

# Fusing Equipment

Electrical Apparatus

# 240-61

## NXC® Full Range Current-Limiting Capacitor Fuse

### GENERAL

Greater latitude in capacitor bank design is now possible with the Cooper Power Systems NXC® outdoor, current-limiting capacitor fuse. It allows safe fusing of at least 50,000 joules of parallel connected energy.

Fast, full-range clearing capability, inherent advantage of the NX® current-limiting fuse line, allows the NXC to perform effectively under both high and low fault currents.

Typical applications include use in high fault areas, fusing of individual capacitors, capacitive circuits requiring positive isolation, circuits where let-through current must be restricted, areas where burning debris cannot be tolerated and where high noise levels are undesirable.

The NXC fuse makes use of an automatic leader wire ejection feature for positive interruption and capacitor isolation. Another feature is the visible indication of a sensed fault. Both clearing and indicating operations take place without the functioning of hinges, flippers or other mechanical devices. See Table 1 for fusing recommendations.

### APPLICATION

Table 1 lists the individual fusing recommendations for applying NXC fuses in outdoor capacitor banks. The fusing tables are based on the following:

$$I_{\text{Capacitor}} = \frac{\text{kVar unit}}{\text{kV unit}}$$

$$I_{\text{Fuse}} = I_{\text{Capacitor}} \times 1.35 \text{ Protective Margin}$$

The protective margin accounts for normal overvoltages, harmonics, capacitor tolerances and a 25° C. ambient.

### TEMPERATURE DERATING

Temperature derating is required when NXC fuses are applied in ambient conditions exceeding 25° C. The derating formula is:

$$A_T = A_{25} [1 - .0065 (T - 25)]$$

A<sub>T</sub> = Amp rating of fuse at "T"° C.

A<sub>25</sub> = Amp rating of fuse at 25° C.

T = Temperature of maximum ambient the fuse will be subjected to at any time.



**Figure 1.** NXC outdoor capacitor fuse, available in voltage ratings of 8.3, 15.5 and 23 kV, offers positive leader wire ejection for reliable interruption and elimination of electrical stress to circuit apparatus. Top end cap has provision for convenient bus bar mounting.

**TABLE 1**  
Fusing Recommendations

| Capacitor or Unit Voltage Rating | Fuse Voltage Rating (kV) | 50 kVar* | 100 kVar | 150 kVar | 200 kVar | 300 kVar | 400 kVar |
|----------------------------------|--------------------------|----------|----------|----------|----------|----------|----------|
| 2400                             | 8.3                      | 30       | 65       | 90**     | —        | —        | —        |
| 2770                             | 8.3                      | 25       | 65       | 80**     | —        | —        | —        |
| 4160                             | 8.3                      | 18       | 40       | 65       | 65       | —        | —        |
| 4800                             | 8.3                      | 18       | 30       | 45       | 65       | —        | —        |
| 6640                             | 8.3                      | 18       | 25       | 40       | 45       | 65       | 90**     |
| 7200                             | 8.3                      | 18       | 25       | 30       | 40       | 65       | 80**     |
| 7620                             | 8.3                      | 18       | 18       | 30       | 40       | 65       | 80**     |
| 7960                             | 8.3                      | 18       | 18       | 30       | 40       | 65       | 80**     |
| 8320                             | 15.5                     | 10       | 18       | 25       | 35       | 50**     | 70**     |
| 9960                             | 15.5                     | 10       | 18       | 25       | 30       | 50**     | 60**     |
| 12470                            | 15.5                     | —        | 12       | 18       | 25       | 35       | 50**     |
| 13280                            | 15.5                     | —        | 12       | 18       | 25       | 35       | 50**     |
| 13800                            | 15.5                     | —        | 10       | 18       | 25       | 30       | 50**     |
| 14400                            | 15.5                     | —        | 10       | 18       | 25       | 30       | 50**     |
| 19920                            | 23.0                     | —        | 12       | 12       | 18       | 25       | 36**     |
| 21600                            | 23.0                     | —        | 12       | 12       | 18       | 25       | 25       |

\*For 50 kVar capacitors, it is difficult to choose reasonably sized fuses which will withstand the I<sup>2</sup>t outrush. This occurs due to the fact that I<sup>2</sup>t withstand goes down exponentially with fuse link rating rather than linearly. Consequently, the 50 kVar capacitor fusing recommendations only cover those units with voltages up to 9960 V.

\*\*Indicates 2 fuses in parallel.

### Example:

Select proper fuse rating for a 7200V 200 kVar capacitor to be used in an enclosed bank with maximum ambient of 55° C.

$$I_{\text{Capacitor}} = \frac{\text{kVar unit}}{\text{kV unit}} = \frac{200}{7.2} = 27.7 \text{ A}$$

$$I_{\text{Fuse}} = I_{\text{Capacitor}} \times 1.35 = 27.7 \times 1.35 = 37.39 \text{ A}$$

Choose 40A NXC and derate for 55° C. ambient

$$A_T = A_{25} [1 - .0065 (T - 25)]$$

$$A_{55} = 40 [1 - .0065 (55 - 25)]$$

$$A_{55} = 40 [.805]$$

$$A_{55} = 32.2$$

32.2 is less than required 37.39. The fuse is not adequate.

Choose 45 A NXC and derate for 55° C. ambient.

$$A_{55} = 45 [.805] = 36.23$$

36.23 is less than required 37.39.

The 45 A NXC fuse is not adequate.

Choose 65 A NXC and derate for 55° C. ambient.

$$A_{55} = 65 [.805] = 52.32$$

52.32 exceeds 37.38 amps. 65 A NXC is proper choice.

TABLE 2  
Ratings and Ordering Information

| Voltage<br>(kV) | Continuous<br>Current<br>(amps) | Interrupting<br>Symmetrical<br>(amps) | Catalog<br>Number | Dimensions (in.) |        | Approx.<br>Weight<br>(lb) |
|-----------------|---------------------------------|---------------------------------------|-------------------|------------------|--------|---------------------------|
|                 |                                 |                                       |                   | A                | B      |                           |
| 8.3             | 10                              | 50,000                                | FA5J10            | 8                | 2 1/8  | 2.5                       |
|                 | 18                              |                                       | FA5J18            |                  |        |                           |
|                 | 25                              |                                       | FA5J25            |                  |        |                           |
|                 | 30                              |                                       | FA5J30            |                  |        |                           |
|                 | 40                              |                                       | FA5J40            |                  |        |                           |
|                 | 45                              |                                       | FA5J45*           |                  |        |                           |
|                 | 65                              |                                       | FA5J65*           | 9 3/16           | 3 9/16 | 7.8                       |
| 15.5            | 10                              | 50,000                                | FA6J10            | 12 11/32         | 2 1/8  | 3.4                       |
|                 | 12                              |                                       | FA6J12            |                  |        |                           |
|                 | 18                              |                                       | FA6J18            |                  |        |                           |
|                 | 25                              |                                       | FA6J25            |                  |        |                           |
|                 | 30                              |                                       | FA6J30            |                  |        |                           |
|                 | 35                              |                                       | FA6J35*           | 13 11/32         | 2 1/8  | 4.3                       |
|                 | 43                              |                                       | FA6J43*           |                  | 2 1/8  | 4.3                       |
| 23              | 12                              | 50,000                                | FA7J12*           | 15 5/32          | 2 1/8  | 3.9                       |
|                 | 18                              |                                       | FA7J18            | 15 5/32          | 2 1/8  | 3.9                       |
|                 | 25                              |                                       | FA7J25*           | 18 3/16          | 2 1/8  | 5.3                       |

\* Contact your Cooper Power Systems representative for information on pricing and availability.

ADDITIONAL  
INFORMATION

Cooper Power Systems offers a variety of additional literature and reference material on NXC fuses to assist in application and coordination.

Bulletin 76051 Production I<sup>2</sup>t Testing of Current-Limiting Fuses  
R240-91-37 8.3 kV NXC Capacitor Fuse-TCC Curves  
R240-91-38 15.5 kV NXC Capacitor Fuse-TCC Curves  
R240-91-39 23 kV NXC Capacitor Fuse-TCC Curves  
S240-61-1 Type NXC Current-Limiting-Fuse – Installation Instructions

Contact your Cooper Power Systems representative for further information or other applications.

DIMENSIONS

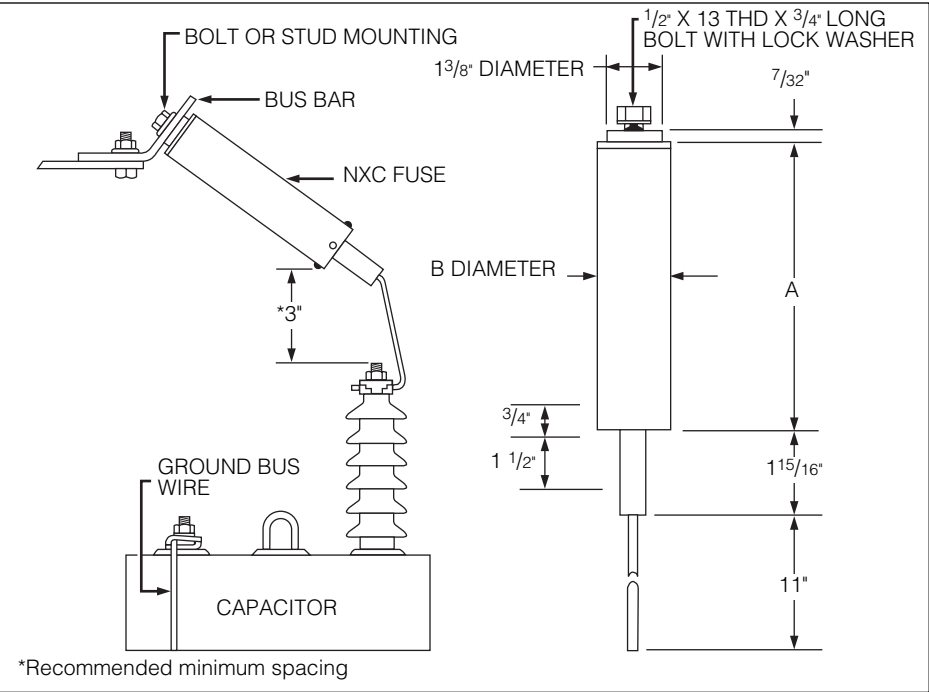


Figure 2.  
Typical Installation.



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