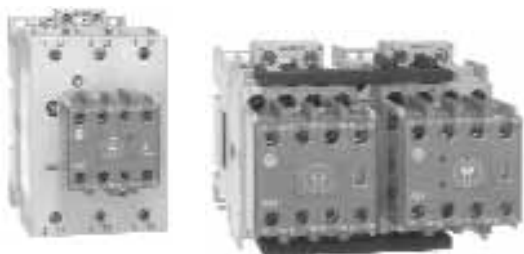


Bulletin 100S/104S Safety Contactors



Bulletin 100S-C/104S-C safety contactors provide mechanically linked positively guided contacts, required in feedback circuits of modern safety applications. The mechanically linked N.C. auxiliary contacts will not change state when a power pole welds. In addition, the gold-plated bifurcated auxiliary contacts are ideally suited for low-energy applications or feedback control circuits with multiple series-connected N.C. auxiliary contacts.

- Mechanically Linked N.C. Auxiliary Contacts
- Front-Mounted Auxiliary Contacts:
  - Permanently Fixed
  - Protective Cover to Prevent Manual Operation
  - Red Contact Housing for Easy Identification
  - Incorporates IEC 60947-5-1 “Mechanically Linked” Symbol
- AC and DC Operating Coils
- SUVA Third-Party Certification

Your order must include: cat. no. of the contactor specified with coil voltage code and, if required, cat. no. of any accessories and/or replacement coils.

3-Pole AC- and DC-Operated Contactors



- 3 Main Contacts

Standards Compliance

- EN50205
- CSA C22.2 No. 14
- UL 508
- EN/IEC 60947-4
- IEC 60947-4-1 Annex H — Mirror Contacts
- IEC 60947-5-1 Annex L — Mechanically Linked Contacts

Approvals

- SUVA Third-Party Certified
- CE Marked
- CSA Certified (Cert No. LR13908)
- UL Listed (File No. E3125; Guide No. NLDX)

$I_e$ [A]		Ratings for Switching AC Motors — AC-2, AC-3, AC-4										Aux. Contacts		Cat. No.*
		3Ø kW (50 Hz)				Hp (60 Hz)								
		AC-3	AC-1	230V	400V/ 415V	500V	690V	1Ø		3Ø				
						115V	230V	200V	230V	460V	575V	N.O.	N.C.	
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	0	5	100S-C09Ø05BC
												1	4	100S-C09Ø14BC
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	0	5	100S-C12Ø05BC
												1	4	100S-C12Ø14BC
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	0	5	100S-C16Ø05BC
												1	4	100S-C16Ø14BC
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	0	5	100S-C23Ø05BC
												1	4	100S-C23Ø14BC
30	65	10	15	15	15	2	5	7-1/2	10	20	25	0	4	100S-C30Ø04BC
												1	4	100S-C30Ø14BC
37	65	11	18.5/20	20	18.5	3	5	10	10	25	30	0	4	100S-C37Ø04BC
												1	4	100S-C37Ø14BC
43	85	13	22	25	22	3	7-1/2	10	15	30	30	0	4	100S-C43Ø04BC
												1	4	100S-C43Ø14BC
60	100	18.5	32	37	32	5	10	15	20	40	50	0	4	100S-C60Ø04BC†
												1	4	100S-C60Ø14BC†
72	100	22	40	45	40	5	15	20	25	50	60	0	4	100S-C72Ø04BC†
												1	4	100S-C72Ø14BC†
85	100	25	45	55	45	7-1/2	15	25	30	60	60	0	4	100S-C85Ø04BC†
												1	4	100S-C85Ø14BC†

\* For other contact configurations and full product details, please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

† If standard cross-stamped front-mount auxiliary contacts are required, remove the letter "B" before the letter "C" in the cat. no. Example: Cat. No. 100S-C09Ø05BC becomes Cat. No. 100S-C09Ø05C.

‡ Bifurcated front-mount auxiliary contacts on Cat. Nos. 100S-C60...C85 conform to mirror contact performance only.

⊗Coil Voltage Code and Terminal Position

The Cat. No. as listed is incomplete. Select a coil voltage code from the table below to complete the Cat. No. Example: 120V, 60Hz: **Cat. No. 100S-C09⊗05BC** becomes **Cat. No.100S-C09D05BC**.

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

[V]	230	230-240	240	277	347	380	380-400	400	400-415	440	480	500	550	600
AC, 50 Hz	—	VA	T	—	—	—	N	—	G	B	—	M	C	—
AC, 60 Hz	—	—	A	T	I	E	—	—	—	N	B	—	—	C
AC, 50/60 Hz	KF	—	KA	—	—	—	—	KN	—	KB	—	—	—	—

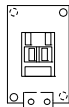
[V]		9	12	24	36	48	60	64	72	80	110	115	125	220	230	250
100S-C09...C43	Standard	ZR	ZQ	ZJ	ZW	ZY	ZZ	ZB	ZG	ZE	ZD	ZP	ZS	ZA	ZF	ZT
	with Integrated Diode	—	—	DJ	—	—	—	—	—	—	—	—	—	—	—	—
100S-C60...C85	with Integrated Diode	DR	DQ	DJ	DW	DY	DZ	DB	DG	DE	DD	DP	DS	DA	DF	DT

Coil Terminal Position

- All contactors are delivered with the coil terminals located on the **line side**.
- For **load side** coil terminations, insert a “U” prior to the coil voltage code.  
 Example: **Cat. No. 100S-C09UD05BC**.







**Cat. No.**  
**100S-C09⊗05C**  
**Line Side**



**Cat. No.**  
**100S-C09U⊗05C**  
**Load Side**

4-Pole AC- and DC-Operated Contactors

• 4 Main Contacts

I <sub>e</sub> [A]		Ratings for Switching AC Motors										Contact Configuration				Cat. No.*†
		AC-2, AC-3, AC-4					Hp (60 Hz)					Main Pole		Auxillary Contacts		
		3Ø kW (50 Hz)*														
AC-3	AC-1	230V	400V/415V	500V	690V	1Ø		3Ø *								
						115V	230V	200V	230V	460V	575V	N.O.	N.C.	N.O.	N.C.	
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	4	0	0	4	
												3	1	0	4	
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	4	0	0	4	
												3	1	0	4	
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	4	0	0	4	
												3	1	0	4	
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	4	0	0	4	
												3	1	0	4	

\* For other contact configurations, please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

\* Three-phase ratings only apply to contactors with at least three N.O. power poles.

† If standard cross-stamped front-mount auxiliary contacts are required, remove the letter "B" before the letter "C" in the cat. no. Example: Cat. No. 100S-C09~~B~~404BC becomes Cat. No. 100S-C09~~B~~404C.

⊗ Coil Voltage Code

The Cat. No. as listed is incomplete. Select a coil voltage code from the table below to complete the cat. no. Example: 120V, 60 Hz: Cat. No. 100S-C09~~B~~404BC becomes Cat. No. 100S-C09D404BC.

[V]	12	24	32	36	42	48	100	100-110	110	120	127	200	200-220	208	208-240
AC, 50 Hz	R	K	V	W	X	Y	KP	—	D	P	S	KG	L	—	—
AC, 60 Hz	Q	J	—	V	—	X	—	KP	—	D	—	—	KG	H	L
AC, 50/60 Hz	—	KJ	—	—	—	KY	KP	—	KD	—	—	KG	KL	—	—

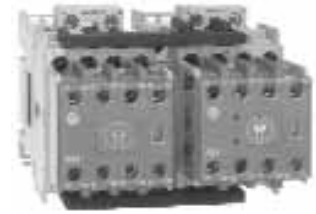
  

[V]	220-230	230	230-240	240	277	347	380	380-400	400	400-415	440	480	500	550	600
AC, 50 Hz	F	—	VA	T	—	—	—	N	—	G	B	—	M	C	—
AC, 60 Hz	—	—	—	A	T	I	E	—	—	—	N	B	—	—	C
AC, 50/60 Hz	KL	KF	—	KA	—	—	—	—	KN	—	KB	—	—	—	—



[V]		9	12	24	36	48	60	64	72	80	110	115	125	220	230	250
100S-C09...C23	Standard	ZR	ZQ	ZJ	ZW	ZY	ZZ	ZB	ZG	ZE	ZD	ZP	ZS	ZA	ZF	ZT
	with Integrated Diode	—	—	DJ	—	—	—	—	—	—	—	—	—	—	—	—

Reversing AC- and DC-Operated Contactors

- 3 Main Contacts
- Includes Mechanical/Electrical Interlock
- Includes Reversing Power Wiring



6-Contactors &  
Control Relays

I <sub>e</sub> [A]		Ratings for Switching AC Motors										Aux. Contacts Installed per Contactor		Cat. No.**
		AC-2, AC-3, AC-4												
		3Ø kW (50 Hz)				Hp (60 Hz)								
AC-3	AC-1	230V	400V/ 415V	500V	690V	1Ø		3Ø				N.O.	N.C. †	
						115V	230V	200V	230V	460V	575V			
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	0	6	104S-C09®012BC
												1	5	104S-C09®210BC
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	0	6	104S-C12®012BC
												1	5	104S-C12®210BC
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	0	6	104S-C16®012BC
												1	5	104S-C16®210BC
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	0	6	104S-C23®012BC
												1	5	104S-C23®210BC
30	65	10	15	15	15	2	5	7-1/2	10	20	25	0	5	104S-C30®010BC
												1	5	104S-C30®210BC
37	65	11	18.5/20	20	18.5	3	5	10	10	25	30	0	5	104S-C37®010BC
												1	5	104S-C37®210BC
43	85	13	22	25	22	3	7-1/2	10	15	30	30	0	5	104S-C43®010BC
												1	5	104S-C43®210BC
60	100	18.5	32	37	32	5	10	15	20	40	50	0	5	104S-C60®010BC§
												1	5	104S-C60®210BC§
72	100	22	40	45	40	5	15	20	25	50	60	0	5	104S-C72®010BC§
												1	5	104S-C72®210BC§
85	100	25	45	55	45	7-1/2	15	25	30	60	60	0	5	104S-C85®010BC§
												1	5	104S-C85®210BC§

\* For other contact configurations, please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

\*\* If standard cross-stamped front-mount auxiliary contacts are required, remove the letter "B" before the letter "C" in the cat. no. Example: Cat. No. 104S-C09®05BC becomes Cat. No. 104S-C09®05C.

† One of the N.C. auxiliary contacts is supplied as part of the mechanical/electrical interlock.

§ Bifurcated front-mount auxiliary contacts on Cat. Nos. 104S-C60...C85 conform to mirror contact performance only.

⊗ Coil Voltage Code





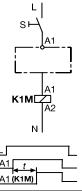
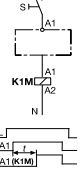

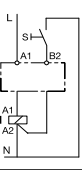
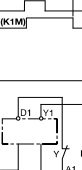

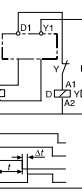




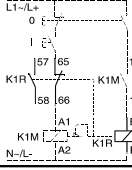
The cat. no. as listed is incomplete. Select a coil voltage code from the table below to complete the cat. no. Example: 120V 60 Hz: Cat. No. 104S-C09®210BC becomes Cat. No. 104S-C09D210BC.

[V]	12	24	32	36	42	48	100	100-110	110	120	127	200	200-220	208	208-240
AC, 50 Hz	R	K	V	W	X	Y	KP	—	D	P	S	KG	L	—	—
AC, 60 Hz	Q	J	—	V	—	X	—	KP	—	D	—	—	KG	H	L
AC, 50/60 Hz	—	KJ	—	—	—	KY	KP	—	KD	—	—	KG	KL	—	—

[V]	220-230	230	230-240	240	277	347	380	380-400	400	400-415	440	480	500	550	600
AC, 50 Hz	F	—	VA	T	—	—	—	N	—	G	B	—	M	C	—
AC, 60 Hz	—	—	—	A	T	I	E	—	—	—	N	B	—	—	C
AC, 50/60 Hz	KL	KF	—	KA	—	—	—	—	KN	—	KB	—	—	—	—

[V]		9	12	24	36	48	60	64	72	80	110	115	125	220	230	250
104S-C09...C43	Standard	ZR	ZQ	ZJ	ZW	ZY	ZZ	ZB	ZG	ZE	ZD	ZP	ZS	ZA	ZF	ZT
	with Integrated Diode	—	—	DJ	—	—	—	—	—	—	—	—	—	—	—	—
104S-C60...C85	with Integrated Diode	DR	DQ	DJ	DW	DY	DZ	DB	DG	DE	DD	DP	DS	DA	DF	DT

Control Modules (For 100-SC09...C85 contactors)

	Description	Connection Diagrams	For Use With	Cat. No.	
	<b>Pneumatic Timing Modules</b> Pneumatic timing element contacts switch after the delay time. The contacts on the main control relay continue to operate without delay.	<b>On-Delay</b> 0.3...30 s Range 1.8...180 s Range		100-C with AC coils, 700-CF all	100-FPTA30 100-FPTA180
		<b>Off-Delay</b> 0.3...30 s Range 1.8...180 s Range		100-C all, 700-CF all	100-FPTB30 100-FPTB180
	<b>Electronic Timing Modules — On-Delay</b> Delay of the contactor or control relay solenoid. The contactor or control relay is energized at the end of the delay time.	<b>On-Delay</b> 0.1...3 s Range 1...30 s Range 10...180 s Range 110...240V, 50/60 Hz 110...250V DC		100-C (all), 700-CF 110...240V 50/60 Hz 110...250V DC	100-ETA3 100-ETA30 100-ETA180
		<b>On-Delay</b> 0.1...3 s Range 0.1...3 s Range 10...180 s Range 24...48V DC		100-C with DC coils, 700-CF with DC coils	100-ETAZJ3 100-ETA3 100-ETAZJ180
	<b>Electronic Timing Modules — Off-Delay</b> Delay of the contactor or control relay solenoid. After interruption of the control signal, the contactor or control relay is deenergized at the end of the delay time.	<b>Off-Delay</b> 0.3...3 s Range 1...30 s Range 10...180 s Range 24V, 50/60 Hz		100-C with AC coils, 700-CF with AC coils	100-ETBKJ3 100-ETBKJ30 100-ETBKJ180
		<b>Off-Delay</b> 0.3...3 s Range 1...30 s Range 10...180 s Range 110...240V, 50/60 Hz		100-C with AC coils, 700-CF with AC coils	100-ETB3 100-ETB30 100-ETB180
	<b>Electronic Timing Modules</b> Delay of the contactor solenoid. Contactor K 3 (Y) is deenergized (off) and K 2 (D) is energized (on) after the end of the set Y end time. (Switching delay at 50 ms.) Continuous adjustment range High repeat accuracy	<b>Transition Time Y Contactor</b> 1...30 s Range 110...240V, 50/60 Hz		100-C with AC coils	100-ETY30
	<b>Mechanical Interlocks</b> For interlocking of two contactors. Common interlock for all Bul. 100-C contactor sizes Interlocking of different sizes possible Mechanical and electrical interlocking possible in one module by means of integrated auxiliary contacts 9 mm dovetail connector included	Mechanical only without auxiliary contacts		100-C (except 100-C40, -C90)	100-MCA00
		Mechanical/electrical interlocking with 2 N.C. auxiliary contacts		100-C (except 100-C40, -C90)	100-MCA02
	—		—	100-FL11KF	


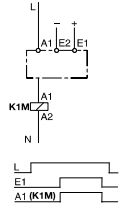

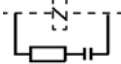
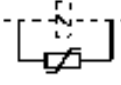
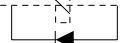
⊗ Coil Voltage Code

The cat. no. as listed is incomplete. Select a voltage suffix code from the table below to complete the Cat. No. Example: 120V, 60 Hz: **Cat. No. 100-FL11**⊗ becomes **Cat. No. 100-FL11D**.






[V]*	24V	48V	100V	110V	120V	230-240V	240V	277V	380-400V	400-415V	440V	480V
AC, 50 Hz	K	Y	KP	D	—	VA	T	—	N	G	B	—
AC, 60 Hz	J	—	—	—	D	—	A	T	—	—	N	B

\* For special voltages, please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

Control Modules (For 100S-C09...C85 contactors), Continued




Description		Voltage Range	Connection Diagrams	For Use With	Cat. No.	
	<b>DC Interface (Electronic)</b> 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: 18...30V DC Output: 110...240V AC			100-JE	
		Input: 48V DC Output: 110...240V AC			100-JE48	
	<b>Surge Suppressors</b> For limitation of coil switching transients. Plug-in, coil mounted Suitable for all Bul. 100-C contactor sizes, 9...85 A RC, varistor and diode versions	<b>RC Module</b> AC operating mechanism		100-C with AC coils	24...48V AC, 50/60 Hz	100-FSC48
					110...280V AC, 50/60 Hz	100-FSC280
					380...480V AC, 50/60 Hz	100-FSC480
		<b>Varistor Module</b> AC/DC operating mechanism		100-C	12...55V AC/ 12...77V DC	100-FSV55
					56...136V AC/ 78...180V DC	100-FSV136
					137...277V AC/ 181...350V DC	100-FSV277
					278...575V AC	100-FSV575
<b>Diode Module</b> DC operating mechanism		100-C with DC coils	12...250V DC	100-FSD250		

Assembly Components (For 100S-C09...C85 contactors)

	Description	For Use With	Pkg. Quantity*	Cat. No.
 Cat. No. 100-S0	<b>Dovetail Connectors</b> For use in contactor and starter assemblies. Single Connector — 0 mm Spacing	100-C	10	100-S0
	<b>Dovetail Connectors</b> For use in contactor and starter assemblies. Dual Connector — 9 mm Spacing			100-S9
 Cat. No. 100-SCCA	<b>Protective Covers</b> Provides protection against unintended manual operation For contactors and front mounted auxiliary contacts, pneumatic timers and latches	100-C all	1	100-SCCA
 Cat. No. 100-SCFA		100-FA, -FB, -FC, -FP, -FL;	10	100-SCFA
 Cat. No. 105-PW23	<b>Reversing Power Wiring Kits</b> For reversing connection with a solid-state or thermal overload relay	100-C09...C23	1	105-PW23
		100-C30...C37		105-PW37
		100-C43		105-PW43
		100-C60...85		105-PW85
	<b>DIN (#3) symmetrical rail</b> 35 mm x 7.5 mm x 1 m long	140M-D 140M-F	10	199-DR1






\* Must be ordered in package quantities.

Marking Systems (For 100S-C09...C85 contactors)

	Description	Pkg. Qty.*	Cat. No.
	<b>Label Sheet</b> 105 self-adhesive paper labels each, 6 x 17 mm	10	100-FMS
	<b>Marking Tag Sheet</b> 160 perforated paper labels each, 6 x 17 mm To be used with a transparent cover	10	100-FMP
	<b>Transparent Cover</b> To be used with marking tag sheets	100	100-FMC
	<b>Marking Tag Adapters</b> To be used with marking tag:	100	100-FMA1
	<b>Marking Tag Adapters</b> To be used with marking tag:	100	100-FMA2

\* Must be ordered in package quantities.

Terminal Kits (For 100S-C09...C85 contactors)

	Description	Max. Current Ratings and Wire Sizes		Pkg. Qty.*	Cat. No.
	<b>Stab Connector Kit</b> Dual stab (0.250 in.) for 100-C coil terminals For 100-C09...C85 contactors			20	199-SC2
	<b>Stab Connector Kit</b> Dual stab (0.250 in.) for 100-C power terminals For 100-C09...C23 contactors			100	199-SC10
	<b>3-Pole Terminal Lug Kit</b> For 100-C09...C23 (Line side)	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	45 A (4...16 mm <sup>2</sup> *, fine stranded w/ferrule) 45 A (4...25 mm <sup>2</sup> , coarse stranded/solid) 40 A (#10...4 AWG, stranded/solid)	1	100-CTN23
	<b>3-Pole Terminal Lug Kit</b> For 100-C09...C23 (Load side)	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	45 A (4...16 mm <sup>2</sup> *, fine stranded w/ferrule) 45 A (4...25 mm <sup>2</sup> , coarse stranded/solid) 40 A (#10...4 AWG, stranded/solid)	1	100-CTL23
	<b>3-Pole Terminal Lug Kit</b> For 100-C30...C37 (Line side)	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	60 A (4...16 mm <sup>2</sup> *, fine stranded w/ferrule) 60 A (4...25 mm <sup>2</sup> , coarse stranded/solid) 55 A (#10...4 AWG, stranded/solid)	1	100-CT37
	<b>1-Pole Terminal Lug Kit</b> For 100-C43	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	90 A (6...35 mm <sup>2</sup> , fine stranded w/ferrule) 90 A (6...50 mm <sup>2</sup> , coarse stranded/solid) 75 A (#8...2 AWG, stranded/solid)	3	100-CT43
	<b>1-Pole Terminal Lug Kit</b> For 100-C60...C85	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	130 A (10...70 mm <sup>2</sup> , fine stranded w/ferrule) 130 A (10...95 mm <sup>2</sup> , coarse stranded/solid) 130 A (#8...2/0 AWG, stranded/solid)	3	100-CT85
	<b>3-Pole Paralleling Kit</b> For 100-C09...C23	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	100 A (35...70 mm <sup>2</sup> , fine stranded w/ferrule) 100 A (35...95 mm <sup>2</sup> , coarse stranded/solid) 100 A (#0...2/0 AWG, stranded/solid)	2	100-CP23
	<b>3-Pole Paralleling Kit</b> For 100-C30...C37	IEC @ 40 °C IEC @ 40 °C UL/CSA (Encl.)	150 A (35...70 mm <sup>2</sup> , fine stranded w/ferrule) 150 A (35...95 mm <sup>2</sup> , coarse stranded/solid) 150 A (#0...2/0 AWG, stranded/solid)	2	100-CP37

\* Must be ordered in package quantities.

\* 16 mm<sup>2</sup> max. according to IEC 60947; actual max. 25 mm<sup>2</sup>.



**Bulletin 100S-D Safety Contactors**



Bulletin 100S-D safety contactors were designed to address the needs of modern safety applications requiring feedback and monitoring of the energy isolating switchgear used in hazardous motion loads. The 100S-D meets these needs through its "mirror contact" design. If a power contact welds, the N.C. auxiliary contacts will not change state. This feature provides reliable indication about the open/closed status of the main power poles. In addition, the gold-plated bifurcated auxiliary contacts are ideally suited for low-energy applications or feedback control circuits with multiple series-connected N.C. auxiliary contacts.

- 50...500 kW @400V
- 60...600 Hp @460V
- 75...700 Hp @575V
- Electronic and Conventional Coils  
 AC & DC  
 Integrated PLC Interface  
 Low Power Pick-Up & Hold-In  
 Wide Voltage Ranges
- Complete Range of Accessories
- Environmentally Friendly
- Compact Dimensions

**Product Selection**

**3-Pole AC-Operated Contactors**



- Conventional and Electronic AC Coils
- 3 Main Contacts
- Non-Reversing

**Standards Compliance**

- IEC 60947-4-1
- IEC 60947-4 Annex F
- IEC 60947 Type "2" Coordination
- CSA C22.2 No. 14
- UL 508

**Approvals**

- CE Marked
- CSA Certified
- UL Listed
- SUVA Certified

$I_e$ [A]		Switching of 3-phase motors AC-2, AC-3										Auxiliary contacts		Cat. No. ➤
60 °C	40 °C	kW (50 Hz)*						Hp (60 Hz)				N.O.	N.C.*	
AC-3	AC-1	230V	400V	415V	500V	690V	1000V	200V	230V	460V	575V			
95	160	25	50	50	55	90	45	25	30	60	75	2	2	100S-D95 <del>2</del> 22BC
110	160	32	55	55	63	100	55	40	40	75	100	2	2	100S-D110 <del>2</del> 22BC
140	250	45	75	75	80/100†	110/132‡	75	40	50	100	125	2	2	100S-D140 <del>2</del> 22BC
180	250	55	90	100	90/125†	132/160‡	90	50	60	150	150	2	2	100S-D180 <del>2</del> 22BC
210	350	63	110	110	150	200	110	60	75	150	200	2	2	100S-D210 <del>2</del> 22BC
250	350	80	132	150	160	250	133	75	100	200	250	2	2	100S-D250 <del>2</del> 22BC
300	450	90	160	160	200	300	160	100	125	250	300	2	2	100S-D300 <del>2</del> 22BC
420	500	132	220	250	300	425	220	150	175	350	400	2	2	100S-D420 <del>2</del> 22BC
630	800	200	355	355	450	500	—	200	250	500	600	2	2	100S-D630 <del>2</del> 22BC
860	1000	250	500	500	560	600	—	250	300	600	700	2	2	100S-D860 <del>2</del> 22BC

\* Preferred values according to IEC 60072-1.  
 † The N.C. contacts meet IEC 60947-4 Annex F requirements for mirror contact performance. The N.C. mirror contacts are wired in series or parallel and must be used as monitoring contacts with feedback to the safety circuit.  
 ‡ Higher kW rating only applies to contactors with electronic coil.  
 ➤ If standard cross-stamped front-mount auxiliary contacts are required, remove the letter "B" before the letter "C" in the cat. no. Example: Cat. No. **100S-D95~~2~~22BC** becomes Cat. No. **100S-D95~~2~~22C**.

⊗ Coil Voltage Codes

Conventional Coil	[V]	24	48	100	110	120	200	208	220 ...230	230	240	277	380 ...400	415	440	480	500	550	600
100S-D95...100S-D180	AC, 50 Hz	K	Y	—	D	—	—	—	A	—	T	—	N	B	G	—	M	C	—
	AC, 60 Hz	J	X	—	—	D	—	H	—	—	A	T	—	—	N	B	—	—	C
100S-D95...100S-D110	AC, 50/60 Hz	—	—	KP	KN	—	KG	—	KL	KF	KA	KT	—	—	—	—	—	—	—

Electronic Coil w/ PLC Interface§	[V]	24	42...64	100	110... 130	200	208... 277	380... 415	380... 440	440... 480	460... 500	500	600
100S-D95...100S-D300	AC, 50/60 Hz	EJ♣	EY	EP	ED	EG	EA	—	VN	—	EN	—	—
100S-D420	AC, 50/60 Hz	—	—	EP	ED	EG	EA	—	EN	—	EN	—	—
100S-D630...100S-D860	AC, 50/60 Hz	—	—	EP	ED	EG	EA	EN	—	EB	—	EM	EC

§ Signal voltage of the Cat. No. 100S-D... electronic interface  $U_e$ : 24V DC/ $I_e$ : 15 mA



Pick-up voltage: 13.0V DC...30.2V DC

Drop-out voltage: -3.0V DC...+5.0V DC

♣ Not available with 100S-D300.

**3-Pole DC-Operated Contactors**

- Conventional and Electronic DC Coils
- 3 Main Contacts
- Non-Reversing

$I_e$ [A]		Switching of 3-phase motors AC-2, AC-3										Auxiliary contacts		Conventional Coil Cat. No.	Electronic Coil Cat. No. ▶
60 °C	40 °C	kW (50 Hz) *						Hp (60 Hz)				N.O.	N.C. *		
AC-3	AC-1	230V	400V	415V	500V	690V	1000V	200V	230V	460V	575V				
95	160	25	50	50	55	90	45	25	30	60	75	2	2	100S-D95@33LC‡	100S-D95@22BC
110	160	32	55	55	63	100	—	40	40	75	100	3	2/1L	100S-D110@33LC‡	100S-D110@22BC
140	250	45	75	75	80/100 §	110/132 §	—	40	50	100	125	3	2/1L	100S-D140@33LC‡	100S-D140@22BC
180	250	55	90	100	90/125 §	132/160 §	90	50	60	150	150	3	2/1L	100S-D180@33LC‡	100S-D180@22BC
210	350	63	110	110	150	200	110	60	75	150	200	2	2	—	100S-D210@22BC
250	350	80	132	150	160	250	133	75	100	200	250	2	2	—	100S-D250@22BC
300	450	90	160	160	200	300	160	100	125	250	300	2	2	—	100S-D300@22BC
420	500	132	220	250	300	425	220	150	175	350	400	2	2	—	100S-D420@22BC
630	800	200	355	355	450	500	—	200	250	500	600	2	2	—	100S-D630@22BC
860	1000	250	500	500	560	600	—	250	300	600	700	2	2	—	100S-D860@22BC

- \* Preferred values according to IEC 60072-1.
- ‡ The N.C. contacts meet IEC 60947-4 Annex F requirements for mirror contact performance. The N.C. mirror contacts are wired in series or parallel and must be used as monitoring contacts with feedback to the safety circuit.
- ‡ For conventional DC coil only. The pickup winding must be interconnected with the N.C. late-breaking auxiliary contacts.
- § Higher kW rating only applies to contactors with electronic coil.
- ▶ If standard cross-stamped front-mount auxiliary contacts are required, remove the letter "B" before the letter "C" in the Cat. No. Example: Cat. No. **100S-D95@22BC** becomes Cat. No. **100S-D95@22C**.




⊗ **Coil Voltage Codes**

Conventional Coil	[V]	24	48	110	125	220	250
100S-D95...100S-D180	DC	ZJ	ZY	ZD	ZS	ZA	ZT

Electronic Coil w/ EI Interface *	[V]	24	48...72	110...130	200...255
100S-D95...100S-D300	DC	EZJ	EZY	EZD	EZA
100S-D420	DC	—	—	EZD	EZA
100S-D630...860	DC	—	—	ED	EA


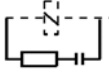
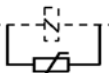
- \* Signal voltage of the cat. no. 100S-S... electronic interface  $U_e$ : 24V DC/ $I_e$ : 15 mA
- Pick-up voltage: 13.0V DC...30.2V DC
- Drop-out voltage: -3.0V DC...+5.0V DC

**Marking Systems (For 100S-D95...D860 contactors)**

	Description	Pkg. Qty.*	Cat. No.
	<b>Label Sheet</b> 105 self-adhesive paper labels each, 6 x 17 mm	10	100-FMS
	<b>Marking Tag Sheet</b> 160 perforated paper labels each, 6 x 17 mm To be used with a transparent cover	10	100-FMP
	<b>Transparent Cover</b> To be used with marking tag sheets	100	100-FMC
	<b>Marking Tag Adapters</b> To be used with marking tag: System V4 / V5	100	100-FMA1
	System 1492 W	100	100-FMA2







\* Must be ordered in package quantities.

**Suppressor Modules**



	Description	Connection Diagram	Suppressor Rating	For Use With	Cat. No.
	<b>Suppressor Module for Bul. 100-D Contactors</b> <ul style="list-style-type: none"> <li>For limiting surge voltage when coil circuits are interrupted</li> <li>Can be plugged into all Bul. 100-D contactors</li> <li>Supplied as standard on all conventional DC coil contactors and all electronic coil contactors (as part of the supply module or delivered with separate suppressor module)</li> </ul>		<b>RC Module (AC control) for contactors with conventional coil</b> 21...48V, 50 Hz; 24...55V, 60 Hz	100-D95...100-D180	100-DFSC48
			95...110V, 50 Hz; 110...127V, 60 Hz		100-DFSC110
			180...277V, 50 Hz; 208...277V, 60 Hz		100-DFSC240
			380...550V, 50 Hz; 440...600V, 60 Hz		100-DFSC550
			<b>Varistor Module for contactors with conventional coil</b> 55V AC	100-D95...100-D180	100-DFSV55
			56...136V AC		100-DFSV136
			137...277V AC		100-DFSV277
			278...600V AC		100-DFSV575
			208...277V AC*		100-DFSV550
					100-D95...100-D180

\* For overvoltage category IV (IEC 947 for 100-D...-E) e.g., lightning protection requirements.

Connecting Components




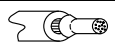



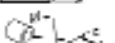
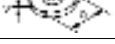
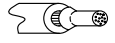


	Description	For Use With	Cat. No.	
	<b>Terminal Lugs</b> Set of 2 Protection class IP2X per IEC 60529 and DIN 40 050	100-D95, 100-D110	100-DTB110	
		100-D140, 100-D180, 100-D95E...D180E, 193-EC_F, 193-EE_F	100-DTB180	
		100-D210...100-D420, 193-EC_G, 193-EF2C, 193-EE_G	100-DTB420	
	<b>Terminal Lugs (UL/CSA), Copper Frame</b> Set of 3	100-D95, 100-D110	100-DL110	
		100-D95E, 100-D110E, 193-EC_F, 193-EE_F	100-DLE110	
		100-D140, 100-D180, 193-EC_F, 193-EE_F	100-DL180	
		100-D210...100-D420, 193-EC_G, 193-EE_G	100-DL420	
		100-D630, 100-D860, 193-EC_H, 193-EE_H	100-DL630	
		100-D630, 100-D860, 193-EC_H, 193-EE_H	100-DL860	
	<b>Control Circuit Terminal</b> 2 x 2.5 mm <sup>2</sup>	Connects to Cat. Nos. 100-D95...D180	100-DAT1	
		Connects to Cat. Nos. 100-D210...D420	100-DAT2	
	<b>Terminal Shields</b> Set of 2 Protection class IP10 per IEC 60529 and DIN 40 050 For direct-on-line, reversing, two-speed, and wye-delta/star-delta assemblies	100-D95, 100-D110	100-DTS110	
		100-D140, 100-D180, 100-D95-E...100-D180-E	100-DTS180	
		100-D210...100-D420	100-DTS420	
	<b>Terminal Covers</b> Protection class IP20 per IEC 60529 and DIN 40 050 For direct-on-line, reversing, two-speed, and wye-delta/star-delta assemblies	100-D95...100-D180, 193-EC_F, 193-EE_F	100-DTC180	
		100-D210...100-D420, 193-EC_G, 193-EE_G	100-DTC420	
		100-D630...100-D860, 193-EC_H, 193-EE_H	100-DTC860	
	<b>Mounting Plate</b> Galvanized steel plate for starter combinations For direct-on-line, reversing, two-speed, wye-delta/star-delta, and Dahlander assemblies	100-D95...100-D180	Direct-on-line	100-DMS180
			Reversing, two-speed or changeover	100-DMU180
			Y-Δ or Dahlander	100-DMY180
		100-D210...100-D420	Direct-on-line	100-DMS420
			Reversing, two-speed or changeover	100-DMU420
			Y-Δ or Dahlander	100-DMY420
		100-D630...100-D860	Direct-on-line	100-DMS860
			Reversing, two-speed or changeover	100-DMU860
			Y-Δ or Dahlander	100-DMY860
	<b>Mounting Plate</b> For two-speed or changeover switches	For interlocking between 100-C60...C85 and 100-D95...D180 contactors	100-DMU85	

Interlocks

	Description	Circuit Diagram	For Use With	Cat. No.
	<b>Interlock — Mechanical Only</b> No additional space required	---∇---	100-D95...100-D420	100-DMA00
	<b>Interlock — Dual Electrical/Mechanical</b> No additional space required 2 N.C. auxiliary contacts	22 NC 21 ▲ ---∇--- ▲ 21 NC 22	100-D95...100-D860	100-DMD02
	<b>Interlock — Mechanical Only</b> No additional space required	---∇---	100-D95...100-D860	100-DMD00
	<b>Interlock — Mechanical Only</b> Provides interlocking between Bul. 100-C and Bul. 100-D contactors	---∇---	100-C60...100-C85 between 100-D95...100-D180	100-DMC00
	<b>Interlock — Dual Electrical/Mechanical</b> Provides interlocking between Bul. 100-C and Bul. 100-D contactors 2 N.C. auxiliary contacts	22 NC 21 ▲ ---∇--- ▲ 21 NC 22	100-C60...100-C85 between 100-D95...100-D180	100-DMC02





6-Contactors & Control Relays

Specifications

Coil Type : Conventional Electronic — EI			100S/104S-C												
			09	12	16	23	30	37	40	43	60	72	85		
			X	X	X	X	X	X	X	X	X	X	X		
<b>Conductor Cross Sections - Main Contacts</b>			 *			 ‡			 ‡						
<b>Terminal type</b>															
	(1) conductor [mm <sup>2</sup> ] (2) conductors [mm <sup>2</sup> ]		1...4 1...4			2.5...10 2.5...10			2.5...16 2.5...10			2.5...35 2.5...25			
	(1) conductor [mm <sup>2</sup> ] (2) conductors [mm <sup>2</sup> ]		1.5...6 1.5...6			2.5...16 2.5...16			2.5...25 2.5...16			2.5...50 2.5...35			
	b max. [mm]		—			—			—			—			
	c max. [mm]		—			—			—			—			
	s max. [mm]		—			—			—			—			
	Ø min. [mm]		—			—			—			—			
Recommended torque [Nm]			1.5...2.5			2.5...3.5			2.5...3.5			3.5...6			
Cross section per UL/CSA [AWG]			16...10			14...4			14...6		14...4		14...1		
Recommended torque [lb-in]			13.3...22			22...31			22...31			31...53			
<b>With terminal lug kit</b>			—			—			—			—			
Cross section per UL/CSA [AWG]			—			—			—			—			
Recommended torque [lb-in]			—			—			—			—			
<b>With Frame Terminal Block</b>			—			—			—			—			
	top opening [mm <sup>2</sup> ] bottom opening [mm <sup>2</sup> ]		—			—			—			—			
	top opening [mm <sup>2</sup> ] bott. opening [mm <sup>2</sup> ]		—			—			—			—			
	b max. [mm] s top [mm] s bottom [mm]		—			—			—			—			
Recommended torque [Nm]			—			—			—			—			
Cross section per UL/CSA top [AWG]			—			—			—			—			
bottom [AWG]			—			—			—			—			
Recommended torque [lb-in]			—			—			—			—			

\* Pozidriv No. 2 / Blade No. 3 screw  
 ‡ Pozidriv No. 2 / Blade No. 4 screw  
 † Hexagonal socket screw

Specifications

100S-D											
95	110	95	110	140	180	210	250	300	420	630	860
X	X	—	—	X	X	—	—	—	—	—	—
—	—	X	X	X	X	X	X	X	X	X	X
											
—			—				—			—	—
—			—				—			—	—
—			—				—			—	—
20			25				30			52	52
10			12.5				15			22	22
5			5				6			2 x 8	2 x 8
6.1			8.3				10.5			13	13
8...10			10...12				16			68	68
—			—				—			—	—
70...90			90...110				130...150			600	600
100-DL110†		100-DLE110†		100-DL180†			100-DL420†			100-DL630	100-DL860
8...2/0		8...2/0		6...300 MCM			(2x) 4...350 MCM			(2X) 2/0... 500MCM	(4X) 2/0... 500MCM
90		90		250			250			400	400
100-DTB110†			100-DTB180†				100-DTB420*			—	—
16...35 16...70			16...35 16...95				25...240* 25...240			—	—
16...50 16...95			16...50 16...120				25...300 25...300			—	—
16 3...9 3...12			20 3...9 3...14				25 4...20 4...20			—	—
8...10			10...12				20...25			—	—
6...1 / 0 AWG			6...1 / 0 AWG				4 AWG...600 MCM			—	—
6...3 / 0 AWG			6 AWG...250 MCM				4 AWG...600 MCM			—	—
70...90			90...110				180...220			—	—

\* Pozidriv No. 2 / Blade No. 3 screw  
 \* Pozidriv No. 2 / Blade No. 4 screw  
 † Hexagonal socket screw  
 § Hexagonal screw  
 \* 25...95 mm<sup>2</sup> with sleeve per DIN 46228



Coil Data

Coil Type :			100S/104S-C													
			09	12	16	23	30	37	40*200	40*400	43	60	72	85	90*200	90*400
			X	X	X	X	X	X	X	X	X	X	X	X	X	X
Conventional			X	X	X	X	X	X	X	X	X	X	X	X	X	
Electronic — EI			—	—	—	—	—	—	—	—	—	—	—	—	—	
<b>Operating Limits</b>																
50 Hz, 60 Hz, 50/60 Hz	pick-up	[x Us]	0.85...1.1					0.85...1.1			0.85...1.1					
	dropout	[x Us]	0.3...0.6					0.3...0.6			0.3...0.6					
DC control	pick-up	[x Us]	0.8...1.1					0.8...1.1			0.8...1.1					
	dropout	[x Us]	0.1...0.6					0.1...0.6			0.1...0.6					
<b>Coil Consumption</b>																
50 Hz, 60 Hz, 50/60 Hz	pick-up	[VA/W]	70/50	70/50	80/60	130/90	130/90	200/110	400/240							
	hold-in	[VA/W]	8/2.6	9/3	9/3	12/3.6	10/3.2	16/4.5	24/9							
DC control	pick-up	[W]	6.5	9.2	9.2	10.1	10.1	200	325							
	hold-in	[W]	6.5	9.2	9.2	10.1	10.1	4.5	5.5							
<b>Operating Times</b>																
AC	closing delay	[ms]	15...30	15...30	15...30	15...30	15...30	20...40	20...30							
	opening delay	[ms]	10...60	10...60	10...60	10...60	10...60	10...60	20...40							
With RC module	opening delay	[ms]	10...60	10...60	10...60	10...60	10...60	10...60	20...40							
DC	closing delay	[ms]	40...70	40...70	50...80	50...80	50...80	20...40	15...25	20...25						
	opening delay	[ms]	7...15	7...15	7...15	7...15	7...15	—	—	20...25						
With integrated diode	opening delay	[ms]	14...20	17...23	17...23	—	17...23	≤ 220V 20...35	—	—						
With external diode	opening delay	[ms]	70...95	80...125	80...125	—	80...125	≤ 220V 80...125	—	—						

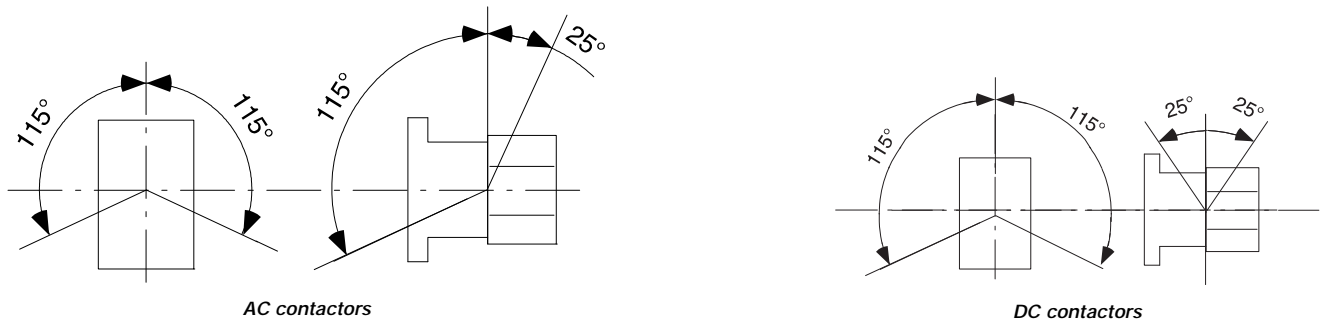
Coil Type :			100S-D											
			95/110	140/180	95	110	140	180	210	250	300	420	630	860
			X	X	—	—	—	—	—	—	—	—	—	—
Conventional			X	X	—	—	—	—	—	—	—	—	—	
Electronic — EI			—	—	X	X	X	X	X	X	X	X	X	
<b>Operating Limits</b>														
50 Hz, 60 Hz, 50/60 Hz	pick-up	[x Us]	0.85...1.1				0.85...1.1				0.8...1.1			
	dropout	[x Us]	0.3...0.6				0.3...0.5				0.3...0.8			
DC control	pick-up	[x Us]	0.85...1.1				0.85...1.1				0.85...1.1			
	dropout	[x Us]	0.3...0.6				0.3...0.5				0.3...0.8			
<b>Coil Consumption</b>														
50 Hz, 60 Hz, 50/60 Hz	pick-up	[VA/W]	650/310			380/240*				490/270*		1915/1720*		
	hold-in	[VA/W]	50/10			13/6				18/7		33/30		
DC control	pick-up	[W]	540			265 <sup>1</sup>				340*		1980*		
	hold-in	[W]	8			6				7		30		
<b>Operating Times</b>														
AC	closing delay	[ms]	20...47				20...45				60...100			
	opening delay	[ms]	6...12				25...110				70...145			
With RC module	opening delay	[ms]	9...18				—				—			
DC	closing delay	[ms]	27...47				25...50				60...100			
	opening delay	[ms]	12...20				35...110				70...145			
With integrated diode	opening delay	[ms]	12...20				—				—			
With external diode	opening delay	[ms]	—				—				—			

\* Electronic coil drives are designed to minimize power requirements, but this control may exhibit a higher inrush (540W, < 10 ms) when energizing. This must be taken into account for the proper sizing of supply devices, all-or-nothing relays and cross-sections of coil supply lines. Please contact your nearest Rockwell Automation distributor for detailed information.

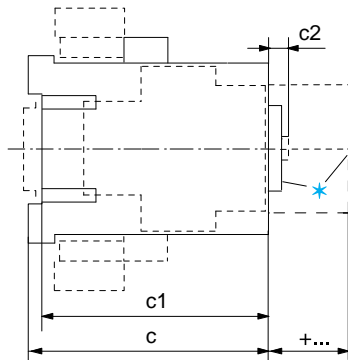
Contactors and Accessories

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

Mounting Position



Accessories



Contactors 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	+ 0	(+ 0)
	marking tag sheet with clear cover	+ 0	(+ 0)
	marking tag adapter for System V4 / V5	+ 5.5	(+ 7/32)
	marking tag adapter for System Bul. 1492W	+ 5.5	(+ 7/32)

AC Contactors

Cat. No.	a	b	c	c1	c2	Ød	d1	d2
100S-C09...100S-C23	45 (1-25/32)	81 (3-3/16)	119.5 (4-3/4)	114.5 (4-43/64)	6 (15/64)	2-4.5 (2-3/16)	60 (2-23/64)	35 (1-3/8)
100S-C30, 100S-C37	45 (1-25/32)	81 (3-3/16)	136.5 (5-37/64)	131.6 (5-11/32)	6.5 (1/4)	2-4.5 (2-3/16)	60 (2-23/64)	35 (1-3/8)
100S-C43	54 (2-1/8)	81 (3-3/16)	139.5 (5-11/16)	134.6 (5-29/64)	6.5 (1/4)	2-4.5 (2-3/16)	60 (2-23/64)	45 (1-25/32)
100S-C60...100S-C85	72 (2-53/64)	122 (4-51/64)	156 (6-11/32)	150.5 (6-1/8)	8.5 (21/64)	4-5.4 (4-7/32)	100 (3-15/16)	55 (2-11/64)

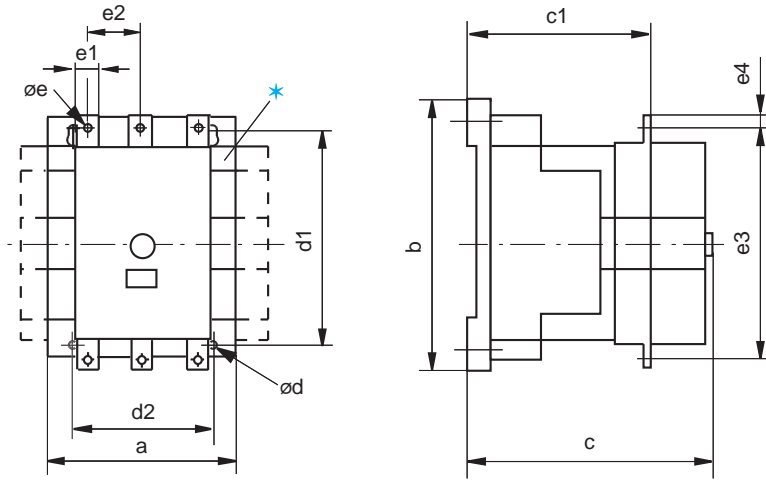
DC Contactors

Cat. No.	a	b	c	c1	c2	Ød	d1	d2
100S-C09Z...100S-C16Z	45 (1-25/32)	81 (3-3/16)	145.5 (5-49/64)	140.5 (5-37/64)	6 (15/64)	2-4.5 (2-3/16)	60 (2-23/64)	35 (1-3/8)
100S-C23Z	45 (1-25/32)	81 (3-3/16)	162.5 (6-7/16)	158 (6-1/4)	6 (15/64)	2-4.5 (2-3/16)	60 (2-23/64)	35 (1-3/8)
100S-C30Z...100S-C37Z	45 (1-25/32)	81 (3-3/16)	180.5 (7-5/32)	175.5 (6-61/64)	6.5 (1/4)	2-4.5 (2-3/16)	60 (2-23/64)	35 (1-3/8)
100S-C43Z	54 (2-1/8)	81 (3-3/16)	183.5 (7-17/64)	179 (7-3/32)	6.5 (1/4)	2-4.5 (2-3/16)	60 (2-23/64)	45 (1-25/32)
100S-C60D...100S-C85D	72 (2-53/64)	122 (4-51/64)	156 (6-11/32)	150.5 (6-1/8)	8.5 (21/64)	4-5.4 (4-7/32)	100 (3-15/16)	55 (2-11/64)

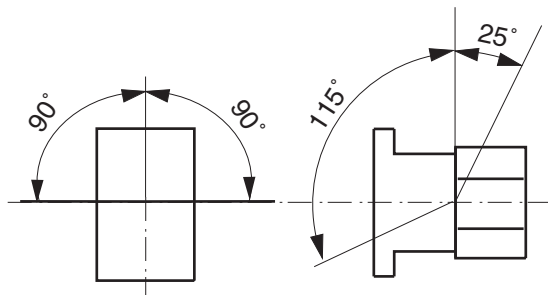
Control Relays

6-Contactors & Control Relays

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



Mounting Position



Cat. No.	a	b	c	c1	Ød	d1	d2	Øe	e1	e2	e3	e4
100S-D95, 100S-D110	120	170	156	110.5	5.2	145	100	M6	16	38.5	147	8
D100S-D95E...100S-D180E, 100S-D140, 100S-D180	120	170	156	110.5	5.2	145	100	M8	20	39	160	10
100S-D120E...100S-D420E	155	205	180	110.5	6.5	180	130	M10	25	48	193	12.5
100S-D630E...100S-D860E	255	310	265	110.5	10	230	225	M12	40	70	291	22

Contactor with	mm
Auxiliary contact block *	100-DS1... 100-DS2... a a + 13.5 each
Mechanical Interlock	100-DM... a + a
Frame terminal block	100-DTB110 100-DTB180 100-DTB420 b + 7 each b + 7 each b + 8.5 each
Label holder	c...+ 5

\* Conventional DC coil contactors will have an additional auxiliary contact block that will add 13.5 mm to the "a" dimension on the right-hand side.