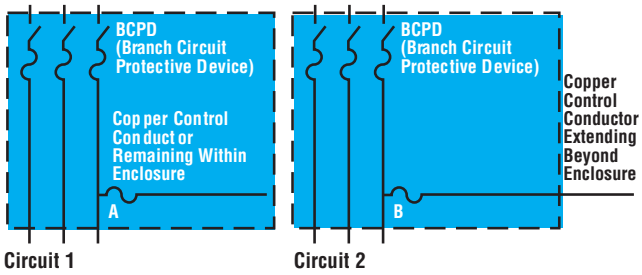
The following Selection Guide Tables simplify and permit easy application of fuses for the protection of the motor control circuits in accordance within the National Electrical Code®. Apply fuses per Table 1 for control circuit without a control transformer (see Circuit Diagrams 1 and 2). Apply fuses per Table 2 for a control circuit with a control transformer (see Circuit Diagrams 3 and 4).

Control Circuit Without Control Transformer (See Table 1)



Control Circuit With Control Transformer (See Table 2)

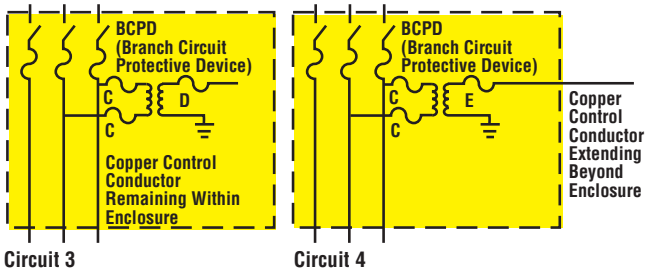


Table 1. Fuse Selection Guide–ControlCircuit WithoutControl Transformer (See Circuit Diagrams 1 & 2)

Ampere Rating of Branch Circuit Protective Device (BCPD)	Circuit 1 (Control Conductor (AWG) Not Extending Beyond Enclosure)				Circuit 2 (Control Conductor (AWG) Extending Beyond Enclosure)			
	18 Wire	16 Wire	14 Wire	12 Wire	18 Wire	16 Wire	14 Wire	12 Wire
Fuse Size	7A	10A	15A	20A	7A	10A	15A	20A
Requirements For Control Circuit Protection (See footnote data)								
1/10 – 7	■	■	■	■	■	■	■	■
7 1/2 – 10	■	■	■	■	▲	■	■	■
12 – 25	■	■	■	■	▲	▲	■	■
30 – 40	▲	■	■	■	▲	▲	■	■
45	▲	▲	■	■	▲	▲	■	■
50 – 60	▲	▲	■	■	▲	▲	▲	■
65 – 100	▲	▲	■	■	▲	▲	▲	▲
110	▲	▲	▲	■	▲	▲	▲	▲
125 – up	▲	▲	▲	▲	▲	▲	▲	▲

▲ Control circuit fuse protection required.

■ Protection recommended but not mandatory when BCPD is a Class CC, G, J, R, or T fuse. Protection is mandatory when BCPD is a thermal magnetic or a magnetic-only circuit breaker (MCP), and available short-circuit current exceeds the values in the table below.

Control Circuit Conductor (AWG Copper)	Available Short-Circuit Current At Branch Circuit Protective Device (BCPD)	
	1 Cycle Clearing Time†	1/2 Cycle Clearing Time†
18	660A	940A
16	1050A	1500A
14	1700A	2400A
12	2700A	3800A

*Thermoplastic Insulation. †Based on ICEA Conductor Withstand Data.

Table 2. Fuse Selection Guide–Control Circuit With Control Transformer (See Circuit Diagrams 3 and 4)

Control Xfmr Rating	V_{pri}/V_{sec} (Volts)	Ipri (Amps)	I_{sec} (Amps)	[1]Fuse C [2]Req'd. If BCPD Exceeds These Amps Values	[4,5]Maximum Amps	Fuse D or E Required if BCPD and Fuse C (When Provided) Exceed These Amp Values 18 AWG Wire	16 AWG Wire	14 AWG Wire	12 AWG Wire	Recommended Amps Time Delay[1]	Non-Time Delay[3]
25VA	480/120	0.05	0.21	[6]See 430-72(C) Except. 1	0.25	0.25	0.25	0.25	0.25	0.25	0.60
	480/24	0.05	1.00		0.25	0.25	0.25	0.25	0.25	1.25	3.0
	240/120	0.10	0.21		0.50	0.50	0.50	0.50	0.50	0.25	0.60
	240/24	0.10	1.00		0.50	0.50	0.50	0.50	0.50	1.25	3.0
50VA	480/120	0.10	0.42	0.5	0.50	0.50	0.50	0.50	0.50	0.50	1.0
	480/24	0.10	2.10	0.5	0.50	0.50	0.50	0.50	0.50	2.5	6.0
	240/120	0.21	0.42	1.0	1.0	1.0	1.0	1.0	1.0	0.50	1.0
	240/24	0.21	2.10	1.0	1.0	1.0	1.0	1.0	1.0	2.5	6.0
100VA	480/120	0.21	0.83	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
	480/24	0.21	4.20	1.0	1.0	1.0/.35[9]	1.0/.50[9]	1.0	1.0	5.0	12.0[7]
	240/120	0.42	0.83	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
	240/24	0.42	4.20	2.0	2.0	2.0/.70[9]	2.0/1.0[9]	2.0	2.0	5.0	12.0[7]
150VA	480/120	0.31	1.25	1.5	1.5	1.5	1.5	1.5	1.5	1.50	3.50
	480/24	0.31	6.25	1.5	1.5	—	1.5/0.5[9]	1.5	1.5	7.50	15.0[7]
	240/120	0.62	1.25	3.0	3.0	3.0	3.0	3.0	3.0	1.50	3.50
	240/24	0.62	6.25	3.0	3.0	—	3.0/1.0[9]	3.0	3.0	7.50	15.0[7]
200VA	480/120	0.42	1.67	2.0	2.0	2.0/1.75[9]	2.0	2.0	2.0	2.0	5.0
	480/24	0.42	8.33	2.0	2.0	—	—	2.0	2.0	10.0	20.0[8]
	240/120	0.84	1.67	4.0	4.0	4.0/3.5[9]	2.0	4.0	4.0	2.0	5.0
	240/24	0.84	8.33	4.0	4.0	—	—	4.0	4.0	10.0	20.0[8]

[1] Time-Delay Fuses: FNQ, FNW, FNM, FNA–Supplementary Type; FNQ-R, FRN-R, FRS-R, LPN-RK_SP, LPS-RK_SP, LPJ_SP, LP-CC, SC6 & above–Branch Circuit Fuses (Rejection Type).
[2] For exceptions, see 430.72(C).
[3] Non-Time-Delay Fuses: KTK, BAN, BAF, MIN, MIC–Supplementary Fuses; KTK-R, JJN, JJS, SC½-5–Branch Circuit Fuses (Rejection Types).
[4] These are maximum values as allowed by 430.72(C). Closer sizing at 125%-300% may be possible for better overload protection using time-delay branch circuit fuses.
[5] Fuse shall be a rejection type branch circuit fuse when withstand rating of controller is greater than 10,000 amps RMS symmetrical
[6] These transformers less than 50VA still need protection–either primary overcurrent protection, inherent protection, or the equivalent. Note that the primary conductors may be protected as shown in Circuit 1 Table 1. [7] Minimum copper secondary control conductor for this application is 14 AWG. [8] Minimum copper secondary control conductor for this application is 12 AWG.
[9] Smaller value applied to Fuse "E".

Cooper Bussmann FNQ-R Maximum Primary Fuse Selection Guide for Motor Control Circuit Transformer Protection***

XFMR VA	600V	550V	480V	460V	415V	380V	277V	240V	230V	208V
50	4/10A	4/10A	½A	½A	5/10A	5/10A	5/10A	1A	1A	1 ⅛A
75	5/10A	5/10A	3/4A	5/10A	5/10A	5/10A	1 3/10A	1 ½A	1 5/10A	1 8/10A
100	8/10A	8/10A	1A	1A	1 ⅛A	1 3/10A	1 8/10A	2A	2A	2 ¼A
150	1 ¼A	1 3/10A	1 ½A	1 6/10A	1 8/10A	1 8/10A	2 ½A	3A	3 2/10A	3 ½A
200	1 6/10A	1 8/10A	2A	2A	2 ¼A	2 ½A	3 ½A	4A	4A	4 ½A
250	2A	2 ¼A	2 ½A	2 ½A	3A	3 2/10A	4 ½A	5A	5A	6A
300	2 ½A	2 6/10A	3A	3 2/10A	3 ½A	3 ½A	5A	6 ¼A	6 ¼A	7A
350	2 8/10A	3A	3 ½A	3 ½A	4A	4 ½A	6 ¼A	7A	7 ½A	8A
500	4A	4 ½A	5A	5A	6A	6 ¼A	9A	3 2/10A**	3 ½A**	4A**
750	6 ¼A	6 ¼A	7 ½A	8A	9A	9A	4 ½A*	5A**	5A**	6A**
1000	8A	9A	3 2/10A*	3 ½A*	4A*	4A*	6A*	6 ¼A**	7A**	8A**
1500	4A*	4 ½A*	5A*	5A*	6A*	6 ¼A*	9A*	10A**	10A**	12A**
2000	5A*	6A*	6 ¼A*	7A*	8A*	8A*	12A*	12A**	12A**	15A**

*For increased time-delay, use FRS-R, LPS-RK_SP, LPJ_SP, or TCF **For increased time-delay, use FRN-R, LPN-RK_SP ***Based upon the NEC®

Supplementary Fuses (13/32" x 1½") (All Voltage and Interrupting Ratings are AC)

Dual-Element, Time-Delay

FNA
1/10-8/10A
250V†
1-15A
125V*
20-30A
32V**

FNM
1/10-10A
250V†
12-15A
125V*
20-30A
32V**

Time-Delay

FNQ
1/10-30A
500V
10K AIR
(FNQ 1/10 - 3 2/10 Dual-Element)

FNW
12-30A
250V*

Non-Time-Delay

BAF
½-15A
250V†
20-30A
125V*

BAN
2/10-30A
250V††

KTK
1/10-30A
600V
100K AIR

MIC
1-15A
250V†
20-30A
32V**

MIN
1-15A
250V†
20-30A
32V**

Branch Circuit Fuses (All Voltage and Interrupting Ratings are AC)

Class R Dual-Element, Time-Delay

LPN-RK_SP
1/10-30A
250V
300K AIR

FRN-R
1/10-30A
250V
200K AIR

FRS-R
1/10-30A
600V
200K AIR

LPS-RK_SP
1/10-30A
600V
300K AIR

Class G

SC
½-20A 600V§
25-30A 480V§
100K AIR

Class CC Fast-Acting, Time-Delay

KTK-R
1/10-30A
600V
200K AIR

FNQ-R
¼-30A
600V
200K AIR

LP-CC
½-30A
600V
200K AIR

TCF
1-30A
600V
300K AIR

† 0 to 1 amp–35 AIR; 1.1 to 3.5 amp–100 AIR; 3.6 to 10 amp–200 AIR; 10.1 to 15 amp–750 AIR; 15.1 to 30 amps–1500AIR *10K AIR. **1K AIR.
§ ½ thru 6 amp fuses are Non-Time-Delay Type; 7 thru 60 amp fuses are Time-Delay Type.
††0 to 3.5 amp-35 AIR; 3.6 to 10 amp-100 AIR; 10.1 to 15 amp-200 AIR; 15.1-30 amp-750 AIR