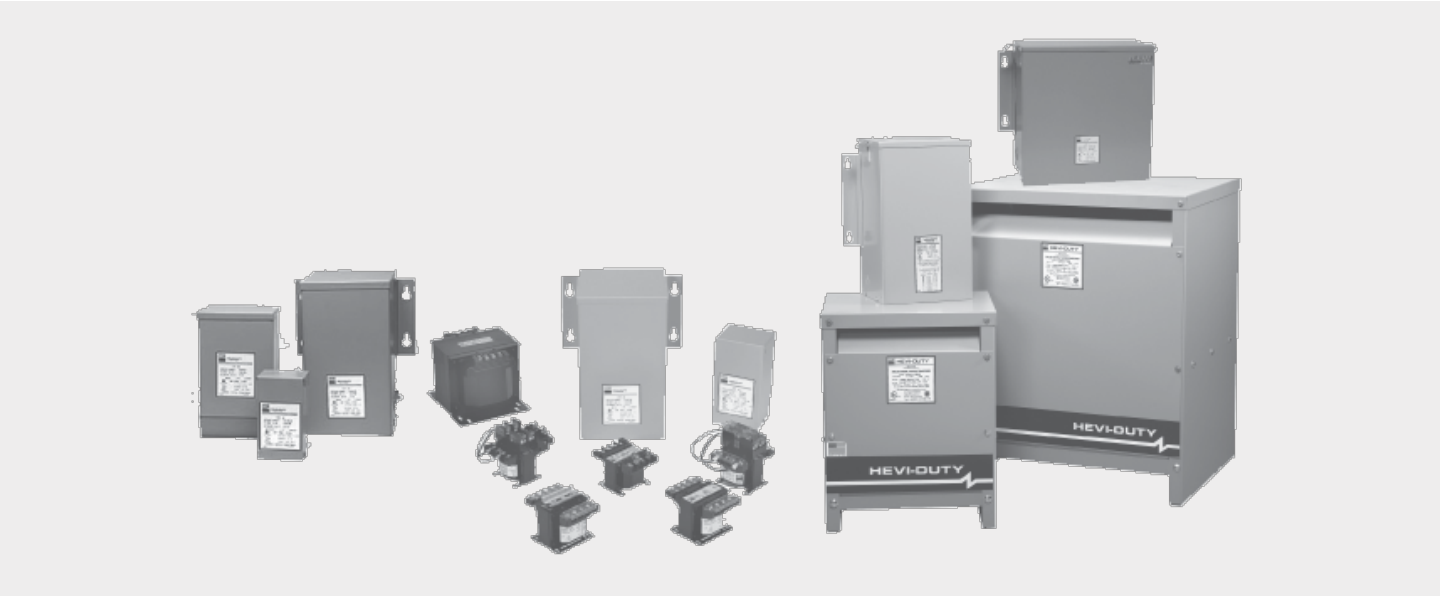

HOW TO DETERMINE THE CORRECT OVERCURRENT PROTECTION FOR TRANSFORMERS

Primary Overcurrent Protection

A transformer has all the same component parts as a motor, and like a motor, exhibits an inrush when energized. This inrush current is dependent upon where in the sine wave the transformer was last turned off in relation to the point of the sinewave you are when you energize the transformer. Although transformer inrush could run up to 30 to 35 times full load current under no load, it typically is the same as a motor...about 6 to 8 times normal running current. For this reason it is important to use a dual element slow blow type fuse - the same type of fuse you would use with a motor. If using a circuit breaker, select a breaker with a time delay – again the same type you would use with a motor. If the time delay is not sufficient, you may experience "nuisance tripping" – a condition where the breaker trips when energizing the transformer but when you try it again, it works fine.

Secondary Overcurrent Protection

Overcurrent devices are used between the output terminals of the transformer and the load for three reasons:

1. Protect the transformer from load electrical anomalies.
2. Since short circuit current is minimized, a smaller gauge wire may be used between the transformer and the load.
3. Per NEC, a larger primary fuse may be used to reduce nuisance tripping.

	Secondary Voltage						
V_{out}	24	110	115	120	220	230	240
VA	Secondary Time Delay Dual Element Slow-Blow Fuse						
50	3.2	0.75	0.6	0.6	0.3	0.3	0.3
75	5	1.125	1	1	0.5	0.5	0.5
100	6.25	1.5	1.4	1.25	0.75	0.6	0.6
150	10	2.25	2	2	1.13	1	1
200	12	3	2.8	2.5	1.5	1.4	1.25
250	15	3.5	3.5	3.2	1.8	1.8	1.6
300	20	4.5	4	4	2.25	2	2
350	20	5	5	4.5	2.5	2.5	2.25
500	30	7.5	7	6.25	3.5	3.5	3.2
750	40	10	10	10	5.6	5	5
1000		12	12	12	7	7	6.25
1500		17.5	17.5	17.5	10	10	10
2000		25	25	25	12	12	12
3000		35	35	35	17.5	17.5	17.5
5000		60	60	60	30	30	30
7500		90	90	80	45	45	40
10K		125	110	110	60	60	60
15K		175	175	175	90	90	80
25K		300	300	300	150	150	150
37.5K				400			200
50K				600			300
75K				800			400
100K				1200			600
167K				1800			900

Recommended fuse sizes per UL 508 and NEC450-3 (B) (1), NED 430-72 and commercially available type fuses.

*Fuse = I * 167% next size smaller if secondary current is less than 9 amp.*

*Fuse = I * 125% next size smaller if secondary current is 9 amp. or higher.*

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Primary Voltage													
V_{in}	120	200	208	220	230	240	277	440	460	480	550	575	600
VA													
50	1.25 (2)	.75 (1.25)	.6 (1.13)	.6 (1.13)	.6 (1)	.6 (1)	.5 (.8)	.3 (.5)	.3 (.5)	.3 (.5)	.25 (.4)	.25 (.4)	.25 (.4)
75	1.8 (3)	1.13 (1.8)	1 (1.8)	1 (1.6)	.8 (1.6)	.8 (1.5)	.8 (1.25)	.5 (.8)	.4 (.8)	.4 (.75)	.4 (.6)	.3 (.6)	.3 (.6)
100	2.5 (4)	1.5 (2.5)	1.4 (2.25)	1.25 (2.25)	1.25 (2)	1.25 (2)	1 (1.8)	.6 (1.13)	.6 (1)	.6 (1)	.5 (.8)	.5 (.8)	.5 (.8)
150	3.5 (6.25)	2.25 (3.5)	2 (3.5)	2 (3.2)	1.8 (3.2)	1.8 (3)	1.6 (2.5)	1 (1.6)	.8 (1.6)	.8 (1.5)	.8 (1.25)	.75 (1.25)	.75 (1.25)
200	5 (8)	3 (5)	2.8 (4.5)	2.5 (4.5)	2.5 (4)	2.5 (4)	2 (3.5)	1.25 (2.25)	1.25 (2)	1.25 (2)	1 (1.8)	1 (1.5)	1 (1.6)
250	3 (5)	3.5 (6.25)	3.5 (6)	3.2 (5.6)	3.2 (5)	3 (5)	2.5 (4.5)	1.6 (2.8)	1.6 (2.5)	1.5 (2.5)	1.25 (2.25)	1.25 (2)	1.25 (2)
300	4 (6.25)	4.5 (7.5)	4 (7)	4 (6.25)	3.5 (6.25)	3.5 (6.25)	3.2 (5)	2 (3.2)	1.8 (3.2)	1.8 (3)	1.6 (2.5)	1.5 (2.5)	1.5 (2.5)
350	4.5 (7)	5 (8)	5 (8)	4.5 (7.5)	4.5 (7.5)	4 (7)	3.5 (6.25)	2.25 (3.5)	2.25 (3.5)	2 (3.5)	1.8 (3)	1.8 (3)	1.75 (2.5)
500	6.25 (10)	4 (6.25)	4 (6)	3.5 (5.6)	3.5 (5)	3 (5)	5 (9)	3.2 (5.6)	3.2 (5)	3 (5)	2.5 (4.5)	2.5 (4)	2.5 (4)
750	10 (15)	6.25 (9)	6 (9)	5.6 (8)	5 (8)	5 (7.5)	8 (12)	5 (8)	4.5 (8)	4.5 (7.5)	4 (6.25)	3.5 (6.25)	3.5 (6.25)
1000	12 (20)	8 (12)	8 (12)	7.5 (10)	7 (10)	6.25 (10)	10 (17.5)	3.5 (5.6)	3.6 (5)	3 (5)	5 (9)	5 (8)	5 (8)
1500	17.5 (30)	12 (15)	12 (15)	10 (15)	10 (15)	10 (15)	15 (25)	5.6 (8)	5 (8)	5 (7.5)	4.5 (6.25)	4.5 (6.25)	4.5 (6.25)
2000	25 (40)	15 (25)	15 (20)	15 (20)	12 (20)	12 (20)	20 (35)	7.5 (10)	7 (10)	6.25 (10)	6 (9)	5.6 (8)	5 (8)
3000	35 (60)	20 (35)	20 (35)	17.5 (30)	17.5 (30)	20 (30)	35 (50)	10 (15)	10 (15)	10 (15)	9 (12)	8 (12)	8 (12)
5000	60 (100)	35 (60)	30 (60)	30 (50)	30 (50)	30 (50)	60 (90)	15 (25)	15 (25)	15 (25)	12 (20)	12 (20)	12 (20)
7500	80 (150)	50 (90)	45 (90)	45 (80)	45 (80)	40 (70)	90 (125)	25 (40)	25 (40)	20 (35)	20 (30)	—	—
10K	110 (200)	70 (125)	60 (110)	60 (110)	60 (110)	60 (100)	110 (175)	30 (50)	30 (50)	30 (50)	25 (45)	—	—
15K	175 (300)	100 (175)	90 (175)	90 (150)	90 (150)	80 (150)	175 (250)	45 (80)	45 (80)	40 (70)	35 (60)	—	—
25K	300 (500)	175 (300)	150 (300)	150 (250)	150 (250)	150 (250)	90 (250)	60 (70)	70 (125)	70 (125)	60 (110)	—	—
37K	—	—	—	—	—	200 (350)	—	—	—	100 (175)	—	—	80 (150)
50K	—	—	—	—	—	300 (500)	—	—	—	150 (250)	—	—	110 (200)
75K	—	—	—	—	—	400 (750)	—	—	—	200 (350)	—	—	175 (300)
100K	—	—	—	—	—	600 (1000)	—	—	—	300 (500)	—	—	225 (400)
167K	—	—	—	—	—	900 (1600)	—	—	—	450 (850)	—	—	350 (650)

Recommended fuse sizes per UL 508 and NEC450-3 (B) (1), NED 430-72 and commercially available type fuses.

*Fuse = I*300% next size smaller if primary current is less than 2 amp. No secondary fusing required.*
*(Fuse) = (I*500%) next size smaller if used for a motor control circuit per NEC 430-72[C] exception No. 4*

*Fuse = I*167% next size smaller if primary current is less than 9 amp. No secondary fusing required.*
*(Fuse) = (I*250%) next size smaller if primary current is less than 9 Amps. and secondary fusing is required see chart for size.*

*Fuse = I*125% next size higher if primary current is 9 amp. or higher. No secondary fusing required.*
*(Fuse) = (I*250%) next size smaller if primary current is 9 Amps. or higher. Secondary fusing is required see chart for size.*

Primary and Secondary Fuse Recommendations for all Three Phase Transformers

	General Purpose Transformers							
	Primary				Secondary			
VA	208	240	480	600	208	240	380	480
3K	12 (20)	9 (17.5)	5 (9)	4 (7)	12	9	6	5
6K	25 (40)	20 (35)	9 (15)	8 (12)	25	20	12	9
9K	35 (60)	30 (50)	15 (25)	12 (20)	35	30	18	15
15K	60 (100)	50 (90)	25 (45)	20 (35)	60	50	30	25
30K	110 (200)	100 (175)	50 (90)	40 (70)	110	100	60	50
45K	175 (300)	150 (250)	70 (125)	60 (100)	175	150	90	70
75K	300 (500)	250 (450)	125 (225)	100 (175)	300	250	150	125
112.5K	400 (750)	350 (650)	175 (300)	150 (250)	400	350	225	175
150K	600 (1000)	500 (900)	250 (450)	200 (350)	600	500	300	250
225K	—	—	350 (650)	300 (500)	800	700	450	350
300K	—	—	500 (900)	400 (700)	1200	1000	600	500
500K	—	—	800 (1500)	650 (1200)	1800	1600	1000	800

	Drive Isolation Transformers				
	Primary			Secondary	
VA	230	460	575	230	460
7.5K	25 (45)	12 (20)	10 (17.5)	25	12
11K	35 (60)	17.5 (30)	15 (25)	35	17.5
14K	45 (85)	25 (40)	20 (35)	45	25
20K	70 (125)	35 (60)	30 (50)	70	35
27K	85 (150)	45 (80)	35 (60)	90	45
34K	110 (200)	60 (100)	45 (80)	110	60
40K	150 (250)	70 (125)	60 (100)	150	70
51K	175 (300)	80 (150)	70 (150)	175	80
63K	200 (350)	100 (175)	80 (150)	200	100
75K	250 (450)	125 (225)	100 (175)	250	125
93K	300 (500)	150 (250)	125 (225)	300	150
118K	400 (700)	200 (350)	150 (250)	400	200
145K	500 (800)	250 (450)	200 (350)	500	250
175K	—	300 (500)	225 (400)	600	300
220K	—	350 (650)	300 (500)	700	350
275K	—	450 (850)	350 (600)	900	450
330K	—	600 (1000)	450 (800)	1200	600
440K	—	700 (1350)	600 (1000)	1400	700

*Fuse = I*125% next size higher if primary current is 9 Amp or higher. No secondary fusing required.*
*(Fuse) = (I*250%) next size smaller if primary current is 9 Amps. or higher. Secondary fusing is required. See chart for size.*
*OUTPUT FUSE = 1*125% next size higher if secondary current is 9 Amps or higher. Recommended fuse size per NEC450.3[B] and commercially available fuse types.*

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