

Recommendations For Overcurrent Protection

UL AND CSA (NORTH AMERICAN) STANDARDS

North American standards, including UL 508, National Electric Code 450 and the Canadian Electrical Code Part I, require overcurrent protection on all control circuit transformers. There are two options for overcurrent protection:

Option 1

Provide an overcurrent device in the primary circuit rated to the current of the transformer. The overcurrent limits are as follows:

Primary 9 amps or more:	no more than 125% of rated current.
Primary 2 to 9 amps:	no more than 167% of rated current.
Primary less than 2 amps:	no more than 300% of rated current for power circuits. no more than 500% of rated current for control circuits.

This method is considered less desirable as start-up inrush to the transformer can frequently surpass the current rating of the device and result in nuisance interruptions.

Option 2

The second option is to install overcurrent devices in both the primary and secondary circuits of the transformer. In this option, the secondary device must be rated no more than 125% of rated current of the transformer and the primary no more than 250%. CEC permits 300% overcurrent on the primary for this option.

In both options listed, it is recommended that **time delay** fuses be considered to avoid unnecessary interruptions.

Secondary

The overcurrent protection listed below, in amperes, is 125% of the rated current of the transformer. Choose the next higher fuse rating if these numbers do not correspond with standard fuse selections.

Sec. Voltage	VA Rating															
	25	50	75	100	150	200	250	300	350	500	750	1000	1500	2000	3000	5000
12	2.7	5.3	7.9	11	16	21	27	-	-	-	-	-	-	-	-	-
24	1.4	2.7	4.0	5.3	7.9	11	14	16	19	27	-	-	-	-	-	-
90	0.4	0.7	1.1	1.4	2.1	2.8	3.5	4.2	4.9	7.0	11	14	21	28	-	-
95	0.4	0.7	1.0	1.4	2.0	2.7	3.3	4.0	4.7	6.6	9.9	14	20	27	-	-
100	0.4	0.7	1.0	1.3	1.9	2.5	3.2	3.8	4.4	6.3	9.4	13	19	25	-	-
110	0.3	0.6	0.9	1.2	1.8	2.3	2.9	3.5	4.0	5.7	8.6	12	18	23	-	-
115	0.3	0.6	0.9	1.1	1.7	2.2	2.8	3.3	3.9	5.5	8.2	11	17	22	-	-
120	0.3	0.6	0.8	1.1	1.6	2.1	2.7	3.2	3.7	5.3	7.9	11	16	21	-	-
220	0.15	0.3	0.5	0.6	0.9	1.2	1.5	1.8	2.0	2.9	4.3	5.7	8.6	12	18	29
230	0.14	0.3	0.5	0.6	0.9	1.1	1.4	1.7	2.0	2.8	4.1	5.5	8.2	11	17	28
240	0.14	0.3	0.4	0.6	0.8	1.1	1.4	1.6	1.9	2.7	4.0	5.3	7.9	11	16	27

Recommendations for Overcurrent Protection continued...

Primary (UL and CSA)

To assist in the selection of fuses, the following chart recommends the maximum primary fuse rating in amperes. The first number shown is the maximum overcurrent protection when the primary current is less than 2 amps and the overcurrent protection device is rated for 300%. The second number shown (italic) is recommended when the primary is less than 2 amps and the overcurrent device is to be rated at 500% of rated current. Where only one number is indicated, the primary is 2 amps or more and one rating of over current protection is shown as optimal. Choose the next higher fuse rating if these numbers do not correspond with standard fuse selections.

Pri.	VA Rating																
Volt	25	50	75	100	150	200	250	300	350	500	750	1000	1500	2000	3000	5000	7500
115	0.6	1.25	1.8	2.5	3.5	5	4	5	5	8	10	15	20	25	-	-	-
	<i>1</i>	<i>2</i>	<i>3.2</i>	<i>4</i>	<i>6.25</i>	<i>8</i>											
120	0.6	1.25	1.8	2.25	3.5	5	4	5	5	8	10	15	15	20	-	-	-
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>6.25</i>	<i>8</i>											
200	0.3	0.75	1.125	1.5	2.25	3	3.5	4.5	5	4.5	7	9	15	15	20	-	-
	<i>0.6</i>	<i>1.25</i>	<i>1.8</i>	<i>2.5</i>	<i>3.5</i>	<i>5</i>	<i>6.25</i>	<i>7.5</i>	<i>8</i>								
208	0.3	0.6	1	1.4	2	2.8	3.5	4	5	4	6	8	12	15	20	30	-
	<i>0.6</i>	<i>1.125</i>	<i>1.8</i>	<i>2.25</i>	<i>3.5</i>	<i>4.5</i>	<i>6</i>	<i>7</i>	<i>8</i>								
220	0.3	0.6	1	1.25	2	2.5	3.2	4	4.5	4	6	8	12	15	20	30	-
	<i>0.5</i>	<i>1.125</i>	<i>1.6</i>	<i>2.25</i>	<i>3.2</i>	<i>4.5</i>	<i>5.6</i>	<i>6.25</i>	<i>7.5</i>								
230	0.3	0.6	0.8	1.25	1.8	2.5	3.2	3.5	4.5	4	6	8	10	15	20	30	-
	<i>0.5</i>	<i>1</i>	<i>1.6</i>	<i>2</i>	<i>3.2</i>	<i>4</i>	<i>5</i>	<i>6.25</i>	<i>7.5</i>								
240	0.3	0.6	0.8	1.25	1.8	2.25	3	3.5	4	3.5	5	7	10	15	15	30	-
	<i>0.5</i>	<i>1</i>	<i>1.5</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6.25</i>	<i>7</i>								
277	0.25	0.5	0.8	1	1.6	2	2.5	3.2	3.5	5	5	6	9	12	15	25	-
	<i>0.4</i>	<i>0.8</i>	<i>1.25</i>	<i>1.8</i>	<i>1.5</i>	<i>3.5</i>	<i>4.5</i>	<i>5</i>	<i>6.25</i>	<i>9</i>							
347	0.25	0.5	0.8	1	1.6	2	2.5	3.2	3.5	5	6.25	5	7.5	10	15	20	30
	<i>0.4</i>	<i>0.8</i>	<i>1.25</i>	<i>1.8</i>	<i>2.5</i>	<i>3.5</i>	<i>4.5</i>	<i>5</i>	<i>6.25</i>	<i>9</i>							
380	0.1875	0.3	0.5	0.75	1.125	1.5	1.8	2.25	2.5	3.5	5.6	4.5	6.25	9	15	20	25
	<i>0.3</i>	<i>0.6</i>	<i>0.8</i>	<i>1.25</i>	<i>1.8</i>	<i>2.5</i>	<i>3.2</i>	<i>3.5</i>	<i>4.5</i>	<i>6.25</i>	<i>9</i>						
400	0.1875	0.3	0.5	0.75	1.125	1.5	1.8	2.25	2.5	3.5	5.6	4.5	6.25	9	12	15	20
	<i>0.3</i>	<i>0.6</i>	<i>0.8</i>	<i>1.25</i>	<i>1.8</i>	<i>2.5</i>	<i>3</i>	<i>3.5</i>	<i>4</i>	<i>6.25</i>	<i>9</i>						
416	0.15	0.3	0.5	0.6	1	1.4	1.8	2	2.5	3.5	5	4	6	8	12	15	20
	<i>0.3</i>	<i>0.6</i>	<i>0.8</i>	<i>1.125</i>	<i>1.8</i>	<i>2.25</i>	<i>3</i>	<i>3.5</i>	<i>4</i>	<i>6</i>	<i>9</i>						
440	0.15	0.3	0.5	0.6	1	1.25	1.6	2	2.25	3.2	5	4	6	8	12	15	20
	<i>0.25</i>	<i>0.5</i>	<i>0.8</i>	<i>1.125</i>	<i>1.6</i>	<i>2.25</i>	<i>2.8</i>	<i>3.2</i>	<i>3.5</i>	<i>5.6</i>	<i>8</i>						
460	0.15	0.3	0.4	0.6	0.8	1.25	1.6	1.8	2.25	3.2	4.5	3.5	6	8	12	15	20
	<i>0.25</i>	<i>0.5</i>	<i>0.8</i>	<i>1</i>	<i>1.6</i>	<i>2</i>	<i>2.5</i>	<i>3.2</i>	<i>3.5</i>	<i>5</i>	<i>8</i>						
480	0.15	0.3	0.4	0.6	0.8	1.25	1.5	1.8	2	3	4.5	3.5	5	7	10	15	20
	<i>0.25</i>	<i>0.5</i>	<i>0.75</i>	<i>1</i>	<i>1.5</i>	<i>2</i>	<i>2.5</i>	<i>3</i>	<i>3.5</i>	<i>5</i>	<i>7.5</i>						
550	0.125	0.25	0.4	0.5	0.8	1	1.25	1.6	1.8	2.5	4	5	4.5	6	9	15	15
	<i>0.2</i>	<i>0.4</i>	<i>0.6</i>	<i>0.8</i>	<i>1.25</i>	<i>1.8</i>	<i>2.25</i>	<i>2.5</i>	<i>3</i>	<i>4.5</i>	<i>6.25</i>						
575	0.125	0.25	0.3	0.5	0.75	1	1.25	1.5	1.8	2.5	3.5	5	4.5	6	9	15	15
	<i>0.2</i>	<i>0.4</i>	<i>0.6</i>	<i>0.8</i>	<i>1.25</i>	<i>1.6</i>	<i>2</i>	<i>2.5</i>	<i>3</i>	<i>4</i>	<i>6.25</i>						
600	0.125	0.2	0.3	0.5	0.75	0.8	1.25	1.5	1.6	2.25	3.5	5	4	6	9	15	15
	<i>0.2</i>	<i>0.4</i>	<i>0.6</i>	<i>0.8</i>	<i>1.25</i>	<i>1.6</i>	<i>2</i>	<i>2.5</i>	<i>2.8</i>	<i>4</i>	<i>6.25</i>						

References: UL 508, 32.7
 UL 845, 11.16 and 11.17
 NEC 430-72 (c) exception #2
 NEC 450-3 (b) 1 and 2
 CEC Part I, 26-256

