

NEMA Combination Starters

Product Selection — Disconnect Type



Bulletin 502

- NEMA contactor sizes 0...5 (no overload relay)
- Fusible or non-fusible disconnect switch
- Painted metal enclosures: Type 1, Type 3R/4/12
- Stainless steel enclosures: Type 4/4X
- Modifications — factory-installed
- Accessories — field-installed
- Service entrance rated

A Bulletin 502 combination contactor consists of a Bulletin 500, 3-pole contactor, and a disconnect switch (fused or non-fused) mounted in a common enclosure.

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Standards Compliance

UL 508
 CSA C22.2, No. 14

Certifications

cULus Listed (File No. E3125, Guide No. NLDX, NLDX7)

NEMA Size	Continuous Ampere Rating [A]	Maximum Horsepower Rating Full Load Current Must Not Exceed Continuous Ampere Rating				Line Voltage [V]	Fuse Clip Rating Amperes [A] Fuses not included. Select per NEC	Type 1 General Purpose	Type 3R/4/12 Rainproof, Waterproof, Dusttight	Type 3R/4/12 Rainproof, Waterproof, Dusttight (Door Safety Hardware)	Type 4/4X Watertight Corrosion-Resistant Stainless Steel
		Motor Voltage									
		60 Hz 200V	60 Hz 230V	50 Hz 380... 415V	60 Hz 460... 575V						
0	18	3	3	—	—	208...240	30	502-AA®-24R	502-AF®-24R	502-AJ®-24R	502-AC®-24R
		—	—	5	5	480...600	30	502-AA®-24R	502-AF®-24R	502-AJ®-24R	502-AC®-24R
1	27	7-1/2	7-1/2	—	—	208...240	30	502-BA®-24R	502-BF®-24R	502-BJ®-24R	502-BC®-24R
		—	—	10	10	480...600	30	502-BA®-24R	502-BF®-24R	502-BJ®-24R	502-BC®-24R
		7-1/2	7-1/2	—	—	208...240	60	502-BA®-25R	502-BF®-25R	502-BJ®-25R	502-BC®-25R
		—	—	10	10	480...600	60	502-BA®-25R	502-BF®-25R	502-BJ®-25R	502-BC®-25R
2	45	—	—	25	25	480...600	30	502-CA®-24R	502-CF®-24R	502-CJ®-24R	502-CC®-24R
		10	15	—	—	208...240	60	502-CA®-25R	502-CF®-25R	502-CJ®-25R	502-CC®-25R
		—	—	25	25	480...600	60	502-CA®-25R	502-CF®-25R	502-CJ®-25R	502-CC®-25R
		10	15	—	—	208...240	100	502-CA®-26J	502-CF®-26J	502-CJ®-26J	502-CC®-26J
		—	—	25	25	480...600	100	502-CA®-26J	502-CF®-26J	502-CJ®-26J	502-CC®-26J
3	90	—	—	50	50	480...600	60	502-DA®-25R	502-DF®-25R	502-DJ®-25R	502-DC®-25R
		25	30	—	—	208...240	100	502-DA®-26R	502-DF®-26R	502-DJ®-26R	502-DC®-26R
		—	—	50	50	480...600	100	502-DA®-26R	502-DF®-26R	502-DJ®-26R	502-DC®-26R
		25	30	—	—	208...240	200	502-DA®-27J	502-DF®-27J	502-DJ®-27J	502-DC®-27J
		—	—	50	50	480...600	200	502-DA®-27J	502-DF®-27J	502-DJ®-27J	502-DC®-27J
4	135	—	—	75	100	480...600	100	502-EA®-26R	502-EF®-26R	502-EJ®-26R	502-EC®-26R
		40	50	—	—	208...240	200	502-EA®-27R	502-EF®-27R	502-EJ®-27R	502-EC®-27R
		—	—	75	100	480...600	200	502-EA®-27R	502-EF®-27R	502-EJ®-27R	502-EC®-27R
		40	50	—	—	208...240	400	502-EA®-28J	502-EF®-28J	502-EJ®-28J	502-EC®-28J
		—	—	75	100	480...600	400	502-EA®-28J	502-EF®-28J	502-EJ®-28J	502-EC®-28J
5	270	40	50	—	—	208...240	200	502-FA®-27R	502-FF®-27R	502-FJ®-27R	502-FC®-27R
		—	—	75	100	480...600	200	502-FA®-27R	502-FF®-27R	502-FJ®-27R	502-FC®-27R
		75	100	150	200	208...600	400	502-FA®-28R	502-FF®-28R	502-FJ®-28R	502-FC®-28R
		—	—	150	200	480...600	400	502-FA®-28R	502-FF®-28R	502-FJ®-28R	502-FC®-28R

*Non-Fusible Disconnect Type

Cat. nos. listed above include a fusible disconnect switch with Class R or J fuse clips. To order a non-fusible disconnect switch, eliminate the fuse clip code from the cat. no. Example: **Cat. No. 502-BFB-24R** becomes **Cat. No. 502-BFB**.

* Class H fuse clips can be supplied. Example: **Cat. No. 502-AA®-24R** becomes **Cat. No. 502-AA®-24H**. Class J fuse clips can be supplied. Example: **Cat. No. 502-AA®-24R** becomes **Cat. No. 502-AA®-24J**. Class HRC form II fuse clips can be supplied. Example: **Cat. No. 502-AA®-24R** becomes **Cat. No. 502-AA®-24E**.

⊗ 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: **Cat. No. 502-AA®-24R** becomes **Cat. No. 502-AAB-24R**. For other voltages, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

	[V]	208	230...240	460...480	575...600
Common Control	AC, 60 Hz	H	A	B	C
Transformer Control (See page 1-78 Note)		AD	AD	CD	CD
120V Separate Control (without transformer)		AD	AD	CD	CD

NEMA Combination Starters

Cat. No. Explanation

Configuration of a Basic Combination Starter

The information below is for reference purposes only. Not all combinations will produce a valid cat. no. Refer to the tables on the following pages for product selection.

Example Cat. No.

512 - A
A
CD - A2E - 1
24R - 90

a
b
c
d
e
f

1

Bulletin No.	
Bulletin No.	Description
502	Combination contactor with disconnect switch
503	Combination contactor with circuit breaker
506	Reversing combination starter with disconnect switch
506X	Reversing combination starter with disconnect switch in a narrow enclosure
507	Reversing combination starter with circuit breaker
507X	Reversing combination starter with circuit breaker in a narrow enclosure
512	Non-reversing combination starter with disconnect switch
512M	Non-reversing combination starter with disconnect switch — extra panel space
513	Non-reversing combination starter with circuit breaker
513M	Non-reversing combination starter with circuit breaker — extra panel space
522E	2-speed, separate-winding, full voltage, multi-speed combination starter with disconnect switch
522F	2-speed, 1-winding, constant or variable torque, full voltage, multi-speed combination starter with disconnect switch
522G	2-speed, 1-winding, constant horsepower, full voltage, multi-speed combination starter with disconnect switch
523E	2-speed, separate-winding, full voltage, multi-speed combination starter with circuit breaker
523F	2-speed, 1-winding, constant or variable torque, full voltage, multi-speed combination starter with circuit breaker
523G	2-speed, 1-winding, constant horsepower, full voltage, multi-speed combination starter with circuit breaker
1232	Pump panel with disconnect switch (Narrow)
1232X	Pump panel with disconnect switch (Extra space)
1232V	Pump panel with vacuum contactor and disconnect switch (Extra space)
1233	Pump panel with circuit breaker (Narrow)
1233X	Pump panel with circuit breaker (Extra space)
1233V	Pump panel with vacuum contactor and circuit breaker (Extra space)

Starter Size	
NEMA Size Code	NEMA Size
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7

Enclosure Type	
Code	Type
A	Type 1: General purpose, painted metal enclosure with spring latch door fastener, external overload relay reset, and non-metallic handle
F	Type 3R/4/12: Rainproof, watertight, dusttight, painted metal enclosure with screw fasteners, external overload relay reset, and non-metallic handle
J	Type 3R/4/12: Rainproof, watertight, dusttight, painted metal enclosure with door safety hardware, metal handle, and NO external overload relay reset
N	Type 3R: Rainproof, painted metal enclosure with screw fasteners, external overload relay reset, and a non-metallic handle
C	Type 4/4X: Watertight corrosion-resistant stainless steel enclosure with screw fasteners, external overload relay reset, and a stainless steel handle
L	Type 12: Hazardous location (Class II, Division 2, Group F + G and Class III, Divisions 1 + 2) painted metal enclosure with screw fasteners, external overload relay reset, and a non-metallic handle.
H	Type 3R/7/9: Hazardous location bolted enclosure, rain proof, metal handle.
U	Type 3R/7/9: Hazardous location Unilock enclosure, rain proof, metal handle.

Coil Voltage			
Voltage Code	Description	Line Voltage [V]	Coil Voltage [V]
H	Common Control (without transformer)	208	208
A		240	240
B		480	480
C		600	600
H	Transformer Control*	208	120
A		240	120
B		480	120
C		600	120
HD	Separate Control (without transformer)	208	120
AD		240	120
BD		480	120
CD		600	120

Overload Relay	
Code	Description
None	Eutectic Alloy
See page 1-164	Solid-State

Options	
See page 1-109	

***Note:** When selecting a factory-installed control circuit transformer use the Transformer Control Voltage Suffix Code to denote the transformer primary voltage. The transformer secondary voltage and starter coil will both be 120V AC by default. Example: **Cat. No. 512-BAB-6P-24R** will have a transformer with a 480V primary voltage, 120V secondary voltage, and a 120V starter coil voltage.



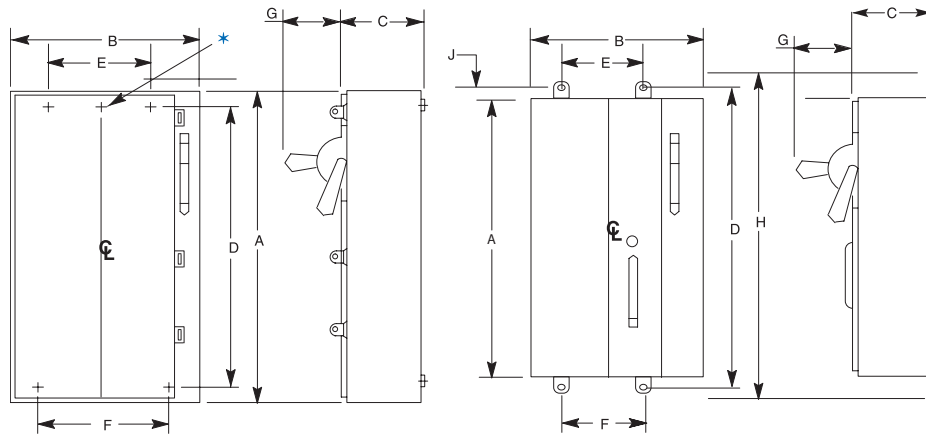
Approximate Dimensions

For NEMA AC Contactors/Starters

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

Type 1 (Enclosure Code "A") General Purpose Painted Enclosure for Bulletins 500, 500L, 502, 502L, 503, 503L, 505, 506, 506X, 507, 507X, 509, 512, 512M, 512V, 513, 513M, 513V, 520E, 520F, 520G, 522E, 522F, 522G, 523E, 523F, 523G, 530, 532, 533, 540, 542, 543, 570, 572 and 573

1



Size 1...4 Size 5

NEMA Size	Bulletin No.	Approximate Dimensions in Inches (Millimeters)							Approx. Shipping Weight [lb (kg)]
		A Height	B Width	C Depth	D Mounting	E Mounting	F Mounting	G Handle Depth	
0...2	506X, 507X	27.50 (968)	10.50 (267)	8.25 (210)	25.13 (639)	*	5.25 (133)	5.56 (141)	40 (18.14)
0...2	502, 502L, 503, 503L, 512, 513								
0...2	506, 507, 512M, 513M, 522E, 522F, 522G, 523E, 523F, 523G	30 (762)	20.5 (521)	9.88 (251)	27.63 (702)	15.25 (387)	15.25 (387)	5.56 (141)	90 (40.82)
3	502, 502L, 503, 503L, 505, 512, 513, 520E, 520F, 520G								
4	500, 500L, 503, 503L, 509, 513								
1PW, 2PW	530, 532, 533								
1YD	540, 542, 543								
3	506, 507, 522E, 522F, 522G, 523E, 523F, 523G	50 (1270)	22 (559)	11.19 (284)	47.63 (1210)	15.25 (387)	15.25 (387)	5.56 (141)	250 (113.4)
4	500LP, 505, 506, 507, 520E, 520F, 520G, 522E, 522F, 522G, 523E, 523F, 523G								
4	502, 502L, 512								
5	500, 500L, 505, 509, 520E, 520F, 520G								
3PW	530, 532, 533								
2YD, 3YD	540, 542, 543								
2	570, 572, 573								
5	502, 502L, 503, 503L, 506, 506X, 507, 507X, 512, 513, 523E, 523F, 523G								
6	500, 500L, 505, 509, 520E								
4PW	530, 532, 533								
5PW	532, 533								
4YD	540, 542, 543								
3, 4	570, 572, 573								
5YD	540, 542, 543								
5, 6	570, 572, 573	60 (1524)	37.38 (949)	16.00 (406)	61.69 (1567)	33.88 (861)	33.88 (861)	7.62 (194)	420 (190.5)
5	522E, 522F, 522G								
5PW	530								

* Sizes 0, 1, and 2 have one top mounting hole located on the center line. Larger size enclosures have two top mounting holes located as shown.



NEMA Specifications

NEMA Non-Combination and Combination Contactors/Starters

Electrical Ratings

NEMA Size	Load Voltage [V]	Continuous Current Rating [A]	Service Limit Current Rating [A]*	Maximum Hp Rating (Non-plugging and non-jogging duty)		Maximum Hp Rating (Plugging and jogging duty)*		Transformer Primary Switching kVa Rating (Inrush Current ≤ 20 times Continuous Current)		Transformer Primary Switching kVa Rating (Inrush Current = 20 to 40 times Continuous Current)		Capacitor Switching kVAR‡	Maximum Circuit Closing Inrush Current [A] Peak Including Offset
				1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø		
				1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø		
00	115	9	11	1/3	—	1/4	—	—	—	—	—	—	87
	200			—	1-1/2	—	1	—	—	—	—	—	
	230			1	1-1/2	1/2	1	—	—	—	—	—	
	380			—	1-1/2	—	1	—	—	—	—	—	
	460			—	2	—	1-1/2	—	—	—	—	—	
	575			—	2	—	1-1/2	—	—	—	—	—	
0	115	18	21	1	—	1/2	—	0.6	—	0.3	—	—	140
	200			—	3	—	1-1/2	—	1.8	—	0.9	—	
	230			2	3	1	1-1/2	1.2	2.1	0.6	1	—	
	380			—	5	—	1-1/2	—	—	—	—	—	
	460			—	5	—	2	2.4	4.2	1.2	2.1	—	
	575			—	5	—	2	3	5.2	1.5	2.6	—	
1	115	27	32	2	—	1	—	1.2	—	0.6	—	—	288
	200			—	7-1/2	—	3	—	3.6	—	1.8	—	
	230			3	7-1/2	2	3	2.4	4.3	1.2	2.1	6	
	380			—	10	—	5	—	—	—	—	—	
	460			—	10	—	5	4.9	8.5	2.5	4.3	13.5	
	575			—	10	—	5	6.2	11	3.1	5.3	17	
1P	115	36	42	3	—	1-1/2	—	—	—	—	—	—	—
	230			5	—	3	—	—	—	—	—	—	
2	115	45	52	3	—	2	—	2.1	—	1	—	—	483
	200			—	10	—	7-1/2	—	6.3	—	3.1	—	
	230			7-1/2	15	5	10	4.1	7.2	2.1	3.6	12	
	380			—	25	—	15	—	—	—	—	—	
	460			—	25	—	15	8.3	14	4.2	7.2	25	
	575			—	25	—	15	10	18	5.2	8.9	31	
3	115	90	104	7-1/2	—	7-1/2	—	4.1	—	2	—	—	947
	200			—	25	—	15	—	12	—	6.1	—	
	230			15	30	15	20	8.1	14	4.1	7.0	27	
	380			—	50	—	30	—	—	—	—	—	
	460			—	50	—	30	16	28	8.1	14	53	
	575			—	50	—	30	20	35	10	18	67	
4	115	135	156	—	—	—	—	6.8	—	3.4	—	—	1581
	200			—	40	—	25	—	20	—	10	—	
	230			—	50	—	30	14	23	6.8	12	40	
	380			—	75	—	50	—	—	—	—	—	
	460			—	100	—	60	27	47	14	23	80	
	575			—	100	—	60	34	59	17	29	100	
5	115	270	311	—	—	—	—	14	—	6.8	—	—	3163
	200			—	75	—	60	—	41	—	20	—	
	230			—	100	—	75	27	47	14	24	80	
	380			—	150	—	125	—	—	—	—	—	
	460			—	200	—	150	54	94	27	47	160	
	575			—	200	—	150	68	117	34	59	200	
6	115	540	621	—	—	—	—	27	—	14	—	—	6326
	200			—	150	—	125	—	81	—	41	—	
	230			—	200	—	150	54	94	27	47	160	
	380			—	300	—	250	—	—	—	—	—	
	460			—	400	—	300	108	188	54	94	320	
	575			—	400	—	300	135	234	68	117	400	
7	230	810	932	—	300	—	—	—	—	—	—	240	9470
	460			—	600	—	—	—	—	—	—	480	
	575			—	600	—	—	—	—	—	—	600	
8	230	1215	1400	—	450	—	—	—	—	—	—	360	14205
	460			—	900	—	—	—	—	—	—	720	
	575			—	900	—	—	—	—	—	—	900	
9	230	2250	2590	—	800	—	—	—	—	—	—	665	25380
	460			—	1600	—	—	—	—	—	—	1325	
	575			—	1600	—	—	—	—	—	—	1670	

* **Service-Limit Current Ratings** — The service-limit current ratings shown represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or the trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.

* **Plugging or Jogging Service** — The listed horsepower ratings are recommended for those applications requiring repeated interruption of stalled motor current encountered in rapid motor reversal in excess of five openings or closings per minute and shall not be more than ten in a ten minute period.

‡ If maximum available current (at capacitor terminals) is greater than 3000 A, please contact your local Rockwell Automation sales office, Allen-Bradley distributor, or NEMA ICS-2 Standard.



Mechanical Ratings

NEMA Size	Mechanical Life (Millions of Operations)	Maximum Number of Auxiliary Contacts	Operating Time [ms]	
			Pick-up (Average)	Drop-out (Average)
00	10	5	20	16
0	10	8	21	16
1	10	8	22	14
2	10	8	27	13
3	5	8	37	20
4	5	8	27	20
5	5	8	25	18
6	5	4	25...79	10...22
7	—	8	88	40
8	—	8	88	45
9	—	8	118	84



Construction

NEMA Size	Wire Size for Power Terminals	Required Torque on Power Terminal Wire Clamps and Pressure Connectors or Lugs	Type of Power Terminal	Contact Material		Requirements for Sizing of Wire		
				Power Contacts	Auxiliary Contacts			
00	#16...10 AWG	9 lb•in	Pressure terminals	Silver alloy	Silver	All wire rated 167 °F (75 °C) or higher must be sized per the local Electrical Code for 167°F (75 °C) wire.		
0	#14...10 AWG	20 lb•in	Saddle or wire clamps					
1	#14...8 AWG	20 lb•in						
2	#14...4 AWG	45 lb•in	Pressure terminals					
3	#8...1/0 AWG	150 lb•in						
4	#6...4/0 AWG	275 lb•in						
5	#4 AWG...500 MCM	375 lb•in						
6	Lugs sold separately. See page 1-113.							
7								
8								
9	Direct bus connections only.							

Environmental

NEMA Size	Operating Position	Operating Temperature Range	Altitude	Corrosion-Resistance
00	Horizontal	Starters with eutectic alloy Overload relay -13...+149 °F (-25...+65 °C) Starters with SMP Overload relay -13...+131 °F (-25...+55 °C) (provided condensation is prevented)	10 000 feet before derating	All metal parts are treated for corrosion-resistance
0	Vertical			
1				
2				
3				
4				
5	Horizontal			
6				
7				
8				
9				

Short Circuit Rating

Combination contactors and starters with disconnect switch: Bulletin 502, 506, 512, 522E, 522F, 522G, and 1232X

Combination Contactors and Starters with Disconnect Switch: Bulletin 502, 506, 512, 522E, 522F, 522G, and 1232X			
NEMA Size	Fuse Type	Available Short Circuit Amperes RMS Symmetrical [A]	Maximum Voltage [V]
0...3	H, K	5000	600
4...5	H, K	10 000	
0...5	J, R	100 000	
6	L	18 000	
7	L	18 000	
Combination Lighting Contactors with Disconnect Switch: Bulletin 502L			
Lighting Contactor Rating [A]	Fuse Type	Available Short Circuit Amperes RMS Symmetrical [A]	Maximum Voltage [V]
20...100	H, K	5000	600
200...300	H, K	10 000	
20...300	J, R	100 000	
Combination Contactors and Starters with Circuit Breaker: Bulletin 503, 507, 513, 523E, 523F, 523G, and 1233X*			
Enclosure Type	NEMA Size	Available Short Circuit Amperes RMS Symmetrical [A]	Maximum Voltage [V]
1, 3R, 3R/4/12, 4/4X (stainless)	0...5	65 000	480
Unilock 3R, 7, & 9	0...5	65 000	
Bolted 3R, 7, & 9	0...2	65 000	
1, 3R, 3R/4/12, 4/4X (stainless)	0...5	25 000	600
Unilock 3R, 7, & 9	0...3	5000	
Unilock 3R, 7, & 9	4...5	10 000	
Bolted 3R, 7, & 9	0...2	5000	
3R, 3R/4/12	6...7	10 000	
Combination Lighting Contactors with Circuit Breaker: Bulletin 503L*			
Enclosure Type	Lighting Contactor Rating [A]	Available Short Circuit Amperes RMS Symmetrical [A]	Maximum Voltage [V]
1, 3R, 3R/4/12, 4/4X (stainless)	20...300	65 000	480
Unilock 3R, 7, & 9	20...300	65 000	
Bolted 3R, 7, & 9	20...300	65 000	
1, 3R, 3R/4/12, 4/4X (stainless)	20...300	25 000	600
Unilock 3R, 7, & 9	20...100	5000	
Unilock 3R, 7, & 9	20...300	10 000	
Bolted 3R, 7, & 9	20...300	5000	

* For the most up-to-date SCCRs, please see the on-line Industrial Controls catalog at www.ab.com/catalogs.

AC Coil Data

NEMA Size	Operating Volt Amperes Burden [VA]		Heat Dissipation [W]	Coil Operating Limits
	60 Hz Coils			
	Inrush	Sealed		
00	70	8	2.7	85...110%
0	192	29	5.9	
1 & 1P	192	29	5.9	
2 (2...3 poles)	240	29	5.9	
2 (4...5 poles)	315	38	5.9	
3 (2...3 poles)	660	45	10	
3 (4...5 poles)	840	58	10	
4 (2...3 poles)	1225	69	14.8	
4 (4...5 poles)	1490	96	14.8	
5 (Series L)	1490	96	19.8	
6*	4860	254	65.7	
6 (Interposing relay)	52.44	3.96	—	
7*	Economized DC Coil		—	
7 (Interposing relay)	74.40	9.84	—	
8†	Economized DC Coil		—	
8 (Interposing relay)	74.40	9.84	—	
9§	Economized DC Coil		—	
9 (Interposing relay)	144	19.20	—	

* This rating is for the size 6 contactor coil only. All starters are shipped with an interposing relay as standard.

‡ Size 7 starters are shipped with a 250 VA control circuit transformer and an interposing relay with a 120V coil. Voltage is then rectified to DC for the contactor coil.

† Size 8 starters are shipped with a 350 VA control circuit transformer and an interposing relay with a 120V coil. Voltage is then rectified to DC for the contactor coil.

§ Size 9 starters are shipped with a 750 VA control circuit transformer and an interposing relay with a 120V coil. Voltage is then rectified to DC for the contactor coil.

Auxiliary Contacts (NEMA A600 and P300) — Bulletin 595, 596

Maximum AC Contact Rating Per Pole						
AC Rating Designation	Maximum Voltage 60 or 50 Hz	[A]		Continuous Carrying Current [A]	[VA]	
		Make	Break		Make	Break
A600	120	60	6	10	7200	720
	240	30	3	10	7200	720
	480	15	1.5	10	7200	720
	600	12	1.2	10	7200	720
Maximum DC Contact Rating Per Pole for 595, 596 Auxiliary Contacts (Maximum Continuous Carrying Current is 5 A)						
DC Rating Designation	125V DC		250V DC		600V DC	
P300	0.55 A		0.55 A (Requires 2 Contacts in Series)		—	
	1.1 A (Requires 2 Contacts in Series)					



1

Load-Life Curves

Bulletin 500 Line contactors and starters are designed to provide superior performance in a variety of applications. These load-life curves are based on Rockwell Automation tests according to the requirements defined in IEC 947-4. Actual contact life may vary based on the application, duty cycle, and environmental conditions from that indicated by the curves.

To find the contactor's estimated electrical life, follow these guidelines:

- Choose the appropriate graph that most closely approximates the utilization category of the application.
- Locate the intersection of the life-load curve of the appropriate contactor with the application's operational current (I^e) found on the horizontal axis.
- Read the estimated contact life in millions of operations along the vertical axis.

Utilization Categories

Category Typical Duty

AC3 Starting of squirrel cage motors and switching off only after the motor is up to speed.

AC4 Starting of squirrel cage motors with inching and plugging duty.

Contact Life for Mixed Utilization Categories AC3 and AC4

In many applications, the utilization category cannot be defined as either purely AC3 or AC4. In those applications, the electrical life of the contactor can be estimated from the following equation:

$$L_{mixed} = \frac{L_{AC3}}{1 + P_{AC4} \left(\frac{L_{AC3}}{L_{AC4}} - 1 \right)}$$

Where:

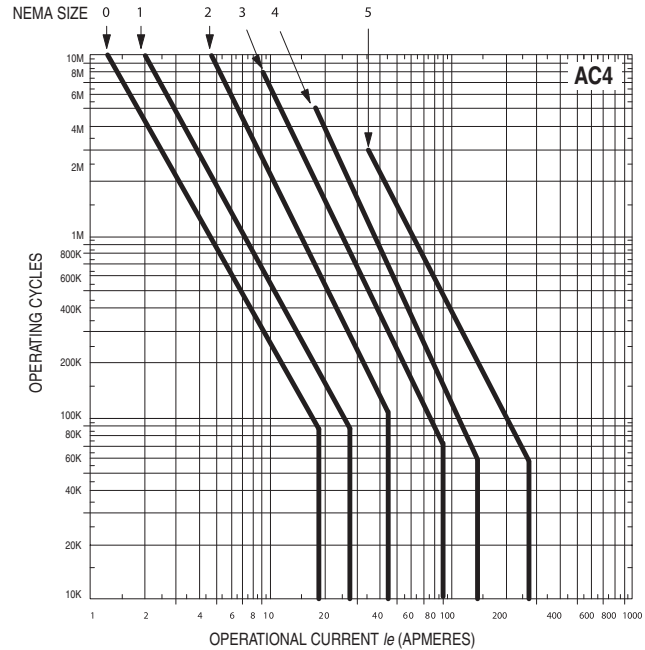
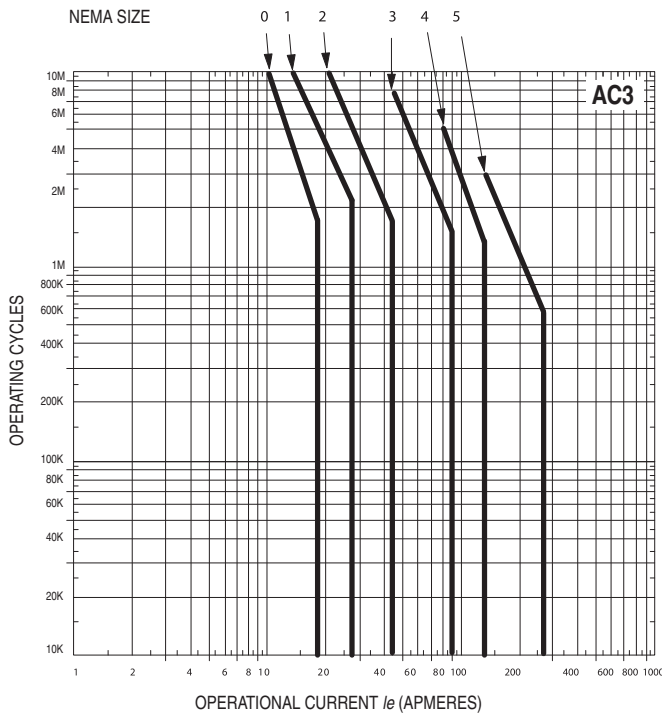
L_{mixed} = Approximate contact life for a mixed AC3/AC4 utilization category application

L_{AC3} = Approximate contact life in operations for AC3 utilization category (from AC3 life-load curves below)

L_{AC4} = Approximate contact life in operations for AC4 utilization category (from AC4 life-load curves below)

P_{AC4} = Percentage of AC4 operations

Bulletin 500 Load/ Life Curves — AC3 and AC4



Group Motor Ratings for NEMA Contactors/Starters

Manual Starters	FLA Range (Amps)	Group Rating (480V)		Contactors				
		w/o Limiter	with Limiter	Size 00	Size 0	Size 1	Size 2	Size 3
140-MN-0016	0.10...0.16	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0025	0.16...0.25	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0040	0.25...0.40	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0063	0.40...0.63	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0100	0.63...1.0	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0160	1.0...1.6	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0250	1.6...2.5	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0400	2.5...4.0	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-0630	4.0...6.3	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-1000	6.3...10.0	42 kA	42 kA	500-TO*	500-AO*	500-BO*	—	—
140-MN-1600	10.0...16.0	10 kA	42 kA	—	500-AO*	500-BO*	500-CO*	—
140-MN-2000	16.0...20.0	10 kA	14 kA	—	500-AO*	500-BO*	500-CO*	—
140-MN-2500	20.0...25.0	10 kA	10 kA	—	—	500-BO*	500-CO*	—
190-MN+190-P320	24.0...32.0	—	42 kA	—	—	—	500-CO*	500-DO*
190-MN+190-P400	32.0...42.0	—	30 kA	—	—	—	500-CO*	500-DO*

Manual Starters	FLA Range (Amps)	Group Rating (480V)		Starters				
		w/o Limiter	with Limiter	Size 00	Size 0	Size 1	Size 2	Size 3
140-MN-0016	0.10...0.16	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0025	0.16...0.25	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0040	0.25...0.40	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0063	0.40...0.63	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0100	0.63...1.0	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0160	1.0...1.6	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0250	1.6...2.5	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0400	2.5...4.0	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-0630	4.0...6.3	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-1000	6.3...10.0	42 kA	42 kA	509-TO*	509-AO*	509-BO*	—	—
140-MN-1600	10.0...16.0	10 kA	42 kA	—	509-AO*	509-BO*	509-CO*	—
140-MN-2000	16.0...20.0	10 kA	14 kA	—	509-AO*	509-BO*	509-CO*	—
140-MN-2500	20.0...25.0	10 kA	10 kA	—	—	509-BO*	509-CO*	—
190-MN+190-P320	24.0...32.0	—	42 kA	—	—	—	509-CO*	509-DO*
190-MN+190-P400	32.0...42.0	—	30 kA	—	—	—	509-CO*	509-DO*

* Cat. No. is incomplete. Refer to page 1-31.

* Cat. No. is incomplete. Refer to page 1-46.

NEMA Specifications

NEMA Non-Combination and Combination Contactors/Starters

Full Load Currents of 3-Phase, 60 Hertz AC Induction Motors

The full load currents listed below are “average values” for horsepower rated motors of several manufacturers at the more common rated voltages and speeds. These “average values”, along with the similar values listed in the U. S. National Electrical Code (NEC), should be used only as a guide for selecting suitable components for the Motor Branch Circuit. The rated full load current, shown on the motor nameplate, may vary considerably from the listed value depending on the specific motor design.

ATTENTION: The motor nameplate full load current should always be used in determining the rating of the devices used for Motor Running Overcurrent Protection.

1

HP	RPM*	Full Load Current [A]					
		208V	240V	480V	600V	2200V	4000V
1/4	3600	1.20	1.04	0.52	0.42	—	—
	1800	1.39	1.20	0.60	0.48	—	—
	1200	1.62	1.40	0.70	0.56	—	—
	900	—	—	—	—	—	—
1/3	3600	1.48	1.28	0.64	0.51	—	—
	1800	1.69	1.46	0.73	0.58	—	—
	1200	1.89	1.64	0.82	0.66	—	—
	900	—	—	—	—	—	—
1/2	3600	2.08	1.80	0.90	0.72	—	—
	1800	2.54	2.20	1.10	0.88	—	—
	1200	2.89	2.50	1.25	1.00	—	—
	900	—	—	—	—	—	—
3/4	3600	2.89	2.50	1.25	1.00	—	—
	1800	3.47	3.00	1.50	1.20	—	—
	1200	3.81	3.30	1.65	1.32	—	—
	900	—	—	—	—	—	—
1	3600	3.51	3.04	1.52	1.22	—	—
	1800	4.25	3.68	1.84	1.47	—	—
	1200	4.60	3.98	1.99	1.59	—	—
	900	—	—	—	—	—	—
1-1/2	3600	5.04	4.36	2.18	1.74	—	—
	1800	5.80	5.02	2.51	2.01	—	—
	1200	6.49	5.62	2.81	2.25	—	—
	900	—	—	—	—	—	—
2	3600	6.51	5.64	2.82	2.26	—	—
	1800	7.18	6.22	3.11	2.49	—	—
	1200	8.20	7.10	3.55	2.84	—	—
	900	—	—	—	—	—	—
3	3600	9.24	8.00	4.00	3.20	—	—
	1800	10.4	9.04	4.52	3.62	—	—
	1200	11.6	10.1	5.04	4.03	—	—
	900	—	—	—	—	—	—
5	3600	15.7	13.6	6.80	5.44	—	—
	1800	15.9	13.8	6.88	5.50	—	—
	1200	18.6	16.1	8.07	6.46	—	—
	900	—	—	—	—	—	—
7-1/2	3600	22.1	19.1	9.57	7.66	—	—
	1800	25.0	21.7	10.8	8.66	—	—
	1200	26.6	23.1	11.5	9.22	—	—
	900	—	—	—	—	—	—
10	3600	29.7	25.7	12.9	10.3	—	—
	1800	31.5	27.3	13.7	10.9	—	—
	1200	32.9	28.4	14.2	11.4	—	—
	900	—	—	—	—	—	—
15	3600	43.0	37.2	18.6	14.9	—	—
	1800	46.7	40.4	20.2	16.2	—	—
	1200	49.1	42.5	21.3	17.0	—	—
	900	—	—	—	—	—	—
20	3600	59.2	51.3	25.6	20.5	5.2	2.9
	1800	59.6	51.6	25.8	20.6	5.3	3.0
	1200	61.7	53.4	26.7	21.4	5.4	3.1
	900	—	—	—	—	5.8	3.2
25	3600	70.9	61.4	30.7	24.6	6.3	3.4
	1800	74.7	64.7	32.3	25.9	6.5	3.6
	1200	76.0	65.8	32.9	26.3	6.7	3.7
	900	—	—	—	—	6.9	3.8
30	3600	85.7	74.2	37.1	29.7	—	—
	1800	88.2	76.4	38.2	30.5	7.8	4.3
	1200	91.6	79.3	39.7	31.7	8.0	4.4
	900	—	—	—	—	8.2	4.5
40	3600	111	96.0	48.0	38.4	—	—
	1800	117	102	50.8	40.6	10.0	5.5
	1200	119	103	51.7	41.4	10.3	5.7
	900	—	—	—	—	10.6	5.8
60	3600	—	—	—	—	11.5	6.3
	1800	—	—	—	—	—	—
	1200	—	—	—	—	—	—
	900	—	—	—	—	—	—

HP	RPM*	Full Load Current [A]					
		208V	240V	480V	600V	2200V	4000V
50	3600	141	122	61.2	49.0	—	—
	1800	144	125	62.3	49.8	12.3	6.8
	1200	147	127	63.4	50.7	12.4	6.8
	900	—	—	—	—	13.1	7.2
60	3600	—	—	—	—	14.2	7.8
	1800	165	143	71.6	57.3	—	—
	1200	172	149	74.3	59.4	14.6	8.0
	900	173	150	74.9	59.9	14.9	8.2
75	3600	—	—	—	—	15.4	8.5
	1800	204	177	88.5	70.8	—	—
	1200	211	183	91.4	73.1	18.0	9.9
	900	215	186	93.1	74.5	18.2	10.0
100	3600	—	—	—	—	19.0	10.5
	1800	267	231	116	92.6	—	—
	1200	276	239	119	95.5	23.6	13.0
	900	281	243	122	97.2	24.2	13.3
125	3600	—	—	—	—	24.8	13.6
	1800	—	—	—	—	26.4	14.5
	1200	—	—	—	—	29.8	16.4
	900	—	—	—	—	—	—
150	3600	333	288	144	115	—	—
	1800	340	294	147	118	29.2	16.1
	1200	347	300	150	120	29.9	16.4
	900	—	—	—	—	30.9	17.0
200	3600	—	—	—	—	31.3	17.2
	1800	—	—	—	—	32.8	18.0
	1200	—	—	—	—	36.0	19.8
	900	—	—	—	—	—	—
250	3600	397	344	172	138	—	—
	1800	404	350	175	140	34.8	19.1
	1200	414	358	179	143	35.5	19.5
	900	—	—	—	—	37.0	20.4
300	3600	—	—	—	—	37.0	20.4
	1800	—	—	—	—	38.8	21.3
	1200	—	—	—	—	42.0	23.1
	900	—	—	—	—	—	—
350	3600	524	454	227	182	—	—
	1800	531	460	230	184	46.7	25.7
	1200	538	466	233	186	47.0	25.9
	900	—	—	—	—	49.4	27.2
400	3600	—	—	—	—	49.0	27.0
	1800	—	—	—	—	50.9	28.0
	1200	—	—	—	—	53.7	29.5
	900	—	—	—	—	—	—
450	3600	642	556	278	222	—	—
	1800	658	570	285	228	57.5	31.6
	1200	682	590	295	236	58.5	32.2
	900	—	—	—	—	61.5	33.8
500	3600	—	—	—	—	61.5	33.8
	1800	—	—	—	—	61.0	33.6
	1200	—	—	—	—	65.3	35.9
	900	—	—	—	—	70.0	38.5
600	3600	774	670	335	268	—	—
	1800	790	684	342	274	69.0	38.0
	1200	804	696	348	278	70.0	38.5
	900	—	—	—	—	73.5	40.4
700	3600	—	—	—	—	72.3	39.8
	1800	—	—	—	—	76.0	41.8
	1200	—	—	—	—	82.8	45.5
	900	—	—	—	—	—	—
800	3600	—	748	374	299	—	—
	1800	—	762	381	305	—	—
	1200	—	774	387	310	—	—
	900	—	—	—	—	—	—
900	3600	—	874	437	350	—	—
	1800	—	892	446	357	—	—
	1200	—	902	451	361	—	—
	900	—	—	—	—	—	—
1000	3600	—	972	486	389	—	—
	1800	—	992	496	397	—	—
	1200	—	1004	502	402	—	—
	900	—	—	—	—	—	—
1200	3600	—	1074	537	430	—	—
	1800	—	1096	548	438	—	—
	1200	—	1108	554	443	—	—
	900	—	—	—	—	—	—

* Synchronous speed nameplate is usually less due to slip.

