

Bulletin SFB

Buss **Small Dimension** **Fuses**

Fuseholders,
Blocks,
and
Accessories



McGraw-Edison

Buss

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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New Buss Products

Fuses	Type MSL Single-Element, Spiral-Wound, Time-Delay	Page 37
Fuseholders	PC Board (5mm × 20mm & ¼" × 1¼")	page 38
	Panel-Mounted (5mm × 20mm & ¼" × 1¼")	page 39
Fuseblocks	Series 8000 (¼" × 1¼")	page 28

How to Use this Bulletin

Locating and/or Selecting a Product

This Bulletin is organized so you can usually locate the product that meets your requirements by simply scanning the pages of the applicable Section. However, the following guide data may prove helpful.

You Know	Refer To
Product Symbol or Designation	"Index by Product Symbol" If that of another mfg., see BUSS Bulletin SF-2, "Cross Reference". If a military designation, see BUSS Bulletin "MIL".
Specific Electrical Requirements	"Fuse Index by Electrical Characteristics" "Fuseology" Section
Specific Mechanical Requirements	"Fuse Index by Physical Size"
Fuse Blocks or Holders	"Fuse Block Index" or "Fuseholder Index"
Can't Find	Contact your Bussmann Representative or Factory

Ordering Information (Catalog Numbers)

Almost all BUSS fuses and other component devices have a basic, designating symbol such as: "AGX". A complete catalog number consists of the "symbol" suffixed by the desired current rating in amperes. Thus, "AGX 25" is the specific catalog number for the AGX fuse with a 25 ampere rating.

Voltage Ratings

The given voltage of a fuse is the "maximum" voltage at which the fuse can be operated. A fuse can be operated at this maximum or any voltage less than maximum.

Dimensions

All dimensions shown are average. When dimensional tolerances are required for specification purposes, request blueprint. When tooling up for mounting holders, request latest blueprint.

Weights

Weights shown are approximate, and include weight of components in carton but not the shipping box.

UL Listing

Where Underwriters' Laboratories listing is shown, the fuse meets the requirements of one of the following standards: Fuses for supplementary protection in U.L. Standard No. 198.6, U.L. Standard 198.2, or the component is Recognized under the U.L. Component Program.

Military Specifications

Most BUSS Fuses and accessories are also available to meet the requirements of military specifications. For additional information, request BUSS Form MIL.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Index By Product Symbol

Sym- bol	Page	Sym- bol	Page	Sym- bol	Page	Sym- bol	Page	Sym- bol	Page
Fuses		KAW	19	HAF-B	27	HN	17	2839	31
ABC	10	KAX	19	HAG-A	27	HPC °HPF	2841	31	
ABS	*	KAZ	15	HAG-B	27	HPC-C °HPF	2857	*	
ABU	°BAF,	KBC	19	HC	17	HPC-	2891	35	
	BAN	KLM °KTK		HDH-A	27	CK °HPF-C	2892	35	
ACF	*	KTK	11	HDH-B	27	HPC-D	2893	35	
ACH	*	KTK-R	11	HDI-A	27	HPC-K °HPF	2894	35	
ACK	18	KTQ	10	HDI-B	27	HPC-L °HPF-L	2895	35	
ACL	18	LKB	16	HDJ-A	27	HPD	2896	35	
ACO	*	LKC	16	HDJ-B	27	HPF	2897	35	
ACT	*	MBB °AGC		HEB	27	HPF-C	2898	35	
AFJ	18	MBO	*	HEC	27	HPF-L	2899	35	
AFS	18	MBW °AGC		HEG	27	HPF-EE	2917	35	
AFX	18	MDA	10	HEH	27	HPF-FF	2918	35	
AGA	9	MDC	*	HEJ	27	HPF-JJ	2919	35	
AGC	10	MDF	*	HET	27	HPF-RR	2920	35	
AGS	*	MDL	10	HEX	27	HPG	2960	34	
AGU	11	MDM; MDR	*	HFA	27	HPL-B	2961	35	
AGW	9	MDQ	10	HFA-HH	27	HPM	2962	35	
AGX	9	MDV	12	HGA	26	HPS	2963	35	
ANL	15	MDX	10	HGA-C	26	HPS-EE	2964	35	
ANN	19	MG	10	HGB	26	HPS-FF	2965	35	
ATC	14	MIC	14	HGB-C	26	HPS-JJ	2966	35	
BAF	11	MIN	14	HGC	26	HPS-L	2967	35	
BAN	11	MIS	15	HHH-A	27	HPS-RR	2968	35	
BBS	10	MJB °AGX		HHH-B	27	HRE	3411	18	
C	17	MJW °AGX		HHI-A	27	HRF	3433	18	
FBP	18	MKB	9	HHI-B	27	HRG	3569	18	
FMO1	12	MS	*	HHJ-A	27	HRH	3578	18	
FNA	14	MTH	10	HHJ-B	27	HRI	3723	33	
FNM	11	N	17	HIF-A	27	HRJ	3742	33	
FNQ	11	SC	13	HIF-B	27	HRK	3743	33	
FNW	11	SFE	13	HIG-A	27	HTA	3792	34	
FWP	18	TFA	19	HIG-B	27	HTA-DD	3823	30	
GBA	14	TFC	19	HJL	25	HTA-HH	3828	29	
GBB	10	TFL	19	HJM	23	HTA-OO	3833	30	
GDA	9	WER	15	HJM-OO	23	HWA	3835	32	
GFA	12	WKH	19	HJM-CC	23	HWG	3839	34	
GJU	°GMA	WKJ	19	HJM-HH	23	Fuse	3845	32	
GJV	12	WKK	19	HKA	25	Blocks	3959	35	
GKB	16	WKL	19	HKA-W	25	2087	35	3992	29
GLD	14	WKU	19	HKL	25	2088	35	3998	31
GLH	10	WQL	19	HKL-X	25	2089	35	4161	32
GLN	12	WTK	19	HKM °HKP	23	2090	35	4164-FR	34
GLQ	17	WWE	19	HKP	23	2091	35	4202	18
GLR	17	WWX	19	HKP-CC	23	2092	35	4228	18
GLX	12	WWZ	19	HKP-HH	23	2093	35	4287	35
GMA	9	1AG °AGA		HKP-OO	23	2094	35	4386	35
GMF	17	°MKB		HKR	25	2095	35	4393	29
GMQ	17	3AB °ABC		HKT	25	2245	30	4396	32
GMT	16	3AG °AGC		HKU	25	2322	18	4399	29
GMW	12	°MGB		HKX	25	2430	30	4405	31
GRF	17	°MTH		HLD	25	2480	30	4406	31
HBO	18	°GLH		HLD-HH	25	2499	31	4407	32
HSK	18	4AB °ABS		HLD-OO	23	2653	18	4408	31
HVA	13	4AG °AGS		HLQ	17	2698	29	4421	33
HVB	13	5AB °BAF		HLR	17	2778	34	4439	34
HVJ	13	°BAN		HLT	16	2788-3	34	4512	32
HVL	13	5AG °AGU		HME	26	2799	31	4515	35
HVR	13	7AG °AGW		HMF	26	2807	33	4520	29
HVT	13	8AG °AGX		HMG	26	2808	33	4525	35
HVU	13	35 Series	15	HMH	26	2809	33	4528	34
HVX	13	70 Series	16	HMI	26	2810	33	4529	34
HVW	13	Fuse-		HMJ	26	2811	33	4530	34
KAA	19	holders		HMM	23	2812	33	4535	35
KAB	19	AF	12	HMR	23	2837	34	4574	31
KAC	19	HAF-A	27	HMS	23	2838	34		

*Refer to these units. *Older style device; not recommended for new design.

Fuse Index by Electrical Characteristics

Time-Delay Fuses — Slow Blowing

(Single Element Types For Circuits With Large Inrush Currents. For Larger Time Delay, See Dual-Element Fuses).

Volts	Ampere Range	Dimensions Inches	mm	Description	Sym- bol	Page
500V	3 1/2 to 30	1 3/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule; for motor control trans's.	FNQ	11
300V	5 to 6 1/4	—	—	For HLR Holder	GMF	17
		—	—	For HLQ size rejection holder	GMQ	17
	6 to 60	1 3/32 D (Various Lengths)	10.3 D	Melamine/ferrule; For branch circuits	SC	13
250V	5 to 20	1/4 x 1 1/4	6.6 x 31.8	Ceramic/ferrule	MDA	10
	12 to 30	1 3/32 x 1 1/2	10.3 x 38.1	Melamine/ferrule for Control Circuits	FNW	11
125V	7 to 10	—	—	For HLR holder	GRF	17
	25 to 30	1/4 x 1 1/4	6.6 x 31.8	Ceramic/ferrule	MDA	10

Dual-Element, Time-Delay Fuses — Slow Blowing,

(Two Elements: one for Short Circuits; one for Overload and Large Inrush Currents).

Volts	Ampere Range	Dimensions Inches	mm	Description	Sym- bol	Page
500V	1/10 to 3 3/10	1 3/32 x 1 1/2	10.3 x 38.1	Tube/ferrule	FNQ	11
300V	1/100 to 4	—	—	For HLQ holder (size rejection)	GMQ	17
		—	—	For HLR holder	GMF	17
250V	1/100 to 1 1/4	—	—	For HN holder	N	17
	1/100 to 1	1/4 x 1 1/4	6.6 x 31.8	Glass/ferrule	MDL	10
		—	—	Glass/radial lead	MDV	12
	1/10 to 8 1/10	1 3/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule; indicating	FNA	14
	1/10 to 10	—	—	Fibre/ferrule	FNM	11
	1 1/4 to 2	1/4 x 1 1/4	6.6 x 31.8	Glass/ferrule	MDX	10
	1/100 to 4	—	—	Ceramic/ferrule	MDA	10
125V	1 1/8 to 2 9/10	—	—	Glass/ferrule	MDL	10
	1 1/8 to 7	—	—	Glass/radial lead	MDV	10
	1 3/10 to 7	—	—	For HN holder	N	17
	1 to 15	—	—	Fibre/axial studs	ACK	18
		1 3/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule Indicating pin	FNA	14
	2 1/2 to 7	1/4 to 1 1/4	6.6 x 31.8	Glass/ferrule	MDX	10
	12 to 15	1 3/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule	FNM	11
	20 to 60	—	—	Fibre/axial studs	ACK	18
	30 to 120	—	—	Fibre/axial studs	ACL	18
32V	3 to 30	1/4 x 1 1/4	6.6 x 31.8	Glass/ferrule	MDL	10
	20 to 30	1 3/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule; indicating	FNA	14
		—	—	Fibre/ferrule	FNM	11
	20 to 150	1 3/16 D	20.6 D	Fibre/radial studs	HSK	18

Limiters — Low Voltage and Heat

Volts	Ampere Range	Inches	Description	Sym- bol	Page
32V	35 to 500	—	Low voltage for S.C. protection (battery power sources)	ANL	15
Various	15 to 30	Various	Heat Limiters: element and leaf types	—	

Devices for Indicating Only (Not for Circuit Protection)

Volts	Ampere Range	Dimensions Inches	mm	Description	Sym- bol	Page
600V	—	1 3/32 x 2	10.3 x 50.8	Melamine/ferrule; pin indicating; for use with 50A and larger fuses	KAZ	15

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Non-Time Delay Fuses — Fast Acting

(For Overload And Short Circuit Protection In Primarily Resistive Load Circuits.)

Volts	Ampere Range	Dimensions Inches	mm	Description	Sym- bol	Page
1 kv to 10 kv	1/16 to 5	Various	—	Fibre/ferrule; for high E instru- ments...	HV-	13
600V	1/10 to 30	13/32 x 1 1/2	10.3 x 38.1	Melamine/ferrule; 200,000 A.I.C.	KTK	11
	1/10 to 20			KTK with rejection feature	KTK-R	11
	1/10 to 30			Military, KTK	KLM	11
	4/10 to 5	13/32 x 1 5/8	10.3 x 34.9	Fibre/ferrule	BBS	10
	2 to 5			Mel./ferrule for gas vapor fixtures	KTQ	10
	1 to 12	13/32 x 2	10.3 x 50.8	Fibre/ferrule; indi- cating pin	MIS	15
300V	1/10 to 8	.267 x 1 17/64	6.8 x 32.1	Glass/ferrule; indi- cating pin for tele- communications or limited space	70	16
	1/8 to 10	—	—	For HLQ holder	GLQ	17
	1/8 to 15	—	—	For HLR holder	GLR	17
	1 to 5	13/32 x 1 5/16	10.3 x 33.3	Mel./ferrule; 100,000A.I.C.	SC	13
	1 to 10	.267 x 1 17/64	6.8 x 32.1	Glass/ferrule; indi- cating pin; for tele- communication or limited space	GKB	16
250V	1/500 to 2	1/4 x 1	6.4 x 25.4	Glass/ferrule	AGX	9
	1/500 to 3	1/4 x 1 1/4	6.4 x 31.8	Glass/ferrule	AGC	10
	1/32 to 10	—	—	For HC holder	C	17
	1/16 or 1/8	1/4 x 1 1/4	6.4 x 31.8	Glass/ferrule; low resistance	MGB	10
	1/4 x 1	6.4 x 25.4			MKB	9
	1/16 to 7	1/4 x 1 1/4	6.4 x 31.8	Glass/radial lead	GJV	12
	1/4 to 20			Ceramic/ferrule	ABC	10
	4 to 6			Glass/ferrule	MTH	10
	1/4 to 35	9/16D	14.3D	Fibre/Axial studs	AFJ	18
	1 to 4	13/32 x 1 1/2	10.3 x 38.1	Glass/ferrule	AGU	11
	1/8 to 10	—	5 x 20		GMA	9
	1 to 15	13/32 x 1 1/2	10.3 x 38.1	Laminated/ferrule Fibre/ferrule; indi- cating pin	BAF	11
					MIC	14
					MIN	14
	1 to 30	13/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule	BAN	11
	2 to 60	13/16D	20.6D	Axial studs	AFS	18
	40 to 200	1 1/16D	27.0D		AFX	18
160 or 90V	1/4 to 5	—	—	"Grasshopper"; flat body; spring indicating	35	15
125V	15/100 to 5	.145 x .300	3.7 x 7.6	Glass/radial lead	GLX	12
	1/200 to 4/10				GLN	12
	1/200 to 5			Glass/axial lead	GFA	12
		.270 x .250	6.9 x 6.4	Pin type for HWA base	GMW	12
	1/4 to 4	3/16 x 5/8	4.8 x 15.9	Axial lead for small components	LKB	16
	3/4 to 5	1/4 to 1 1/4	6.4 x 31.8	Fibre/ferrule; indi- cating pin	GBA	14
					GLD	14
	1/16 to 1 1/2	1/4 x 5/8	6.4 x 15.9	Glass/ferrule	AGA	9
	3 to 5	1/4 x 1	6.4 x 25.4		AGX	9
	5 to 8	3/16 x 5/8	4.8 x 15.9	Flat; axial for small components	LKC	16
	18/100 to 10	—	—	For HLT holder; indicating for tele- communications	GMT	16
	7 to 10	1/4 x 1 1/4	6.4 x 31.8	Glass/ferrule	GLH	10
	20 to 30	13/32 x 1 1/2	10.3 x 38.1	Laminated/ferrule	BAF	11
				Fibre/ferrule; indi- cating pin	MIN	14
	25 to 30	1/4 x 1 1/4	6.4 x 31.8	Ceramic/ferrule	ABC	10

Volts	Ampere Range	Dimensions Inches	mm	Description	Sym- bol	Page
32V	1/4 to 10	—	—	Flatbody; slotted	WER	15
	2 1/2 to 30	1/4 x 7/8	6.4 x 22.2		AGW	9
	4 to 30	1/4 x 1 1/4	6.4 x 31.8	Glass/ferrule	AGC	10
		1/4 D	6.4D		SFE	13
	5 to 30	13/32 x 1 1/2	10.3 x 38.1		AGU	11
	6 to 15	1/4 x 1 1/4	6.4 x 31.8	Fibre/ferrule; indicating pin	GBA	14
	6 to 30				GLD	14
	7 to 15	.145 x .300	3.7 x 7.6	Glass/axial lead	GFA	12
					GLN	12
	8 to 30	1/4 x 1	6.4 x 25.4	Glass/ferrule	AGX	9
	8 to 150	13/16D	20.6D	Radial studs	HBO	18
	20 to 30	13/32 x 1 1/2	10.3 x 38.1	Fibre/ferrule; indi- cating pin	MIC	14

Very Fast Acting Fuses

(For Protection of Semiconductors and Other Low Withstand Components; Have High Degree of Current Limiting and High Interrupting Rating)

Volts	Ampere Range	Dimensions Inches	mm	Description	Sym- bol	Page
700V	15 to 30	9/16 x 2	14.3 x 50.8	Ceramic/ferrule	FBP	18
					FWP	18
600V	1 to 30	9/16D	14.3D	Melamine/studs	KAC	19
		13/16 x 5	4.8 x 127	Melamine/ferrule	KBC	19
250V	1/2 to 30	9/16 x 2	14.3 x 50.8	Melamine/ferrule	KAB	19
					KAX	19
130V	1/2 to 30	13/32 x 1 1/2	10.3 x 38.1	Melamine/ferrule	KAA	19
					KAW	19
	10 to 800	—	—	Flatbody; slotted terminals	ANN	19
60V	1 to 30	1/4 x 1 1/4	6.4 x 31.8	Ceramic/ferrule	GBB	10

Fuse Index By Physical Size

Ferrule Types

(Common Fuseholder or Block Mounting)

Dimensions Inches	mm	Tube	Sym- bol	Type	Page
—	5 x 20	Glass	GMA	Non-Delay	9
1/4 x 5/8	6.4 x 15.9		AGA		9
1/4 x 7/8	6.4 x 22.2		AGW		9
1/4 x 1	6.4 x 25.4		AGX,		9
			MKB		9
1/4 x 1 1/4	6.4 x 31.8		AGC,		10
			GLH		10
1/4 x 1 1/4	6.4 x 31.8	Ceramic	ABC	Non-Delay	10
			GBB	Very Fast	10
		Glass	MGB,	Non-Delay	10
			MTH		10
		Ceramic	MDA	Dual-element or Time-delay	10
		Glass	MDL,	Dual-element	10
			MDX		10
			TFA	Heat Limiter	19
13/32 x 13/8	10.3 x 34.9	Fibre	BBS,	Non-delay	10
			KTQ		10
13/32 x 1 1/2	10.3 x 38.1	Glass	AGU		11
		Laminated/Fibre	BAF,		11
			BAN		11
		Melamine	KTK,		11
			KTK-R		11
			KAA,	Very Fast	19
			KAW		19
		Fibre/Melamine	FNQ,	Dual-element or	11
			FNW	Time-delay	11
		Fibre	FNM	Dual-element	11

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Dimensions		Tube	Sym- bol	Type	Page
Inches	mm				
$\frac{9}{16} \times 2$	14.3 x 50.8	Ceramic	FBP, FWP	Very Fast	18
			KAB, KAX		18
		Melamine	KBC		19
$\frac{13}{16} \times 5$	20.6 x 127	Melamine			19

Pigtail or Pin Types

Dimensions		Tube	Mounting	Sym- bol	Type	Page
Inches	mm					
.145 x .300	3.7 x 7.6	Glass	Lead-in/Solder	GFA, GLN, GLX	Non-delay	12
				GJV		12
				MDV		12
				TFL, TFS		19
				GMW		12
$\frac{1}{4} \times 1\frac{1}{4}$	6.4 x 31.8	Ceramic	Pin/Base	LKB, LKC	Non-delay	16
						16
						16
$\frac{270}{56} \times \frac{250}{16}$	6.9 x 6.6	Ceramic	Pin/Base		Non-delay	12
$\frac{5}{8} \times \frac{3}{16}$	15.9 x 4.8	Phenolic	Lead-in/Solder		Non-delay	16

Varying-Size Types (For Replacement Protection)

Dimensions	mm	Tube	Sym- bol	Type	Page
Fuse/Holder		Glass	GLQ, GLR	Non-delay	17
Fuse/Holder		Glass	GMF, GMQ, GRF	Dual-element	17
$\frac{1}{4}D$	6.4D	Glass	SFE	Non-delay	13
$\frac{3}{32}$ to $2\frac{1}{4}D$	10.3 to 57.2D	Melamine	SC	Time-delay	13
$\frac{13}{32}$ to $\frac{13}{16}D$	10.3 to 20.6D	Fibre	HV Series	Non-delay	13
Bolted Terminals		Melamine	KAC	Very Fast	19

* Special Connection/Construction Types

(For Telecommunication, Computer, Aircraft And Other Equipment With Special Space Requirements).

Construction	Connection/ Mounting	Type	Symbol	Page
Flat, Open Link	Slotted Screws	Non-delay	WER	15
Flat	Slotted/4164 Holder	Non-delay Limiter	ANL	15
Tubular	Slotted/Stud Mounted	Non-delay	AFJ, AFS, AFX, HBO	18
		Dual-element	ACK, ACL, HSK	18
	HC Holder	Non-delay	C	17
	HN Holder	Dual-element	N	17
$.267" \times 1\frac{53}{64}"$	Ferrule/HWG	Non-delay	GKB	16
Glass Tube (6.8mm x 46.4mm)	Holder		Series 70	16
Special	Special HLT Holder	Non-delay	GMT	16
Vary/Flat (Grasshopper)	Slotted/Screws	Non-delay	Series 35	15
Leaf	Spade/Screws	Heat Limiter	WKJ, WKK, WKH, WTK, WQL	19
			WKL, WWX, WWZ	19

*Types **ANL** and **WER** are visual indicating; Series **70** and Type **GKB** are pin indicating; Type **GMT** and Series **35** are spring indicating.

Indicating Types

(Visual Indication Or Contact For Closing a Separate Alert Circuit. Fibre Tube; Ferrule).

Dimensions	Indicating/ Mounting	Type	Sym- bol	Page
Inches	mm			
$\frac{1}{4} \times 1\frac{1}{4}$	6.6 x 31.8	Silver Pin/HKA Holder; Signal Block	Non-Delay	GLD 14
		Red Pin/HLH Holder	Non-Delay	GBA 14
$\frac{13}{32} \times 1\frac{1}{2}$	10.3 x 38.1	Red Pin/HPC-C Holder	Non-Delay	MIN 14
		Silver Pin/HPF-C Holder; Signal Block	Non-Delay	MIC 14
		Silver Pin/HPF-C Holder; Signal Block	Dual-element	FNA 14
		Pin/Signal Block	—	KAZ 15
$\frac{13}{32} \times 2$	10.3 x 50.8	Pin/Signal Block	Non-Delay	MIS 15

Fuse	Fuseholder					
Size	Symbol	Symbol	Amps	Volts	Features	Page
Panel Mounted Types, Lamp Indicating						
1 ³ / ₃₂ " x 1 1 ¹ / ₂ "	AGU	BAF	HGC	30	90 to	Neon/Clear
(10.3mm x	BAN	FNM		500		
39.1mm)	FNQ	KAA				
	KAW	KTK				

* Holders with flatsided knob; all other lamp indicating type have octagonal knobs.
† $\frac{1}{10}$ amp to 10 amp.

Panel Mounted or In-The-Line Type Assembly (Includes SFE

Fuses and Wire Lead Loop)

Fuse	Fuseholder					Page
Size	Symbol	Symbol	Amps	Volts		
$\frac{1}{4} \times \frac{5}{8}$	SFE4, AGA	HMF, HRF	15	32		26
(6.4 x 15.9)						26
$\frac{1}{4} \times \frac{3}{4}$	SFE6	HMG, HRG				26
(6.4 x 19.0)						26
$\frac{1}{4} \times \frac{7}{8}$	SFE7 $\frac{1}{2}$, AGW	HME, HRE				26
(6.4 x 22.2)						26
$\frac{1}{4} \times 1$	SFE9, AGX, MKB	HMH, HRH				26
(6.4 x 25.4)						26
$\frac{1}{4} \times 1\frac{1}{16}$	SFE14	HMI, HRI				26
(6.4 x 29.4)						26
$\frac{1}{4} \times 1\frac{1}{4}$	SFE20, ABC, AGC, GBB, GLH, MDA, MDL, MDX, MGB, MTH	HMJ, HRJ				26
(6.4 x 31.8)						26

Panel Mounted Types, Lamp Indicating

In-The-Line Universal Type						
$\frac{1}{4} \times \frac{5}{8}$	ABC, AGA, AGC, AGW, thru $\frac{1}{4}$ "	HRK	15	32		27
(6.4 x 15.9)	AGX, GBB, GLH, MDA, MDL, MDX, MGB, MKB, MTH, SFE4, SFE6, SFE7 $\frac{1}{2}$, SFE9, SFE14, SFE20					

In-The-Line Waterproof Type

$\frac{1}{4} \times 1\frac{1}{4}$	ABC, AGC, GBB, GLH, MDA, MDL, MDX, MGB, MTH, SFE20	HFA, HFA-HH	20	250		27
(6.4 x 31.8)						27

In-The-Line Waterproof Type (Trons)

$\frac{13}{32} \times 1\frac{1}{2}$	AGU, BAF, BAN, FNM, (10.3 x 38.1)	HEB, HET, HEX	30	600		27
(10.3 x 38.1)	FNQ, KAA, KAW, KLM, KTK					27
$\frac{13}{32} \times 1\frac{5}{8}$	SC30	HEC		300		27
(10.3 x 41.3)						
$\frac{13}{32} \times 1\frac{5}{16}$	SCO to SC15	HEG	15	300		27
(10.3 x 33.3)						
$\frac{13}{32} \times 1\frac{3}{32}$	SC20	HEH	20	300		27
(10.3 x 35.7)						
$\frac{13}{32} \times 2\frac{1}{4}$	SC35 to SC60	HEJ	60	300		27
(10.3 x 57.2)	HVW $\frac{1}{2}$ to HVW6		6	1200		

*Note—millimeters shown in ()'s.

Panel Mounted Or In-The-Line Type With Wire Contacts Only

Same basic holder as above but without lead wires and fuses. Available with various size wire contacts and metal or phenolic holding ears.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Notes on Mechanical Aspects of Small Dimension Fuses and Devices

Construction: The most common construction is the tubular body with ferrule terminals; they can be mounted in holders or blocks for easy access. Most of the other types accommodate applications with more space limitations.

Physical Size: The most common physical sizes in the United States are the $\frac{1}{4} \times \frac{1}{4}$ (6.6mm x 31.8mm) and the $\frac{3}{32} \times \frac{1}{2}$ (10.3mm x 38.1mm) (the latter often called "midget fuse"). Dimensions are listed as the diameter of the ferrule and the overall length. Other sizes can accommodate space limitations or control interchangeability.

Tubular Material: Glass, Fibre (includes laminated and bakelite), melamine and ceramic are typical materials used, and are listed primarily for differentiation of types. Glass, of course, provides an inherent visual indication of the fuse condition. (The materials are chosen to meet the electrical characteristics).

Fuse Block Index

Fuse or Device		Block Numbers	Page
Size	Symbol		
For Common Ferrule Type Fuses and Devices			
$\frac{1}{4} \times \frac{1}{4}$ (6.6mm x 25.4mm)	AGX, MKB	2698, 3828, 3992, 4393, 4399, 4520	29
$\frac{1}{4} \times \frac{1}{4}$ (6.6mm x 31.8mm)	ABC, AGC, GBB, GLH, MBO, MDA, MDL, MDX, MGB, MTH, TFA, GLD, GBA	2245, 2430, 2499, 2480, 2799, 2839, 2841, 3823, 3833, 3998, 4161-FR, 4396, 4405, 4406, 4407, 4408, 4512, 4574	30-31
$\frac{3}{32} \times \frac{1}{8}$ (10.3mm x 34.9mm)	BBS, KTQ	3845	32
$\frac{3}{32} \times \frac{1}{2}$ (10.3mm x 38.1mm)	ABU, AGU, BAF, BAN, FNM, FNQ, KAA, KAW, 0 to 30, KLM, KTK, FNA, MIC, MIN	2807, 2808, 2809, 2810, 2811, 2812, 3742, 3743, 3792, 3835, 4421, 4439, 4515, 4525	33
Signal Blocks for Pin-Indicating Fuses and Devices			
$\frac{3}{32} \times \frac{1}{2}$ (10.3mm x 38.1mm)	FNA, MIC, MIN	3839	34
$\frac{3}{32} \times \frac{1}{2}$ (10.3mm x 50.8mm)	KAZ, MIS	2778, 2788-3, 2837, 2838	34
For Special Connection and Construction Fuses and Devices			
	ACK	2653, 4228, 3411, 2322, 3569, 3578	18
	ACL	4228, 3433	18
	AFJ, AFX, AFX, HBO, HSK	4228, 3411, 2322, 4202, 4202	18
	ANL, ANN	4164	34
	HV-	4528, 4529, 4530, 2960, 4528, 4529, 4530, 2960	34
For Semiconductor Fuses (0 to 30 Ampere)			
	KAB or KAX	4386, 4287, 3959	35
	KAA or KAW	4515, 4525, 4535	35
For Type SC Fuses			
	SC1 to SC60	(See detail data)	

Fuseholder Index

Fuse Size	Fuseholder Symbol	Amps	Volts	Features	Page
Panel Mounted (General Types)					
$\frac{1}{4} \times \frac{1}{4}$ (6.4mm x 25.4mm)	HJM	30	125	Bayonet Knob	23
	AGX, MKB			Bayonet Knob (Short)	23
	HJM-CC			Snap-Lock	23
	HJM-OO			RF Shielded	23
	HMS	30	250		
$\frac{1}{4} \times \frac{1}{4}$ (6.4mm x 31.8mm)	HKP	30	250	Bayonet Knob	23
	HKP-CC			Bayonet Knob (Short)	23
	HKP-OO	15		Snap-Lock	23
	HMM			Slot Knob	23
	HMR	30		RF Shielded	23
	HTA	15		Space Saver	23
	HTA-DD			$\frac{3}{16}$ Quick Connect	23
	HTA-HH			$\frac{1}{4}$ Quick Connect	23
	HTA-OO			Snap-Lock	23
$\frac{3}{32} \times \frac{1}{16}$ (10.3mm x 33.3mm)	SC1 to 15	HPF-EE	15	300	Bayonet Knob
		HPS-EE			Screw Knob
$\frac{3}{32} \times \frac{1}{8}$ (10.3mm x 34.9mm)	BBS	HPS-L	5	600	Bayonet Knob
	KTQ				
$\frac{3}{32} \times \frac{1}{32}$ (10.3mm x 35.7mm)	SC20	HPF-JJ	20	300	Bayonet Knob
		HPS-JJ			Screw Knob
$\frac{3}{32} \times \frac{1}{2}$ (10.3mm x 38.1mm)	AGU	HPF	30	600	Screw Knob
	BAN	HPC-D			Waterproof
	FNQ				
	KAW	HPD			Short; $\frac{1}{2}$ KO
	BAF	HPG			$\frac{1}{2}$ KO
	FNM	HPL-B			Solder Type
	KAA	HPM			Quick-Connect
	KTK	HPS			Bayonet Knob
	KTK-R	HPS-RR	20		Bayonet Knob
$\frac{3}{32} \times \frac{1}{8}$ (10.3 x 41.3)	SC21 to 30	HPF-RR	30	300	Screw Knob
		HPS-FF			Bayonet Knob
Panel Mounted With Transparent Knobs for Pin-Indicating Fuses					
$\frac{1}{4} \times \frac{1}{4}$ (6.4mm x 31.8mm)	GBA	HLD	15	250	Bayonet Knob
	$\frac{3}{4}$ to 15				
	GLD	HLD-HH			Quick-Connect
	$\frac{3}{4}$ to 15	HLD-OO			Snap-Lock
$\frac{3}{32} \times \frac{1}{2}$ (10.3 x 39.1)	†FNA	HPF-C	15	250	Screw Knob
	MIC				
	MIN				
Panel Mounted Types, Lamp Indicating					
$\frac{1}{4} \times \frac{1}{4}$ (6.4 x 25.4)	AGX	HJL	20	90 to 250	Neon/Clear
	MKB				
$\frac{1}{4} \times \frac{1}{4}$ (6.4mm x 31.8mm)	ABC	HGA	30	90 to 250	Neon/Clear
	GBB				
	MDA	*HGA-C			Neon/Clear
	MDX	*HGB-C			Incand/Clear
	MTH	HKL	20		Neon/Clear
	AGC	*HKL-X			Neon/Clear
	GLH	HKR	20	22 to 33	Incand/Amber
	MDL	HKT		13 to 22	Incand/Amber
	MDL	HKU		4 to 6	Incand/Red
	MGB	*HKX		22 to 33	Incand/Amber
	GLD	HKA		125	Neon/Amber
		HKA-W			
		HGB	30	90 to 250	Neon/Clear

In-The-Line Type

(See Pages 17, 26, 27)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

7

Fuseology

Introduction

A fuse is an overcurrent protective device used to protect equipment. It derives its name from the verb "fuse," meaning "to melt." A fuse is a current-responsive device, and it is placed in series with the electrical circuit it is intended to protect. When the current in the circuit exceeds its rated value, the current-carrying element in the fuse melts and opens the circuit. Although the function of the fuse is elementary, a thorough understanding of fuse characteristics and circuit overcurrent condition is necessary to specify the appropriate fuse.

Fuses have been in existence almost from the inception of electricity. Ever since their early existence, fuses have been found to be the most effective and reliable overcurrent protective device. Their simple operating principle and no need for maintenance mean dependable protection. And as time progresses newer and better fuses continually evolve due to advances in technology.

Need for Overcurrent Protection

The opening of a fuse signifies that something is wrong with the circuit and should be corrected before the current is turned back on. The problem can be a defective or worn-out component, an accident, or a natural cause. When a problem exists and the fuse is called upon to open, the device should isolate only the faulty circuit from other unaffected circuits and it should respond in time to protect unaffected components in the faulty circuit. To properly protect a circuit, three considerations are necessary in the selection of a fuse:

1. During normal circuit operation, the fuse should not open unnecessarily.
2. The fuse must protect itself and the circuit components over the full range of overcurrent conditions—from overload to short-circuit.
3. Only the nearest fuse on the line-side of the fault should open.

History of Fuses

The earliest fuse was no more than a bare wire stretched between two studs. The wire had a smaller cross-sectional area than the conductor it was protecting and hence, would melt out first. Some "open-link" types exist today, but are limited only to circuits with very low short-circuit energy release. After changing from copper to other lower temperature metals, tubes or enclosures were developed to contain the fusing metal. The enclosed fuse made possible the adding of a filler material to help quench the arc.

Many very low power applications, such as in automotive and electronic use, do not require the filler. The use of a glass enclosure gives the added advantage of seeing when a fuse is open. An early system of "AG" sizes, from "Automotive Glass" Fuses, was developed. Because this nomenclature persists today, a cross-reference is given in the **Fuse Index by Symbol** on page 3. The "5AG" size is sometimes referred to as "midget" fuses; this term is also cross-referenced for those familiar with it.

In addition to the many older designed fuses still available today, many new modern fuses are being developed to meet the new demands. The "small dimension" fuse is no longer only for electronic and automotive applications; many are now used in control

circuits, branch circuits, supplementary protection and some applications for power and lighting.

Electrical Operation of a Fuse

There are two conditions to consider: normal circuit conditions and overcurrent circuit conditions. During normal circuit conditions, the fuse must carry the normal load current of the circuit; therefore, the current rating and the fusing characteristic in the momentary overload region must be considered to avoid unnecessary fuse opening. During overcurrent circuit conditions, the fuse must interrupt the overcurrent, limit the energy let-thru, and withstand the voltage across the fuse during arcing and after it opens. Therefore the voltage rating, interrupting rating, and the fusing characteristic over the full range must be considered for proper fuse selection and to protect the components in the faulty circuit.

Current Rating

The current rating of a fuse is a nominal value expressed in amperes (rms) and is established by the manufacturer as a value of current to which the fuse is rated based on a controlled set of test conditions set forth in Underwriters' Laboratories Standards or by other procedures. The current rating is always on the fuse.

Voltage Rating

The voltage rating is not a measure of its ability to withstand a specified voltage while carrying current. Rather, the voltage rating is the ability of the fuse to quickly extinguish the arc after the fuse element has melted and to prevent the system open-circuit voltage from restriking across the open fuse element. Because of the manner in which the voltage rating is applied, it is a maximum rms voltage value and expressed in **volts, or less**. For example, a 300 volt fuse will safely clear 300, 250, 125 or any value under 300 system volts across the open fuse element.

Overload Fusing Characteristics

The overload fusing characteristic is the relationship of the value of current through the fuse and the time required for the fuse to open or clear. The overload fusing characteristic can range widely in speed depending upon the fusible link material, construction of the fusible elements, and other design parameters.

For ease in selection, the fuses in this publication have been broadly classified into four major overload fusing characteristics.

1. Time-delay fuse (slow blowing). As used in this publication, means the fuse has a built-in delay in the overload region. Time delay slows down the opening time in the overload region. Time-delay fuses are widely used for general purpose circuits and especially suitable for loads with surge or starting currents.

2. Dual-element, time-delay fuse (slow blowing). These fuses have two separate fusible elements in series within the fuse case. This feature enables these types to have a very long time-delay in the overload region. Widely used for general purpose circuits and especially well suited for loads with inrush currents such as motors, solenoids, and transformers.

3. Non-time-delay (or non delay). These types have little intentional delay in the overload region. Typically used where fast speed of response is needed or where time-delay is unnecessary. Often sized for short-circuit protection only.

4. Very fast-acting fuse. These types of fuses have little or no intentional delay in the overload region, and are extremely current-limiting. Typically used for protection of semiconductor devices.

5. Limiters. There are two types of limiters presented in this publication. Limiters for short-circuit protection are distinguished from fuses by their intended purpose of providing only short-circuit protection for a component or circuit. Short-circuit limiters are not designed to provide overload protection. Heat limiters are for opening an electrical circuit when surrounding temperatures attain hazardous levels. Heat limiters are not intended for over-current protection.

For either time-delay fuses or dual-element, time-delay fuses, the amount of time-delay that can be achieved is determined by the mass of heat sink built-in which is increasingly restrictive as the fuse size diminishes.

Selecting a Fuse

1. Current Rating. The ampere rating of fuse selected is dependent upon:

- a. Degree of protection desired.
 1. Overload and short-circuit protection. Generally, select fuse ampere rating at 125% of the full load amperes.
 2. Short-circuit protection only. Select fuse ampere rating at 150% to 300% of equipment or circuit rating.
- b. Ambient temperature affects the current carrying capacity of fuses. Refer to page 20 for fuse ampere rating for ambient temperature effects.

2. Voltage Rating. For general circuit protection, the voltage rating of the fuse should be equal to, or greater than the voltage of the circuit in which the fuse is applied.

3. Time Current Characteristics. The fuse time current characteristic should be compatible with the time-current characteristic of the load and the time current characteristic of the circuit components to be protected.

- a. Select a dual-element, time-delay or time-delay fuse where high inrush or starting loads are present as with motors, solenoids, or control transformers. (Usually sized at 125% of full load amperes.)
- b. Select non-time-delay fuses for resistive currents or other currents where no transients or surges are encountered. (Usually sized at 125% of full load amperes.)
- c. Select a limiter or non-time-delay fuse where short-circuit protection only is required. (Usually sized at 150% to 300% of circuit ampere rating.)
- d. Select very fast-acting fuses to protect very low energy withstand components, such as semi-conductors.
- e. Test the selected fuse in the intended circuit under all normal circuit conditions that may include transient, inrush, or any other non-steady-state currents.

U.L. Test Requirements

Fuses marked as being "UL Listed" (Underwriters Laboratories Listed) in this bulletin are tested to the requirements of that organization. Tests consist of both ampere rating and short circuit tests.

The ampere rating tests are conducted at 110, 135 and 200% of rated current.

The fuse must carry 110% of its ampere rating until temperatures measured on its tube and terminals level off and do not continue to rise. This usually takes between 1½ and 4 hours. These temperatures are not allowed to exceed a 50°C rise. The tests are performed in a circuit specified in Underwriters Laboratories Standards UL 198.6 and 198.2.

In addition, the fuses must open at 135% of rated current within one hour, and open at 200% of rated current within 2 minutes. If the fuse is designated as "dual-element" or "time-delay," the fuse has an additional requirement to open in not less than 12 seconds at 200% of rated current.

The short circuit tests are performed at the rated voltage of a fuse which can be 125, 250, 300, 500 or 600 volts. The available short circuit current is 10,000 amperes AC, with the exception of some 250 volt fuses. 250 volt fuses can have short circuit ratings of 10,000 amperes or can adhere to the following schedule:

Ampere Rating of Fuse	Short Circuit Current
0 to 1	35
1.1 to 3.5	100
3.6 to 10	200
10.1 to 15	750
15.1 to 30	1500

Some fuses are shown as being "UL Recognized under the Components Program." This UL recognition is different from the above described listing in that the fuse has certain characteristics which are different from those described in UL 198.6. In this case, Underwriters Laboratories and the manufacturer agree on a test program designed to measure these characteristics and satisfy the requirements of the UL Safety Requirements. In some cases, the fuse may be designed to carry currents other than 110% of rated current or it may open at currents other than at 135% of rated current. Also, the short circuit rating might be different from those shown above.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Ferrule Fuses

0.197" x 0.769"
(5mm x 20mm)



- For miniature circuits in foreign equipment.
- **Non-Time-Delay** Type **GMA**.
- Glass tube (visual indicating).
- Type **GJU** now called **GMA**.

GMA		GMA		GMA	
Amps	Volts	Amps	Volts	Amps	Volts
1/32		6/10		3	
1/20		7/10		1/2	
1/16		3/4		4	250
1/10		8/10		5	
1/8	250	1	250	6	
3/10		1 2/10		7	
1/4		1 6/10		8	125
3/10		1 1/2		10	
4/10		2		15	
1/2		2 1/2			

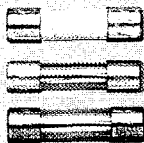
Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: 0.69 lbs. (313g).

Test Specifications

Load Opening Time

100%	4 Hours (min.)
200%	10 Seconds (max.)

5mm x 20mm
(0.205" x 0.787")



GDA-Ceramic
GDB-Glass
GDC-Glass

- Types **GDA**, **GDB** and **GDC** are 250 volt miniature fuses for foreign equipment. Meet IEC* specification 127; covered by SEMKO 104 approval and CEE 4 certification.
- Types **GDA** and **GDB**—quick-acting; Type **GDC**—time-lag for circuits with surge currents.

(*Except GDA 315mA and 400mA.)

Symbol	Type	*I.R.	IEC 127 Sheet	Ampere Ratings
GDA	Quick-	1500A	1	50mA-6.3A
GDB	Acting	†35A	2	32mA-10A
GDC	Time-lag	†35A	3	32mA-6.3A

*I.R.—Interrupting rating (breaking capacity) at 250 volts. †Interrupting rating is 35A or ten times current rating of fuse whichever is larger.

Ampere Ratings

Milliamperes: 32, and 40, (**GDB** and **GDC** only); 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, and 800. Amperes: 1, 1.25, 1.6, 2, 2.5, 3.15, 4, 5 and 6.3. (8A and 10A, **GDB** only—not covered by SEMKO approval and IEC specifications).

1/4" x 5/8"
(6.35mm x 15.9mm)



- For mounting in in-the-line holders **HMF**, **HRF**, **HAF**, **HIF**, and **HRK** or 1/4" clips.
- **Non-Time-Delay**, Type **AGA**.
- For electronic and small appliance circuits.
- Glass tube (visual indicating).
- Formerly called **1AG**.

AGA		AGA		AGA	
Amps	Volts	Amps	Volts	Amps	Volts
* 1/16		* 1	125	7	
* 1/10		* 1 1/2		7 1/2	
* 1/8		† 2		10	
* 1/4	125	† 2 1/2		15	32
* 3/8		† 3	32	20	
* 1/2		† 5		25	
* 5/10		6		30	
* 3/4					

*U.L. Listed.

†U.L. Recognized under Components Program.

Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: 0.73 lbs. (331g).

Test Specifications

Load Opening Time

110%	4 Hours (min.)
135%	1 Hour (max.)

1/4" x 7/8"
(6.35mm x 22.2mm)



- For electronic and small appliance circuits.
- **Non-Time-Delay**, Type **AGW**.
- Glass tube (visual indicating).
- Formerly called **7AG**.
- Mounting: In-the-line holders **HME**, **HRE**, **HDM**, **HHH**, and **HRK**. Clips—1/4"

AGW		AGW		AGW	
Amps	Volts	Amps	Volts	Amps	Volts
1/2		4		15	
1		5		20	
1 1/2	32	6	32	25	32
2		7 1/2		30	
2 1/2		10			
3					

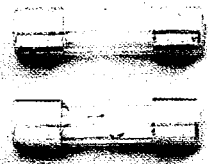
Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: 0.80 lbs. (363g).

Test Specifications

Load Opening Time

110%	4 Hours (min.)
135%	1 Hour (max.)

1/4" x 1"
(6.35mm x 25.4mm)



AGX

MKB

- For instruments, electronic and small appliance circuits.
- Use Type **MKB** when low resistance is desired.
- **Non-Time-Delay**, Types **AGX** and **MKB**.
- Glass tube (visual indicating).
- Formerly called **8AG**.
- Types **MJB** and **MJW** now called **AGX**.
- Mounting: Panel-Mounted Holders—**HJM**, **HJM-CC**, **HJM-00**; **HMS**; **HJL**. In-the-Line Holders—**HMI**, **HRI**, **HDI**, **HHJ**, **HRK**. Fuse Blocks and Clips (1/4").
- U.L. Listed (except **AGX25** & **30**, and **MKB 1/16**).

Amps	Volts	*Resistance in Ohms
		† Cold †† Hot
AGX		
1/500		1750.0 2450.0
1/200		95.0 450.0
1/100		150.0 350.0
1/64		125.0 300.0
1/32		32.0 130.0
1/16		22.0 88.0
1/10		10.0 40.0
1/8		6.7 25.0
3/16		3.8 15.0
1/4	250	3.1 13.5
3/10		2.3 12.0
3/8		2.1 8.4
1/2		1.5 5.6
3/4		.8 3.6
1		.75 3.3
1 1/4		.26 .70
1 1/2		.16 .30
2		.13 .22
2 1/2		.096 .16
3		0.07 0.11
4	125	— —
6		
8		
10	32	— —
15		
20		
25		
30		
MKB		
1/16	250	5 9.0
1/8		1.0 4.0

† At 10% rated current. †† 100% rated current. * Approx.
Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: 0.76 lbs. (345g).

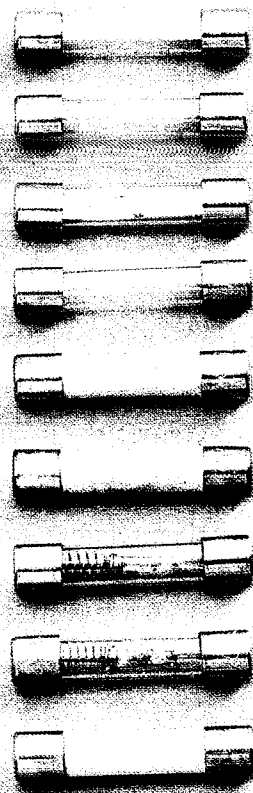
Test Specifications

Fuse	Load	Opening Time
AGX (1/500 to 50A)	110%	4 Hours (min.)
	135%	1 Hour (max.)
AGX (1/500 to 2A)	200%	5 Seconds (max.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

10

1/4" x 1 1/4"
(6.35mm x 31.8mm)



AGC

GLH

MGB

MTH

ABC

GBB

MDL

MDQ

MDX

MDA

• For instruments, electronic and small appliance circuits, use **Non-Time-Delay Types AGC, GLH, MGB, MTH (glass), and ABC (ceramic).**

• For circuits with high inrush currents, use **Dual-Element Types MDL, MDX, MDQ (glass) and MDA (ceramic).**

• For protection of solid-state devices such as SCR's, use **Very Fast-Acting Type GBB.** Also see Rectifier Fuses.

• Common size in U. S.

• Formerly **3AG** (glass) and **3AB** (ceramic).

• Time-current curves for **AGC, GLH, MTH, ABC, MDL, MDX, and MDA** at back of section.

• Mounting: Panel Holders; In-the-Line Holders; Blocks, and Clips (1/4").

Test Specifications

Fuse	Load	Opening Time
GBB	100%	4 Hours (min.)
All types	110%	4 Hours (min.)
	135%	1 Hour (max.)
AGC (1/500 to 2A)	200%	5 Seconds (max.)

Carton quantity: 5. Shelf package: 100

Shipping wt. per 100:

AGC, MGB, MTH, GLH—91 lbs. (413g).

MDL, MDQ, MDX—93 lbs. (421g).

MDA—97 lbs. (440g).

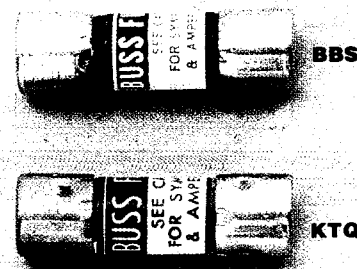
ABC—1.0 lb. (454g).

(Data continued in next column.)

Non-Time Delay				Dual-Element			
AGC		ABC		MDL			
Amps	Volts	Amps	Volts	Amps	Volts		
* 1/500		* 2		4			
* 1/200		* 2 1/2		5			
* 1/100		* 3		6 1/4			
* 1/32		* 4		7			
* 1/20		* 5		† 7 1/2			
* 1/16		* 6	250	† 8			
* 1/10		* 8		† 9	32		
* 1/8		* 10		† 10			
* 15/100		* 12		† 12			
* 175/1000		* 15		† 15			
* 3/16		† 20		† 20			
* 2/10		† 25	125	† 25 † 30			
* 1/4		30		MDQ			
* 3/10		Very Fast-Act.		* 2 1/2, * 2 3/10			
* 3/8		GBB		* 3, * 3 3/10	250		
* 4/10	250	† 1/4		* 4, * 5, * 6			
* 45/100		† 1		* 6 1/4, * 7			
* 1/2		† 1 1/4		MDX			
* 6/10		† 2		* 1 1/4			
* 3/4		† 3		* 1 1/2			
* 8/10		† 4		* 1 5/10			
* 1		† 5		* 1 8/10			
* 1 1/4		† 6		* 2			
* 1 1/2		† 7		* 2 1/2			
* 1 5/10		† 8		* 3			
* 1 3/4		† 9	60	* 3 2/10			
* 1 9/10		† 10		* 4	125		
* 2		† 12		* 5			
* 2 1/4		† 15		* 6 1/4			
* 2 1/2		† 20		* 7			
* 3		† 25		MDA			
† 3 2/10		† 30					
† 4		Dual-Element		1/100			
† 5		MDL		1/32			
† 6		* 1/100		† 1/16			
† 6 1/4		* 1/32		† 1/10			
† 7		* 1/16		† 1/8			
† 7 1/2		* 1/10		† 15/100			
† 8		* 1/8		† 175/1000			
† 9	32	* 15/100		† 3/16			
† 10		* 175/1000		† 2/10			
† 12		* 3/16		† 1/4			
† 15		* 2/10		† 3/10			
† 20		* 1/4	250	† 3/8			
† 25		* 3/10		† 4/10	250		
† 30		* 3/8		† 1/2			
		* 4/10		† 6/10			
GLH		* 1/2		† 3/4			
* 7		* 6/10		† 8/10			
* 8	125	* 7/10		† 1			
* 10		* 3/4		† 1 1/4			
MGB		* 8/10		† 1 1/2			
1/16	250	* 1		† 1 5/10			
1/8		* 1 2/10		† 2			
MTH		* 1 1/4		† 2 1/2			
* 4		* 1 1/2		† 2 5/10			
* 5	250	* 1 5/10		† 3			
* 6		* 1 8/10	125	† 3 2/10			
* 8		* 2		† 4			
ABC		* 2 1/4		Time-Delay			
* 1/4		* 2 1/2		MDA			
* 1/2		* 2 5/10		† 5, † 6			
* 3/4		3		† 6 1/4, † 7			
* 1	250	3 2/10		† 8, † 10	250		
* 1 1/2		3 1/2	32	† 12, † 15			
				† 20			
				25, 30	125		

*UL listed. †UL Recognized under Components Prog.
[CSA Listed: **AGC's**; **MTH's**; **MDL's** (except 32V);
and **MDX** (125V)].

1 3/32" x 1 3/8"
(10.3mm x 34.9mm)



- For control, gaseous vapor fixture, and electronic circuits.
- Type **KTQ** has slightly more delay than **BBS** to override transient currents where needed.
- Mounting: Panel Holders **HPC-L** and **HPS-L**. Block **3845**. Clips (1 3/32").
- Type **BBS** U.L. Listed.

Non-Time-Delay

BBS		BBS	
Amps	Volts	Amps	Volts
2/10		3	
4/10		4	600
3/4		5	
8/10		KTQ	
1	600	2	
1 1/2		3	600
1 5/10		4	
1 8/10		5	
2			

Test Specifications

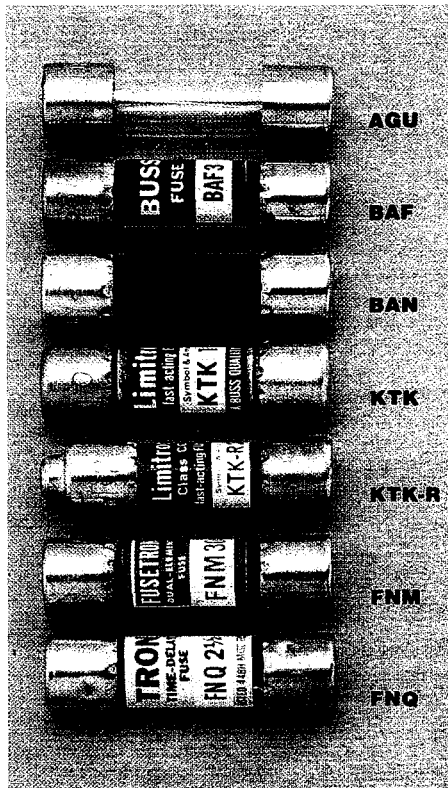
Load Opening Time

110%	Indefinitely
135%	1 Hour (max.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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$1\frac{3}{32}$ " x $1\frac{1}{2}$ "
(10.3mm x 38.1mm)



Non-Time-Delay Types

- Glass—**AGU** (formerly **5AG**).
- Laminated—**BAF**.
- Fibre—**BAN** (formerly **5AB**).
- **LIMITRON** fast-acting **KTK-R** types have an interrupting rating of 200,000 amperes (ac) and current-limiting characteristics. **KTK-R**'s are U.L. Class CC with rejection feature.
- For control circuits, gaseous vapor fixture circuits, or circuits having high fault current capacity, use Type **KTK LIMITRON** fast-acting fuses. (100,000A interrupting rating).
- For branch circuit fusing (1 to 20 ampere current rating), use Type **KTK-R** fuses. (The **HPS-RR** fuseholder for **KTK-R**'s rejects fuses with lower interrupting rating).
- The military version (MIL-F-15160) of Type **KTK** is Type **KLM** (**KLM**'s have a dc rating of 500 volts or less).
- For more information on **KTK-R** fuse, request Bulletin **LKTR**.

Dual-Element FUSETRONS

- For circuits with high inrush currents use Type **FNM** (formerly called **5AB**).

Time-Delay Types (TRONS)

- For motor control transformers and other circuits with inrush currents, use Types **FNQ** and **FNW** (interrupting rating of 10,000 amperes, ac).

Mounting

Panelholders—**HPC**, **HPD**, **HPC-D**, **HPG**, **HPL-B**, **HPM**, and **HPS**.

Panelholder, lamp indicating—**HGC**.

In-the-line fuseholders—**HEB** and **HEX**.

Fuseblocks and clips ($1\frac{3}{32}$).

Test Specifications

Load Opening Time

110% 4 Hour (min.)

135% 1 Hour (max.)

Carton quantity: 10. Shelf package: 100.

Shipping wt. per 100:

BAF—1.3 lbs. (590g).

BAN—1.4 lbs. (635g).

FNQ, FNM—1.5 lbs. (680g).

AGU, KLM—1.8-lbs. (816g).

Non-Time-Delay

AGU		KTK, KLM		FNM	
Amps	Volts	Amps	Volts	Amps	Volts
* 1	250	1½	600 (KLM 500V dc)	* 3¾/10	250
* 2		2		* 3½/2	
* 3		2½/2		* 4	
4		3		* 4½/2	
5		3½/2		* 5	
8		4		* 5⅞/10	
10		5		* 6¼/4	
15		6		* 7	
20	7	* 8	125		
25	8	* 9			
30	9	* 10			
BAF	10	* 12			
* ½	12	* 15			
* 1	15	20			
* 1½	20	25			
* 2	25	30			
* 2½	30	FNQ	32		
* 3	KTK-R			* 1/10	
* 4	* 1/10	* 1/8			
* 5	* 1/8	* 15/100			
* 6	* 2/10	* 3/16			
* 6¼	* ¼	* 2/10			
* 7	* 3/10	* ¼			
* 8	* ½	* 3/10			
* 9	* ¾	* 4/10			
* 10	* 1	* ½			
* 12	* 1½	* 6/10	500		
* 15	* 2	* 8/10			
20	* 2½	* 1			
25	* 3	* 1½			
30	* 3½	* 1¼			
BAN	* 4	* 1½			
2/10	* 5	* 16/10			
4/10	* 6	* 2			
¾	* 7	* 2¼/4			
9/10	* 8	* 2½/2			
1	* 9	* 3			
1½	* 10	* 3¾/10			
16/10	* 12	Time-Delay			
18/10	* 15	FNQ			
3	* 20 & 30	* 3½/2			
4	Dual-Element	* 4			
5	FNM	* 4½/2			
6	* 1/10	* 5			
7	* 15/100	* 5⅞/10			
8	* 2/10	* 6			
10	* ¾/10	* 6¼/4			
15	* 4/10	* 7			
20	* ½/2	* 8			
25	* 6/10	* 9			
30	* 8/10	* 10			
* KTK, KLM	* 1	* 12			
1/10	* 1½/8	* 14			
1/8	* 1¼/4	* 15			
2/10	* 14/10	* 20			
¼	* 16/10	* 25			
3/10	* 18/10	* 30			
½	* 2	FNW			
¾	* 2¼/4	* 12			
1	* 2½/2	* 15			
	* 28/10	* 20			
		* 25			
		* 30			
		* 250			

*UL Listed. ♦ KTK—UL Listed; CSA Listed as follows:

BAF 0A-15A (250V); **KTK** 0A-15A (600V);

FNM 0A-10A (250V); **FNM** 12A-15A (125V);

FNQ 0A-15A (500V).

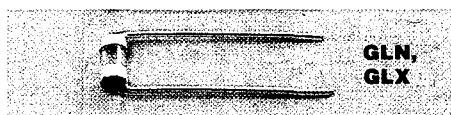
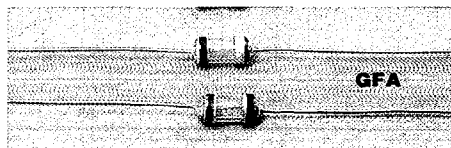
Time current curves for **FNQ, FNM, KTK, KLM, BAF**, and **BAN** at end of this section.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Lead-In or Pin Type

0.145" x 0.300" Axial or Radial Leads (3.7mm x 7.6mm)

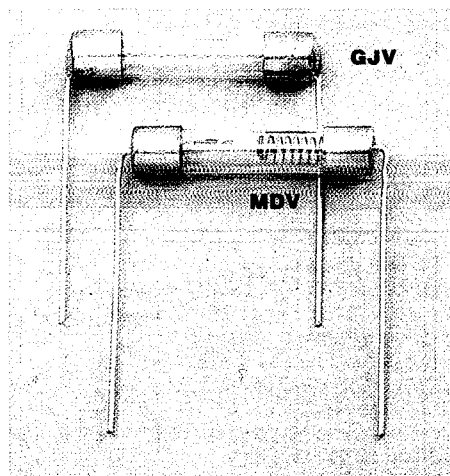


- **Non-Time-Delay** TRON fuses.
- Sub-miniature size for protection of sub-miniature devices.
- Tinned wire leads solder into circuit.
- Withstand high shock and vibration.
- 50 ampere interrupting rating.
- Color-coded ampere rating.
- Glass tubing permits visual indication of element.
- Axial leads (1/2") can feed thru wire forming machine.
- Radial leads spaced for easy assembly on printed circuit chassis.

Ratings		Test Spec.			Color Code	
Amps	Volts	GFA	GLN	GLX	One End	Other End
*GFA, GLN						
1/200	125	A	A		Red	Blk
1/100		A	A		Red	Orn
1/64		A	A		Red	Grn
1/32		A	A		Red	Brn
1/20		A	A		Yel	Yel
1/16		A	A		Brn	Brn
1/10		A	A		Red	Red
1/8		A	A		Orn	Orn
*GFA, GLN, GLX						
15/100	125	B	A	B	Red	Yel
2/10		B	A	B	Red	Blu
1/4		B	A	B	Red	Pur
3/10		A	A	B	Grn	Grn
4/10		A	A	B	Blu	Blu
*GFA, GLX						
1/2	125	B		B	Orn	Grn
6/10		B		B	Orn	Blu
3/4		B		B	Orn	Pur
1		B		B	Yel	Grn
1 1/2		B		B	Yel	Pur
2		B		B	Grn	Blu
2 1/2		B		B	Grn	Brn
3		B		B	Blu	Pur
4		B		B	Pur	Brn
5		B		B	Brn	Blk
GFA, GLN						
7	32	A	A		Pur	Grn
8		A	A		Grn	Blk
10		A	A		Yel	Brn
12		A	A		Blk	Blu
15		A	A		Blk	Pur

*GFA 0 to 5 amps; U.L. Recognized under Component Program.
Unit Wt.: 0.33 grams (approx.)
Shipping Wt. per 100: 116 lbs. (52.6 gm)

1/4" x 1 1/4" Radial Leads (6.35mm x 31.8mm)



- For electronic and small appliance circuits use **Non-Time-Delay**, Type **GJV**.
- For circuits with high inrush currents, use **FUSETRON Dual-Element**, Type **MDV**.
- Glass tubing permits visual indication of element.
- Radial leads 1/4", **GJV**; 1 1/2", **MDV** (minimum lengths), are #20 tinned wire for circuit connection.
- U.L. Listed and CSA Listed.

No Time-Delay		Dual-Element		Dual-Element	
GJV		MDV		MDV	
Amps	Volts	Amps	Volts	Amps	Volts
1/16	125	1/100	125	1 1/4	125
1/8		1/32		1 1/2	
1/4		1/16		1 5/10	
3/10		1/10		1 8/10	
1/8		1/8		2	
1/2		15/100		2 1/4	
3/4		175/1000		2 1/2	
1		3/16		2 9/10	
1 1/2		2/10		3	
1 3/4		1/4		3 1/10	
2	250	3/10	250	4	125
3		3/8		5	
4		4/10		6 1/4	
5		1/2		7	
6		6/10			
7		3/4			
8 & 10		8/10			

Also see Type **TFL** and **TFS** Heat Limiters.

† Not U.L. Listed.

Test Specifications

Load Opening Time

110%	4 hours (min.)
135%	1 hour (max.)

Metal box: qty. 5; shelf package: qty. 100.
Shipping Wt. per 100: **GJV**—0.9 lb. (408.2 gm)
MDV—1.1 lb. (499.0 gm)

Test Specifications

Load Opening Time

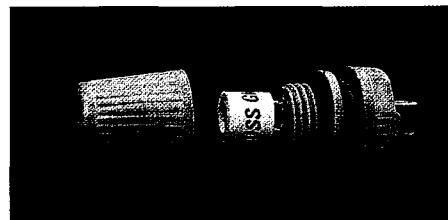
"A"	"B"
100%	4 hours (min.)
150%	—
200%	*10 sec.

*Maximum time.

Wire Load Size

No.	Fuse
24	GLN, GLX, GFA (1/200 to 5A)
18	GFA (7 to 12A)
	GLN (7 to 15A)
16	GFA (15A)

0.270" x 0.25" Pin (6.9mm x 6.35mm)



- Sub-miniature pin-base fuses for limited space applications.
- Fuses solder direct into circuit or can be inserted into an **HWA** fuseholder for panel mounting (holder can also be soldered direct into circuit).
- Fuses are **Non-Time-Delay** type.
- Transparent window in fuses permits visual indication of element.
- Interrupting rating of 35 amperes.
- Military version of Type **GMW** fuse is designated Type **FM01**.
- Military version of Type **HWA** fuseholder is designated Type **FHN42W**.
- Water-proof knob (Type **AF**) available for holder.

*GMW and FM01		*GMW and FM01	
Amps	Volts	Amps	Volts
1/200	125	1/2	125
1/100		6/10	
1/64		3/4	
1/32		1	
1/16		1 1/2	
1/10		2	
2/10		3	
1/4		4	
3/10		5	
4/10			

*GMW 0 to 5 amps; U.L. Recognized under the Components Program.

Carton quantity: 10

Shipping Wt. per 100:

Fuses—0.20 lbs. (90.7 gm)

Fuseholders—0.44 lbs. (199.6 gm)

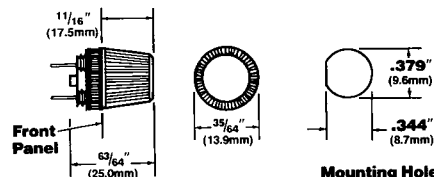
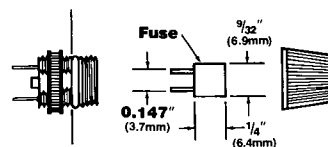
Type **AF** Knob—0.25 lbs. (113.4 gm)

Test Specifications

Load Opening Time

100%	4 hours (min.)
200%	10 sec. (max.)

Request latest blueprints before tooling.

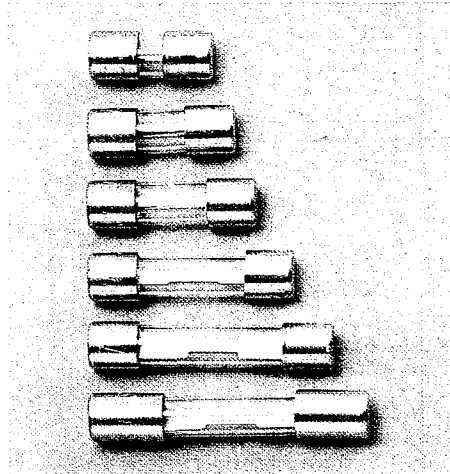


Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Ferrule Fuses, Varying Case Size

1/4" x Length Tabulated
(6.35mm x Length Tabulated)



- For automotive circuits, **Non-Time-Delay SFE** Type.
- Visual indicating glass tubing.
- Made to SAE specifications.
- U.L. Listed.
- Physical size varies with electrical rating of fuse to prevent over-fusing.
- For mounting in panel and in-the-line holder, and 1/4" clips.

SFE

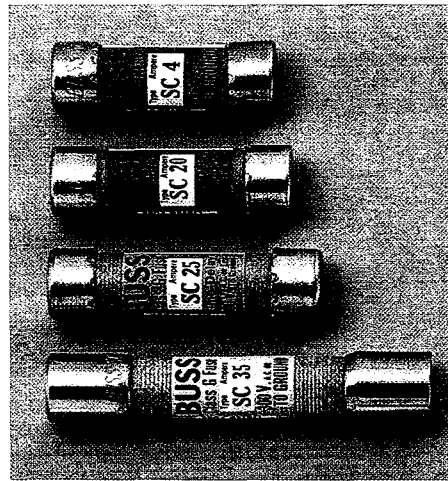
Amps	Volts	Length Inches mm	Ship. Wt. per 100	
			Lbs.	Grams
4		5/8	15.9	.73 331
6		3/4	19.0	.75 340
7 1/2		7/8	22.2	.80 363
9	32	7/8	22.2	.80 363
14		1 1/16	27.0	.82 372
20		1 1/4	31.7	.87 395
30		1 7/16	36.5	1.60 726

Carton quantity: 5. Shelf package: 100.

Test Specifications

Load	Opening Time
110%	4 Hours (min.)
135%	1 Hour (max.)

1 3/32" x Length Tabulated
(10.3mm x Length Tabulated)



- For branch circuits and supplementary protection, **Time-Delay SC** (6 to 60 amp).
- One to 5 amp **SC**'s are **Non-Delay** Type.
- Interrupting rating of 100,000A.
- High degree of current-limitation.
- Physical size varies with electrical rating of fuse to prevent over-fusing.
- UL Class G (U.L. Listed).
- For mounting in blocks, panels and in-the-line holders, and 1 3/32" clips.
- For more information request Bulletin **SCS**.

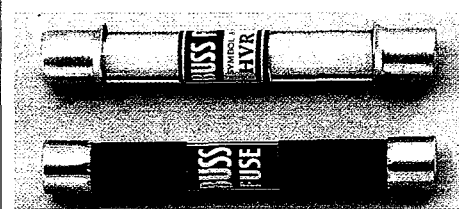
SC

Amps	Volts	Length In. mm	Ship. Wt. per 100		Cart. Qty.
			Lbs.	Gm	
1/2					
1					
2					
3					
4	300	1 5/16	33.3	1 1/2 680	4
5					
6					
8					
10					
15					
20	300	1 13/32	35.7	1 9/10 726	4
25	300	1 5/8	41.2	2 907	4
30					
35					
40					
45	300	2 1/4	57.1	3 3/4 1701	2
50					
60					

Test Specifications

Load	Opening Time
110%	4 hours (min.)
135%	1 Hour (max.)

1 3/32" and 1 3/16" x Length
(10.3mm and 20.6mm x Length)
For High Voltage Circuits



- **Non-Time-Delay** fuses for high voltage instruments and circuits.
- Physical size varies with electrical rating of fuse to prevent over-fusing.
- Use **HVA, HVB, HVJ** and **HVL** for circuits up to 20kw dc or 30 KVA ac. For higher interrupting capacity, use **HVR, HVT, HVU, HVW** and **HVX**.

HVA (1000 Volts)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
3/8	1			
1/2	1 1/2	1 3/32"	3	76.1 2 0.91
3/4	2			

HVB (2500 Volts)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/2	1 1/2			
3/4	2	1 3/32"	4 1/2	114.2 3 1.36

HVJ (5000 Volts)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/16	3/4			
1/8	1			
1/4	1 1/2	1 3/16"	5	126.9 9 4.08
3/8	2			

HVL (10,000 Volts)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/16	3/4			
1/8	1			
1/4	1 1/2	1 3/16"	10	253.8 15 6.80
3/8	2			

HVR (1000 Volts) (max. S.C. KVA-500)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/2	3			
1	4	1 3/32"	3	76.1 3 1.36
1 1/2	5			

HVT (2500 Volts) (max. S.C. KVA-1250)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/2	3			
1	4	1 3/32"	4 1/2	114.2 4 1.81
1 1/2	5			

HVU (5000 Volts) (max. S.C. KVA-2500)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/2	3			
1	4	1 3/16"	5	126.9 19 8.62
2	5			

HVW (1200 Volts) (max. S.C. KVA-5000)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/2	3			
1	4	1 3/32"	2 1/4	57.1 2 0.91
2	5			

HVX (10,000 Volts) (max. S.C. KVA-12,000)

Amps	Dia.	Length In. mm	*Wt./100	
			Lbs.	Kg
1/2	3			
1	4	1 3/16"	10	253.8 36 16.33
1 1/2	5			

Carton quantity: 10.

* Shipping.

Test Specifications

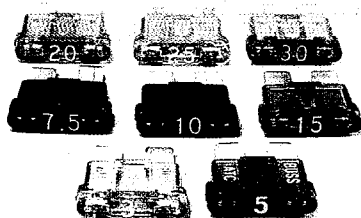
HVA, HVB, HVJ, HVL, HVW, HVX	HVR, HVT, HVU, HVW, HVX
Load	Load
Opening Time	Opening Time
110%	100%
4 Hours (min.)	4 Hours (min.)
135%	150%
1 Hour (max.)	1 Hour (max.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Buss ATC Fuses for Automotive Use

Buss ATC Fuses For Automotive Use

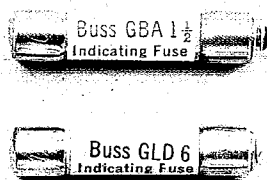


- For mounting in especially designed fuseblocks for automobiles and trucks.
- **Non-Time-Delay** Type.
- Totally enclosed fuse link confines arc.
- Transparent for visual inspection of element.

ATC		Test Specifications	
Amps	Volts	Load	Opening Time
3	32	110%	4 Hours (min.)
5		135%	.75 to 1800 Seconds
7 1/2		200%	.15 to 5 Seconds
10		350%	.08 Seconds (min.)
15			
20			
25			
30			

Ferrule Fuses, Pin Indicating

1/4" x 1 1/4"
(6.35mm x 31.8mm)



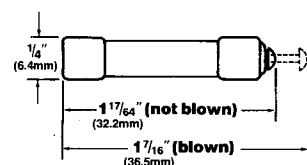
- **Non-Time-Delay** fuses for electronic circuits where a fuse opening must be quickly apparent.
- **GBA** Type have red pin for easy visual indication of open fuse.
- **GLD** Type have Albaloy-plated pin for positive signal activation.
- Time current curves on back pages.
- Mounting: Fuseblocks—1/4" x 1 1/4" for visual indicating.
- Panel Holders—**HLD** (15A. max.) for visual indicating. **HKA** (15A. max.) for lamp indicating.

GBA, GLD		GBA, GLD		GBA, GLD	
Amps	Volts	Amps	Volts	Amps	Volts
* 1/2	125	* 4	125	15	32
* 3/4		* 5		GLD	
* 1		6		20	
* 1 1/2		8		25	
* 2		10		30	
* 3		12			

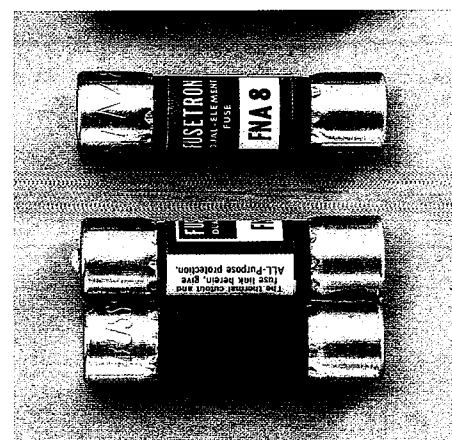
*UL Listed. †Dual tube construction. CSA Listed:
GLD 0A-4A.
Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: 1/2A to 15A—.86 lbs. (390 g).
20A to 30A—1.75 lbs. (794 g).

Test Specifications

Load	Opening Time
110%	4 Hours (min.)
135%	1 Hour (max.)



1 3/32" x 1 1/2"
(10.3mm x 38.1mm)



- For electronic circuits in which a fuse opening must be identified quickly, use **Non-Time-Delay MIC** and **MIN** Types.
- For electronic circuits with high inrush currents, use **FUSETRON Dual-Element FNA** Type. (Time current curve for **FNA** at end of section).
- **MIN** Type have red pin for easily seen visual indication of open fuse.
- **MIC** and **FNA** Types have silver-plated pin for "positive" signal activation.
- **FNA** Type in ampere sizes larger than 10 amperes have dual tube construction.
- Mounting: Fuseblocks—1 3/32" x 1 1/2".
Panel Holders—**HPC-C**, **HPC-CK** for visual indication.
Signal Blocks—**3839** for signal activation.

Non-Time Delay		Dual-Element		Dual-Element	
MIC, MIN		FNA		FNA	
Amps	Volts	Amps	Volts	Amps	Volts
1	250	* $\frac{4}{10}$	250	* $3\frac{2}{10}$	
2		* $\frac{1}{2}$		* $3\frac{1}{2}$	
3		* $\frac{6}{10}$		* 4	
5		* $\frac{8}{10}$		* $4\frac{1}{2}$	
10		* 1		* 5	
15	32	* $1\frac{1}{8}$	125	* $5\frac{6}{10}$	
20		* $1\frac{1}{4}$		* 6	
25		* $1\frac{4}{10}$		* $6\frac{1}{4}$	
30		** $1\frac{1}{2}$		* 7	
Dual-Element		* $1\frac{6}{10}$		* 8	
FNA	125	* $1\frac{8}{10}$	* 10		
* $\frac{1}{10}$		* 2	† * 12		
* $\frac{15}{100}$		* $2\frac{1}{4}$	† * 15		
* $\frac{2}{10}$		* $2\frac{1}{2}$	† 20		
* $\frac{1}{4}$		* $2\frac{8}{10}$	† 25		
* $\frac{3}{10}$		* 3	† 30	32	

• Type **MIC** U.L. Listed (up to 15 amps). *U.L. Listed.
[CSA Listed **FNA** 0-9/10 amps (250 V); 0-10A (125 V)]
†Dual tube construction.
Carton quantity:
Single tube types: 10. Dual tube types: 5.
Shipping Wt. per 100:
Single tube types: 1.5 lbs. (650 g).
Dual tube types: 3.0 lbs. (1.36 kg).

Test Specifications

Load	Opening Time
110%	Indefinitely
135%	1 Hour (max.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

15

$1\frac{13}{32}$ " x 2"

(10.3mm x 50.8mm)

Type **KAZ** actuator. (Is not a fuse).



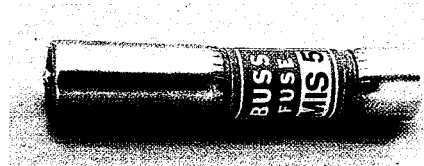
- Connects in parallel with fuses having a rating of 50 amperes or larger.
- The **KAZ** is a **Non-Time-Delay** component. Opens at 10A or more.
- When used with Buss signal blocks, actuates a miniature switch which closes a signal circuit should fuse open. Device also gives a direct visual indication of an open fuse by ejected (spring actuated) end pin.
- Interrupting rating of 200,000A.
- Mounts in Buss signal blocks 2778, 2778-2 thru -5, 2837, and 2838.
- U.L. Listed as "fuse accessory."
- For more data, request Bulletin KAFS.
- Rated 600V ac.

Carton quantity: 10.

$1\frac{13}{32}$ " x 2"

(10.3mm x 50.8mm)

Pin Indicating **Non-Time-Delay** Fuses, Type **MIS**.



- Can be used as fuses, or in parallel with larger fuses to indicate opening of the larger fuses.
- Interrupting rating of 200,000 amperes.
- Mount in all signal blocks with miniature signal switches (referenced above for use with **KAZ** actuating devices).

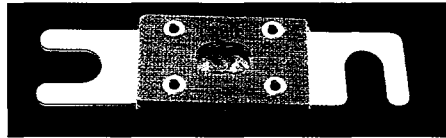
MIS		MIS	
Amps	Volts	Amps	Volts
1		6	
2	600 ac	8	600 ac
3	(250 dc)	10	(250 dc)
4		12	
5			

Test Specifications

Fuse	Load	Opening Time
MIS	110%	4 Hours (min.)
MIS 1 to MIS 5	150%	6 Minutes (max.)
MIS 6 to MIS 12	150%	12 Minutes (max.)

Special Fuses and Devices

Low Voltage Limiters



- Isolates faults in equipment systems such as lift trucks and other battery operated systems. Are **Non-Time-Delay** components.
- Silver-plated copper link.
- Link element visible thru mica window.
- Slot width $1\frac{1}{32}$ " (8.7mm); distance between slot centers $2\frac{7}{16}$ " (62mm).
- See time-current curve at end of section.

ANL		ANL		ANL	
Amps	Volts	Amps	Volts	Amps	Volts
35		130		275	
40		150		300	
50	32	175	32	325	32
60		200		350	
80		225		400	
100		250		500	

Carton quantity: 10.

Type WER Telecommunication Fuses



- For mounting with #10 screws.
- **Non-Time-Delay** type.
- Visible link element.
- U.L. recognized under the components program.

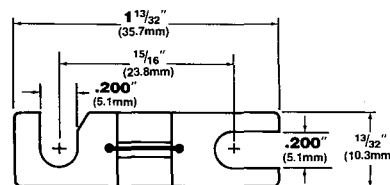
WER		WER		WER	
Amps	Volts	Amps	Volts	Amps	Volts
$\frac{1}{4}$		$1\frac{1}{3}$		4	
$\frac{1}{2}$		2		5	
$\frac{3}{4}$	32	3	32	8	32
1		$3\frac{1}{2}$		10	

Carton quantity: 20.

Shipping wt. per 100: 25 lbs. (113.4 g).

Test Specifications

Load	Opening Time
100%	4 Hours (min.)
135%	1 Hour (max.)
200%	1 Minute (max.)



Grasshopper Telecommunication Fuses



- **Non-Time-Delay** fuses especially intended for telecommunication circuits.
- Indicator spring actuation gives visual indication of opening of fuse or actuates contact alert circuit.
- Color coded to insure proper replacement.

Fuse	Amps	Volts	Fuse	Amps	Volts
35A	$1\frac{1}{3}$		35J	$\frac{1}{2}$	
35B	$1\frac{1}{3}$		35K	$1\frac{1}{3}$	
35B	2		35L	2	
35C	2		35M	3	160
35D	$1\frac{1}{3}$	90	35N	5	
35E	3		35P	$\frac{3}{4}$	
35F	$\frac{1}{2}$		35R	$\frac{18}{100}$	90
35G	3		35S	$\frac{1}{4}$	160
35H	5		35T	$\frac{65}{100}$	90

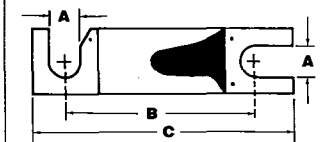
Test Specifications

Fuse	Load	Opening Time (Seconds—max.)
35E,H,N	133%	300
35A,B1 1/3,D,F,J,P,R,S		90
35B2,C,K,L	150%	180
35G,M		300
35T	170%	180

Physical Data

Fuse	Color	Dimensions			Mtg.
	Code	A*	B	C	Scr.
35A	Wh	.200			#10
35B	Wh	.150			#6
35B	Orn	.150	1 ³ / ₁₆ " (30.2mm)	1 ⁴³ / ₆₄ " (42.5mm)	#6
35C	Orn	.200			#10
35D	Wh	.150	1 ¹ / ₈ " (28.6 mm)	1 ⁵ / ₈ " (41.3mm)	#6
35E	Wh	.150	1 ¹ / ₂ " (38.1mm)	1 ⁶³ / ₆₄ " (50.4mm)	#6
35F	Red	.200			#10
35G	Blu	.150			#6
35H	Grn	.150			#6
35J	Red	.200			#10
35K	Wh	.200			#10
35L	Orn	.200			#10
35M	Blu	.150	1 ³ / ₁₆ " (30.2mm)	1 ⁴³ / ₆₄ " (42.5mm)	#6
35N	Grn	.150			#6
35P	Tan	.200			#10
35R	Yel	.200			#10
35S	Pink	.200			#10
35T	Tan	.200			#10

*0.200" (5.1mm); 0.150" (3.8mm)



Small Dimension Fuses, Fuseholders,
Fuse Blocks, and Accessories

16

Types LKB and LKC
Solder Direct into Circuit



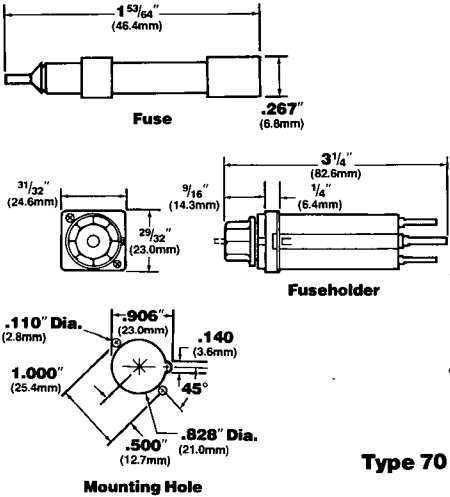
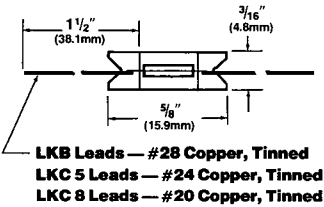
- Types **LKB** and **LKC** small component fuses for soldering directly to circuit.
- Ideal for small motors, appliances, coils of solenoids and non-energy limiting transformers, Class 2, or other low energy circuits.
- **Non-Delay** Fuse.
- Visual indication of link element.
- Because of possible confined space and high ambient temperature where mounted, the fuse should be tested in the product to determine current size.
- U.L. recognized under the components program.

LKB		LKB		LKB	
Amps	Volts	Amps	Volts	Amps	Volts
1/4	125	1	125	3	125
3/10		1 1/4		3 1/10	
4/10		1 1/2		4	
1/2		2		LKC	
6/10		2 1/4		5	
3/4	125	2 1/2	125	8	125
7/8		2 3/4			

Test Specifications

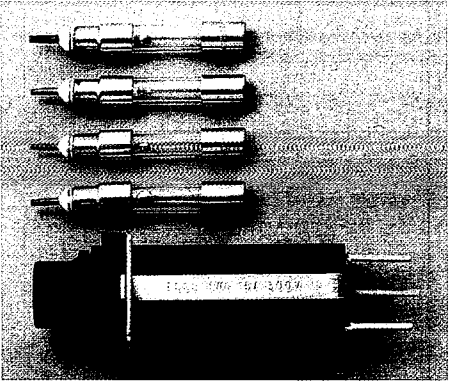
Fuse	Load	Opening Time
LKB, LKC	100%	4 Hours (min.)
LKB 1/4 thru 1 1/2	160%	20 Seconds (max.)
LKB 2 thru 4	160%	1 Minute (max.)

Carton quantity: 100.
Shipping wt.: 3/4 oz. (21.3g).



Type 70

Type 70 Indicating Fuse and HWG
Panelholder Combination for Tele-
communications ...



- For telecommunications. **Non-Time-Delay** Fuses.
- Pin indicating and alert circuit activating. Pin projects thru front center hole of fuse holder should fuse open.
- Color-coded pin for ampere size identification.
- Glass tube permits visual check of fuse element.
- Type **HWG** fuseholder has metal shoulder plate, tapped for two screws for mounting from front or back of panel; 1/16" maximum panel thickness when mounted from rear. Metal strap is tapped for cantilever mounting from rear. Two #3-48 zinc-plated mounting screws are furnished with each holder.
- Terminals may be soldered or wire wrapped.

Type	Amps	Volts	Color Code
70P	1/10	300	Grey & Wh
70R	15/100		Red & Wh
70E	18/100		Yel
70X	2/10		Blk
70F	1/4		Vio
70K	1/4	125 ac	Vio & Wh
70G	1/2		Red
70H	3/4		Brn
GKB	1		Pink
70A	1 1/3		Wh
70B	2	60 dc	Orn
70C	3		Blu
70J	3 1/2		Blk & Wh
70D	5		Grn
71A	6		Grn & Wh
70M	8	100%	Tan & Wh
GKB	10		Pur & Yel

Holder

HWG	15	300
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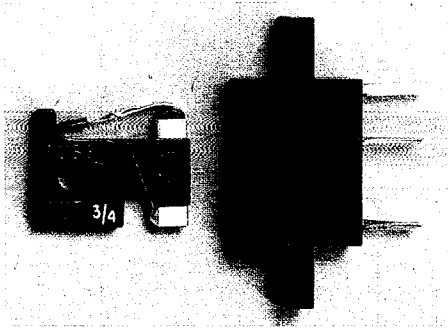
Carton quantity: 10.
Shipping wt. per 100: 1 lb. (454g).

Test Specifications

Fuse	Load	Opening Time
All except 70R	100%	1 hour (min.)
70E, F, G, H, A, B, C, J, D, M, GKB 10	150%	0 to 90 Seconds
70X, K, GKB 1	150%	90 to 300 Seconds
70P	200%	5 Minutes (max.)
70R	100%	1 Hour (min.) at 170°F
	0.4A	5 Minutes (max.) at 80°F

Fuse and Panel Holder Combina-
tion.

Type GMT Indicating Fuses for Multiple
Panel Mounting in Limited Space.



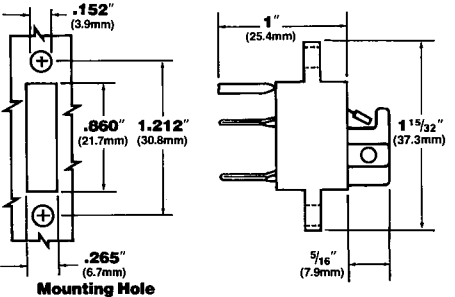
- Type **GMT** indicating fuse mounts in **HLT** holder.
- For telecommunications, computer or control circuits. **Non-Delay** Type.
- Visual spring indicating and alarm circuit activating.
- Color-coded flag for ampere size identification.
- **HLT** holder can be panel mounted as small as 1/4" (6.35mm) horizontal and 1 15/32" (4.92 mm) vertical.
- Open fuses are readily replaced without use of insulating tools. When mounted on minimum centers, removal of fuse can be made by a wire hook.
- For mounting on printed circuit boards, request additional information.
- Fuse and holder UL recognized under Com-
ponent Program.

GMT, HLT			GMT, HLT		
A m p s	Volts	Color Code	A m p s	Volts	Color Code
18/100	125 ac	Yel	3	125 ac	Blu
1/4		Vio	3 1/2		Wh & Blu
1/2		Red			Blu
65/100		Blk	4		Wh & Blu
3/4		Brn			Brn
1	60 dc	Grey	5	60 dc	Grn
1 1/3		Wh	7 1/2		Blk & Wh
1 1/2		Wh & Yel			Wh
			10		Red & Wh
2		Orn			

Carton quantity: 100.
Shipping wt. per 100: GMT: 0.33 lbs (150g).
HLT: 3/4 lbs. (340g).

Test Specifications

Load	Opening Time
100%	10 Minutes (min.)
150%	5 Minutes (max.)



Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Types C and N Fuses-and-Holder Combination With "Over Sizing Rejection" Feature



- Oversize fuse rejection. Ears on fuse mate only with fuseholder that corresponds in ampere rating. Slot in holder matches ears on fuse.
- For resistive circuits, use **Non-Time-Delay** Type **C** fuse.
- For circuits with high inrush currents use FUSETRON **Dual-Element Time-Delay** Type **N** fuse.
- Install fuseholders by simply pushing into panel (.043" to .062" thick) until snap-in steel clip engages edge of hole in panel. (These holders can also be furnished to mount in .030" to .042" thick panel by specifying #4909 clip when ordering holder).
- **Caution:** Panel mount behind insulator and interlock to protect personnel from electrically "live" fuse and fuseholder.
- Fuses are U.L. Listed.
- Holders are U.L. recognized under the Components Program.

Fast-Acting			Dual-Element		
C	Amps	Volts	N	Amps	Volts
1/32			1/16		
1/16			1/10		
1/8	250	HC 3/10	15/100	250	HN 3/10
1 1/16		(For 1/32 to 3/10A Fuses)	2 1/10		(For 1/16 to 3/10A Fuses)
1/4			3/10		
3/10			4 1/10	250	HN 1/2
3/8	250	HC 1/2	1/2		(1/10-1 1/2A)
1/2		(3/8-1/2A)	5/10		
3/4	250	HC 3/4	7/10	250	HN 3/4
1		HC 1 1/4	3/4		(1/10-3/4A)
1 1/4	250	(1-1 1/4A)	9/10		
1 1/2	250	HC 1 1/4	1	250	HN 1 1/4
1 3/4		(1 1/2-1 3/4A)	1 1/4		(9/10-1 1/4A)
2	250	HC 2 1/2	1 1/2	125	HN 1 3/4
2 1/2		(2-2 1/2A)	1 3/4		(1 1/2-1 3/4A)
3	250	HC 3 1/2	2	125	HN 2 1/2
3 1/2		(3-3 1/2A)	2 1/2		(2-2 1/2A)
4	250	HC 5	2 3/10	125	HN 3 1/2
5		(4-5A)	3 1/2		(2 3/10-3 1/2A)
6	250	HC 7	4	125	HN 5
7		(6-7A)	5		(4-5A)
8	250	HC 10	6	125	HN 7
10		(8-10A)	7		(6-7A)
Dual-Element			N		
1/100	250	HN 3/10	1/32		
1/32		(1/100-1/32A)			

*Voltage rating of holder—250V.

Carton quantity: fuses—5; holders—10.

Shipping wt. per 100:

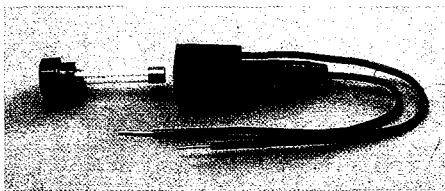
Fuses: Type C, 0 to 3 1/2 amps—0.5 lbs. (227g)
3.6 to 10 amps—0.6 lbs. (272g)

Type N, 0 to 1 1/4 amps—0.5 lbs (227g)
1/3 to 10 amps—0.6 lbs. (272g)

Fuseholders: 1.5 lbs. (680g).

(Data continued in next column.)

In-The-Line Fuse and Holder Combination

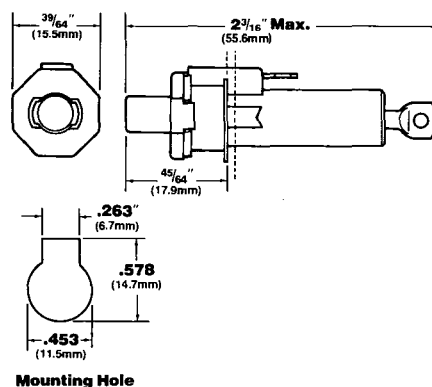


- Integral one-piece fuse and insulating knob.
- Type **GMF**, **GRF**, and **GMQ** fuses are FUSETRON **Dual-Element Time-Delay** units
- For fluorescent fixtures, single-size Type **GLR**, **GMF** and **GRF** mount in single-size holder Type **HLR**.
- Varying size Type **GLQ** and **GMQ** fuses mount into Type **HLQ** size rejection holder to prevent overfusing.
- These in-the-line fuses can be panel mounted when ordered with separate clip. Specify panel mounting clip #6374 for .043" to .062" thick panel and #4909 for .030" to .042" thick panel. Snap-in steel clip is inserted in mounting hole before holder is pushed into place.
- **HLR** and **HLQ** holder leads consist of 6" of insulated No. 18 solid copper wire.
- All fuses are U.L. Listed and CSA Listed.
- All holders are U.L. Recognized under Components Program and CSA Listed.

(Data continued in next column.)

Test Specifications

Load	Opening Time
110%	4 Hours (min.)
135%	1 Hour (max.)



Mounting Hole

Non-Delay			Dual-Element		
GLR	Amps	Volts	Holder	GMF	Amps
1/2				1/2	
1				6/10	
1 1/2				8/10	
1 6/10				1	
2				1 1/4	
2 1/2				1 6/10	300
3				2	
4				2 1/2	
5	300		HLR (15A)	2 9/10	
6				3	
7				3 2/10	
8				4	
9				GMQ	
10				1/2	300
12				6/10	
15				8/10	
GLQ					
1/2	300		HLQ 1/2	1 1/4	
1			HLQ	1 6/10	
1 1/2	300		HLQ	2	
1 9/10			HLQ	2 1/2	
2			HLQ	2 9/10	300
2 1/2	300		HLQ	3	
3			HLQ5	3 2/10	
4			HLQ5	4	300
5	300		HLQ5	Time-Delay	
6			HLQ8	GMQ	
7	300		HLQ8	5	300
8			HLQ8	6 1/4	300
9			HLQ10	GMF	
10	300		HLQ10	5	300
				6 1/4	
				GRF	
				7	
				8	125
				10	

Carton quantity: fuses—5; holders—10.

Shipping wt. per 100: **GLR**, **GLQ**—1.5 lbs. (680g)

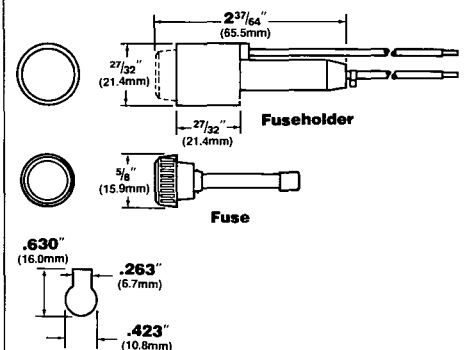
GMF, **GRF**, **GMQ**—1.4 lbs

(635g)

HLR, **HLQ**—3.13 lbs. (1.42kg)

Test Specifications

Load	Opening Time
110%	4 Hours (min.)
135%	1 Hour (max.)

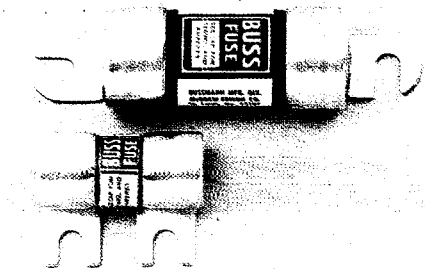


Mounting Hole

Small Dimension Fuses, Fuseholders,
Fuse Blocks, and Accessories

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Stud Mounted Fuses



- For resistive, low transient circuits use **Non-Time-Delay AFJ, AFS, AFX, and HBO** Types.
- For high inrush circuits use **FUSETRON Dual-Element ACK, ACL, and HSK** Types.
- For mounting in blocks (see table below).

Non-Time-Delay				Dual-Element			
AFJ		HBO		ACK			
Amps	Volts	Amps	Volts	Amps	Volts		
1/4		8		75			
1		10		80			
1 1/3		12		90			
2		15		100			
3		20		120			
5	250	25		140			
10		30		150	125		
15		35		160			
20		40	32	175			
25		50		200			
30		60		225			
35		70		250			
AFS		75		300			
2		80		ACL			
3		100		30			
5		125		35			
10		150		40			
15		Dual-Element		50			
20	250	ACK		60	125		
25		1					
30		2		80			
35		3		100			
40		5					
50		6		HSK			
60		10		20			
AFX		15		30			
40		20	125	40			
50		25		50			
60		30		60	32		
70		35		70			
75		40		80			
80	250	50		100			
100		60		125			
120		70		150			
125							
150							
200							

(Data continued in next column.)

Dimensions and Fuseblocks					
Fuse Symbol	Inches		mm		Block No.
	Slot	Dia	Slot	Dia.	
	†C-C		†C-C		
AFJ	2 1/2	9/16	63.5	14.3	4228
AFS	3	13/16	76.2	20.6	3411
AFX	3 1/2	1 1/16	88.9	27.0	2322
HBO	1	13/16	25.4	20.6	4202
ACK 1-15	2 1/4	9/16	57.1	14.3	2653
ACK 20-30	2 1/2	9/16	85.7	14.3	4228
ACK 35-60	3	13/16	76.2	20.6	3411
ACL 30-60	2 1/2	9/16	63.5	14.3	4228
ACL 70-120	2 3/4	13/16	69.9	20.6	3433
ACK 70-120	3 1/2	1 1/16	88.9	27.0	2322
ACK 140-200	3 5/8	1 1/16	92.1	27.0	3569
ACK 225-300	3 7/8	1 1/16	98.4	27.0	3578
HSK	1	13/16	25.4	20.6	4202

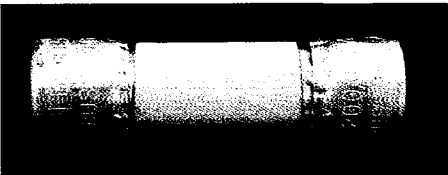
†Center-to-Center
Note: All fuses have a slot width of 17/64" (6.75 mm) except ACK 140-200 and ACK 225-300. The slot width of the latter is 5/16" (7.94 mm).

Test Specifications		
Fuse	Load	Opening Time
All Types	110%	4 Hours (min.)
AFJ, AFS, AFX, HBO	135%	1 Hour (max.)
ACK, ACL, HSK	125%	2 Hours (max.)
	200%	90 to 480 Seconds
ACK	200%	100 Seconds*
	300%	35 Seconds*
	500%	13 Seconds*
	200%	60 Seconds*
ACL, HSK	300%	20 Seconds*
	500%	7 Seconds*

*Approximately.

Semiconductor Fuses

9/16" x 2"
(14.3mm x 50.8mm)



- Very Fast-Acting fuses to protect diodes, SCR's, and other semiconductors.
- Extremely low I²t and I_p let-thru values very current-limiting.
- 200,000 amperes interrupting rating.
- FBP and FWP fuses have same electrical characteristics. 0-30 amp ratings FBP and FWP have same dimensions, but for higher amp ratings the dimensions are different.
- For mounting, see Bulletin SCF.
- U.L. recognized under the Components Program.
- For specifications, larger sizes and additional information, request Bulletin **SCF**.

FBP, FWP		
Amps	Volts	
15		(Other units are available in 1A to
20	700	1000A sizes; 200V, 250V, 500V, and
25		700V.)
30		

Shipping carton: 10.
Shipping wt. per 100: 9 oz. (255g).

TRON Rectifier Types



- Very Fast-Acting fuses to protect semiconductor rectifiers, SCR's, thyristors, and solid state devices.
- High degree of restriction of let-thru current.
- For mounting, see fuseholder and fuseblock indexes for 1/4" x 1 1/4" (6.35mm x 31.8mm) and 13/32" x 1 1/2" (10.3mm x 38.1mm) dimensions. For 13/32" x 1 1/2", also see fuseblocks 4514, 4525, and 4536.
- Request Bulletin **TRFS** for additional information and larger sizes.

(Data continued on following page.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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* GBB		KAB, KAX		KAW	
Amps	Volts	Amps	Volts	Amps	Volts
1/4		1/2		1	
1		1		2	
1/4		2		3	
2		3		4	
3		4		5	
4		5		6	
5		6		7	
6		7		8	130
7	60	8	250	9	
8		9		10	
9		10		12	
10		12		15	
12		15		20	
15		17 1/2		25	
20		20		30	
25		25		KBC	
30		30		1	
KAA		KAC		2	
1/2		1		3	
1		2		4	
2		3		5	
3		4		6	
4		5		7	
5		6		8	600
6		7		9	
7	130	8	600	10	
8		9		12	
9		10		15	
10		12		17 1/2	
12		15		20	
15		17 1/2		25	
20		20		30	
25		25			
30		30			

* U.L. recognized under the Components Program.

Carton quantity:

GBB—5

KAA, KAB, KAC, KAW, KAX, KBC—10

Shipping wt. per 100: GBB—1 lb. (453g)

KAA—1 3/4 lbs. (794g)

KAB—3 1/2 lbs. (1588g)

KAC—4 3/4 lbs. (2155g)

KAW—1 3/4 lbs. (794g)

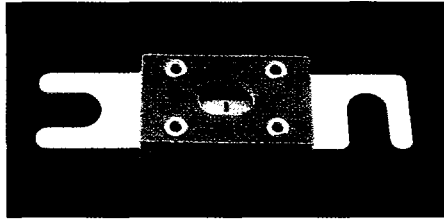
KAX—3 1/2 lbs. (1588g)

KBC—13 lbs. (5897g)

Test Specifications

Load	Opening Time
100%	4 Hours (min.)
120% to 180%	1000 Seconds (max.)
250%	1 Second (max.)

Type ANN for Stud Mounting in Block



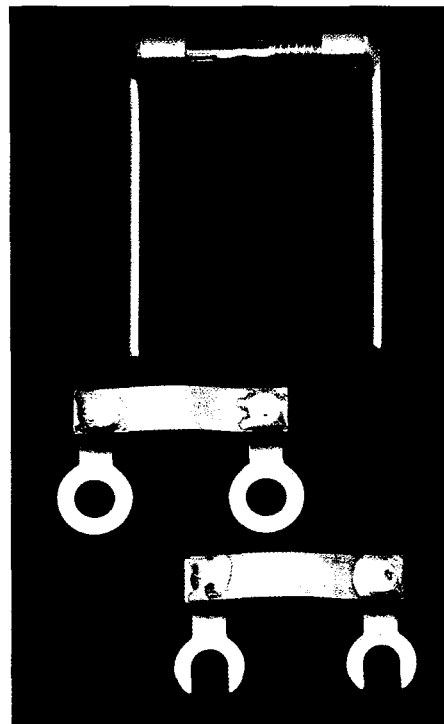
- Type **ANN** is very fast-acting fuse for protection of semiconductor devices.
- Visual indication of link element.
- Mica window slot width 1 1/32" (8.7mm), distance between slot centers 27/16" (61.9mm).
- Mount in block **4164**.

ANN		ANN		ANN	
Amps	Volts	Amps	Volts	Amps	Volts
10		125		325	
35		150		350	
40		175		400	
50	130	200	130	475	130
60		225		50	
80		250		600	
90		275		700	
100		300		800	

Carton quantity: 10.

Buss Heat Limiters

Element and Leaf Types



- For the protection of heating type appliances or other electrical apparatus when overheating would cause a fire hazard. (Limiters are not fuses.)

- High accuracy and consistency.

- Mounting: 1/4" x 1 1/4" ferrule types—see fuse-holder index.

Pigtail Types—solder.

Spade Types—No. 8 studs.

Hole Types—No. 10 studs.

Element Types

- Have a maximum current rating 4A or 15A.

- Limiters of 4A at 480V available in opening temperatures of 175°, 200°, 250°, 285°, 350°, or 360°F (79°, 93°, 121°, 141°, 177°, 182°C).

Leaf Types

- Limiters of 15A at 240V ac or less; available in opening temperatures of 165°, 175°, 190°, 200°, 225°, 250°, 260°, 270°, 285°, 310°, 340°, 360°, 410°, 440°, or 460°F (74°, 79°, 88°, 93°, 107°, 121°, 127°, 132°, 141°, 154°, 171°, 182°, 210°, 227°, 236°C).

- For resistive loads of 30A at 600V ac or less;

WU leaf types available in opening temperatures up to 490°F (254°C).

Note: See Bulletin PRO-1 for additional information on limiters.

Typical Element Types

Sym- bol	Ter- minal	Amps	Ambient Temperatures Holding † Opening	
			F°/C°	F°/C°
TFA	*Ferrule	15	200°/93°	200°/121°
TFC			235°/113°	285°/141°
TFL	*Radial Pigtail	15	235°/113°	285°/141°

Typical Leaf Types

WKJ	Spade		150°/66°	200°/93°
WKK	(Side)	15	200°/93°	250°/121°
WKH			235°/113°	285°/141°
WKL	Hole	15	310°/154°	360°/182°
WKU	(Side)		235°/113°	285°/141°
WQL	Spade	30	360°/182°	410°/210°
WTK	(Side)		235°/113°	285°/141°
WWE	Spade (End)	30	150°/66°	200°/93°
WWX	Hole	30	200°/93°	250°/121°
WWZ	(Side)		260°/127°	310°/154°

* 1/4" x 1 1/4"

† With No Current

Carton quantity: 10

Fuse Time-Current Characteristic Curves * and Temperature Effects

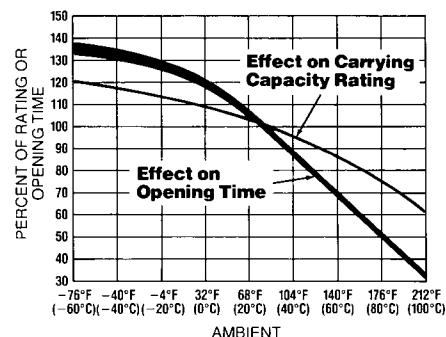
* Average Total Clearing Time

Effects of Ambient Temperatures

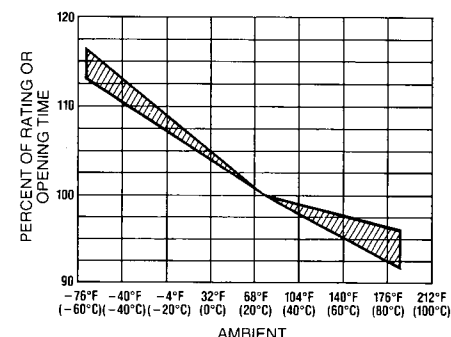
The operating characteristics of fuses are based on a nominal ambient temperature level. Higher ambients will, to some extent, reduce the current carrying capacity and the fuse opening time. Conversely, lower ambients result in a somewhat increased current carrying capacity and opening time.

As indicated in the Fusetron graph below, for example, an ambient of 100°F (40°C) reduces the current carrying capacity of this type of fuse by 5%.

The graphs below show the effects of ambient temperatures for Fusetron and "Non-Time-Delay" fuses.

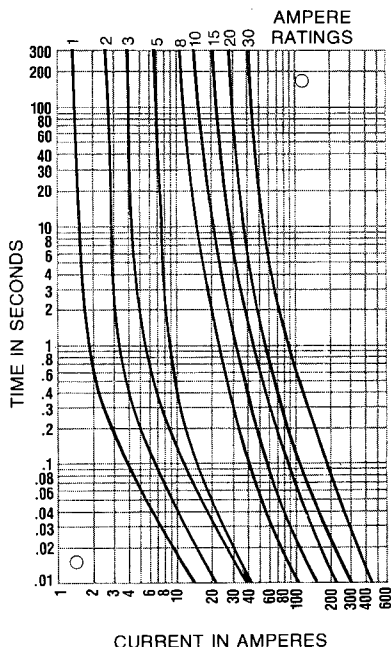


Effects of Ambient Temperature on the Operating Characteristics of Fusetron Dual-Element Fuses. Nominal Fuse Ratings Based on Ambient Temperatures in the Range of 70°F (21.0°C) thru 80°F (26.7°C). Change in Opening Time Occurs with Loads of 500% (or less) of the Nominal Current Rating of the Fuse.

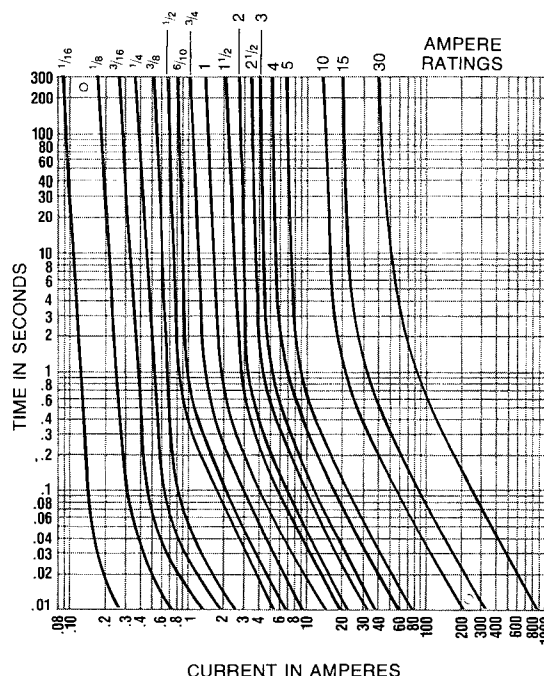


Effects of Ambient Temperatures on the Operating Characteristics of Non-Time-Delay Fuses. The Single Curve Reflects the Effects of Single Temperature on both the Current Carrying Capacity and Opening Time Relative to Ratings Based on a Nominal 75.2°F (24°C) Ambient.

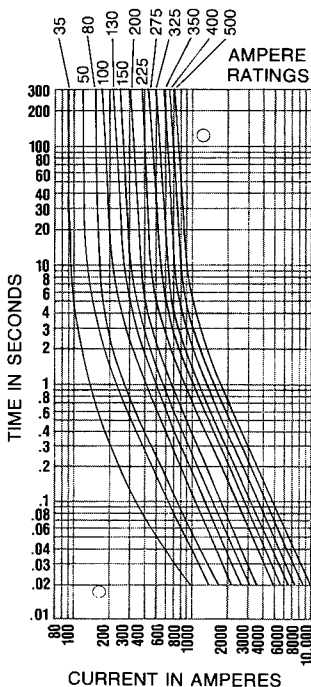
Type ABC Fuses, $\frac{1}{4}$ " x $1\frac{1}{4}$ "
(6.4mm x 31.8mm)



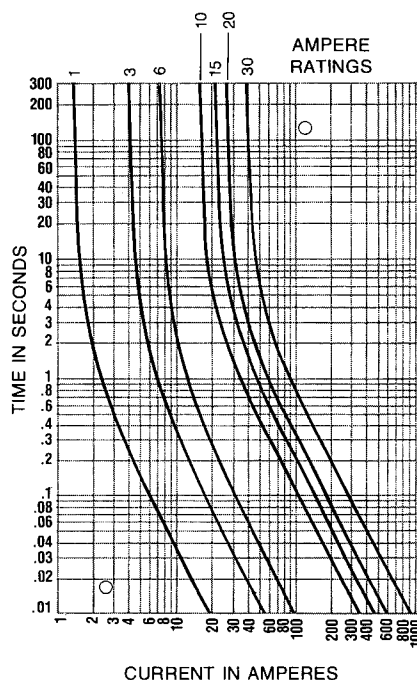
Type AGC Fuses, $\frac{1}{4}$ " x $1\frac{1}{4}$ "
(6.4mm x 31.8mm)



Type ANL Limiters



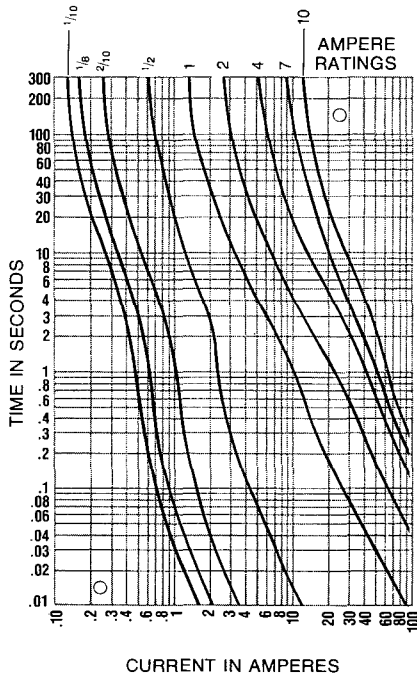
Type BAF, BAN Fuses, $\frac{1}{32}$ " x $1\frac{1}{2}$ "
(10.3mm x 38.1mm)



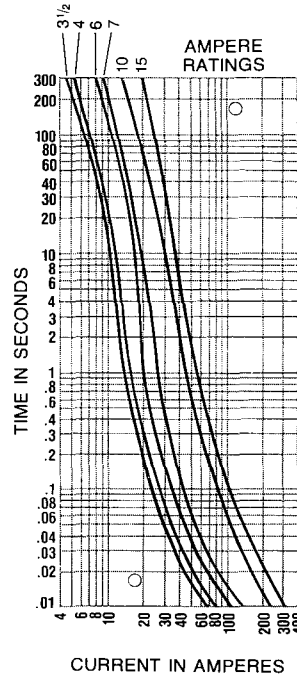
Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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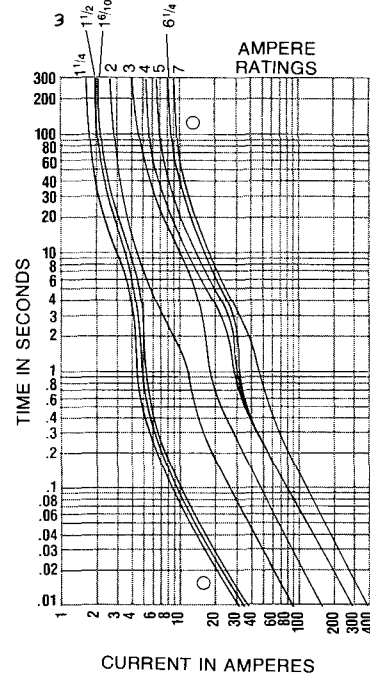
Fusetron FNA Dual-Element, Indicating Fuses, $\frac{13}{32}$ " x $1\frac{1}{2}$ " (10.3mm x 38.1mm)



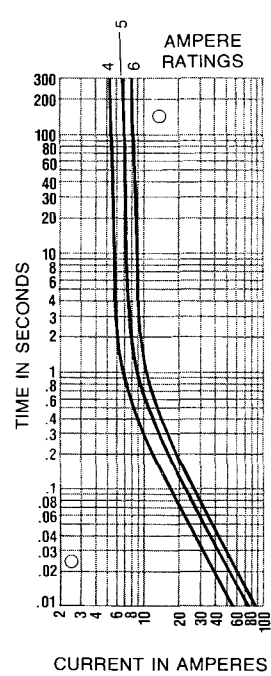
Type FNQ Time-Delay Fuses, $\frac{13}{32}$ " x $1\frac{1}{2}$ " (10.3mm x 38.1mm)



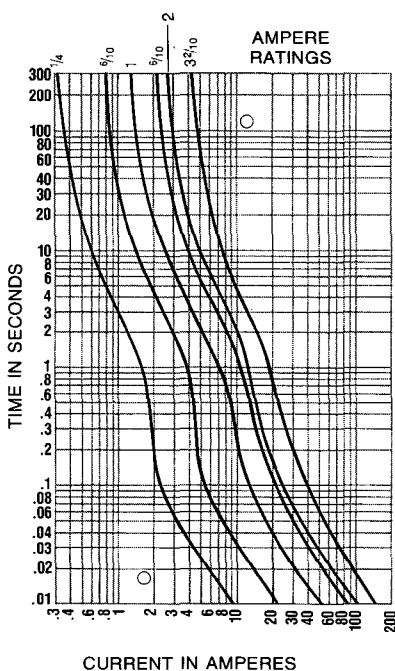
Fusetron MDX, and MDQ Dual-Element Fuses, $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8)



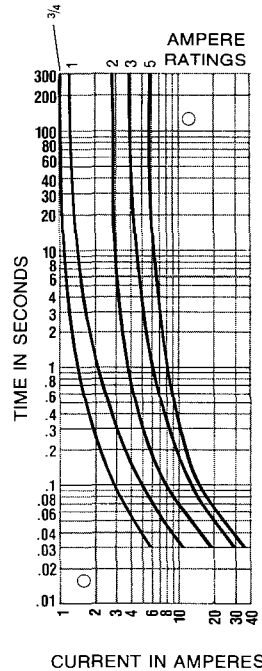
Type MTH Fuses, $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm)



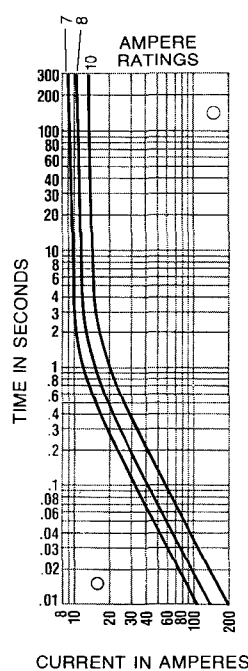
Fusetron FNQ Dual-Element Fuses, $\frac{13}{32}$ " x $1\frac{1}{2}$ " (10.3mm x 38.1mm)



Type GBA, GLD Indicating Fuses, $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm)



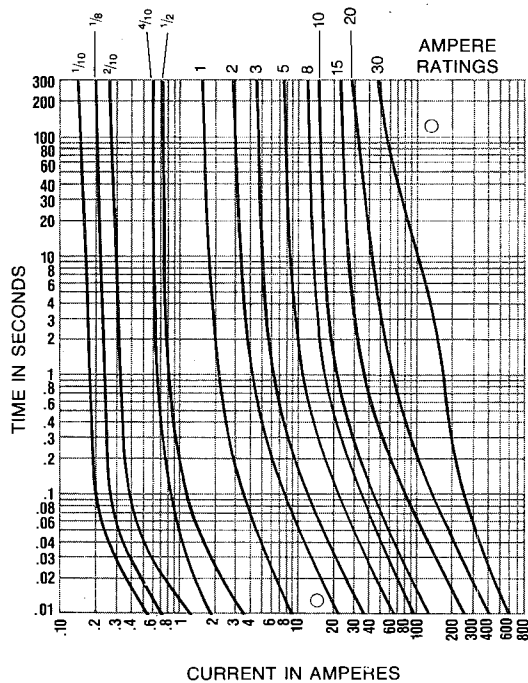
Type GLH Fuses, $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm)



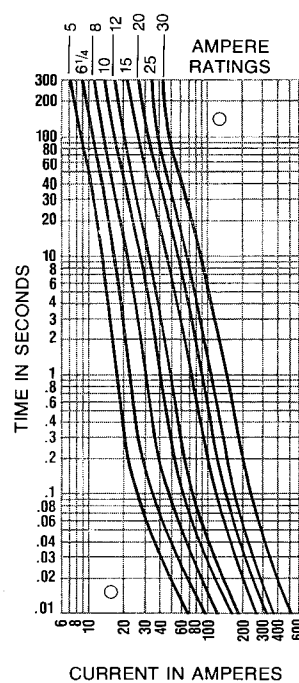
Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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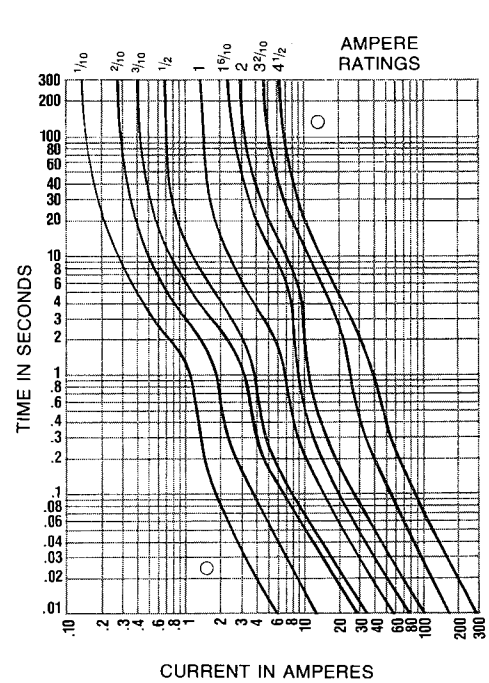
Limitron Fast-Acting KLM, KTK Fuses,
 $\frac{13}{32}$ " x $1\frac{1}{2}$ " (10.3mm x 38.1mm)



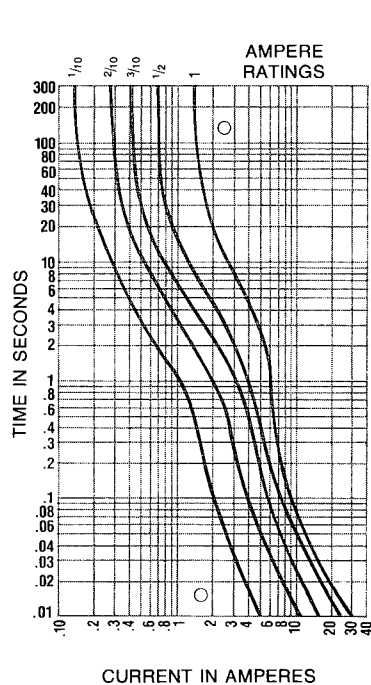
Type MDA Time-Delay Fuses,
 $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm).



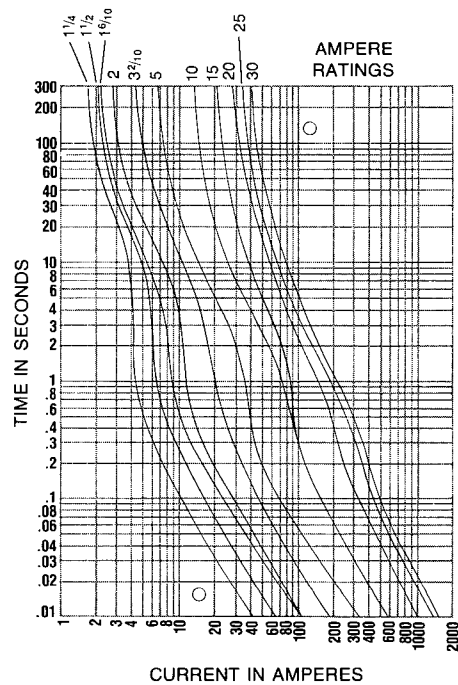
Fusetron MDA Dual-Element Fuses,
 $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm)



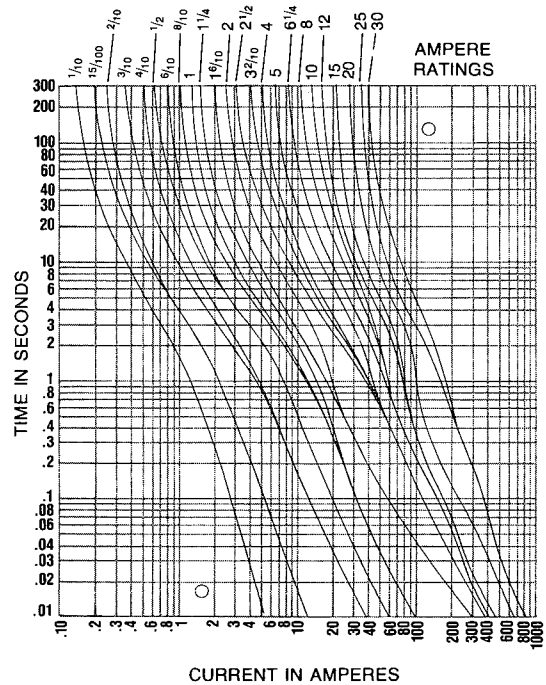
Fusetron MDL, MDV Dual-Element Fuses,
 $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm)



Fusetron MDL, MDV Dual-Element Fuses,
 $\frac{1}{4}$ " x $1\frac{1}{4}$ " (6.4mm x 31.8mm)



Fusetron FNM Dual-Element Fuses,
 $\frac{13}{32}$ " x $1\frac{1}{2}$ " (10.3mm x 38.1mm)



Fuseholders—Panel Mounted (General Types)

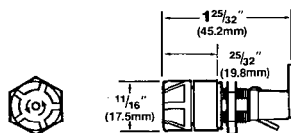
Space Saver for 1/4" x 1 1/4" Fuses (6.4mm x 31.8mm)



- Extremely compact.
- 1/2" mounting hole.
- Extend only 1" behind panel.
- U.L. Recognized under the Components Program.
- CSA Listed.

Symbol	Amps	Volts	Features
HTA			Bayonet Type; easy grip knob
HMM			Screw Type; screw driver slotted knob
HTA-DD	15	250	Bayonet Type; 3/16" (4.8mm) quick-connect terminals
HTA-HH			Bayonet Type; 1/4" (6.4mm) quick-connect terminals

Note: When tooling up for mounting, get latest Bussmann drawing.



HTA

Snap-Lock for 1/4" x 1 1/4" and 1" Fuses (6.4mm x 31.8mm and 25.4mm)



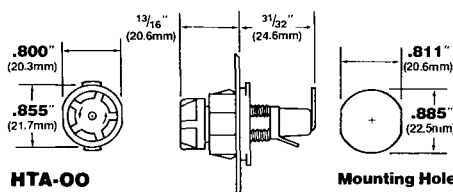
- Can easily be pre-wired and quickly snapped into place from rear of panel.
- Mounts in 1/2" holes or knock outs of electrical boxes.
- For panels 0.025" to 0.85" thick (0.64mm to 21.6mm).
- U.L. Recognized under Components Program.

(Data continued in next column.)

Symbol	Amps	Volts	Features
* HTA-00	15	250	For 1/4" x 1 1/4" fuses; a space saver
HLD-00	15	250	Visual indicating for 1/4" x 1 1/4" GBA fuses
* HKP-00	30	250	Standard, for 1/4" x 1 1/4" fuses
* HJM-00	5	125	fuses

* CSA Listed.

Note: When tooling up for mounting, get latest Bussmann drawing.

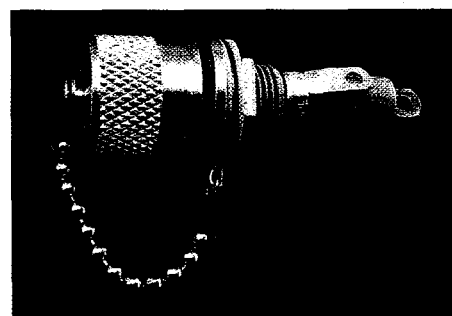


HTA-00

Mounting Hole

(See Mounting Arrangement A, end of Section)

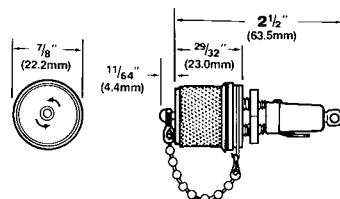
RFI Shielded for 1/4" x 1" and 1 1/4" Fuses (16.4mm x 25.4 and 31.8mm)



- Prevents radio frequency interference.
- Provide both shielding and grounding.
- Type **FHN 55W** is military version of Type **HMR**. Meets MIL-F-19207/36.

Symbol	Amps	Volts	Fuse
HMR	30	250	1/4" x 1 1/4"
HMS			1/4" x 1"

Note: When tooling up for mounting, get latest Bussmann drawing.



HMR & HMS

(See Mounting Arrangement A, end of Section)

Standard for 1/4" x 1 1/4" Fuses with Bayonet Type Knobs (6.4mm x 31.8mm)



- Bayonet type knob.
- Spring pressure contact.
- Vibration resistant.
- For panels up to 5/16" (7.9mm) thick.
- Locking keys available (specify 1/16" (1.6mm) for panels up to 1/8" (3.2mm) thick; 1/8" for panels in excess of 1/8").
- Military version of **HKP** is **FHN 26G1**; **HJM** is **FHN 31G1**.

Symbol	Amps	Volts	Features
* HKP	30	250	For 1/4" x 1 1/4" fuses; high amps
HKP-CC			[-CC, 3/32" (2.4mm) shorter behind panel]
* HKP-HH	15		Quick connect terminals
* HJM	5		For 1/4" x 1" fuses; high amps
HJM-CC	5	125	[-CC, 3/32" (2.4mm) shorter behind panel]
HJM-HH			Quick connect terminals

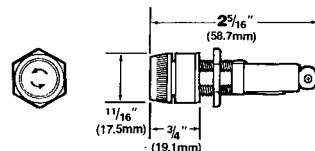
* U.L. Recognized under the Components Program.

Notes: **HKP** (30A) and **HKP-HH** (15A) CSA Listed; **HJM** and **HJM-HH** at 5A, 125V.

When tooling up for mounting, get latest Bussmann drawing.

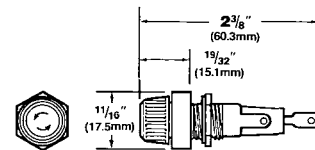
Carton quantity: 10

Shipping wt. per 100: 3.25 lbs. (1.47kg)



HKP

(See Mounting Arrangement A, end of Section)



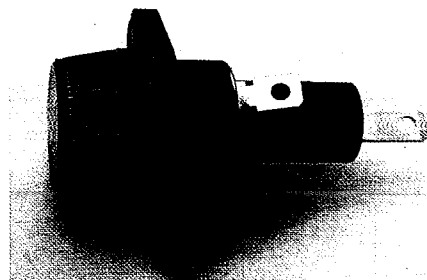
HJM

(See Mounting Arrangement A, end of Section)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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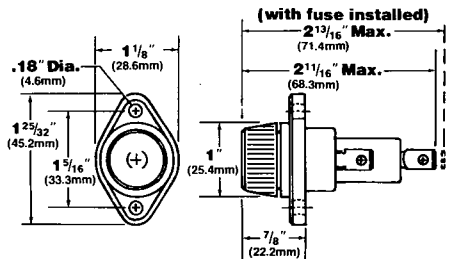
HPF Series—Standard For $\frac{13}{32}$ " (10.3mm) Diameter Fuses by Various Lengths



- One piece side terminal and threaded insert eliminates two-piece solder fabrication.
- Combination $\frac{1}{4}$ " quick-connect/solder terminals for increased flexibility. (Straight end)
- Screw type knob.
- **HPF-RR** has U.L. Class CC rejection feature.
- U.L. Recognized under The Components Program.
- **HPF** Series functionally replaces **HPC** Series.

Symbol	Amps	Volts	Fuse
HPF	30	600	$1\frac{1}{2}$ " (38.1mm)
HPF-L	5	600	$1\frac{3}{8}$ " (34.9mm)
HPF-EE	15		SC 0 to 15, $1\frac{1}{16}$ " (33.3mm)
HPF-JJ	20	300	SC 20; $1\frac{3}{32}$ " (35.7mm)
HPF-FF	30		SC 25 & 30; $1\frac{5}{8}$ " (41.3mm)
HPF-RR	30	600	KTK-R

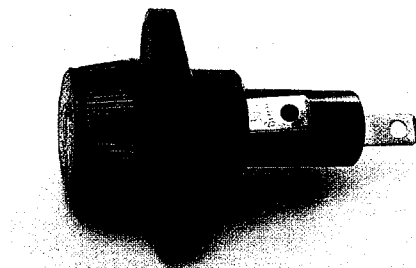
Carton quantity: 10 Shipping wt. per 100: 6 $\frac{3}{4}$ lbs. (3.06kg)



(See Mounting Arrangement C, end of Section)

Standard for $\frac{13}{32}$ "D x $\frac{13}{16}$ " and $1\frac{1}{2}$ " Fuses and Type SC and KTK-R Fuses

(10.3mmD x 34.5mm and 38.1mm)



- Quick-connect terminals ($\frac{1}{4}$ " wide) (6.4mm wide).
- Terminals can be used as solder type. (Holders with standard solder type terminals available).
- Bayonet type knob.

(Data continued in next column.)

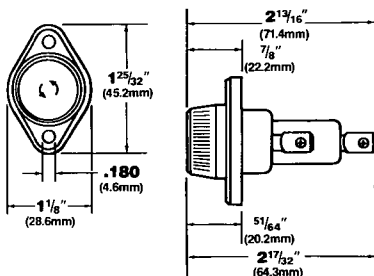
Symbol	Amps	Volts	Fuse
* HPS-L	5	600	$1\frac{3}{8}$ "
* HPS	30		$1\frac{1}{2}$ "
† HPS-EE	15		SC 0 to 15 ($1\frac{5}{16}$ ")
† HPS-JJ	20	300	SC 20 ($1\frac{13}{32}$ ")
† HPS-FF	30		SC25 & 30 ($1\frac{5}{8}$ ")
† HPS-RR	20	600	KTK-R

* U.L. Recognized under the Components Program.

† U.L. Recognized under the Components Program as suitable for branch circuit protection.

Notes: **HPS** CSA Listed at 25A.

When tooling up for mounting, get latest Bussmann drawing.

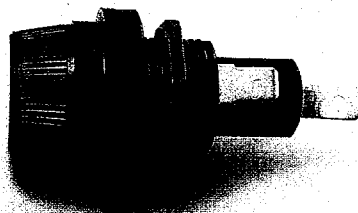


HPS

(See Mounting Arrangement C, end of Section)

Standard for $\frac{13}{32}$ " x $1\frac{1}{2}$ " Fuses

(10.3mm x 38.1mm)



- For supplementary protection (transformers, relays, ballasts, solenoids, small motors, etc.).
- Mounts in $\frac{1}{2}$ " (12.7mm) knock-out with lock nut.
- Screw type knob.

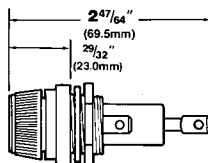
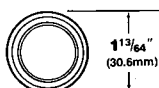
Symbol	Amps	Volts	Terminals
HPL-B	30	600	Solder type
* HPM			$\frac{1}{4}$ " quick-connect

* U.L. Recognized under the Components Program. CSA Listed.

Note: When tooling up for mounting, get latest Bussmann drawing.

Carton Quantity: 50
Shipping wt. per 100:

*See footnote



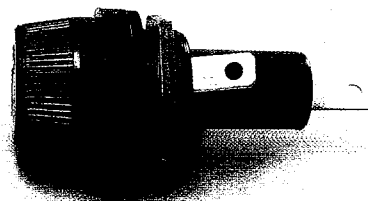
HPM

(See Mounting Arrangement B, end of Section)

*O-ring seal is incorporated in panel flange.

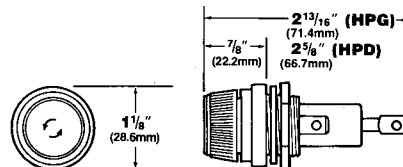
Standard for $\frac{13}{32}$ " x $1\frac{1}{2}$ " Fuses

(10.3mm x 38.1mm)



- Combination quick-connect terminals, $\frac{1}{4}$ " (6.4mm).
- Mount in $\frac{1}{2}$ " (12.7mm) knock-outs with lock nut.
- For supplementary protection of transformers, relays, ballasts, and small motors.
- U.L. Recognized under the Components Program.
- Bayonet type knob.

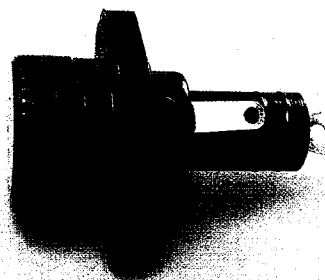
Symbol	Amps	Volts	Features
HPG			Quick-connect side terminal ($\frac{1}{4}$ "); short rear solder terminal. (Length $\frac{3}{16}$ " shorter than HPG).
HPD	30	600	



(See Mounting Arrangement B, end of Section)

Waterproof for $\frac{13}{32}$ " x $1\frac{1}{2}$ " Fuses

(10.3mm x 38.1mm)



- "O" ring in flange for underwater waterproofing.
- For panels up to $\frac{1}{4}$ " (6.4mm) thick.
- Military version designated **FHN23W**.
- U.L. Recognized under the Components Program.

(Data continued on following page.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

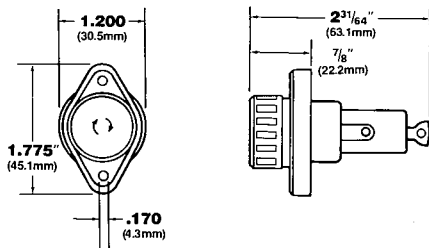
25

Symbol	Amps	Volts	Features
HPC-D	30	600	Waterproof

Note: When tooling up for mounting, get latest Bussmann drawing.

Carton quantity: 10

Shipping wt. per 100: 7.5 lbs (3.40kg).



(See Mounting Arrangement C, end of Section)

Fuseholders—Panel Mounted (Indicating Types)

For Pin-Indicating Fuses (1/4" x 1 1/4")
(6.4mm x 31.8mm)



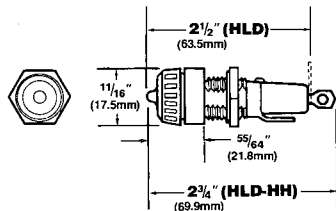
- Bayonet type transparent knob to permit visual indication of opened pin indicating fuses.
- Locking keys available for drilled holes.

Symbol	Amps	Volts	Features
*HLD			Solder terminals
HLD-HH	15	250	With quick-connect terminals

* U.L. Recognized under the Components Program.
Note: When tooling up for mounting, get the latest Bussmann drawing.

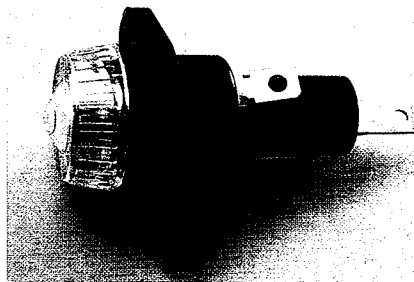
Carton quantity: 10.

Shipping wt. per 100:



(See Mounting Arrangement A, end of Section)

For Pin-Indicating Fuses (1 3/32" x 1 1/2")
(10.3mm x 38.1mm)

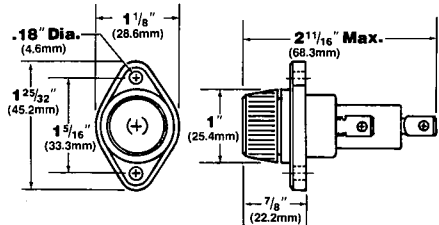


- Transparent screw type knob for visual indication.
- One piece side terminal and threaded insert. Eliminates two-piece solder fabrication.
- Combination 1/4" quick-connect/solder terminals for increased flexibility.
- Straight end terminal.
- U.L. Recognized under The Components Program.
- Replaces **HPC-C** and **HPC-CK**.

Symbol	Amps	Volts	Fuse
HPF-C	15	250	Transparent Knob

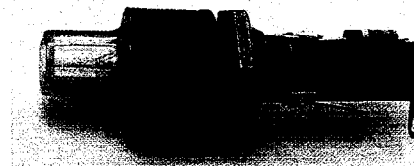
Carton quantity: 10

Shipping wt. per 100: 6 3/4 lbs. (3.06kg).



(See Mounting Arrangement C, end of Section)

Lamp Indicating Type for 1/4"D x 1" and 1 1/4" Fuses
(6.4mmD x 25.4mm and 31.8mm)



- **HJL** for 1/4" x 1" fuses.
- **HK** for 1/4" x 1 1/4" fuses.
- For panels up to 3/16" 4.8mm) thick.
- Bayonet type knob.
- Vibration resistant.
- Military versions available such as **FHL17G1** and **FHL18G1-1** thru **-9**.
- Drip-proof types also available.
- Knobs are octagonal (Oct) or flat-sided (F-S).

(Data continued in next column.)

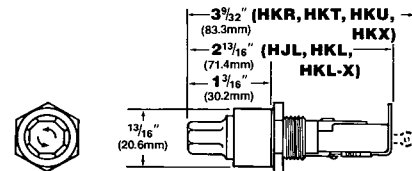
Symbol	Amps	Lamp Volts	Knob Type	Color	Type
HJL	20	90			Oct
*HKL			Neon	Clear	Oct
HKL-X	15	250			F-S
HKR		22 to 30	In-	Amber	Oct
HKT		13 to 22	can-		Oct
HKU	20	4 to 6	des-	Red	Oct
HKX		22 to 33	cent	Amber	F-S

* U.L. Recognized under the Components Program and CSA Listed.

Note: When tooling up for mounting, get latest Bussmann drawing.

Carton quantity: 10

Shipping wt per 100: 5.125 lbs (2.32kg).



(See Mounting Arrangement D, end of Section)

Lamp Indicating Type with Signal Activation for 1/4" x 1 1/4" GLD 3/4 to 5A Fuses
(6.4mm x 31.8mm)



- Provides external signal indication when fuse opens.
- For panels up to 1/2" (2.7mm) thick.
- Amber knob.

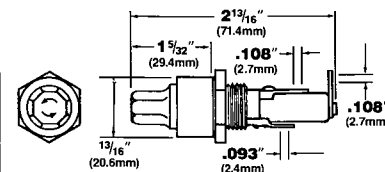
Symbol	Amps	Volts	Features
HKA			
HKA-W	5	125	With "O" ring for drip proofing.

Bulb Resistance: 700 ohms at 24V; 500 ohms at 10V.

Note: When tooling up for mounting, get latest Bussmann drawing.

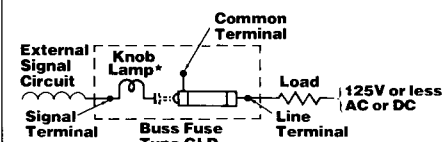
Carton quantity: 10.

Shipping wt. per 100: 5.25 lbs. (2.38kg).



HKA

(See Mounting Arrangement D, end of Section)



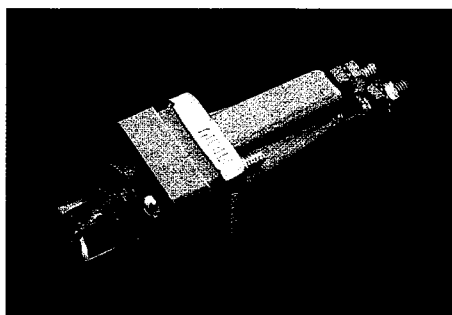
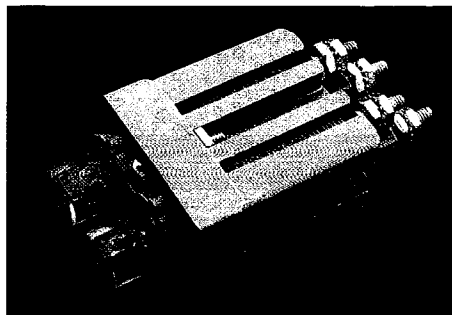
* External signal circuit must have sufficient impedance to limit lamp voltage to 10-24 volts AC or DC.

Wiring Diagram

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Lamp Indicating Type for $\frac{1}{4}$ " x $\frac{1}{4}$ " and $\frac{13}{32}$ " x $\frac{1}{2}$ " Fuses (6.4mm x 31.8mm and 10.3mm x 38.1mm)



- Fuses mount in fuse clips of a fuse carrier.
- Threaded stud terminals with tooth lock washers and hex nuts.
- Clear transparent, bayonet knobs for maximum visibility of indicating light.
- Neon lamp.
- For panels up to $\frac{1}{8}$ " (3.2mm) thick.
- Drip proof.
- Military versions available made to MIL-F-19207

HGA-C designated **FHL 10U**.

HGB-C designated **FHL 11U**.

HGC designated **FHL 12U**.

- Current rating—30 amps.

Symbol	Lamp Volts	Ohms	No. of Poles	Fuse Size"	*Knob Type
HGA	90		2		Oct
HGA-C	to 120K		2		F-S
HGB	250		1	$\frac{1}{4}$ x $\frac{1}{4}$	Oct
HGB-C			1		F-S
HGC	90 to 500	330K	1	$\frac{13}{32}$ x $\frac{1}{2}$	Oct

*"Oct" (Octagonal); "F-S" (Flat-Sided).

Note: When tooling up for mounting, get latest Bussmann drawing.

Carton quantity: 10.

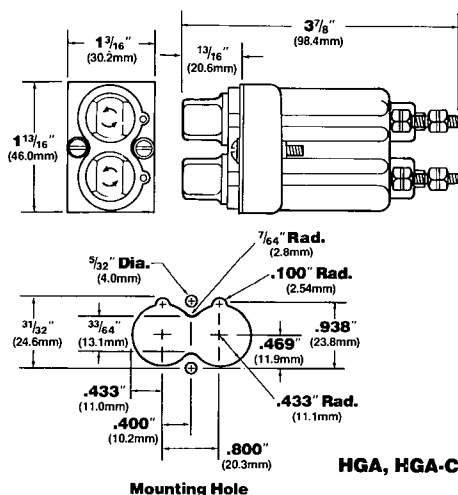
Shipping wt. per 100:

HGA, HGA-C—30.5 lbs.(14.29kg)

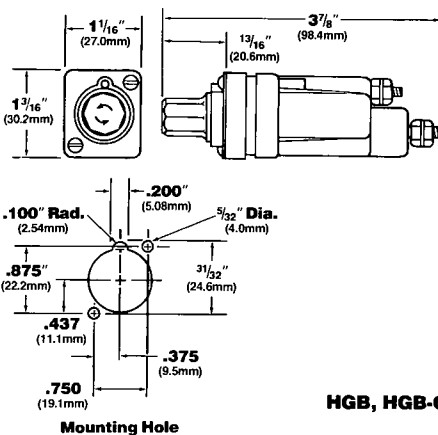
HGB, HGB-C—20.5 lbs.(9.30kg)

HGC—30 lb.(13.61kg)

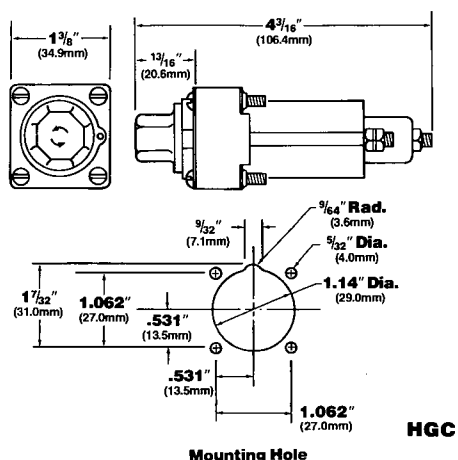
(Data continued in next column.)



HGA, HGA-C



HGB, HGB-C

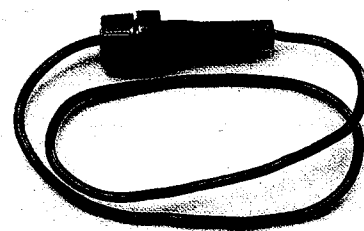


HGC

Fuseholders, Panel Mounted or In-The-Line

For Mounting Type SFE and $\frac{1}{4}$ "D x $\frac{1}{4}$ " Fuses

(6.4mmD x 31.8mm, 27.0mm, 22.2mm, 19.5mm)



- Maximum current rating 20 amps; voltage rating 32 volts.
- Bayonet type knob.
- Holders can be mounted in panels up to $\frac{5}{16}$ " (7.9mm) thick with the BUSS No. **9969** spring nut.
- Holders available as complete assembly consisting of in-the-line holder with #14 insulated wire, 8" or 19" (203.2mm or 482.6mm) length, installed fuse (Type **SFE**), and BUSS No. **9969** spring nut.
- Available also as in-the-line fuse holder only, with lead wire contacts. (Panel mounting spring nut, No. **9969**, must be ordered as a separate item). Series **HH** and **HI** holders have metal holding ears on knob. Series **HD** and **HA** holders have phenolic holding ears on knob.

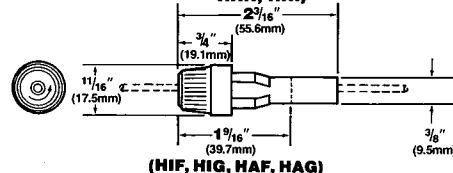
Complete Assembly With Fuse and Wire Lead

Wire Length	*Ass'y	Fuse	†Holder
	HRJ	SFE 20	HHJ
	HRI	SFE 14	HHI
19"	HRH	SFE 9	HHH
(# 14 Wire)	HRE	SFE 7 1/2	HHH
	HRG	SFE 6	HIG
	HRF	SFE 4	HIF
	HMJ	SFE 20	HDJ
	HMI	SFE 14	HDI
8"	HHH	SFE 9	HDH
(# 14 Wire)	HME	SFE 7 1/2	HDH
	HMG	SFE 6	HAG
	HMF	SFE 4	HAF

* Catalog number for ordering complete holder assembly.

† See next page for complete catalog number.

(**HDH, HDI, HDJ, HHJ, HHH, HHI**)



(**HIF, HIG, HAF, HAG**)

(Data continued in next column.)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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Fuseholder and Wire Contacts Only

Wire Size Contacts				Fuse
#18 to #20		#14 to #16		Lgth.
Pheno-lic Ears	Metal Ears	Pheno-lic Ears	Metal Ears	
HDJ-A	HHJ-A	HDJ-B	HHJ-B	1 1/4"
HDI-A	HHI-A	HDI-B	HHI-B	1 1/16"
HDH-A	HHH-A	HDH-B	HHH-B	7/8"
HAG-A	HIG-A	HAG-B	HIG-B	3/4"
HAF-A	HIF-A	HAF-B	HIF-B	5/8"

Carton quantity: 10

Shipping Wt. per 100:

HDJ, DHI, HDH: 2.3 lbs. (1.04kg).

HAG, HAF: 1.8 lbs. (0.82kg).

HHJ, HHI, HHH: 2.5 lbs. (1.13kg).

HIG, HIF: 2.0 lbs. (0.91kg).

HRJ, HRK, HRR, HRE: 7.2 lbs. (3.27kg).

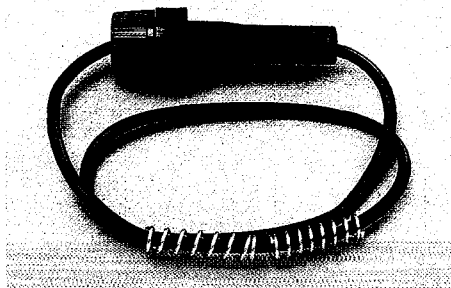
HRG, HRF: 6.6 lbs. (2.99kg).

HMJ, HMI, HMM, HME: 5.4 lbs. (2.45kg).

HMG, HMF: 5.0 lbs. (2.27kg).

Fuseholders—In-the-line

Universal for 1/4"D x 5/8" to 1 1/4" Fuses (6.4mmD x 15.9mm to 31.8mm)

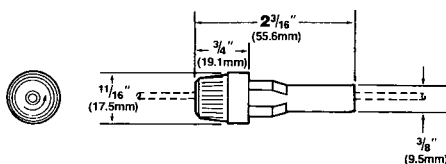


- Accepts fuses of different lengths via the use of different size springs.
- Furnished with three springs.
- Holders includes 8" (203mm) wire lead staked and soldered to holder contacts.

Symbol	Amps	Volts
HRK	15	32

Carton quantity: 10

Weight per carton: 0.5 lbs. (227g).



Waterproof for 1/4" x 1 1/4" Fuses (6.4mm x 31.8mm)

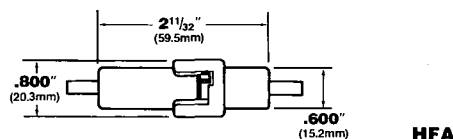


- Waterproof for exposed locations.
- Accepts #16 to #12 copper wire.

Symbol	Amps	Volts	Terminals
HFA	20	250	Crimp
HFA-HH			Quick-connect

Carton quantity: **HFA**—50

HFA-HH—5



Waterproof Tron Fuseholders for 1 3/32" x 1 1/2", Types SC and HVW Fuses (10.3mm x 38.1mm)



- Watertight for exposed locations.
- Available for wide range of sizes of copper and aluminum wire and cable.
- Holders available with "break-away" receptacles and insulating boots.
- For complete data on Tron in-the-line fuseholders, see BUSS Bulletin SFH-11.
- To order fuseholders, specify symbol of holder for proper fuse size, suffix to holder symbol letter designation for the size terminal needed for "load" side wire, and thirdly, the size terminal needed for the "line" size wire. (See table at bottom for terminal symbols). For example, the complete ordering catalog number for a fuseholder (1 3/32" x 1 1/2" fuse), with a #10 copper wire on "load" side and two #6 wires on the "line" side would be **HEB-AD**.

Symbol	Amps	Volts	Fuse Size
*HEB			
†HET	30	600	1 3/32" x 1 1/2"
†HEX			
HEC	30		SC 25 to SC 30
*HEH	20	300	SC 20
HEG	15		SC 0 to SC 15
	60	300	SC 35 to SC 60
HEJ	6	1200	HVW 1/2 to HVW 6

*CSA Listed **HEB** (30A), and **HEH** (15A).

†**HET** is same as **HEB** except permanently attached solid neutral. **HEX** is same as **HEB** except is 2-pole.

Terminals for HEB and HEJ Fuseholders

Crimp Type for Copper Wire

Symbol	Wire Size	Wire Type
A	One #14, #12, #10, or #8	Solid/Stranded
	Two #14 or #12	Solid
B	One #6 or #4	Solid
	One #6	Stranded
C	Two #10	Solid/Stranded
	Two #8	Solid/Stranded
D	One #4	Stranded
	Two #6	Solid/Stranded
E	One #2	Solid/Stranded
	Two #4	Solid/Stranded

Set-Screw Type for Copper Wire

J	One #12 to #2	Solid/Stranded
K	Two #12 to #2	Solid/Stranded

Set-Screw Type for Aluminum Wire

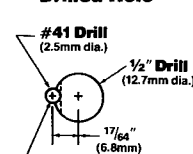
L	One #12 to #2	Solid/Stranded
Y	Two #12 to #2	Solid/Stranded

W	Solid copper terminal for break-away receptacle	—
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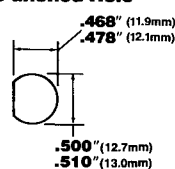
A, B, C, D, E, and W CSA Listed with **HEB** and **HEH**.

Panel Mounting Arrangements

Drilled Hole



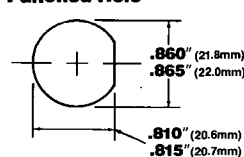
Punched Hole



Locking disc 3/32" (2.4mm) dia. thickness not greater than panel thickness

Mounting Hole A

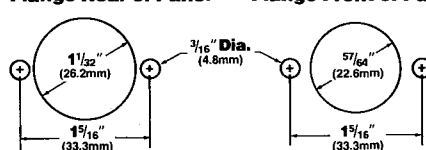
Punched Hole



Mounting Hole B

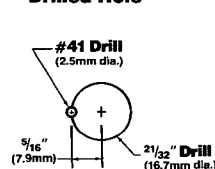
Flange Rear of Panel

Flange Front of Panel

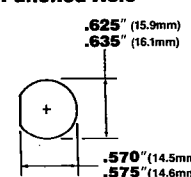


Mounting Hole C

Drilled Hole



Punched Hole

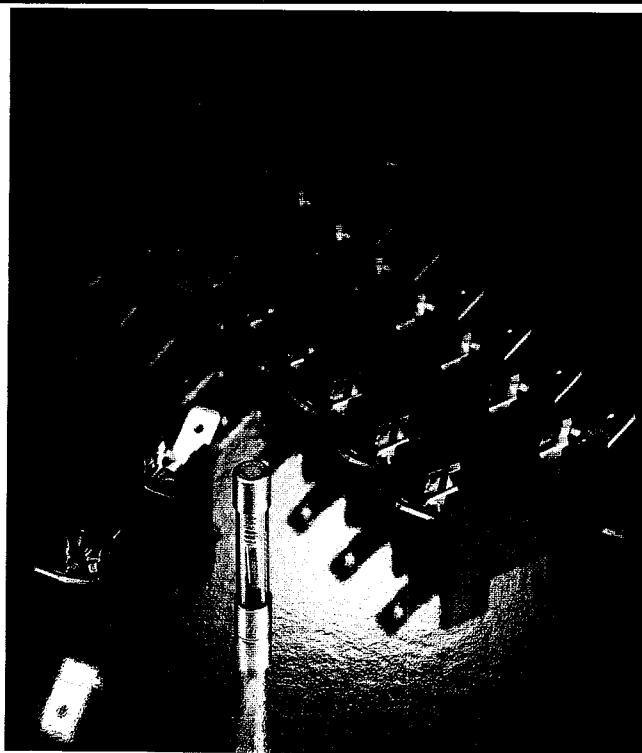


Mounting Hole D

Small Dimension Fuseblocks

$\frac{1}{4}" \times 1\frac{1}{4}"$ —Series 8000

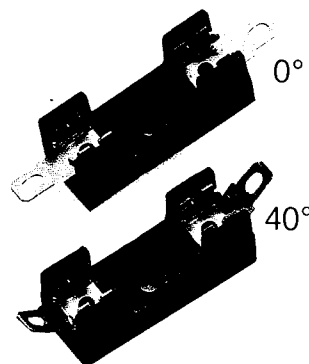
28
(New)



- For low-cost, tight cluster mounting of $\frac{1}{4}" \times 1\frac{1}{4}"$ fuses.
- Single-pole to 12 pole units • Break-a-way design permits Fuse Block to be sub-divided with simple finger pressure.
- All types of terminal configurations.
- 300 volt rating.
- U.L. Recognized under Components Program.
- CSA listed • A host of exclusive Buss features.
- Blocks are molded glass-filled, thermoplastic polyester. Clips are spring-bronze; Albaloy-plated.

A Full Line Of Terminal Configurations

Solder

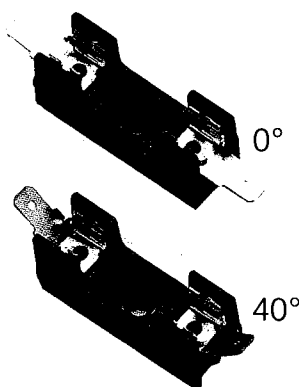


Screw

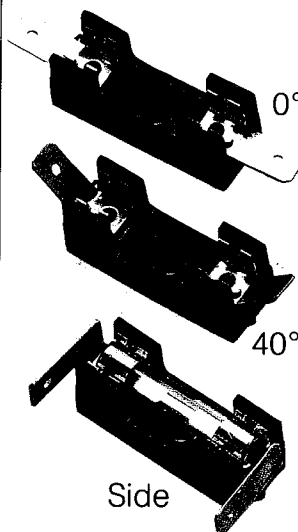


Quick Connect

$\frac{3}{16}$ Inch



$\frac{1}{4}$ Inch



Exclusive Features

"Anti-Pivot" Barriers



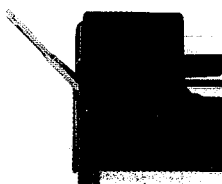
Screw terminal models have "anti-pivot" side barriers. Prevents lead connectors from twisting to side when tightening terminal screws.

Solid Mount Clips



Patented Buss clip design does not rely on fuse for solid "no-wobble" mounting.

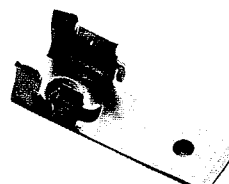
Totally Sealed Base



The totally sealed periphery of the Series 8000 base prevents possible shorts to the chassis by metal chips. Solid-designed side barriers offer similar short-circuit protection.

Full $\frac{1}{4}"$ base of all Buss Series 8000 fuse blocks provide a safe dielectric up to the rated voltage of 300 volts. Meets U. L. standards.

Spec. Grade Terminal Tabs



The $\frac{1}{4}"$ quick-connect terminals are designed with a full 0.032" thick connector tab—no "waffles". Provides a complete gripping surface for the connectors and gives them high engagement strength. This patented design assures that connectors stay put. Large contact surface also offers highest electrical conductivity. Approved by all manufacturers of connectors.

Small Dimension Fuseblocks

1/4" × 1 1/4"—Series 8000

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(New)

Catalog Data

Catalog Code

BK/	S-8	0	00	-00
Prefix for Bulk Packing				
Series 8000 Product Line				
Type Terminal				
"0"—Solder; "1"—3/16" Quick Connect; "2"—1/4" Quick Connect; "3"—Screw				
Terminal Angle				
"01"—straight (0°); "02"—40°; "03"—side				
Number of Poles (01-12)				

Catalog Numbers.

Terminals	Size	Angle	*Basic Cat. No.	Poles (Suffix)
Solder	3/16"	(0°)	S-8001-	1-12
		40°	S-8002-	
		(0°)	S-8101-	
		40°	S-8102-	
Quick-Connect	1/4"	(0°)	S-8201-	
		40°	S-8202-	
		Side	S-8203	
Screw	—	—	S-8300-	

Carton Quantity: 10; shelf package: 100.
Bulk Carton: Single-pole and 2-pole fuse blocks—1,000;
Multiple-pole fuse blocks—3-8 pole: 200;
9-12 pole: 50.

*When ordering bulk quantities, prefix "BK/" to catalog number; i.e., "BK/S-8001-12".

Cross Reference (Standard Fuseblocks Vs. Series 8000 Fuseblocks.)

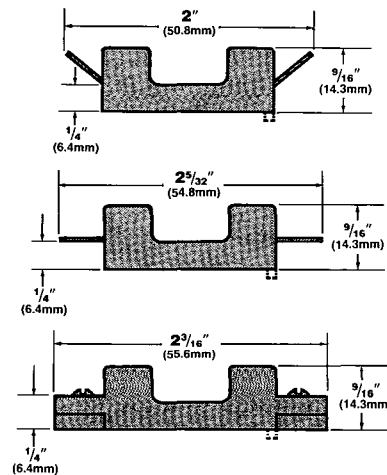
Standard Blocks (No Side Barriers)	Series 8000 Blocks
2245-1 thru -12	S-8002-1 thru -12
2430-1 thru -12	S-8202-1 thru -12
2480-1 thru -12	S-8102-1 thru -12
2799	S-8101-1
2839	S-8202-1
2841	S-8201-1
3823-1 thru -12	S-8002-1 thru -12
3833-1 thru -12	S-8301-1 thru -12
3998	S-8002-1
4405	S-8001-1
4407	S-8301-1
4408	S-8001-2
4512	S-8301-1

Current Ratings.

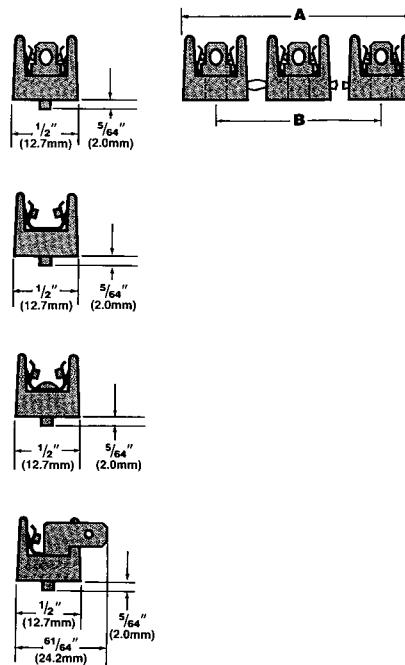
Series	Terminal	Amperes
8000	Solder	25A
8100	3/16" Quick Connect	15A
8200	1/4" Quick Connect	20A
8300	Screw	30A

Dimensional and Mounting Data

Single Pole



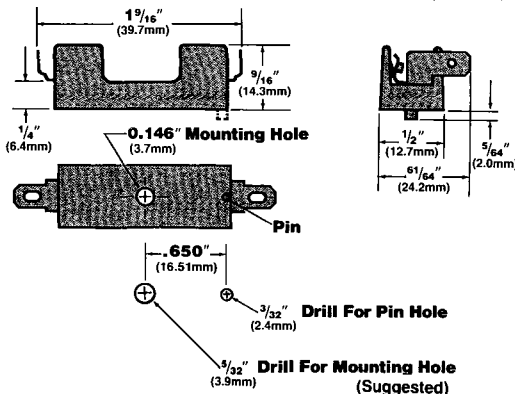
Multiple Pole



Dimensions.

No. of Poles	Inches		Millimeters	
	A	B	A	B
1				
2	1 1/8"	5/8"	28.6	15.9
3	1 3/4"	1 1/4"	44.4	31.8
4	2 3/8"	1 7/8"	60.3	47.6
5	3"	2 1/2"	76.2	63.5
6	3 5/8"	3 1/8"	92.1	79.4
7	4 1/4"	3 3/4"	108.0	95.2
8	4 7/8"	4 3/8"	123.8	111.1
9	5 1/2"	5"	139.7	127.0
10	6 1/8"	5 5/8"	155.6	142.9
11	6 3/4"	6 1/4"	171.4	158.8
12	7 3/8"	6 7/8"	187.3	174.6

*See outline drawings.



Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

(For 1/4" x 1 1/4" Fuses)

30

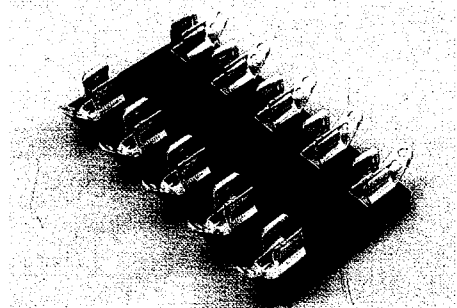
Fuse Blocks for 1/4" x 1 1/4" Fuses

(6.4mm x 31.8mm)

Multiple Pole

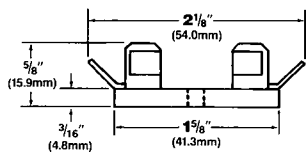
(Rated 30 Amps, 250 Volts; Phenolic Base; Spring Bronze, Albaloy Plated Clips)

Series 3823—Solder Terminals



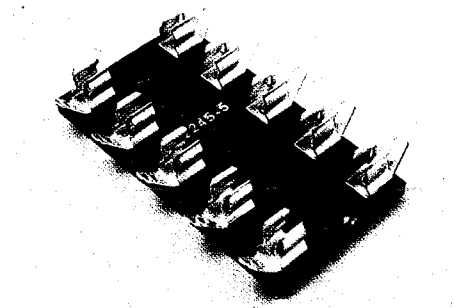
Cat. No.	No. of Poles	*Base Length
		Inches mm
3823-1	1	1/2" 12.7
3823-2	2	1 1/8" 28.6
3823-3	3	1 3/4" 44.5
3823-4	4	2 3/8" 60.3
3823-5	5	3" 76.2
3823-6	6	3 5/8" 92.1
3823-7	7	4 1/4" 108.0
3823-8	8	4 7/8" 123.8
3823-9	9	5 1/2" 139.7
3823-10	10	6 1/8" 155.6
3823-11	11	6 3/4" 171.5
3823-12	12	7 3/8" 187.3

*Small phenolic base; base width 1 5/8" (41.3mm).



Type 2245—Solder Terminals

(Beryllium copper clips)

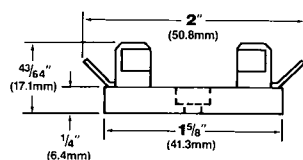


(Data continued in next column.)

Cat. No.	No. of Poles	*Base Length
		Inches mm
*2245-1	1	1/2" 12.7
*2245-2	2	1 1/8" 28.6
*2245-3	3	1 3/4" 44.5
2245-4	4	2 3/8" 60.3
2245-5	5	3" 76.2
2245-6	6	3 5/8" 92.1
2245-7	7	4 1/4" 108.0
2245-8	8	4 7/8" 123.8
2245-9	9	5 1/2" 139.7
2245-10	10	6 1/8" 155.6
2245-11	11	6 3/4" 171.5
2245-12	12	7 3/8" 187.3

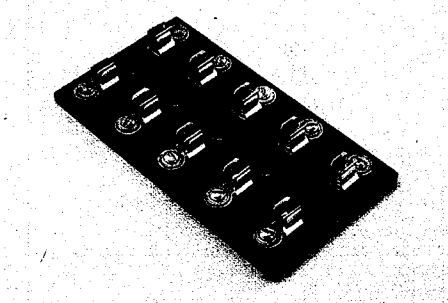
*CSA Listed at 15 amps, 250 volts.

†Small phenolic base; base width 1 5/8" (41.3mm).



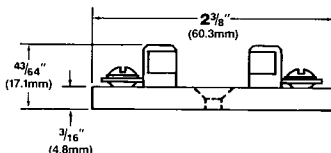
U.L. Recognized under Components Program.

Type 3833—Screw Terminals

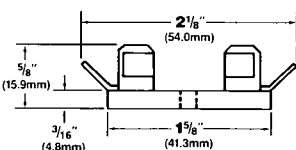


Cat. No.	No. of Poles	*Base Length
		Inches mm
3833-1	1	25/32" 19.8
3833-2	2	1 11/16" 42.9
3833-3	3	2 19/32" 65.9
3833-4	4	3 1/2" 88.9
3833-5	5	4 13/32" 111.9
3833-6	6	5 5/16" 134.9
3833-7	7	6 7/32" 158.0
3833-8	8	7 1/8" 181.0
3833-9	9	8 1/32" 204.0
3833-10	10	8 5/16" 227.0
3833-11	11	9 27/32" 250.0
3833-12	12	10 3/4" 273.1

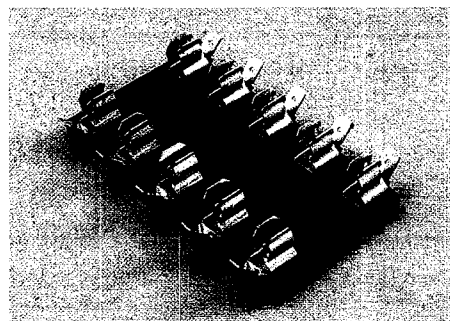
*Full phenolic base; base width 2 3/8" (60.3mm).



U.L. Recognized under Components Program.

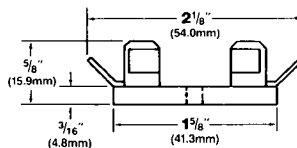


Type 2480—Quick Connect Terminals—3/16" (4.8mm)

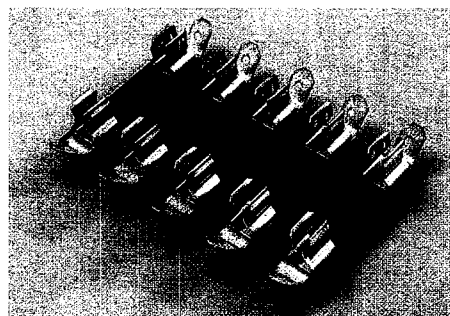


Cat. No.	No. of Poles	*Base Length
		Inches mm
2480-1	1	1/2" 12.7
2430-1	2	1 1/8" 28.6
2480-3	3	1 3/4" 44.5
2480-4	4	2 3/8" 60.3
2480-5	5	3" 76.2
2480-6	6	3 5/8" 92.1
2480-7	7	4 1/4" 108.0
2480-8	8	4 7/8" 123.8
2480-9	9	5 1/2" 139.7
2480-10	10	6 1/8" 155.6
2480-11	11	6 3/4" 171.5
2480-12	12	7 3/8" 187.3

*Small phenolic base; base width 1 5/8" (41.3mm).



Type 2430—Quick Connect Terminals—1/4" (6.4mm)



Cat. No.	No. of Poles	*Base Length
		Inches mm
2430-1	1	1/2" 12.7
2430-2	2	1 1/8" 28.6
2430-3	3	1 3/4" 44.5
2430-4	4	2 3/8" 60.3
2430-5	5	3" 76.2
2430-6	6	3 5/8" 92.1
2430-7	7	4 1/4" 108.0
2430-8	8	4 7/8" 123.8
2430-9	9	5 1/2" 139.7
2430-10	10	6 1/8" 155.6
2430-11	11	6 3/4" 171.5
2430-12	12	7 3/8" 187.3

*Small phenolic base; base width 1 5/8" (41.3mm).

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

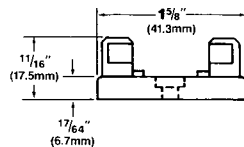
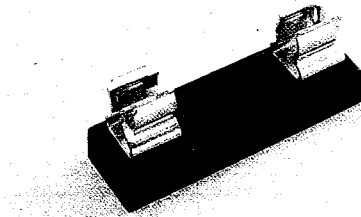
(For 1/4" x 1 1/4" Fuses)

31

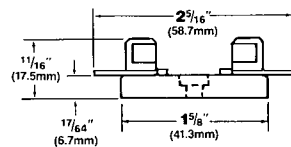
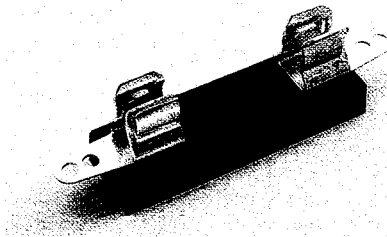
Single Pole

(Unless Otherwise Indicated - Small Bakelite Base; Spring-Bronze, Albaloy-Plated Clips; Rated 30 Amps, 250 Volts; Base Width 1/2") (12.7mm)

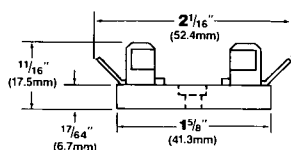
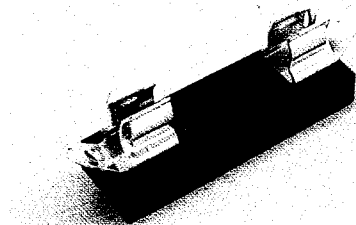
No. 4574—Spare Fuse Block



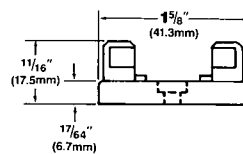
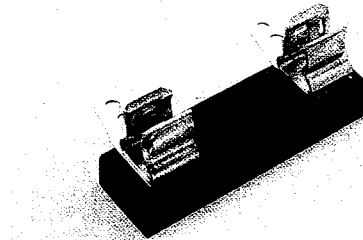
No. 4405—One Piece Solder Terminals



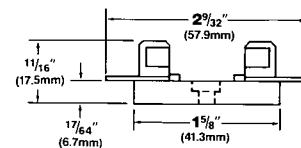
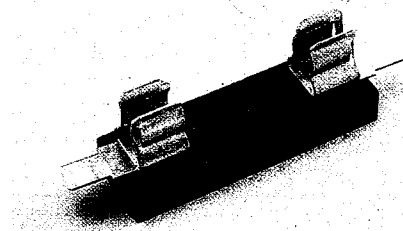
No. 3998—One Piece Solder Terminals



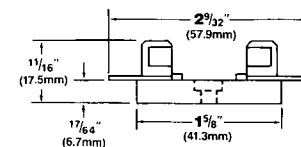
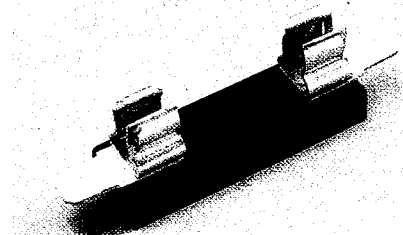
No. 4406—Side Solder Terminals



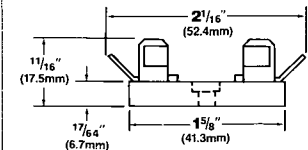
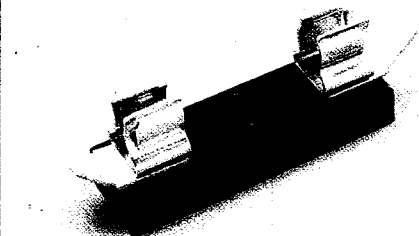
No. 2799—Quick Connect Terminals, 3/16" (4.8mm)



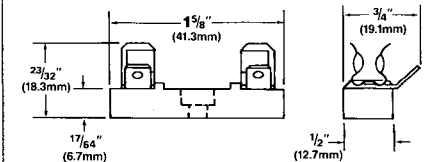
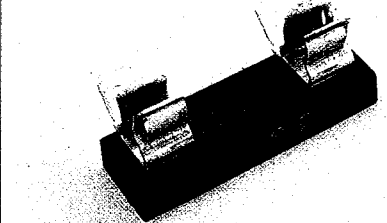
No. 2841—Quick Connect Terminals, 1/4" (6.4mm)



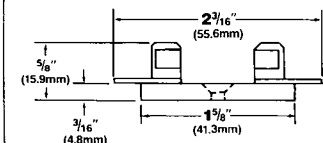
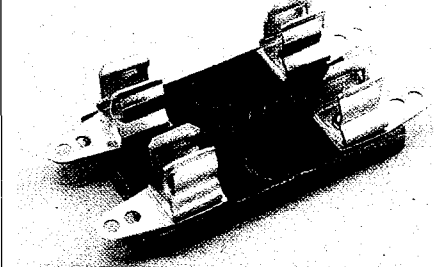
No. 2839—Quick Connect Terminals, 1/4" (6.4mm) (Rated 15 Amps; U.L. Recognized under Components Program)



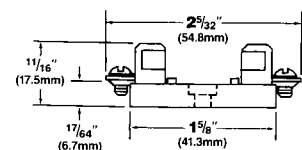
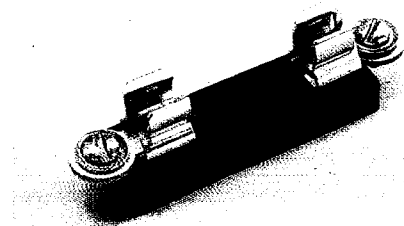
No. 2499—Side Quick Connect Terminals, 1/4" (6.4mm) (Rated 15 Amps; U.L. Recognized under Components Program)



No. 4408—Solder Terminals; 2-Pole (Base width 1") (25.4mm)



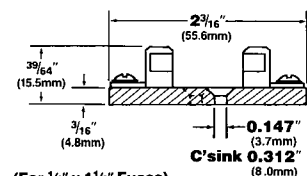
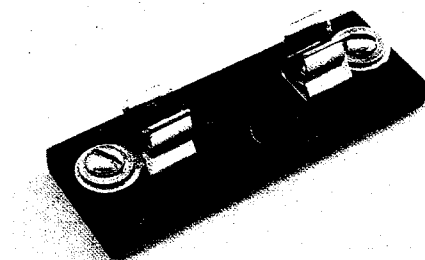
No. 4407—Screw Terminals



(For 1/4" x 1 1/4" Fuses)

No. 4512—Screw Terminals

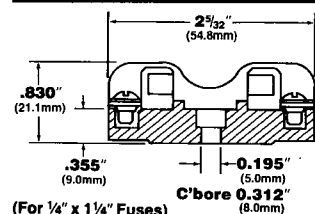
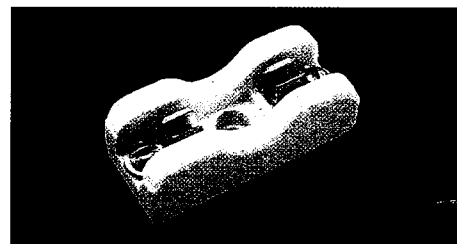
(Full bakelite base; base width, 3/4")
(19.00mm)



(For 1/4" x 1 1/4" Fuses)

No. 4396—Full Porcelain Base with Side Barrier

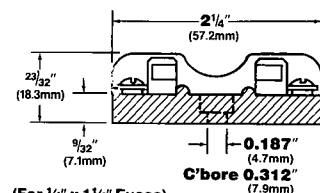
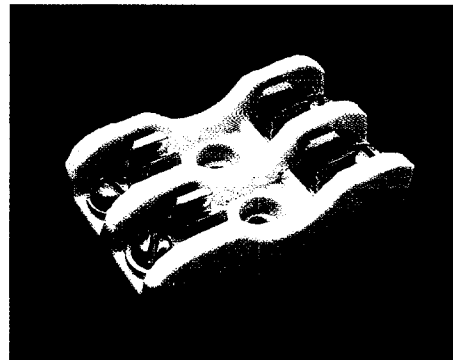
(Screw terminals; base width 59/64", 23.5mm; rated 15A, 250V; U.L. Recognized under the Components Program)



(For 1/4" x 1 1/4" Fuses)

No. 4161—Full Porcelain Base with Side Barriers

(2-pole; screw terminals; base width 1 5/16" 33.3mm; 15A, 250V; U.L. Recognized under the Components Program)



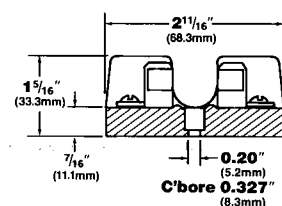
(For 1/4" x 1 1/4" Fuses)

Fuse Blocks for 1 3/32" x 1 3/8" Fuses

(10.3mm x 34.9mm)

No. 3845—Single Pole; Full Porcelain Base with Side Barrier

(Screw terminals; spring bronze albaloy plated clips; base width 1 5/32", 29.4mm; Rated 5A, 600V; CSA Listed).



U.L. Recognized under the Components Program.

Fuse Blocks for 1 3/32" x 1 1/2" Fuses

(10.3mm x 38.1mm)

Without Side Barriers

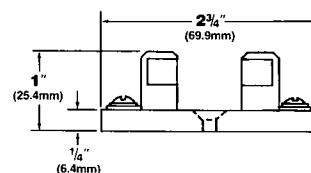
(Beryllium Copper, Silver Plated Clips; Rated 30A, 250V)

Type 3835—Multiple Pole; Screw Terminals



Cat. No.	No. of Poles	*Base Length Inches	*Base Length mm
3835-1	1	27/32"	21.4
3835-2	2	1 13/16"	46.0
3835-3	3	2 25/32"	70.6
3835-4	4	3 3/4"	95.2
3835-5	5	4 23/32"	119.9
3835-6	6	5 11/16"	144.5
3835-7	7	6 21/32"	169.0
3835-8	8	7 5/8"	193.7
3835-9	9	8 19/32"	218.8
3835-10	10	9 9/16"	242.9
3835-11	11	10 17/32"	267.5
3835-12	12	11 1/2"	292.1

*Full phenolic base; base width 2 3/4" (69.9mm).

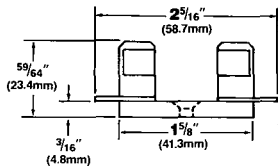
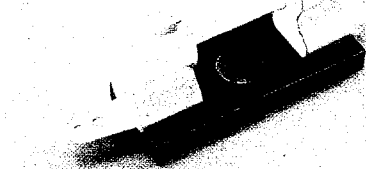


Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

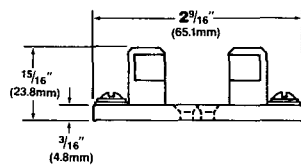
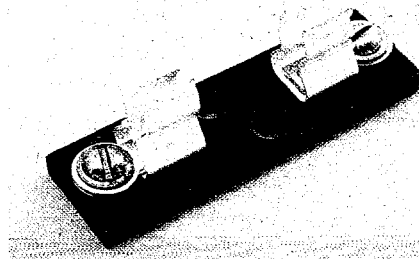
(For $1\frac{3}{32}$ " x $1\frac{1}{2}$ " Fuses)

33

No. 4421—Single Pole; Solder Terminals
(Small Base; Base Width, $\frac{5}{8}$ " (15.9mm))



No. 4515—Single Pole; Screw Terminals
(Full Bakelite Base, Base Width, $\frac{3}{4}$ " (19mm))



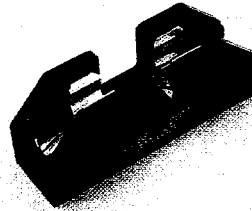
With Side Barriers

(Molded Phenolic Base; Screw or Pressure Terminals; Spring Bronze, Albaloy Plated Clips; Rated 30A, 600V; U.L. Recognized under Component Program)

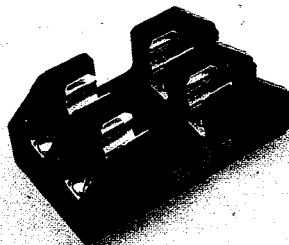
No. of Poles	Fuse Block Cat. No.	Terminal Type	Base Width Inches	mm
1	2807	Screw	2810	2096
2	2808	Box	2811	2097
3	2809	*Teeter	2812	2098

* Panhead teeter screw provides a secure terminal connection similar to the box type pressure terminal.

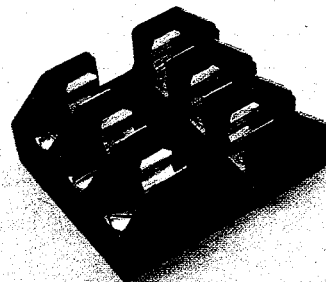
No. 2807



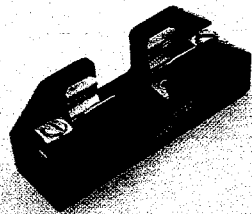
No. 2808



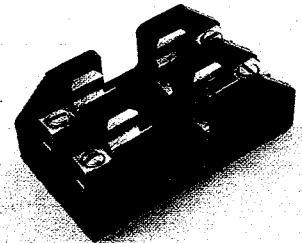
No. 2809



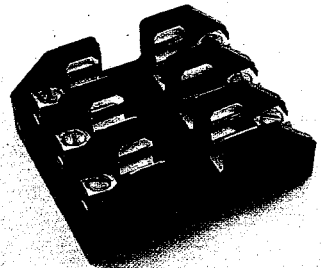
No. 2810



No. 2811

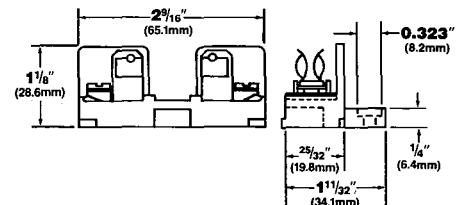
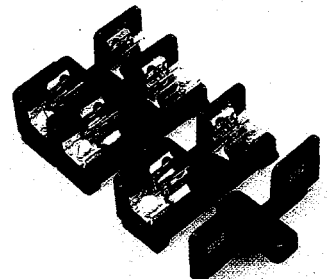


No. 2812



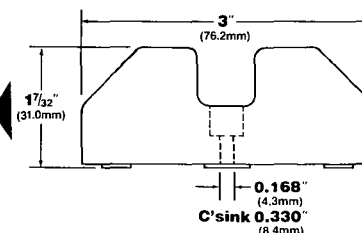
Add-On Fuse Blocks

No. 3743—Block with One Pole
(Single pole blocks lock into each other and can be added at any time. Each has end barrier. Molded phenolic base; screw terminal; beryllium copper, bright-dipped clips. Rated 30 amps, 600 volts. U.L. Recognized under Components Program. When ordering, specify "one-pole only").



No. 3742—End Barrier Only

No. 3723—Marking Strip
 $9\frac{3}{8}$ " (23.8cm) lengths for add-on blocks.



Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

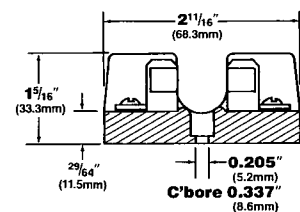
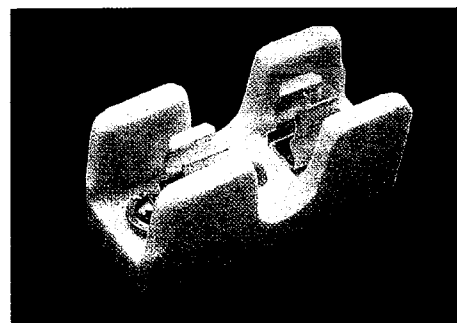
34

Fuse Blocks with Porcelain Base

(With Side Barriers; Screw Terminals; Beryllium Copper, Silver-plated clips. Rated 30 Amps).

No. 3792—Single Pole, 600 Volts

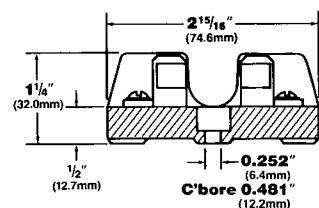
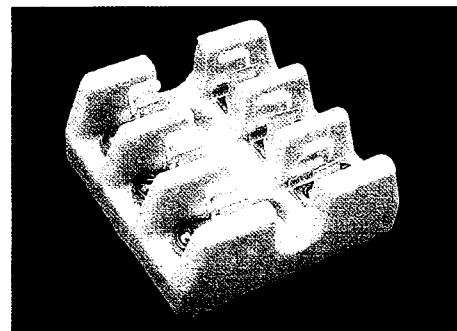
(Base width $1\frac{5}{32}$ " (29.4mm))



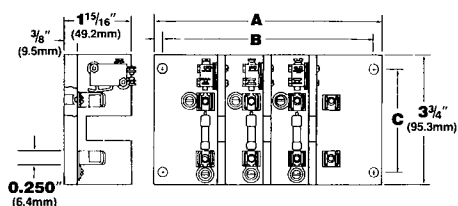
(For $1\frac{3}{32}$ " x $1\frac{1}{2}$ " Fuses)

No. 4439—Three Pole, 250 Volts

Base width $2\frac{15}{16}$ " (74.6mm)

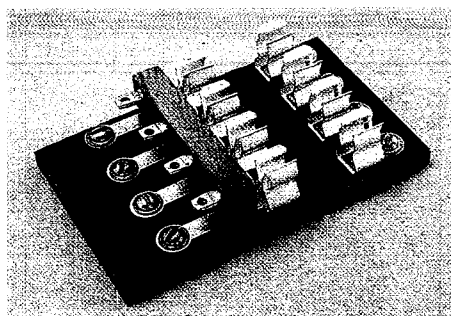


(For $1\frac{3}{32}$ " x $1\frac{1}{2}$ " Fuses)

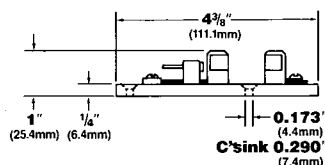


BUSS Signal Blocks for Pin Indicating Fuses and Devices

No. 3839—Four Pole Signal-Fuse Block



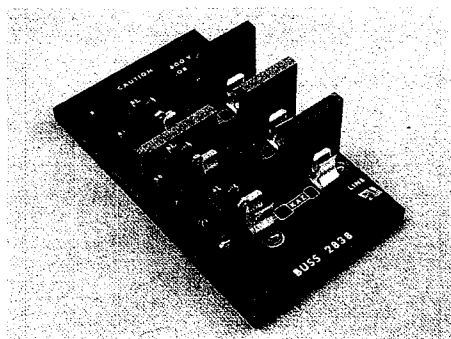
(Screw terminals; beryllium copper, silver-plated slips; Fuse case size, $1\frac{3}{32}$ " x $1\frac{1}{2}$ ", 10.3mm x 38.1mm; accepts **FNA**, **MIC** and **MIN** units. Block rating, 30A, 250V. Base width $2\frac{1}{16}$ " (68.3mm))



(For $1\frac{3}{32}$ " x $1\frac{1}{2}$ " Fuses)

Blocks with Miniature Signaling Switches for BUSS KAZ Actuator Devices

(For $1\frac{3}{32}$ " x 2" Fuses)



Cat. No.	No. of Poles	Dimensions $\pm 1/32$ " (0.8mm)		
		A	B	C
2778	1	$1\frac{3}{4}$ (44.5)	—	$2\frac{1}{2}$ (63.5)
2837	2	$5\frac{5}{16}$ (134.9)	$4\frac{3}{16}$ (122.2)	3 (76.2)
2838	3	$6\frac{5}{8}$ (168.3)	$6\frac{1}{8}$ (155.6)	3 (76.2)
2788-3		$5\frac{3}{8}$ (136.5)	$4\frac{7}{8}$ (123.8)	3 (76.2)

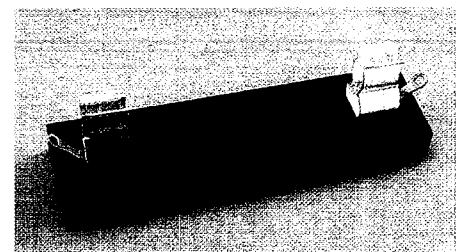
U.L. Recognized under Components Program.

Note: **2788-2** (2 pole) thru **2788-5** (5 pole) also available.

Fuse Blocks for High Voltage Instrument Type Fuses

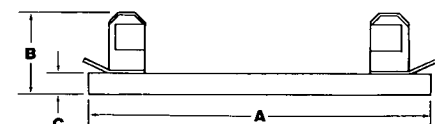
For BUSS High Voltage Fuses (1000 to 10,000 Volts)

(Bakelite base; alloy plated terminals)



Fuse Sym.	Block Cat. No.	*Dimensions			
		Inches/(mm's)			Base Width
HVA	4528	$3\frac{3}{4}$ " (95.3)	$1\frac{1}{8}$ " (28.6)	$\frac{3}{8}$ " (9.5)	1" (25.4)
HVR					
HVB	4529	$5\frac{1}{4}$ " (133.4)	$1\frac{1}{8}$ " (28.6)	$\frac{3}{8}$ " (9.5)	1" (25.4)
HVT					
HVJ	4530	$6\frac{1}{2}$ " (165.1)	$1\frac{1}{8}$ " (28.6)	$\frac{1}{2}$ " (12.7)	$1\frac{3}{8}$ " (34.9)
HVV					
HVL	2960	$11\frac{7}{16}$ " (290.5)	$1\frac{1}{8}$ " (28.6)	$\frac{3}{4}$ " (19.1)	$1\frac{3}{8}$ " (34.9)
HVX					

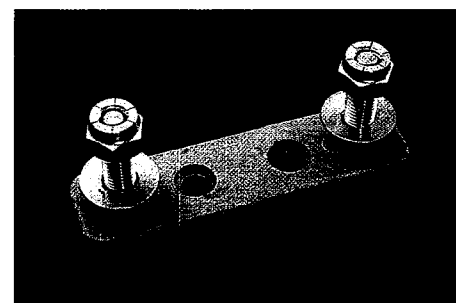
* Two mounting holes: Use #8 screws on blocks **4528** and **4529**; #10 screws on blocks **4530** and **2960**.



Fuse Blocks for ANN Fuses and ANL Limiters

No. 4164

Single pole; stud terminal; free running lock nut; molded alkyd base; metal components cadmium plated. Stud center-to-center dimensions $2\frac{7}{16}$ " (68.3mm); base width $1\frac{5}{16}$ " (23.8mm); length $3\frac{13}{32}$ " (86.5mm); height $1\frac{37}{64}$ " (40.1mm)



Fuse Blocks for Rectifier Fuses

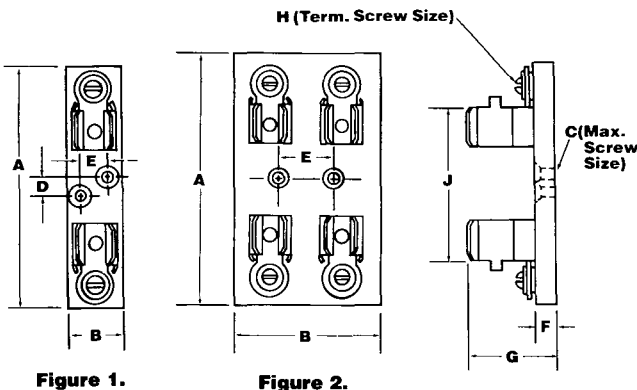
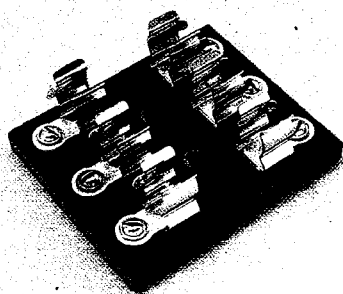


Figure 1.

Figure 2.

Tron Rectifier Fuseblocks

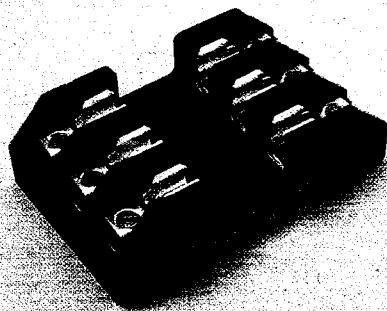
Fuse	Volts	Amps	Poles	Block	Fig.	Dimensions in Inches										Dimensions in Metric (mm)									
						A	B	C	*D	*E	F	G	H	J	A	B	C	*D	*E	F	G	H	J		
KAA or KAW	130	1/2	1	4515	1		3/4		1/4	3/8						19.1		6.4	9.5						
		to	2	4525	2	2 9/16	1 5/16	#6		5/8	3/16	1 5/16	#8	1 9/16	65.1	33.3	3.5		15.9	4.8	23.8	4.2	39.7		
		30	3	4535			2 1/16									52.4									
KAB or KAX	250	1	1	4386	1	3 1/4	3/4		1/4	3/8	3/8	1 5/16			82.6	19.1		6.4	9.5	9.5	33.3				
		to	2	4287	2	3 1/2	2	#6		1	1/4	1 3/16	#8	2 1/16		50.8	3.5		25.4	6.4	30.2	4.2	52.4		
		30	3	3959			3				3/8	1 5/16				88.9	76.2			9.5	33.3				

Mounting holes are counterbored for round-head or flister-head screws. All others are countersunk for flat-head screws.

* Where no dimension shown, mounting holes are on center line.

Fuse Blocks for SC Fuses

- Molded one-piece thermosetting plastic with side barriers for isolation.
- Screw type terminals are furnished with No. 10-32 pan headwire binding type screw. Terminal will take any size wire proper for the ampere rating of the fuse.
- 0 to 30 ampere solderless lug terminals takes 6 to 14 gauge wire—60 ampere solderless lug terminals take 4 to 14 gauge wire.
- "Teeter" screw terminals are a combination screw terminal with a basically flat square terminal that "teeters" to adapt the wires to the terminal. Takes 14 to 10 gauge wire.
- U.L. Listed.



Class G Dimension Fuseblocks (For Type SC Fuses)

Volts	Amps	Poles	Fuseblocks			Fig.	Dimensions in Inches					Dimensions (mm)					
			Terminal Type				A	B	C	D	E	A	B	C	D	E	
			*Teeter	Screw	Box												
300	1	1	2087	2961	2891	1	3	55/64	.360	1/4	17/32	76.2	21.8	9.1	6.4	31.0	
	to	2	2090	2917	2894	2		15/8	.765	27/64			41.3	19.4			
	15	3	2093	2965	2897	2		23/8	1.530	60.3			38.9	10.7			
	20	1	2088	2962	2892	1	3	55/64	.360	1/4	17/32	76.2	21.8	9.1	6.4	31.0	
		2	2091	2918	2895	2		15/8	.765	27/64			41.3	19.4	10.7	31.0	
		3	2094	2966	2898	2		23/8	1.530	60.3			38.9				
	25	1	2089	2963	2893	1	3	55/64	.360	1/4	17/32	76.2	21.8	9.1	6.4	31.0	
	to	2	2092	2919	2896	2		15/8	.765	27/64			41.3	19.4	10.7		
	30	3	2095	2967	2899	2		23/8	1.530	60.3			38.9				
	35	1	—	—	2964	1	2	4 1/4	31/32	.437	17/64	119/64	108.0	24.6	11.1	6.7	32.9
	to	2	—	—	2920	2			125/32	.830	31/64			45.2	21.1	12.3	
	60	3	—	—	2968	2			25/8	1.660	66.7			42.2			

* Teeter screw with molded base gives a terminal connection similar to a box screw, but it is somewhat more economical.

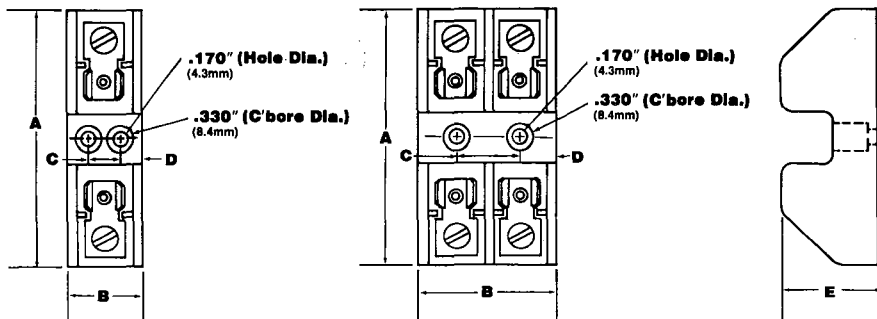


Figure 1.

Figure 2.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

36

Fuse Clips

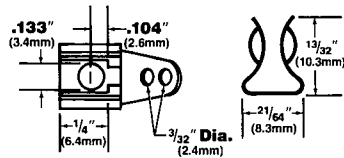
Bronze Clips provide high gripping strength and retain spring pressure under adverse conditions. Albaloy plating is highly corrosion resistant and has a high degree of conductivity.

The highest quality clip metal is beryllium copper. Gives lasting spring pressure and high conductivity.

No. 5678-14—One-Piece Clip With Terminal for 1/4" (6.4mm) Fuses
(Solder type terminals; spring bronze albaloy plated; formerly designated No. 4501)

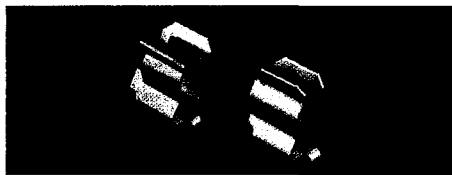


Carton quantity: 10
Shipping wt. per 100: 0.3 lbs (135.1g).



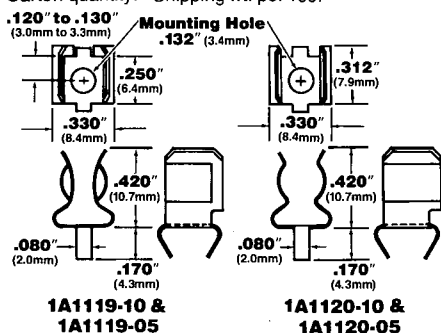
Tron Clips (1/4", 6.4mm) for Printed Circuit Boards

(Twin tabs with bowed design firmly snaps into PC board to facilitate soldering—eliminates riveting and misalignment)

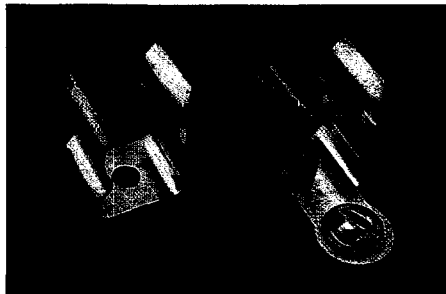


Cat No.	End Stops	Metal	Plating Finish
1A1119-05	Yes	Beryllium	Silver
1A1119-10		Spring Bronze	Albaloy
1A1120-05	No	Beryllium	Silver
1A1120-10		Spring Bronze	Albaloy

Carton quantity: Shipping wt. per 100:



Clip Assemblies for 1/4", 9/32", 13/32" and 9/16" Fuses
(6.4mm, 7.1mm, 10.3mm and 14.3mm)
(Consists of clip, brass terminal base and screws).

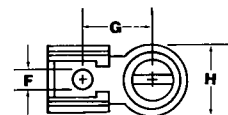


Fuse Dia.	Ass'y. Cat. No.	*Clip No.	Mount. Screw (Steel)	Term. Screw (Brass)
1/4"	4431	5682-44	4-40	
(6.4mm)	4432	5682-02	1/4"	6-32
	4567	5682-44		3/16"
	4583	5682-02		
9/32"	4560	5674-41		
(7.1mm)	4585	5674-01		
13/32"	4561	5960-63	8-32	8-32
(10.3mm)	4586	5960-09	3/8"	3/16"
9/16"	4208	5591-42		
(14.3mm)	4207	5591-52		

* See Tron fuse clips for detail data.

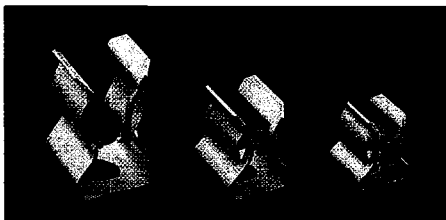
Ass'y. Cat. No.	Dimensions Inches/(mm's)			Wt./100 Lbs. Gm's.	
No.	F	G	H		
4431	.089	.3575	.3775	1	454
4432	(2.3)	(9.1)	(9.6)		
4567	.1325	.3575	.3775	1	454
4583	(3.4)	(9.1)	(9.6)		
4560	.136	.4425	.445	1.6	726
4585	(3.5)	(11.2)	(11.3)		
4561	.136	.4425	.445	1.6	726
4586	(3.5)	(11.2)	(11.3)		
4208	.136	.5705	.510	2.7	1225
4207	(3.5)	(5.8)	(13.0)		

Carton quantity: 10



Tron Clips for 1/4", 9/32", 13/32", and 9/16" Fuses

(6.4mm, 7.1mm, 10.3mm, and 14.3mm)

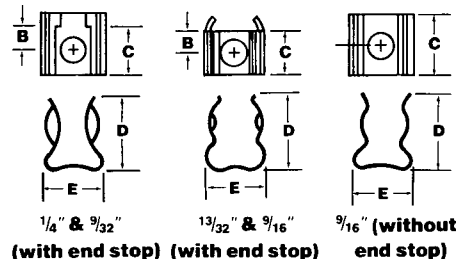


- Beryllium copper clips recommended for loads 20 amperes or higher.
- With or without end stops.
- Spring bronze clips are albaloy plated.
- Beryllium copper clips are silver plated

Fuse Dia.	End Stop	*Metal	†Cat. No.	Wt./100 Lbs. Gm's.	
1/4"	Yes	Spg Br	5682-44	0.3	136
(6.4 mm)		Bery Cu	5682-02		
		Spg Br	5682-41		
		Bery Cu	5682-01		
	—	Spg Br	5681-15		
9/32"	Yes	Spg Br	5674-41	0.5	227
(7.1 mm)		Bery Cu	5674-01		
	—	Spg Br	5672-11	0.4	181
13/32"	Yes	Spg Br	5960-63	0.7	318
(10.3 mm)		Bery Cu	5960-09		
		Spg Br	5960-61		
		Bery Cu	5960-07		
	—	Spg Br	5956-16	0.5	227
9/16"	Yes	Spg Br	5591-42	1.4	635
(14.3 mm)		Spg Br	5591-52		
		Spg Br	5592-33	1.2	544

* Spg Br—Spring Bronze; Bery Cu—Beryllium Copper.

† See dimensional data for further differentiation of clip types.



Cat. No.	°Dimensions Inches/(mm's)			
	B To End Stop	C Contact (min)	D Hght. (Max)	E Wdth. (max)
5682-44	*.130"			
5682-02	(3.30)	.250"	.430"	.335"
5682-41	‡.104"	(6.35)	(10.92)	(8.51)
5682-01	(2.64)			
5681-15	†—	.265"	.430"	.335"
		(6.73)	(10.92)	(8.51)
5674-41	*.177"	.360"	.525"	.385"
5674-01	(4.50)	(9.14)	(13.33)	(9.78)
5672-11	†—	.358"	.525"	.385"
		(9.09)	(13.33)	(9.78)
5960-63	*.201"	.383"	.743"	.464"
5960-09	(5.10)	(9.73)	(18.87)	(11.78)
5960-61	‡.169"	.378"	.743"	.464"
5960-07	(4.29)	(9.60)	(18.87)	(11.78)
5956-16	†—	.307"	.743"	.464"
		(7.80)	(18.87)	(11.78)
5591-42	.252"	.500"	.937"	.666"
5591-52	(6.40)	(12.70)	(23.80)	(16.92)
5592-33	†—			

* Hole in center of contact area.

‡ Hole in center of clip.

† Hole in center of both clip and contact area.

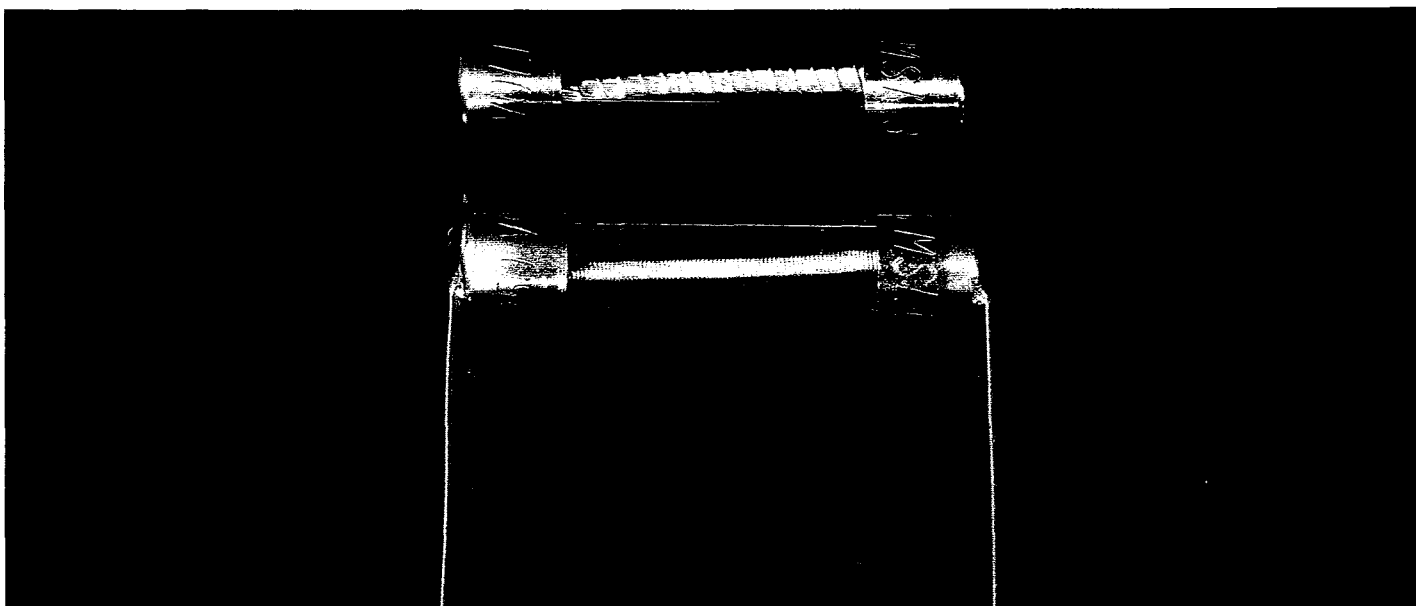
° Dimension "A"—Mounting Hole Diameters: Series 5682 and 5681, 0.1325" (3.37mm); 5674, 5672, 5960-63, 5960-09, 5956, 5591 and 5592, 0.1725" (4.38mm); 5960-61 and 5960-07, 0.196" (4.98mm).

Carton quantity: 10.

Small Dimension Fuses

Type MSL Single-Element, Time-Delay

37
(New)



Buss MSL Spiral-Wound, Single-Element Time-Delay Fuses.

- MSL and MSV $\frac{1}{4}$ " x $1\frac{1}{4}$ " fuses are spiral-wound, single-element time-delay fuses for protection of less demanding circuits that are subject to high inrush currents. When there are critical parameters of resistance, low voltage, and/or amplitude and duration of inrush currents, use Fusetron dual-element fuses MDL or MDV.
- Time-delay characteristics superior to competitive "slow-blow" type fuses (see time-current curves). At 200% load, MSL fuses provide 16-18 seconds delay.
- 250 volts AC or less.*
- MSL Series—standard tube fuse; MSV Series with radial leads ($1\frac{1}{4}$ "; 20 gauge).
- Standard tube fuses mount in Buss panel holders, in-line holders, blocks, or clips. Radial lead fuse solder connect.
- Interrupting rating:
10,000A @ 125V (all)
35A @ 250V ($\frac{1}{4}$ A—1A)
100A @ 250V ($1\frac{1}{4}$ A—3.2A).
200A @ 250V (4A—8A).
- U.L. and CSA listed.

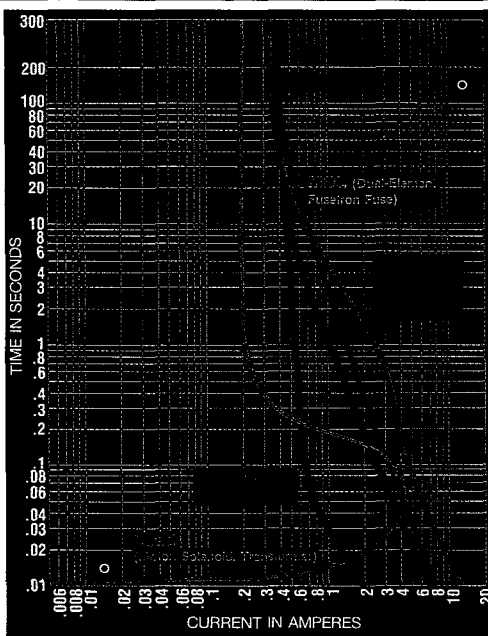
*For fuses with current ratings of 1 amp or smaller, minimum voltage is 5 volts. Characteristic of all spiral-wound fuses, the lineal increase in resistance with temperature rise incident to overcurrents prohibits their use in circuits having an applied voltage below a nominal minimum.

*Test Specifications

Load	Operating Time
110%	4 Hours (min.)
135%	1 Hour (max.)
200%	†5 Seconds (min.)

* Per U. L.

† Actual time-delay, 16-18 seconds.

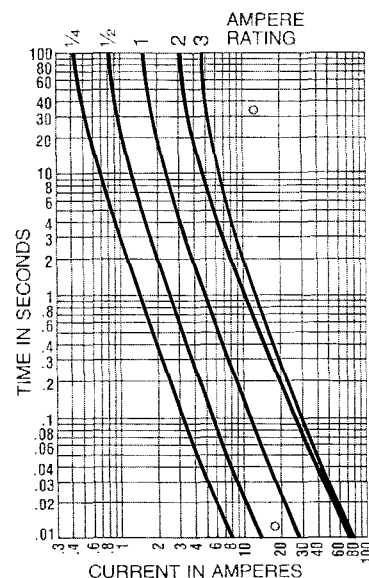


The above graph compares the actual time/current characteristics of four different $\frac{1}{4}$ ampere fuses together with a load curve which represents the "severe" current excursions that can be evidenced when an inductive device such as a motor, solenoid, or transformer is energized (as can be noted, in this particular instance only the Buss Type MDL, dual-element, time-delay fuse can handle the inrush current without opening).

*Catalog Numbers (Symbol and Amperes)

Std.	Radial Lead	Std.	Radial Lead
MSL- $\frac{1}{4}$	MSV- $\frac{1}{4}$	MSL-2	MSV-2
MSL- $\frac{3}{10}$	—	MSL-2 $\frac{1}{2}$	MSV-2 $\frac{1}{2}$
MSL- $\frac{3}{8}$	MSV- $\frac{3}{8}$	MSL-3	MSV-3
MSL- $\frac{1}{2}$	—	MSL-3 $\frac{3}{10}$	MSV-3 $\frac{3}{10}$
MSL- $\frac{1}{2}$	MSV- $\frac{1}{2}$	MSL-4	MSV-4
MSL- $\frac{5}{10}$	—	MSL-5	MSV-5
MSL- $\frac{3}{4}$	—	MSL-6	—
MSL- $\frac{5}{10}$	—	MSL-6 $\frac{1}{4}$	MSV-6 $\frac{1}{4}$
MSL-1	MSV-1	MSL-7	MSV-7
MSL-1 $\frac{1}{4}$	—	MSL-7 $\frac{1}{2}$	MSV-7 $\frac{1}{2}$
MSL-1 $\frac{1}{2}$	MSV-1 $\frac{1}{2}$	MSL-8	MSV-8
MSL-1 $\frac{5}{10}$	—	—	—

Carton Quantity: 5
Shelf Package: 100
Bulk Packaging: 1000 per shipping carton
(1000 minimum per catalog number).
*For bulk package orders, prefix "BK/" to basic catalog number (i.e. BK/MSL- $\frac{1}{4}$).

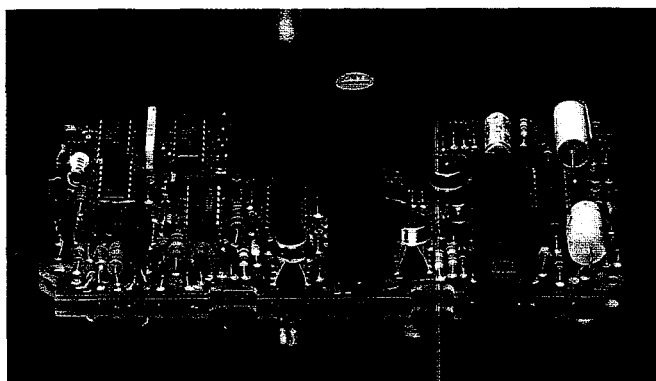


MSL and MSV time-current curves.
(Contact Bussmann for data on 3.2A to 8A fuses.)

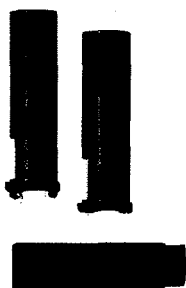
Small Dimension Fuseholders

PC Board (5mm × 20mm & 1/4" × 1 1/4")

38
(New)



Models For Vertical and Horizontal Mounting



There's one model that mounts on a PC board in a horizontal plane (HBH); and two models which mount in a vertical plane—one with "stability" pins (HBV) and one without (HBW). All three feature common fuse carriers that are interchangeable with their European counterparts.

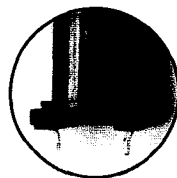
Fuse Carriers For 5mm × 20mm and 1/4" × 1 1/4" Fuses



Carriers fit all three body models. Carrier knobs are color coded for easy identification—gray for 1/4" fuses; black for 5mm fuses.

When locked, slots of horizontal holders are always parallel to PC board; always in alignment on vertical holders. Precise, uniform line-up makes them look good.

"Kicked" Terminals For Optimum Wave-Soldering



Stabilizes holder. Makes for constant high quality soldering even with wide tolerance PC board hole tooling.

Anti-Wicking Terminals



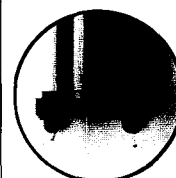
The bottom (line-side) terminal incorporates an exclusive closed element design. Prevents solder flux from "wicking-up" into the holder body and the resulting poor continuity between the fuse and the terminal.

*Individual Components—PC Board Fuseholders	
Fuseholder Body Only	
Body Type	Cat. No.
Horizontal Mount	BK/HBH
Vertical Mount w/ Stability Pins	BK/HBV
Vertical Mount w/o Stability Pins	BK/HBW
Fuseholder Carrier Only	
1/4" × 1 1/4"	BK/FBI
5mm × 20mm	BK/FBM

*Available in bulk only.

"Stabilizer" Pins on HBV Vertical Model Offer Added Stability

Corner pins integral to the HBV holder body give additional stability to vertical holders for wave-soldering and, at the same time, reduce any mechanical stress that might be imposed on contact pins during service. HBV model offers direct interchangeability with European models.



Specifications PC Board Fuseholders

Electrical Ratings	UL—12A @ 250V; CSA—12A @ 250V; VDE—6.3A @ 250V; SEMKO—6.3A @ 250V. Insulation resistance—10,000 megohm at 500 VDC. Contact resistance—less than 0.005 ohms @ 20mV. Dielectric strength—over 200 volts/mil.
Molded Material	High dielectric molded phenolic with a UL VO flammability rating.
Terminals	Copper alloy, tin plated
Fuse Carrier & Knob	Spring-loaded, bayonet type. Brass, tin-plated. Screwdriver slotted.
Mounting	"Kicked" terminals (all models) and stabilizer pins on HBV model for increased stability.
Environmental	Ambient temperature—(−40°C) to (+85°C).

Note: Voltage ratings of fuseholders in A.C.

Selection Chart—Printed Circuit Board Fuseholders.

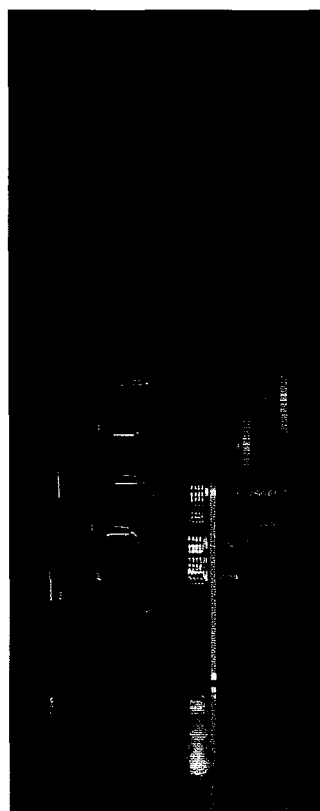
Model	Fuse Size	*Cat. No.	*Agency Listings	Dimensions	Mounting Dimensions
Horizontal Mount					
	 1/4" × 1 1/4"	HBH-I	UL CSA VDE SEMKO		 Panel PC Board
	 5mm × 20mm	HBH-M			
Vertical Mount With Stability Pins					
	 1/4" × 1 1/4"	HBV-I	UL CSA VDE SEMKO		 Panel PC Board
	 5mm × 20mm	HBV-M			
Vertical Mount Without Stability Pins					
	 1/4" × 1 1/4"	HBW-I	UL CSA VDE SEMKO		 Panel PC Board
	 5mm × 20mm	HBW-M			

*Pending
Note—Carriers do not fit panel-mounted fuseholders.

Small Dimension Fuseholders

Panel-Mounted (5mm × 20 mm & 1/4" × 1 1/4") (New)

39

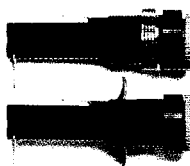


Two Front-Panel Mounting Exposures



There's a low-profile exposure plus a high-profile exposure . . . you have a choice!

Two Mounting Options



There's a threaded body plus a smooth holder body that permits close panel clustering, fast easy "speed-nut" mounting, and eliminates scrap from over-torqueing.

Two Basic Fuse Carriers



There's a carrier for 1/4" × 1 1/4" fuses and one for 5mm × 20mm fuses. They both fit all fuseholder bodies. Carrier knobs are color-coded for easy identification (gray for 1/4" fuses, black for 5mm fuses).

Two Types of Carrier Knobs



There's one with a screwdriver slot and another with finger-grip serrations.

Specifications—Panel-Mounted Fuseholders

Electrical Ratings	UL—16A @ 250V; CSA—16A @ 250V; VDE—10A @ 250V; SEMKO—6.3A @ 250V. Insulation resistance—10,000 megohm minimum at 500 VDC (per IEC No. 257). Contact resistance—less than or equal to 0.005 ohm at 1 Amp (per IEC No. 257). Dielectric strength—480 volts/mil at 0.125" thickness (per IEC No. 257).
Molded Material	Body—black, glass-filled polyester (UL-94V0 flammability rating). Knob—glass-filled polyester, gray or black. Hex nut—clear polycarbonate.
Terminals	Brass, tin plated; 3/16" quick-connect/solder type; .020" thickness.
Fuse Carrier & Knob	Spring-loaded, bayonet type. Brass, tin-plated. Finger-grip or screwdriver slotted.
Mounting	Threaded body withstands 10 lb/in. torque (maximum panel thickness 5/16"); push-on speed-nut withstands 50 pounds pull.
Environmental	Ambient temperature—(–55°C) to (+85°C).

Note: Voltage ratings of fuseholders in A.C.

*Individual Components—Panel-Mounted Fuseholders

Fuseholder Body Only	Cat. No.
Smooth (for speed-nut)	Low Profile HSL
	High Profile HSN
Threaded (for hex-nut)	Low Profile HFL
	High Profile HFN
Fuseholder Carrier Only	
1/4" × 1 1/4"	Screwdriver Slot FCI
	Finger Grip FCI-F
5mm × 20mm	Screwdriver Slot FCM
	Finger Grip FCM-F

Hardware

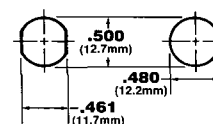
Washer, Threaded or Smooth Body	1A3321
Hex-nut, Threaded Body	1A3322
Speed-nut, Smooth Body	1A3844

** Available in bulk only.

Selection Chart—Panel-Mounted Fuseholders

Mounting	Body	Fuse Size	Fuse Carrier and Cap Unit	*Cat. No.	Agency Listings**	Dimensions
Hex Nut On Threaded Body	Low Profile	1/4" × 1 1/4"	Screwdriver Slot	HFL-I	UL, CSA, SEMKO, and * VDE	
			Finger Grip	HFL-IF		
	High Profile	5mm × 20mm	Screwdriver Slot	HFL-M		
			Finger Grip	HFL-MF		
Speed Nut On Smooth Body	Low Profile	1/4" × 1 1/4"	Screwdriver Slot	HSL-I	UL, CSA, and SEMKO	
			Finger Grip	HSL-IF		
	High Profile	5mm × 20mm	Screwdriver Slot	HSL-M		
			Finger Grip	HSL-MF		
Speed Nut On Threaded Body	Low Profile	1/4" × 1 1/4"	Screwdriver Slot	HSN-I	UL, CSA, and SEMKO	
			Finger Grip	HSN-IF		
	High Profile	5mm × 20mm	Screwdriver Slot	HSN-M		
			Finger Grip	HSN-MF		

* Available in standard pack or bulk pack (when ordering bulk pack, prefix "BK" to catalog number).



Panel Mount Hole Punching
(Two options apply to all fuseholders)



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