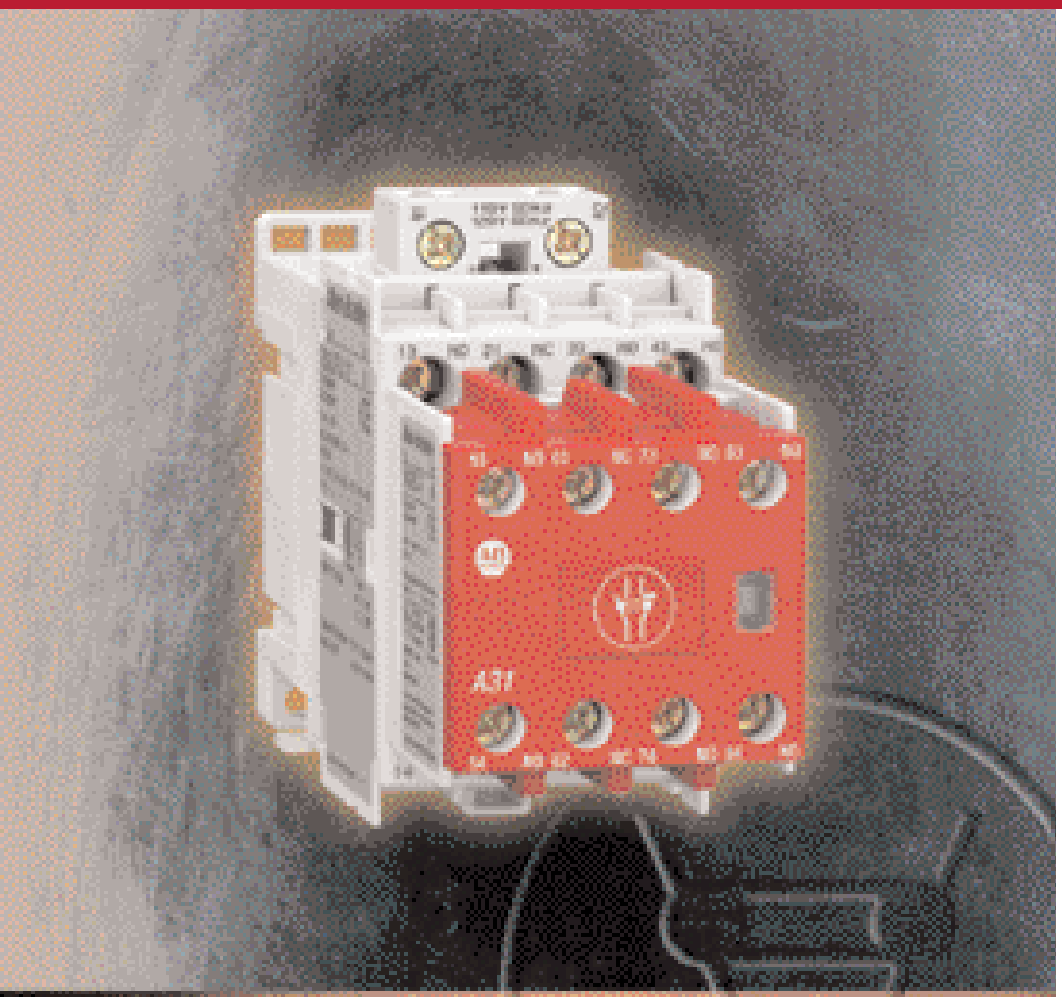


Allen-Bradley

Bulletin 700S-CF
Bulletin 700S-P

Safety Control Relays–The Safe Solution

Rockwell Automation

Bringing Together Leading Brands in Industrial Automation

Allen-Bradley

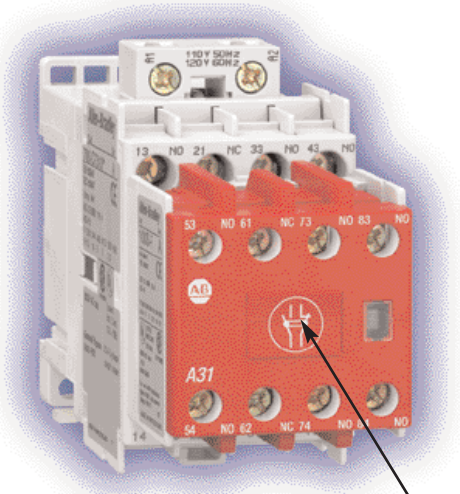
Product Profile

Safety Control Relays
Designed To Meet Worldwide Safety Standards

Bulletin 700S-CF
Bulletin 700S-P

Rockwell Automation introduces a new category of relays designed to meet the latest and emerging worldwide safety standards. These safety control relays offer special features to enable you to design safe control circuits with current ratings up to 20 Amps.

Bulletin 700S Safety Control Relays provide mechanically-linked contacts on all poles. Mechanically-linked contacts are required in feedback circuits for modern safety applications, such as e-stops, safety gates, light curtains, and master control relays.



700S-CF (8 pole)

IEC mechanically-linked symbol

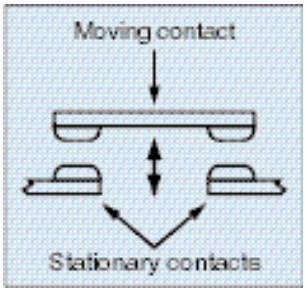
700S-P (4 -12 pole)

Mechanically-Linked Contacts

This feature allows detection of a welded contact condition. Mechanically-linked contacts are linked together; they are not independent. If a N.O. contact welds, all N.C. contacts remain open. If a N.C. contact welds, all N.O. contacts remain open.

Double-Break Contacts

This design provides better protection against contact welding than a single break design. It offers greater DC load breaking capability and better isolation. This feature also provides separation of N.O. and N.C. circuits. Double-break contacts open the circuits in two places, creating two air gaps and reducing the probability of welded contacts by more that 50% compared to a single-break design.



Double-break contacts reduce the probability of a welded contact.

Easy Identification

The red faceplate allows easy identification of safety devices. This face place displays the IEC 60947-5-1 mechanically-linked symbol.

Anti-Tamper

The anti-tamper feature ensures the long-term integrity of your safety system. All contact blocks are permanently fixed to ensure that the safety function is not jeopardized. Manual operation and field modifications are prevented.

Bulletin 700S-CF

- **Positively guided/mechanically linked contacts**
- **Mechanically-linked contacts symbol prominently displayed on front**
- **Red face plate**
- **8 poles, all permanently attached**
- **Ideal for use in safety circuits**
- **AC and DC operating coils**
- **SUVA third-party certification**

TABLE OF CONTENTS

Description	Page	Description	Page
Product Selection	4	**Specifications**	5
Dimensions	7		

Description

Bulletin 700S-CF Safety Control Relays provide mechanically linked, positively guided contacts, which are required in feedback circuits for modern safety applications. The positively guided N.C. auxiliary contacts will not change state if a N.O. contact welds. Use with safety relays to expand output capability.

Conformity to Standards

IEC 947-5-1
EN 50011, EN 50005, EN 50022
UL 508
VDE 0660
CSA C22.2 Part 14

Approvals

CE Certified
CSA Certified
UL Listed, File E14840, Guide NKCR
SUVA Third Party Certified

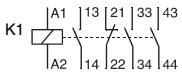
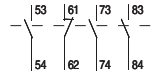
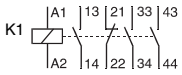
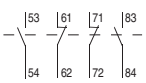
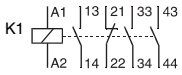
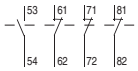
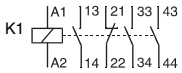
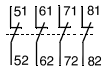
Your order must include:

- Cat. No. of the relays required, complete with coil suffix.
- Cat. No. of adder decks, timers and accessories required.
- If required, the part number of replacement coils.

Safety Control Relays

Product Selection

Type S-CF Safety Control Relays — 8-Pole AC and DC Coil Voltages

Connection Diagrams		Contacts		700S-CF	
				AC Coils	DC Coils
Main Contacts	Auxiliary Contacts	N.O.	N.C.	Cat. No.	Cat. No. ❶
		6	2	700S-CF620⊗C	700S-CF620Z⊗C
		5	3	700S-CF530⊗C	700S-CF530Z⊗C
		4	4	700S-CF440⊗C	700S-CF440Z⊗C
		3	5	700S-CF350⊗C	700S-CF350Z⊗C

⊗ AC Coil Voltage Suffix Code

Voltage	12	24	32	36	42	48	100	100-110	110	120	127	200	200-220	208	208-240	220-230
50 Hz	R	K	V	W	X	Y	KP	–	D	P	S	KG	–	–	–	F
60 Hz	Q	J	–	V	–	X	–	KP	–	D	–	–	KG	H	L	–
50/60 Hz	–	KJ	–	–	–	KY	KP	–	KD	–	–	KG	–	–	–	–

Voltage	230	230-240	240	277	347	380	380-400	400	400-415	440	480	500	550	600
50 Hz	–	VA	T	–	–	–	N	–	G	B	–	M	C	–
60 Hz	–	–	A	T	I	E	–	–	–	N	B	–	–	C
50/60 Hz	KF	–	KA	–	–	–	–	KN	–	KB	–	–	–	–

⊗ DC Coil Voltage Suffix Code ❶

Voltage	9	12	24	36	48	60	64	72	80	110	115	125	220	230	250
Standard	R	Q	J	W	Y	Z	B	G	E	D	P	S	A	F	T
With diode suppressor	—	—	DJ	—	—	—	—	—	—	—	—	—	—	—	—

❶When ordering **DJ** coil with built-in surge suppression, remove **Z** from the Cat. No.
Example: Cat. No. 700S-CF440Z⊗C becomes Cat. No. 700S-CF440DJC.

General

			Cat. No. 700S-CF main poles	front auxiliary contacts
Contact Ratings — NEMA			A600, P600	A600, Q600
UL General Purpose Current			20A	!0A
Minimum Contact Rating		17 – 19.9V	30 mA	
		20 – 24V	20 mA	
Contact Ratings — IEC AC-15 (solenoids, contactors) at rated voltage IEC 947, EN 60947		24V	15 A	6 A
		48V	15 A	6 A
		120V	14 A	6 A
		240V	10 A	5 A
		400/415V	5 A	3 A
		480V/500V	2.5 A	1.6 A
		600V	1.8 A	1.2 A
		690V	1 A	1.0 A
AC-12 (Control of AC resistive loads) IEC 947, EN 60947	**40°C**	I_{th}	20 A	10 A
		230V	10 kW	
		400V	17 kW	
		690V	30 kW	
	60°C	I_{th}	20 A	6 A
		230V	8 kW	
		400V	14 kW	
		690V	24 kW	
DC-12 (Control of DC resistive loads) IEC 947 EN 60947		24V	12 A	12 A
		48V	9 A	9 A
		60V	5.0 A	3.5 A
		110V	3.5 A	3.5 A
		125V	3.0 A	3.0 A
		220V	0.55 A	0.55 A
		440V	0.2 A	0.2 A
DC-13 IEC 947, EN 60947, Solenoids and contactors		24V	5 A	5 A
		48V	2 A	2 A
		60V	1.5 A	1.5 A
		125V	0.7 A	0.55 A
		220V	0.25 A	0.25 A
		440V	0.12 A	0.12 A
		600V	0.1 A	0.1 A
Avg-Mechanical Life (ops)		[Mil]	15	15
Average-Electrical Life (ops)	AC-15 (240V, 3 A)	[Mil]	1.1	0.75
Terminal Cross-Sections				
Terminal Type				
Terminal Size per IEC 947-1			2 x A4	2 x A4
 Solid/ Stranded ❶	1 or 2 Conductor	[mm²]	1.5…6	0.5…2.5
	Conductor	[mm²]	1…4	0.75…2.5
Max. Wire Size per UL/CSA		[AWG]	16…10	18…14
Tightening Torque		[lb.-in.]	8.9…22	8.9…13.3
Tightening Torque		[N•m]	1…2.5	1…1.5

❶ For sixteen or more strands, end ferrule is required.

				Yes	Yes
 **Mechanically -linked Contacts ❷**	Location of welded N.O. contacts	State of N.C. Contacts if N.O. contact welds			
		Main	Front aux.	Left side aux.	Right side aux.
	Main	Open	Open ❸	Open	Open
	Front aux.	Open	Open ❸	Open	Open
	Left side aux.	Open	Open ❸	Open	Open
	Right side aux.	Open	Open ❸	Open	Open

❷ Defined in IEC 947-5-1 annex L. Mechanically-linked is a relationship between contacts of opposite types (i.e., N.O. and N.C.).
❸ If the accessory is a pneumatic timer or latch, there is no mechanically-linked guidance; the accessory contacts are independent.

Control Circuit

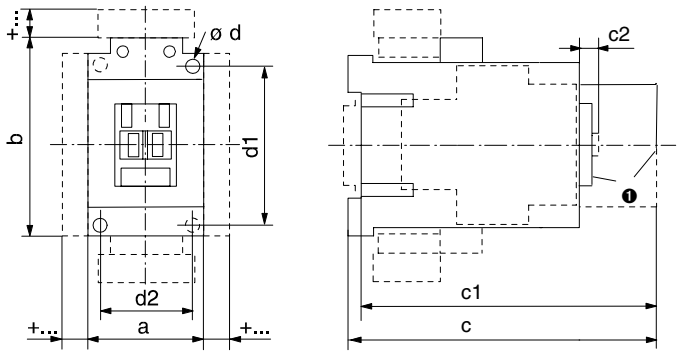
			Cat. No. 700S-CF
Operating Voltage			
AC 50/60 Hz	Pickup	[x U_s]	0.85…1.1
	Dropout	[x U_s]	0.3…0.6
DC ❶	Pickup	[x U_s]	0.8…1.1
	Dropout	[x U_s]	0.1…0.6
Coil Consumption at nominal voltage			
AC 50/60 Hz	Inrush	[VA/W]	70/50
	Seal	[VA/W]	8/2.6
DC	Inrush/Seal warm coil	[W]	6.5
	Inrush/Seal cold coil	[W]	8.5
Operating Times			
AC 50/60 Hz	Pickup Time	[ms]	15…30
	Dropout Time	[ms]	10…60
DC	Pickup Time	[ms]	40…70
	Dropout Time	[ms]	7…15
With integrated suppression		[ms]	14…20
With diode suppression		[ms]	70…95

❶ For 9V DC, code ZR, use operating voltage 0.65… 1.3 x U_s.
For 24V DC, code ZJ or DJ, use operating voltage 0.7… 1.25 x U_s.

General

	Cat. No. 700S-CF
Rated Insulation Voltage U_i	
IEC	690V
UL; CSA	600V
Dielectric Withstand Voltage	2500V
Rated Impulse Strength U_{imp}	8 kV ❷
Rated Voltage U_e	
AC	115, 230, 400, 500, 690V
DC	24, 48, 110, 220, 440V
Short-Circuit Protection IEC 947-5 Fuse-Type GG	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)❸❹
Corrosion Resistance	humid-alternating climate, cyclic, per IEC 68-2-30 and DIN 50 016, 56 cycles
Altitude	2000 m above mean sea level, per IEC 947-4
Type of Protection	IP2X in connected state
Finger Protection	safe from touch by fingers and back of hand per VDE 0106, Part 100

❷ 8 kV for main poles, 6 kV for front aux. contacts.
❸ 40 degree max. for 700S-CF350 with DC coil.
❹ Operation in 70°C ambient is permitted with current reduction of 15% below rated values



AC Safety Control Relays

a	b	c	c1	c2	∅d	d1	d2	Cat. No. ❶
45 (1-25/32)	81 (3-3/16)	119.5 (4-3/4)	114.5 (4-43/64)	6 (1/4)	2 - 4.5 (2 - 3/16)	60 (2-23/64)	35 (1-25/64)	700S-CF

DC Safety Control Relays

a	b	c	c1	c2	∅d	d1	d2	Cat. No. ❶
45 (1-25/32)	81 (3-3/16)	145.5 (5-49/64)	140.5 (5-37/64)	6 (1/4)	2 - 4.5 (2 -3/16)	60 (2-23/64)	35 (1-25/64)	700S-CF

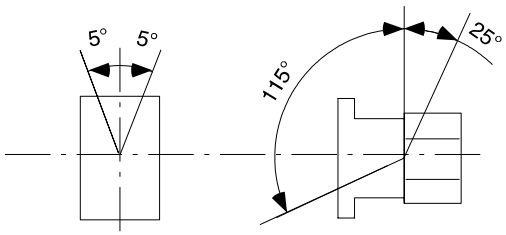
❶ All Cat. Nos. are factory stocked.

Accessories

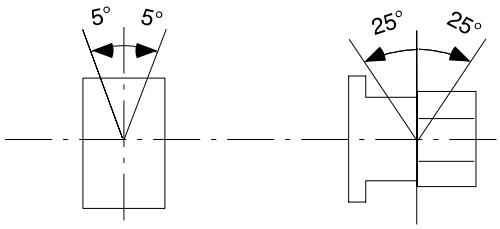
Safety Control Relays with	mm	(inches)
Auxiliary contact block for side mounting 1- or 2-pole	a + 9	(a + 23/64)
Electronic Timing Module on coil terminal side	b + 24	(b + 15/16)
Mechanical Interlock on side of contactor	a + 9	(a + 23/64)
Interface Module on coil terminal side	b + 9	(b + 23/64)
Surge Suppressor on coil terminal side	b + 3	(b + 1/8)
Labeling with label sheet marking tag sheet with clear cover marking tag adapter for System Bul. 1492W	+ 0 + 0 + 5.5	(+ 0) (+ 0) (+ 7/32)

Mounting Positions

Mounting Position



AC Safety Control Relays



DC Safety Control Relays

Bulletin 700S-P

- **Mechanically-linked contacts meeting IEC 947-5-1-L**
- **2…12 poles–all mechanically-linked**
- **Red faceplate for easy identification of safety circuits**
- **IEC mechanically-linked contacts symbol displayed on front**
- **Double-break contacts to reduce probability of welded contacts**
- **Visual indication of contact state**
- **Tamper resistant Lexan® cover helps prevent changes which could jeopardize safety**
- **Complete catalog number displayed on front**
- **Ideal for use in safety circuits**

TABLE OF CONTENTS

Description	Page	Description	Page
Product Selection	9	**Specifications**	10
		Approximate Dimensions	11

Description

The 700S-P safety control relay is designed with special features for use in safety circuits. It is designed to reduce the possibility of a welded contact, and, with external monitoring, a welded contact can be detected if one ever occurs. It features mechanically linked contacts for all N.O./N.C. contact pairs which allow detection of a welded contact in any of the poles. Contacts cannot be added, removed, nor changed so that the safety function is never jeopardized. Similarly, there is no “push-to-test” function so that safety function is not jeopardized. Typical applications: use with E-stops, light curtains, safety gates, safety interlocks.

Conformity to Standards

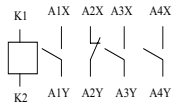
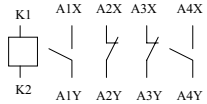
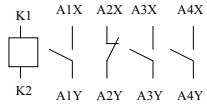
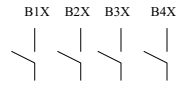
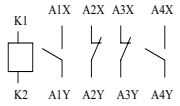
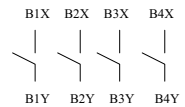
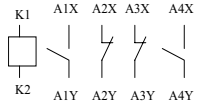
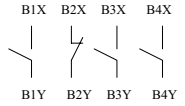
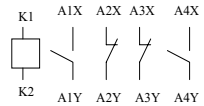
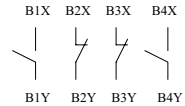
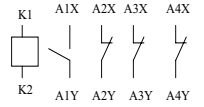
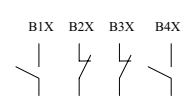
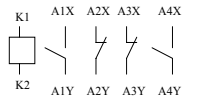
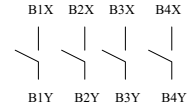
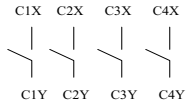
NEMA ICS-5-2
EN/IEC 60947-5-1, including Mechanically-linked Contacts
IEC 337-1 CENELEC
BS 4794
VDE 0660
CSA C22.2 No. 14
ANSI B11.19, section 5.5.1, Control Reliability
UL508

Approvals

cULus Listed
UL File #E14840, Guide NKCR
CE Certified

Your order must include:

- Cat. No. of the relays required, complete with coil suffix.

Connection Diagrams and terminal markings			Contacts		AC Coils	24V DC Coils
Coil and Main Contacts	Additional Contacts	Additional Contacts	N.O.	N.C.	Cat. No. ❶	Cat. No. ❶
	—	—	3	1	700S-P310⊗	700S-DCP310Z24
	—	—	2	2	700S-P220⊗	700S-DCP220Z24
		—	7	1	700S-P710⊗	700S-DCP710Z24
		—	6	2	700S-P620⊗	700S-DCP620Z24
		—	5	3	700S-P530⊗	700S-DCP530Z24
		—	4	4	700S-P440⊗	700S-DCP440Z24
		—	3	5	700S-P350⊗	700S-DCP350Z24
			10	2	700S-P1020⊗	700S-DCP1020Z24

❶ For other coil voltages, consult your local Allen-Bradley Sales Office.

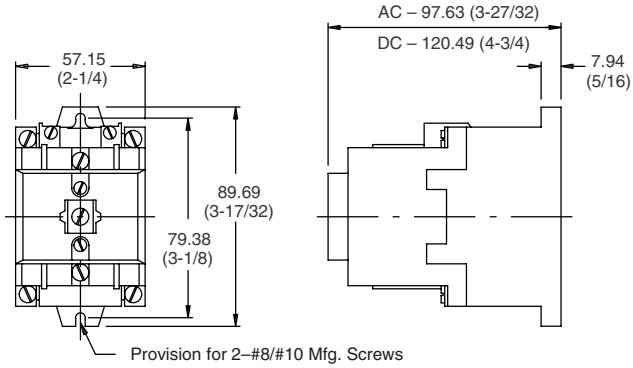
⊗ AC Voltage Suffix Code

The Cat. No. as listed is incomplete. Select a voltage suffix code from the table below to complete the Cat. No.
Example: Cat. No. 700S-P310 becomes Cat. No. 700S-P310A1 for a 120V AC coil.

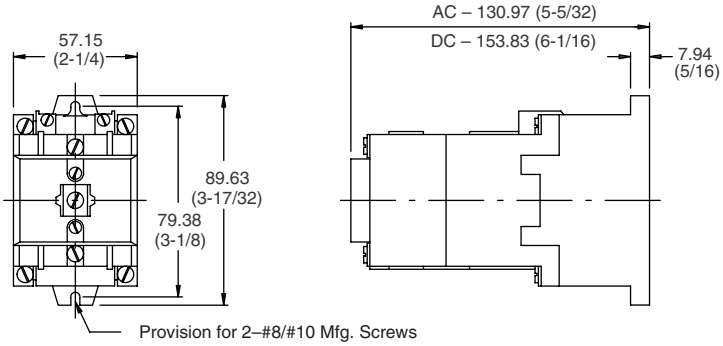
Hz	24	115-120	230-240	277	460-480
60	A24	A1	A2	A27	A4

Type			700S-P					
Electrical								
Contact Rating Continuous			10 A @ 600V AC 5 A @ 600V DC					
Ratings Make/Break	AC		NEMA A600					
	DC		NEMA P600					
Minimum Contact Switching Ratings			10V, 50 mA					
DC Switching	Contacts in Series		Volts DC					
			24	**64**	**125**	**250**	**500**	**600**
		1	5 A	2.2 A	1.1 A	.55 A	.24 A	.2 A
		2	10 A	10 A	5 A	2 A	.7 A	.5 A
		3	—	—	7 A	3 A	1.5 A	1.0 A
		4	—	—	10 A	5 A	2.5 A	1.5 A
Contact Electrical Life—Resistive Loads			1.5 million operations at 10A break at 120V AC 14 million operations at 1A break at 120V AC 6 million operations at 1A break at 24V DC					
Coil Voltage Range ❶	AC		85…110%					
	DC		80…110%					
	Battery Charging		85…115%					
Coil Consumption			**50 Hz**			**60 Hz**		
	AC	Inrush	132 VA			138 VA		
		Sealed	19.3 VA			19 VA		
	DC	Inrush	12.7 W					
		Sealed	12.7 W					
Mechanical								
Mechanically Linked Contacts			All contacts are mechanically linked per IEC 947-5-1 annex L for 2 to 12 poles					
Operating Time	Pickup		AC – 10…20 ms DC – 30…50 ms					
	Dropout		AC – 10…20 ms DC – 20…33 ms					
Mechanical Life			12.5 million operations ❸					
Construction								
Contact Arrangement			2 to 12 Poles, Double Break Contacts N.O. or N.C. (8 N.C. Maximum)					
Contact Material/Design			Silver Nickel/Bifurcated					
Mounting			Panel mount or mount on 700-MP Rail Horizontal Mounting Recommended					
Environmental								
Temperature	Operating ❷		–20…+65°C (–4…149°F)					
	Storage		–40…+65°C (–40…149°F)					
Wire Terminations								
Wire size per UL/CSA			1X #18 AWG…2X #12 AWG					
Tightening Torque			8…12 lb-in. (0.9…1.4 N•m)					

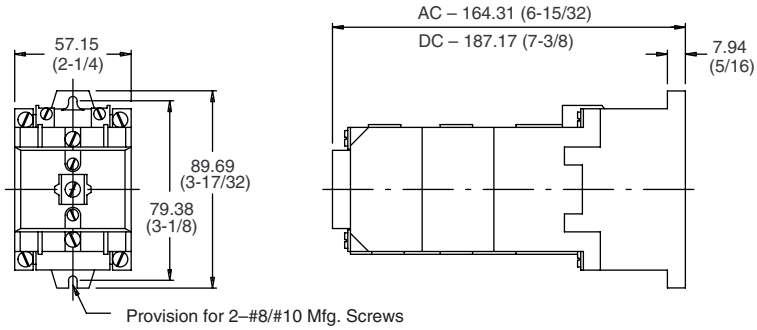
❶ Coil voltage required for proper operation (percent of rated coil voltage).
❷ Temperature inside the panel.
❸ 90% of devices are expected to meet or exceed 12.5 million operations, and 50% of devices are are expected to meet 20 million operations.



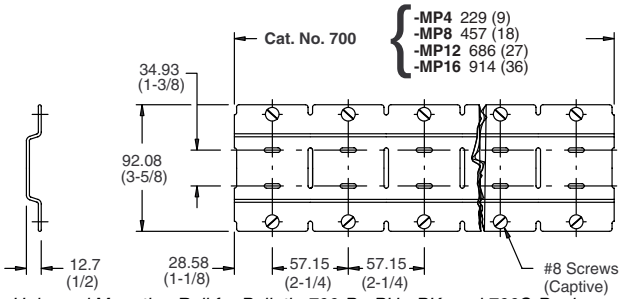
2-pole and 4-pole Bulletin 700S-P Relay
Approximate Shipping Weight AC – 0.68 kg (1.5 lbs.),
DC – 1.34 kg (2.95 lbs.)



6- and 8-pole Bulletin 700S-P Relay
Approximate Shipping Weight AC – 0.79 kg (1.75 lbs.),
DC – 1.45 kg (3.20 lbs.)



10- and 12-pole Bulletin 700S-P Relay
Approximate Shipping Weight AC – 1.02 kg (2.25 lbs.),
DC – 1.68 kg (3.7 lbs.)

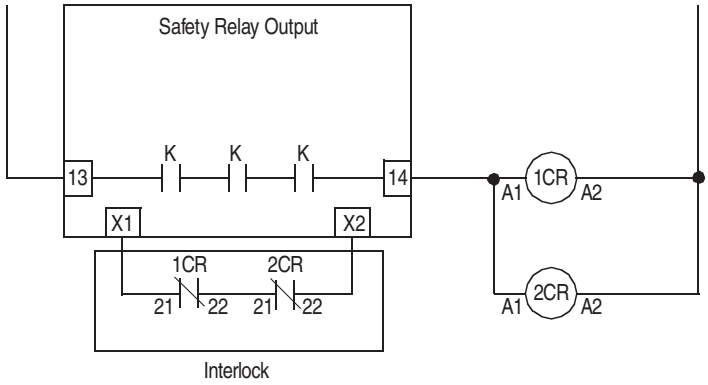


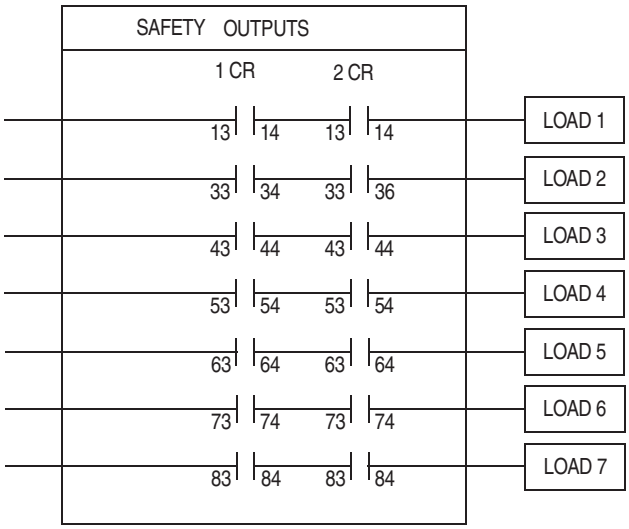
Universal Mounting Rail for Bulletin 700-P, -PH, -PK, and 700S-P relays.

Secure the mounting strip with 2 screws at each end relay position.
Use a minimum of one screw at the 3rd, 5th, 7th, etc., relay positions.
Alternate between upper and lower horizontal slots.

Safety Relay Output Block Diagram

This diagram illustrates how 2 700S safety control relays can be used to expand Allen-Bradely Bulletin 440 safety relay outputs.

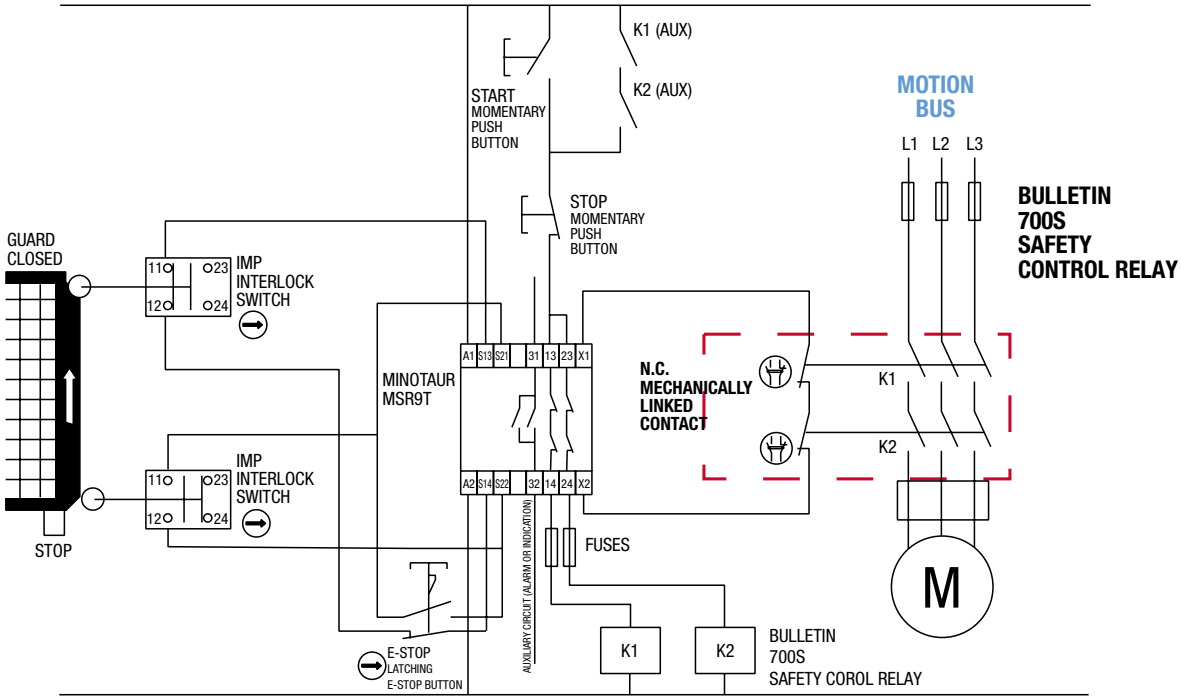




CR = Industrial Relay (700S-P, 700S-CF)

Note: 1 CR and 2 CR are Allen-Bradley 700S safety control relays with mechanically-linked contacts.

Application Example: EN954-1 Category 3 Safety Circuit
This diagram shows how to increase the current rating or number of safety outputs on Allen-Bradely Bulletin 440 safety relay by using 700S relays.



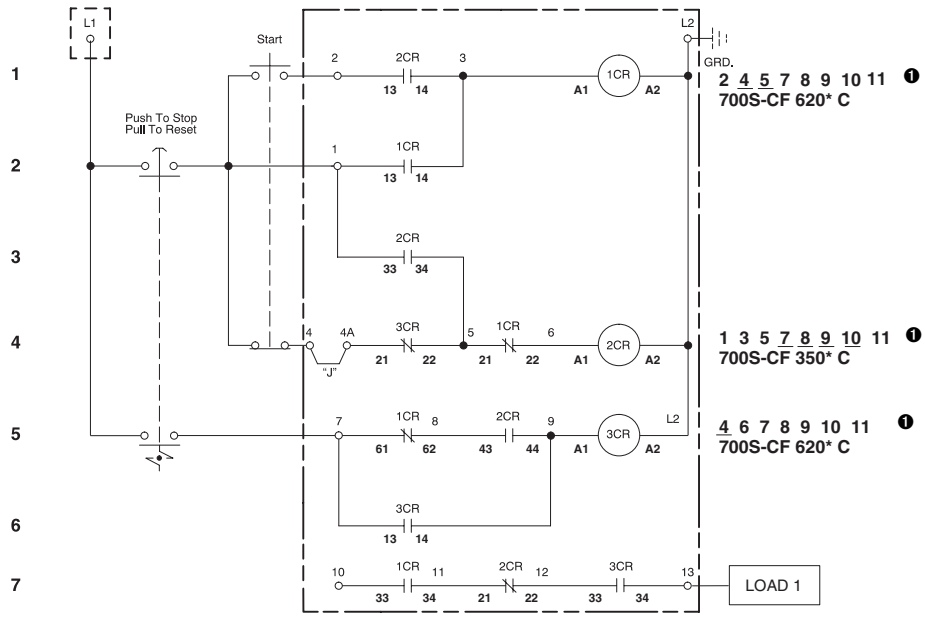
Safety Relay Circuit With 5 Safety Outputs Using 700S-CF Safety Control Relays

- Circuit complies with EN 954 categories 1, 2, 3
- Use for E-stop control. E-stop will work properly if any one fault occurs (a fault could be one welded contact or one undesired open connection such as a loose wire).
- Prevents restart of the 5 safety outputs if there is a single fault anywhere in the system.
- High output switching capability and long contact life.
- Provides greater user flexibility for the number of N.O. and N.C. contacts.

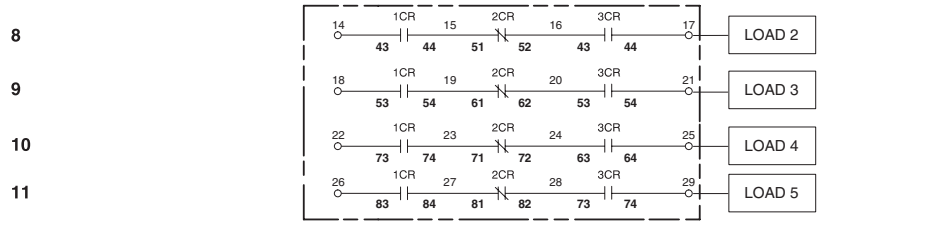
Use (3) 700S-CF relays and this diagram to construct the circuit.

Basic Circuit

(1) Output Circuit (3 Relays, 9 Terminal Blocks)

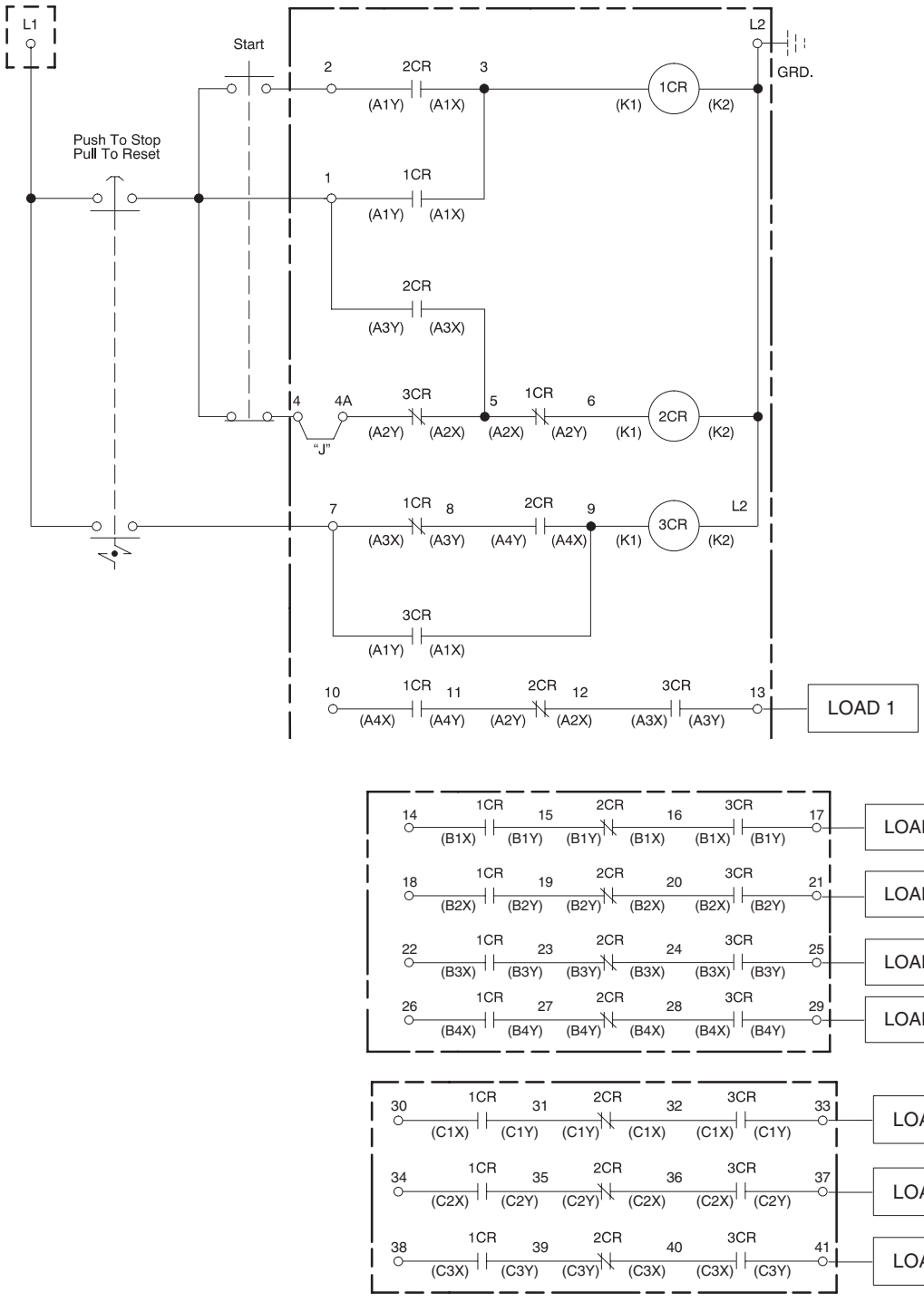


(5) Output Circuit (3 Relays, 17 Terminal Blocks)



❶ Numbers shown are the line numbers where the contacts for this relay appear.

Safety Relay Circuit With 8 Safety Outputs Using 700S-P Safety Control Relays



Safety Control Relays Solutions to Meet Your Needs

Learn more about Complete Automation Safety Control Relays from Allen-Bradley on our website: www.ab.com or call your local Allen-Bradley distributor.

Our experienced representatives will support the integration of our Relays into all phases of your operation.

Get It Now!

Three ways to get more information:

- View publications online at: www.ab.com/
- Order publications online at: www.theautomationbookstore.com
- Contact your local Allen-Bradley distributor

Rockwell Automation Technical Response Center representatives are available to support your Complete Automation solution.

www.rockwellautomation.com

Corporate Headquarters
Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI, 53202-5302 USA, Tel: (1) 414.212.5200, Fax: (1) 414.212.5201

Headquarters for Allen-Bradley Products, Rockwell Software Products and Global Manufacturing Solutions
Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36-BP 3A/B, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Headquarters for Dodge and Reliance Electric Products
Americas: Rockwell Automation, 6040 Ponders Court, Greenville, SC 29615-4617 USA, Tel: (1) 864.297.4800, Fax: (1) 864.281.2433
Europe: Rockwell Automation, Brühlstraße 22, D-74834 Elztal-Dallau, Germany, Tel: (49) 6261 9410, Fax: (49) 6261 17741
Asia Pacific: Rockwell Automation, 55 Newton Road, #11-01/02 Revenue House, Singapore 307987, Tel: (65) 351 6723, Fax: (65) 355 1733

Publication 700S-SG001A-EN-E – October 2001