



***GE 8000-Line
Motor Control Centers***

Starters



GENERAL

Combination motor control starter units consist of an externally operable circuit disconnect, either a fusible switch or circuit breaker, and a magnetic starter with an overload relay in the motor lines.

Unit NEMA sizes listed are based on continuous horsepower ratings. The maximum horsepower rating of each NEMA size controller is reduced for long accelerating times and for jogging or plugging duty. Jogging duty is defined as 5 or more contactor openings or closings per minute or over 10 in a 10-minute period. Plugging is rapidly stopping or reversing the motor by reversing the phase sequence of the power supplied to the motor. Refer to the factory anytime accelerating times exceed 10 seconds or jogging or plugging duty is required.

The short-circuit interrupting rating depends on the type disconnect furnished. Select a starter combination for which the interrupting rating equals or exceeds the maximum available fault current.

Basic combination motor starter units consist of:

1. Externally operable circuit disconnect.
2. Magnetic starter with a thermal-magnetic, or electronic overload relay.
3. External overload reset operator.
4. Tapped line voltage, 120-volt CPT control power or external control power.
5. Drawout or pull-apart control terminal boards through NEMA Size 4.
6. Drawout power terminal boards through NEMA Size 3 (when specified).
7. Extra CPT capacity for operating auxiliary relays and pilot devices (when specified).
8. Plug-in construction through NEMA Size 4 (FVNR) starters. Bolt-in construction may require vertical bus modifications.

Specify basic starter units from the tables in this section. Starters are listed by starter function, line voltage, HP, NEMA size, and combination short-circuit rating. Indicate type control power desired. Include any options from "Optional Modifications," noting additional space requirements for some options.

Typical starter circuits are shown in Typical Circuits (Section K). Starters can also be used for lighting or resistive heat loads (Section J).



Spectra Series™ and 8000-Line Motor Control Centers

Starters

SELECTION TABLES

CIRCUIT BREAKER TYPE, 208 VOLTS, 60 HERTZ

Combination Motor Starters

FVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	7.5	25	TEC	1	X	
2	10	25	TEC	1	X	
3	25	25	TEC	2	X	
4	40	25	TEC	2.5	X	
5	75	100	SGL	3	X	⑧
6	150	65	SKL	6	X	①④
FVR						
1	7.5	25	TEC	1.5	X	
2	10	25	TEC	2	X	
3	25	25	TEC	3	X	
4	40	25	TEC	3	X	
5	75	100	SGL	6	X	①⑧
6	150	65	SKL	12	-	②④
1	7.5	65,100	SEL	1.5	X	
2	10	65,100	SEL	2	X	
3	25	65,100	SEL	3.5	X	
4	40	65,100	SFL	4	X	
5	75	100	SGL	6	X	①⑧
6	150	65	SKL	12	-	②④

RVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units ^④		UL Listed (X)	Notes
				13" Deep or Back-to-Back	20" Deep		
2	10	25	TEC	4	4	X	
3	25	25	TEC	5	4	X	
4	40	25	TEC	5	4	X	
5	75	100	SGL	-	4.5	X	③⑧
6	150	65	SKL	N/A	12	X	②
2	10	65,100	SEL	4	4	X	
3	25	65,100	SEL	5	4	X	
4	40	65,100	SEL	5.5	4.5	X	⑦
5	75	100	SGL	-	6	X	③
6	150	65	SKL	N/A	12	X	②

2S1W, 2S2W

NEMA Size	Max. Hp		IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
	Constant Variable Torque	Constant Hp					
1	7.5	5	25	TEC	1½	X	⑨
2	10	7.5	25	TEC	2	X	
3	25	20	25	TEC	3.5	X	
4	40	30	25	TEC	3.5	X	
5	75	60	30	TJC	6	-	①④
6	150	100	65	SKL	12	-	②④
1	7.5	5	65,100	SEL	1½	X	⑨
2	10	7.5	65,100	SEL	2	X	
3	25	20	65,100	SEL	4	X	
4	40	30	65,100	SFL	4	X	
5	75	60	100	TBC4	6	-	①④
6	150	100	65	SKL	12	-	②④

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	10	25	TEC	2		
2	20	25	TEC	2.5		
3	40	25	TEC	4		
4	75	10	SGL	4.5		
5	-	-	-	-		④⑥
1	10	65,100	SEL	2		
2	20	65,100	SEL	2.5		
3	40	65,100	SFL	4.5		
4	75	100	TBC4	5		
5	-	-	-	-		④⑥
Y-DELTA						
2	20	25	TEC	4		
3	40	25	TEC	4.5		①
4	60	100	TBC4	5.5		①
5	-	-	-	-		⑥
2	20	65,100	SEL	4		
3	40	65,100	SEL	5		
4	60	100	TBC4	5.5		
5	-	-	-	-		④⑥

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep (2S1W-RTF).
- ③ Size 5 RVNR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑥ Refer to factory.
- ⑦ For 40 HP applications requiring a thermal-magnetic CB, the disconnect will be SFT type and will require an additional .5 space height.
- ⑧ Requires 12" bottom wireway cover to UL Label.
- ⑨ Requires additional 6 inches if Type "A" wiring specified.



Spectra Series™ and 8000-Line Motor Control Centers

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SELECTION TABLES

CIRCUIT BREAKER TYPE, 230 VOLTS, 60 HERTZ

Combination Motor Starters

FVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	7.5	25	TEC	1	X	
2	15	25	TEC	1	X	
3	30	25	TEC	2	X	
4	50	25	TEC	2.5	X	
5	100	100	SGL	3	X	⑧
6	200	65	SKL	6	X	①⑧
1	7.5	65,100	SEL	1	X	
2	15	65,100	SEL	1	X	
3	30	65,100	SEL	2	X	
4	50	65,100	SFL	2.5	X	
5	100	100	SGL	3.5	X	⑧
6	200	65	SKL	6	X	①⑧
FVR						
1	7.5	25	TEC	1.5	X	
2	15	25	TEC	2	X	
3	30	25	TEC	3	X	
4	50	25	TEC	3	X	
5	100	100	SGL	6	X	①⑧
6	200	65	SKL	12	-	②④
1	7.5	65,100	SEL	1.5	X	
2	15	65,100	SEL	2	X	
3	30	65,100	SEL	3.5	X	
4	50	65,100	SFL	4	X	
5	100	100	SGL	6	X	①⑧
6	200	65	SKL	12	-	②④

RVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units ^④		UL Listed (X)	Notes
				13" Deep or Back-to-Back	20" Deep		
2	15	25	TEC	4	4	X	
3	30	25	TEC	5	4	X	
4	50	25	TEC	5.5	4.5	X	
5	100	100	SGL	N/A	4.5	X	③⑧
6	200	65	SKL	N/A	12	X	②⑧
2	15	65,100	SEL	4	4	X	
3	30	65,100	SEL	5	4	X	
4	50	65,100	SEL	6	4.5	X	⑦
5	100	100	SGL	N/A	6	X	③⑧
6	200	65	SKL	N/A	12	X	②⑧

2S1W, 2S2W

NEMA Size	Max. Hp		IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
	Constant Variable Torque	Constant Hp					
1	7.5	5	25	TEC	1½	X	⑨
2	15	10	25	TEC	2	X	
3	30	25	25	TEC	3.5	X	
4	50	40	25	TEC	3.5	X	
5	100	75	30	TJC	6	-	①
6	200	150	65	SKL	12	-	②
1	7.5	7.5	65,100	SEL	1½	X	⑨
2	15	20	65,100	SEL	2	X	
3	30	40	65,100	SEL	4	X	
4	50	75	65,100	SFL	4	X	
5	100	150	100	TBC4	6	-	①
6	200	150	65	SKL	12	-	②

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	10	25	TEC	2		
2	25	25	TEC	2.5		
3	50	25	TEC	4		
4	75	10	SGL	4.5		
5	-	-	-	-		④⑥
1	10	65,100	SEL	2		
2	25	65,100	SEL	2.5		
3	50	65,100	SEL	4.5		
4	75	100	TBC4	5		
5	-	-	-	-		④⑥
Y-DELTA						
2	25	25	TEC	4		
3	50	25	TEC	4.5		①
4	75	100	TBC4	5.5		①
5	-	-	-	-		④⑥
2	25	65,100	SEL	4		
3	50	65,100	SEL	5		①
4	75	100	TBC4	5.5		①
5	-	-	-	-		④⑥

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep (2S1W-RTF).
- ③ Size 5 RVNR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑥ Refer to factory.
- ⑦ For 50 HP applications requiring a thermal-magnetic CB, the disconnect will be SFT type and will require an additional .5 space height.
- ⑧ Requires 12" bottom wireway cover to UL Label.
- ⑨ Requires additional 6 inches if Type "A" wiring.



Spectra Series™ and 8000-Line Motor Control Centers

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SELECTION TABLES

CIRCUIT BREAKER TYPE, 460 VOLTS, 60 HERTZ

Combination Motor Starters

FVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	10	25	TEC	1	X	
2	25	25	TEC	1	X	
3	50	25	TEC	2	X	
4	100	25	TEC	2.5	X	
5	200	100	SGL	3	X	⑧
6	400	65	SKL	6	X	①⑧
FVR						
1	10	25	TEC	1.5	X	
2	25	25	TEC	2	X	
3	50	25	TEC	3	X	
4	100	25	TEC	3	X	
5	200	100	SGL	6	X	①⑧
6	400	65	SKL	12	-	②④
1	10	65,100	SEL	1.5	X	
2	25	65,100	SEL	2	X	
3	50	65,100	SEL	3.5	X	
4	100	65,100	SFL	4	X	
5	200	100	SGL	6	X	①⑧
6	400	65	SKL	12	-	②④

RVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units ^④		UL Listed (X)	Notes
				13" Deep or Back-to-Back	20" Deep		
2	25	25	TEC	4	4	X	
3	50	25	TEC	5	4	X	
4	100	25	TEC	5	4	X	
5	200	100	SGL	-	4.5	X	③⑧
6	400	65	SKL	N/A	12	X	②
2	25	65,100	SEL	4	4	X	
3	50	65,100	SEL	5	4	X	
4	100	65,100	SEL	6	4.5	X	⑦
5	200	100	SGL	N/A	6	X	③
6	400	65	SKL	N/A	12	X	②

2S1W, 2S2W

NEMA Size	Max. Hp		IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
	Constant Variable Torque	Constant Hp					
1	10	7.5	25	TEC	1½	X	⑨
2	25	20	25	TEC	2	X	
3	50	40	25	TEC	3.5	X	
4	100	75	25	TEC	3.5	X	
5	200	150	30	TJC	6	-	①④
6	400	300	65	SKL	12	-	②④
1	10	7.5	65,100	SEL	1½	X	⑨
2	25	20	65,100	SEL	2	X	
3	50	40	65,100	SEL	4	X	
4	100	75	65,100	SFL	4	X	
5	200	150	100	TBC4	6	-	①④
6	400	300	65	SKL	12	-	②④

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	15	25	TEC	2		
2	40	25	TEC	2.5		
3	75	25	TEC	4		
4	150	10	SGL	4.5		
5	-	-	-	-		④⑥
1	15	65,100	SEL	2		
2	40	65,100	SEL	2.5		
3	75	65,100	SEL	4.5		
4	150	100	TBC4	5		
5	-	-	-	-		④⑥
Y-DELTA						
2	40	25	TEC	4		
3	75	25	TEC	4.5		①
4	150	10	SGL	5.5		①
5	-	-	-	-		④⑥
2	40	65,100	SEL	4		
3	75	65,100	SEL	5		
4	150	100	TBC4	5.5		
5	-	-	-	-		④⑥

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep (2S1W-RTF).
- ③ Size 5 RVNR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑥ Refer to factory.
- ⑦ For 100 HP applications requiring a thermal-magnetic CB, the disconnect will be SFT type and will require an additional .5 space height.
- ⑧ Requires 12" bottom wireway cover to UL Label.
- ⑨ Requires additional 6 inches if Type "A" wiring.

D



Spectra Series™ and 8000-Line Motor Control Centers

Starters

SELECTION TABLES

CIRCUIT BREAKER TYPE, 575 VOLTS, 60 HERTZ

Combination Motor Starters

FVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
2	25	25	SEL	1	X	
3	50	25	SEL	2	X	
4	100	25	SFL	2.5	X	
5	200	65	SGL	3	X	⑧
6	400	42	SKL	6	X	①⑧
1	10	100	TECL	1	X	
2	25	100	TECL	1	X	
3	50	100	TECL	2	X	
4	100	100	TECL	2.5	-	
5	200	100	TBC4	3.5	X	⑧
6	400	42	SKL	6	X	①⑧

FVR

1	10	25	SEL	1.5	X	
2	25	25	SEL	2	X	
3	50	25	SEL	3.5	X	
4	100	25	SFL	4	X	
5	200	65	SGL	6	X	①⑧
6	400	42	SKL	12	-	②④
1	10	100	TECL	1.5	X	
2	25	100	TECL	2	X	
3	50	100	TECL	3	X	
4	100	100	TECL	3	X	
5	200	100	TBC4	6	X	①⑧
6	400	42	SKL	12	X	①④

RVNR

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units ^④		UL Listed (X)	Notes
				13" Deep or Back-to-Back	20" Deep		
2	25	25	SEL	4	4	X	
3	50	25	SEL	5	4	X	
4	100	25	SEL	6	4.5	X	⑦
5	200	65	SGL	4.5	4.5	X	③⑧
6	400	42	SKL	N/A	12	X	②
2	25	100	TECL	4	4	X	
3	50	100	TECL	5	4	X	
4	100	100	TECL	5	4	-	
5	200	100	TBC4	N/A	6	X	③
6	400	42	SKL	N/A	12	X	②

2S1W, 2S2W

NEMA Size	Max. Hp		IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
	Constant Variable Torque	Constant Hp					
1	10	7.5	25	SEL	1½	X	⑨
2	25	20	25	SEL	2	X	
3	50	40	25	SEL	4	X	
4	100	75	25	SFL	4	X	
5	200	150	22	TJC	6	-	①④
6	400	300	42	SKL	12	-	②④
1	10	7.5	100	TECL	1½	X	⑨
2	25	20	100	TECL	2	X	
3	50	40	100	TECL	3.5	X	
4	100	75	100	TECL	3.5	-	
5	200	150	100	TBC4	6	-	①④
6	400	300	42	SKL	-	-	②④⑥

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Circuit Breaker Type	Space Units	UL Listed (X)	Notes
1	15	25	SEL	2		
2	40	25	SEL	2.5		
3	75	25	SEL	4.5		
4	150	100	TBC4	5		
5	-	-	-	-		④⑥
1	15	100	TECL	2		
2	40	100	TECL	2.5		
3	75	100	TECL	4		
4	150	100	TBC4	5		
5	-	-	-	-		④⑥

Y-DELTA

2	40	25	SEL	4		
3	75	25	SEL	5		①
4	100	25	SEL	5		①
4	150	100	TBC4	5.5		①
5	-	-	-	-		④⑥
2	40	100	TECL	4		
3	75	100	TECL	4.5		①
4	150	100	TBC4	5.5		①
5	-	-	-	-		④⑥

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep (2S1W-RTF).
- ③ Size 5 RVNR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑥ Refer to factory.
- ⑦ For 100 HP applications requiring a thermal-magnetic CB, the disconnect will be SFT type and will require an additional .5 space height.
- ⑧ Requires 12" bottom wireway cover to UL Label.
- ⑨ Requires additional 6 inches if Type "A" wiring.



Spectra Series™ and 8000-Line Motor Control Centers

Starters

FUSED SWITCH TYPE, 208 VOLTS, 60 HERTZ

Combination Motor Starters® (For Notes, See Page D-8)

FVNR

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	3	100	30	30	1	X	
1	7½	100	30	60	1	X	
2	10	100	60	100	1½	X	
3	25	100	100	200	2½	X	
4	30	100	200	200	3½	X	
4	40	100	200	400	3½	X	
5	60	100	400	400	4½	X	④
5	75	100	400	600	4½	X	④
6	-	-	-	-	-	-	④⑨
Class H, K-1, K-5							
1	3	5	30	30	1	X	
1	7½	5	30	60	1	X	
2	10	5	60	60	1	X	
3	20	5	100	100	2½	X	
3	25	5	100	200	2½	X	
4	40	10	200	200	3½	X	
5	75	10	400	400	4½	X	④
6	-	-	-	-	-	-	④⑨
Class RK-1, RK-5							
1	7½	100	30	30	1	X	
2	10	100	60	60	1	X	
3	15	65	100	60	2½	X	⑩
3	25	65	100	100	2½	X	⑩
4	40	100	200	200	3½	X	
5	75	100	400	400	4½	X	④
6	-	-	-	-	-	-	④⑨

FVR

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	3	100	30	30	1½	X	
1	7½	100	30	60	1½	X	
2	10	100	60	100	2	X	
3	25	100	100	200	3½	X	
4	30	100	200	200	5	X	
4	40	100	200	400	5	X	
5	60	100	400	400	9½	X	⑥ ④
5	75	100	400	600	9½	X	⑥ ④
6	-	-	-	-	-	-	④⑨
Class H, K-1, K-5							
1	3	5	30	30	1½	X	
1	7½	5	30	60	1½	X	
2	10	5	60	60	2	X	
3	20	5	100	100	3½	X	
3	25	5	100	200	3½	X	
4	40	10	200	200	5	X	
5	75	10	400	400	9½	X	⑥ ④
6	-	-	-	-	-	-	④⑨
Class RK-1, RK-5							
1	7½	100	30	30	1½	X	
2	10	100	60	60	2	X	
3	15	65	100	60	3½	X	⑩
3	25	65	100	100	3½	X	⑩
4	40	100	200	200	5	X	
5	75	100	400	400	9½	X	⑥ ④
6	-	-	-	-	-	-	④⑨

RVNR

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units		UL Listed (X)
			Switch Amps	Clip Amps	13" Deep or Back-To-Back	20" Deep	
2	10	100	60	100	4	4	X
3	25	100	100	200	5½	4½	X
4	30	100	200	200	6	5	X
4	40	100	200	400	6	5	X
5	60	100	400	400	③	6	X ④
5	75	100	400	600	③	6	X ④
6	-	-	⑨	⑨	-	-	-
Class H, K-1, K-5							
2	10	5	60	60	4	4	X
3	20	5	100	100	5	4	X
3	25	5	100	200	5½	4½	X
4	40	10	200	200	6	5	X
5	75	10	400	400	③	6	X ④
6	-	-	⑨	⑨	-	-	-
Class RK-1, RK-5							
2	10	100	60	60	4	4	X
3	15	65	100	60	5	4	X ⑩
3	25	65	100	100	5	4	X ⑩
4	40	100	200	200	6	5	X
5	75	100	400	400	-③	6	X ④
6	-	-	⑨	⑨	-	-	-

2S1W

NEMA Size	Max. Hp		IC (kA)	Class J		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	3	3	100	30	30	1½	X	④
1	7½	5	100	30	60	1½	X	④
2	-	7½	100	60	60	2	X	
2	10	-	100	60	100	2	X	
3	25	20	100	100	200	4	X	
4	30	30	100	200	200	5	X	
4	40	-	100	200	400	5	X	
5	60	60	100	400	400	9½	-	④⑥
5	75	-	100	400	600	9½	-	④⑥
6	-	-	-	-	-	-	-	④⑨
Class H, K-1, K-5								
1	3	3	5	30	30	1½	X	④
1	7½	5	5	30	60	1½	X	④
2	10	7½	5	60	60	2	X	
3	20	20	5	100	100	4	X	
3	25	-	5	100	200	4	X	
4	40	30	10	200	200	5	X	
5	-	40	10	400	200	9½	-	④⑥
5	75	60	10	400	400	9½	-	④⑥
6	-	-	-	-	-	-	-	④⑨
Class RK-1, RK-5								
1	7½	5	100	30	30	1½	X	④
2	-	7½	100	60	30	2	X	
2	10	-	100	60	60	2	X	
3	15	15	65	100	60	4	X	⑩
3	25	20	65	100	100	4	X	⑩
4	40	-	100	200	200	5	X	
5	75	-	100	400	400	9½	-	④⑥
6	-	-	100	-	-	-	-	④⑥

D



Spectra Series™ and 8000-Line Motor Control Centers

Starters

SELECTION TABLES

FUSED SWITCH TYPE, 208 VOLTS, 60 HERTZ

Combination Motor Starters®

2S2W

NEMA Size	Max. Hp		IC (kA)	Class J		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	3	3	100	30	30	1½	X	
1	7½	5	100	30	60	1½	X	
2	—	7½	100	60	60	2	X	
2	10	—	100	60	100	2	X	
3	25	20	100	100	200	4	X	
4	30	30	100	200	200	5	X	
4	40	—	100	200	400	5	X	
5	60	60	100	400	400	9½	—	④⑥
5	75	—	100	400	600	9½	—	④⑥
6	—	—	—	—	—	—	—	④⑥
Class H, K-1, K-5								
1	3	3	5	30	30	1½	X	
1	7½	5	5	30	60	1½	X	
2	10	7½	5	60	60	2	X	
3	20	20	5	100	100	4	X	
3	25	—	5	100	200	4	X	
4	40	30	10	200	200	5	X	
5	—	40	10	400	200	9½	—	⑥
5	75	60	10	400	400	9½	—	⑥
6	—	—	—	—	—	—	—	⑨
Class RK-1, RK-5								
1	7½	5	100	30	30	1½	X	
2	—	7½	100	60	30	2	X	
2	10	—	100	60	60	2	X	
3	15	15	65	100	60	4	X	⑩
3	25	20	65	100	100	4	X	⑩
4	40	—	100	200	200	5	X	
5	75	—	100	400	400	9½	—	④⑥
6	—	—	—	—	—	—	—	④⑥

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	3	100	30	30	2		
1	7½	100	30	60	2		
2	10	100	60	100	2½		
3	20	100	100	200	4½		
3	30	100	200	200	5		
4	40	100	200	400	5		
4	60	100	400	400	6		
5	—	—	—	—	—		④⑨
Class H, K-1, K-5							
1	3	5	30	30	2		
1	7½	5	30	60	2		
1	10	5	60	60	2		⑤
2	20	5	100	100	3		
3	40	10	200	200	5		
4	75	10	400	400	6		
5	—	—	—	—	—		④⑨
Class RK-1, RK-5							
1	7½	100	30	30	2		
2	15	100	100	60	3		
3	20	65	100	100	4		⑩
3	30	100	200	200	5		
4	60	100	400	400	6		
5	—	—	—	—	—		④⑨

Y-DELTA

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
2	3	100	60	30	4		②
2	7½	100	60	60	4		
2	10	100	60	100	4		
3	20	100	100	200	5		①
3	30	100	200	200	5½		①
4	40	100	200	400	5½		①
4	60	100	400	400	6		⑦
5	—	—	—	—	—		④⑨
Class H, K-1, K-5							
2	3	5	60	30	4		②
2	7½	5	60	60	4		
2	20	5	100	100	4		
3	40	10	200	200	5½		①
4	60	10	400	400	6		⑦
5	—	—	—	—	—		④⑨
Class RK-1, RK-5							
2	7½	100	60	30	4		②
2	10	100	60	60	4		
2	15	100	100	60	4		
3	20	65	100	100	4½		①
3	30	100	200	200	5½		①
4	40	100	200	200	5½		①
4	60	100	400	400	6		⑦
5	—	—	—	—	—		④⑨

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 1 not available. Use Size 2.
- ③ Size 5 RNVR cannot be mounted in 13-inch deep enclosure. Two Size 5 RNVR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ Use time-delay fuse, maximum rating same as switch amps.
- ⑥ Size 5 FVR, 2S1W, 2S2W with fused switch requires (2) adjacent sections; left hand section is 24-inch wide 6X, right hand section is 20-inch wide with top 3½ X used for disconnect.
- ⑦ Size 4 Wye-Delta with fused switch requires a 24-inch wide section when main horizontal bus is rated 1000 ampere UL or less. A 30-inch wide section is required with 1200 ampere UL or higher rated main horizontal bus.
- ⑧ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑨ Refer to factory.
- ⑩ Use size 4 spacing for 100K ratings.
- Requires 12" bottom wireway cover to UL Label.
- Class J Table is based on fast-acting Class J fuses. For time delay Class J fuses (Std.) use RK-1, RK-5 Table.
- Requires additional 6 inches if Type "A" wiring.



Spectra Series™ and 8000-Line Motor Control Centers

Starters

FUSED SWITCH TYPE, 230 VOLTS, 60 HERTZ

Combination Motor Starters® (For Notes, See Page D-10)

FVNR

NEMA Size	Max. Hp	IC (kA)	Class J ①		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	3	100	30	30	1	X	
1	7½	100	30	60	1	X	
2	15	100	60	100	1½	X	
3	30	100	100	200	2½	X	
4	50	100	200	400	3½	X	
5	75	100	400	400	4½	X	⑥
5	100	100	400	600	4½	X	⑥
6	150	100	600	800	6	X	①⑥
6	200	100	600	1200	6	X	①⑥
Class H, K-1, K-5							
1	2	5	30	30	1	X	
1	7½	5	30	60	1	X	
2	15	5	60	100	1½	X	
3	30	5	100	200	2½	X	
4	60	10	200	400	3½	X	
5	100	10	400	600	4½	X	
6	-	-	-	-	-	-	①⑨
Class RK-1, RK-5							
1	7½	100	30	30	1	X	
2	15	100	60	60	1	X	
3	30	65	100	100	2½	X	①
4	50	100	200	200	3½	X	
5	100	100	400	400	4½	X	⑥
6	200	100	600	600	6	X	①⑥

FVR

NEMA Size	Max. Hp	IC (kA)	Class J ①		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	3	100	30	30	1½	X	
1	7½	100	30	60	1½	X	
2	15	100	60	100	2	X	
3	30	100	100	200	3½	X	
4	50	100	200	400	5	X	
5	75	100	400	400	9½	X	⑥
5	100	100	400	600	9½	X	⑥
6	150	100	600	800	12	-	②
6	200	100	600	1200	12	-	②
Class H, K-1, K-5							
1	2	5	30	30	1½	X	
1	7½	5	30	60	1½	X	
2	15	5	60	100	2	X	
3	30	5	100	200	3½	X	
4	60	10	200	400	5	X	
5	100	10	400	600	9½	X	⑥
6	-	-	-	-	-	-	②⑨
Class RK-1, RK-5							
1	7½	100	30	30	1½	X	
2	15	100	60	60	2	X	
3	30	65	100	100	3½	X	①
4	50	100	200	200	5	X	
5	100	100	400	400	9½	X	⑥
6	200	100	600	600	12	-	②

RVNR

NEMA Size	Max. Hp	IC (kA)	Class J ①		Space Units④		UL Listed (X)
			Switch Amps	Clip Amps	13" Deep or Back-To-Back	20" Deep	
2	10	100	60	100	4	4	X
2	15	100	60	100	4	4	X
3	30	100	100	200	5½	4½	X
4	50	100	200	400	6	5	X
5	75	100	400	400	③	6	X
5	100	100	400	600	③	6	X
6	150	100	600	800	N/A	12②	X
6	200	100	600	1200	N/A	12②	X
Class H, K-1, K-5							
2	15	5	60	100	4	4	X
3	30	5	100	200	5½	4½	X
4	60	10	200	400	6	5	X
5	100	10	400	600	③	6	X
6	-	-	⑨	⑨	-	-	-
Class RK-1, RK-5							
2	15	100	60	60	4	4	X
3	30	65	100	100	5	4	X
4	50	100	200	200	6	5	X
5	100	100	400	400	③	6	X
6	200	100	600	600	N/A	12②	X

2S1W

NEMA Size	Max. Hp		IC (kA)	Class J ①		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	3	3	100	30	30	1½	X	⑥
1	7½	5	100	30	60	1½	X	⑥
2	-	7½	100	60	60	2	X	
2	10	10	100	60	100	2	X	
2	15	-	100	60	100	2	X	
3	30	25	100	100	200	4	X	
4	50	40	100	200	400	5	X	
5	75	75	100	400	400	9½	-	⑥
5	100	-	100	400	600	9½	-	⑥
6	-	100	100	600	600	12	-	②
6	150	125	100	600	-	12	-	②
6	200	150	100	600	1200	12	-	②
Class H, K-1, K-5								
1	2	2	5	30	30	1½	X	⑥
1	7½	5	5	30	60	1½	X	⑥
2	-	7½	5	60	60	2	X	
2	15	10	5	60	100	2	X	
3	-	15	5	100	100	4	X	
3	30	25	5	100	200	4	X	
4	-	30	10	200	200	5	X	
4	50	40	10	200	400	5	X	
5	60	50	10	400	400	9½	-	⑥
5	100	75	10	400	600	9½	-	⑥
6	125	100	10	600	400	12	-	②
6	200	150	10	600	600	12	-	②
Class RK-1, RK-5								
1	7½	5	100	30	30	1½	X	⑥
2	-	7½	100	60	30	2	X	
2	15	10	100	60	60	2	X	
3	30	25	65	100	100	4	X	①
4	-	30	100	200	100	5	X	
4	50	40	100	200	200	5	X	
5	100	75	100	400	400	9½	-	⑥
6	200	150	100	600	600	12	-	②

D



Spectra Series™ and 8000-Line Motor Control Centers

Starters

SELECTION TABLES

FUSED SWITCH TYPE, 230 VOLTS, 60 HERTZ

Combination Motor Starters®

2S2W

NEMA Size	Max. Hp		IC (kA)	Class J		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	3	3	100	30	30	1½	X	
1	7½	5	100	30	60	1½	X	
2	–	7½	100	60	60	2	X	
2	10	10	100	60	100	2	X	
2	15	–	100	60	100	2	X	
3	30	25	100	100	200	4	X	
4	50	40	100	200	400	5	X	
5	75	75	100	400	400	9½	–	
5	100	–	100	400	600	9½	–	
6	–	100	100	600	600	12	–	
6	150	125	100	600	800	12	–	
6	200	150	100	600	1200	12	–	
Class H, K-1, K-5								
1	2	2	5	30	30	1½	X	
1	7½	5	5	30	60	1½	X	
2	–	7½	5	60	60	2	X	
2	15	10	5	60	100	2	X	
3	–	15	5	100	100	4	X	
3	30	25	5	100	200	4	X	
4	–	30	10	200	200	5	X	
4	50	40	10	200	400	5	X	
5	60	50	10	400	400	9½	–	
5	100	75	10	400	600	9½	–	
6	125	100	10	600	400	12	–	
6	200	150	10	600	600	12	–	
Class RK-1, RK-5								
1	7½	5	100	30	30	1½	X	
2	–	7½	100	60	30	2	X	
2	15	10	100	60	60	2	X	
3	30	25	65	100	100	4	X	
4	–	30	100	200	100	5	X	
4	50	40	100	200	200	5	X	
5	100	75	100	400	400	9½	–	
6	200	150	100	600	600	12	–	

Y-DELTA

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
2	3	100	60	30	4		
2	7½	100	60	60	4		
2	10	100	60	100	4		
3	30	100	100	200	5		
4	75	100	400	400	6		
5	–	–	–	–	–		
Class H, K-1, K-5							
2	2	5	60	30	4		
2	7½	5	60	60	4		
2	10	5	60	60	4		
2	25	5	100	100	4		
3	30	5	100	100	4½		
3	50	5	200	200	5½		
4	60	10	400	400	6		
4	75	10	400	400	6		
5	–	–	–	–	–		
Class RK-1, RK-5							
2	7½	100	60	30	4		
2	10	100	60	60	4		
2	15	100	60	60	4		
2	20	100	100	100	4		
3	30	65	100	100	4½		
4	60	100	400	400	6		
5	–	–	–	–	–		

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	3	100	30	30	2		
1	7½	100	30	60	2		
2	10	100	60	100	2½		
3	30	100	100	200	4½		
4	50	100	200	400	5		
4	75	100	400	400	6		
5	–	–	–	–	–		
Class H, K-1, K-5							
1	2	5	30	30	2		
1	7½	5	30	60	2		
1	10	5	60	60	2		
2	25	5	100	100	3		
3	30	5	100	100	4		
3	50	5	200	200	5		
4	60	10	400	400	6		
4	75	10	400	400	6		
5	–	–	–	–	–		
Class RK-1, RK-5							
1	7½	100	30	30	2		
2	15	100	60	60	2½		
2	20	100	100	100	3		
3	30	65	100	100	4		
4	60	100	400	400	6		
5	–	–	–	–	–		

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S1W, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep, with 12-inch bottom wireway cover.
- ③ Size 5 RNVR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑥ Size 5 FVR, 2S1W, 2S2W with fused switch requires (2) adjacent sections; left hand section is 24-inch wide 6X, right hand section is 20-inch wide with top 3½ X used for disconnect.
- ⑦ Size 4 Wye-Delta with fused switch requires a 24-inch wide section when main horizontal bus is rated 1000 ampere UL or less. A 30-inch wide section is required with 1200 ampere UL or higher rated main horizontal bus.
- ⑧ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑨ Refer to factory.
- ⑩ Use time-delay fuse, maximum rating same as switch amps.
- Use size 4 spacing for 100K ratings.
- Requires 12" bottom wireway cover to UL Label.
- Class J Table is based on fast acting Class J fuses. For time delay Class J fuses (Std.) use RK1, RK5 Table.
- Requires Additional 6 inches if Type "A" wiring.



Spectra Series™ and 8000-Line Motor Control Centers

Starters

FUSED SWITCH TYPE, 460 VOLTS, 60 HERTZ

Combination Motor Starters® (For Notes, See Page D-12)

FVNR

NEMA Size	Max. Hp	IC (kA)	Class J Ⓜ		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	5	100	30	30	1	X	
1	10	100	30	60	1	X	
2	15	100	60	60	1	X	
2	25	100	60	100	1½	X	
3	50	100	100	200	2½	X	
4	60	100	200	200	3½	X	
4	100	100	200	400	3½	X	
5	150	100	400	400	4½	X	Ⓜ
5	200	100	400	600	4½	X	Ⓜ
6	250	100	600	600	6	X	① Ⓜ
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps			
1	7½	–	30	30	1	X	
1	10	5	30	60	1	X	
2	15	5	60	60	1	X	
2	25	5	60	100	1½	X	
3	30	5	100	100	2½	X	
3	50	5	100	200	2½	X	
4	75	10	200	200	3½	X	
4	100	10	200	400	4½	X	Ⓜ
5	150	10	400	400	4½	X	Ⓜ
5	200	10	400	600	4½	X	Ⓜ
6	400	10	600	600	6	–	①④⑩
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps			
1	10	100	30	30	1	X	
2	15	100	60	30	1	X	
2	25	100	60	60	1	X	
3	30	65	100	60	2½	X	Ⓜ
3	50	65	100	100	2½	X	Ⓜ
4	100	100	200	200	3½	X	Ⓜ
5	125	100	400	200	4½	X	Ⓜ
5	200	100	400	400	4½	X	Ⓜ
6	250	100	600	400	6	X	①
6	400	100	600	600	6	X	① Ⓜ

FVR

NEMA Size	Max. Hp	IC (kA)	Class J Ⓜ		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	5	100	30	30	1½	X	
1	10	100	30	60	1½	X	
2	15	100	60	60	2	X	
2	25	100	60	100	2	X	
3	50	100	100	200	3½	X	
4	60	100	200	200	5	X	
4	100	100	200	400	5	X	
5	150	100	400	400	9½	X	Ⓜ
5	200	100	400	600	9½	X	Ⓜ
6	250	100	600	600	12	–	②
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps			
1	7½	–	30	30	1½	X	
1	10	5	30	60	1½	X	
2	15	5	60	60	2	X	
2	25	5	60	100	2	X	
3	30	5	100	100	3½	X	
3	50	5	100	200	3½	X	
4	75	10	200	200	5	X	
4	100	10	200	400	5	X	
5	150	10	400	400	9½	X	Ⓜ
5	200	10	400	600	9½	X	Ⓜ
6	400	10	600	600	12	–	②⑩
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps			
1	10	100	30	30	1½	X	
2	15	100	60	30	2	X	
2	25	100	60	60	2	X	
3	30	65	100	60	3½	X	Ⓜ
3	50	65	100	100	3½	X	Ⓜ
4	100	100	200	200	5	X	
5	125	100	400	200	9½	X	Ⓜ
5	200	100	400	400	9½	X	Ⓜ
6	250	100	600	400	12	–	②

RVNR

NEMA Size	Max. Hp	IC (kA)	Class J Ⓜ		Space Units④		UL Listed (X)
			Switch Amps	Clip Amps	13" Deep or Back-To-Back	20" Deep	
2	15	100	60	60	4	4	X
2	25	100	60	100	4	4	X
3	50	100	100	200	5½	4½	X
4	60	100	200	200	6	5	X
4	100	100	200	400	6	5	X
5	100	100	400	400	③	6	X Ⓜ
5	200	100	400	600	③	6	X Ⓜ
6	250	100	600	600	N/A	12②	X
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps			
2	15	5	60	60	4	4	X
2	25	5	60	100	4	4	X
3	30	5	100	100	5	4	X Ⓜ
3	50	5	100	200	5½	4½	X Ⓜ
4	75	10	200	200	6	5	X
4	100	10	200	400	6	5	X
5	150	10	400	400	③	6	X Ⓜ
5	200	10	400	600	③	6	X Ⓜ
6	400	10	600	600⑩	N/A	12②	–
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps			
2	15	100	60	30	4	4	X
2	25	100	60	60	4	4	X
3	30	65	100	60	5	4	X
3	50	65	100	100	5	4	X
4	100	100	200	200	6	5	X
5	125	100	400	200	③	6	X Ⓜ
5	200	100	400	400	③	6	X Ⓜ
6	250	100	600	400	N/A	12②	X
6	400	100	600	600	N/A	12②	X

2S1W

NEMA Size	Max. Hp		IC (kA)	Class J Ⓜ		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	5	5	100	30	30	1½	X	Ⓜ
1	10	7½	100	30	60	1½	X	Ⓜ
2	15	15	100	60	60	2	X	
2	25	20	100	60	100	2	X	
3	–	25	100	100	100	4	X	
3	50	40	100	100	200	4	X	
4	60	50	100	200	200	5	X	
4	100	75	100	200	400	5	X	
5	150	150	100	400	400	9½	–	④⑥
5	200	–	100	400	600	9½	–	④⑥
6	250	200	100	600	600	12	–	②
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes	
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps				
1	7½	7½	5	30	30	1½	X	Ⓜ
1	10	–	5	30	60	1½	X	Ⓜ
2	15	10	5	60	60	2	X	
2	25	20	5	60	100	2	X	
3	30	25	5	100	100	4	X	
3	50	40	5	100	200	4	X	
4	75	75	10	200	200	5	X	
4	100	–	10	200	400	5	X	
5	150	150	10	400	400	9½	–	④⑥
5	200	–	10	400	600	9½	–	④⑥
6	250	250	10	600	400	12	–	②
6	400	300	10	600	600	12	–	②⑩
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes	
NEMA Size	Max. Hp	IC (kA)	Switch Amps	Clip Amps				
1	10	7½	100	30	30	1½	X	Ⓜ
2	15	15	100	60	30	2	X	
2	25	20	100	60	60	2	X	
3	30	30	65	100	60	4	X	Ⓜ
3	50	40	65	100	100	4	X	Ⓜ
4	100	75	100	200	200	5	X	
5	125	100	100	400	200	9½	–	⑥
5	200	150	100	400	400	9½	–	⑥
6	250	250	100	600	400	12	–	②
6	400	300	100	600	600	12	–	②



Spectra Series™ and 8000-Line Motor Control Centers

Starters

SELECTION TABLES

FUSED SWITCH TYPE, 460 VOLTS, 60 HERTZ

Combination Motor Starters®

2S2W

NEMA Size	Max. Hp		IC (kA)	Class J		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	5	5	100	30	30	1½	X	⑤
1	10	7½	100	30	60	1½	X	⑤
2	15	15	100	60	60	2	X	
2	25	20	100	60	100	2	X	
3	–	25	100	100	100	4	X	
3	50	40	100	100	200	4	X	
4	60	50	100	200	200	5	X	
4	100	75	100	200	400	5	X	
5	150	150	100	400	400	9½	–	④⑥
5	200	–	100	400	600	9½	–	④⑥
6	250	200	100	600	600	12	–	②
Class H, K-1, K-5								
1	7½	7½	5	30	30	1½	X	⑤
1	10	–	5	30	60	1½	X	⑤
2	15	10	5	60	60	2	X	
2	25	20	5	60	100	2	X	
3	30	25	5	100	100	4	X	
3	50	40	5	100	200	4	X	
4	75	75	10	200	200	5	X	
4	100	–	10	200	400	5	X	
5	150	150	10	400	400	9½	–	④⑥
5	200	–	10	400	600	9½	–	④⑥
6	250	250	10	600	400	12	–	②
6	400	300	10	600	600	12	–	②⑩
Class RK-1, RK-5								
1	10	7½	100	30	30	1½	X	⑤
2	15	15	100	60	30	2	X	
2	25	20	100	60	60	2	X	
3	30	30	65	100	60	4	X	
3	50	40	65	100	100	4	X	
4	100	75	100	200	200	5	X	
5	125	100	100	400	200	9½	–	⑥
5	200	150	100	400	400	9½	–	⑥
6	250	250	100	600	400	12	–	②
6	400	300	100	600	600	12	–	②

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	5	100	30	30	2		
1	10	100	30	60	2		
1	15	100	60	60	2		
2	25	100	60	100	2½		
3	50	100	100	200	4½		
3	60	100	200	200	5		
4	100	100	200	400	5		
4	150	100	400	400	6		
5	–	–	–	–	–		④⑨
Class H, K-1, K-5							
1	7½	5	30	30	2		
1	10	5	30	60	2		
1	15	5	60	60	2		
2	25	5	60	100	2½		⑩
2	30	5	100	100	3		
2	40	5	100	100	3		
3	50	5	100	100	4		⑩
3	75	10	200	200	5		
4	100	10	200	200	5		⑩
4	150	10	400	400	6		
5	–	–	–	–	–		④⑨
Class RK-1, RK-5							
1	10	100	30	30	2		
1	15	100	60	30	2		
2	25	100	60	60	2½		
2	30	100	100	60	3		
3	50	65	100	100	4		
3	60	100	200	200	5		
4	100	100	200	200	5		
4	125	100	400	200	6		
5	–	–	–	–	–		④⑨

Y-DELTA

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
2	5	100	60	30	4		⑤
2	10	100	60	60	4		
2	15	100	60	60	4		
2	25	100	60	100	4		
3	50	100	100	200	5		①
3	60	100	200	200	5½		①
4	100	100	200	400	6		①
4	150	100	400	400	6		⑦
5	–	–	–	–	–		④⑨
Class H, K-1, K-5							
2	7½	5	60	30	4		⑤
2	10	5	60	60	4		
2	15	5	60	60	4		
2	25	5	60	60	4		⑩
2	30	5	100	100	4		
2	40	5	100	100	4		
3	50	5	100	100	4½		①⑩
3	75	5	200	200	5½		①
4	100	10	200	200	6		①⑩
4	150	10	400	400	6		⑦
5	–	–	–	–	–		④⑨
Class RK-1, RK-5							
2	10	100	60	30	4		⑤
2	15	100	60	30	4		
2	25	100	60	60	4		
2	30	100	100	60	4		
3	50	65	100	100	4½		①
3	60	100	200	200	5½		①
4	100	100	200	200	6		①
4	125	100	400	200	6		⑦
5	–	–	–	–	–		④⑨

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S1W, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep, with 12-inch bottom wireway cover.
- ③ Size 5 RVNR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ Size 1 not available. Use Size 2.
- ⑥ Size 5 FVR, 2S1W, 2S2W with fused switch requires (2) adjacent sections; left hand section is 24-inch wide 6X, right hand section is 20-inch wide with top 3½ X used for disconnect.
- ⑦ Size 4 Wye-Delta with fused switch requires a 24-inch wide section when main horizontal bus is rated 1000 ampere UL or less. A 30-inch wide section is required with 1200 ampere UL or higher rated main horizontal bus.
- ⑧ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑨ Refer to factory.
- ⑩ Use time-delay fuse, maximum rating same as switch amps.
- Use size 4 spacing for 100K ratings.
- Requires 12" bottom wireway cover to UL Label.
- ⚡ Class J Table is based on fast acting Class J fuses. For time delay Class J fuses (Std.) use RK-1, RK-5 Table.
- ⊞ Requires additional 6 inches if Type "A" wiring.



Spectra Series™ and 8000-Line Motor Control Centers

Starters

FUSED SWITCH TYPE, 575 VOLTS, 60 HERTZ

Combination Motor Starters® (For Notes, See Page D-14)

FVNR

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	7½	100	30	30	1	X	
1	10	100	30	60	1	X	
2	20	100	60	60	1	X	
2	25	100	60	100	1½	X	
3	30	100	100	100	2½	X	
3	50	100	100	200	2½	X	
4	75	100	200	200	3½	X	
4	100	100	200	400	3½	X	
5	200	100	400	400	4½	X	
6	250	100	600	600	6	X	①②
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes
1	10	5	30	30			
2	20	5	60	60	1	X	
2	25	5	60	100	1½	X	
3	40	5	100	100	2½	X	
3	50	5	100	200	2½	X	
4	100	10	200	200	3½	X	
5	200	10	400	400	4½	X	
6	400	10	600	600	6	-	①②⑩
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes
1	10	100	30	30			
2	25	100	60	60	1	X	
3	40	100	200	60	3½	X	
3	50	100	200	100	3½	X	
4	100	100	200	200	3½	X	
5	200	100	400	400	4½	X	
6	400	100	600	600	6	X	①②

FVR

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	7½	100	30	30	1½	X	
1	10	100	30	60	1½	X	
2	20	100	60	60	2	X	
2	25	100	60	100	2	X	
3	30	100	100	100	3½	X	
3	50	100	100	200	3½	X	
4	75	100	200	200	5	X	
4	100	100	200	400	5	X	
5	200	100	400	400	9½	X	⑥⑩
6	250	100	600	600	12	-	②
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes
1	10	5	30	30			
2	20	5	60	60	2	X	
2	25	5	60	100	2	X	
3	40	5	100	100	3½	X	
3	50	5	100	200	3½	X	
4	100	10	200	200	5	X	
5	200	10	400	400	9½	X	⑥⑩
6	400	10	600	600	12	-	②⑩
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes
1	10	100	30	30			
2	25	100	60	60	2	X	
3	40	100	200	60	5	X	
3	50	100	200	100	5	X	
4	100	100	200	200	5	X	
5	200	100	400	400	9½	X	⑥⑩
6	400	100	600	600	12	-	②

RVNR

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units		UL Listed (X)
			Switch Amps	Clip Amps	13" Deep or Back-To-Back	20" Deep	
2	20	100	60	60	4	4	X
2	25	100	60	100	4	4	X
3	30	100	100	100	5	4	X
3	50	100	100	200	5½	4½	X
4	75	100	200	200	6	5	X
4	100	100	200	400	6	5	X
5	200	100	400	400	③	6	X⑩
6	250	100	600	600	N/A	12②	X
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes
2	20	5	60	60			
2	25	5	60	100	4	4	X
3	40	5	100	100	5	4	X
3	50	5	100	200	5½	4½	X
4	100	10	200	200	6	5	X
5	200	10	400	400	③	6	X⑩
6	400	10	600	600⑩	N/A	12②	X
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes
2	25	100	60	60			
3	40	100	200	60	6	5	X
3	50	100	200	100	6	5	X
4	100	100	200	200	6	5	X
5	200	100	400	400	③	6	X⑩
6	400	100	600	600	N/A	12②	X

2S1W

NEMA Size	Max. Hp		IC (kA)	Class J		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	7½	7½	100	30	30	1½	X	⑩
1	10	-	100	30	60	1½	X	⑩
2	20	20	100	60	60	2	X	
2	25	-	100	60	100	2	X	
3	30	25	100	100	100	4	X	
3	50	40	100	100	200	4	X	
4	75	75	100	200	200	5	X	
4	100	-	100	200	400	5	X	
5	200	150	100	400	400	9½	-	⑥
6	-	200	100	600	400	12	-	②
6	250	250	100	600	600	12	-	②
			Class H, K-1, K-5		Space Units	UL Listed (X)	Notes	
1	10	7½	5	30				30
2	-	10	5	60	30	2	X	
2	20	20	5	60	60	2	X	
2	25	-	5	60	100	2	X	
3	40	40	5	100	100	4	X	
3	50	-	5	100	200	4	X	
4	100	75	10	200	200	5	X	
5	-	100	10	400	200	9½	-	⑥
5	200	150	10	400	400	9½	-	⑥
6	350	300	10	600	400	12	-	②⑩
6	400	-	10	600	600	12	-	②⑩
			Class RK-1, RK-5		Space Units	UL Listed (X)	Notes	
1	10	7½	100	30				30
2	25	-	100	60	60	2	X	
3	40	40	100	200	60	5	X	
3	50	-	100	200	100	5	X	
4	100	-	100	200	200	5	X	
5	200	-	100	400	400	9½	-	⑥
6	400	-	100	600	600	12	-	②



Spectra Series™ and 8000-Line Motor Control Centers

Starters

SELECTION TABLES

FUSED SWITCH TYPE, 575 VOLTS, 60 HERTZ

Combination Motor Starters®

2S2W

NEMA Size	Max. Hp		IC (kA)	Class J		Space Units	UL Listed (X)	Notes
	CT/VT	Const. Hp.		Switch Amps	Clip Amps			
1	7½	7½	100	30	30	1½	X	
1	10	—	100	30	60	1½	X	
2	20	20	100	60	60	2	X	
2	25	—	100	60	100	2	X	
3	30	25	100	100	100	4	X	
3	50	40	100	100	200	4	X	
4	75	75	100	200	200	5	X	
4	100	—	100	200	400	5	X	
5	200	150	100	400	400	9½	—	④⑥
6	—	200	100	600	400	12	—	②
6	250	250	100	600	600	12	—	②
Class H, K-1, K-5								
1	10	7½	5	30	30	1½	X	
2	—	10	5	60	30	2	X	
2	20	20	5	60	60	2	X	
2	25	—	5	60	100	2	X	
3	40	40	5	100	100	4	X	
3	50	—	5	100	200	4	X	
4	100	75	10	200	200	5	X	
5	—	100	10	400	200	9½	—	④⑥
5	200	150	10	400	400	9½	—	④⑥
6	350	300	10	600	400	12	—	②⑩
6	400	—	10	600	600	12	—	②⑩
Class RK-1, RK-5								
1	10	7½	100	30	30	1½	X	
2	25	—	100	60	60	2	X	
3	40	40	100	200	60	5	X	
3	50	—	100	200	100	5	X	
4	100	—	100	200	200	5	X	
5	200	—	100	400	400	9½	—	⑥
6	400	—	100	600	600	12	—	②

Y-DELTA

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
2	7½	100	60	30	4		⑤
2	20	100	60	60	4		
2	25	100	60	100	4		
2	30	100	100	100	4		
3	50	100	100	200	5		①
3	75	100	200	200	5½		①
4	100	100	200	400	6		①
4	150	100	400	400	6		⑦
5	—	—	—	—	—		⑨
Class H, K-1, K-5							
2	10	5	60	30	4		⑤
2	25	5	60	60	4		⑩
2	40	5	100	100	4		
3	75	5	200	200	5½		①
4	100	10	200	200	6		①
4	150	10	400	400	6		⑦
5	—	—	—	—	—		⑨
Class RK-1, RK-5							
2	10	100	60	30	4		⑤
2	15	100	60	30	4		
2	20	100	60	60	4		
2	25	100	60	60	4		
3	50	100	200	100	5½		①
3	75	100	200	200	5½		①
4	100	100	200	200	6		①
4	150	100	400	400	6		⑦
5	—	—	—	—	—		⑨

PART WINDING

NEMA Size	Max. Hp	IC (kA)	Class J		Space Units	UL Listed (X)	Notes
			Switch Amps	Clip Amps			
1	7½	100	30	30	2		
1	10	100	30	60	2		
1	15	100	60	60	2		
2	20	100	60	60	2½		
2	25	100	60	100	2½		
2	30	100	100	100	3		
3	50	100	100	200	4½		
3	75	100	200	200	5		
4	100	100	200	400	5		
4	150	100	400	400	6		
5	—	—	—	—	—		⑨
Class H, K1, K5							
1	10	5	30	30	2		
1	15	5	60	60	2		
2	20	5	60	60	2½		
2	25	5	60	100	2½		
2	40	5	100	100	3		
3	75	5	200	200	5		
4	100	10	200	200	5		
4	150	10	400	400	6		
5	—	—	—	—	—		⑨
Class RK1, RK5							
1	10	100	30	30	2		
1	15	100	60	30	2		
2	20	100	60	60	2½		
2	25	100	60	60	2½		
3	50	100	200	100	5		
3	75	100	200	200	5		
4	100	100	200	200	5		
4	150	100	400	400	6		
5	—	—	—	—	—		⑨

- ① Requires 24-inch wide section (Size 6 requires minimum 20-inch deep).
- ② Size 6 FVR, RVNR, 2S1W, 2S2W require (2) adjacent 24-inch wide sections, 20-inch deep, with 12-inch bottom wireway cover.
- ③ Size 5 RVNR cannot be mounted in 13-inch deep enclosure. Two Size 5 RVNR starters cannot be mounted back-to-back in the same 20-inch deep section.
- ④ 12-inch wireway at bottom required.
- ⑤ Size 1 not available. Use Size 2.
- ⑥ Size 5 FVR, 2S1W, 2S2W with fused switch requires (2) adjacent sections; left hand section is 24-inch wide 6X, right hand section is 20-inch wide with top 3½ X used for disconnect.
- ⑦ Size 4 Wye-Delta with fused switch requires a 24-inch wide section when main horizontal bus is rated 1000 ampere UL or less. A 30-inch wide section is required with 1200 ampere UL or higher rated main horizontal bus.
- ⑧ The space requirements shown in these tables are minimum. Where layout dimensions are critical, refer to Company. One space unit or X unit equals 12 inches of vertical height.
- ⑨ Refer to factory.
- ⑩ Use time-delay fuse, maximum rating same as switch amps.
- Requires 12" bottom wireway cover to UL Label.
- Class J Table is based on fast acting Class J fuses. For time delay Class J fuses (Std.) use RK-1, RK-5 Table.
- Requires additional 6 inches if Type "A" wiring.



Spectra Series™ and 8000-Line Motor Control Centers

Starters

STARTER OPTIONS

Option	Function	Additional Space Required	UL Listed (X)
Control Transformer	Provides 120V control power. See "Control Transformer" for details	–	X
CPT Primary Fuses	Class CC fuse wired in each ungrounded transformer primary conductor.	–	X
CPT Secondary Fuse	One Class H or Equivalent Fuse wired in ungrounded Control Power Conductor	–	X
Control Power Fuse	One Class CC fuse wired in each ungrounded control power conductor. Use when control power source is remote from unit.	–	X
Standard OL Relay	1 NC contact (standard)–1 NC and 1 NO (pilot duty) contact (Optional)	–	X
Ambient Comp. OL Electronic OL	Ultimate trip current remains essentially unchanged over a range of OL ambient temperatures. 1 NC contact (standard) 1 NC and 1 NO (pilot duty) contact (Optional)	– –	X X
Pilot Lights Full Voltage	CR104P type with 120V lamp. Red–ON FAST, FWD, UP Amber–DOWN, REV, SLOW Green–STOPPED, READY	–	X
Transformer	CR104P with 6V lamp (See full voltage lights for lens colors)	–	X
LED ^①	CR104P Type transformer type with 6V LED Lamp	–	X
Push-to-test	CR104P, Full-voltage transformer type, or LED (See full-voltage lights for lens colors)	–	X
Push buttons Start-Stop ^①	CR104P momentary type-use with FVNR starters with 3-wire control.	–	X
Stop ^①	CR104P momentary type-provides stop function at MCC with 3-wire control.	–	X
Stop ^①	CR104P maintained type–provides stop function at MCC with 2/3 wire control. Can be furnished with mushroom head and provision for locking open.	–	X
Fwd, Rev, Stop ^①	CR104P momentary type-use with FVR starters.	–	X
Fast, Slow, Stop ^①	CR104P momentary type-use with 2-speed starters.	–	X
Selector Switches On-Off	CR104P maintained type–use as permissive start with 2 or 3 wire control.	–	X

Option	Function	Additional Space Required	UL Listed (X)
Hand-Off-Auto ^①	CR104P maintained type–use to select auto or manual start with 2-wire control.	–	X
Fast-Slow-Off-Auto	CR104P maintained type–use with 2-speed starters.	–	X
Fixed Control TB	Stationary control terminal boards in place of split type terminal boards.	–	X
Power TB	Stationary motor lead terminal boards Size 3 and 4 split type terminal boards. (NEMA size 1, 2)	–	X
Shielded Unit Racking Screw	Disconnect must be in open position to rack unit in or out.	–	X
Control Disconnect	High density pull-apart TB will provide foreign voltage isolation without disengaging the unit vertical bus stabs.	–	X
Control Relay	MCR4 Type (standard) Rated 600V, with 10A contacts. Relays are available with normally open and normally closed non-convertible contacts. Up to four additional contact blocks can be added to basic 4 pole relay. Size 1 and Size 2 FVNR starters require an additional half-space unit for two to four relays. One relay can be added with no increase in space units. CR7RA Alternate Relay	Yes	X
	CR120B type (optional), rated 600V, with 10A convertible contacts. Three 4/8 pole relays will mount in a half-space unit extension, plus nine additional terminal board points. Size 1 and 2 FVNR starters require an additional half-space unit for one to three relays. One relay can be added on other starters with no increase in space unit.	Yes	X
Timing Relays Pneumatic	CR7R (standard) .3 to 3 seconds or 10 to 180 seconds timing range. 10A contacts. 4 INST and 2 TD interlocks (NO and NC).	1/2X	X
Timing Relays Electronic	Time-delay on energization/de-energization double pole, double throw contacts rated 600V, 10A. Timing ranges 1-10 or 10-300 seconds.		X

^① Functions also available with ECM keypad.





Spectra Series™ and 8000-Line Motor Control Centers

Starters

STARTER OPTIONS

Option	Function	Additional Space Required	UL Listed (X)
Motor Driven	Used for long timing periods. Specify timing range.	1/2 X	-
Accelerating Relay	CR7R (standard) timing relay for multi-speed motors to provide definite accelerating time for each speed above first speed. Time interval is adjustable .3 to 30 seconds. Alternate Electronic Timer.		X
Decelerating Relay	CR7R (standard) timing relay allows time for motor to coast stop before permitting restart or coast to a lower speed on multi-speed motors before initiating slow speed operation (2-speed motors). Time interval is adjustable .3 to 30 seconds. Alternate Electronic Timer.		X
Compelling Relays	On multi-speed starters, requires the controller to progress in sequence from low to high speed. One relay is required for each speed over one. Requires same space as CR7R timing relay. Alternate Electronic Timer.		X
Latch Relay	CR120BL, 4 pole. Once relay closes, mechanical latch holds relay closed until electrically reset. Requires same space as CR120B (4 pole) control relay.		X
Ambient Comp. CB's	Thermal trip is ambient compensated.	-	X
Fused Switch Auxiliary Interlock	2-10A auxiliary interlocks operated by disconnect operator (2NO, or 1NO and 1NC)	-	X
CB Options Aux. Interlock	SPDT auxiliary interlocks mounted in CB. Refer to factory if more than 2 required.	-	X
Bell Alarm	Internal CB alarm switch.	-	X
Key Interlock	Added to disconnect operating handle to require a predetermined system operating sequence. Specify operating sequence.	-	X
Ground Fault ^①	Zero sequence sensing Ground Fault Relay for equipment protection for NEMA size 1-6 starters.	1/2 X	X
Current Transformer	Donut type CT located in one motor phase conductor for purchasers use. Purchaser connects directly to CT secondary terminals (Also used for door mounted Ammeter.)	1/2 X	X
Amp Transducer	Integrated CT/Current transducer with 4-20 MA output. (Requires 120V Power).	1/2 X	X

Option	Function	Additional Space Required	UL Listed (X)
Ammeter ^①	AC panel-type, single current-transformer operated five-ampere movement. Scale selected based on 125% motor full-load amperes.	1/2 X ^①	X
Voltmeter	AC panel-type, direct-reading 600 volts maximum. Includes a fuse in each ungrounded conductor.	-	X
Elapsed Time Meter ^①	Mounts on pushbutton bracket. Visible from front of MCC.	-	X
Phase Loss/Unbalance Current Sensing Alternate ECM	CR324X Electronic overload module senses unbalanced running motor currents (no reversal).	-	X
Phase Loss/Unbalance Voltage Sensing	APVR used primarily to sense phase loss, unbalance, or reversal, has time delay under-voltage.	-	X
Motor Winding Heater	The motor winding heater is designed for use with 3-phase AC motors to guard against damage caused by condensation buildup on motor windings which can occur in high humidity environments during motor idle periods. Refer to application data in Components (Section H). (1x-size 5)	1/2 X	X
Coil Suppressor, 120V	Surge suppressors reduce undesirable transients in control circuits by absorbing voltage transients generated by operating coils.	-	X
Over Size Unit	Standard unit height may be increased 1/2 X or 1X	1/2 X, 1X	X X
Door Diagram	Circuit diagram mounted on back of unit door.	-	X
Wire markers	Permanent wire number identification on each control wire.	-	X
V-Gnd Bus Stab	Grounds unit to V-ground bus when specified (order ground bus under "Structure").	-	X
Provision For PLC	See Programmable Logic Control (Section F).		
Provision for GENIUS	See Programmable Logic Control (Section F).		
Provision for PFC Capacitor	Terminals located between contactor and OL relay.		X

^① Functions also available with ECM, Display.



PRODUCT INFORMATION UNDervoltage PROTECTION

Standard starters drop out when line voltage drops below approximately 65 percent rated volts and can be reclosed when voltage returns to 85 percent rated volts.

Where momentary contact devices are used in standard three-wire control circuits, the starter will not reclose on momentary loss of voltage until the START button is pushed, thus inherently providing undervoltage protection.

If a maintained contact device, such as a float switch, is used to start the motor, the starter will close automatically upon restoration of control voltage. In some cases, this may not be desirable for safety reasons, and a reset pushbutton and auxiliary relay should be specified to provide undervoltage protection.

OVERLOAD RELAYS

Standard relays are three-leg block bimetallic type with adjustment from 90 to 110 percent of the heater rating. A single calibration adjusts all three legs. A single reset button mounted on the starter door permits external reset. Ambient-compensated relays are available for ambients from -30°C to +80°C and have adjustment from 90 to 110 percent of normal rating. Improved protection is provided when the motor is in a relatively constant ambient but control is subject to varying ambient. Relays are interchangeable with standard type.

OPTIONAL ELECTRONIC OVERLOAD RELAY

Both analog and digital relays are also available with or without communications (see page H-11).

CONTROL CIRCUIT PROTECTION

Motor control circuits tapped from the load side of the starter unit disconnect, such as line-to-line control and line-to-neutral control are protected by fuses in each ungrounded conductor. UL requires rejection type fuses for equipment rated above 10KA short-circuit rating. 10 ampere, 600-volt Class CC fuses are furnished as standard. If loading dictates a larger fuse, the fuse rating may be increased up to 20 amperes maximum. Time delay Class J fuses are available as an option.

Motor control circuit transformers are protected with a fuse in each ungrounded secondary conductor. Secondary fuses are (Class RK-5) sized on the basis of 125 percent rated secondary (20 amperes maximum). UL requires primary transformer protection in accordance with NEC Article 430-72(c). ATM-R fuses are furnished in each ungrounded primary conductor.

Motor control circuit power, other than power tapped from the load side of the starter unit disconnect, should be protected against overcurrent. The protective device may be located at the source or by the optional fuse(s) located in each unit. Normally, one (Class CC) fuse in the ungrounded conductor will provide the needed protection.

Where wiring external to the motor control center is indicated, No. 14 AWG copper will be assumed as the minimum conductor size unless otherwise specified.

LONG CONTROL CIRCUITS

On exceedingly long control circuits two problems may occur— (1) starter will not close due to line voltage drop and (2) starter may not open due to capacitive coupling. Table below gives the one-way distances (in feet) from the starter to the pushbutton along the route of the control cable. This table is for 120-volt coils and allows for a maximum voltage variation of 10 percent. The distances are given for #14 and #12 AWG control wire.

NEMA Size	Distance in Feet With #14 Wire	Distance in Feet with #12 Wire
1	1300	2070
2	460	730
3	320	510
4	250	395
1-6 ①	5000	6000

① Distance based on using an interposing relay, type MCR4, CR7A [CR120B is 1600/2500 feet]

SEPARATE SOURCE CONTROL CIRCUITS

A separate control bus is available as an option. This bus can be fed from a separate external source, or from within the motor control center by a separate distribution transformer or distribution panel.

A normally open auxiliary contact should be specified on each unit disconnect to open the control bus circuit when the unit disconnect is opened. Unit control circuit fusing should also be added.

In lieu of the auxiliary disconnect contact, pull-apart terminal boards may be specified to provide control voltage isolation for individual starters.

PILOT DEVICES

Pushbuttons, selector switches, pilot lights, etc., are single-unit, heavy-duty oil-tight type mounted on the starter unit door.

Auxiliary Contact Ratings NEMA Size 1-6

AC Volts	Amperes		
	Continuous	Make	Break
115	10	60	6.0
230	10	30	3.0
460	10	15	1.5
575	10	12	1.2
DC Volts			
125	10	—	1.1
250	10	—	0.5

D



PRODUCT INFORMATION

STARTER AUXILIARY CONTACTS (OPTION)

Auxiliary contacts rated 10 amperes, 600 volts are available, either normally open or closed (non-convertible). Quantities of contacts shown are maximum available and include starter requirements for cross-electrical interlocking and holding circuits. If more contacts are required than shown, a relay must be added.

Starter Type	Total Control Contacts Available (includes contacts required in basic control circuit for seal-in, cross interlocking, etc.)					
	NEMA Size Starter					
	1	2	3	4	5	6
Full-voltage, Nonreversing	5	6 ^②	6	6	6	6
Full voltage, Reversing						
Forward Contactor	4	4	4	4	4	4
Reverse Contactor	4	4	4	4	4	4
Two-speed, One winding ^①						
Low-speed Contactor	4	4	4	4	4	5
High-speed Contactor	3	4	4	4	4	5
Two-speed, Two winding						
Low-speed Contactor	4	4	4	4	4	5
High-speed Contactor	4	4	4	4	4	5
Part Winding						
Run Contactor	5	6	6	6	6	6
Autotransformer, Reduced-voltage						
Run Contactor	-	6	6	6	6	6

- ① For constant- or variable-torque motors.
- ② Limit 4 with APVR relay.

CONTROL TERMINALS

The table below lists the total number of control terminals available on standard heights units. Nine additional control terminal points (12 for HD) can be provided for each 6-inch increase in unit height. See standard diagrams in Typical Circuits (Section K) for number of control terminals required for standard starters. Note total number of control points are in addition to T1, T2 and T3 power terminal points.

Starter Function	Size 1 CB/FS		Size 2 CB/FS		Size 3 CB/FS		Size 4			
	OPT	HD	OPT	HD	OPT	HD	CB		FS	
							OPT	HD	OPT	HD
FVNR	12	18	12	18	15	18	24	18	21	48
FVR	21	30	30	42	33	48	33	48	24	48
2S1W	27	24	15	36	24	48	24	48	24	48
2S2W	27	24	27	36	33	48	33	48	24	48

CB = Circuit Breaker; FS = Fused Switch; HD = High Density; OPT= 3-point split type.

300 LINE STANDARD COIL DATA

Size	Coil	Amps 120V	Amps 480V	VA	Watts	Vars	PF	% Volts		Millisec	
								P/U	D/O	P/U	D/O
1	Inrush	1.26	.33	151	69.5	134	.46	85	63	15	7
	Holding	.2	.55	24	6	23	.25			30	15
2	Inrush	4.4	1.2	528	169	500	.32	85	68	20	7
	Holding	.5	.14	60	12.9	57.9	.26			40	15
3	Inrush	9.6	2.6	1152	230	1129	.20	85	65	20	7
	Holding	.69	.18	83	18.4	81.5	.19			45	15
4	Inrush	10.4	2.8	1248	262	1220	.21	85	65	20	7
	Holding	.73	.2	87	18.8	84.8	.22			45	15
5	Inrush	21.5	5.7	2580	464	2538	.18	85	65	30	15
	Holding	1.6	.42	191	38.8	185	.25			50	25
6	Inrush	28.1	7.6	3360	608	3325	.18	85	65	30	15
	Holding	2.1	.58	255	44	246	.25			50	25

CONTROL TRANSFORMERS

Power is tapped from the load side of the starter unit disconnect and the transformer provides 120-volt power. Two 600-volt primary fuses, plus one 250-volt secondary fuse in the ungrounded conductor is standard.

Standard control power transformer ratings are adequate to handle the starter-coil current and three pilot lights. If additional burdens are expected, larger transformers should be specified.

Starter Size and Type ^③	CPT Std. VA		CPT Max. VA ^⑤		UL Listed (X)	Notes
	60 Hz	50 Hz	60 Hz	50 Hz		
All Size 1 60	60	150	150	150	X	
All Size 2 150	150	150	150	150	X	
All Size 3 300	300	250	300	250	X	
All Size 4 300	300	250	300	250	X	
All Size 5 and 6	300	250	500	500	X	④

- ③ Refer to Company for part-winding and Y-delta starters.
- ④ Starter coils operated at line voltage. Starters operated by control relay in 120-volt control circuit. Class CC fuses are provided for starter coil circuit.
- ⑤ Without increasing standard unit space requirements.

COIL CHARACTERISTICS

Size and Type	Inrush Volt-Amp	Sealed Volt-Amp
Size 1, FVNR, FVR	151	23
Size 2, FVNR, FVR	528	60
Size 3, FVNR, FVR	1152	83
Size 4, FVNR, FVR	1248	87
Size 5, FVNR	2580	191
Size 6, FVNR	3360	255
Size 2, 2S1W	576	75
Size 3, 2S1W	1248	87
Size 4, 2S1W	1336	95
Relay for RVNR		
Size 3 and 4	55	9
Relay for FVNR		
Size 5 and 6	55	9



THERMAL MAGNETIC CIRCUIT BREAKER SUBSTITUTION

Substituting a thermal-magnetic circuit breaker in place of a Mag-Break® circuit breaker may require increasing the circuit breaker trip rating to avoid tripping on starting. See Appendix (Section J) for recommended thermal-magnetic circuit breaker trip ratings.

NEMA Size Starter	Standard Circuit Breaker	Substitute	Short-Circuit Rating			UL Listed (X)
			230V	460V	575V	
1,2,3	TEC	THED	25	25	22	X
	SELI	SELT	100	100	25	X
	TECL	THEDL	100	100	100	X
4	TEC	THFK ^②	25	5	18	X
	SFLI	SFLT	100	100	25	X
	SFLI	TB4 ^①	100	100	100	X
	TBC4	TB4	100	100	100	X
5	SGLI	SGLT	100	100	65	X
	TBC4	TB4	100	100	100	X

① TB4 requires same unit space as TBC4.

② Available in 8000-Line MCC only.

TERMINALS FOR FIELD WIRING

Description	Will Accept Wire ^②	
	AWG/MCM	Material
STARTER LOAD TERMINALS		
Size 1 and 2 Power Block (Draw out)	14-4 12-2	CU AL
Size 1 Starter	14-8	CU
Size 2 Starter	14-4	CU
Size 3 Power Block (Stationary)	6-2/0	CU-AL
Size 3 Starter	8-1/0	CU
Size 4 Power Block (Stationary)	6-250	CU-AL
Size 4 Starter	4-3/0	CU
Size 5 Starter	1/0-500	CU
Size 6 Contactor	(2) 2/0-500	CU-AL
Control Terminal Boards		
Drawout/Stationary	10 Max.	CU
Hi Density Pull-Apart	(2) 12 Max.	CU
POWER TERMINAL BOARDS		
50 AMP		
Size 1 & 2 Type C Wiring and Distribution Transformers	14-4 12-2	CU AL
100 AMP		
Size 3 Type C Wiring and Distribution Transformers	6-2/0	CU-AL
100 AMP		
Size 2 Wye-Delta Starters	14-1/0 12-1/0	CU AL
150 AMP		
Size 4 Type C Wiring and Distribution Transformers	4-3/0	CU

② Conductors #1 and smaller may be rated 60/75°C.
Conductors #0 and larger must be rated 75°C.
Conductors wired directly to OL device terminals must be rated 75°C CU.

