

# NEMA Space Saving Contactors and Starters

Bulletin Numbers 300, 300S, 305, 309

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## Summary of Changes

This publication contains new and updated information:  
 Product selection information and new series devices were added. Older (series D) information was moved to the end of the publication.



## Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://www.rockwellautomation.com/global/certification/overview.page">http://www.rockwellautomation.com/global/certification/overview.page</a>	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/global/literature-library/overview.page>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

## Product Description

### Bulletin 300

Bulletin 300 modular line of NEMA contactors, when combined with Bulletin 193 solid-state overload relays, auxiliary contacts, interlocks, suppressors, and DIN Rail mounting provides compact and flexible starter component systems.

- NEMA sizes 0...8
- Compact size (space-saving design)
- Guarded terminals
- Complete range of accessories
- Solid-state overload relays
- Electronic and conventional coils
- Panel or DIN Rail mounts available

### Bulletin 305/309



Bulletin 305 reversing starters are most commonly used for full-voltage starting and reversing of polyphase squirrel-cage motors. Factory-assembled starter sizes 0...4 are electrically and mechanically interlocked to avoid both contactors being closed simultaneously.

Bulletin 309 starters are designed for full-voltage starting of polyphase squirrel-cage motors. You can operate these starters by remote control with push buttons, float switches, thermostats, pressure switches, snap switches, limit switches, or any other suitable 2- or 3-wire pilot device. Starters are available in factory-assembled sizes 0...4 and current transformer kits for sizes 5...7.

- NEMA sizes 0...4 (factory assembled)
- NEMA sizes 5...7 (user assembled)
- Non-combination with NEMA contactor and electronic overload relay with optional communication module

## Product Selection

### 3-Pole AC/DC Operated Contactors and Starters

NEMA Size	$I_e$ [A]	Switching of 3-phase Motors — AC-2, AC-3									Auxiliary Contacts Each Contactor		Bulletin 300 Direct On-line Contactor	Bulletin 305 Reversing Starter	Bulletin 309 Starter
		Hp (60 Hz)					kW (50 Hz)				N.O.	N.C.			
	60 °C	AC-3 (400V)	200 V	230 V	460 V	575 V	220...240V	380...400V	415 V	500 V	690 V			Cat No.	Cat No.
0	16	3	3	5	5	5.5	7.5	7.5	7.5	7.5	1	—	300-A0⊗930	305-A0⊗-⊗	309-A0⊗-⊗
1	37	7.5	7.5	10	10	11	20	20	20	18.5	1	—	300-B0⊗930	305-B0⊗-⊗	309-B0⊗-⊗
2	43	10	15	25	25	13	22	22	25	22	1	—	300-C0⊗930	305-C0⊗-⊗	309-C0⊗-⊗
3	85	25	30	50	50	25	45	45	55	45	1	1	300-D0⊗930	305-D0⊗-⊗	309-D0⊗-⊗
4	146	40	50	100	125	45	75	75	90	90	1	1	300-E0⊗9311 <sup>(1)</sup>	305-E0⊗-⊗	309-E0⊗-⊗
5	265	75	100	200	250	75	132	132	160	200	1	1	300-F0⊗9311		
6	460	150	200	400	500	132	250	250	315	355	1	1	300-G0⊗9311		
7	750	250	300	600	700	220	400	425	530	600	1	1	300-H0⊗9311		
8	—	—	—	—	—	—	—	—	—	—	1	1	300-J0⊗9311		

(1) To order with built-in terminal lugs, add the letter "L" to the end of the catalog number (for example, 300-E0⊗9311L).

#### ⊗ Coil Voltage Codes and Terminal Position (NEMA Sizes 0...3)

The cat. no. as listed is incomplete. To complete the cat. no., select a coil voltage code from the following table and insert into the cat. no.  
 Example: 120V, 60 Hz: **Cat. No. 300-A0⊗930** becomes **Cat. No. 300-AOD930**.

	[V]	24	110	120	220	240	277	440	480	550	600
NEMA Size 0...3	AC, 50 Hz	K <sup>(1)</sup>	D	p <sup>(1)</sup>	A	T <sup>(1)</sup>	—	B	—	C	—
	AC, 60 Hz	J <sup>(1)</sup>	—	D	—	A	T <sup>(1)</sup>	—	B	—	C
	AC, 50/60 Hz	KJ	—	—	—	KA <sup>(1)</sup>	—	—	—	—	—
NEMA Size 0...2	DC	EJ	—	—	—	—	—	—	—	—	—
NEMA Size 3	DC	DJ <sup>(1)</sup>	—	—	—	—	—	—	—	—	—

(1) Bulletin 300 contactors only.

#### ⊗ Coil Voltage Codes and (NEMA sizes 4...8)

Electronic Coils with PLC Interface	[V]	24...60	48...130	100...250	250...500
NEMA Size 4...5	AC/DC	KJ	KY	KD	KN
NEMA Size 4...5	AC/DC with PLC Input	—	—	ED	EN
NEMA Size 6...7		EJ <sup>(1)</sup>	EY	ED	EN
NEMA Size 8		—	—	ED	—

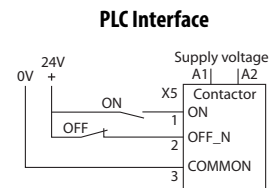
(1) 24...60V DC only.

#### Coil Terminal Position

All contactors are delivered with the coil terminals that are located on the line side.



Cat. No. 300-A0⊗930 Line Side



🔁 **Overload Relay Codes (Bulletin 305 or 309, NEMA Sizes 0...3)**

The cat. no. as listed is incomplete. Select an overload relay code from the following table to complete the cat. no.

Example: **Cat. No. 305-AOD-🔁** becomes **Cat. No. 305-AOD-EEC**. For other voltages, contact your local Rockwell Automation sales office or Allen-Bradley distributor.

NEMA Size	Adjustment Range [A]	Overload Relay Code
0	1.0...5	EEC
0, 1	5.4...27	EEE
2	9...45	EEF
3	18...90	EEG

🔁 **Overload Options (Bulletin 305 or 309, NEMA Size 4)**

Relay	Option	Cat. No. Suffix
none	No overload option - reverser	-23
193-EE_	—	-AZM
193-ESM_	200 A Current Sense Module	-I-200A
	200 A Current Sense w/ ground fault module	-IG-200A
	200 A Voltage and Current Sense w/ ground fault module	-VIG-200A

*Bulletin 193-EE – Three-Phase Devices (Bulletin 300, NEMA Sizes 0...4)*

- Selectable trip class (10, 15, 20, 30)
- Selectable manual/auto-manual reset
- Screw-type control terminals
- Direct mount

Mounts to NEMA Contactor Size	Adjustment Range [A]	Cat. No.
0	1.0...5.0	193-EECB
	5.4...27	193-EEEB
1	5.4...27	193-EEED
2	9...45	193-EEFD
3	18...90	193-EEGE
4	30...150	193-EEHJ
	60...300	193-EEJJ

*E3 Solid-State Overload Relay (Bulletin 300, NEMA Sizes 0...3)*

- 0.4...5000 A current range
- Adjustable trip class 5...30
- Integrated I/O

NEMA Size	Adjustment Range [A]	E3	E3 Plus	
			Internal Ground	External Ground
		Cat. No.	Cat. No.	Cat. No.
0	1...5	193-EC1AB	193-EC2AB	193-EC3AB
	3...15	193-EC1BB	193-EC2BB	193-EC3BB
	5...25	193-EC1CB	193-EC2CB	193-EC3CB
1...2	9...45	193-EC1DD	193-EC2DD	193-EC3DD
3	18...90	193-EC1EE	193-EC2EE	193-EC3EE

*E3 and E3 Plus Solid-State Overload Relays (Bulletin 300, NEMA Sizes 0...3)*



**Panel Mount Devices for Use with External Current Transformers <sup>(1)</sup> <sup>(2)</sup>**

Description	Adjustment Range [A] <sup>(3)</sup>	Cat. No.
<ul style="list-style-type: none"> <li>• 2 Inputs</li> <li>• 1 Output</li> </ul>	9...5000	193-EC1ZZ
<ul style="list-style-type: none"> <li>• 4 Inputs</li> <li>• 2 Outputs</li> <li>• External Ground Fault Sensor Input</li> <li>• PTC Thermistor Input</li> <li>• DeviceLogix</li> </ul>	9...5000	193-EC2ZZ

CT Ratio	FLA Setting Range [A]	CT Ratio	FLA Setting Range [A]	CT Ratio	FLA Setting Range [A]
50:5	9...45	300:5	60...302	1200:5	240...1215
100:5	18...90	500:5	84...420	2500:5	450...2250
150:5	28...140	600:5	125...630	5000:5	1000...5000
200:5	42...210	800:5	172...860	—	—

(1) Current transformers that are supplied by customer. See Specifications, External Current Transformers (for use with Cat. Nos. 193-EC1ZZ1, 193-EC3ZZ, 193-EC4ZZ, and 193-EC5ZZ) for proper current transformer selection.  
 (2) Order panel adapter, Cat. No. 193-ECPM2, separately.  
 (3) CT Ratio to FLA setting range correlation.

### 3-Pole AC/DC Operated Safety Contactors

NEMA Size	$I_e$ [A]		Switching of 3-phase Motors — AC-2, AC-3											Auxiliary Contacts Each Contactor		Bulletin 300S Direct On-line Safety Contactor
	60 °C	40 °C	Hp (60 Hz)				kW (50 Hz)							N.O.	N.C.	
	AC-3 (400V)	AC-1 (690V)	200V	230V	460V	575V	220...240V	380...400V	415V	440V	500V	690V	1000V			Cat No.
4	146	225	40	50	100	125	45	75	75	90	90	90	75	1	1	300S-E0⊗9312C <sup>(1)</sup>
5	265	400	75	100	200	250	75	132	132	160	160	200	132	1	1	300S-F0⊗9312C
6	460	700	150	200	400	500	132	250	250	250	315	355	280	1	1	300S-G0⊗9312C
7	750	1050	250	300	600	700	220	400	425	450	530	600	400	1	1	300S-H0⊗9312C

(1) To order with built-in terminal lugs, add the letter "L" to the end of the catalog number (for example, 300S-E0⊗9312CL).

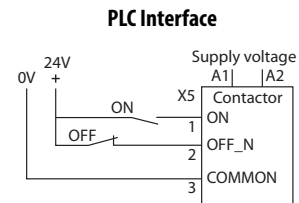
#### ⊗ Coil Voltage Codes

The cat. no. as listed is incomplete. To complete the cat. no., select a coil voltage code from the following table and insert into the cat. no.



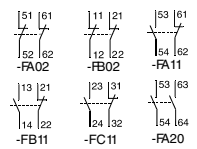
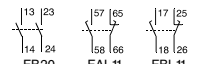
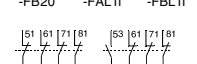
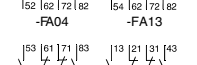
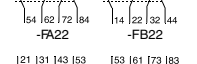
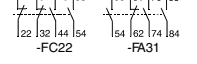
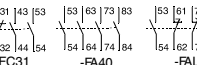


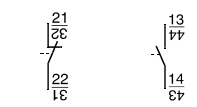
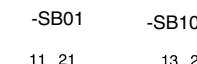
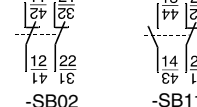
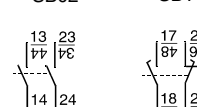
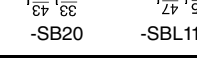

Example: 120V, 60 Hz: Cat. No. 300S-E0⊗9312C becomes Cat. No. 300S-E0D9312C.

Conventional Coil	[V]	24	110	120	220	240	277	440	480	550	600
NEMA Size 4	AC, 50 Hz	K	D	—	A	—	—	B	—	C	—
	AC, 60 Hz	J	—	D	—	A	T	—	B	—	C
Electronic Coil with EI	[V]	24	110	120	220	240	277	440	480	550	600
NEMA Size 4...5	AC, 50/60 Hz	K	D	—	A	—	—	B	—	C	—
NEMA Size 4...5	DC	J	—	D	—	A	T	—	B	—	C
Electronic Coils with PLC Interface	[V]	24...60	48...130	100...250	250...500						
NEMA Size 4...5	AC/DC	KJ	KY	KD	KN						
NEMA Size 4...5	AC/DC with PLC Input	—	—	ED	EN						
NEMA Size 6...7		EJ <sup>(1)</sup>	EY	ED	EN						
NEMA Size 8		—	—	ED	—						





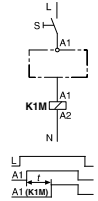

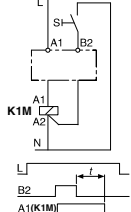

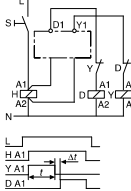


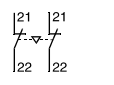

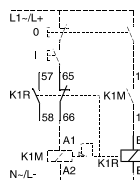
(1) 24...60V DC only.



## Accessories (NEMA Sizes 0...3)

	Description			Connection Diagrams	For Use with NEMA Size	Cat. No.
		N.O.	N.C.			
	<b>Auxiliary Contact Blocks for Front Mounting<sup>(1)</sup></b> <ul style="list-style-type: none"> <li>• 2- and 4-pole</li> <li>• Quick and easy mounting without tools</li> <li>• Electronic-compatible contacts down to 17V, 5 mA</li> <li>• Mirror contact performance to the main contactor poles (except for L types)</li> <li>• Models with equal function with several terminal numbering choices</li> <li>• L = Late break N.C./early make N.O.</li> </ul>	0	2		0...3	100-FA02 100-FB02
		1	1			100-FA11 100-FB11 100-FC11
		2	0			100-FA20 100-FB20
		1L	1L			100-FAL11 100-FBL11
		0	4			100-FA04
		1	3			100-FA13
		2	2			100-FA22 100-FB22 100-FC22
		3	1			100-FA31 100-FC31
		4	0			100-FA40
		1+1L	1+1L			100-FAL22
	<b>Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations<sup>(1)</sup></b> <ul style="list-style-type: none"> <li>• 1- and 2-pole</li> <li>• Two-way numbering for right or left mounting on the contactor</li> <li>• Quick and easy mounting without tools</li> <li>• Electronic compatible contacts down to 17V, 10 mA</li> <li>• Mirror contact performance to the main contactor poles, L = Late break N.C./early make N.O.</li> </ul>	0	1		0...3	100-SB01
		1	0			100-SB10
		0	2			100-SB02
		1	1			100-SB11
		2	0			100-SB20
		1L	1L			100-SBL11

(1) Maximum number of auxiliary contacts that can be mounted:  
 AC coil contactors — max. 4 N.O. contacts on the front of the contactor, 2 N.O. contacts on the side, 4 N.C. front or side, 6 total.  
 DC coil contactors — max. 4 N.O. contacts on the front of the contactor or max 2 N.O. contacts on the side, 4 N.C. front or side, 4 total.

	Description		Connection Diagrams	For Use with NEMA Sizes	Cat. No.
	<b>Pneumatic Timing Modules</b> Pneumatic timing element contacts switch after the delay time. The contacts on the main contactor continue to operate without delay.	On-delay 0.3...30 s 1.8...180 s		0...3 with AC coils	100-FPTA30 100-FPTA180
		OFF-Delay 0.3...30 s 1.8...180 s		0...3	100-FPTB30 100-FPTB180
	<b>Electronic Timing Modules — on-delay</b> Delay of the contactor or control relay solenoid. The contactor is energized at the end of the delay time.	On-delay 0.1...3 s 1...30 s 10...180 s		0...3 with AC coils  110...240V, 50/60 Hz 110...250VDC	100-ETA3 100-ETA30 100-ETA180
	<b>Electronic Timing Modules — OFF-Delay</b> Delay of the contactor or control relay solenoid. After interruption of the control signal, the contactor is de-energized at the end of the delay time.	OFF-Delay 0.3...3 s 1...30 s 10...180 s		0...3 with AC coils  110...240V, 50/60 Hz	100-ETB3 100-ETB30 100-ETB180
	<b>Electronic Timing Modules</b> Delay of the contactor solenoid. Contactor K 3 (Y) is de-energized (off) and K 2 (D) is energized (on) after the end of the set Y end time. (Switching delay at 50 ms). <ul style="list-style-type: none"> <li>• Continuous adjustment range</li> <li>• High repeat accuracy</li> </ul>	Transition Time Y Contactor  1...30 s		0...3 with AC coils  110...240V, 50/60 Hz	100-ETY30
	<b>Mechanical Interlocks</b> For interlocking of two contactors. <ul style="list-style-type: none"> <li>• Common interlock for NEMA size 0...3 contactors</li> <li>• Interlocking of different sizes possible</li> <li>• Mechanical and electrical interlocking possible in one module</li> <li>• 9 mm dovetail connector is included</li> </ul>	Mechanical only, without auxiliary contacts		0...3	100-MCA00
		Mechanical/ electrical interlock with 2 N.C. auxiliary contacts		0...3	100-MCA02
	<b>Mechanical Latch</b> After the contactor latches, the contactor coil is immediately de-energized (off) by the N.C. auxiliary contact (65-66). <ul style="list-style-type: none"> <li>• Electrical or manual release</li> <li>• 1 N.O. + 1 N.C. auxiliary contacts</li> <li>• Suitable for NEMA size 0...3 contactors</li> </ul>	Maximum command duration 0.03...10 s		0...3 with AC coils	100-FL11⊗


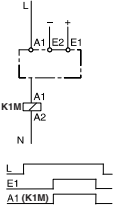

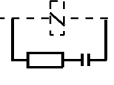
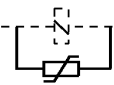
⊗ Voltage Suffix Code

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



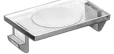

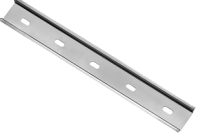
Voltage <sup>(1)</sup>	24V	48V	100V	110V	120V	230-240V	240V	277V	380-400V	400-415V	440V	480V
50 Hz	K	Y	KP	D	—	VA	T	—	N	G	B	—
60 Hz	J	—	—	—	D	—	A	T	—	—	N	B

(1) For special voltages, consult your local Allen-Bradley distributor.




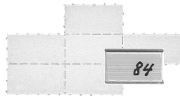
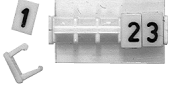
	Description		Connection Diagrams	For Use with NEMA Size	Cat. No.	
	<p><b>DC Interface</b> (electronic) Interface between the DC control signal (PLC) and the AC operating mechanism of the contactor.</p> <ul style="list-style-type: none"> <li>Control (input) voltage: 18...30V DC (24V nominal)</li> <li>Requires no additional surge suppression on the contactor coils</li> </ul>			<p>0...3 with AC coils</p> <p>110...240V AC</p>	<p>100-JE12 100-JE 100-JE48</p>	
	<p><b>Surge Suppressors</b> For limitation of coil switching transients.</p> <ul style="list-style-type: none"> <li>Plug-in, coil mounted</li> <li>Suitable for NEMA size 0...3 contactors</li> <li>RC, Varistor, and Diode Versions</li> </ul>	<p>RC Module AC operating mechanism</p>	<p>Voltage Range 24...48V 50/60Hz</p> <p>110...280V 50/60Hz</p> <p>380...480V 50/60Hz</p>		<p>0...3 with AC coils</p>	<p>100-FSC48</p> <p>100-FSC280</p> <p>100-FSC480</p>
		<p>Varistor Module AC/DC operating mechanism</p>	<p>12...55V AC/ 12...77V DC</p> <p>56...136V AC/ 78...180V DC</p> <p>137...277V AC/ 181...350V DC</p> <p>278...575V AC</p>		<p>0...3</p>	<p>100-FSV55</p> <p>100-FSV136</p> <p>100-FSV277</p> <p>100-FSV575</p>

**Assembly Components (NEMA Size 0...3 Contactors)**

	Description	For Use with NEMA Size	Pkg. Qty. (1)	Cat. No.
 Cat. No. 100-S0	<b>Dovetail Connectors</b> For use in contactor and starter assemblies.  Single Connector 0 mm Spacing Dual Connector 9 mm Spacing	0...3	10	100-S0
			10	100-S9
 Cat. No. 100-SCCA   Cat. No. 100-SCFA	<b>Protective Covers</b> <ul style="list-style-type: none"> <li>Provides protection against unintended manual operation</li> <li>For contactors and front-mounted auxiliary contacts, pneumatic timers and latches</li> </ul>	0...3	1	100-SCCA
		Auxiliary Contact Blocks: 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	0 1 2 3	1	105-PW23 105-PW37 105-PW43 105-PW85
	35 x 7.5 mm DIN Rail (1 m)	0...2	10	199-DR1




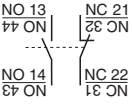
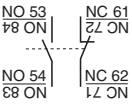
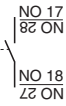
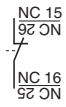

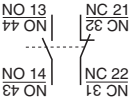
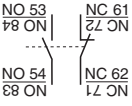
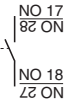
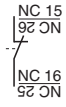
(1) Must be ordered in multiples of package quantities.

**Marking Systems (NEMA Size 0...3 Contactors)**



	Description	Pkg. Qty. (1)	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: <ul style="list-style-type: none"> <li>System V4 / V5</li> <li>System Bul. 1492W</li> </ul>	100	100-FMA1
		100	100-FMA2

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

### Accessories (NEMA Sizes 4...8)



	Description			Connection Diagrams	For Use with NEMA Size	Standard Auxiliary Contact	
		N.O.	N.C.			Cat. No.	
	<b>Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations</b> <ul style="list-style-type: none"> <li>2-pole</li> <li>Two-way numbering for right or left mounting on the contactor</li> <li>Quick and easy mounting without tools</li> <li>Mirror contact performance to the main contactor poles</li> <li>Low-power switching down to 24V 50 mA</li> </ul>	1	1		4...5, left or right inside mounting	100-ES1-11	
		1	1		4...5, left or right outside mounting	100-ES2-11	
	<b>Low-power Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations (1)</b> <ul style="list-style-type: none"> <li>1-pole</li> <li>Two-way numbering for right or left mounting on the contactor</li> <li>Quick and easy mounting without tools</li> <li>Mirror contact performance to the main contactor poles</li> <li>Electronic compatible, 3V 1 mA</li> </ul>	1	0		4...5, left or right inside mounting	100-ES1-B10	
		0	1		4...5, left or right inside mounting	100-ES1-B01	
		<b>Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations</b> <ul style="list-style-type: none"> <li>2-pole</li> <li>Two-way numbering for right or left mounting on the contactor</li> <li>Quick and easy mounting without tools</li> <li>Mirror contact performance to the main contactor poles</li> <li>Low power switching down to 24V 50 mA</li> </ul>	1	1		6...8, left or right inside mounting	100-ES3-11
			1	1		6...8, left or right outside mounting	100-ES4-11
<b>Low Power Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations (1)</b> <ul style="list-style-type: none"> <li>1-pole</li> <li>Two-way numbering for right or left mounting on the contactor</li> <li>Quick and easy mounting without tools</li> <li>Mirror contact performance to the main contactor poles</li> <li>Electronic compatible, 3V 1 mA</li> </ul>		1	0		6...8, left or right inside mounting	100-ES3-B10	
		0	1		6...8, left or right inside mounting	100-ES3-B01	

(1) No auxiliary contacts blocks can be mounted on the outside of the 100-ES1-10-B\* or 100-ES3-B\*.


	Description		Connection Diagrams	For Use with NEMA Size	Cat. No.
	<b>Mechanical Interlocks</b> <ul style="list-style-type: none"> <li>For interlocking of two contactors.</li> <li>Interlocking of different sizes possible</li> </ul>	Mechanical only, without auxiliary contacts		4	100-EM1-00
				5	
				4	100-EM4-00
				5	100-EM5-00
				6...7 <sup>(1)</sup>	100-EM2-00
				8 <sup>(2)</sup>	100-EM3-00
				Rod for vertical mounting 6...7 reversing contactors	

(1) Mounting plate ordered separately  
 (2) Mounting plate included

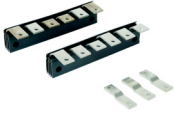

**Terminal Lugs (NEMA Size 4...8 Contactors)**

	Description	Wire Sizes	For Use with NEMA Size	Cat. No.
	<b>Terminal Lug Kit</b> <ul style="list-style-type: none"> <li>Standard on 100-E116*L...100-E146*L contactors</li> </ul>	2 x 6 AWG...3/0 AWG	4	100-ECL146
	<b>Terminal Lugs</b>	4 AWG...400 MCM	5	100-ETL370
		(2x) 4 AWG...500 MCM		100-ETL370B
		(3x) 2/0 AWG...500 MCM	6	100-ETL580
		(3x) 2/0 AWG...500 MCM	7	100-ETL750

**Terminal Shrouds (NEMA Size 4...8 Contactors)**


	Description	Contactor with Terminal Lugs	Wires with Compression Lugs	For Use with NEMA Size	Cat. No.
	<b>Terminal Shrouds</b>		X	4	100-ETS146L
			X	5	100-ETS370L
		X			100-ETS370C
			X	6	100-ETS460L
		X			100-ETS460C
			X	7	100-ETS750L
		X			100-ETS750C
	IP20 terminal shield between contactor and 193-E overload relay on an assembled direct on-line starter			4	100-ETC146
	IP20 terminal shield between contactor and 193-E overload relay on an assembled reversing starter			4	100-ETCR146

**Wiring Kits (NEMA Size 4...8 Contactors)**


	Description	For Use with NEMA Size	Cat. No.	
	Reversing Power Wiring Kits	4	105-PW146	
		5	105-PW370 <sup>(1)</sup>	
		6	105-PW460 <sup>(1)</sup>	
		7	105-PW750 <sup>(1)</sup>	
	Wye-delta Power Wiring Kits	Delta Contactor	Wye Contactor	Cat. No.
		4	4	170-PW146
		5	5	170-PW370
		6	6	170-PW460
		7	6	170-PW580
		7	7	170-PW750
	Shorting Bars	4	170-PWY146	
		5	170-PWY370	
		6	170-PWY460	
		7	170-PWY750	

(1) If 100-ETL\* terminal lugs are to be used on line and load side of reversing contactor, two sets of 100-ETX terminal extensions are also required.


**Mounting Plates (NEMA Size 4...8 Contactors)**

	Description	For Use with NEMA Size	Cat. No.
	For Direct On-line Starters	4	100-EMS146
	For Reversing Contactors	4	100-EMR146
		5	100-EMR370
		6	100-EMR460
		7	100-EMR750
For Reversing Starters	4	100-EMRS146	


**Connection Bars between 100-E Contactors and 140G MCCBs (NEMA Size 4...8 Contactors)**

	Description	For Use with Circuit Breaker	For Use with NEMA Size	Cat. No.
	<b>For Connection to 140G or 140MG</b> <ul style="list-style-type: none"> <li>• Connection between contactors/starters and molded case circuit breakers.</li> <li>• These connection sets are solid copper bars.</li> </ul>	140G-H, 140MG-H	4	100-PCE1
		140G-I, 140MG-I		100-PCE2
		140G-J, 140MG-J		100-PCE3
		140G-K, 140MG-K	5	100-PCE5
		140G-M, 140MG-M	6...7	100-PCE6
		140G-K, 140MG-K	6...7	100-PCE7

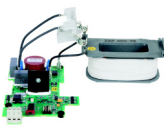
**Terminal Enlargements**

	Description	For Use with NEMA Size	Cat. No.
 <p><b>Terminal Enlargements</b></p> <ul style="list-style-type: none"> <li>Enlargement pieces that are designed to increase the width of the contactor terminal pads so larger connections can be mounted.</li> </ul>		4	100-ETE146
		5	100-ETE370
		6	100-ETE460
		7	100-ETE750

**Terminal Extensions**


	Description	For Use with Contactor	Cat. No.
 <p><b>Terminal Extensions</b></p> <ul style="list-style-type: none"> <li>Extension pieces that are designed to extend the main terminals of contactors for combined mounting of contactors and connection sets</li> </ul>		4	100-ETX146
		5	100-ETX370
		6	100-ETX460
		7	100-ETX750

**Renewal Coils (NEMA Size 4...8 Contactors)**

	Description	For Use with NEMA Size	Voltage	Cat. No.
 <p><b>Renewal Coil Modules</b></p>		4	24-60V AC/DC	TG901
			48-130V AC/DC	TG902
			100-250V AC/DC	TG903
			250-500V AC/DC	TG904
			100-250V AC/DC w/ PLC Interface	TGE903
			250-500V AC/DC w/ PLC Interface	TGE904
		5	24-60V AC/DC	TG909
			48-130V AC/DC	TG910
			100-250V AC/DC	TG911
			250-500V AC/DC	TG912
			100-250V AC/DC w/ PLC Interface	TGE917
			250-500V AC/DC w/ PLC Interface	TGE918
		6	24-60V DC	THE901
			48-130V AC/DC	THE902
			100-250V AC/DC	THE903
			250-500V AC/DC	THE904
		7	24-60V DC	TJE901
			48-130V AC/DC	TJE902
			100-250V AC/DC	TJE903
			250-500V AC/DC	TJE904
8	100-250V AC/DC	TKE903 <sup>(1)</sup>		
		TKE904 <sup>(2)</sup>		

(1) One set of two coils  
 (2) Printed circuit board

**Renewal Contact Kit (NEMA Size 4...8 Contactors)**

	Description	For Use with NEMA Size	Cat. No.
	Renewal Contact Kits	4	100-EA146
		5	100-EA265
		6	100-EA460
		7	100-EA750
		8	100-EA2050
	Renewal Arc Chutes	6	100-EC460
		7	100-EC750
		8	100-EC1060

## Specifications (NEMA Sizes 0...3)

### Technical Specifications





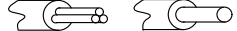
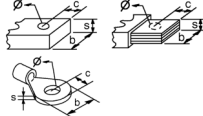
		NEMA Size				
		0	1	2	3	
<b>Coil Type:</b>	<b>Conventional</b>	X	X	X	X	
<b>Resistance and Power Dissipation</b>						
Main current circuit resistance	[mΩ]	2.7	2	1.5	0.9	
Power dissipation by all circuits at <i>I<sub>e</sub></i> AC-3/400V	[W]	2.1	8.2	8.3	19.5	
<b>Total Power Dissipation</b>						
At <i>I<sub>e</sub></i> AC-3/400V	AC	[W]	4.7	11.2	11.5	17.5
	DC	[W]	8.1	17.4	18.4	17.5
<b>Life Span</b>						
Mechanical AC control	[Mil. operations]	13	13	12	10	
Mechanical DC control	[Mil. operations]	13	13	13	10	
Electrical AC-3 (400 V)	[Mil. operations]	1.3	1.3	1	1	

### Coil Data

		NEMA Size				
		0	1	2	3	
<b>Coil Type:</b>	<b>Conventional</b>	X	X	X	X	
<b>Operating Limits</b>						
50 Hz, 60 Hz, 50/60 Hz	pick up	[x <i>I<sub>s</sub></i> ]	0.85...1.1		0.85...1.1	
	drop out	[x <i>I<sub>s</sub></i> ]	0.3...0.6		0.3...0.6	
DC (conventional)	pick up	[x <i>I<sub>s</sub></i> ]	0.8...1.1		0.8...1.1	
	drop out	[x <i>I<sub>s</sub></i> ]	0.1...0.6		0.1...0.6	
DC (electronic)	pick up	[x <i>I<sub>s</sub></i> ]	0.7...1.25		—	
	drop out	[x <i>I<sub>s</sub></i> ]	0.4		—	
<b>Coil Consumption</b>						
50 Hz, 60 Hz, 50/60 Hz	pick up	[VA/W]	70/50	80/60	130/90	200/110
	hold in	[VA/W]	8/2.6	9/3	10/3.2	16/4.5
DC (conventional)	pick up	[W]	6.5	9.2	10.1	200
	hold in	[W]	6.5	9.2	10.1	4.5
DC (electronic)	pick up	[W]	17	17	10.1	—
	hold in	[W]	1.7	1.7	10.1	—
<b>Operating Times</b>						
AC	closing delay	[ms]	15...30	15...30	15...30	20...40
	opening delay	[ms]	10...60	10...60	10...60	10...60
with RC module	opening delay	[ms]	10...60	10...60	10...60	10...60
DC (conventional)	closing delay	[ms]	40...70	50...80	50...80	20...40
	opening delay	[ms]	7...15	7...15	7...15	—
with integrated diode	opening delay	[ms]	14...20	17...23	17...23	≤ 220V, 20...35
with external diode	opening delay	[ms]	70...95	80...125	80...125	—
DC (electronic)	closing delay	[ms]	—	20...40		—
	opening delay	[ms]	—	20...40		—
Maximum Ripple			± 15%		—	
Minimum OFF Time	[ms]		200		—	



**Conductor Cross Sections**

			NEMA Size			
			0	1	2	3
<b>Coil Type:</b>	<b>Conventional</b>		X	X	X	X
<b>Conductor Cross Sections - Main Contacts Terminal Type</b>			 <sup>(1)</sup>	 <sup>(2)</sup>	 <sup>(3)</sup>	
	1 conductor	[mm <sup>2</sup> ]	1...4	2.5...10	2.5...16	2.5...35
	2 conductors	[mm <sup>2</sup> ]	1...4	2.5...10	2.5...10	2.5...25
	1 conductor	[mm <sup>2</sup> ]	1.5...6	2.5...16	2.5...25	2.5...50
	2 conductors	[mm <sup>2</sup> ]	1.5...6	2.5...16	2.5...16	2.5...35
	b max.	[mm]	—	—	—	—
	c max.	[mm]	—	—	—	—
	s max.	[mm]	—	—	—	—
	∅ min.	[mm]	—	—	—	—
Cross section per UL/CSA		[AWG]	16...10	14...4	14...4	14...1
Recommended torque		[lb·in.]	13.3...22	22...31	22...31	31...53
Recommended torque		[N·m]	1.5...2.5	2.5...3.5	2.5...3.5	3.5...6

- (1) Pozidriv No. 2/Blade No. 3 screw.
- (2) Pozidriv No. 2/Blade No. 4 screw.
- (3) Hexagonal socket screw.

## Specifications (NEMA Sizes 4...8)

### Technical Specifications

		Bulletin 300, 300S
		NEMA Sizes 4...8
<b>Rated Isolation Voltage <math>U_i</math></b>		
IEC	[V]	1000
UL, CSA	[V]	600
Rated Impulse Voltage Withstand $U_{imp}$	[kV]	8
<b>Rated Voltage <math>U_e</math></b>		
AC 50/60 Hz	[V]	115, 200, 230, 240, 400, 415, 460 500, 575, 690, 1000
DC	[V]	24, 48, 110, 220, 440
Electromagnetic compatibility		IEC 60947-1 - Environment A
Insulation Class of the Coil		Class F per IEC 60947-4-1
Rated coil frequency		AC 50/60 Hz, DC

**Specifications, Main Circuits**

NEMA Size		4	5	6	7	8
Coil Type:	Electronic	X	X	X	X	X

**AC-1 Active Power Load (50/60 Hz);  
Ambient Temperature 40°C**

690V	[A]	225	400	700	1050	2050
1000V	[A]	225	350	700	1000	2050
230V	[kW]	90	159	279	418	817
240V	[kW]	94	166	291	436	852
400V	[kW]	156	277	485	727	1420
415V	[kW]	162	288	503	755	1474
500V	[kW]	195	346	606	909	1775
690V	[kW]	269	478	837	1255	2450
1000V	[kW]	390	606	1212	1732	3551

**Ambient Temperature 60°C**

690V	[A]	200	350	600	875	1750
1000V	[A]	200	300	600	875	1750
230V	[kW]	80	139	239	349	697
240V	[kW]	83	145	249	364	727
400V	[kW]	139	242	416	606	1212
415V	[kW]	144	252	431	629	1258
500V	[kW]	173	303	520	758	1516
690V	[kW]	239	418	717	1046	2091
1000V	[kW]	346	520	1039	1516	3031

**Ambient Temperature 70°C**

690V	[A]	175	290	480	720	1500
1000V	[A]	175	240	480	720	1500
230V	[kW]	70	116	191	287	598
240V	[kW]	73	121	200	299	624
400V	[kW]	121	201	333	499	1039
415V	[kW]	126	208	345	518	1078
500V	[kW]	152	251	416	624	1299
690V	[kW]	209	347	574	860	1793
1000V	[kW]	303	416	831	1247	2598

With conductor sizes	[mm <sup>2</sup> ]	95	240	2x240	800 <sup>(1)</sup>	2000
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(1) Maximum connection bar width 50 mm.

**Specifications, Main Circuits, Continued**

NEMA Size		4	5	6	7	8	
<b>Coil Type:</b>	Electronic	X	X	X	X	X	
<b>Switching of 3-phase Motors; (50 Hz) Ambient Temperature 60°C, AC-2, AC-3</b>							
	220-240V	[A]	146	265	460	750	—
	380-400V	[A]	146	265	460	750	—
	415V	[A]	146	265	460	750	—
	440V	[A]	146	265	460	750	—
	500V	[A]	130	250	460	750	—
	690V	[A]	93	250	400	650	—
	1000V	[A]	60	100	200	300	—
	220-240V	[kW]	45	75	132	220	—
	380-400V	[kW]	75	132	250	400	—
	415V	[kW]	75	132	250	425	—
	440V	[kW]	90	160	250	450	—
	500V	[kW]	90	200	315	530	—
	690V	[kW]	90	200	355	600	—
	1000V	[kW]	75	132	280	400	—
	<b>Load Carrying Capacity Per UL/CSA</b>						
	General Purpose Current (enclosed)						
	[A]	200	350	650	900	2100	
Rated Power (enclosed)							
3-phase	200V	[A]	120	221	414	692	—
	230V	[A]	130	248	480	722	—
	460V	[A]	124	240	477	722	—
	575V	[A]	125	242	472	672	—
	200V	[Hp]	40	75	150	250	—
	230V	[Hp]	50	100	200	300	—
	460V	[Hp]	100	200	400	600	—
	575V	[Hp]	125	250	500	700	—
With 3 poles in series	260V DC	[A]	200	—	—	—	—
	300V DC	[A]	—	—	—	—	—
	340V DC	[A]	—	350	—	—	—
	600V DC	[A]	—	—	650	900	1900

NEMA Size		4	5	6	7	8
Coil Type:	Electronic	X	X	X	X	X

**Switching of 3-phase Motors, (50Hz); Ambient Temperature 60°C, AC-4**

230V	[A]	103	195	377	—	—
240V	[A]	103	195	377	—	—
400V	[A]	103	195	377	—	—
415V	[A]	103	195	377	—	—
500V	[A]	103	195	377	—	—
690V	[A]	80	153	350	—	—
1000V	[A]	48	90	155	—	—
230V	[kW]	32	55	110	—	—
240V	[kW]	32	63	125	—	—
400V	[kW]	55	110	200	—	—
415V	[kW]	55	110	220	—	—
500V	[kW]	63	132	250	—	—
690V	[kW]	75	150	335	—	—
1000V	[kW]	63	125	220	—	—

**AC-4 at Approximately 200'000 Operations**

230V	[A]	38	73	135	—	—
240V	[A]	38	73	135	—	—
400/415V	[A]	38	73	135	—	—
500V	[A]	33	53	89	—	—
690V	[A]	33	53	89	—	—
1000V	[A]	—	—	—	—	—
230V	[kW]	11	22	40	—	—
240V	[kW]	11	22	45	—	—
400V	[kW]	20	40	75	—	—
415V	[kW]	20	40	75	—	—
500V	[kW]	22	37	63	—	—
690V	[kW]	30	50	80	—	—
1000V	[kW]	—	—	—	—	—
Max. switching frequency	Ops/h	150	150	60	—	—

**Wye-delta (60 Hz)**

200V	[Hp]	75	150	300	450	—
230V	[Hp]	75	150	350	500	—
460V	[Hp]	150	350	700	1000	—
575V	[Hp]	200	450	800	1250	—

**Specifications, Main Circuits, Continued**

		NEMA Size	4	5	6	7	8
<b>Coil Type:</b>	Electronic		X	X	X	X	X
<b>UL/CSA Elevator Duty</b>							
	200V	[A]	54	—	—	—	—
	230V	[A]	54	—	—	—	—
	460V	[A]	54	—	—	—	—
	575V	[A]	54	—	—	—	—
	200V	[Hp]	15	—	—	—	—
	230V	[Hp]	20	—	—	—	—
	460V	[Hp]	40	—	—	—	—
	575V	[Hp]	50	—	—	—	—
<b>UL/CSA HVAC Applications</b>							
Definite purpose rating (3-phase)							
FLA		[A]	160	300	—	—	—
LRA	230V	[A]	960	1800	—	—	—
	460V	[A]	800	1500	—	—	—
	575V	[A]	640	1200	—	—	—
AC resistance heating	600V	[A]	200	400	—	—	—
<b>Star-delta Starting (50 Hz)</b>							
	≥ 230V	[A]	252	458	796	1299	—
	≥ 240V	[A]	252	458	796	1299	—
	400V	[A]	252	458	796	1299	—
	415V	[A]	252	458	796	1299	—
	500V	[A]	225	433	796	1299	—
	690V	[A]	161	433	692	1125	—
	1000V	[A]	103	173	346	519	—
	230V <sup>(1)</sup>	[kW]	75	132	250	400	—
	240V <sup>(1)</sup>	[kW]	75	132	250	400	—
	400V <sup>(1)</sup>	[kW]	132	250	400	710	—
	415V <sup>(1)</sup>	[kW]	132	250	400	800	—
	500V <sup>(1)</sup>	[kW]	160	315	500	800	—
	690V <sup>(1)</sup>	[kW]	132	400	710	1100	—
	1000V <sup>(1)</sup>	[kW]	132	250	500	710	—

(1) Power ratings at 50 Hz: Preferred values according to IEC 60947-4-1

**Specifications, Main Circuits, Continued**

NEMA Size		4	5	6	7	8
Coil Type:	Electronic	X	X	X	X	X

**Switching of Power Transformers, AC-6a (50 Hz)**

Inrush Current  
Rated transformer current = n

n = 30	≥ 230V	[A]	79	143	252	286	—
	≥ 240V	[A]	79	143	252	286	—
	≥ 400V	[A]	79	143	252	286	—
	≥ 415V	[A]	79	143	252	286	—
	≥ 500V	[A]	79	143	252	286	—
	≥ 690V	[A]	79	143	252	286	—
	≥ 1000V	[A]	—	—	—	—	—
	230V	[kVA]	31	57	100	114	—
	240V	[kVA]	33	59	105	119	—
	400V	[kVA]	55	99	175	198	—
	415V	[kVA]	56	102	179	203	—
	500V	[kVA]	68	124	218	248	—
	690V	[kVA]	94	171	301	342	—
1000V	[kVA]	—	—	—	—	—	
n = 20	≥ 690V	[A]	119	215	378	429	—
n = 15	≥ 690V	[A]	158	286	504	572	—

**60 Hz Peak Inrush/peak Rated Transformer Current**

n = 30	≥ 660V	[A]	79	143	252	286	—
	200V	[kVA]	27	50	87	99	—
	208V	[kVA]	28	52	91	103	—
	240V	[kVA]	33	59	105	119	—
	480V	[kVA]	66	119	210	238	—
	600V	[kVA]	82	149	262	297	—
	660V	[kVA]	90	163	288	327	—
n = 20	≥ 660V	[A]	119	215	378	429	—
	200V	[kVA]	41	74	131	149	—
	208V	[kVA]	43	77	136	155	—
	240V	[kVA]	49	89	157	178	—
	480V	[kVA]	99	179	314	357	—
	600V	[kVA]	124	223	393	446	—
	660V	[kVA]	136	246	432	490	—
n = 15	≥ 660V	[A]	158	286	504	572	—
	200V	[kVA]	55	99	175	198	—
	208V	[kVA]	57	103	182	206	—
	240V	[kVA]	66	119	210	238	—
	480V	[kVA]	131	238	419	476	—
	600V	[kVA]	164	297	524	594	—
	660V	[kVA]	181	327	576	654	—

**Specifications, Main Circuits, Continued**

		NEMA Size	4	5	6	7	8
<b>Coil Type:</b>		Electronic	X	X	X	X	X
<b>Switching of 3-phase Capacitors, AC-6b (50 Hz)</b>							
Single capacitor 40 °C	230V	[kVar]	50	85	140	220	—
	240V	[kVar]	50	85	140	220	—
	400V	[kVar]	90	145	240	400	—
	415V	[kVar]	90	145	240	400	—
	500V	[kVar]	110	180	325	490	—
	690V	[kVar]	110	200	325	600	—
	1000V	[kVar]	100	155	300	450	—
Single capacitor 55 °C	230V	[kVar]	50	85	140	220	—
	240V	[kVar]	50	85	140	220	—
	400V	[kVar]	90	145	240	400	—
	415V	[kVar]	90	145	240	400	—
	500V	[kVar]	110	180	325	490	—
	690V	[kVar]	110	200	325	600	—
	1000V	[kVar]	100	155	300	450	—
Single capacitor 70 °C	230V	[kVar]	42	70	120	190	—
	240V	[kVar]	42	70	120	190	—
	400V	[kVar]	74	135	225	370	—
	415V	[kVar]	74	135	225	370	—
	500V	[kVar]	96	165	300	435	—
	690V	[kVar]	110	200	325	600	—
	1000V	[kVar]	95	140	270	400	—
<b>60 Hz Single Capacitor</b>							
Single capacitor 40 °C	200V	[kVar]	41.569	83	137	205	—
	230V	[kVar]	47.804	95	157	236	—
	460V	[kVar]	100	200	329	494	—
	600V	[kVar]	125	250	410	618	—
<b>Switching of Lamps</b>							
Gas discharge lamps AC-5a	open	[A]	146	265	460	750	1332
UL Ballast ratings		[A]	200	400	—	—	—
Filament AC-5b	230/240V	[A]	146	265	460	750	1332



**Specifications, Main Circuits, Continued**

		NEMA Size	4	5	6	7	8
Coil Type:		Electronic	X	X	X	X	X

**Switching of DC loads**

Non-inductive or slightly inductive loads or resistance furnaces DC-1 at 60 °C

1 pole	24V	[A]	200	400	700	1050	2050
	48/60V	[A]	200	400	700	1050	2050
	110V	[A]	—	400	700	1050	2050
	220V	[A]	—	—	—	—	—
	440V	[A]	—	—	—	—	—
2 poles in series	24V	[A]	200	400	700	1050	2050
	48/60V	[A]	200	400	700	1050	2050
	110V	[A]	200	400	700	1050	2050
	220V	[A]	—	400	700	1050	—
	440V	[A]	—	—	—	—	—
3 poles in series	24V	[A]	200	400	700	1050	2050
	48/60V	[A]	200	400	700	1050	2050
	110V	[A]	200	400	700	1050	2050
	220V	[A]	200	400	700	1050	2050
	440V	[A]	—	—	700	1050	2050

**Shunt-wound Motors**

Starting, reverse current breaking, reversing, stepping DC-3, 60 °C

3 poles in series	24V	[A]	160	350	700	1050	—
	48/60V	[A]	160	350	700	1050	—
	110V	[A]	160	350	700	1050	—
	220V	[A]	160	350	700	1050	—
	440V	[A]	—	—	700	1050	—

**Series-wound Motors**

Starting, reverse current breaking, reversing, stepping DC-5, 60 °C

3 poles in series	24V	[A]	160	350	700	1050	—
	48/60V	[A]	160	350	700	1050	—
	110V	[A]	160	350	700	1050	—
	220V	[A]	160	350	700	1050	—
	440V	[A]	—	—	700	1050	—

**Short Time Withstand  $I_{CW}$  40 °C**

	1 s	[A]	1460	2650	4600	7000	12000
	10 s	[A]	1168	2120	4400	6400	10000
	30 s	[A]	674	1224	3100	4500	7500
	1 min	[A]	477	865	2500	3500	5500
	15 min	[A]	225	400	840	1300	2200

NEMA Size		4	5	6	7	8
<b>Resistance and Power Dissipation</b>						
Main current circuit resistance	[mΩ]	0.454	0.200	0.086	0.045	0.030
Power dissipation per pole at $I_e$ AC-1, 400V	[W]	23	32	42	50	125
Power dissipation per pole at $I_e$ AC-3/400V	[W]	10	14	21	28	—
Total power dissipation at:						
$I_e$ AC-3, 400V; AC/DC control (120-250V)	[W]	33	46.5	68	89	—
<b>Maximum Switching Frequency</b>						
AC-1	ops /hr	300	300	300	300	60
AC-3	ops /hr	300	300	300	300	—
AC-2, AC-4	ops /hr	150	150	60	60	—
<b>Weight</b>						
AC/DC (Electronic) with bar connections	kg (lbs.)	1.50 (3.3)	4.64 (10.2)	12 (26.4)	15 (33)	35 (77)
with built-in cable clamps	kg (lbs.)	1.75 (3.85)	—	—	—	—

**Specifications, Main Circuits, Continued**

NEMA Size		4	5	6	7	8
<b>Coil Type:</b>	Electronic	X	X	X	X	X
<b>Short Circuit Coordination (Max. Fuse or Circuit Breaker Rating)</b> Per IEC 60947-4-1						
<b>DIN Fuses - gG</b>		100 kA available fault current				
Type "2" (400V)	[A]	250	400	630	800	—
<b>DIN Fuses - gG</b>		80 kA available fault current				
Type "2" (690V)	[A]	200	400	630	800	—
<b>MCCB</b>		70 kA available fault current				
Type "2" (400V)	[A]	160	400	630	1000	—
<b>Short Circuit Current Rating (Max. Fuse or Circuit Breaker Rating)</b> Per UL 60947 and CSA 22.2 No. 14 (Contactor and Fuses or Circuit Breaker Only)						
<b>UL Class RK5 Fuses</b>		10 kA available fault current				
Type 1 Combination (600V)	[A]	250	—	—	—	—
<b>UL Class L Fuses</b>		18 kA available fault current				
Type 1 Combination (600V)	[A]	—	800	—	—	—
<b>UL Class L Fuses</b>		30 kA available fault current				
Type 1 Combination (600V)	[A]	—	—	1000	—	—
<b>UL Class L Fuses</b>		85 kA available fault current				
Type 1 Combination (600V)	[A]	—	—	—	—	—
<b>UL Class J and CSA HRCI-J Fuses</b>		100 kA available fault current				
Type 1 Combination (600V)	[A]	250	600	600	—	—
Type 2 Combination (600V)	[A]	200	600	600	—	—
<b>UL Class L Fuses</b>		100 kA available fault current				
Type 1 Combination (600V)	[A]	—	—	800	1200	—
Type 2 Combination (600V)	[A]	—	—	—	1200	—
<b>UL Inverse-Time Circuit</b>		42 kA available fault current				
Type 1 Combination (480V)	[A]	—	—	—	1200	—
<b>UL Inverse-Time Circuit</b>		65 kA available fault current				
Type 2 Combination (480V)	[A]	250	800	800	800	—
<b>UL Inverse-Time Circuit</b>		84 kA available fault current				
Type 1 Combination (480V)	[A]	—	—	800	—	—
<b>UL Inverse-Time Circuit</b>		89 kA available fault current				
Type 1 Combination (480V)	[A]	—	—	—	800	—
<b>UL Inverse-Time Circuit</b>		100 kA available fault current				
Type 1 Combination (480V)	[A]	250	800	—	—	—
<b>UL Inverse-Time Circuit</b>		25 kA available fault current				
Type 2 Combination (600V)	[A]	250	—	—	—	—
<b>UL Inverse-Time Circuit</b>		35 kA available fault current				
Type 2 Combination (600V)	[A]	—	800	800	800	—
<b>UL Inverse-Time Circuit</b>		42 kA available fault current				
Type 1 Combination (600V)	[A]	—	800	800	800	—
<b>UL Inverse-Time Circuit</b>		50 kA available fault current				
Type 1 Combination (600V)	[A]	250	—	—	—	—
<b>UL Inverse-Time Circuit</b>		65 kA available fault current				
Type 1 Combination (600V)	[A]	—	400	—	—	—

**Coil Data**

		NEMA Size	4	5	6	7	8
<b>Coil Type:</b>		Electronic	X	X	X	X	X
<b>Operating Limits</b>							
50/60 Hz	pick-up	[x Us]	0.85...1.1				
	dropout	[x Us]	0.55				
DC control	pick-up	[x Us]	0.80...1.1				
	dropout	[x Us]	0.55				
24...60V AC	pick-up	[VA]	225	475	—	—	—
	hold-in	[VA]	5.5	8.5	—	—	—
48...130V AC	pick-up	[VA]	170	340	1215	1100	—
	hold-in	[VA]	4	17	12	12	—
100...250V AC	pick-up	[VA]	130	385	955	880	2450
	hold-in	[VA]	6	17.5	12	12	48
250...500V AC	pick-up	[VA]	205	420	950	985	—
	hold-in	[VA]	16	21	12	12	—
24...60V DC	pick-up	[W]	210	400	900	785	—
	hold-in	[W]	2.5	3.5	5	5.5	—
48...130V DC	pick-up	[W]	130	360	1150	1020	—
	hold-in	[W]	2.5	2.5	5	5	—
100...250V DC	pick-up	[W]	135	410	895	880	2290
	hold-in	[W]	3	4.5	5	5	20.5
250...500V DC	pick-up	[W]	205	600	885	910	—
	hold-in	[W]	4	4.7	7.5	7.5	—
<b>Operating Times</b>							
AC or DC	closing delay	[ms]	20...55	30...60	50...120	50...120	50...80
	opening delay	[ms]	40...70	45...80	33...70	33...70	35...55
With PLC Interface	closing delay	[ms]	20...31	25...45	40...60	40...90	40...65
	opening delay	[ms]	24...34	25...45	10...30	10...30	10...30

**Cross Sections, Screw Type Terminals**

NEMA Size		4	5	6	7	8
<b>Coil Type:</b>	Electronic	X	X	X	X	X

**Main Terminals**

Conductor Cross Sections — Main Contacts (Terminal Type)							
	(1) conductor	[mm <sup>2</sup> ]	10...95	16...400	—	—	—
	Clamp Type		100-ECL146	100-ETL370	—	—	—
	Recommended torque	[Nm]	8	42	—	—	—
	(2) conductors	[mm <sup>2</sup> ]	10...95	16...500	70...500	70...500	—
	Clamp Type		100-ECL146	100-ETL370B	100-ETL580	100-ETL750	—
	Recommended torque	[Nm]	8	42	31	43	—
	(3) conductors	[mm <sup>2</sup> ]	—	—	—	70...500	—
	Clamp Type		—	—	—	100-ETL750	—
	Recommended torque	[Nm]	—	—	—	43	—
	L max.	[mm]	22	32	47	50	100
	Ø min.	[mm]	6	10	10	12	12
	Recommended torque	[Nm]	9	28	35	45	45

**Cross Section Per UL/CSA**



	(1) conductor	[AWG]	3...3/0	4...400 <sup>(1)</sup>	—	—	—
	Clamp Type		100-ECL146	100-ETL370	—	—	—
	Recommended torque	[lb-in]	80	375	—	—	—
	(2) conductors	[AWG]	6...3/0	4...500 <sup>(1)</sup>	2/0...500 <sup>(1)</sup>	2/0...500 <sup>(1)</sup>	—
	Clamp Type		100-ECL146	100-ETL370B	100-ETL580	100-ETL750	—
	Recommended torque	[lb-in]	80	375	275	375	—
	(3) conductors	[AWG]	—	—	—	2/0...500 <sup>(1)</sup>	—
	Clamp Type		—	—	—	100-ETL750	—
	Recommended torque	[lb-in]	—	—	—	375	—
	L max.	[in]	0.866	1.26	1.85	1.97	3.94
	Ø min.	[in]	0.236	0.394	0.394	0.472	0.472
	Recommended torque	[lb-in]	80	248	310	398	398

**Conductor Cross Sections  
— Coil Terminals (Terminal Type)**

	(1) conductor	[mm <sup>2</sup> ]				
	(2) conductors	[mm <sup>2</sup> ]				
	(1) conductor	[mm <sup>2</sup> ]	0.75...2.5			
	(2) conductors	[mm <sup>2</sup> ]	1...4			
	Recommended torque	[Nm]	1...1.2			
	Cross section per UL/CSA	[AWG]	18...14			
	Recommended torque	[lb-in]	8.9...10.6			

(1) MCM

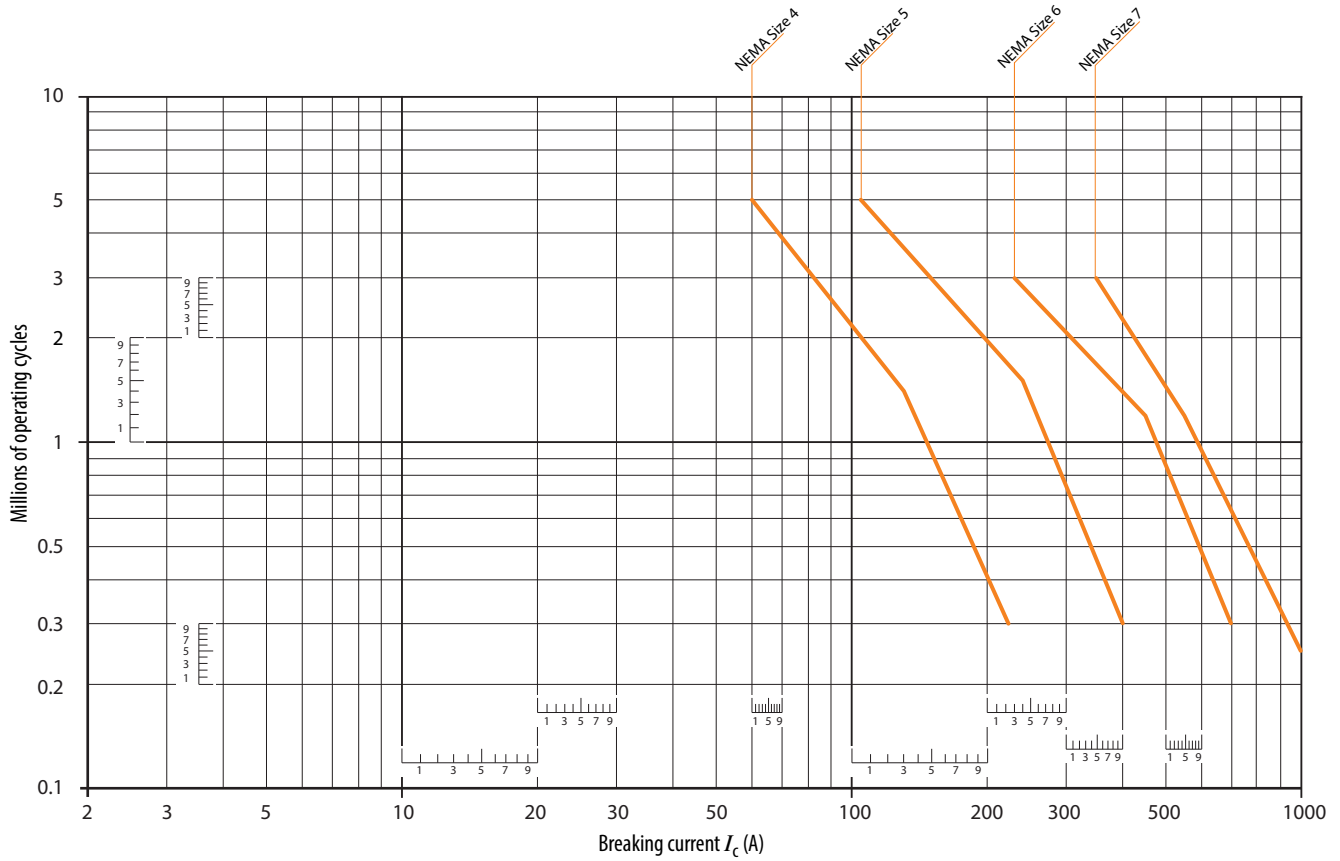
**Specifications, Auxiliary Contacts**

			Auxiliary Contact for 100/104-E, 100S-E		
			Standard 100-ES1/2*	Standard 100-ES3/4*	Low Power 100-ES*-B*
<b>Switching of AC Loads</b>					
Rated Insulation voltage $U_i$			690V	690V	250V
Rated operating voltage $U_e$			690V	690V	125V
Rated impulse withstand voltage $U_{imp}$			6kV	6kV	1.5kV
AC-12 $I_{th}$	at 40 °C	[A]	16	16	0.1
	at 60 °C	[A]	—	—	—
AC-14 at rated voltage of	24V	[A]	—	—	0.1
	42/48V	[A]	—	—	0.1
	120V	[A]	—	—	0.1
AC-15 at rated voltage of	24V	[A]	6	6	—
	42/48V	[A]	6	6	—
	120V	[A]	6	6	—
	230V	[A]	4	4	—
	240V	[A]	4	4	—
	400V	[A]	3	3	—
	415V	[A]	3	3	—
	500V	[A]	2	2	—
690V	[A]	2	2	—	
<b>Switching of DC Loads</b>					
DC-12 L/R < 1 ms resistive loads at	24V DC	[A]	—	—	0.1
	48V DC	[A]	—	—	0.1
	110V DC	[A]	—	—	0.1
	220V DC	[A]	—	—	—
	440V DC	[A]	—	—	—
DC-14 L/R < 15 ms inductive loads with economy resistor in series at	24V DC	[A]	—	—	—
	48V DC	[A]	—	—	—
	110V DC	[A]	—	—	—
	220V DC	[A]	—	—	—
	440V DC	[A]	—	—	—
DC-13 switching electromagnets at	24V DC	[A]	3	6	—
	48V DC	[A]	1.5	2.8	—
	110V DC	[A]	0.55	0.55	—
	220V DC	[A]	0.3	0.3	—
	440V DC	[A]	—	—	—
<b>Fuse gG</b>					
Short circuit protection with no welding of contacts per IEC 60947-5-2		[A]	10	10	0.1
		[A]	10	10	0.1
Protective Separation per IEC 60947-1, Annex N					
Min. switching capacity at 24V IEC 60947-5-4		[mA]	50	50	—
Min. switching capacity at 3V IEC 60947-5-4		[mA]	—	—	1
<b>Load Carrying Capacity Per UL/CSA</b>					
Rated voltage	AC	[V]	600	600	125
Continuous rating	40 °C	[A]	10	10	0.1
Switching capacity	AC		A 600	A 600	—
Rated voltage	DC	[V]	250	250	125
Continuous rating	40 °C	[A]	2.5	2.5	0.1
Switching capacity	DC		P 600	Q 300	—

## Life-load Curves 3-pole Contactors — Electrical Durability

### Electrical Durability for AC-1 Utilization Category - $U_e \leq 690V$

Switching non-inductive or slightly inductive loads. The breaking current  $I_c$  for AC-1 is equal to the rated operating current of the load. Ambient temperature (see [page 19](#)) and maximum electrical switching frequency (see [page 26](#)).

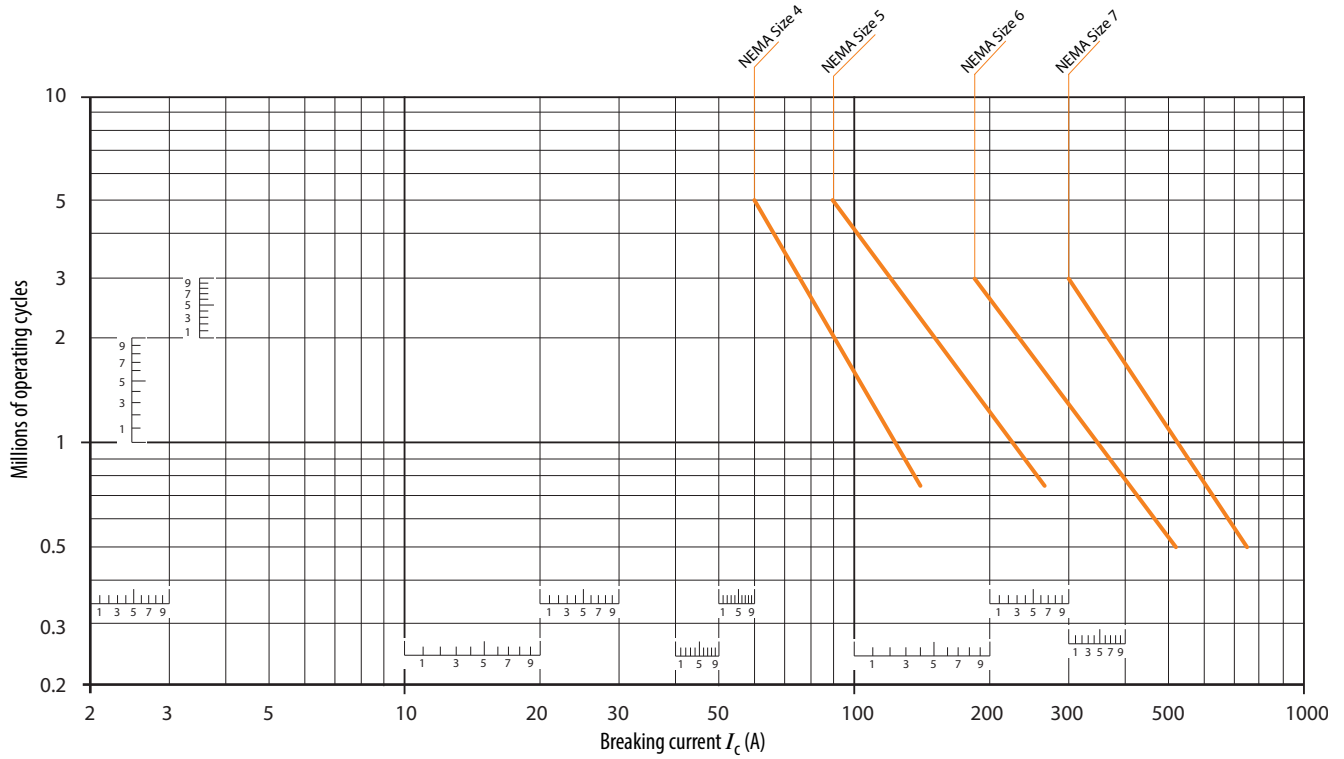


**E860, E1060:** The electrical durability at the rated current is 50 000 operating cycles.

### Electrical Durability for AC-3 Utilization Category - $U_e \leq 440V$

Switching cage motors: starting and switching off running motors. The breaking current  $I_c$  for AC-3 is equal to the rated operating current  $I_e$  ( $I_c =$  motor full load current).

For ambient temperature (see [page 19](#)) and maximum electrical switching frequency (see [page 26](#)).



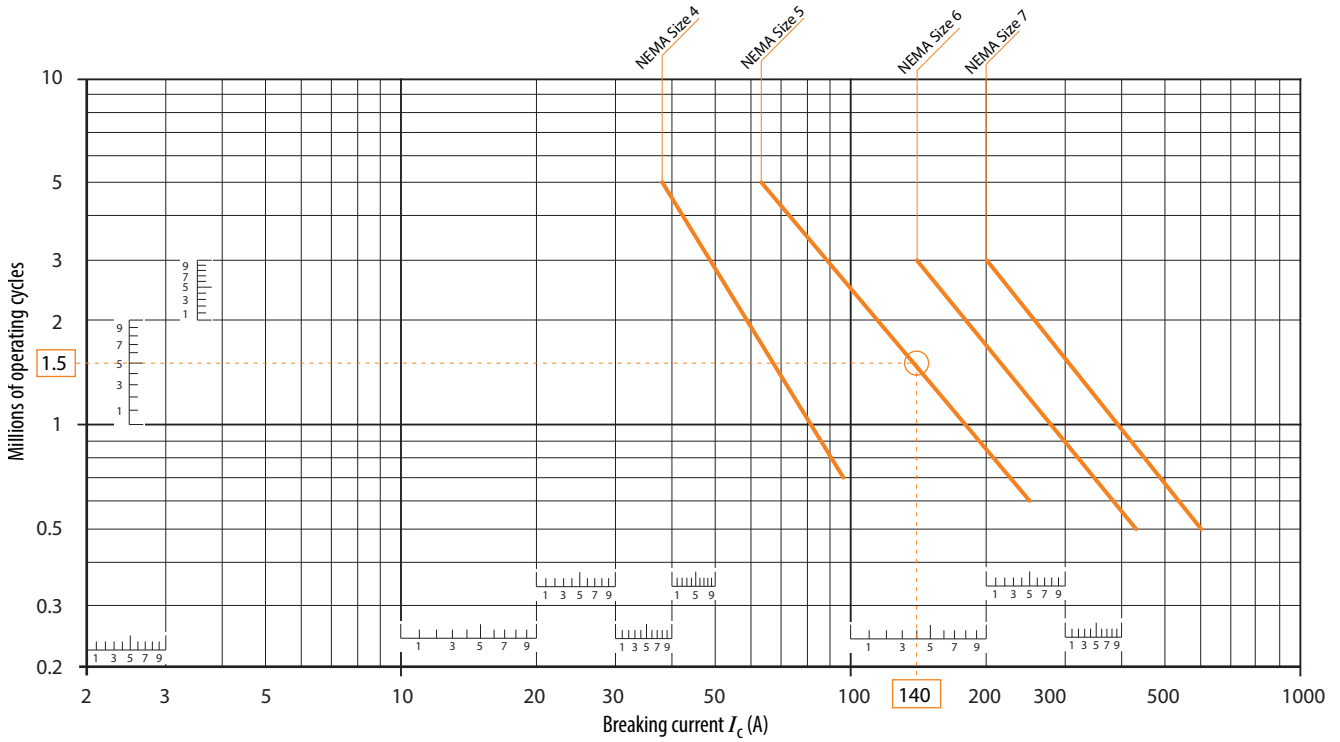
**E860, E1060:** The electrical durability at the rated current is 50 000 operating cycles.



### Electrical Durability for AC-3 Utilization Category - $440V < U_e \leq 690V$

Switching cage motors: starting and switching off running motors. The breaking current  $I_c$  for AC-3 is equal to the rated operating current  $I_e$  ( $I_c =$  motor full load current).

For ambient temperature (see [page 19](#)) and maximum electrical switching frequency (see [page 26](#)).



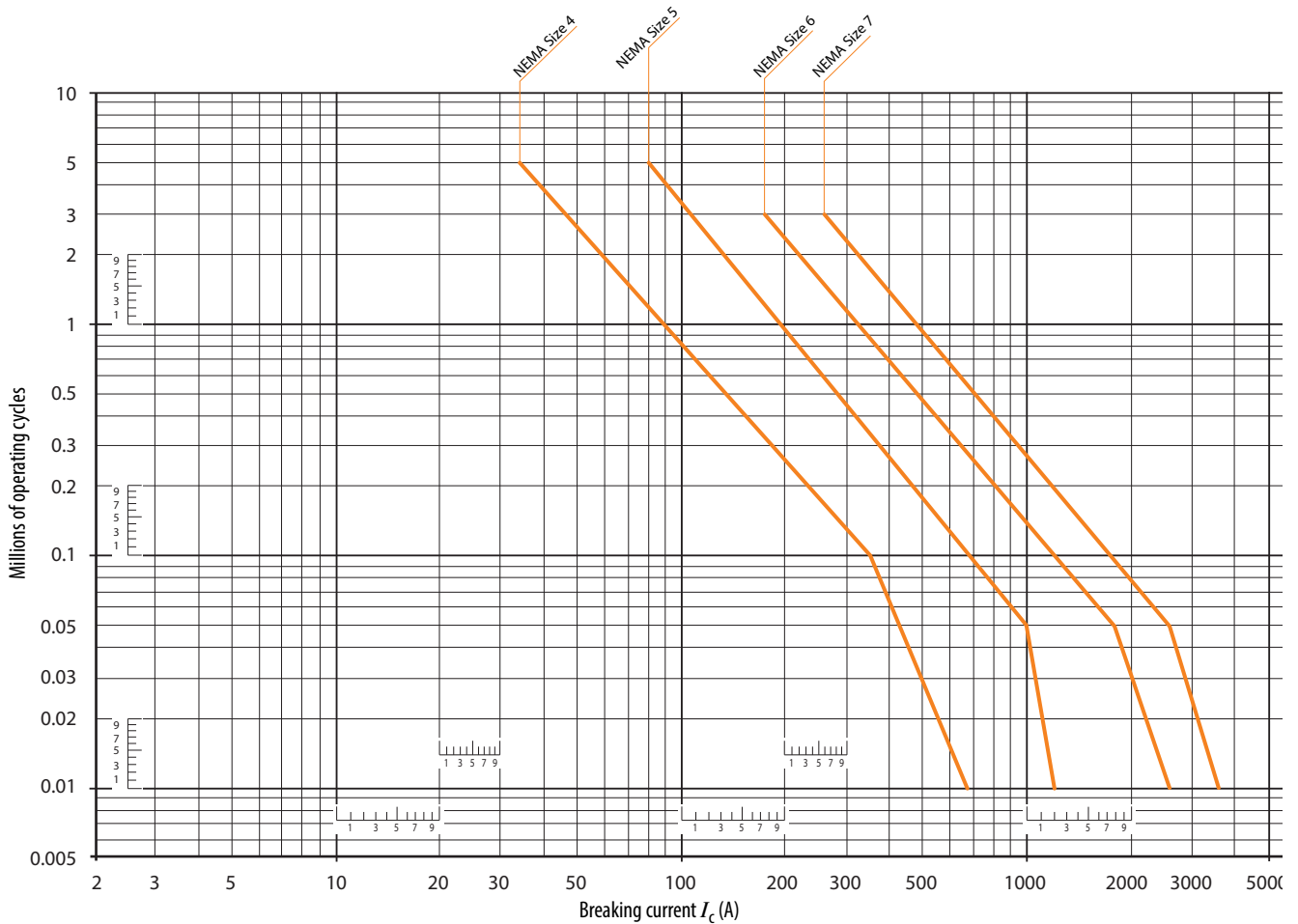
**E860, E1060:** The electrical durability at the rated current is 50 000 operating cycles.

### Electrical Durability for AC-2 or AC-4 Utilization Category - $U_e \leq 440V$

Ambient temperature  $\leq 60^\circ C$  for AF09...AF370,  $\leq 55^\circ C$  for AF400...AF1650

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current  $I_c$  is equal to  $2.5 \times I_e$  for AC-2 and  $6 \times I_e$  for AC-4, keeping in mind that  $I_e$  is the motor rated operating current ( $I_e =$  motor full-load current).

For maximum electrical switching frequency (see [page 26](#)).

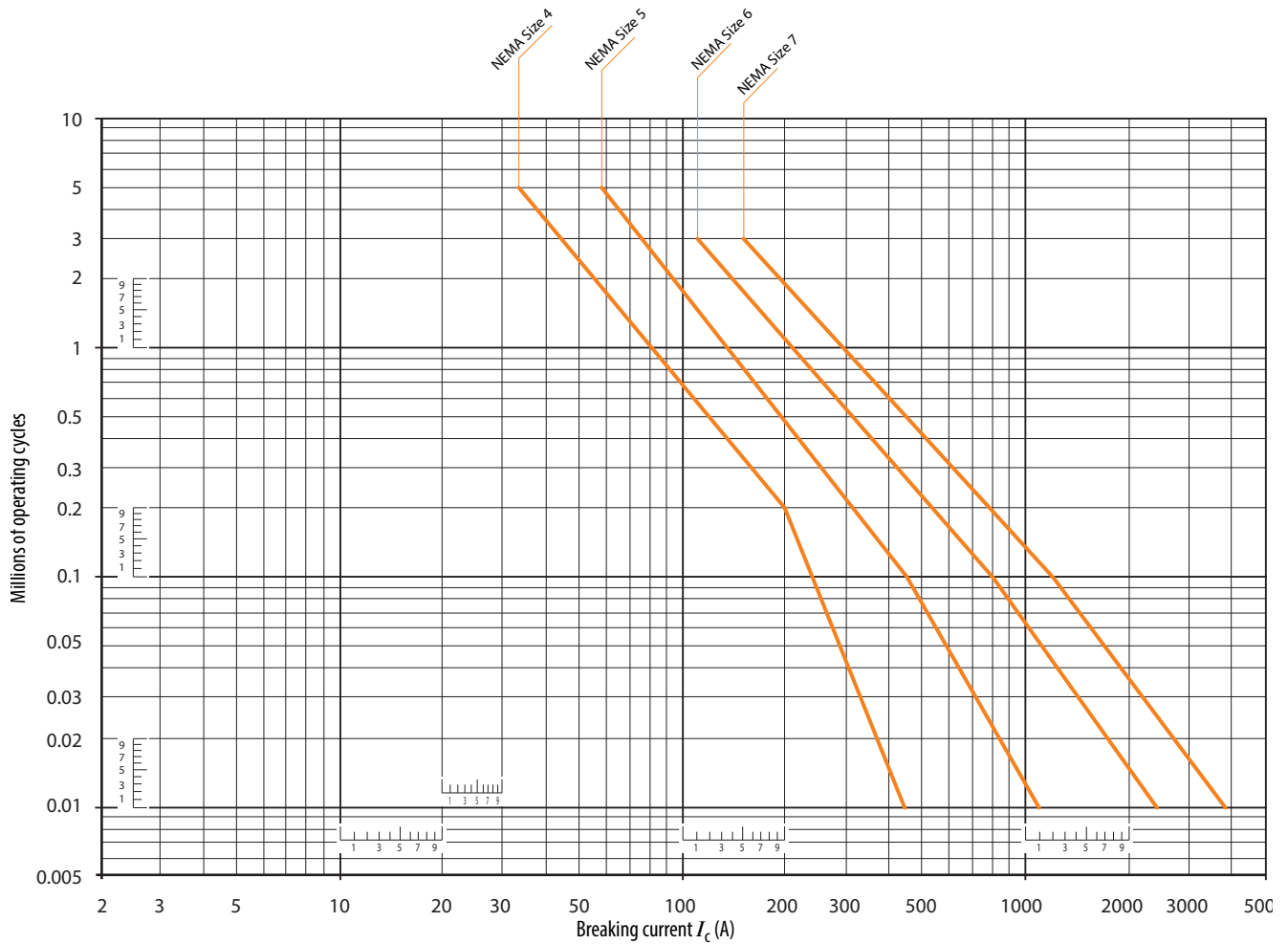


### Electrical Durability for AC-2 or AC-4 Utilization Category - $440V < U_e \leq 690V$

Ambient temperature  $\leq 60^\circ\text{C}$  for AF09...AF370,  $\leq 55^\circ\text{C}$  for AF400...AF750

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current  $I_c$  is equal to  $2.5 \times I_e$  for AC-2 and  $6 \times I_e$  for AC-4, keeping in mind that  $I_e$  is the motor rated operating current ( $I_e =$  motor full load current).

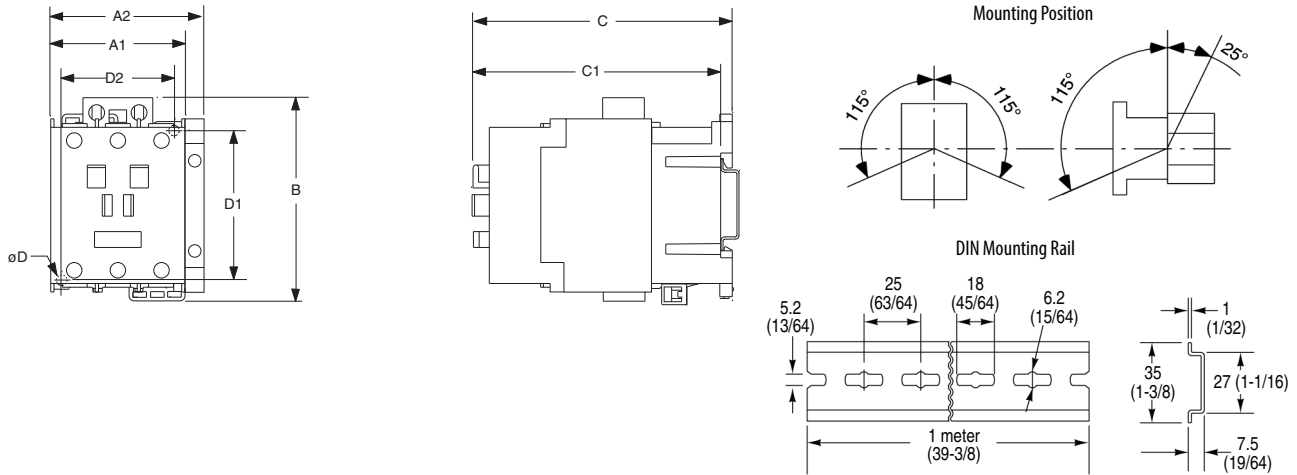
For maximum electrical switching frequency (see [page 26](#)).



## Approximate Dimensions

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

### Bulletin 300 Contactors and Accessories (NEMA Sizes 0...3)



### AC Contactors

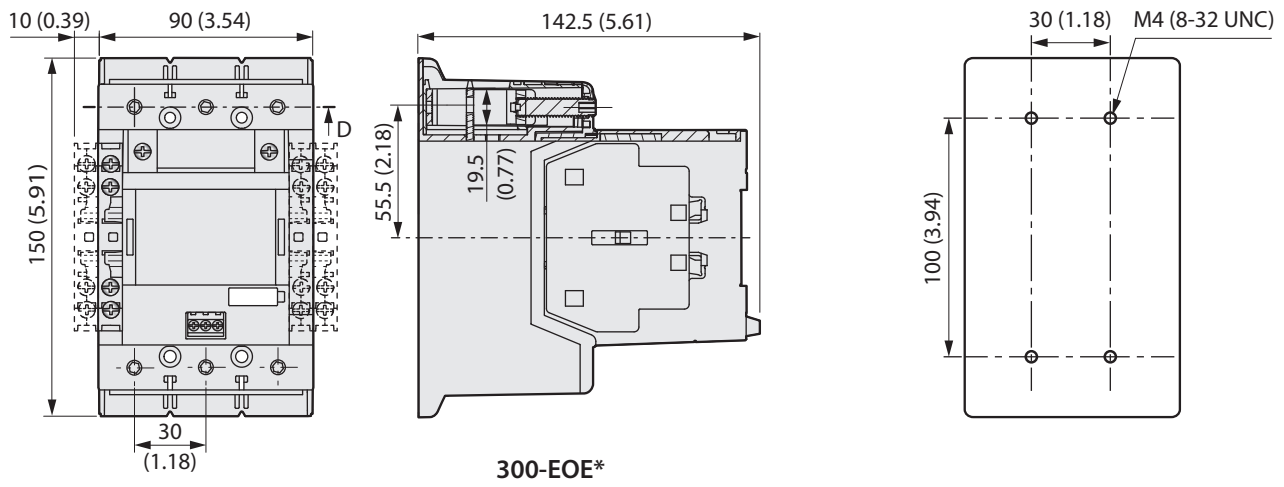
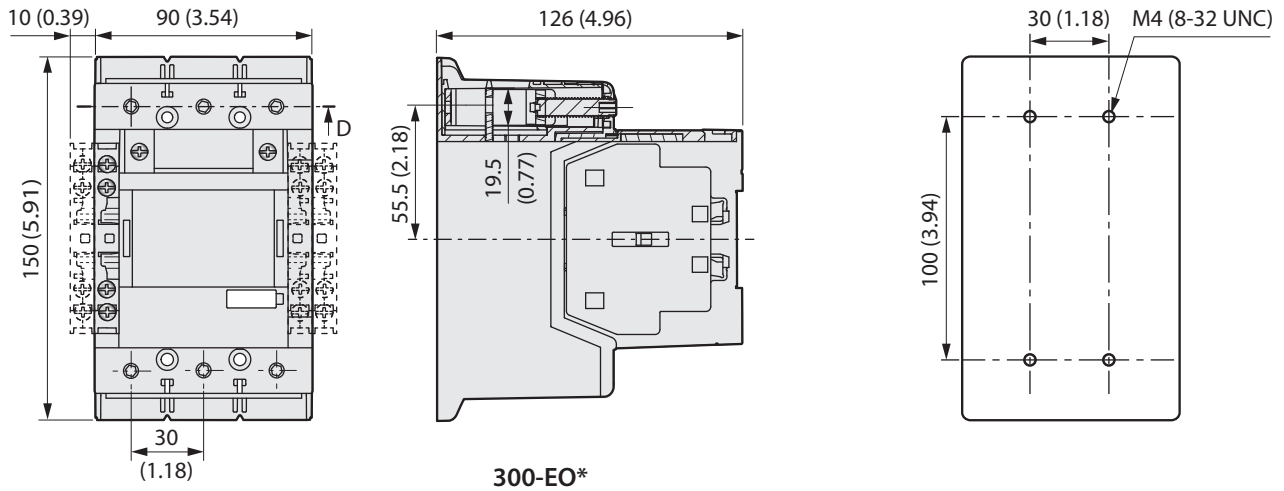
Cat. No.	NEMA Size	A1	A2	B	C	C1	Mounting Dimensions		
							Ø D	D1	D2
300-A0_	0	1.76 (45)	—	3.19 (81)	3.39 (86)	3.19 (81)	0.17 (4.5)	2.36 (60)	1.38 (35)
300-B0_	1	—	2.12 (54)	3.19 (81)	4.06 (103)	3.86 (98)	0.17 (4.5)	2.36 (60)	1.38 (35)
300-C0_	2	—	2.48 (63)	3.19 (81)	4.17 (106)	3.98 (101)	0.17 (4.5)	2.36 (60)	1.77 (45)
300-D0_	3	—	3.19 (81)	4.80 (122)	4.80 (122)	4.61 (117)	0.22 (5.4)	3.94 (100)	2.17 (55)

### Accessories

Contactors with		in. (mm)
Auxiliary contact block for front mounting	2- or 4-pole	C/C1 + 1.54 (39)
Auxiliary contact block for side mounting	1- or 2-pole	A + 0.35 (9)
Pneumatic Timing Module		C/C1 + 2.28 (58)
Electronic Timing Module	on coil terminal side	B + 0.94 (24)
Mechanical Interlock	on side of contactor	A + 0.35 (9)
Mechanical Latch		C/C1 + 2.40 (61)
Interface Module	on coil terminal side	B + 0.35 (9)
Surge Suppressor	on coil terminal side	B + 0.12 (3)
Labeling with:	label sheet	+ 0
	marking tag sheet with clear cover	+ 0
	marking tag adapter for System V4/V5	+ 0.22 (5.5)
	marking tag adapter for System Bulletin 1492W	+ 0.22 (5.5)

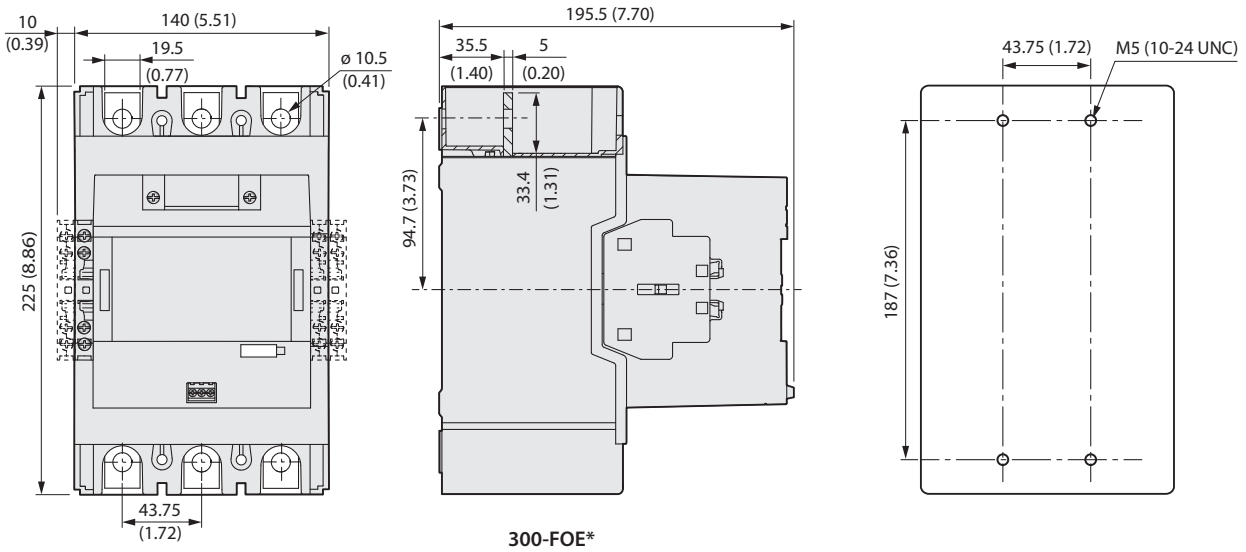
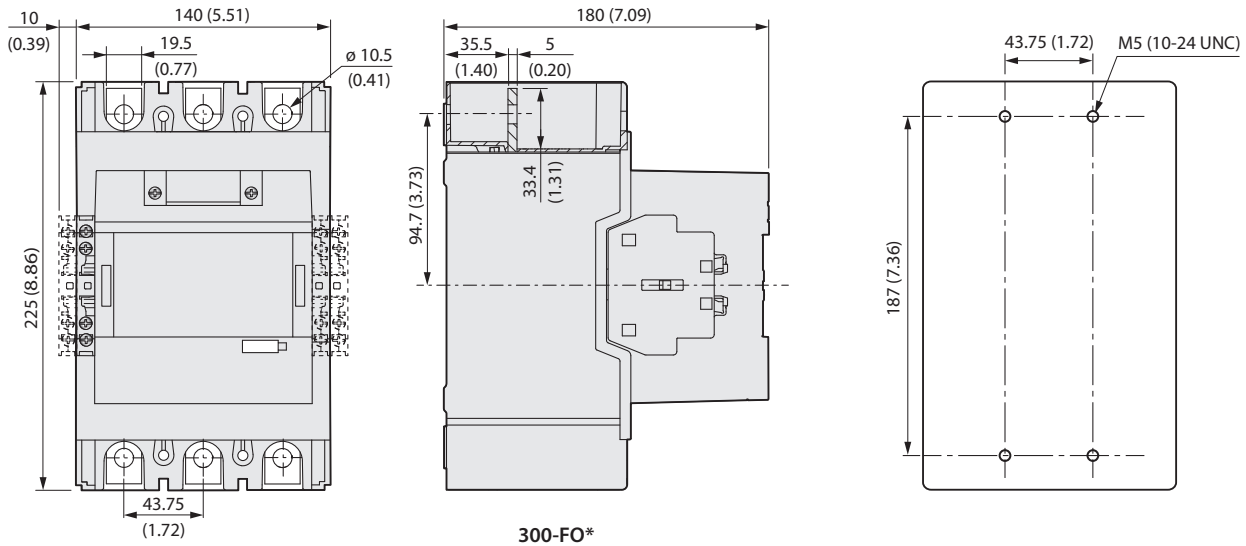
Approximate dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

**Bulletin 300 Contactor (NEMA size 4)**



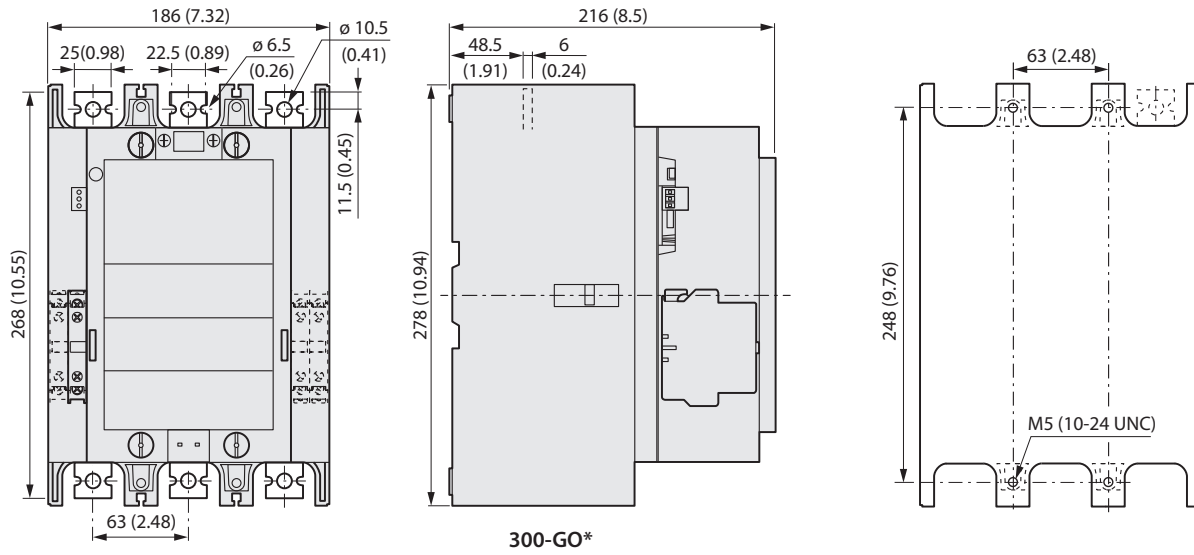
Approximate dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

**Bulletin 300 Contactor (NEMA size 5)**



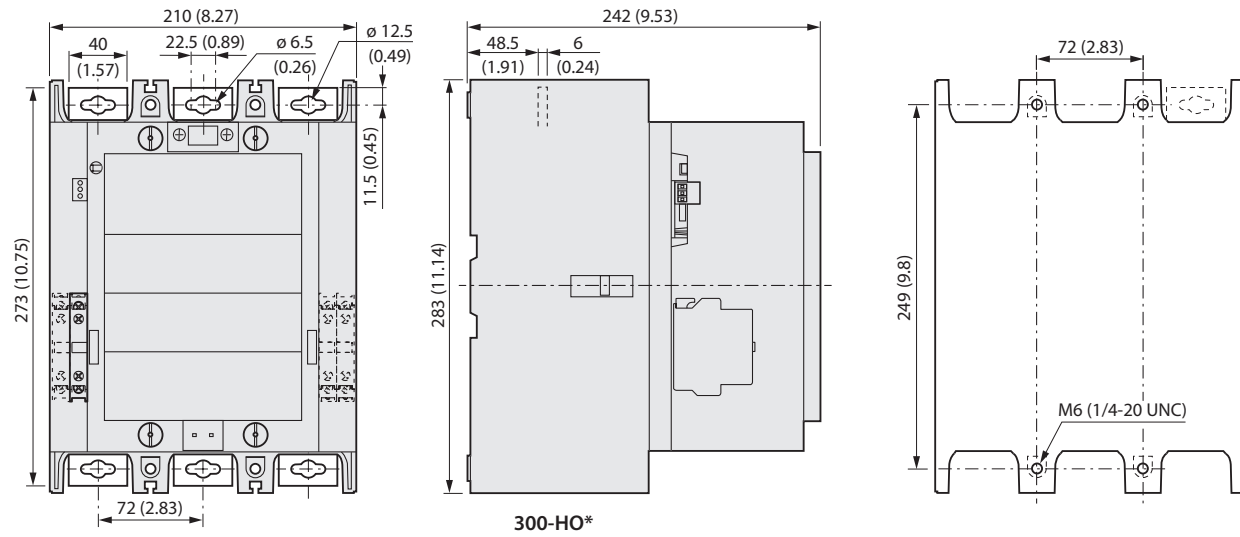
Approximate dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

**Bulletin 300 Contactor (NEMA size 6)**



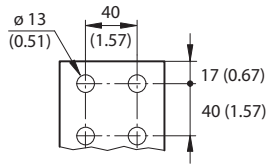
Approximate dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

**Bulletin 300 Contactor (NEMA size 7)**

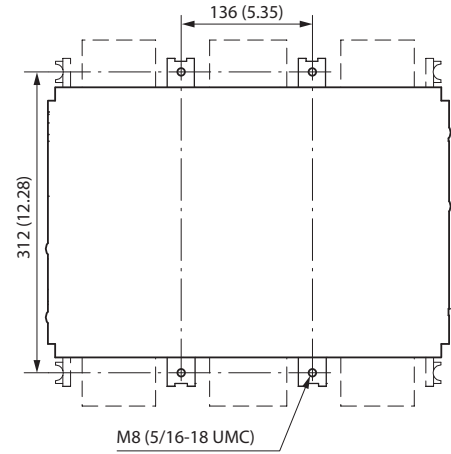
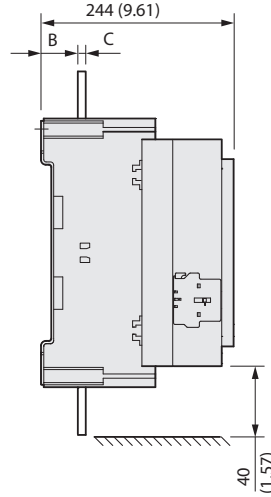
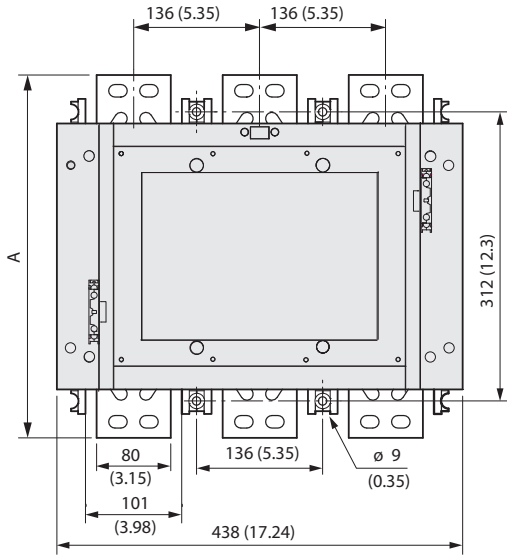


Approximate dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

**Bulletin 300 Contactor (NEMA size 8)**



<b>A</b>	392 (15.43)
<b>B</b>	47 (1.85)
<b>C</b>	10 (0.39)

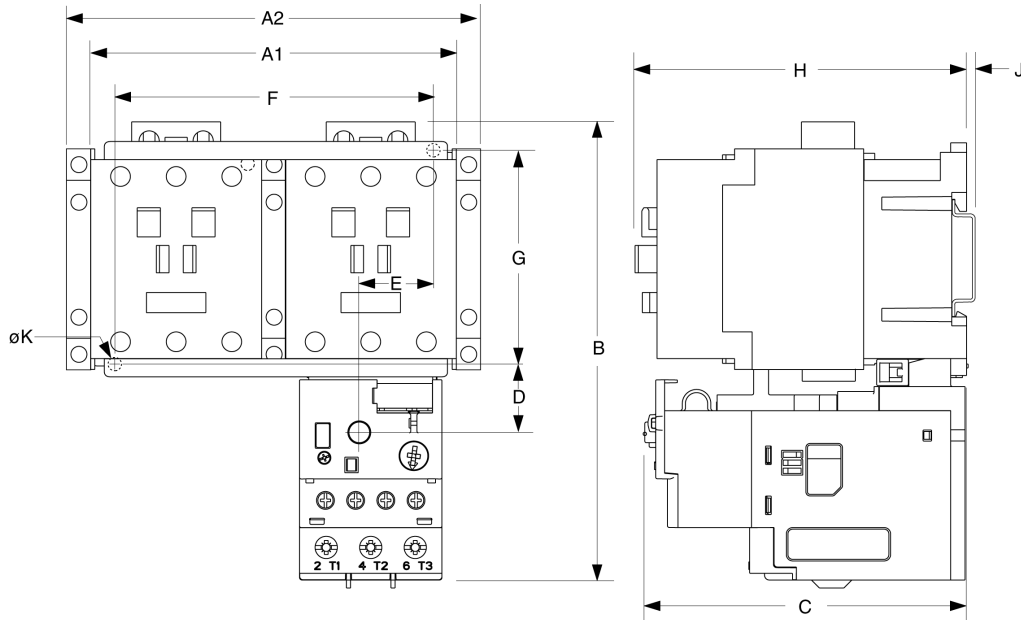


300-JO\*



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

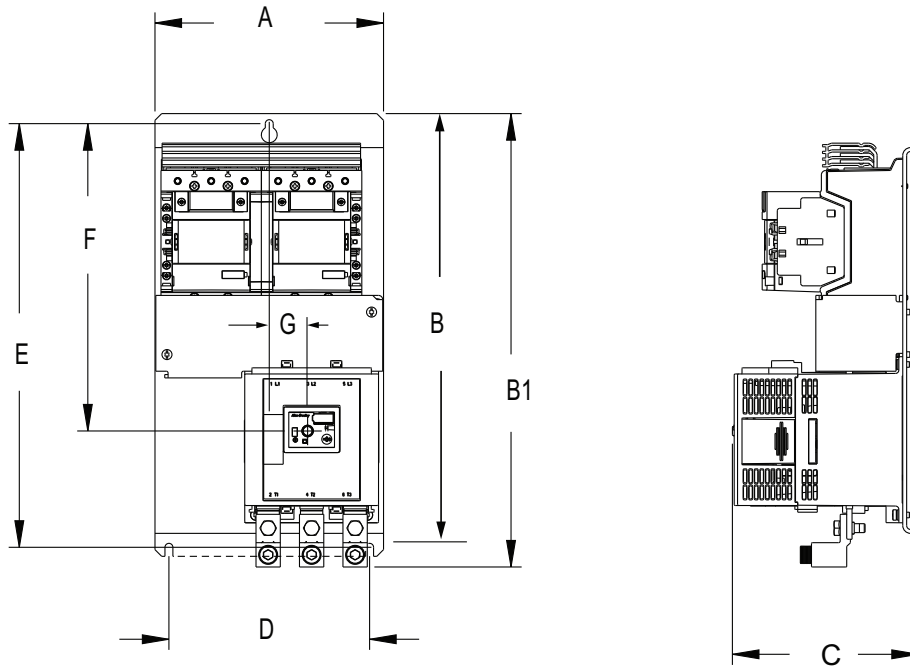
**Bulletin 305 Reversing Starter with E1 Plus Solid-state Overload Relay (NEMA Sizes (0..3)**



Cat. No.	NEMA Size	A1	A2	B	C	D	E	F	G	H	J	ØK
305-A0_	0	3.9 (99)	—	5.77 (147)	3.35 (85.2)	0.96 (24.5)	0.83 (21.1)	3.54 (90)	2.36 (60)	3.4 (86.5)	0.08 (2)	0.17 (4.5)
305-B0_	1	—	4.61 (117)	5.77 (147)	3.98 (101)	0.96 (24.5)	0.83 (21.1)	3.54 (90)	2.36 (60)	4.09 (104)	0.08 (2)	0.17 (4.5)
305-C0_	2	—	4.61 (117)	5.77 (147)	3.98 (101)	0.96 (24.5)	0.83 (21.1)	3.54 (90)	2.36 (60)	4.09 (104)	0.08 (2)	0.17 (4.5)
305-D0	3	—	6.74 (171)	7.58 (192.3)	4.75 (120.4)	1.14 (29)	1.23 (31.2)	5.35 (136)	3.94 (100)	4.94 (125.5)	0.08 (2)	0.39 (5.4)

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

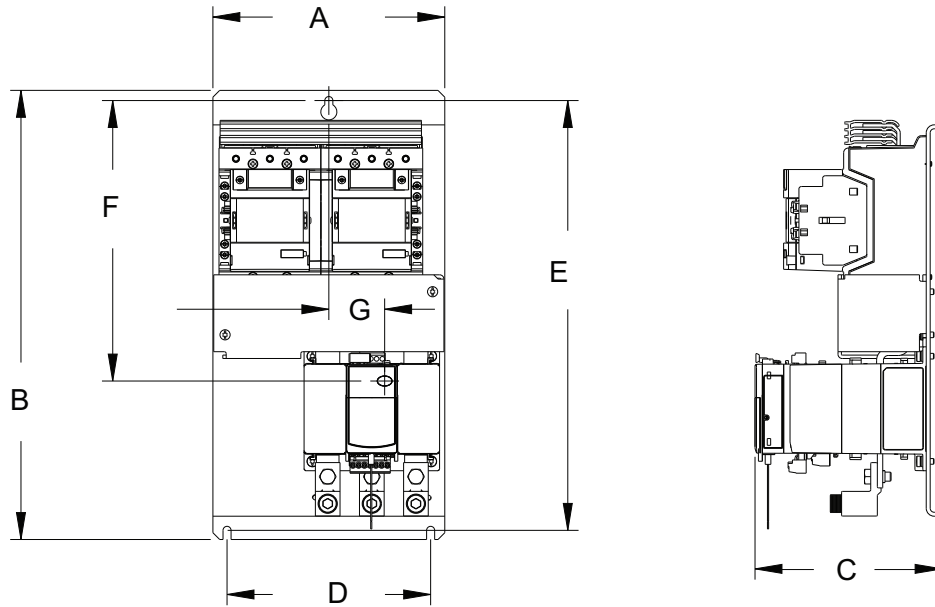
**Bulletin 305 Reversing Starter with E1 Plus Solid-state Overload Relay (NEMA Size 4)**



Cat. No.	NEMA Size	A	B	B1	C	D	E	F	G
305-E0_	4	8.07 (205)	15.2 (385)	16 (407)	6.57 (167)	7.09 (180)	15 (380)	10.9 (276)	1.36 (34.5)

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

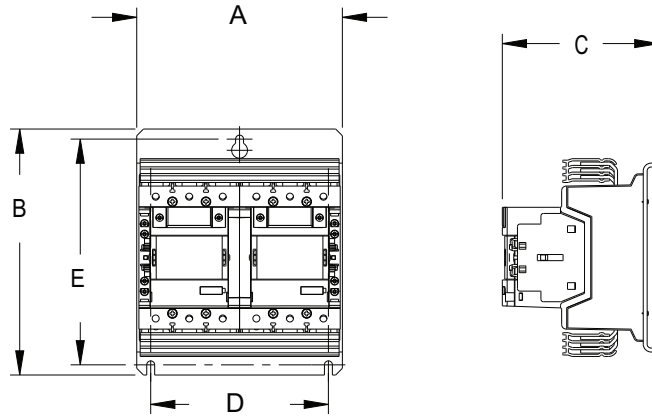
**Bulletin 305 Reversing Starter with E300 Solid-state Overload Relay (NEMA Size 4)**



Cat. No.	NEMA Size	A	B	C	D	E	F	G
305-E0_	4	8.07 (205)	15.6 (397)	6.51 (165)	7.09 (180)	15 (380)	9.76 (248)	2.41 (61.2)

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

**Bulletin 305 Reversing Contactor (NEMA Sizes 4...7)**

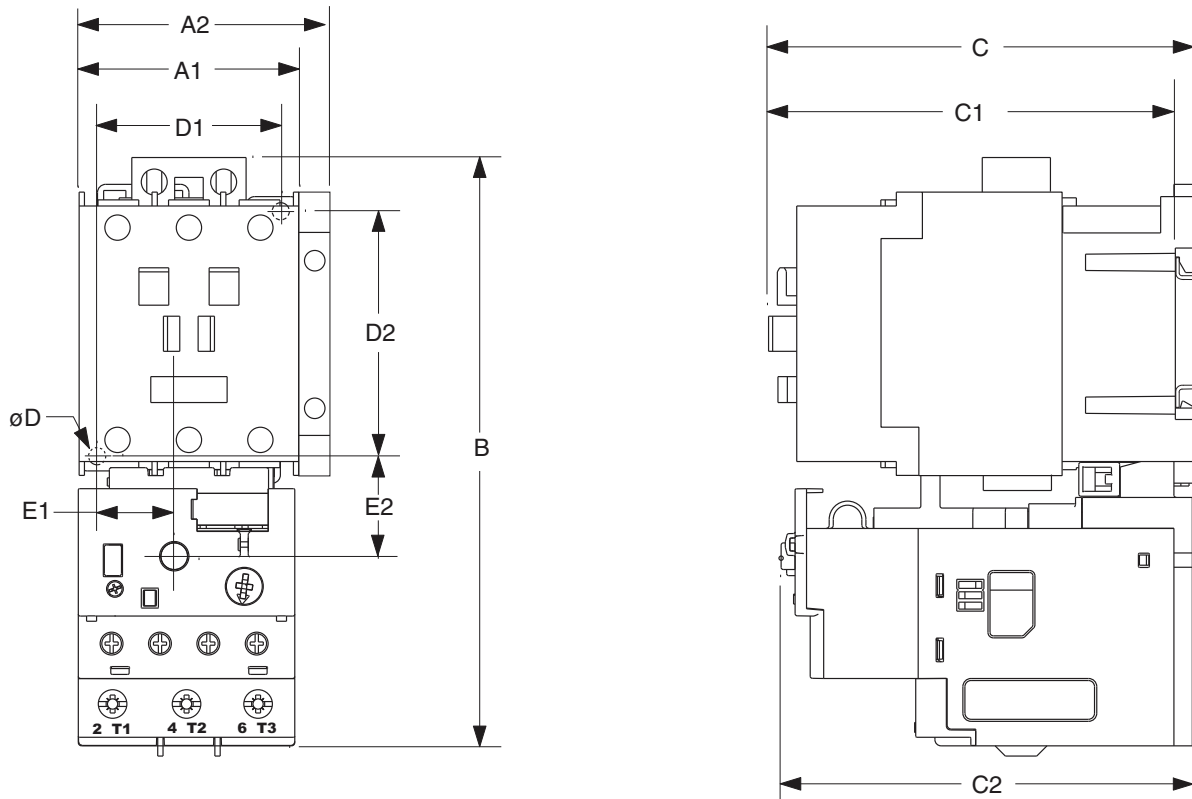


Cat. No.	NEMA Size	A	B	C	D	E
305-E0_	4	7.24 (184)	8.67 (220)	5.52/6.16 <sup>(1)</sup> (140/157)	6.26 (159)	7.95 (202)
305-F0_	5	11.2 (285)	11.8 (299)	7.60/8.20 <sup>(1)</sup> (193/209)	10 (255)	11.1 (281)
305-G0_	6	15.9 (404)	13.9 (354)	8.9 (226)	12.3 (313)	13.1 (332)
305-H0_	7	17.8 (452)	14.2 (369)	9.94 (252)	14.2 (360)	13.7 (347)

(1) Depth with PLC interface option.

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

**Bulletin 309 Full Voltage Starter with E1 Plus Solid-State Overload Relay (NEMA Sizes 0...3)**

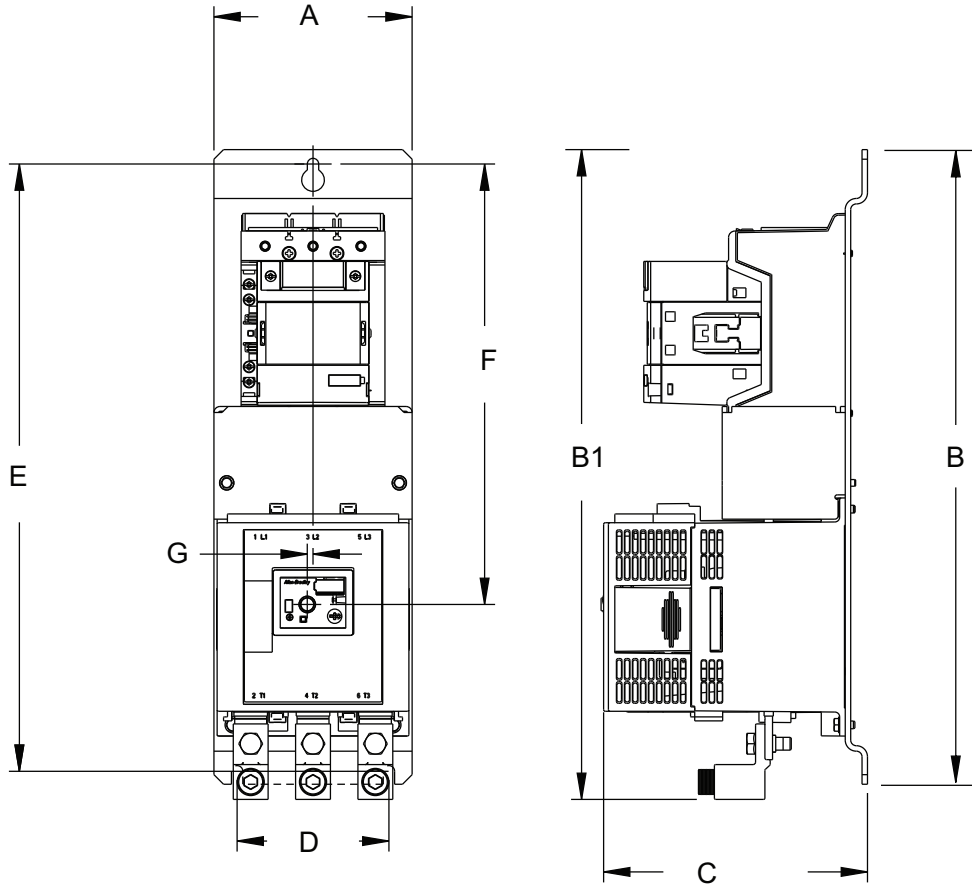


Cat. No.	NEMA Size	A1	A2	B	C	C1	C2	Mounting Dimensions			Reset Location	
								Ø D	D1	D2	E1	E2
193 <sup>(1)</sup> -EE_B	0	1.76 (45)	—	5.77 (147)	3.39 (86)	3.19 (81)	3.35 (85)	0.17 (4.5)	2.36 (60)	1.38 (35)	2.36 (60)	1.38 (35)
193 <sup>(1)</sup> -EE_D	1	—	2.12 (54)	5.77 (147)	4.06 (103)	3.86 (98)	3.98 (101)	0.17 (4.5)	2.36 (60)	1.38 (35)	2.36 (60)	1.38 (35)
193 <sup>(1)</sup> -EE_D	2	—	2.48 (63)	5.77 (147)	4.17 (106)	3.98 (101)	3.98 (101)	0.17 (4.5)	2.36 (60)	1.77 (45)	2.36 (60)	1.77 (45)
193 <sup>(1)</sup> -EE_E	3	—	3.19 (81)	7.58 (192)	4.80 (122)	4.61 (117)	4.74 (120)	0.22 (5.4)	3.94 (100)	2.17 (55)	3.94 (100)	2.17 (55)

(1) Valid for Bulletin Numbers 193, 193R, and 193S.

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

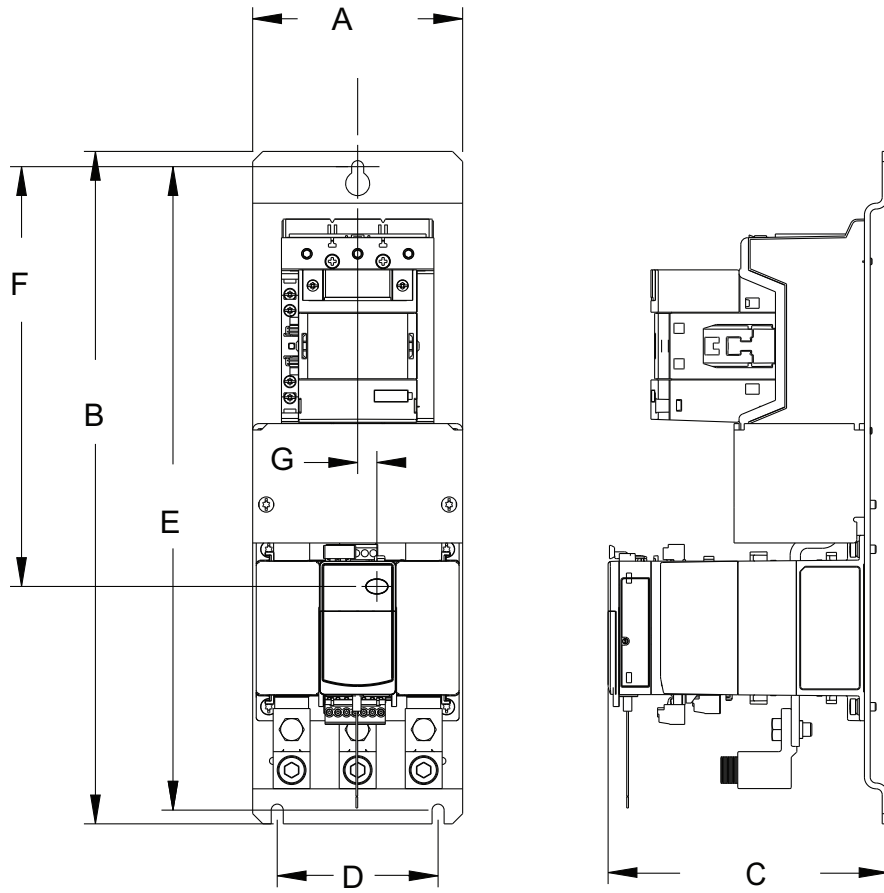
**Bulletin 309 Full Voltage Starter with E1 Plus Solid-state Overload Relay (NEMA Size 4)**



Cat. No.	NEMA Size	A	B	B1	C	D	E	F	G
193-EE_F	4	4.88 (124)	15.6 (397)	16 (407)	6.5 (165)	3.74 (95)	15 (380)	10.9 (276)	0.14 (3.6)

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

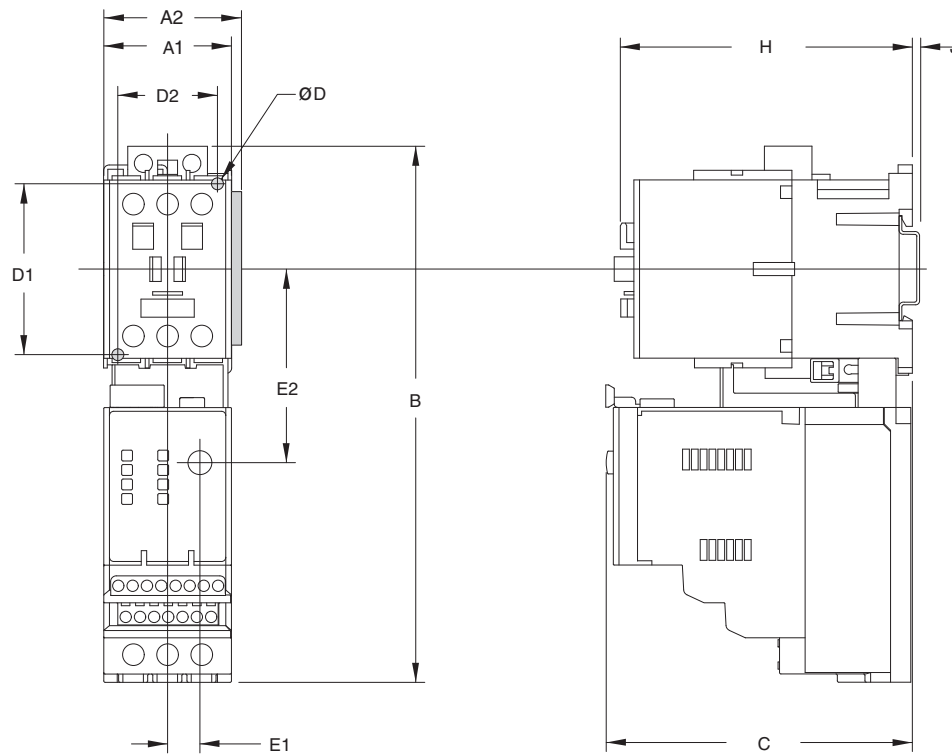
**Bulletin 309 Full Voltage Starter with E300 Solid-state Overload Relay (NEMA Size 4)**



Cat. No.	NEMA Size	A	B	C	D	E	F	G
193-ESM	4	4.88 (124)	15.6 (397)	6.51 (165)	3.74 (95)	15 (380)	9.76 (248)	0.45 (11.4)

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

**Bulletin 309 with E3, E3 Plus Solid-state Overload Relay (NEMA Sizes 0...3)**

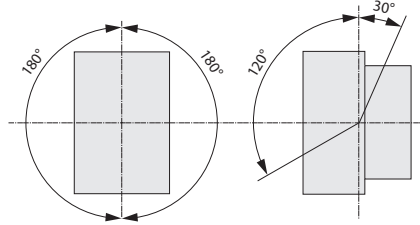


Overload Cat. No.	NEMA Size	A1	A2	B Height		B1	C Depth	Ø D	D1	D2	E1	E2	H	J
				without 193-EIMD	with 193-EIMD									
193-EC_B	0	1.76 (45)	—	7.40 (188)	8.19 (208)	5.71 (145)	4.21 (107)	0.17 (4.5)	2.36 (60)	1.38 (35)	2.36 (60)	1.38 (35)	3.35 (85)	0.08 (2)
193-EC_D	1	—	2.12 (54)	7.40 (188)	8.19 (208)	5.71 (145)	4.21 (107)	0.17 (4.5)	2.36 (60)	1.38 (35)	2.36 (60)	1.38 (35)	4.09 (104)	0.08 (2)
193-EC_D	2	—	2.48 (63)	7.40 (188)	8.19 (208)	5.71 (145)	4.21 (107)	0.17 (4.5)	2.36 (60)	1.77 (45)	2.36 (60)	1.77 (45)	4.09 (104)	0.08 (2)
193-EC_E	3	—	3.19 (81)	9.29 (236)	10.1 (256)	6.81 (173)	4.92 (125)	0.22 (5.4)	3.94 (100)	2.17 (55)	3.94 (100)	2.17 (55)	4.96 (126)	0.08 (2)



## Mounting Position

AC/DC and AC/DC with PLC Input



## Environmental Specifications

		<b>Bulletin 300, 300S</b>
		<b>NEMA Sizes 4...8</b>
<b>Ambient Temperature</b>		
Storage	[°C]	-40...+70
Operation at rated voltage	[°C]	-40...+70
Max. Altitude of Installation Site	[m]	3000
Climatic Withstand	100-E116-370: IEC 60068-2-30 Test Db & IEC 60068-2-2 test Bd & IEC 60068-2-1 test Ab (report 1314369) 100-E400-2650: IEC 60068-2-2 test Ba & Bb & IEC 60068-2-1 test Aa&Ab, IEC 60068-2-30	
Resistance to Shock	IEC 60068-2-27	
Resistance to Vibration	IEC 60068-2-6	
<b>Protection Class</b>		
Contactors main contacts	IP00	
Contactors coil terminals	P2X (in connected state)	
Auxiliary contacts	P2X (in connected state)	

## Standards, Approvals, and Certifications

### NEMA Sizes 0...3

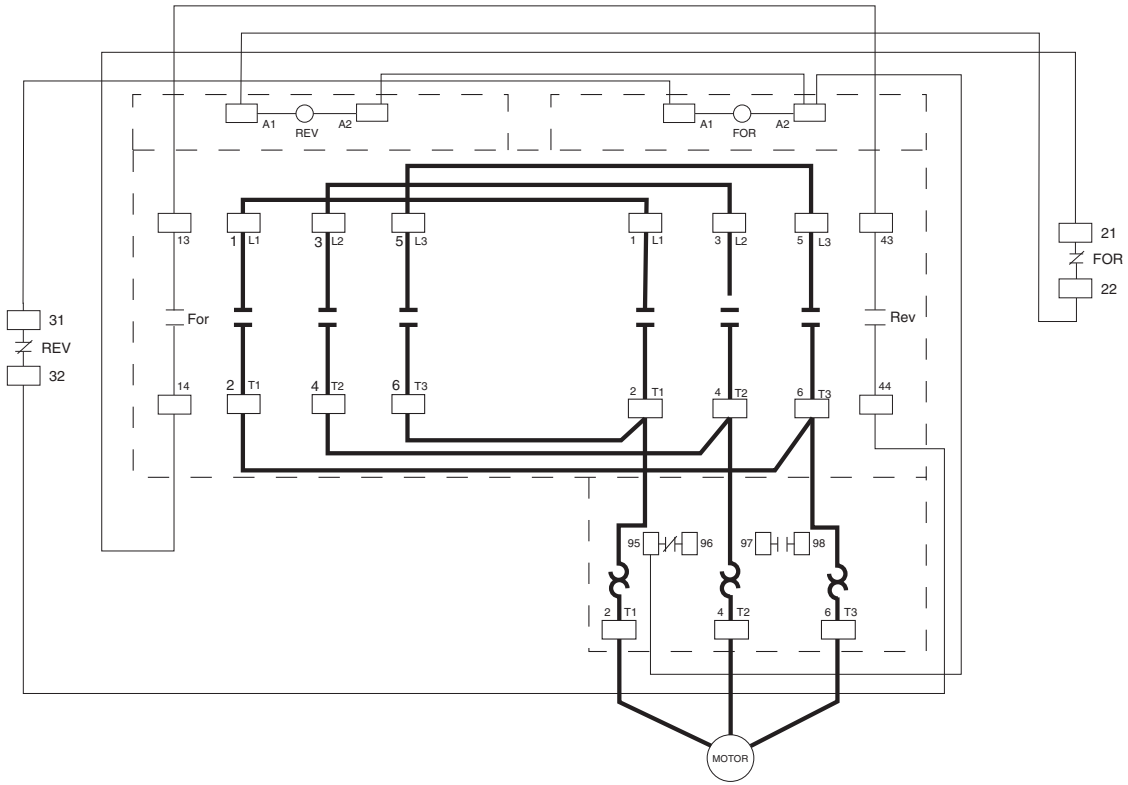
<b>Standards</b>	<b>EN/IEC 60947-4-1</b> , Low-voltage switchgear and controlgear, Contactors and motor-starters; <b>EN/IEC 60947-5-1</b> , Low-voltage switchgear and controlgear, Control circuit devices and switching elements; <b>IEC 60947</b> , Type "2" Coordination; <b>CSA C22.2 No. 14</b> , Industrial Control Equipment (Canada); <b>UL 508</b> ; Meets the material restrictions for European Directive <b>2002/95/IEC-EU-RoHS</b>	
<b>Certifications</b>	CE	√
	CCC	√
	c-UL-us Listed (File No. E3125; Guide NLDX, NLDX7)	

### NEMA Sizes 4...8

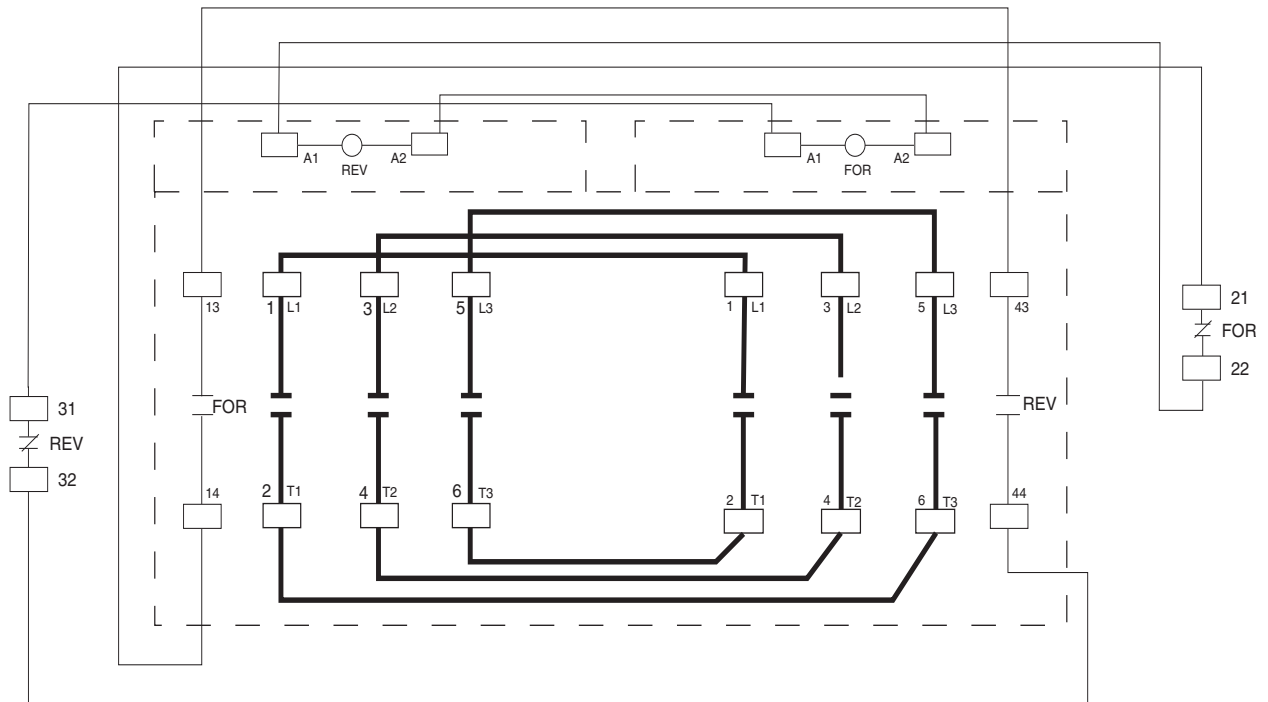
<b>Standards</b>	<b>EN/IEC 60947-1</b> , Low-voltage switchgear and controlgear; <b>EN/IEC 60947-4-1</b> , Low-voltage switchgear and controlgear, Contactors and motor-starters; <b>EN/IEC 60947-5-1</b> , Low-voltage switchgear and controlgear, Control circuit devices and switching elements; <b>UL 60947-4-1</b> , Industrial Control Equipment (USA); <b>CSA C22.2 No. 14</b> , Industrial Control Equipment (Canada).	
	Mechanically Linked Contacts: IEC 60947-5-1, Annex L	
	Mirror Contacts: IEC 60947-4-1, Annex F	300/300S, NEMA sizes 4...8 with all side mounted N.C. auxiliary contacts
<b>Approvals</b>	UL	c-UL-us, File No. E41850 / E196120 (contactors, reversing contactors)
	CSA	
	CCC	√
	EAC	√
	C-Tick	√
	RINA	√
<b>Certifications</b>	ABS	√
	CE	√
	SUVA	√
	SEMI-F47	conditions of use on request

## Wiring Diagrams

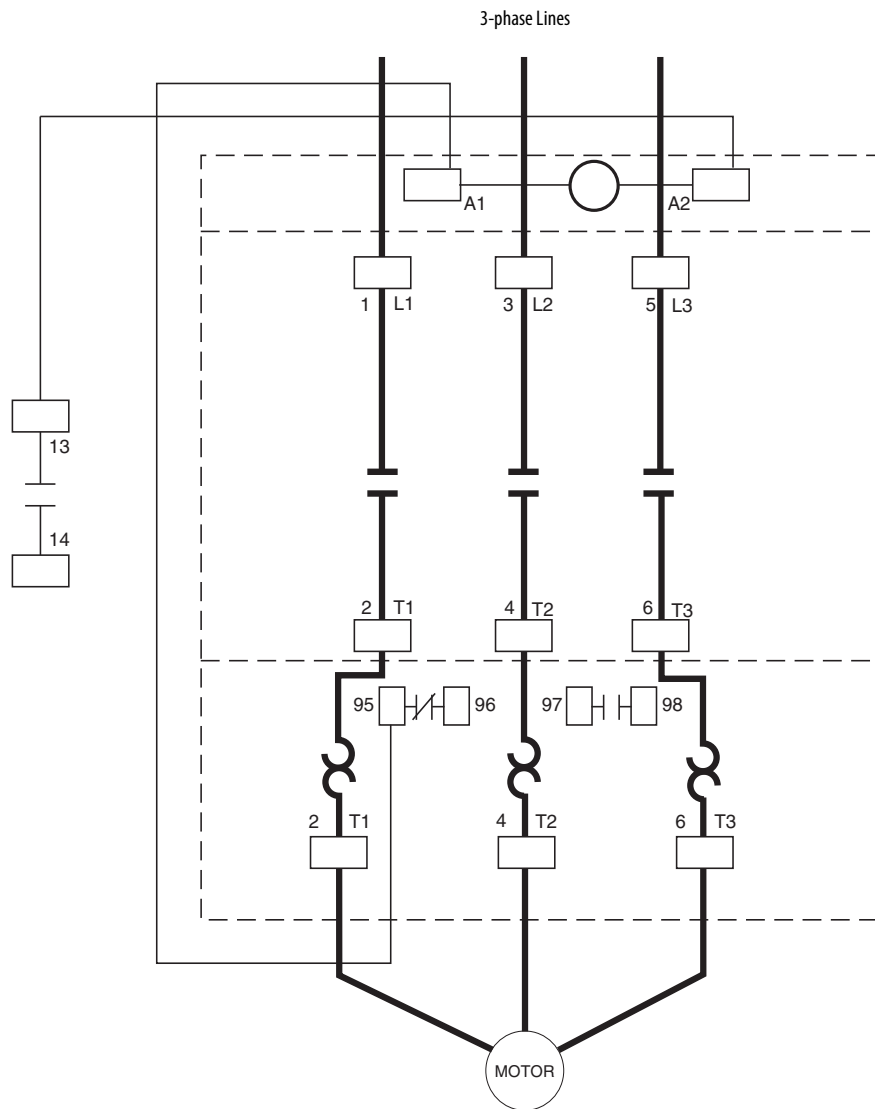
### Bulletin 305 Reversing Starter Typical Wiring Diagram



### Bulletin 305 Reversing Contactor Typical Wiring Diagram







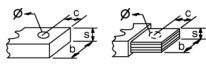

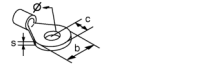
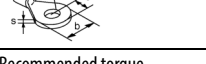

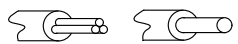
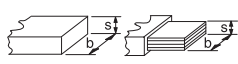
### Bulletin 309 Full Voltage Starter Typical Wiring Diagram



## D-series Specifications and Approximate Dimensions

### D-series Specifications (NEMA Sizes 4 and 5)

		NEMA Size		
		4		5
<b>Coil Type:</b>	Conventional	X	—	—
	Electronic - EI	—	X	X
<b>Resistance and Power Dissipation</b>				
Main current circuit resistance	[mΩ]	0.42	0.42	0.18
Power dissipation by all circuits at <i>I<sub>e</sub></i> AC-3/400V	[W]	40.8	40.8	48.6
<b>Total Power Dissipation</b>				
At <i>I<sub>e</sub></i> AC-3/400V	AC [W]	50.8	46.8	54.6
	DC [W]	48.8	46.8	54.6
<b>Life Span</b>				
Mechanical AC control	[Mil. operations]	10	10	10
Mechanical DC control	[Mil. operations]	10	10	10
Electrical AC-3 (400 V)	[Mil. operations]	1	1	1

		NEMA Size	
		4	5
<b>Coil Type:</b>	Electronic - EI	X	X
<b>Conductor Cross Sections - Main Contacts</b>			
<b>Terminal Type</b>			
	b max. [mm]	25	30
	c max. [mm]	12.5	15
	s max. [mm]	5	6
	∅ min. [mm]	8.3	10.5
Recommended torque	[lb·in.]	195	380
Recommended torque	[N·m]	22	43
<b>with Terminal Lug Kit</b>		100-DL180 <sup>(2)</sup>	100-DL420 <sup>(2)</sup>
Cross section per UL/CSA	[AWG]	6...300 MCM	(2x) 4...350 MCM
Recommended torque	[lb·in.]	250	250
<b>with Frame Terminal Block</b>		100-DTB180 <sup>(2)</sup>	100-DTB420 <sup>(1)</sup>
	top opening [mm <sup>2</sup> ]	16...35	25...240 <sup>(3)</sup>
	bottom opening [mm <sup>2</sup> ]	16...95	25...240
	top opening [mm <sup>2</sup> ]	16...50	25...300
	bottom opening [mm <sup>2</sup> ]	16...120	25...300
	b max. [mm <sup>2</sup> ]	20	25
	s top [mm <sup>2</sup> ]	3...9	4...20
	s bottom [mm <sup>2</sup> ]	3...14	4...20
Cross section per UL/CSA	top [AWG]	6...1/0 AWG	4 AWG...600 MCM
	bottom [AWG]	6 AWG...250 MCM	4 AWG...600 MCM
Recommended torque	[lb·in.]	124	220
	[N·m]	14	25

(1) Hexagonal screw.

(2) Hexagonal socket screw.

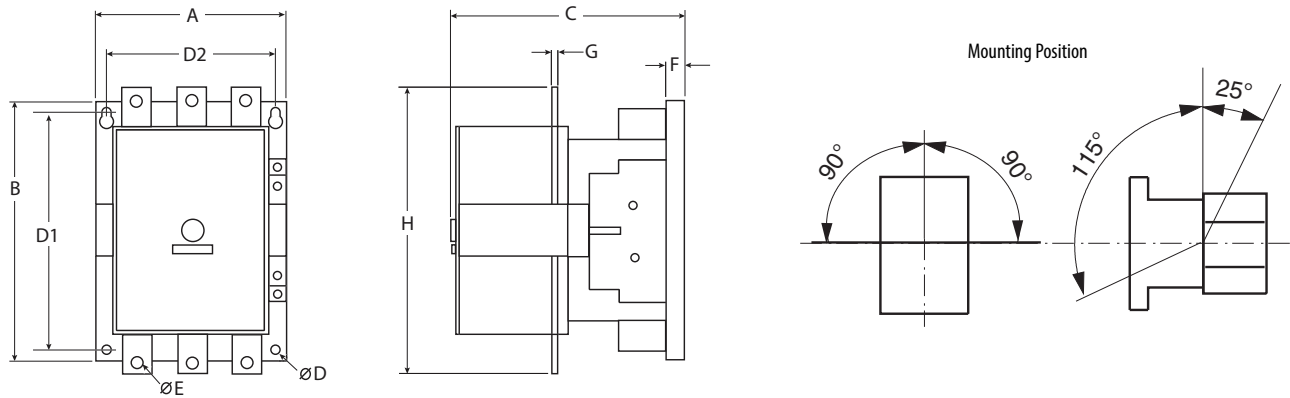
(3) 25...95 mm<sup>2</sup> with sleeve per DIN 46228.

			NEMA Size	
			4	5
Coil Type:	Electronic - EI		X	X
<b>Operating Limits</b>				
50 Hz, 60 Hz, 50/60 Hz	pick up	[x Us]	0.85...1.1	
	drop out	[x Us]	0.3...0.5	
DC (conventional)	pick up	[x Us]	0.85...1.1	
	drop out	[x Us]	0.85...1.1	
DC (electronic)	pick up	[x Us]	0.3...0.5	
	drop out	[x Us]	0.3...0.5	
<b>Coil Consumption</b>				
50 Hz, 60 Hz, 50/60 Hz	pick up	[VA/W]	380/240 <sup>(1)</sup>	
	hold in	[VA/W]	13/6	
DC (electronic)	pick up	[W]	265 <sup>(1)</sup>	
	hold in	[W]	6	
<b>Operating Times</b>				
AC	closing delay	[ms]	20...45	
	opening delay	[ms]	25...110	
with RC module	opening delay	[ms]	—	
DC (conventional)	closing delay	[ms]	25...50	
	opening delay	[ms]	35...110	
with integrated diode with external diode				
DC (electronic)	closing delay	[ms]	25...50	
	opening delay	[ms]	35...110	

- (1) Electronic coil drives are designed to minimize power requirements, but this control can exhibit a higher inrush (540 W, < 10 ms) when energizing. You must consider this higher inrush for the proper sizing of supply devices, all-or-nothing relays, and cross-sections of coil supply lines. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for detailed information.

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

**D-series Bulletin 300 Contactors and Accessories (NEMA Sizes 4 and 5)**



**AC Contactors**

Cat. No.	NEMA Size	A	B	C	Mounting Dimensions			Ø E	F	G	H
					Ø D	D1	D2				
300-E0_	4	4.72 (120)	6.69 (170)	6.14 (156)	0.21 (5.4)	5.71 (145)	3.94 (100)	0.34 (8.5)	0.59 (15)	0.157 (4)	7.17 (182)
300-F0_	5	6.10 (155)	8.07 (205)	7.09 (180)	0.26 (6.5)	7.09 (180)	5.12 (130)	0.41 (10.4)	0.59 (15)	0.236 (6)	8.74 (222)

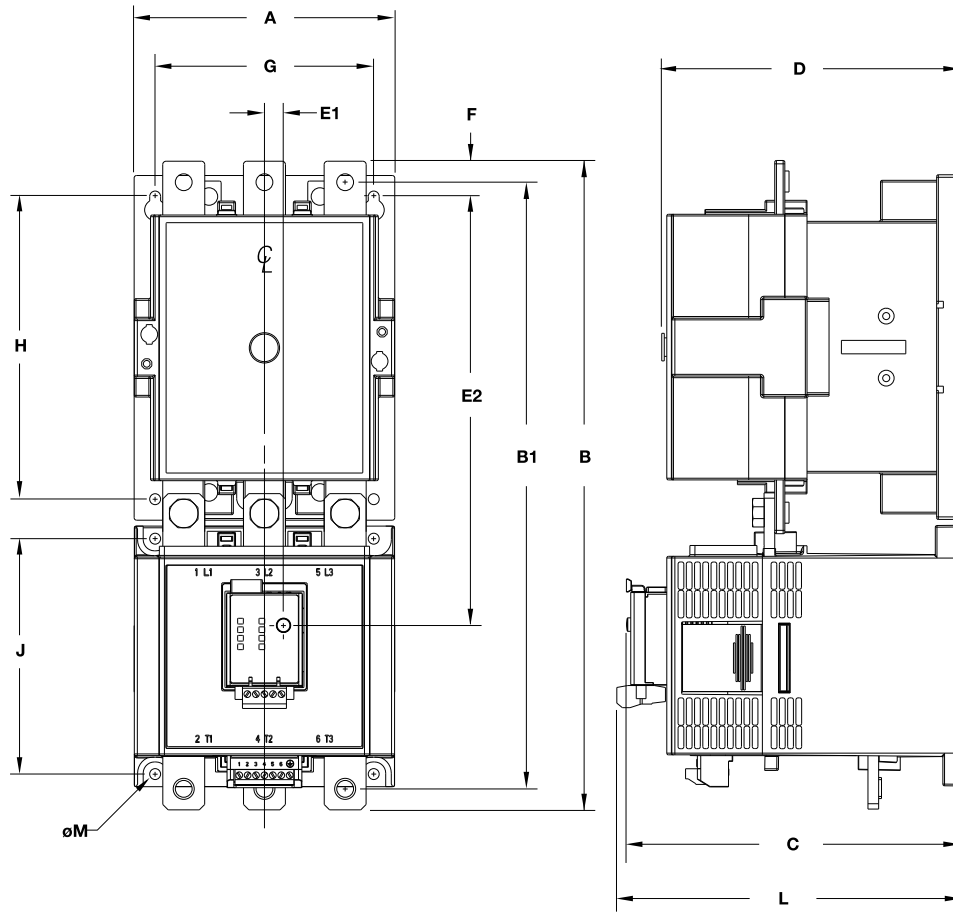
**Accessories**

	Contactors with	in. (mm)
Auxiliary contact block <sup>(1)</sup>	100-DS1_	A
	100-DS2_	A + 0.53 (13.5) each
Mechanical Interlock	100-DM_	A + A
Frame terminal block	100-DTB110	B + 0.28 (7) each
	100-DTB180	B + 0.28 (7) each
	100-DTB420	B + 0.33 (8.5) each
Label holder	—	C + 0.20 (5) each

(1) Conventional DC coil contactors accept only Cat. No. 100-DS2\_ auxiliary contacts.

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

**D-series Bulletin 309 with E3, E3 Plus Solid-State Overload Relay (NEMA Sizes 4 and 5)**



Overload Cat. No.	NEMA Size	A Width	B Height		B1	C Depth	D	E1	E2	F	G	H	J	L	M
			without Terminal Covers	with Terminal Covers											
193-EC_F	4	4.72 (120)	13.4 (340)	16.5 (418)	12.5 (318)	6.89 (175)	6.14 (156)	0.43 (11)	8.50 (216)	0.63 (16)	3.94 (100)	5.71 (145)	5.31 (135)	7.13 (181)	0.21 (5.2)
193-EE_F		4.72 (120)	13.4 (340)	16.5 (418)	12.5 (318)	6.01 (153)	6.14 (156)	0.14 (3.6)	8.91 (226)	0.63 (16)	3.94 (100)	5.71 (145)	5.31 (135)	7.13 (181)	0.21 (5.2)
193-EC_G	5	6.10 (155)	15.2 (386)	19.2 (487)	14.2 (361)	7.83 (199)	7.09 (180)	0.43 (11)	10.0 (255)	0.83 (21)	5.12 (130)	7.09 (180)	5.51 (140)	8.07 (205)	0.26 (6.5)
193-EE_G		6.10 (155)	15.2 (386)	19.2 (487)	14.2 (361)	6.95 (177)	7.09 (180)	0.14 (3.6)	10.44 (265)	0.83 (21)	5.12 (130)	7.09 (180)	5.51 (140)	8.07 (205)	0.26 (6.5)

## Rockwell Automation Support

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<b>Technical Support Center</b>	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	<a href="http://www.rockwellautomation.com/knowledgebase">www.rockwellautomation.com/knowledgebase</a>
<b>Local Technical Support Phone Numbers</b>	Locate the phone number for your country.	<a href="http://www.rockwellautomation.com/global/support/get-support-now.page">www.rockwellautomation.com/global/support/get-support-now.page</a>
<b>Direct Dial Codes</b>	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	<a href="http://www.rockwellautomation.com/global/support/direct-dial.page">www.rockwellautomation.com/global/support/direct-dial.page</a>
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<b>Product Compatibility and Download Center (PCDC)</b>	Get help determining how products interact, check features and capabilities, and find associated firmware.	<a href="http://www.rockwellautomation.com/global/support/pcdc.page">www.rockwellautomation.com/global/support/pcdc.page</a>

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Publication 300-TD003B-EN-P - May 2018

Supersedes Publication 300-TD003A-EN-P - August 2014

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