

# Semiconductor Fuses



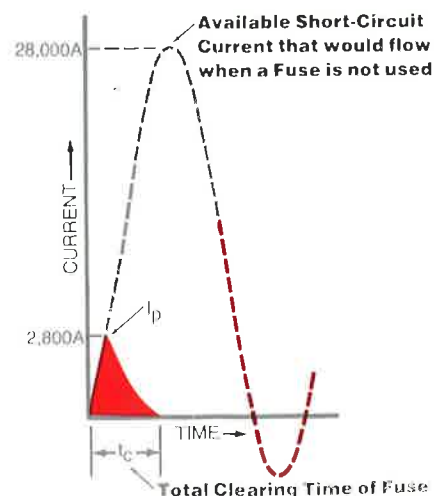
**VOLTAGE RATINGS (Full Voltage or Less):**  
 FWA Series—150V AC; 200V DC  
 FWX Series—250V AC; 300V DC  
 FWH Series—500V AC; 500V DC  
 FWP and FBP Series—700V AC; 700V DC  
**CURRENT RATINGS:** 1 to 1000 Amperes.  
**INTERRUPTING RATING:** 200,000 Amperes RMS Symmet.  
**CURRENT LIMITATION:** Ultra-High Degree.  
**I<sup>2</sup>t LET-THRU:** Very Low.  
**U.L. RECOGNIZED:** (FWA—15-600A); (FWX—15-800A);  
 (FWH, FWP and FBP—15-1000A); other Series pending  
 completion of U.L. action).  
**CONSTRUCTION:** Patented design. Totally inorganic,  
 non-degradable materials for reliability at high temperatures.  
 High thermal conductivity, ceramic tubes with revolver-like  
 cylindrical chambers for isolation of multiple fuse links.  
 Provide high-performance, a-c or d-c operation.  
**MOUNTING:** Bolt holes spaced for dimensional compatibility  
 with most existing mount configurations and Buss fuse  
 blocks. Buss high-performance, FW Series Semiconductor  
 Fuses are generally mounted directly to bus bars. For  
 fuseblock mounting, See Section 8.  
**APPLICATION DATA—See Buss Bulletin SCF.**

Semiconductor Fuses are so designed. They prevent large destructive excursions of heat energy from being impressed upon diodes, SCR's and other semiconductor devices. They isolate faults in parallel branches. Buss Semiconductor Fuses give high performance protection. They have been designed for maximum reliability.



### Ultra High Degree of Current Limitation and Low I<sup>2</sup>t.

The heat energy of even low-level fault currents can quickly destroy a semi-conductor device. As shown in the illustration below, the Buss FW type fuse limits peak let-thru current to a level which is a fraction of the potential available short-circuit peak current. In this typical case, the peak let-thru current of the fuse is only 2,800 amperes instead of 28,000 amperes peak current that would occur if there were not current limiting action. The immensely fast speed-of-response to build-up of short-circuit current and the quickly decaying short-circuit current as the fuse suppresses internal arcing together can limit the I<sup>2</sup>t let-thru to values substantially lower than the I<sup>2</sup>t withstand of the semiconductor device.



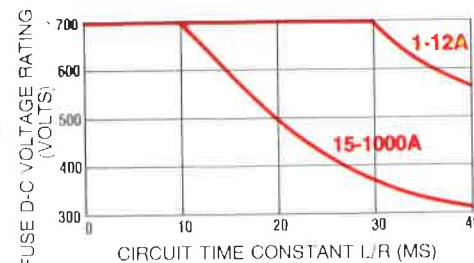
Current Limiting Effect of Fuse.

### Full Line For Optimum Selection

FW Series Semiconductor Fuses are available in four a-c voltage ratings; 150V, 250V, 500V and 700V. Current ratings cover the full range of 1 to 1000 amperes. Performance characteristics of the FWP and FBP 700 volt Series fuses are the same; however, the dimensional size of the FBP Series is smaller than the FWP Series and thus provides greater economy of space. Fuses can be applied at their full voltage rating or any lesser voltage. For instance, it may be desirable to use 700 volt (FWP Series) units in 500 volt circuits, etc.

### AC or DC Application

DC voltage ratings are the same or higher than a-c ratings. For instance, the 700 volt FWP Series fuses can be applied at 700 volts AC or, if the overcurrent L/R time constant of the DC circuit is 10 milliseconds or less, at 700 volts DC. Practically, circuits of most applications do have a time constant of 10 ms or less. However, for circuits with longer time constants, derating curves such as the one shown, permit the determination of the appropriate d-c voltage rating.



DC voltage rating versus circuit time constant (Overcurrent L/R in milliseconds). (Curves shown apply to the 700V FWP Series).

**Buss FW Series Fuses Will Interrupt Any AC Overcurrent Above Their Ampere Rating . . . They are Full Range AC Fuses.**

### Ampere And Voltage Ratings—Semiconductors

150 Volts	250 Volts	500 Volts	700 Volts	700 Volts
FWA	FWX	FWH	FWP	FBP
—	FWX-1	FWH-1	FWP-1	—
FWA-2	FWX-2	FWH-2	FWP-2	—
—	FWX-3	FWH-3	FWP-3	—
FWA-3	FWX-4	FWH-4	FWP-4	—
FWA-5	FWX-5	FWH-5	FWP-5	—
FWA-6	FWX-6	FWH-6	FWP-6	—
FWA-7	FWX-7	FWH-7	FWP-7	—
FWA-8	FWX-8	FWH-8	FWP-8	—
FWA-10	FWX-10	FWH-10	FWP-10	—
FWA-12	FWX-12	FWH-12	FWP-12	—
FWA-15	FWX-15	FWH-15	FWP-15	FBP-15
FWA-20	FWX-20	FWH-20	FWP-20	FBP-20
FWA-25	FWX-25	FWH-25	FWP-25	FBP-25
FWA-30	FWX-30	FWH-30	FWP-30	FBP-30
FWA-35	FWX-35	FWH-35	FWP-35	FBP-35
FWA-40	FWX-40	FWH-40	FWP-40	FBP-40
—	—	—	FWP-45	FBP-45
FWA-50	FWX-50	FWH-50	FWP-50	FBP-50
FWA-60	FWX-60	FWH-60	FWP-60	FBP-60
FWA-70	FWX-70	FWH-70	FWP-70	FBP-70
FWA-80	FWX-80	FWH-80	FWP-80	FBP-80
FWA-90	FWX-90	FWH-90	FWP-90	FBP-90
FWA-100	FWX-100	FWH-100	FWP-100	FBP-100
FWA-125	FWX-125	FWH-125	FWP-125	FBP-125
FWA-150	FWX-150	FWH-150	FWP-150	FBP-150
FWA-175	FWX-175	FWH-175	FWP-175	FBP-175
FWA-200	FWX-200	FWH-200	FWP-200	FBP-200
—	FWX-225	—	—	—
FWA-250	FWX-250	FWH-250	FWP-250	FBP-250
FWA-300	FWX-300	FWH-300	FWP-300	FBP-300
FWA-350	FWX-350	FWH-350	FWP-350	FBP-350
FWA-400	FWX-400	FWH-400	FWP-400	FBP-400
FWA-450	FWX-450	FWH-450	FWP-450	FBP-450
FWA-500	FWX-500	FWH-500	FWP-500	FBP-500
FWA-600	FWX-600	FWH-600	FWP-600	FBP-600
FWA-700	FWX-700	FWH-700	FWP-700	FBP-700
FWA-800	FWX-800	FWH-800	FWP-800	FBP-800
—	FWX-HP-700	—	—	—
—	FWX-HP-800	—	—	—
—	FWX-HP-900	FWH-900	FWP-900	FBP-900
—	FWX-HP-1000	FWH-1000	FWP-1000	FBP-1000

This is a significant feature relative to some type of semiconductor fuses. Buss semiconductor fuses will interrupt any a-c overload or fault current (up to 200,000 amperes symmetrical rms).\* In contrast, some type fuses will not interrupt a-c overloads below a certain level. This limitation then requires the use of some other means of interrupting the low-level overloads.

### Arc Voltage

The arc voltage which develops within a fuse when it is clearing a fault current always exceeds the system voltage. This arc voltage may reach a value which is twice that of the system applied voltage.

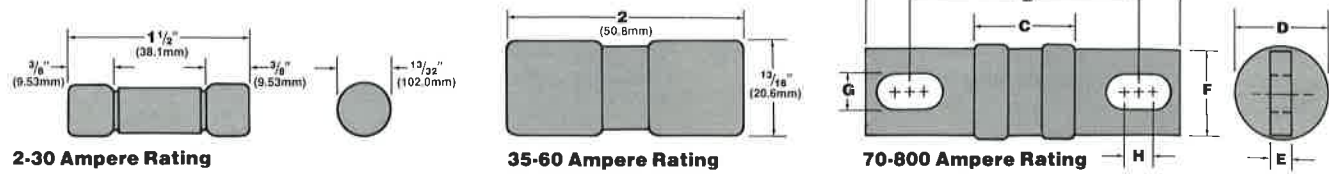
\*To interrupt d-c overcurrents which are 200% or less of the ampere rating of the fuse, electronic sensing with SCR gate suppression or other means must be used.

### Carton Quantity And Weight (Semiconductor Fuses)

Voltage	Cat. Symbol	Ampere Rating	Ctn. Qty.	Wt. Per Ctn.	
				Lbs.	Kg
150	FWA	2-30	10	0.19	0.086
		35-60	10	1.26	0.571
		70-100	10	1.30	0.590
		125-400	1	0.17	0.077
		450-600	1	0.35	0.159
		700-800	1	0.50	0.227
250	FWX	1-30	10	0.56	0.254
		35-60	10	1.19	0.540
		70-100	10	1.58	0.717
		125-200	1	0.20	0.091
		250-400	1	0.28	0.127
		450-600	1	0.36	0.163
500	FWH	700-800	1	0.50	0.227
		800-1000	1	2.62	1.188
		1-30	10	0.56	0.254
		35-60	10	1.40	0.635
		70-100	1	0.19	0.086
		125-200	1	0.28	0.127
700	FWP	250-400	1	0.48	0.218
		450-600	1	0.69	0.313
		700-800	1	1.62	0.735
		900-1000	1	8.00	3.629
		1-30	10	0.56	0.254
		35-60	10	0.87	0.395
700	FBP	70-100	1	0.38	0.172
		125-200	1	0.48	0.218
		250-400	1	1.15	0.522
		450-600	1	2.62	1.188
		700-800	1	3.56	1.615
		900-1000	1	6.31	2.862
700	FBP	15-30	10	0.56	0.254
		35-60	10	0.72	0.326
		70-100	1	0.28	0.127
		125-200	1	0.49	0.222
		250-400	1	1.19	0.540
		450-600	1	2.13	0.966
700-800	1	4.19	1.901		
900-1000	1	6.0	2.722		

# Semiconductor Fuses

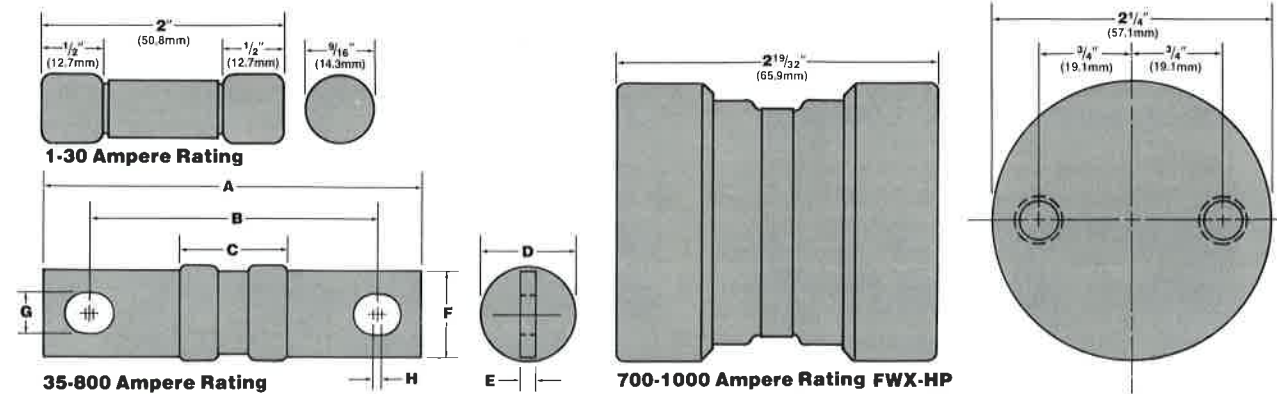
## FWA Series (150 Volts) 2 to 800 Amperes



### FWA 70-800 Ampere Rating

Ampere Rating	Dimensions in Inches								Dimensions in Millimeters							
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H
70-100	2 <sup>21</sup> / <sub>32</sub>	2 <sup>3</sup> / <sub>64</sub>	2 <sup>7</sup> / <sub>32</sub>	1 <sup>3</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>16</sub>	9 <sup>1</sup> / <sub>64</sub>	67.5	52.0	21.4	20.6	4.76	19.1	7.94	3.6
125-400	2 <sup>21</sup> / <sub>32</sub>	2 <sup>7</sup> / <sub>32</sub>	2 <sup>7</sup> / <sub>32</sub>	1	3 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>16</sub>		67.5		21.4	25.4	4.76	22.2	7.94	
400-600	3 <sup>1</sup> / <sub>2</sub>	2 <sup>7</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>32</sub>	1 <sup>11</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>4</sub>	1	1 <sup>3</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>8</sub>	88.9	62.0	21.4	34.1	6.35	25.4	10.3	1.6
700-800	3 <sup>1</sup> / <sub>2</sub>		3 <sup>1</sup> / <sub>32</sub>	1 <sup>19</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>4</sub>	1	1 <sup>3</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>8</sub>	88.9		24.6	40.5	6.35	25.4	10.3	

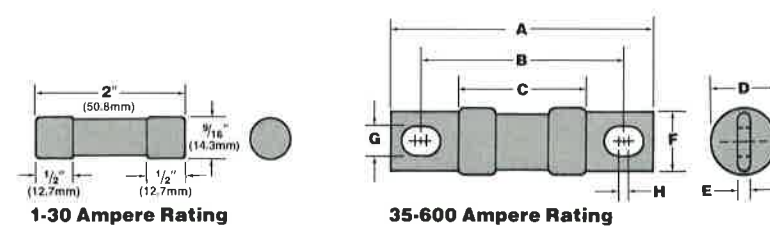
## FWX Series (250 Volts) 1 to 1000 Amperes



### FWX 35-600 Ampere Rating

Ampere Rating	Dimensions in Inches								Dimensions in Millimeters							
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H
35-60	3 <sup>3</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>16</sub>		1 <sup>3</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>32</sub>		81.0	61.9		20.6	3.18	18.3	8.73	
70-100	3 <sup>1</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>8</sub>		1 <sup>3</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>16</sub>		79.4	60.3		20.6	4.76	19.1	7.94	
125-200	3 <sup>1</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>8</sub>	2 <sup>7</sup> / <sub>32</sub>	1	3 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>16</sub>	79.4	60.3	21.4	25.4	4.76	22.2	7.94	1.59
225-300	3 <sup>27</sup> / <sub>32</sub>	2 <sup>25</sup> / <sub>32</sub>		1	1 <sup>1</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>32</sub>		97.6	70.6		25.4	6.35	22.2	10.3	
350-600	3 <sup>27</sup> / <sub>32</sub>	2 <sup>25</sup> / <sub>32</sub>		1 <sup>11</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>4</sub>	1	1 <sup>3</sup> / <sub>32</sub>		97.6	70.6		34.1	6.35	25.4	10.3	
700-800	3 <sup>27</sup> / <sub>32</sub>	2 <sup>39</sup> / <sub>64</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>63</sup> / <sub>64</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>5</sup> / <sub>32</sub>	1 <sup>7</sup> / <sub>64</sub>	97.6	40.9	25.4	50.4	6.35	31.8	11.9	6.7

## FWH Series (500 Volts) 1 to 1000 Amperes

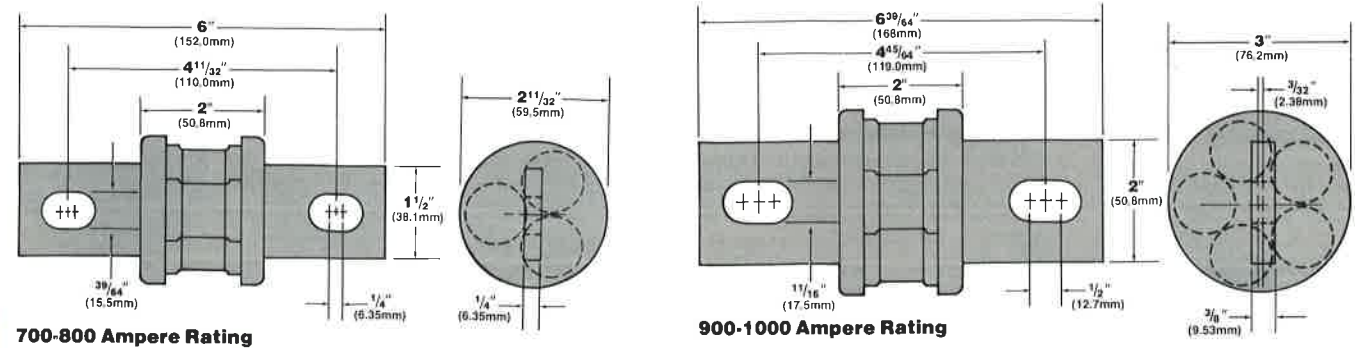


### FWH 35-600 Ampere Rating

Ampere Rating	Dimensions in Inches								Dimensions in Millimeters							
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H
35-60	3 <sup>3</sup> / <sub>16</sub>	2 <sup>15</sup> / <sub>32</sub>	1 <sup>35</sup> / <sub>64</sub>	1 <sup>3</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>32</sub>	1 <sup>11</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>8</sub>	81.0	62.7	39.3	20.6	3.18	18.3	8.73	3.18
70-100	3 <sup>5</sup> / <sub>16</sub>	2 <sup>11</sup> / <sub>16</sub>	1 <sup>35</sup> / <sub>64</sub>	1 <sup>3</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	1 <sup>11</sup> / <sub>32</sub>	1 <sup>11</sup> / <sub>32</sub>	92.1	68.3	39.3	20.6	3.18	19.1	8.73	8.73
125-200	3 <sup>5</sup> / <sub>16</sub>	2 <sup>5</sup> / <sub>8</sub>	1 <sup>9</sup> / <sub>16</sub>	1	3 <sup>1</sup> / <sub>16</sub>	1	1 <sup>11</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>4</sub>	92.1	66.7	39.7	25.4	4.76	25.4	8.73	6.35
250-400	4 <sup>11</sup> / <sub>32</sub>	3 <sup>3</sup> / <sub>32</sub>	2 <sup>3</sup> / <sub>32</sub>	1 <sup>21</sup> / <sub>64</sub>	1 <sup>1</sup> / <sub>4</sub>	1	1 <sup>3</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>32</sub>	110	78.6	53.2	33.7	6.35	25.4	10.3	8.73
450-600	4 <sup>15</sup> / <sub>32</sub>	3 <sup>17</sup> / <sub>64</sub>	2 <sup>3</sup> / <sub>32</sub>	1 <sup>19</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>9</sup> / <sub>32</sub>	1 <sup>5</sup> / <sub>64</sub>	114	83.0	53.2	40.5	6.35	31.8	11.9	5.95

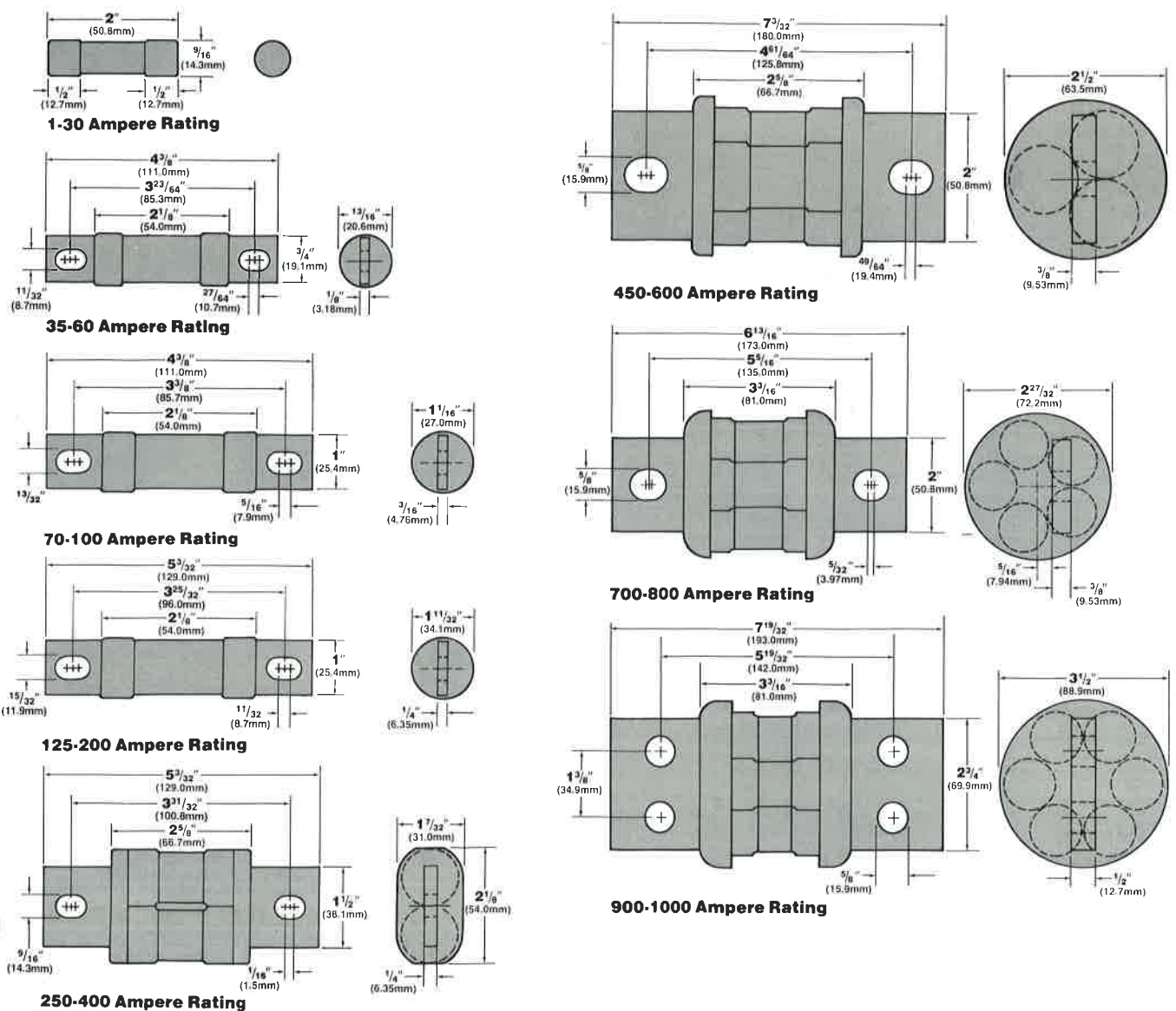
(Data continued on next page.)

## FWH Series (500 Volts) 1 to 1000 Amperes (cont.)



### 700-800 Ampere Rating

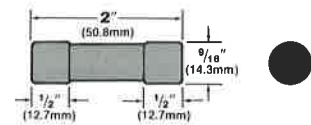
## FWP Series (700 Volts) 1 to 1000 Amperes



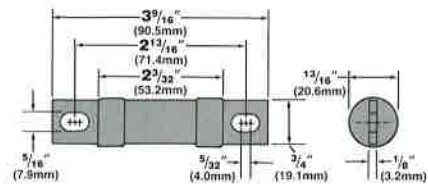
### 250-400 Ampere Rating

# Semiconductor Fuses

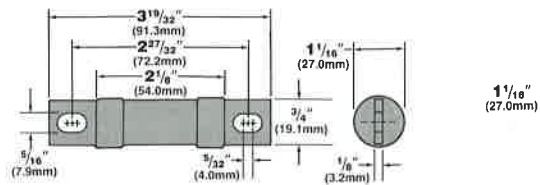
## FBP Series (700 Volts) 15 to 1000 Amperes



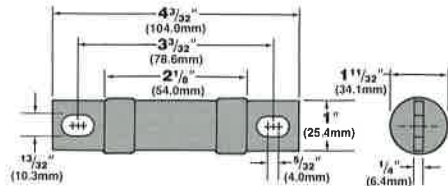
15-30 Ampere Rating



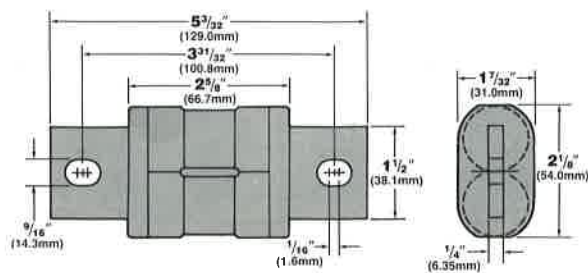
35-60 Ampere Rating



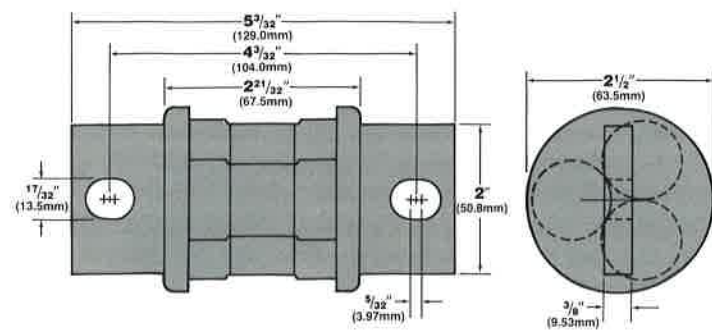
70-100 Ampere Rating



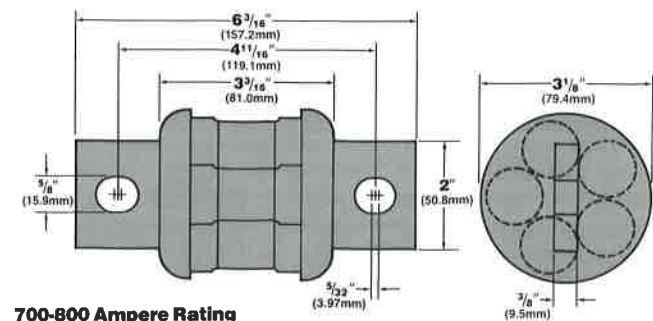
125-200 Ampere Rating



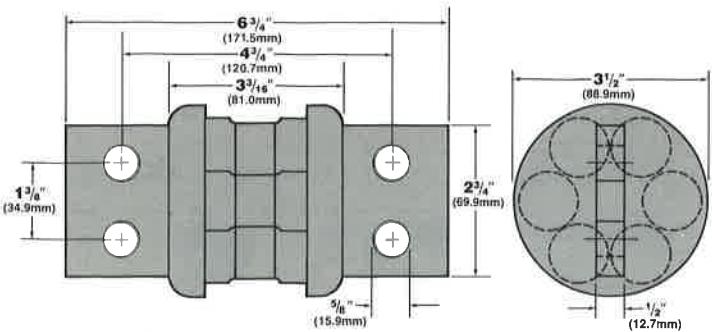
250-400 Ampere Rating



450-600 Ampere Rating



700-800 Ampere Rating



900-1000 Ampere Rating

# Tron Rectifier Fuses



TRON Rectifier Fuses are especially designed for the protection of semi-conductor rectifiers, SCR's, Thyristors, solid state devices or any instance in which a very fast acting fuse is needed. They provide extremely fast opening on overload and fault currents, with a high degree of restriction of the let-thru current. If each diode is protected by a TRON rectifier fuse, the fuse will open very quickly when the current drawn exceeds the rating of the diode. Thus when a short-circuit occurs in a diode the fuse opens and takes that diode out of the circuit; other good diodes in the rectifier which might otherwise be damaged are not affected. For application data, see Bulletin TRFS and E60.

Ampere and Voltage Ratings—Rectifier Fuses

60 Volts	130 Volts	250 Volts	500 Volts	600 Volts	700 Volts
GBB	KAA KAW KAH	KAB KAX KAG	KBH	KAC KBC KAJ	KBP
*GBB-1/8	—	—	—	—	—
*GBB-1/4	—	—	—	—	—
*GBB-1/2	*KAA-1/2	—	KAB-1/2 KAX-1/2	—	—
*GBB-3/4	—	—	—	—	—
*GBB-1	*KAA-1 KAW-1	—	KAB-1 KAX-1	KAC-1 KBC-1 KAJ-1	—
*GBB-1 1/4	—	—	—	—	—
*GBB-1 1/2	*KAA-1 1/2	—	—	—	—
*GBB-2	*KAA-2 KAW-2	—	KAB-2 KAX-2	KAC-2 KBC-2	—
—	*KAA-2 1/2	—	—	—	—
*GBB-3	*KAA-3 KAW-3	—	KAB-3 KAX-3	KAC-3 KBC-3	—
*GBB-4	*KAA-4 KAW-4	—	KAB-4 KAX-4	KAC-4 KBC-4	—
*GBB-5	*KAA-5 KAW-5	—	KAB-5 KAX-5	KAC-5 KBC-5	—
*GBB-6	*KAA-6 KAW-6	—	KAB-6 KAX-6	KAC-6 KBC-6	—
*GBB-7	*KAA-7 KAW-7	—	KAB-7 KAX-7	KAC-7 KBC-7	—
*GBB-8	*KAA-8 KAW-8	—	KAB-8 KAX-8	KAC-8 KBC-8	—
*GBB-9	*KAA-9 KAW-9	—	KAB-9 KAX-9	KAC-9	—
*GBB-10	*KAA-10 KAW-10	—	KAB-10 KAX-10	KAC-10 KBC-10 KAJ-10	—
*GBB-12	*KAA-12 KAW-12	—	KAB-12 KAX-12	KAC-12 KBC-12	—
*GBB-15	*KAA-15 KAW-15	—	KAB-15 KAX-15	KAC-15 KBC-15	—
*GBB-17 1/2	—	—	KAB-17 1/2 KAX-17 1/2	KAC-17 1/2 KBC-17 1/2	—
*GBB-20	*KAA-20 KAW-20	—	KAB-20 KAX-20	KAC-20 KBC-20	—
*GBB-25	*KAA-25 KAW-25	—	KAB-25 KAX-25	*KAC-25 KBC-25 KAJ-25	KBP-25
*GBB-30	*KAA-30 KAW-30	—	KAB-30 KAX-30	*KAC-30 KBC-30 KAJ-30	KBP-30
—	—	*KAH-35	*KAB-35 *KAX-35	*KBH-35 *KAC-35 *KBC-35	KAJ-35 KBP-35
—	—	*KAH-40	*KAB-40 *KAX-40	*KBH-40 *KAC-40 *KBC-40	KAJ-40 KBP-40
—	—	*KAH-45	*KAB-45 *KAX-45	*KBH-45 *KAC-45 *KBC-45	KAJ-45 KBP-45
—	—	*KAH-50	*KAB-50 *KAX-50	*KBH-50 *KAC-50 *KBC-50	KAJ-50 KBP-50
—	—	*KAH-60	*KAB-60 *KAX-60	*KBH-60 *KAC-60 *KBC-60	KAJ-60 KBP-60
—	—	—	—	*KBH-65	—
—	*KAA-70	—	*KAB-70 KAX-70	*KBH-70 *KAC-70 *KBC-70	— KBP-70
—	*KAA-80	—	*KAB-80 KAX-80	*KBH-80 *KAC-80 *KBC-80	— KBP-80
—	*KAA-90	—	*KAB-90 KAX-90	*KBH-90 *KAC-90 *KBC-90	— KBP-90
—	*KAA-100	—	*KAB-100 KAX-100	*KBH-100 *KAC-100 *KBC-100	— KBP-100
—	—	—	—	*KAC-110 *KBC-110	—
—	*KAA-125	—	*KAB-125 KAX-125	*KBH-125 *KAC-125 *KBC-125	— KBP-125
—	*KAA-130	—	—	—	—
—	*KAA-150	—	*KAB-150 KAX-150	*KBH-150 *KAC-150 *KBC-150	— KBP-150
—	*KAA-175	—	*KAB-175 KAX-175	*KBH-175 *KAC-175 *KBC-175	— KBP-175
—	*KAA-200	—	*KAB-200 KAX-200	*KBH-200 *KAC-200 *KBC-200	— KBP-200
—	*KAA-225	—	*KAB-225 *KAX-225	*KBH-225 *KAC-225 *KBC-225	— KBP-225
—	*KAA-250	—	*KAB-250 *KAX-250	*KBH-250 *KAC-250 *KBC-250	— KBP-250
—	*KAA-300	—	*KAB-300 *KAX-300	*KBH-300 *KAC-300 *KBC-300	— KBP-300
—	*KAA-350	—	*KAB-350 *KAX-350	*KBH-350 *KAC-350 *KBC-350	—
—	*KAA-400	—	*KAB-400 *KAX-400	*KBH-400 *KAC-400 *KBC-400	— KBP-400
—	*KAA-450	—	*KAB-450 *KAX-450	*KBH-450 *KAC-450 *KBC-450	— KBP-450
—	*KAA-500	—	*KAB-500 *KAX-500	*KBH-500 *KAC-500 *KBC-500	— KBP-500
—	—	—	—	*KBH-550	—
—	*KAA-600	—	*KAB-600 *KAX-600	*KBH-600 *KAC-600 *KBC-600	— KBP-600
—	*KAA-650	—	—	—	—
—	*KAA-700	—	*KAB-700 *KAX-700	KBH-700 KAC-700 *KBC-700	—
—	*KAA-800	—	*KAB-800 *KAX-800	KBH-800 KAC-800 *KBC-800	—
—	*KAA-1000	—	—	KAG-800 KBH-1000 KAC-1000 KBC-1000	—
—	KAA-1200	—	—	KAG-1000 KBH-1200	—
—	KAA-1500	—	—	KAG-1200	—
—	KAA-2000	—	—	KAG-1500	—
—	KAA-2500	—	—	KAG-2000	—
—	KAA-3000	—	—	KAG-2500	—
—	—	—	—	KAG-3000	—

\*U.L. Recognized.