

High Speed Fuses

Section Contents

| | Page |
|--|---------|
| General Applications | 88-89 |
| North American fuses & accessories | 90-106 |
| Square Body fuses & accessories | 107-180 |
| BS 88 fuses & accessories | 181-190 |
| Ferrule fuses & accessories | 191-212 |



High Speed Fuses

General applications

Rated Voltage

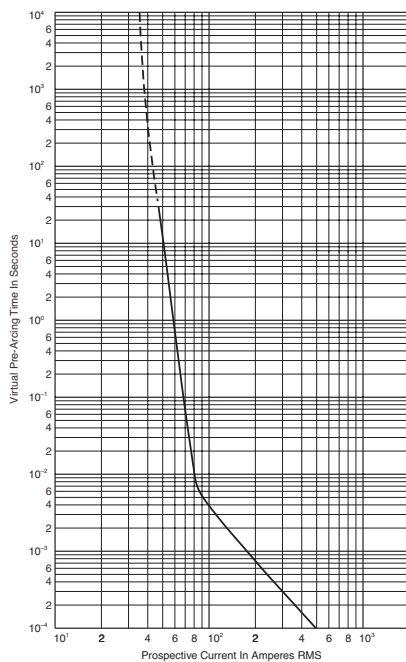
The ac voltage rating of Cooper Bussmann® fuses is given in volts rms. Fuses tested to IEC are tested at 10% above their rated voltage. British Style BS 88 fuses are tested at 5% above its rated voltage. UL recognition tests are performed at the rated voltage.

Rated Current

Rated current is given in amperes rms. Cooper Bussmann fuses can continuously carry the rated current.

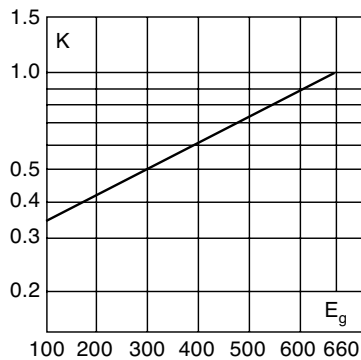
Melting Characteristic

The melting characteristic shows the virtual melting time in seconds as a function of the prospective current in amperes rms. The fuses are specially constructed for short-circuit protection against high level fault currents. Loading and operation of the fuse in the non-continuous/dashed section of the melt curve must be avoided. The curve can also be read as the real melting time as a function of the RMS value of the pre-arc current.

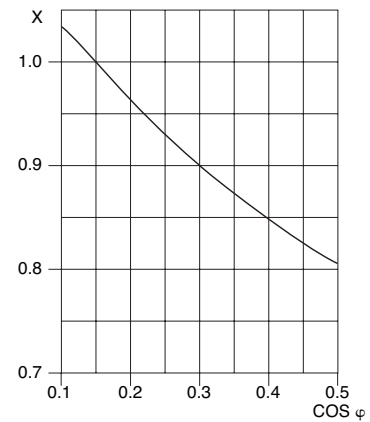


Clearing Integrals

The total clearing I^2t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I^2t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g , (rms).

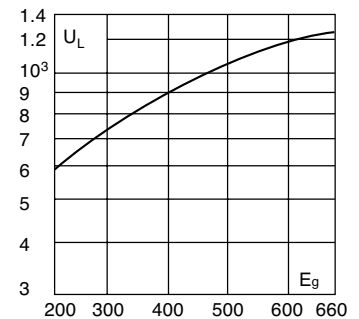


For other power factor values, the total clearing integral can be calculated as a multiple of the clearing integrals, the correction factor K and the correction factor X.



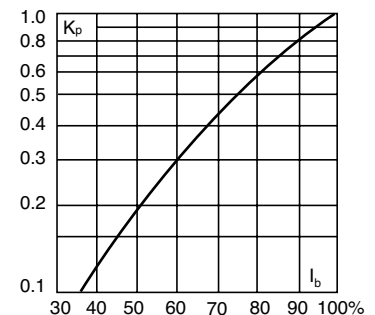
Arc Voltage

This curve gives the peak arc voltage, U_L , which may appear across the fuse during its operation as a function of the applied working voltage, E_g , (rms) at a power factor of 15%.



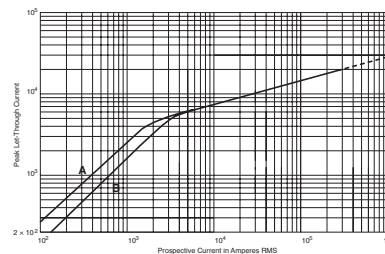
Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p , is given as a function of the RMS load current, I_b , in % of the rated current.



Cut-Off Current

A fuse operation relating to short-circuits only. When a fuse operates in its current-limiting range, it will clear a short-circuit in less than 1/2 cycle. Also, it will limit the instantaneous peak let-through current to a value substantially less than that obtainable in the same circuit if that fuse were replaced with a solid conductor of equal impedance.



A asymmetrical current
B symmetrical current

General applications

Parallel Connection

When fuses are connected in parallel it is recommended that the applied voltage does not exceed $0.9 U_N$ (the rated voltage of the fuse). This is due to the fact that the energy released within the fuses may be unevenly shared between the parallel connected barrels.

When fuses are connected in parallel, one must take into account that the current sharing is not necessarily equal. And it must be checked, that the maximum load current is not exceeded.

Series Connection

Fuses in series may not equally divide the applied voltage. It is recommended that series connected fuses should only be operated at fault currents that yield melting times less than 10 ms and a recovery voltage per fuse of less than or equal to $0.9 U_N$ (the rated voltage of the fuse).

Mounting Guidance

The recommendations below have to be followed when mounting a Cooper Bussmann fuse with end plate threaded holes.

1. Screw in studs: 5 N•m Max, 3 N•m Min
2. Attachment of the fuse to buss-bar by means of nut and washer:

| Thread Configuration | Torque (N•m)* | |
|---------------------------|---------------|-----|
| | Max | Min |
| $\frac{5}{16}$ " - 18, M8 | 25 | 20 |
| $\frac{3}{8}$ " - 16, M10 | 45 | 40 |
| $\frac{1}{2}$ " - 24 | 45 | 40 |
| $\frac{1}{2}$ " - 13, M12 | 65 | 50 |
| $\frac{3}{4}$ " - 20 | 65 | 50 |

*1 N•m = 0.7375 lb-ft

Overloads

The design of Cooper Bussmann® fuses is such that they can be operated under rather severe operating conditions imposed by overloads (any load current in excess of the maximum permissible load current).

In applications, there will be a maximum overload current, I_{max} , which can be imposed on the fuse with a corresponding duration and frequency of occurrence.

Time durations fall into two categories:

1. Overloads longer than one second
2. Overloads less than one second termed "impulse" loads.

The following table gives general application guidelines which, in the expression $I_{max} < (\% \text{ factor}) \times I_t$, I_t is the melting current corresponding to the time "t" of the overload duration as read from the time-current curve of the fuse. The guidelines in the table below determine the acceptability of the selected fuses for a given I_{max} .

| Frequency of Occurrence | Overloads (> 1 sec) | Impulse Loads (< 1 sec) |
|--------------------------|-----------------------------|-----------------------------|
| Less than once per month | $I_{max} < 80\% \times I_t$ | $I_{max} < 70\% \times I_t$ |
| Less than twice per week | $I_{max} < 70\% \times I_t$ | $I_{max} < 60\% \times I_t$ |
| Several times per day | $I_{max} < 60\% \times I_t$ | — |

When impulse loads are an intrinsic/normal parameter of the load current either as single pulse or in trains of pulses or when their level is higher than the melting current at 0.01 seconds (per time-current curve), contact Cooper Bussmann for application assistance.

In addition to the parameters set forth in the preceding table, the RMS value of the load current as calculated for any period of 10 minutes or more should not exceed the maximum permissible load current.

Furthermore, it is important that a fuse should not be applied in the non-continuous/dashed portion of the associated time-current curve.

Any time-current combination point which falls in the non-continuous/dashed portion of the time-current curve is beyond the capability of the fuse to operate properly.

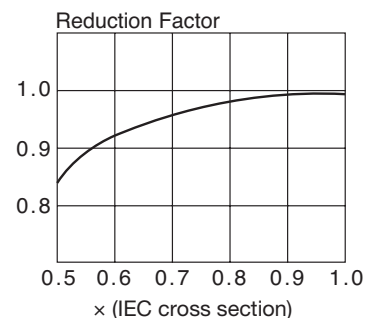
DC Operation

Depending upon the short-circuit time constant and the magnitude of the prospective short-circuit current, the dc voltage at which a fuse can be applied may be less than its ac rating. Long time constants require a lower dc voltage. Conversely, however, higher available prospective short-circuit currents result in faster fuse openings and thus permit a fuse to be operated at a higher dc voltage.

Consult Cooper Bussmann for additional information and application assistance when fuses have to operate under dc conditions.

Load Current Versus Conductor Cross Section

Reduction of permissible load current when the conductor cross section is less than that given in IEC Publication 269-1 & 4 valid for Cooper Bussmann semiconductor fuses.



Application Assistance

If you have application problems or need a fuse outside our standard program, please contact the nearest Cooper Bussmann representative. Phone numbers are shown on the back cover.

High Speed Fuses

North American fuses



Introduction

North American Contents

| Catalog Number | Volts | Amp Range | Page |
|----------------|-------|-----------|---------|
| FWA | 130 | 1000-4000 | 91-92 |
| FWA | 150 | 70-1000 | 93-94 |
| FWX | 250 | 35-2500 | 95-96 |
| FWH | 500 | 35-1600 | 97-98 |
| KAC | 600 | 1-1000 | 99 |
| KBC | 600 | 35-800 | 100 |
| FWP | 700 | 5-1200 | 101-103 |
| FWJ | 1000 | 35-2000 | 104-105 |

Accessories

Fuse Bases 106

North American Fuse Ranges

| Amps | Volts | AC | DC |
|-----------|-------|----|----|
| 1000-4000 | 130 | X | X |
| 70-1000 | 150 | X | X |
| 35-2500 | 250 | X | X |
| 35-1600 | 500 | X | X |
| 1-1000 | 600 | X | — |
| 5-1200 | 700 | X | X |
| 40-600 | 800 | — | X |
| 35-2000 | 1000 | X | — |

General Information

Cooper Bussmann offers a complete range of North American blade and flush-end style fuses and accessories. Their design and construction were optimized to provide:

- Low energy let-through (I^2t)
- Low watts loss
- Superior cycling capability
- Low arc voltage
- Excellent dc performance

North American style fuses provide an excellent solution for medium power applications. While there are currently no published standards for these fuses, the industry has standardized on mounting centers that accept Cooper Bussmann fuses.

Voltage Rating

All Cooper Bussmann® North American style fuses are tested at their rated voltage. Cooper Bussmann should be consulted for applications exceeding those values.

Accessories

External and internal open fuse indication is available for selected portions of the North American line. Fuse blocks are available for most applications.

North American — FWA 130V: 1000-4000A

FWA

Specifications

Description: North American style flush-end high speed fuses.

Dimensions: See Dimensions illustrations.

Ratings:

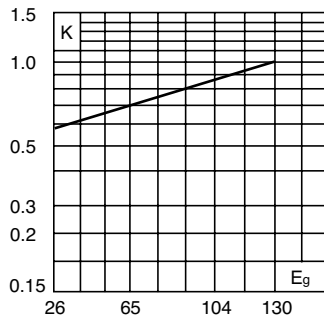
- Volts: — 130Vac
- Amps: — 1000-4000A
- IR: — 200kA RMS Sym.
- 50kA @130Vdc

Agency Information: CE, UL Recognized on 1000-2000A fuses

Electrical Characteristics

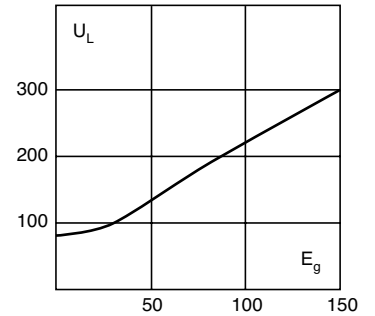
Total Clearing I²t

The total clearing I²t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I²t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g, (rms).



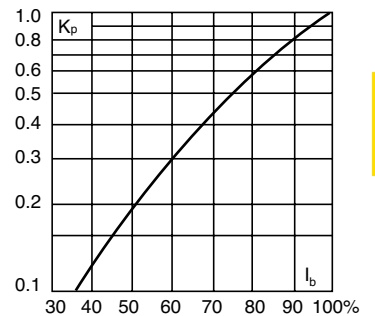
Arc Voltage

This curve gives the peak arc voltage, U_L, which may appear across the fuse during its operation as a function of the applied working voltage, E_g, (rms) at a power factor of 15%.



Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p, is given as a function of the RMS load current, I_b, in % of the rated current.



Catalog Numbers

| Catalog Numbers | Electrical Characteristics | | | |
|-----------------|----------------------------|---------------------------------------|------------------|------------|
| | Rated Current RMS-Amps | I ² t (A ² Sec) | | Watts Loss |
| | | Pre-arc | Clearing at 130V | |
| FWA-1000AH | 1000 | 170000 | 460000 | 60 |
| FWA-1200AH | 1200 | 270000 | 730000 | 70 |
| FWA-1500AH | 1500 | 520000 | 1400000 | 78 |
| FWA-2000AH | 2000 | 860000 | 2400000 | 108 |
| FWA-2500AH | 2500 | 1500000 | 4100000 | 130 |
| FWA-3000AH | 3000 | 2100000 | 5700000 | 150 |
| FWA-4000AH | 4000 | 3400000 | 9200000 | 257 |

• Watts loss provided at rated current.
• See accessories on page 106.

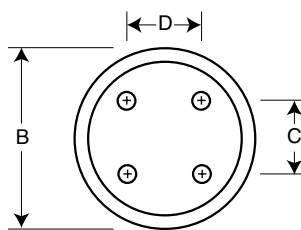
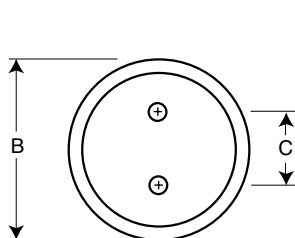
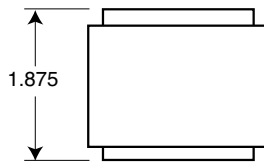
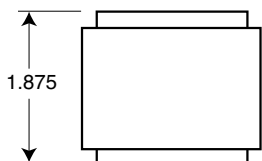
Dimensions (in)

| Catalog Number | Fig. | B | C | D | Thread Depth |
|-------------------|------|-----|-----|-----|-----------------------|
| FWA-1000AH-2000AH | 1 | 2.0 | 1.0 | — | Tapped 3/8"-24 x 1/2" |
| FWA-2500AH-3000AH | 1 | 3.0 | 1.5 | — | Tapped 1/2"-20 x 1/2" |
| FWA-4000AH | 2 | 3.5 | 1.5 | 1.5 | Tapped 1/2"-20 x 1/2" |

1mm = 0.0394" / 1" = 25.4mm

Fig. 1: 1000-3000A

Fig. 2: 4000A



Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Low watts loss
- Superior cycling capability

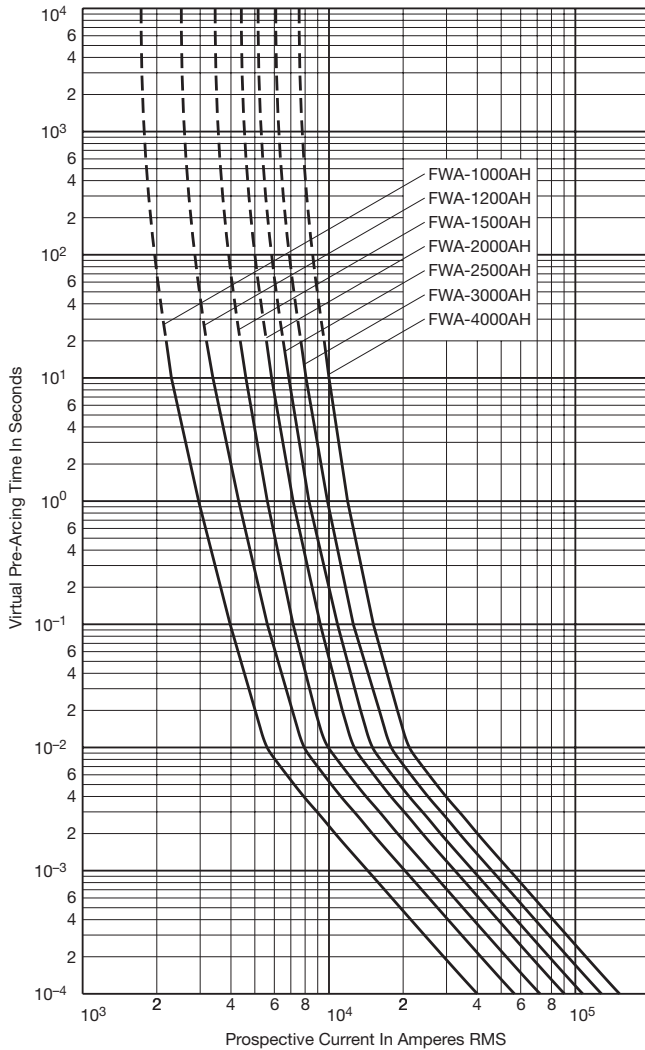
Typical Applications

- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

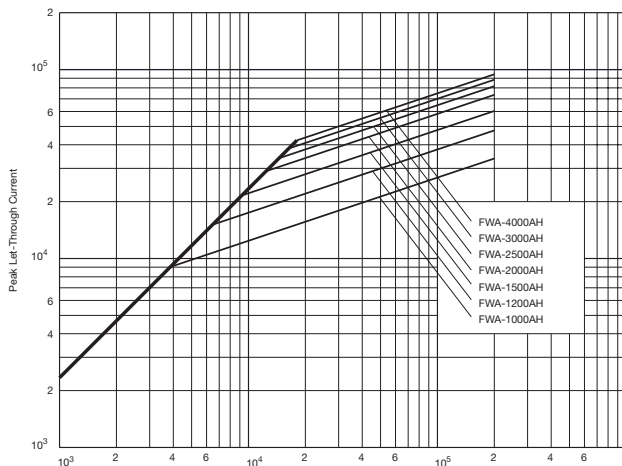
North American — FWA 130V: 1000-4000A

FWA 1000-4000A: 130V

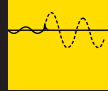
Time-Current Curve



Peak Let-Through Curve



Data Sheet: 35785301



Did You Know?

Protect Against Downtime with Technical Training, and Earn CEUs at the Same Time

Our application engineering team offers two training seminars at the Cooper Bussmann St. Louis headquarters Technical Center for end-user customers. These two-day seminars provide participants 1.6 Continuing Education Units (CEUs). Attendees are responsible for their own airfare and hotel costs; meals and ground transportation are provided.

Industrial Machinery

This two-day seminar highlights overcurrent protection considerations for industrial machinery and industrial control panels, design standards as well as a review of various overcurrent protective devices. The seminar is offered to:

- Engineers for industrials who specify equipment
- Electrical panel builders
- Machinery builders
- Electrical designers

Commercial and Industrial Power Systems

This two-day seminar provides a comprehensive review of the proper overcurrent protection of building power distribution systems including elevator protection, ground fault protection and compliance with industry standards. The seminar is targeted to:

- Consulting engineers
- Plant engineers
- Electrical contractors
- Electrical designers
- Inspectors

Contact your local district sales engineer or representative, or call our application engineering team for more information: **636-527-1270**. Check at www.cooperbussmann.com for schedules and seminar cost.

North American — FWA 150V: 70-1000A

FWA

Specifications

Description: North American style stud-mount fuses.

Dimensions: See Dimensions illustrations.

Ratings:

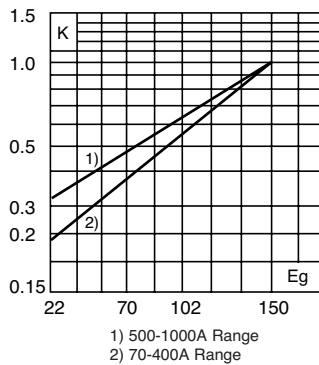
- Volts: — 150Vac
- Amps: — 70-1000A
- IR: — 100kA Sym. (70-400A)
- 200kA Sym. (450-1000A)
- 20kA @150Vdc (70-800A)
- 100kA @ 80Vdc (70-400A)

Agency Information: CE, UL Recognized

Electrical Characteristics

Total Clearing I²t

The total clearing I²t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I²t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g, (rms).



Dimensions (in)

Fig. 1: 70-400A

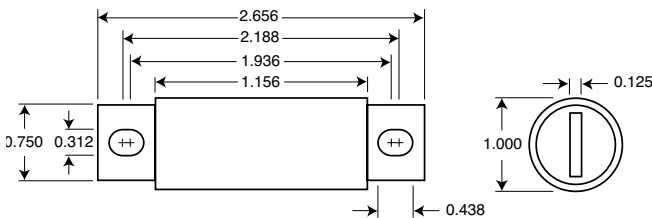
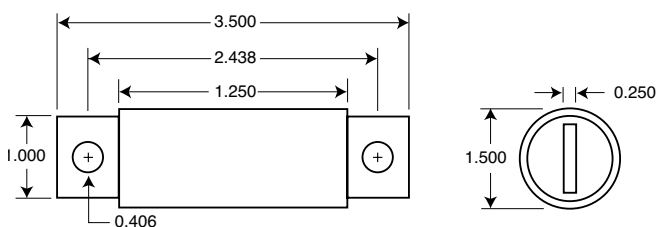


Fig. 2: 500-1000A

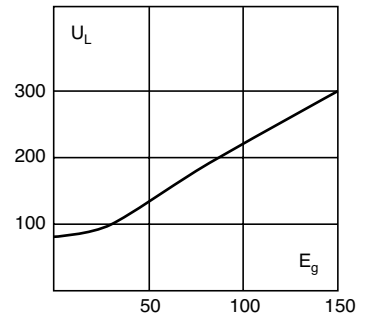


1mm = 0.0394" / 1" = 25.4mm



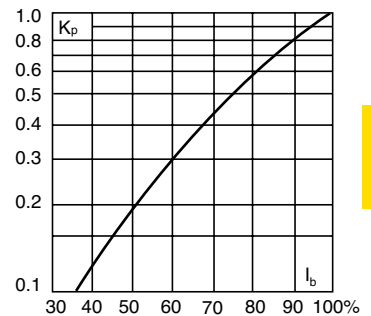
Arc Voltage

This curve gives the peak arc voltage, U_L, which may appear across the fuse during its operation as a function of the applied working voltage, E_g, (rms) at a power factor of 15%.



Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p, is given as a function of the RMS load current, I_b, in % of the rated current.



Catalog Numbers

| Catalog Number | Rated Current RMS-Amps | Electrical Characteristics | | |
|----------------|------------------------|---------------------------------------|------------------|------------|
| | | I ² t (A ² Sec) | | Watts Loss |
| | | Pre-arc | Clearing at 150V | |
| FWA-70B | 70 | 470 | 4000 | 6.9 |
| FWA-80B | 80 | 670 | 6000 | 7.7 |
| FWA-100B | 100 | 1200 | 12000 | 9.0 |
| FWA-125B | 125 | 1870 | 18000 | 11.2 |
| FWA-150B | 150 | 2700 | 26000 | 13.5 |
| FWA-200B | 200 | 4780 | 45000 | 17.6 |
| FWA-250B | 250 | 7470 | 70000 | 22.5 |
| FWA-300B | 300 | 10760 | 100000 | 27.0 |
| FWA-350B | 350 | 15700 | 140000 | 30.6 |
| FWA-400B | 400 | 20300 | 180000 | 35.2 |
| FWA-500A | 500 | 39000 | 120000 | 35.0 |
| FWA-600A | 600 | 46000 | 140000 | 47.0 |
| FWA-700A | 700 | 75000 | 220000 | 49.0 |
| FWA-800A | 800 | 92000 | 280000 | 58.0 |
| FWA-1000A | 1000 | 170000 | 510000 | 60.0 |

• Watts loss provided at rated current.
• See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Low watts loss
- Superior cycling capability

Typical Applications

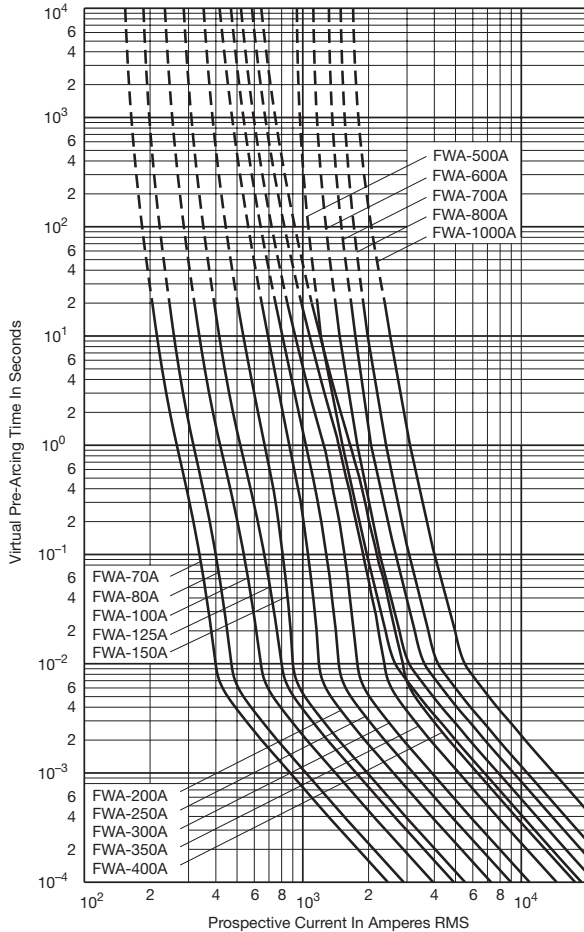
- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

High Speed Fuses

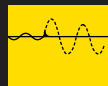
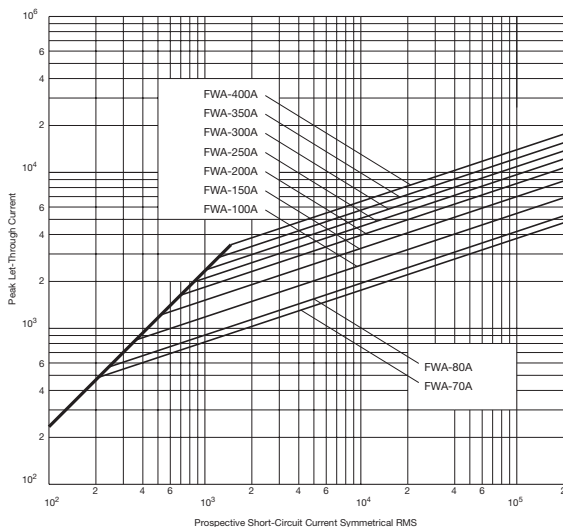
North American — FWA 150V: 70-1000A

FWA 70-1000A: 150V

Time-Current Curve



Peak Let-Through Curve



Did You Know?

Cooper Bussmann® Equipped Solar Car Wins American Solar Challenge Race



The University of Missouri-Rolla Solar Car Team won the prestigious American Solar Challenge Race recently with

circuit protection provided by Cooper Bussmann FWX series 80 amp semiconductor fuses.

The grueling endurance test pitted UM-Rolla's "Solar Miner IV" against race teams from some of the most famous engineering schools in the nation. By driving approximately 2,300 miles from Chicago to Claremont (a suburb of Los Angeles), in just 51 hours, 47 minutes and 39 seconds, they set a race record by more than four hours.

North American — FWX 250V: 35-2500A

FWX

Specifications

Description: North American style stud-mount and flush-end fuses.

Dimensions: See Dimensions illustrations.

Ratings:

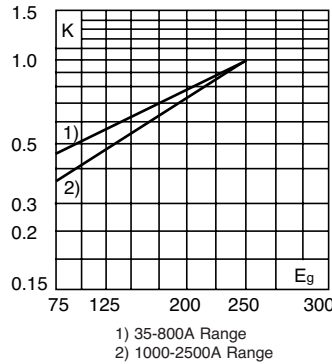
- Volts: — 250Vac
- Amps: — 35-2500A
- IR: — 200kA RMS Sym.

Agency Information: CE, UL Recognized & CSA Component Acceptance on 35-800A fuses (20kA IR @250Vdc).

Electrical Characteristics

Total Clearing I²t

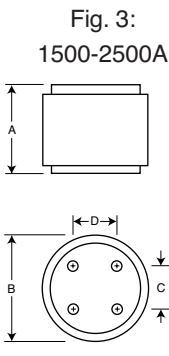
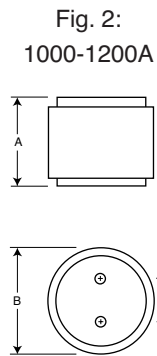
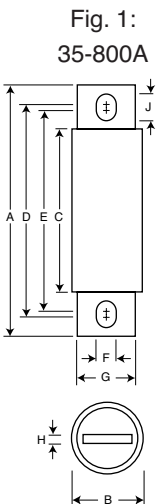
The total clearing I²t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I²t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g, (rms).



Dimensions (in)

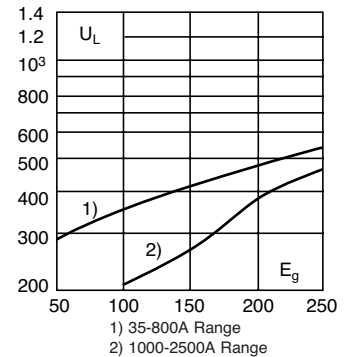
| Amp Range | Fig. A | B | C | D | E | F | G | H | J | Tapped Thread Depth |
|-----------|--------|------|------|------|------|------|------|------|------|---------------------|
| 35-60 | 1 | 3.19 | 0.81 | 1.59 | 2.59 | 2.25 | 0.34 | 0.63 | 0.13 | 0.52 |
| 70-200 | 1 | 3.13 | 1.22 | 1.59 | 2.44 | 2.19 | 0.34 | 1.00 | 0.19 | 0.47 |
| 225-600 | 1 | 3.84 | 1.50 | 1.59 | 2.94 | 2.25 | 0.41 | 1.00 | 0.25 | 0.75 |
| 700-800 | 1 | 3.84 | 2.00 | 1.59 | 3.03 | 2.28 | 0.41 | 1.50 | 0.25 | 0.78 |
| 1000-1200 | 2 | 2.59 | 3.00 | 1.50 | — | — | — | — | — | 3/16"-24 x 1/2" |
| 1500-2500 | 3 | 2.59 | 3.50 | 1.50 | 1.50 | — | — | — | — | 3/16"-24 x 1/2" |

1mm = 0.0394" / 1" = 25.4mm



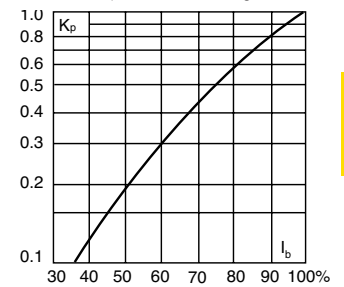
Arc Voltage

This curve gives the peak arc voltage, U_L, which may appear across the fuse during its operation as a function of the applied working voltage, E_g, (rms) at a power factor of 15%.



Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p, is given as a function of the RMS load current, I_b, in % of the rated current.



Catalog Numbers

| Catalog Number | Electrical Characteristics | | | |
|----------------|----------------------------|---------------------------------------|------------------|------------|
| | Rated Current RMS-Amps | I ² t (A ² Sec) | | Watts Loss |
| | | Pre-arc | Clearing at 250V | |
| FWX-35A | 35 | 50 | 230 | 4.2 |
| FWX-40A | 40 | 60 | 310 | 5.2 |
| FWX-45A | 45 | 80 | 390 | 5.7 |
| FWX-50A | 50 | 100 | 520 | 6.0 |
| FWX-60A | 60 | 140 | 740 | 8.1 |
| FWX-70A | 70 | 330 | 1400 | 7.2 |
| FWX-80A | 80 | 430 | 1850 | 8.1 |
| FWX-90A | 90 | 570 | 2450 | 9.0 |
| FWX-100A | 100 | 740 | 3150 | 10.0 |
| FWX-125A | 125 | 1130 | 4850 | 12.5 |
| FWX-150A | 150 | 1620 | 6950 | 15.7 |
| FWX-175A | 175 | 2170 | 9300 | 18.5 |
| FWX-200A | 200 | 2790 | 12000 | 22 |
| FWX-225A | 225 | 3210 | 14700 | 24 |
| FWX-250A | 250 | 3960 | 18100 | 27 |
| FWX-275A | 275 | 4720 | 21600 | 31 |
| FWX-300A | 300 | 6000 | 27300 | 32 |
| FWX-350A | 350 | 10600 | 48600 | 39 |
| FWX-400A | 400 | 14500 | 66100 | 44 |
| FWX-450A | 450 | 22100 | 101000 | 49 |
| FWX-500A | 500 | 28000 | 128000 | 54 |
| FWX-600A | 600 | 41100 | 188000 | 62 |
| FWX-700A | 700 | 48800 | 190000 | 72 |
| FWX-800A | 800 | 59000 | 230000 | 84 |
| FWX-1000AH | 1000 | 44000 | 360000 | 100 |
| FWX-1200AH | 1200 | 92000 | 750000 | 103 |
| FWX-1500AH | 1500 | 120000 | 880000 | 140 |
| FWX-1600AH | 1600 | 160000 | 1200000 | 140 |
| FWX-2000AH | 2000 | 320000 | 2300000 | 151 |
| FWX-2500AH | 2500 | 670000 | 4700000 | 163 |

* Watts loss provided at rated current. * See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Superior cycling capability

Typical Applications

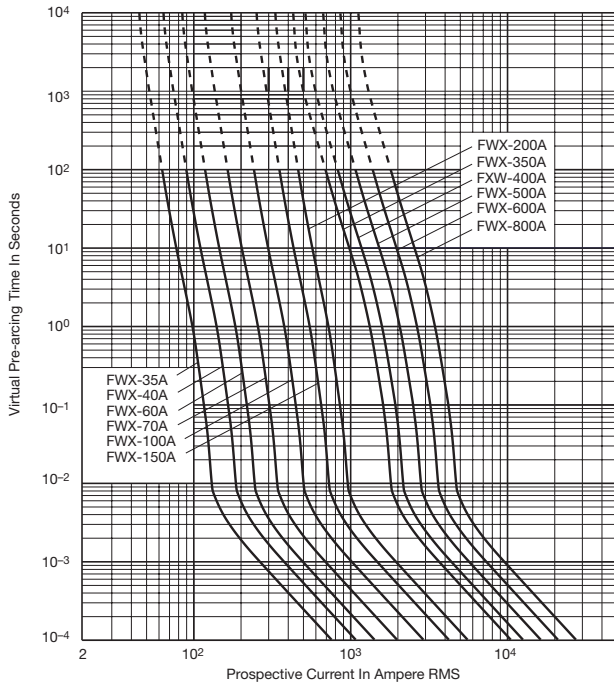
- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

High Speed Fuses

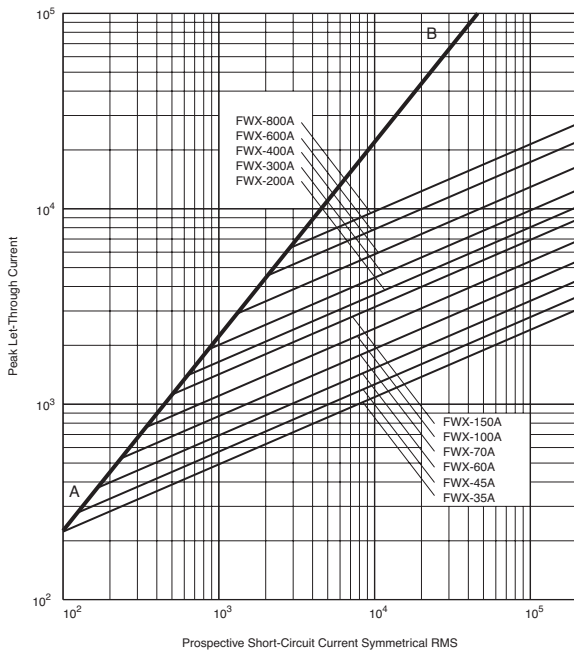
North American — FWX 250V: 35-2500A

FWX 35-800A: 250V

Time-Current Curve



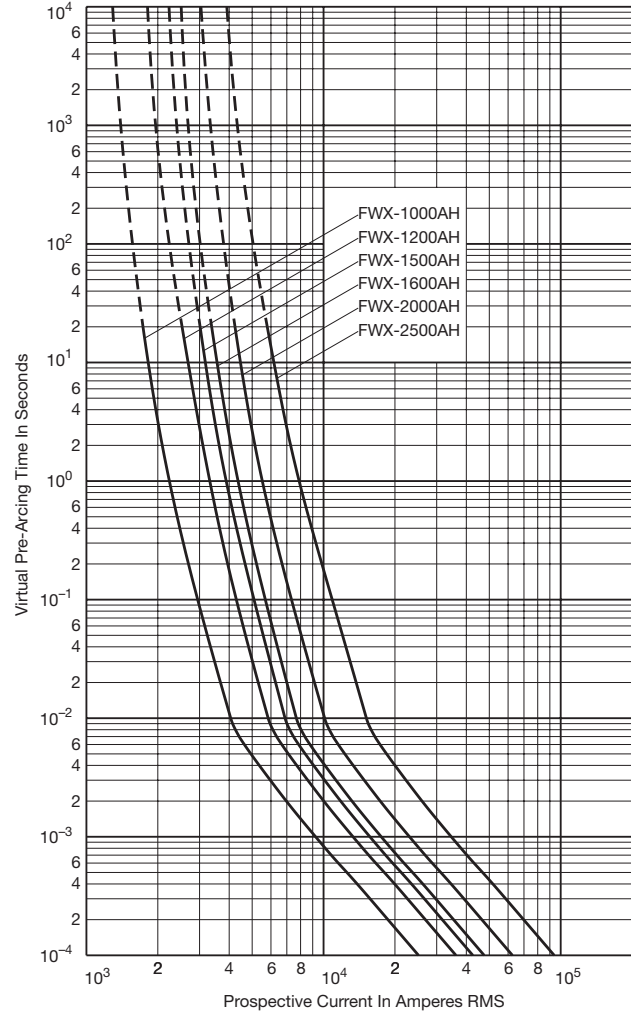
Peak Let-Through Curve



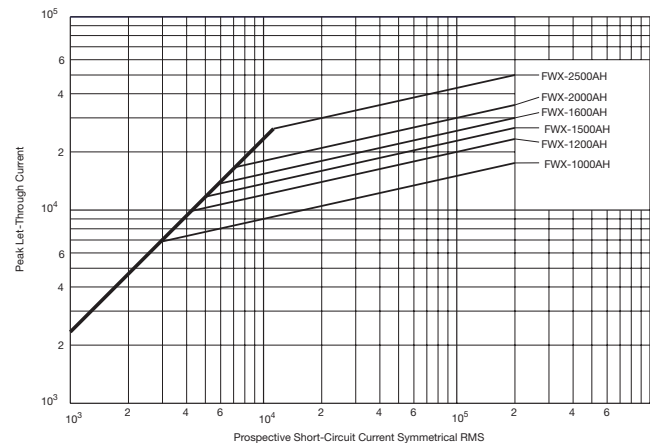
Data Sheet: 359

FWX 1000-2500A(H): 250V

Time-Current Curve



Peak Let-Through Curve



Data Sheet: 35785299

North American — FWH 500V: 35-1600A

FWH

Specifications

Description: North American style stud-mount fuses.

Dimensions: See Dimensions illustration.

Ratings:

Volts: — 500Vac

Amps: — 35-1600A

IR: — 200kA Sym.

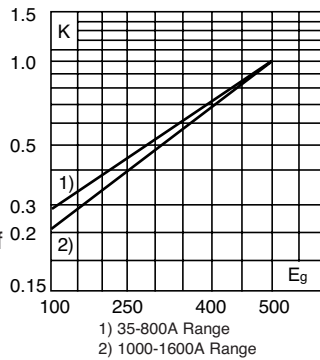
— 50kA @ 500Vdc

Agency Information: CE, UL Recognition & CSA Component Acceptance on 35-800A only (50kA IR@500Vdc). UL Recognition on 35-1200A only, CSA Component Acceptance: 35-1600A.

Electrical Characteristics

Total Clearing I²t

The total clearing I²t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I²t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g, (rms).



Dimensions (in)

| Amp Range | Fig. | A | B | C | D | E | F | G | H | J |
|-----------|------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 35-60 | 1 | 3.188 | 0.813 | 1.593 | 2.541 | 2.193 | 0.344 | 0.719 | 0.125 | 0.518 |
| 70-100 | 1 | 3.625 | 0.947 | 1.736 | 2.853 | 2.807 | 0.352 | 0.750 | 0.125 | 0.375 |
| 125-200 | 1 | 3.625 | 1.156 | 1.836 | 2.892 | 2.768 | 0.344 | 1.000 | 0.188 | 0.406 |
| 225-400 | 1 | 4.340 | 1.500 | 2.090 | 3.440 | 2.750 | 0.410 | 1.000 | 0.250 | 0.750 |
| 450-600 | 1 | 4.340 | 2.000 | 2.090 | 3.530 | 2.780 | 0.410 | 1.500 | 0.250 | 0.780 |
| 700-800 | 1 | 6.340 | 2.500 | 2.090 | 4.970 | 3.440 | 0.530 | 2.000 | 0.380 | 1.300 |
| 1000-1200 | 1 | 6.969 | 3.000 | 3.219 | 5.465 | 4.475 | 0.625 | 2.375 | 0.438 | 1.120 |
| 1400-1600 | 2 | See Drawing | | | | | | | | |

1mm = 0.0394" / 1" = 25.4mm

Fig. 1: 35-1200A

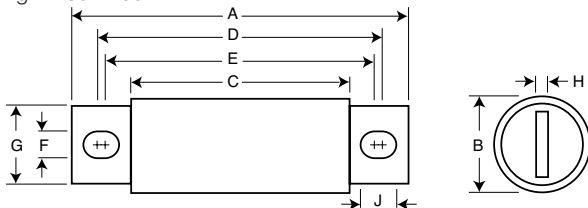
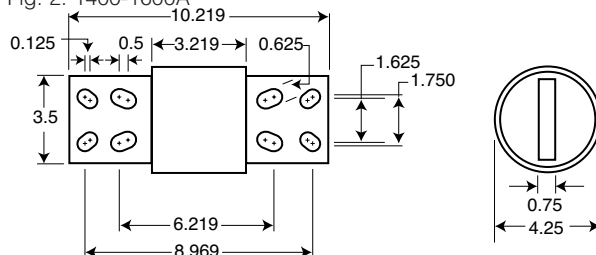
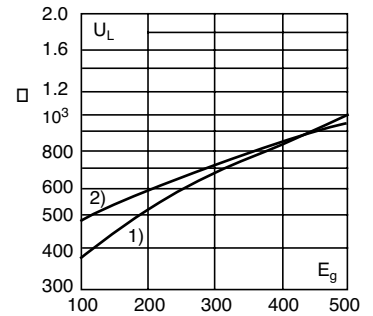


Fig. 2: 1400-1600A



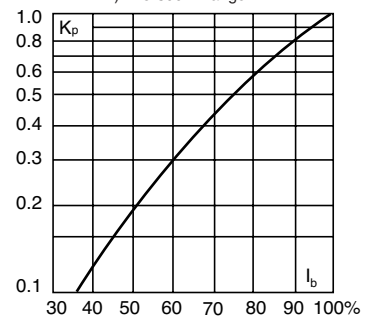
Arc Voltage

This curve gives the peak arc voltage, U_L, which may appear across the fuse during its operation as a function of the applied working voltage, E_g, (rms) at a power factor of 15%.



Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p, is given as a function of the RMS load current, I_b, in % of the rated current.



Catalog Numbers

| Catalog Numbers | Rated Current RMS-Amps | Electrical Characteristics | | |
|-----------------|------------------------|---------------------------------------|------------------|------------|
| | | I ² t (A ² Sec) | | Watts Loss |
| | | Pre-arc | Clearing at 500V | |
| FWH-35B | 35 | 34 | 150 | 8 |
| FWH-40B | 40 | 76 | 320 | 7.5 |
| FWH-45B | 45 | 105 | 450 | 7.5 |
| FWH-50B | 50 | 135 | 670 | 7.5 |
| FWH-60B | 60 | 210 | 900 | 9.9 |
| FWH-70B | 70 | 210 | 900 | 10.6 |
| FWH-80B | 80 | 305 | 1400 | 12.7 |
| FWH-90B | 90 | 360 | 1600 | 15 |
| FWH-100B | 100 | 475 | 2000 | 17 |
| FWH-125B | 125 | 800 | 3500 | 25 |
| FWH-150B | 150 | 1100 | 4600 | 30 |
| FWH-175B | 175 | 1450 | 6200 | 35 |
| FWH-200B | 200 | 1900 | 8500 | 40 |
| FWH-225A | 225 | 4600 | 23300 | 39 |
| FWH-250A | 250 | 6300 | 32200 | 41 |
| FWH-275A | 275 | 7900 | 40300 | 46 |
| FWH-300A | 300 | 9800 | 49800 | 51 |
| FWH-325A | 325 | 13700 | 63800 | 53 |
| FWH-350A | 350 | 14500 | 72900 | 58 |
| FWH-400A | 400 | 19200 | 96700 | 65 |
| FWH-450A | 450 | 24700 | 127000 | 74 |
| FWH-500A | 500 | 29200 | 149000 | 84 |
| FWH-600A | 600 | 41300 | 206000 | 108 |
| FWH-700A | 700 | 55000 | 298000 | 120 |
| FWH-800A | 800 | 76200 | 409000 | 129 |
| FWH-1000A | 1000 | 92000 | 450000 | 145 |
| FWH-1200A | 1200 | 122000 | 600000 | 180 |
| FWH-1400A | 1400 | 200000 | 1000000 | 210 |
| FWH-1600A | 1600 | 290000 | 1400000 | 230 |

*Watts loss provided at rated current.

• See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Low watts loss
- Superior cycling capability

Typical Applications

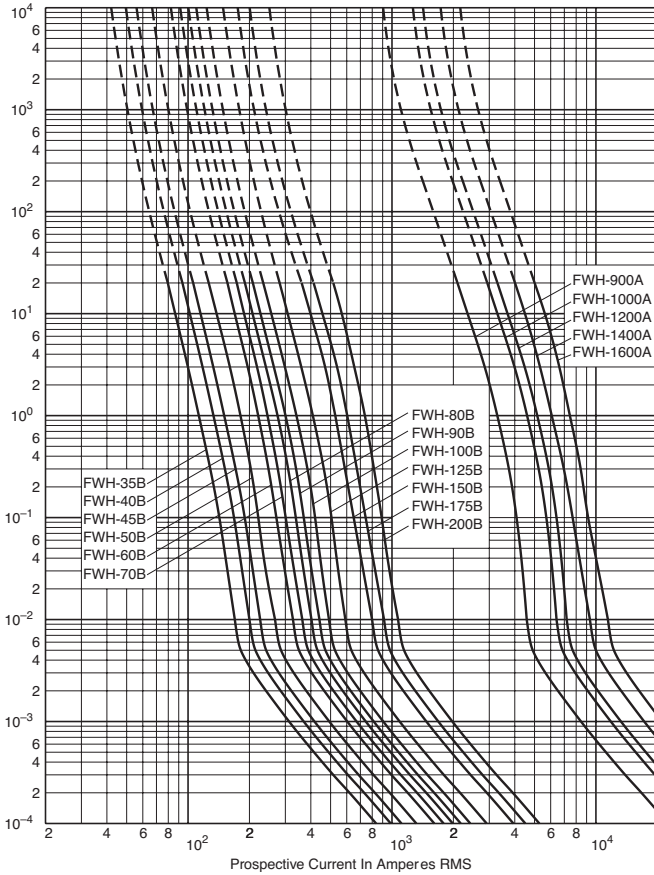
- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

High Speed Fuses

North American — FWH 500V: 35-1600A

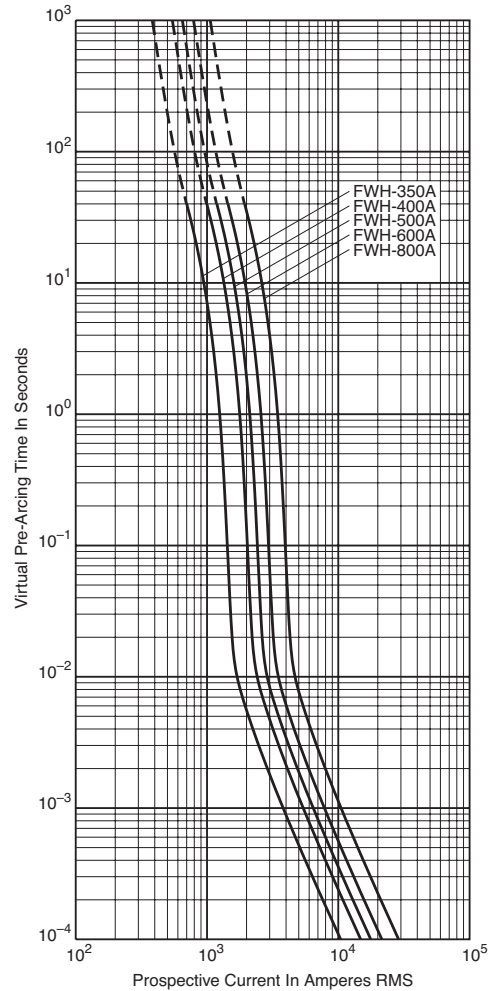
FWH 35-200A(B) & 900-1600A(A): 500V

Time-Current Curve

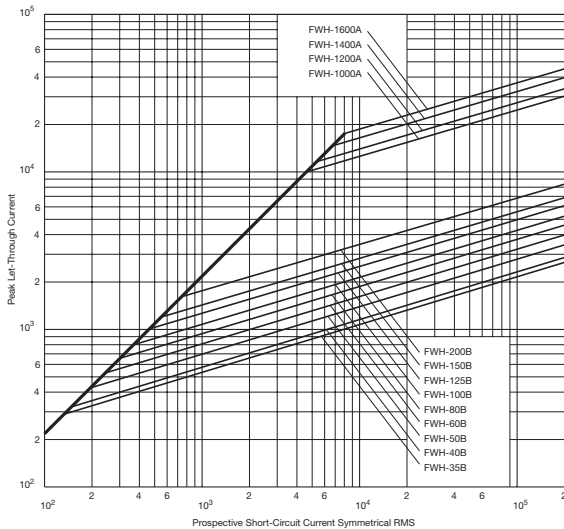


FWH 225-800A: 500V

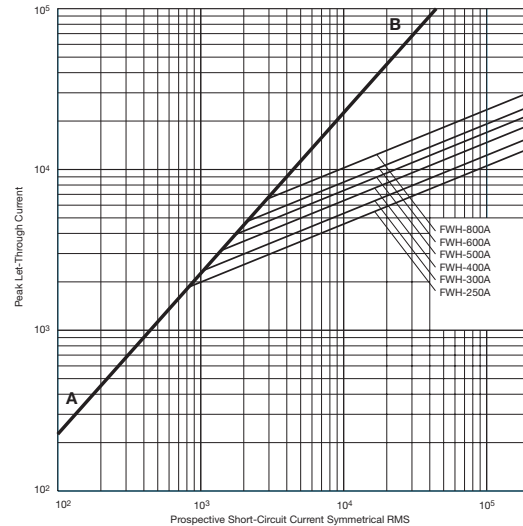
Time-Current Curve



Peak Let-Through Curve



Peak Let-Through Curve



North American — KAC 600V: 1-1000A

KAC

Specifications

Description: North American style stud-mount fuses. These 600V fuses are supplied as replacements only. For new installations, Cooper Bussmann recommends the 700V FWP series fuse.

Dimensions: See Dimensions illustrations.

Ratings:

Volts: — 600Vac

Amps: — 1-1000A

IR: — 200kA RMS Sym.

Agency Information: CE, UL Recognition on 1-600A only.



Catalog Numbers (-amps)

| | | |
|----------|---------|----------|
| KAC-1 | KAC-25 | KAC-175 |
| KAC-2 | KAC-30 | KAC-200 |
| KAC-3 | KAC-35 | KAC-225 |
| KAC-4 | KAC-40 | KAC-250 |
| KAC-5 | KAC-45 | KAC-300 |
| KAC-6 | KAC-50 | KAC-350 |
| KAC-7 | KAC-60 | KAC-400 |
| KAC-8 | KAC-70 | KAC-450 |
| KAC-9 | KAC-80 | KAC-500 |
| KAC-10 | KAC-90 | KAC-600 |
| KAC-12 | KAC-100 | KAC-700 |
| KAC-15 | KAC-110 | KAC-800 |
| KAC-17.5 | KAC-125 | KAC-1000 |
| KAC-20 | KAC-150 | |

• Consult Cooper Bussmann for dc ratings.
• See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I^2t)
- Low watts loss
- Superior cycling capability

Typical Applications

- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

High Speed Fuses

Dimensions (in)

| Amp Range | Fig. | A | B1 | B2 | B3 | C | D | E | F | G | H |
|-----------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1-30A | 1 | 2.875 | 2.500 | — | — | 1.875 | 0.406 | — | 0.563 | 0.063 | 0.257 |
| 35-60A | 2 | 4.375 | — | 3.750 | 3.500 | 2.750 | 0.625 | 0.343 | 0.813 | 0.094 | 0.468 |
| 70-100A | 2 | 5.000 | — | 4.063 | 3.656 | 2.750 | 0.750 | 0.406 | 1.000 | 0.125 | 0.609 |
| 110-200A | 2 | 5.140 | — | 4.390 | 3.766 | 2.906 | 1.000 | 0.406 | 1.500 | 0.188 | 0.718 |
| 225-400A | 2 | 6.182 | — | 4.815 | 4.565 | 3.000 | 1.625 | 0.562 | 2.000 | 0.250 | 0.687 |
| 450-800A | 1 | 6.250 | 4.750 | — | — | 3.063 | 2.000 | — | 2.500 | 0.250 | 0.563 |
| 1000A | 1 | 7.250 | 4.750 | — | — | 3.063 | 2.750 | — | 3.500 | 0.375 | 0.563 |

1mm = 0.0394" / 1" = 25.4mm

Fig. 1: 1-30 & 450-1000A

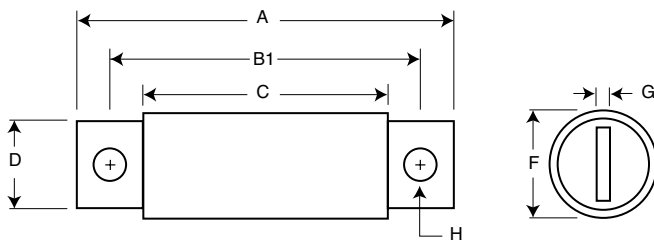
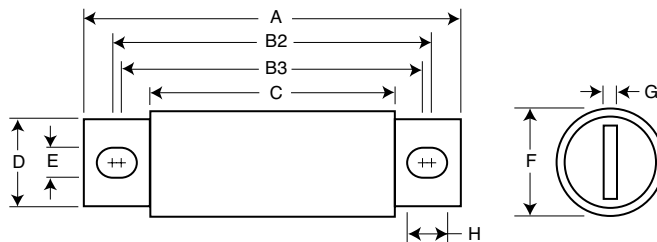


Fig. 2: 35-400A



North American — KBC 600V: 35-800A

KBC

Specifications

Description: North American style stud-mount and flush-end fuses. These 600V fuses are supplied as replacements only. For new installations, Cooper Bussmann recommends the 700V FWP series fuse.

Dimensions: See Dimensions illustrations.

Ratings:

Volts: — 600Vac

Amps: — 35-800A

IR: — 200kA RMS Sym.

Agency Information: CE, UL Recognition on 35-600A only.



Catalog Numbers (-amps)

| | | |
|--------|---------|---------|
| KBC-35 | KBC-100 | KBC-300 |
| KBC-40 | KBC-110 | KBC-350 |
| KBC-45 | KBC-125 | KBC-400 |
| KBC-50 | KBC-150 | KBC-450 |
| KBC-60 | KBC-175 | KBC-500 |
| KBC-70 | KBC-200 | KBC-600 |
| KBC-80 | KBC-225 | KBC-800 |
| KBC-90 | KBC-250 | |

- Consult Cooper Bussmann for dc ratings.
- See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Low watts loss
- Superior cycling capability

Typical Applications

- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

Dimensions (in)

| Amp Range | Fig. | A | B | C | D | E | F | G | H | I | |
|-----------|------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| 35-60A | 1 | 4.375 | 3.750 | 3.500 | 2.750 | 0.343 | 0.625 | 0.813 | 0.094 | 0.468 | |
| 70-100A | 2 | See Drawing | | | | | | | | | |
| 110-200A | 1 | 4.406 | 3.719 | 3.594 | 2.906 | 0.312 | 0.875 | 1.219 | 0.187 | 0.375 | |
| 225-400A | 1 | 5.125 | 4.188 | 3.563 | 2.906 | 0.406 | 1.000 | 1.500 | 0.250 | 0.719 | |
| 450-600A | 1 | 5.125 | 4.389 | 3.687 | 2.875 | 0.406 | 1.500 | 2.000 | 0.250 | 0.757 | |
| 800A | 3 | See Drawing | | | | | | | | | |

1mm = 0.0394" / 1" = 25.4mm

Fig. 1: 35-60 and 110-600A

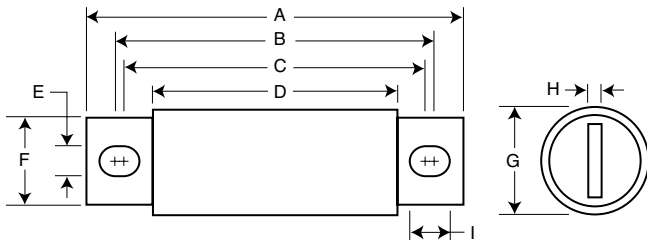


Fig. 2: 70-100A

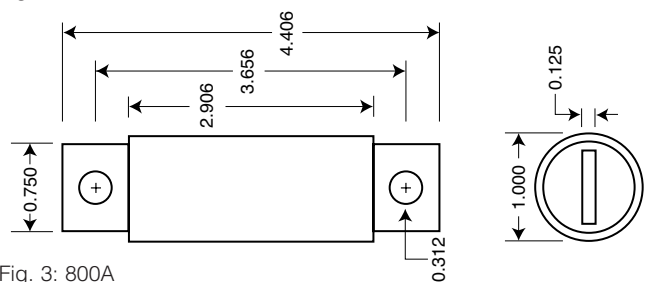
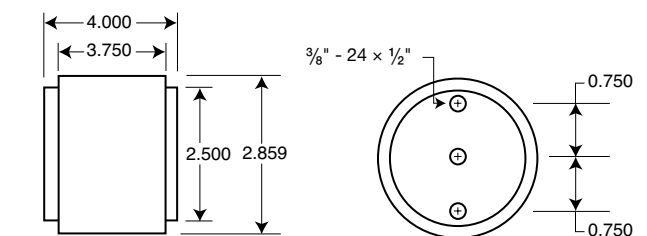


Fig. 3: 800A



Did You Know?

Cooper Bussmann® Paul P. Gubany Center Receives Prestigious ASTA Accreditation

The Cooper Bussmann Paul P. Gubany Center in St. Louis is certified by Britain's prestigious ASTA (Associated Short Circuit Testing Authority) to perform short testing of its own devices designed to operate to ASTA requirements which are closely tied to IEC requirements. The Gubany Center is the only testing facility available in North or South America for this product certification.

The Gubany Center has equipment capable of generating 300,000A of current at 600Vac three-phase, and 100,000A at 170Vdc, under carefully controlled conditions. It offers a wider range of current voltage and frequency configurations than any other facility of its kind in the world, and is built to exceed the short circuit capacity of today's high power electrical distribution systems.

North American — FWP 700V: 5-1200A

FWP

Specifications

Description: North American style stud-mount fuses.

Dimensions: See Dimensions illustrations.

Ratings:

Volts: — 700Vac

Amps: — 5-1200A

IR: — 200kA RMS Sym.

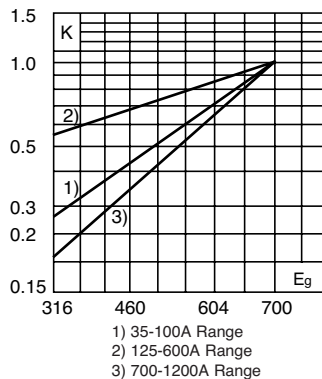
— 50kA @700Vdc

Agency Information: CE, UL Recognition & CSA Component Acceptance on 5-800A

Electrical Characteristics

Total Clearing I²t

The total clearing I²t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I²t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g, (rms).



Dimensions (in)

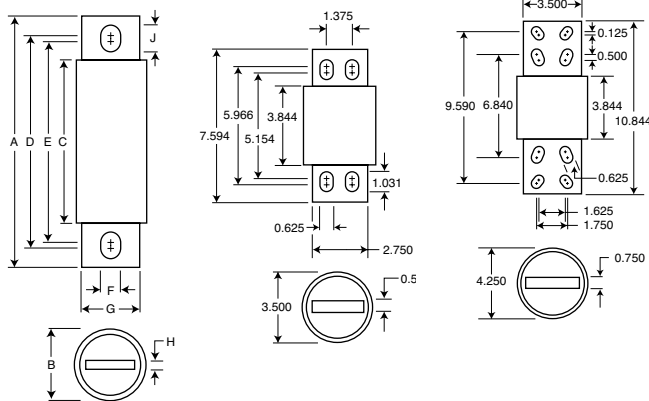
| Amp Range | Fig. | A | B | C | D | E | F | G | H | I |
|-----------|------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5-30 | 1 | 2.870 | 0.563 | 1.855 | 2.477 | 2.477 | 0.250 | 0.405 | 0.063 | 0.250 |
| 35-60 | 1 | 4.375 | 0.813 | 2.750 | 3.708 | 3.312 | 0.344 | 0.725 | 0.125 | 0.542 |
| 70-100 | 1 | 4.406 | 0.947 | 2.594 | 3.625 | 3.563 | 0.344 | 0.750 | 0.125 | 0.375 |
| 125-200 | 1 | 5.090 | 1.500 | 2.840 | 4.190 | 3.500 | 0.410 | 1.000 | 0.250 | 0.750 |
| 225-400 | 1 | 5.090 | 2.000 | 2.840 | 4.280 | 3.530 | 0.410 | 1.500 | 0.250 | 0.780 |
| 450-600 | 1 | 7.090 | 2.500 | 2.840 | 5.720 | 4.190 | 0.530 | 2.000 | 0.380 | 1.300 |
| 700-800 | 1 | 6.630 | 2.000 | 2.844 | 5.562 | 5.062 | 0.625 | 1.500 | 0.250 | 0.875 |
| 900-1000 | 2 | See Drawing | | | | | | | | |
| 1200 | 3 | See Drawing | | | | | | | | |

1mm = 0.0394" / 1" = 25.4mm

Fig. 1: 5-800A

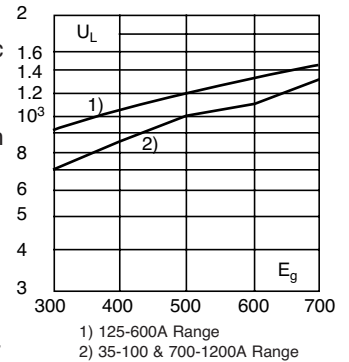
Fig. 2: 900-1000A

Fig. 3: 1200A



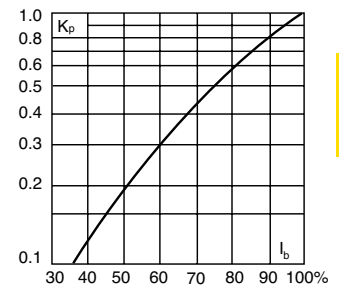
Arc Voltage

This curve gives the peak arc voltage, U_L, which may appear across the fuse during its operation as a function of the applied working voltage, E_g, (rms) at a power factor of 15%.



Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p, is given as a function of the RMS load current, I_b, in % of the rated current.



Catalog Numbers

| Catalog Numbers | Rated Current RMS-Amps | Electrical Characteristics | | | Watts Loss |
|-----------------|------------------------|---------------------------------------|---------|------------------|------------|
| | | I ² t (A ² Sec) | | Clearing at 700V | |
| | | Pre-arc | | | |
| FWP-5B | 5 | 1.6 | 10 | 1.5 | |
| FWP-10B | 10 | 3.6 | 20 | 4 | |
| FWP-15B | 15 | 10 | 75 | 5.5 | |
| FWP-20B | 20 | 26 | 180 | 6 | |
| FWP-25B | 25 | 44 | 340 | 7 | |
| FWP-30B | 30 | 58 | 450 | 9 | |
| FWP-35B | 35 | 34 | 160 | 12 | |
| FWP-40B | 40 | 76 | 320 | 12 | |
| FWP-50B | 50 | 135 | 600 | 12 | |
| FWP-60B | 60 | 210 | 950 | 15.5 | |
| FWP-70B | 70 | 305 | 2000 | 18 | |
| FWP-80B | 80 | 360 | 2400 | 21 | |
| FWP-90B | 90 | 415 | 2700 | 25 | |
| FWP-100B | 100 | 540 | 3500 | 27 | |
| FWP-125A | 125 | 1800 | 7300 | 28 | |
| FWP-150A | 150 | 2900 | 11700 | 32 | |
| FWP-175A | 175 | 4200 | 16700 | 35 | |
| FWP-200A | 200 | 5500 | 22000 | 43 | |
| FWP-225A | 225 | 7700 | 31300 | 45 | |
| FWP-250A | 250 | 10500 | 42500 | 48 | |
| FWP-300A | 300 | 17600 | 71200 | 58 | |
| FWP-350A | 350 | 23700 | 95600 | 65 | |
| FWP-400A | 400 | 31000 | 125000 | 78 | |
| FWP-450A | 450 | 36400 | 137000 | 94 | |
| FWP-500A | 500 | 45200 | 170000 | 107 | |
| FWP-600A | 600 | 66700 | 250000 | 122 | |
| FWP-700A | 700 | 54000 | 300000 | 125 | |
| FWP-800A | 800 | 78000 | 450000 | 140 | |
| FWP-900A | 900 | 91500 | 530000 | 150 | |
| FWP-1000A | 1000 | 120000 | 600000 | 170 | |
| FWP-1200A | 1200 | 195000 | 1100000 | 190 | |

• Watts loss provided at rated current.
• See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Superior cycling capability

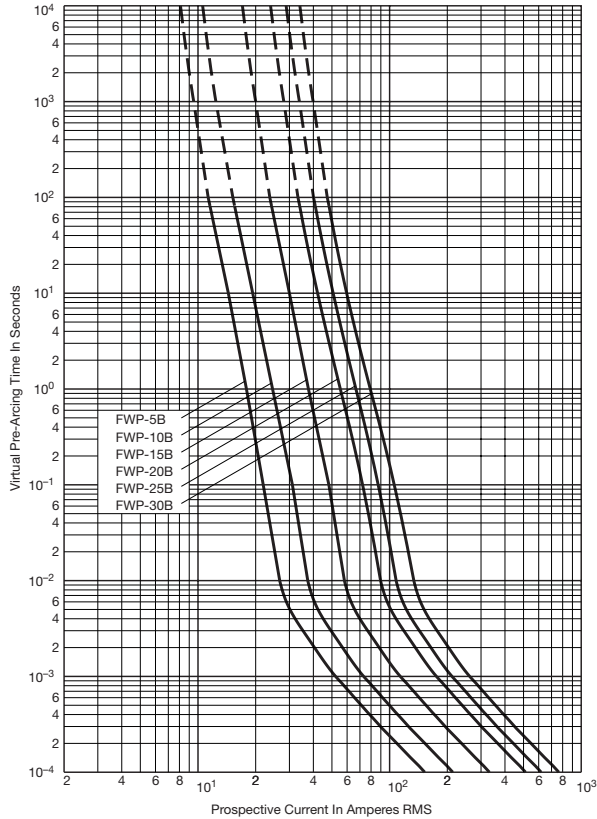
Typical Applications

- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

North American — FWP 700V: 5-1200A

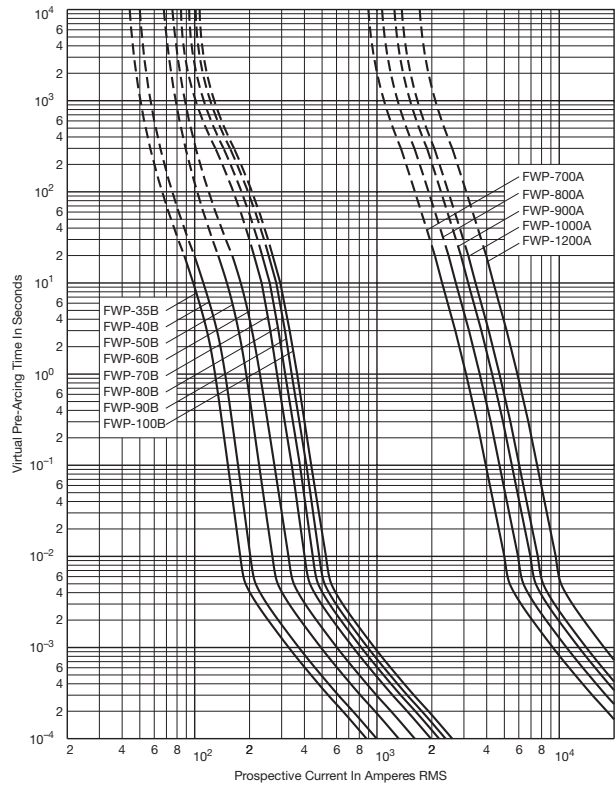
FWP 5-30A(B): 700V

Time-Current Curve

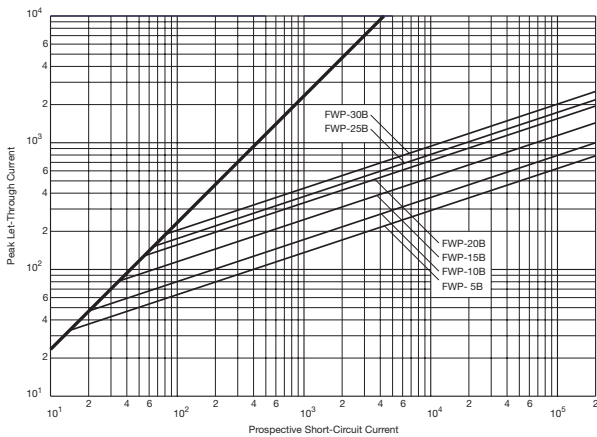


FWP 35-100A(B) & 700-1200A(A): 700V

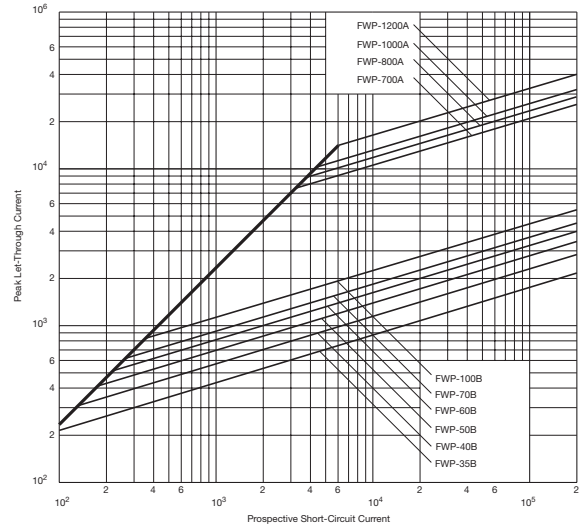
Time-Current Curve



Peak Let-Through Curve



Peak Let-Through Curve

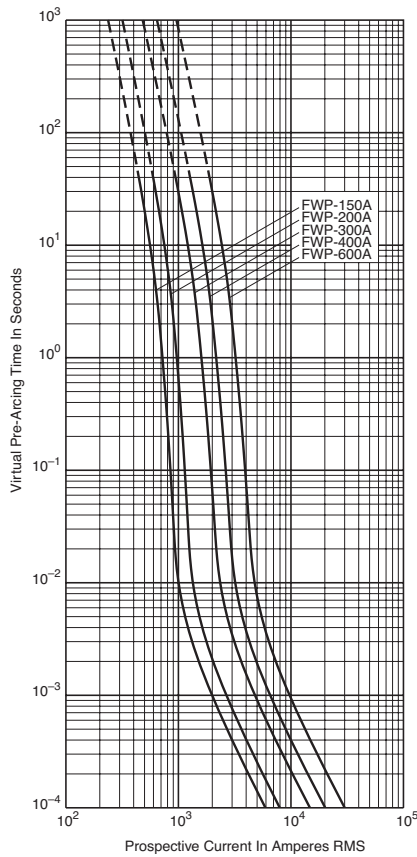


High Speed Fuses

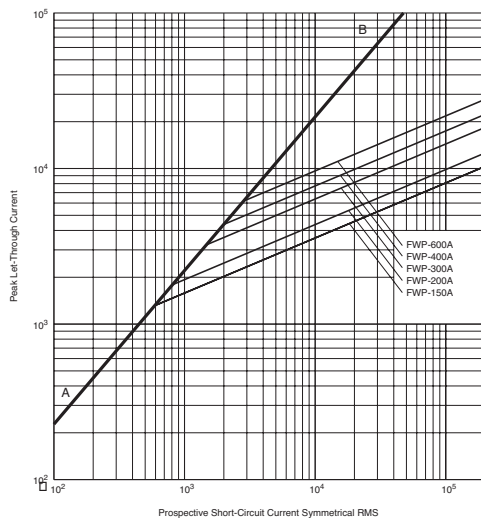
North American — FWP 700V: 5-1200A

FWP 125-600A: 700V

Time-Current Curve



Peak Let-Through Curve



Did You Know?

Cooper Bussmann Named First in Fuses by Readers of Plant Services Magazine

Cooper Bussmann has been named as the vendor offering the highest value in electrical fuses in a recent fill-in-the-blank survey of nearly 40,000 qualified readers of Plant Services Magazine. A full 70 percent of survey respondents said Cooper Bussmann was their number one choice. The nearest competitor weighed in at only 7 percent. The 63 percent spread was the widest of all 63 product categories, ranging from aerial work platforms to welding equipment. According to Plant Services editors, the products chosen are those “that deliver the combination of functionality, durability and low maintenance that add up to the lowest estimated life-cycle cost”—those offering the very best value in their product category.

High Speed Fuses

High Speed Fuses

North American — FWJ 1000V: 35-2000A

FWJ

Specifications

Description: North American style stud-mount fuses.

Dimensions: See Dimensions illustration.

Ratings:

- Volts: — 1000Vac
- Amps: — 35-200A
- IR: — 25kA (35-200A)
- 100kA (250-2000A)
- 50kA @ 800Vdc (450-600A)

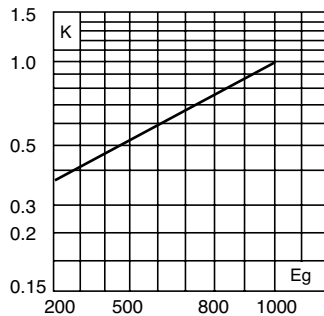
Agency Information: CE, UL Recognition on 35-600A only.



Electrical Characteristics

Total Clearing I²t

The total clearing I²t at rated voltage and at power factor of 15% are given in the electrical characteristics. For other voltages, the clearing I²t is found by multiplying by correction factor, K, given as a function of applied working voltage, E_g, (rms).

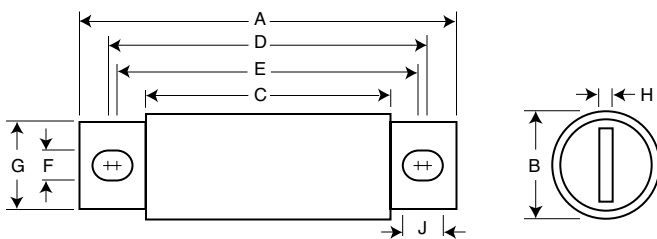


Dimensions (in)

| Amp Range | Fig. | A | B | C | D | E | F | G | H | I |
|-----------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 35-60 | 1 | 5.000 | 0.940 | 3.110 | 4.235 | 4.180 | 0.352 | 0.750 | 0.125 | 0.380 |
| 70-100 | 1 | 4.932 | 1.125 | 3.085 | 4.266 | 4.156 | 0.352 | 1.000 | 0.188 | 0.407 |
| 125-200 | 1 | 5.685 | 1.526 | 3.261 | 4.803 | 4.055 | 0.445 | 1.000 | 0.250 | 0.819 |
| 250-400 | 1 | 5.768 | 2.000 | 3.500 | 4.811 | 4.150 | 0.433 | 1.500 | 0.250 | 0.764 |
| 500-600 | 1 | 7.201 | 2.500 | 3.465 | 5.984 | 4.706 | 0.562 | 2.000 | 0.375 | 1.201 |
| 800-2000 | 1 | 6.811 | 3.500 | 3.312 | 5.472 | 4.962 | 0.625 | 2.750 | 0.500 | 0.880 |

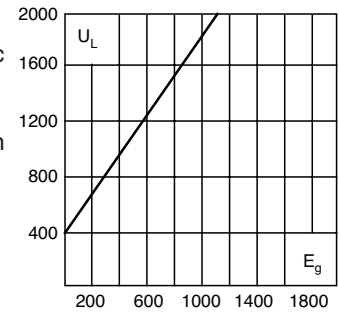
1mm = 0.0394" / 1" = 25.4mm

Fig. 1: 35-2000A



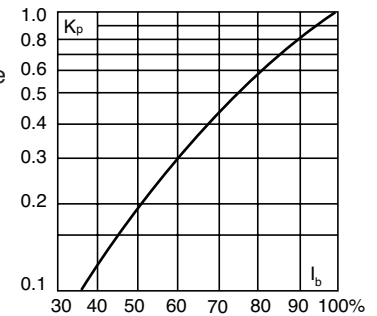
Arc Voltage

This curve gives the peak arc voltage, U_L, which may appear across the fuse during its operation as a function of the applied working voltage, E_g, (rms) at a power factor of 15%.



Power Losses

Watts loss at rated current is given in the electrical characteristics. The curve allows the calculation of the power losses at load currents lower than the rated current. The correction factor, K_p, is given as a function of the RMS load current, I_b, in % of the rated current.



Catalog Numbers

| Catalog Numbers | Rated Current RMS-Amps | Electrical Characteristics | | |
|-----------------|------------------------|---------------------------------------|-------------------|------------|
| | | I ² t (A ² Sec) | | Watts Loss |
| | | Pre-arc | Clearing at 1000V | |
| FWJ-35A | 35 | 210 | 2000 | 7 |
| FWJ-40A | 40 | 300 | 2500 | 8 |
| FWJ-50A | 50 | 470 | 3500 | 10 |
| FWJ-60A | 60 | 670 | 5000 | 11 |
| FWJ-70A | 70 | 1100 | 6900 | 12 |
| FWJ-80A | 80 | 1550 | 9700 | 13 |
| FWJ-90A | 90 | 1900 | 12000 | 14 |
| FWJ-100A | 100 | 2800 | 17500 | 15 |
| FWJ-125A | 125 | 4800 | 35000 | 16 |
| FWJ-150A | 150 | 6300 | 45000 | 25 |
| FWJ-175A | 175 | 7500 | 65000 | 30 |
| FWJ-200A | 200 | 11700 | 80000 | 32 |
| FWJ-250A | 250 | 16000 | 112000 | 50 |
| FWJ-300A | 300 | 23500 | 164000 | 56 |
| FWJ-350A | 350 | 33000 | 231000 | 62 |
| FWJ-400A | 400 | 47000 | 330000 | 67 |
| FWJ-500A | 500 | 39500 | 329000 | 95 |
| FWJ-600A | 600 | 61000 | 520000 | 105 |
| FWJ-800A | 800 | 87000 | 500000 | 182 |
| FWJ-1000A | 1000 | 190000 | 1100000 | 206 |
| FWJ-1200A | 1200 | 370000 | 2100000 | 240 |
| FWJ-1400A | 1400 | 470000 | 2700000 | 248 |
| FWJ-1600A | 1600 | 700000 | 4000000 | 267 |
| FWJ-1800A | 1800 | 925000 | 5300000 | 239 |
| FWJ-2000A | 2000 | 1330000 | 7600000 | 244 |

• Watts loss provided at rated current.
• See accessories on page 106.

Features and Benefits

- Excellent dc performance
- Low arc voltage and low energy let-through (I²t)
- Low watts loss
- Superior cycling capability

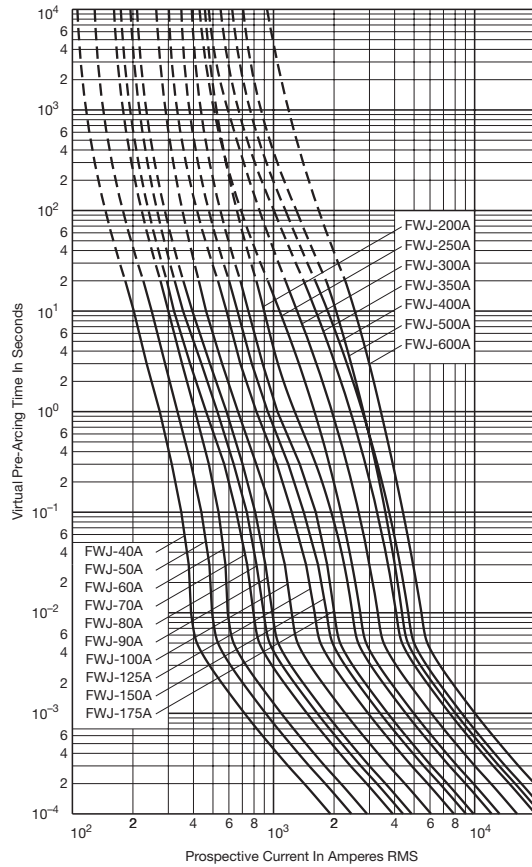
Typical Applications

- DC common bus
- DC drives
- Power converters/rectifiers
- Reduced voltage starters

North American — FWJ 1000V: 35-2000A

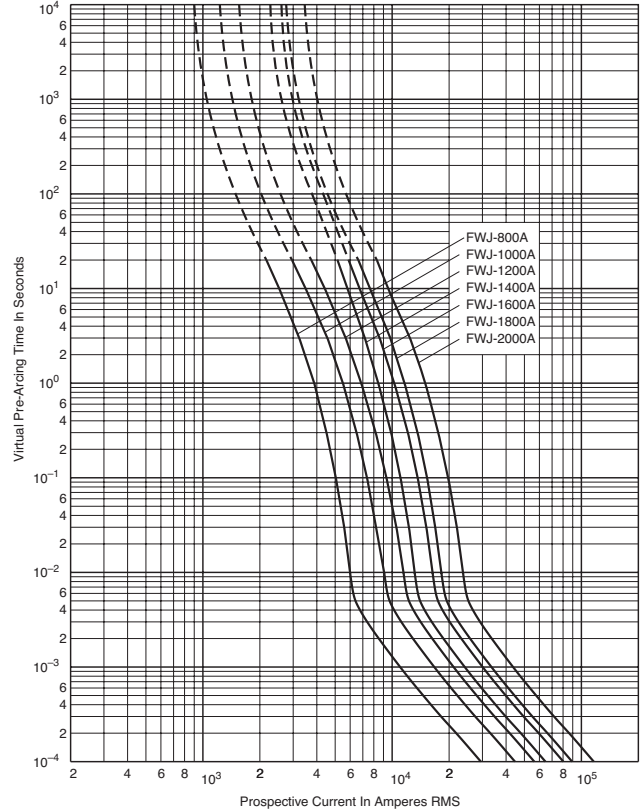
FWJ 35-600A: 1000V

Time-Current Curve



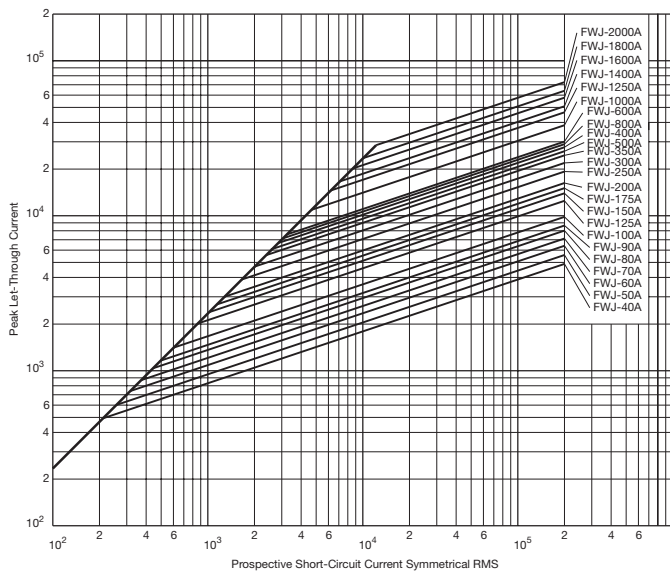
FWJ 800-2000A: 1000V

Time-Current Curve

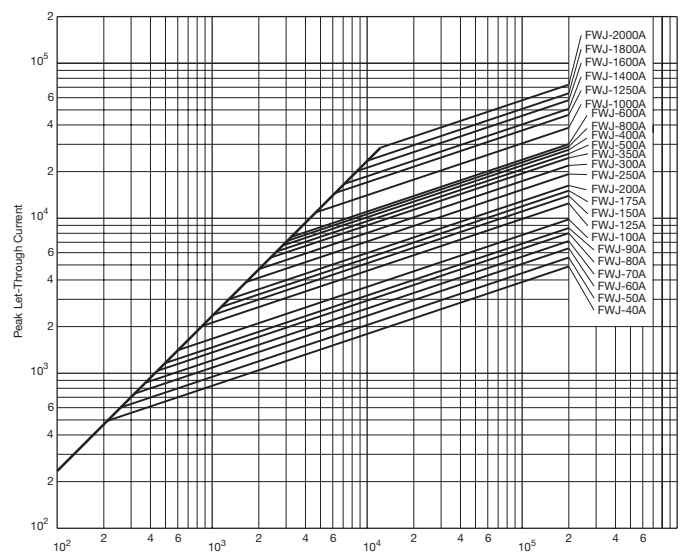


High Speed Fuses

Peak Let-Through Curve



Peak Let-Through Curve



Data Sheet: 35785303

Data Sheet: 35785309

North American fuse accessories

Fuse Bases (Blocks)

Modular Style

Cooper Bussmann offers a comprehensive line of fuse bases that provide the user with design and manufacturing flexibility. Two identical half bases make up a Cooper Bussmann® modular fuse base. These “split” units can be panel mounted any distance apart to accommodate any length fuse.

Stud Type

The simpler design is the C5268 series modular fuse base. With this design, the fuse terminal and cable (with termination) are mounted on the same stud, minimizing labor needed for installation. The stud type base is available in the configuration shown in the table below.

| Catalog Number | Max Fuse Amp Rating | Stud Height (in) | Stud Dia. & Threads |
|----------------|---------------------|------------------|---------------------|
| C5268-1 | 200 | 1.00 | 5/16"-18 |
| C5268-2 | 200 | 1.75 | 5/16"-18 |
| C5268-3 | 200 | 0.75 | 5/16"-18 |
| C5268-4 | 100 | 1.00 | 1/4"-20 |
| C5268-5 | 100 | 1.75 | 1/4"-20 |

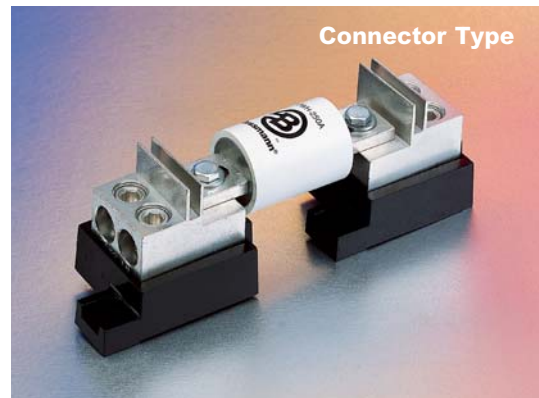
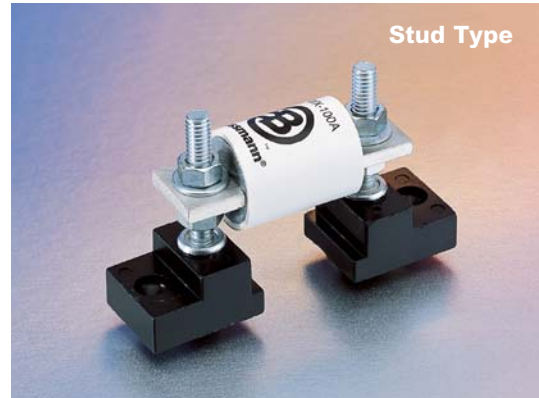
Connector Type

Cooper Bussmann also offers a modular style fuse base that utilizes a tin-plated connector (for wire termination and heat dissipation) and a plated-steel stud (for fuse mounting). The connector type fuse base is available in the configurations shown below. Consult Cooper Bussmann for additional product details.

| Modular Base Style | Max Voltage | Max Fuse Amp Rating | Data Sheet Number |
|--------------------|-------------|---------------------|-------------------|
| 1BS101 | 600 | 100 | 1206 |
| 1BS102 | 600 | 400 | 1207 |
| 1BS103 | 600 | 400 | 1208 |
| 1BS104 | 600 | 600 | 1209 |
| BH-0xxx | 700 | 100 | 1200 |
| BH-1xxx | 2500 | 400 | 1201 |
| BH-2xxx | 5000 | 400 | 1202 |
| BH-3xxx | 1250 | 700 | 1203 |

Fixed Center Base Style

Cooper Bussmann offers a comprehensive line of fixed mount style fuse bases under the trademark TRON® rectifier fuse blocks. The cable and fuse connections are similar to the stud type fuse base — both are mounted on the same stud. Consult Cooper Bussmann for complete product details.



Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А