/U_e	$\cos \psi$	I/I_e	U/U_e	$\cos \psi$	No. operating cycles♣	Operating cycles per minute	ON time [s]♦
AC-12▲	1	1	0.9	1	1	0.9	6050	6	0.05
AC-13▲	2	1	0.65	1	1	0.65	6050	6	0.05
AC-14▲	6	1	0.3	1	1	0.3	6050	6	0.05
AC-15▲	10	1	0.3	1	1	0.3	6050	6	0.05
DC	—	—	$T_{0.95}$	—	—	$T_{0.95}$	—	—	—
DC-12	1	1	1 ms	1	1	1 ms	6050	6	0.05♦
DC-13	1	1	$6 \times P\Delta$	1	1	$6 \times P\Delta$	6050	6	0.05♦
DC-14▲	10	1	15 ms	1	1	15 ms	6050	—	0.05♦

I_e Rated operational current, I Current to be made or broken

U_e Rated operational voltage, U Voltage before make

$P_{U_e I_e}$ Steady-state power consumption (W)

$T_{0.95}$ Time to reach 95% of the steady-state current (ms)

‡ See sub-clause 8.3.3.5.2.

§ For tolerances on test quantities, see sub-clause 8.3.2.2.

♣ The first 50 operating cycles shall be run at $U/U_e=1.1$ with the loads set at U_e .

▲ The value “ $6 \times P$ ” results from an empirical relationship which is found to represent most DC magnetic loads to an upper limit of $P = 50$ W, e.g., $6 \times P= 300$ W.

♦ The ON time shall be at least equal to $T_{0.95}$.

▲ Where the break current differs from the make current value, the ON time refers to the make current value after which the current is reduced to the break current value for a suitable period e.g., 0.05 s.

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
AC-12 (Control of resistive loads) IEC 60947-5-1	40 °C	I_{th}	20 A	10 A	10 A	20 A	10 A
		230V	8 kW				
		400V	14 kW				
		690V	24 kW				
	60 °C	I_{th}	20 A	6 A	6 A	20 A	6 A
		230V	8 kW				
		400V	14 kW				
		690V	24 kW				
DC-12 Switching DC Loads L/R < 1ms, 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	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	0.68 A
	220V	0.6 A	0.6 A	0.3 A	0.6 A	0.3 A	0.32 A
	440V	0.3 A	0.15 A	0.15 A	0.3 A	0.15 A	0.15 A

	Location of welded N.O. contacts	State of N.C. Contacts if N.O. contact welds		
	Main	Main	Front aux.	Side aux.
Mechanically Linked Contacts ‡	Front aux.	Open	Open	Open★
		Open	Open	—

★ Side mounted auxiliary contacts provide “mirror contact” performance with main poles only.

‡ Defined in IEC 60947-5-1 annex L. Mechanically linked is a relationship between contacts of opposite types (i.e., N.O. and N.C.).

		Cat. No. 700-CF	Aux./Pneu matic Timer Contact (Front- mounted)
Mechanical Life	[Mil]	15	5
Electrical Life	AC-15 (240V, 3 A) [Mil]	1.5	1.5
Weight	AC Coil [g]	390	—
Terminal Cross-Sections			
Terminal Type			
Terminal Size per IEC60 947-1		2 x A4	2 x A4
	Solid/ Stranded	1 Conductor	[mm ²]
	★	2 Conductor	[mm ²]
Max. Wire Size per UL/CSA		[AWG]	16...10
Tightening Torque		[lb-in]	13.3...17.7
Tightening Torque		[N·m]	1.5...2.0

DC Switching Ratings for 700-CF Main Poles in Series (Resistive Load at 60 °C)			
	1 pole	2 poles	3 poles
24/48V	15/10 A	25 A	25 A
125V	6 A	25 A	25 A
220V	1.5 A	8 A	25 A
440V	0.4 A	1 A	3 A

★ For 16 or more strands, end ferrule is required.

Control Circuit

			Cat. No. 700-CF
Operating Voltage			
AC 50/60 Hz	Pickup	[x U _s]	0.85...1.1
	Dropout	[x U _s]	0.3...0.6
DC (conventional) ★	Pickup	[x U _s]	0.8...1.1
	Dropout	[x U _s]	0.1...0.6
DC (electronic - EQ, EW)	Pickup	[x U _s]	0.7...1.25
	Dropout	[x U _s]	0.3...0.4
DC (electronic - EY)	Pickup	[x U _s]	0.8...1.25
	Dropout	[x U _s]	0.3...0.4
DC (electronic - ED)	Pickup	[x U _s]	0.7...1.12 ‡
	Dropout	[x U _s]	0.3...0.4
DC (electronic - EA)	Pickup	[x U _s]	0.8...1.1
	Dropout	[x U _s]	0.3...0.4
Coil Consumption			
AC 50/60 Hz	Inrush	[VA]	75
	Sealed	[VA/W]	9.5/2.7
DC (conventional)	Inrush	[W]	7.7
	Sealed	[W]	6.3
DC (electronic - EQ, EJ)	Inrush (avg./peak)	[W]	10/17
	Sealed	[W]	1.7
DC (electronic - EY)	Inrush (avg./peak)	[W]	10/17
	Sealed	[W]	1.9
DC (electronic - ED)	Inrush (avg./peak)	[W]	12/19
	Sealed	[W]	2.1
DC (electronic - EA)	Inrush (avg./peak)	[W]	14/22
	Sealed	[W]	3.0
Operating Times			
AC 50/60 Hz	Pickup Time	[ms]	15...30
	Dropout Time	[ms]	10...60
DC (conventional)	Pickup Time	[ms]	40...70
	Dropout Time	[ms]	7...15
With integrated diode	Opening Delay	[ms]	14...20
With external diode	Opening Delay	[ms]	70...125
DC (electronic - EQ, EJ)	Closing Delay	[ms]	25...50
	Opening Delay	[ms]	27...45
Min OFF time		[ms]	50
Max. ripple			± 15%
DC (electronic - EY, ED, EA)	Closing Delay	[ms]	25...50
	Opening Delay	[ms]	23...33
Min OFF time		[ms]	50
Max. ripple			± 15%
Latch Attachment Release, 100-FL			
Coil Consumption	AC	[VA/W]	45/40
	DC	[W]	25
Contact Signal Duration		[min./max]	0.03...15 s
Timing Attachment			
Reset Time, 100-ETA, 100-ETB	at min. time setting	[ms]	10
	at max. time setting	[ms]	70
Repeat Accuracy			± 10%

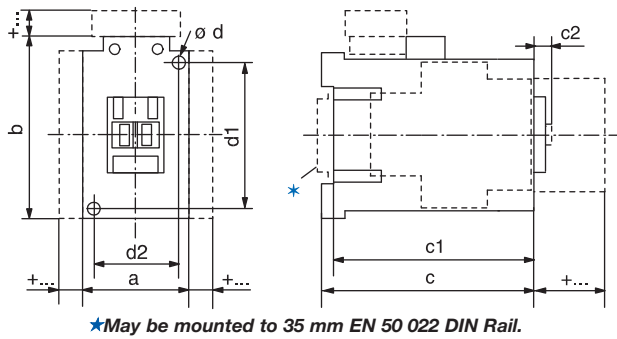
★ For 9V DC, code ZR, use operating voltage 0.65...1.3 x U_s.
 For 24V DC, code ZJ, DJ, or EJ use operating voltage 0.7...1.25 x U_s.
 ‡ At 110V DC, coil code ED has an operating voltage range of 0.7...1.25 x U_s.

General

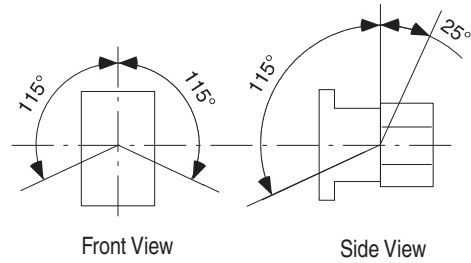
		Cat. No. 700-CF
Rated Insulation Voltage U_i		
IEC		690V
UL; CSA		600V
Rated Impulse Strength U_{imp}		6 kV
High Test Voltage 1 minute (per IEC 60947-4)		2500V
Rated Voltage U_e		
AC		115, 230, 400, 500, 690V
DC		24, 48, 110, 220, 440V
Short-Circuit Protection gG Fuse 20 A		
Rated Frequency		50/60 Hz, DC
Ambient Temperature		
Storage		-55...+80 °C (-67...176 °F)
Operation at nominal current		-25...+60 °C (-13...140 °F)
15% current reduction for AC-12 at > 60 °C		-25...+70 °C (-13...158 °F)
Corrosion Resistance		humid-alternating climate, cyclic, per IEC 60068-2-30 and DIN 50 016, 56 cycles
Altitude		2000 m above mean sea level, per IEC60 947-4
Type of Protection		
IP2X (IEC 60529 and DIN 40050)		in connected state
Shock Resistance		IEC 60068-2: Half sinusoidal shock 11 ms, 30 G (in 3 directions)
Vibration Resistance		IEC 60068-2: Static >2 G, in normal position no malfunction <5 G

Approximate Dimensions are shown in millimeters (inches). Approximate Dimensions are not intended for manufacturing purposes.

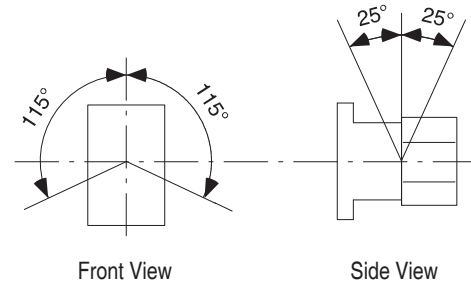
Mounting Position



AC and DC Control Relay with DC Electronic Coil



DC Control Relay



AC and DC Control Relays with 12V or 24V DC Electronic Coil

Type	a	b	c	c1	c2	Ød	d1	d2
700-CF, -CFB, -CFM	45 (1-25/32)	81 (3-3/16)	80.5 (3-11/64)	75.5 (3-3/32)	6 (1/4)	2 screws 4.5 (3/16)	60 (2-23/64)	35 (1-25/64)

DC Control Relays with 48...72V, 110...125V or 220...250V DC Electronic Coil

Type	a	b	c	c1	c2	Ød	d1	d2
700-CF, -CFB, -CFM	45 (1-25/32)	105 (4-1/8)	80.5 (3-11/64)	75.5 (3-3/32)	6 (1/4)	2 screws 4.5 (3/16)	60 (2-23/64)	35 (1-25/64)

DC Control Relays with Conventional Coil

Type	a	b	c	c1	c2	Ød	d1	d2
700-CF, -CFB, -CFM	45 (1-25/32)	81 (3-3/16)	106.5 (4-3/16)	101.5 (4)	6 (1/4)	2 screws 4.5 (3/16)	60 (2-23/64)	35 (1-25/64)

Accessories

Relay with		AC Control Relay		DC Control Relay	
		mm	(inches)	mm	(inches)
Auxiliary Contact for Front Mounting	2- or 4-pole	c/c1 + 39	(c/c1 + 1 – 37/64)	c/c1 + 39	c/c1 + 1 – 37/64)
Auxiliary Contact for Side Mounting	1- or 2-pole	a + 9	(a + 23/64)	a + 9	(a + 23/64)
Pneumatic Timing Module	—	c/c1 + 58	(c/c1 + 2 – 23/64)	—	—
Solid-state Timing Module	on coil terminal side	b + 24	(b + 15/16)	b + 24	(b + 15/16)
Mechanical Latching	—	c/c1 + 61	(c/c1 + 2 – 31/64)	—	—
DC Interface	on coil terminal side	b + 9	(b + 23/64)	—	—
Surge Suppressor	on coil terminal side	b + 3	(b + 1/8)	b + 3	(b + 1/8)
Labelling with:	label sheet	+0	(+0)	+0	(+0)
—	marking tag with cover	+0	(+0)	+0	(+0)
—	marking tag carrier for System V4/V5	+5.5	(+7/32)	+5.5	(+7/32)
—	marking tag carrier for System Bull. 1492W	+5.5	(+7/32)	+5.5	(+7/32)