MOTOR PROTECTION TABLES

Selection of Class RK5 Fuses (FLNR_ID / FLSR_ID / IDSR Series) or POWR-PRO® Class RK1 Fuses (LLNRK / LLSRK / LLSRK_ID Series) Based on Motor Full Load Amps

Using AC Motor Protection Tables to Select Fuse Ratings

Time-delay RK1 and RK5 fuse ratings selected in accordance with the following recommendations also meet NEC® requirements for Motor Branch circuit and Short-Circuit Protection.

Selecting Fuses for Motor Running Protection Based on Motor Horsepower

Motor horsepower and motor Full Load Amperes (FLA) shown are taken from NEC® Tables 430.248 through 430.250 covering standard speed AC motors with normal torque characteristics. Fuse ratings for motors with special characteristics may need to vary from given values.

If motor running protection will be provided by the fuses, select fuse ratings for correct type of motor from Motor Protection Table Columns headed, "Without Overload Relays."

If overload relays will provide principal motor running protection, select fuse ratings for correct type of motor from Motor Protection Table Columns headed, "Back-up Running Protection" or "With Overload Relays." Fuse ratings selected from these columns coordinate with most UL Class 10 and 20 overload relays which covers over 90% of motor applications.

Selecting Fuses for Motor Running Protection Based on Motor Actual Full Load Currents

Better protection is achieved when fuse ratings are based on motor actual FLA obtained from motor nameplates. Locate motor nameplate FLA in the column appropriate for the type of motor and type of protection required. Then select the corresponding ampere rating of the fuse from the first column of that line.

TIME DELAY UL CLASS RK1 OR RK5 FUSE AMPERE RATING	MOTOR RUNNING PROTECTION (USED WITHOUT PROPERLY SIZED OVERLOAD RELAYS) MOTOR FULL-LOAD AMPS		BACK-UP MOTOR RUNNING PROTECTION (USED WITH PROPERLY SIZED OVERLOAD RELAYS) MOTOR FULL-LOAD AMPS	
	MOTOR SERVICE FACTOR OF 1.15 OR GREATER OR WITH TEMP. RISE NOT OVER 40°C.	MOTOR SERVICE FACTOR LESS THAN 1.15 OR WITH TEMP. RISE GREATER THAN 40°C.	MOTOR SERVICE FACTOR OF 1.15 OR GREATER OR WITH TEMP. RISE NOT OVER 40°C.	MOTOR SERVICE FACTOR LESS THAN 1.15 OR WITH TEMP. RISE GREATER THAN 40°C
1/10	0.08-0.09	0.09-0.10	0-0.08	0-0.09
1/8	0.10-0.11	0.11-0.125	0.09-0.10	0.10-0.11
15/100	0.12-0.15	0.14-0.15	0.11-0.12	0.12-0.13
2/10	0.16-0.19	0.18-0.20	0.13-0.16	0.14-0.17
1/4	0.20-0.23	0.22-0.25	0.17-0.20	0.18-0.22
3/10	0.24-0.30	0.27-0.30	0.21-0.24	0.23-0.26
4/10	0.32-0.39	0.35-0.40	0.25-0.32	0.27-0.35
1/2	0.40-0.47	0.44-0.50	0.33-0.40	0.36-0.43
6/10	0.48-0.60	0.53-0.60	0.41-0.48	0.44-0.52
8/10	0.64-0.79	0.70-0.80	0.49-0.64	0.53-0.70
1	0.80-0.89	0.87-0.97	0.65-0.80	0.71-0.87
1 1/8	0.90-0.99	0.98-1.08	0.81-0.90	0.88-0.98
1 1/4	1.00-1.11	1.09-1.21	0.91-1.00	0.99-1.09
1 4/10	1.12-1.19	1.22-1.30	1.01-1.12	1.10-1.22
1 1/2	1.20-1.27	1.31-1.39	1.13-1.20	1.23-1.30
1 6/10	1.28-1.43	1.40-1.56	1.21-1.28	1.31-1.39
1 8/10	1.44-1.59	1.57-1.73	1.29-1.44	1.40-1.57
2	1.60-1.79	1.74-1.95	1.45-1.60	1.58-1.74
2 1/4	1.80-1.99	1.96-2.17	1.61-1.80	1.75-1.96
2 1/2	2.00-2.23	2.18-2.43	1.81-2.00	1.97-2.17
2 8/10	2.24-2.39	2.44-2.60	2.01-2.24	2.18-2.43
3	2.40-2.55	2.61-2.78	2.25-2.40	2.44-2.60
3 2/10	2.56-2.79	2.79-3.04	2.41-2.56	2.61-2.78
3 1/2	2.80-3.19	3.05-3.47	2.57-2.80	2.79-3.04
4	3.20-3.59	3.48-3.91	2.81-3.20	3.05-3.48
4 1/2	3.60-3.99	3.92-4.34	3.21-3.60	3.49-3.91
5	4.00-4.47	4.35-4.86	3.61-4.00	3.92-4.35
5 6/10	4.48-4.79	4.87-5.21	4.01-4.48	4.36-4.87
6	4.80-4.99	5.22-5.43	4.49-4.80	4.88-5.22
6 1/4	5.00-5.59	5.44-6.08	4.81-5.00	5.23-5.43
7	5.60-5.99	6.09-6.52	5.01-5.60	5.44-6.09
7 1/2	6.00-6.39	6.53-6.95	5.61-6.00	6.10-6.52
8	6.40-7.19	6.96-7.82	6.01-6.40	6.53-6.96
9	7.20-7.99	7.83-8.69	6.41-7.20	6.97-7.83
10	8.00-9.59	8.70-10.00	7.21-8.00	7.84-8.70
12	9.60-11.99	10.44-12.00	8.01-9.60	8.71-10.43
15	12.00-13.99	13.05-15.00	9.61-12.00	10.44-13.04
17 1/2	14.00-15.99	15.22-17.39	12.01-14.00	13.05- 15.21
20	16.00-19.99	17.40-20.00	14.01-16.00	15.22-17.39
25	20.00-23.99	21.74-25.00	16.01-20.00	17.40-21.74
30	24.00-27.99	26.09-30.00	20.01-24.00	21.75-26.09
35	28.00-31.99	30.44-34.78	24.01-28.00	26.10-30.43
40	32.00-35.99	34.79-39.12	28.01-32.00	30.44-37.78
45	36.00-39.99	39.13-43.47	32.01-36.00	37.79-39.13
50	40.00-47.99	43.48-50.00	36.01-40.00	39.14-43.48
60	48.00-55.99	52.17-60.00	40.01-48.00	43.49-52.17
70	56.00-59.99	60.87-65.21	48.01-56.00	52.18-60.87
75	60.00-63.99	65.22-69.56	56.01-60.00	60.88-65.22
80	64.00-71.99	69.57-78.25	60.01-64.00	65.23-69.57
90	72.00-79.99	78.26-86.95	64.01-72.00	69.58-78.26
100	80.00-87.99	86.96-95.64	72.01-80.00	78.27-86.96
110	88.00-99.99	95.65-108.69	80.01-88.00	86.97-95.65
125	100.00-119.99	108.70-125.00	88.01-100.00	95.66-108.70
150	120.00-139.99	131.30-150.00	100.01-120.00	108.71-130.43
175	140.00-159.99	152.17-173.90	120.01-140.00	130.44-152.17
200	160.00-179.99	173.91-195.64	140.01-160.00	152.18-173.91
225	180.00-199.99	195.65-217.38	160.01-180.00	173.92-195.62
250	200.00-239.99	217.39-250.00	180.01-200.00	195.63-217.39
300	240.00-279.99	260.87-300.00	200.01-240.00	217.40-260.87
350	280.00-319.99	304.35-347.82	240.01-280.00	260.88-304.35
400	320.00-359.99	347.83-391.29	280.01-320.00	304.36-347.83
450	360.00-399.99	391.30-434.77	320.01-360.00	347.84-391.30
500	400.00-479.99	434.78-500.00	360.01-400.00	391.31-434.78
600	480.00-600.00	521.74-600.00	400.01-480.00	434.79-521.74



Motor Protection White Paper

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MOTOR PROTECTION TABLES

Selection of Class RK5 Fuses (FLNR_ID / FLSR_ID / IDSR Series) or POWR-PRO® Class RK1 Fuses (LLNRK / LLSRK / LLSRK_ID Series) Based on Motor Horsepower

MOTOR HP	FULL LOAD AMPS	WITHOUT OVERLOAD RELAYS		WITH OVERLOAD RELAYS		SWITCH OR FUSE CLIP RATING
		S.F. = 1.15 OR MORE, TEMP RISE NOT OVER 40°C	S.F. = LESS THAN 1.15 OR TEMP RISE MORE THAN 40°C	S.F. = 1.15 OR MORE, TEMP RISE NOT OVER 40°C	S.F. = LESS THAN 1.15 OR TEMP RISE MORE THAN 40°C	
120 VOLT 1-PHASE MOTORS (120V CIRCUIT)						
1/6	4.4	5	5	5 6/10	5 6/10	30
1/4	5.8	7	6 1/4	7 1/2	7	30
1/3	7.2	9	8	9	9	30
1/2	9.8	12	10	15	12	30
3/4	13.8	15	15	17 1/2	17 1/2	30
1	16	20	17 1/2	20	20	30
1 1/2	20	25	20	25	25	30
2	24	30	25	30	30	30
230 VOLT 1-PHASE MOTORS (240V CIRCUIT)						
1/6	2.2	2 1/2	2 1/2	2 8/10	2 8/10	30
1/4	2.9	3 1/2	3 2/10	4	3 1/2	30
1/3	3.6	4 1/2	4	4 1/2	4 1/2	30
1/2	4.9	5 6/10	5 6/10	6 1/4	6	30
3/4	6.9	8	7 1/2	9	8	30
1	8	10	9	10	10	30
1 1/2	10	12	10	15	12	30
2	12	15	12	15	15	30
3	17	20	17 1/2	25	20	30
5	28	35	30*	35	35	60
7 1/2	40	50	45	50	50	60
10	50	60	50	70	60	60
200 VOLT 3-PHASE MOTORS (208V CIRCUIT)						
1/2	2.5	3	2 8/10	3 2/10	3	30
3/4	3.7	4 1/2	4	5	4 1/2	30
1	4.8	6	5 6/10	6 1/4	6	30
1 1/2	6.9	8	7 1/2	7 1/2	8	30
2	7.8	9	8	10	9	30
3	11	12	12	15	15	30
5	17.5	20	20	25	25	30
7 1/2	25.3	30*	25*	35	30*	60
10	32.2	40	35	45	40	60
15	48.3	60	50	70†	60	60
20	62.1	75	70	80	75	100
25	78.2	90	80	100	90	100
30	92	110	100*	125	110	200
40	120	150	125	150	150	200
50	150	175	150	200	175	200
60	177	200*	200*	225	225	400
75	221	250	250	300	300	400
100	285	350	300	400	350	400
125	359	400*	400*	450	450	600
150	414	500	450	600	500	600
230 VOLT 3-PHASE MOTORS (240V CIRCUIT)						
1/2	2.2	2 8/10	2 1/2	2 8/10	2 8/10	30
3/4	3.2	4	3 1/2	4	4	30
1	4.2	5	4 1/2	5 6/10	5	30
1 1/2	6.0	7 1/2	6 1/4	7 1/2	7 1/2	30
2	6.8	8	7 1/2	9	8	30
3	9.6	12	10	12	12	30
5	15.2	17 1/2	17 1/2	20	17 1/2	30
7 1/2	22	25	25	30	30	30
10	28	35	30*	35	35	60
15	42	50	45	60	50	60
20	54	60*	60*	70	70	100
25	68	80	75	90	80	100
30	80	100	90	100	100	100
40	104	125	110	150	125	200
50	130	150	150	175	150	200
60	154	175	175	200	200	200
75	192	225	200*	250	225	400
100	248	300	250	350	300	400
125	312	350	350	400	400	400
150	360	450	400*	450	450	600
200	480	600	500	600	600	600

MOTOR HP	FULL LOAD AMPS	WITHOUT OVERLOAD RELAYS		WITH OVERLOAD RELAYS		SWITCH OR FUSE CLIP RATING
		S.F. = 1.15 OR MORE, TEMP RISE NOT OVER 40°C	S.F. = LESS THAN 1.15 OR TEMP RISE MORE THAN 40°C	S.F. = 1.15 OR MORE, TEMP RISE NOT OVER 40°C	S.F. = LESS THAN 1.15 OR TEMP RISE MORE THAN 40°C	
460 VOLT 3-PHASE MOTORS (480V CIRCUIT)						
1/2	1.1	1 4/10	1 1/4	1 4/10	1 4/10	30
3/4	1.6	2	1 8/10	2	2	30
1	2.1	2 1/2	2 1/4	2 8/10	2 1/2	30
1 1/2	3.0	3 1/2	3 2/10	4	3 1/2	30
2	3.4	4	3 1/2	4 1/2	4	30
3	4.8	5 6/10	5	6	5 6/10	30
5	7.6	9	8	10	9	30
7 1/2	11	12	12	15	15	30
10	14	17 1/2	15	17 1/2	17 1/2	30
15	21	25	20	30	25	30
20	27	30*	30*	35	35	60
25	34	40	35	45	40	60
30	40	50	45	50	50	60
40	54	60*	60*	70	60*	100
50	65	80	70	90	75	100
60	77	90	80	100	90	100
75	96	110	110	125	125	200
100	124	150	125	175	150	200
125	156	175	175	200	200	200
150	180	225	200*	225	225	400
200	240	300	250	300	300	400
575 VOLT 3-PHASE MOTORS (600V CIRCUIT)						
1/2	0.9	1 1/8	1	1 1/8	1 1/8	30
3/4	1.3	1 6/10	1 4/10	1 6/10	1 6/10	30
1	1.7	2	1 8/10	2 1/4	2	30
1 1/2	2.4	3	2 1/2	3	3	30
2	2.7	3 2/10	2 8/10	3 1/2	3 2/10	30
3	3.9	4 1/2	4	5	4 1/2	30
5	6.1	7 1/2	7	8	7 1/2	30
7 1/2	9	10	10	12	12	30
10	11	12	12	15	15	30
15	17	20	17 1/2	25	20	30
20	22	25	25	30	30	30
25	27	30*	30*	35	35	60
30	32	40	35	40	40	60
40	41	50	45	60	50	60
50	52	60	60	70†	60	60
60	62	75	70	80	75	100
75	77	90	80	100	90	100
100	99	110	110	125	125	200
125	125	150	125	175	150	200
150	144	175	150	200	175	200
200	192	225	200*	250	225	400

NOTES

S.F. = Motor Service Factor
* Fuse Reducers Required
† 100 Amp Switch Required



Motor Protection White Paper

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MOTOR PROTECTION TABLES

Selection of POWR-PRO® Class J Fuses (JTD_ID / JTD Series) Based on Motor Full Load Amps

MOTOR F.L.A.	JTD_ID / JTD AMPERE RATING	MOTOR F.L.A.	JTD_ID / JTD AMPERE RATING	MOTOR F.L.A.	JTD_ID / JTD AMPERE RATING
0.00 – 0.60	8/10	12.1 – 14.5	17 1/2	76.1 – 84.0	110
0.61 – 0.80	1	14.6 – 17.0	20	84.1 – 90.0	125
0.81 – 1.00	1¼	17.1 – 21.0	25	90.1 – 102	150
1.01 – 1.20	1½	21.1 – 25.0	30	103 – 125	175
1.21 – 1.65	2	25.1 – 28.5	35	126 – 144	200
1.66 – 2.00	2½	28.6 – 34.0	40	145 – 162	225
2.01 – 2.40	3	34.1 – 37.0	45	163 – 180	250
2.41 – 3.30	4	37.1 – 41.0	50	181 – 204	300
3.31 – 4.10	5	41.1 – 48.0	60	205 – 240	350
4.11 – 4.90	6	48.1 – 52.0	70	241 – 288	400
4.91 – 6.40	8	52.1 – 59.0	80	289 – 312	450
6.41 – 8.00	10	59.1 – 66.0	90	313 – 360	500
8.01 – 9.80	12	66.1 – 76.0	100	361 – 432	600
9.81 – 12.0	15				

NOTE: For severe motor starting conditions, fuses may be sized up to 225% motor F.L.A. (See NEC® Article 430.52 for Exceptions)

Selection of CCMR Time-Delay Fuses Based on Motor Full Load Amps

MOTOR FULL LOAD CURRENT (F.L.A.)						CCMR AMPERE RATING
FOR MOTORS WITH AN ACCELERATION TIME OF 2 SECONDS OR LESS		FOR MOTORS WITH AN ACCELERATION TIME OF 5 SECONDS OR LESS		FOR MOTORS WITH AN ACCELERATION TIME OF 8 SECONDS OR LESS		
MIN. F.L.A. (1)	MAX F.L.A. (3)	MIN. F.L.A. (1)	MAX F.L.A. (3)	MIN F.L.A. (2)	MAX F.L.A. (3)	
0.2	0.2	0.2	0.2	0.2	0.2	3/10
0.3	0.4	0.3	0.4	0.3	0.3	½
0.4	0.6	0.4	0.5	0.4	0.5	8/10
0.5	0.7	0.5	0.6	0.5	0.6	1
0.6	1.0	0.6	0.9	0.6	0.8	1¼
0.8	1.1	0.8	1.0	0.7	0.9	1½
0.9	1.3	0.9	1.1	0.8	1.0	1 8/10
1.1	1.4	1.1	1.2	0.9	1.1	2
1.2	2.1	1.2	2.1	1.2	1.8	2½
1.5	2.6	1.5	2.6	1.4	2.3	3
1.8	3.0	1.8	3.0	1.6	2.6	3½
2.1	3.4	2.1	3.2	1.8	2.8	4
2.3	3.9	2.3	3.3	2.0	2.8	4½
2.6	4.3	2.6	3.4	2.3	2.8	5
2.9	4.8	2.9	3.7	2.5	3.1	5 6/10
3.3	5.2	3.3	4.0	2.7	3.4	6
3.5	5.4	3.5	4.1	2.8	3.5	6¼
3.6	5.7	3.6	4.2	3.2	3.7	7
4.1	5.8	4.1	4.3	3.4	3.8	7½
4.3	6.2	4.3	4.6	3.6	4.2	8
4.6	6.9	4.6	5.2	4.0	4.5	9
5.2	7.7	5.2	5.8	4.5	4.9	10
5.8	8.9	5.8	6.6	5.4	5.5	12
6.9	10.0	6.9	7.7	6.7	6.7	15
8.9	13.5	8.9	10.0	6.8	9.0	20
11.5	15.8	11.2 (2)	11.8	9.0	11.0	25
14.3	17.8	13.4 (2)	13.4	10.0	15.0	30
20.7	23.3	16.1	17.9	15.6	15.9	35
23.7	26.7	18.4	20.5	17.8	18.2	40
26.6	30.0	20.7	23.1	20.0	20.4	45
30.0	33.3	23.0	25.6	22.3	22.7	50
35.5	40.0	27.6	30.1	26.7	27.3	60

1 Based on NEC® requirement limiting the rating of time-delay fuses to 175% of motor F.L.A., or next higher rating.

2 Based on NEC® exception permitting fuse rating to be increased, but not to exceed, 225% motor F.L.A., however per NEC® Article 430.52 Class CC (0-30) fuses can now be sized up to 400% of motor F.L.A.

3 Based on Littelfuse CCMR time-delay characteristics.

NOTE: These values were calculated for motors with Locked Rotor Current (LRA), not exceeding the following values:

MOTOR F.L.A.	*LRA
0.00 – 1.00	850%
1.01 – 2.00	750%
2.01 – 10.0	650%
10.1 – 17.8	600%

*If motor LRA varies from these values, contact Littelfuse.