Bulletin SFB

Buss® Small Dimension Fuses

Fuseholders, Blocks, and Accessories

McGRAW-EDISON

Buss

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories 2

Contents by Section

New Buss Products

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

Index By Product Symbol

°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	Dimensions mm	Description	Symbol	Page
500V	3½ to 30	13/32 x 1½	10.3 x 38.1	Fibre/ferrule; for motor control tranf's.	FNQ	11
300V	5 to 6¼	—	—	For HLR Holder	GMF	17
		—	—	For HLQ size rejection holder	GMQ	17
	6 to 60	13/32D (Various Lengths)	10.3D	Melamine/ferrule; For branch circuits	SC	13
250V	5 to 20	¼ x 1¼	6.6 x 31.8	Ceramic/ferrule	MDA	10
	12 to 30	13/32 x 1½	10.3 x 38.1	Melamine/ferrule for Control Circuits	FNW	11
125V	7 to 10	—	—	For HLR holder	GRF	17
	25 to 30	¼ x 1¼	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	Dimensions mm	Description	Symbol	Page
500V	1/10 to 3 2/10	13/32 x 1½	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 1¼	—	—	For HN holder	N	17
	1/100 to 1	¼ x 1¼	6.6 x 31.8	Glass/ferrule	MDL	10
				Glass/radial lead	MDV	12
	1/10 to 8/10	13/32 x 1½	10.3 x 38.1	Fibre/ferrule; indicating	FNA	14
	1/10 to 10			Fibre/ferrule	FNM	11
	1¼ to 2	¼ x 1¼	6.6 x 31.8	Glass/ferrule	MDX	10
	1/100 to 4			Ceramic/ferrule	MDA	10
125V	1⅛ to 2 8/10			Glass/ferrule	MDL	10
	1⅛ 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
		13/32 x 1½	10.3 x 38.1	Fibre/ferrule Indicating pin	FNA	14
	2½ to 7	¼ to 1¼	6.6 x 31.8	Glass/ferrule	MDX	10
	12 to 15	13/32 x 1½	10.3 x 38.1	Fibre/ferrule	FNM	11
	20 to 60	—	—	Fibre/axial studs	ACK	18
	30 to 120				ACL	18
32V	3 to 30	¼ x 1¼	6.6 x 31.8	Glass/ferrule	MDL	10
	20 to 30	13/32 x 1½	10.3 x 38.1	Fibre/ferrule; indicating	FNA	14
				Fibre/ferrule	FNM	11
	20 to 150	13/16D	20.6D	Fibre/radial studs	HSK	18

Limiters — Low Voltage and Heat

Volts	Ampere Range	Inches	Description	Symbol	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	Dimensions mm	Description	Symbol	Page
600V	—	13/32 x 2	10.3 x 50.8	Melamine/ferrule; pin indicating; for use with 50A and larger fuses	KAZ	15

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

Non-Time Delay Fuses — Fast Acting

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

Volts	Ampere Range	Dimensions Inches	Dimensions mm	Description	Symbol	Page
1 kv to 10 kv	1/16 to 5	Various	—	Fibre/ferrule; for high E instruments...	**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 3/8	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; indicating pin	**MIS**	15
300V	1/10 to 8	.267 x 1 17/64	6.8 x 32.1	Glass/ferrule; indicating pin for telecommunications 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 15/16	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; indicating pin; for telecommunication 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	**BAF**	11
				Fibre/ferrule; indicating pin	**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; indicating 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 telecommunications	**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; indicating pin	**MIN**	14
	25 to 30	1/4 x 1 1/4	6.4 x 31.8	Ceramic/ferrule	**ABC**	10
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; indicating 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	Dimensions mm	Description	Symbol	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	Dimensions mm	Tube	Symbol	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 1 3/8	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

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

Dimensions		Tube	Sym-bol	Type	Page
Inches	mm				
9/16 x 2	14.3 x 50.8	Ceramic	**FBP,**	Very Fast	18
			FWP		18
		Melamine	**KAB,**		19
			KAX		19
13/16 x 5	20.6 x 127	Melamine	**KBC**		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,**	Non-delay	12
				GLN,		12
				GLX		12
1/4 x 1 1/4	6.4 x 31.8			**GJV**		12
				MDV	Dual-element	12
				TFL, TFS	Heat Limiter	19
.270 x .250	6.9 x 6.6	Ceramic	Pin/Base	**GMW**	Non-delay	12
5/8 x 3/16	15.9 x 4.8	Phenolic	Lead-in/Solder	**LKB,**	Non-delay	16
				LKC		16

Varying-Size Types (For Replacement Protection)

Dimensions	mm	Tube	Sym-bol	Type	Page
Fuse/Holder		Glass	**GLQ,**	Non-delay	17
			GLR		17
Fuse/Holder		Glass	**GMF,**	Dual-element	17
			GMQ,		17
			GRF		17
1/4D	6.4D	Glass	**SFE**	Non-delay	13
13/32 to 2 1/4D	10.3 to 57.2D	Melamine	**SC**	Time-delay	13
13/32 to 13/16D	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" x 1 53/64" Glass Tube (6.8mm x 46.4mm)	Ferrule/HWG Holder	Non-delay	**GKB**	16
			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
	Hole/Screws	Heat Limiter	**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				
1/4 x 1 1/4	6.6 x 31.8	Silver Pin/HKA Holder; Signal Block	Non-Delay	**GLD**	14
		Red Pin/HLD Holder	Non-Delay	**GBA**	14
13/32 x 1 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
13/32 x 2	10.3 x 50.8	Pin/Signal Block	—	**KAZ**	15
		Pin/Signal Block	Non-Delay	**MIS**	15

Fuse		Fuseholder				
Size	Symbol	Symbol	Amps	Volts	Features	Page
Panel Mounted Types, Lamp Indicating						
13/32" x 1 1/2" (10.3mm x 39.1mm)	AGU BAN FNQ KAW BAF FNM KAA KTK	**HGC**	30	90 to 500	Neon/Clear	26

*Holders with flatsided knob; all other lamp indicating type have octagonal knobs.
† 1/10 amp to 10 amp.

Panel Mounted or In-The-Line Type Assembly (Includes SFE Fuses and Wire Lead Loop)

Fuse		Fuseholder			
Size	Symbol	Symbol	Amps	Volts	Page
1/4" x 5/8" (6.4 x 15.9)	SFE4, AGA	**HMF,**	15	32	26
		HRF			26
1/4" x 3/4" (6.4 x 19.0)	SFE6	**HMG,**			26
		HRG			26
1/4" x 7/8" (6.4 x 22.2)	SFE7 1/2, AGW	**HME,**			26
		HRE			26
1/4" x 1 (6.4 x 25.4)	SFE9, AGX, MKB	**HMH,**			26
		HRH			26
1/4" x 1 1/16" (6.4 x 29.4)	SFE14	**HMI,**			26
		HRI			26
1/4" x 1 1/4" (6.4 x 31.8)	SFE20, ABC, AGC, GBB, GLH, MDA, MDL, MDX, MGB, MTH	**HMJ,**			26
		HRJ			26
Panel Mounted Types, Lamp Indicating					
In-The-Line Universal Type					
1/4" x 5/8" thru 1 1/4" (6.4 x 15.9 thru 31.8)	ABC, AGA, AGC, AGW, AGX, GBB, GLH, MDA, MDL, MDX, MGB, MKB, MTH, SFE4, SFE6, SFE7 1/2, SFE9, SFE14, SFE20	**HRK**	15	32	27
In-The-Line Waterproof Type					
1/4" x 1 1/4" (6.4 x 31.8)	ABC, AGC, GBB, GLH, MDA, MDL, MDX, MGB, MTH, SFE20	**HFA,**	20	250	27
		HFA-HH			27
In-The-Line Waterproof Type (Trons)					
13/32" x 1 1/2" (10.3 x 38.1)	AGU, BAF, BAN, FNM, FNQ, KAA, KAW, KLM, KTK	**HEB,**	30	600	27
		HET			27
		HEX			27
13/32" x 1 5/8" (10.3 x 41.3)	SC30	**HEC**		300	27
13/32" x 1 5/16" (10.3 x 33.3)	SCO to SC15	**HEG**	15	300	27
13/32" x 1 13/32" (10.3 x 35.7)	SC20	**HEH**	20	300	27
13/32" x 2 1/4" (10.3 x 57.2)	SC35 to SC60	**HEJ**	60	300	27
	HVW 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

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 1/4 x 1 1/4 (6.6mm x 31.8mm) and the 13/32 x 1 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 Size	Symbol	Block Numbers	Page
For Common Ferrule Type Fuses and Devices			
1/4" x 1" (6.6mm x 25.4mm)	AGX, MKB	**2698, 3828, 3992, 4393, 4399, 4520**	29
1/4" x 1 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
13/32" x 13/8" (10.3mm x 34.9mm)	BBS, KTQ	**3845**	32
13/32" x 1 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			
13/32" x 1 1/2" (10.3mm x 38.1mm)	FNA, MIC, MIN	**3839**	34
13/32" x 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	Symbol	Fuseholder Symbol	Amps	Volts	Features	Page
Panel Mounted (General Types)						
1/4" x 1" (6.4mm x 25.4mm)	AGX, MKB	**HJM**	30	125	Bayonet Knob	23
		HJM-CC			Bayonet Knob (Short)	23
		HJM-OO			Snap-Lock	23
		HMS	30	250	RF Shielded	23
1/4" x 1 1/4" (6.4mm x 31.8mm)	ABC GBB MDA MDX MTH AGC GLH MDL MGB	**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			3/16 Quick Connect	23
		HTA-HH			1/4" Quick Connect	23
		HTA-OO			Snap-Lock	23
13/32" x 15/16" (10.3mm x 33.3mm)	SC1 to 15	**HPF-EE**	15	300	Bayonet Knob	24
		HPS-EE			Screw Knob	24
13/32" x 13/8" (10.3mm x 34.9mm)	BBS KTQ	**HPS-L**	5	600	Bayonet Knob	24
13/32" x 1 13/32" (10.3mm x 35.7mm)	SC20	**HPF-JJ**	20	300	Bayonet Knob	24
		HPS-JJ			Screw Knob	24
13/32" x 1 1/2" (10.3mm x 38.1mm)	AGU BAN FNQ KAW BAF FNM KAA KTK	**HPF**	30	600	Screw Knob	24
		HPC-D			Waterproof	25
		HPD			Short; 1/2" KO	24
		HPG			1/2" KO	24
		HPL-B			Solder Type	24
		HPM			Quick-Connect	24
		HPS			Bayonet Knob	24
	KTK-R	**HPS-RR**	20		Bayonet Knob	24
13/32" x 15/8" (10.3 x 41.3)	SC21 to 30	**HPF-RR**	30	300	Screw Knob	24
		HPS-FF			Bayonet Knob	24
Panel Mounted With Transparent Knobs for Pin-Indicating Fuses						
1/4" x 1 1/4" (6.4mm x 31.8mm)	GBA	**HLD**	15	250	Bayonet Knob	25
	3/4" to 15 GLD	**HLD-HH**			Quick-Connect	25
	3/4" to 15	**HLD-OO**			Snap-Lock	23
13/32" x 1 1/2" (10.3 x 39.1)	†FNA MIC MIN	**HPF-C**	15	250	Screw Knob	25
Panel Mounted Types, Lamp Indicating						
1/4" x 1" (6.4 x 25.4)	AGX MKB	**HJL**	20	90 to 250	Neon/Clear	25
1/4" x 1 1/4" (6.4mm x 31.8mm)	ABC GBB MDA MDX MTH AGC GLH MDL MGB	**HGA**	30	90 to 250	Neon/Clear	26
		***HGA-C**			Neon/Clear	26
		***HGB-C**			Incand/Clear	26
		HKL	20		Neon/Clear	25
		***HKL-X**			Neon/Clear	25
		HKR	20	22 to 33	Incand/Amber	25
		HKT		13 to 22	Incand/Amber	25
		HKU		4 to 6	Incand/Red	25
		***HKX**		22 to 33	Incand/Amber	25
	GLD	**HKA**	—	125	Neon/Amber	25
		HKA-W				25
		HGB	30	90 to 250	Neon/Clear	26
In-The-Line Type						**(See Pages 17, 26, 27)**

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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 starting 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 rerating 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

Ferrule Fuses

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

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

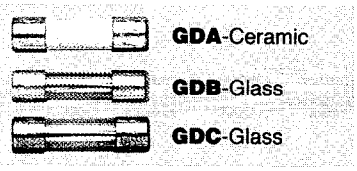
GMA Amps	Volts	GMA Amps	Volts	GMA Amps	Volts
1/32	250	6/10	250	3	250
1/20		7/10		1/2	
1/16		3/4		4	
1/10		8/10		5	
1/8		1		6	
2/10		1 2/10		7	125
1/4		1 6/10		8	
3/10		1 1/2		10	
4/10		2		15	
1/2		2 1/2			

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 × 20mm
(0.205" × 0.787")



- 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 ¼" clips.
- **Non-Time-Delay,** Type **AGA.**
- For electronic and small appliance circuits.
- Glass tube (visual indicating).
- Formerly called **1AG.**

AGA Amps	Volts	AGA Amps	Volts	AGA Amps	Volts
* 1/16	125	* 1	125	7	32
* 1/10		* 1 1/2		7 1/2	
* 1/8		† 2	32	10	
* 1/4		† 2 1/2		15	
* 3/8		† 3		20	
* 1/2		† 5		25	
* 6/10		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, HDH, HHH,** and **HRK.** Clips-¼"

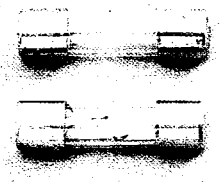
AGW Amps	Volts	AGW Amps	Volts	AGW Amps	Volts
1/2	32	4	32	15	32
1		5		20	
1 1/2		6		25	
2		7 1/2		30	
2 1/2		10			
3					

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)



- 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	250	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
-/10		3.1	13.5
1/4		2.3	12.0
3/10		2.1	8.4
3/8		1.5	5.6
4/10		.8	3.6
1/2		.75	3.3
3/4		.26	.70
1		.16	.30
1 1/4		.13	.22
1 1/2		.096	0.16
2		0.07	0.11
2 1/2 3	125	—	—
4 5			
6 7	32	—	—
8 10			
15 20			
25 30			
MKB			
1/16	250	5	9.0
1/8		1.0	4.0

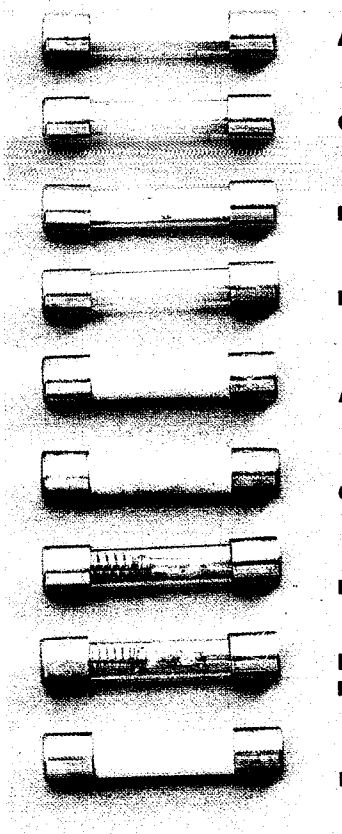
†At 10% rated current. ††100% rated current. *Approx.
Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: 0.76 lbs. (345g).

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

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



- 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.)

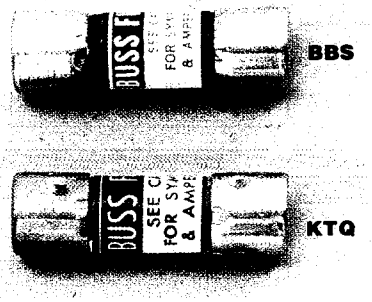
Carton quantity: 5. Shelf package: 100
Shipping wt. per 100:
AGC, MGB, MTH, GLH—.91 lbs. (413g).
MDL, MDQ, MDX—.93 lbs. (421g).
MDA—.97 lbs. (440g).
ABC—1.0 lb. (454g).

(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		†25 † 30	
*1/4		30	125	**MDQ**	
*3/10		**Very Fast-Act.**		*2½, *2⅝10	
*3/8		**GBB**		*3, *3⅜10	
*4/10	250	†1/4		*4, *5, *6	250
*45/100		†1		*6¼, *7	
*1/2		†1 1/4			
*6/10		†2		**MDX**	
*3/4		†3		*1 1/4	
*8/10		†4		*1 1/2	
*1		†5		*1 6/10	
*1 1/4		†6		*1 8/10	
*1 1/2		†7		*2	
*1 6/10		†8		*2 1/2	
*1 3/4		†9	60	*3	
*1 8/10		†10		*3 2/10	
*2		†12		*4	125
*2 1/4		†15		*5	
*2 1/2		†20		*6 1/4	
*3		†25		*7	
†3 2/10		†30		**MDA**	
†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	
†30		*3/8		†1/2	250
		*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 6/10	
1/8		*1 2/10		†2	
MTH		*1 1/4		†2 1/2	
*4		*1 1/2		†2 8/10	
*5	250	*1 6/10		†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 8/10		†5, †6	
*3/4		3		†6¼, †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)].

13/32" 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 (13/32").
- Type **BBS** U.L. Listed.

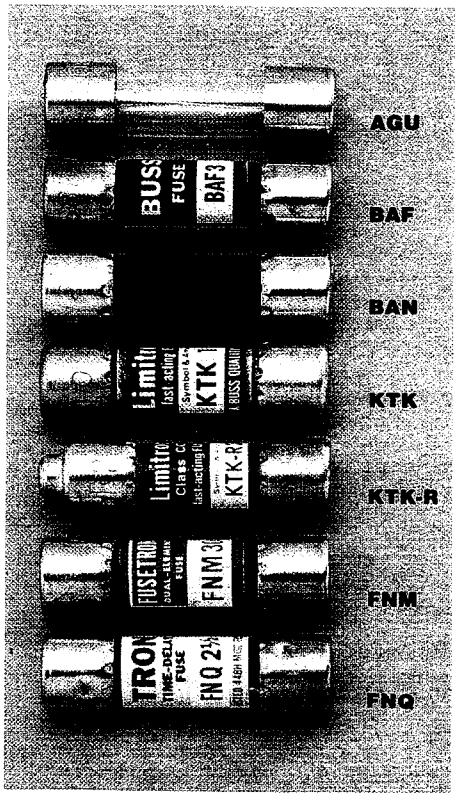
Non-Time-Delay			
BBS		**BBS**	
Amps	**Volts**	**Amps**	**Volts**
2/10		3	
4/10		4	600
3/4		5	
8/10		**KTQ**	
1	600	2	
1 1/2		3	600
1 6/10		4	
1 8/10		5	
2			

Test Specifications

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

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

$^{13}/_{32}$" x 1$^{1}/_{2}$"
(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 ($^{13}/_{32}$).

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				Dual-Element	
AGU		**KTK, KLM**		**FNM**	
Amps	**Volts**	**Amps**	**Volts**	**Amps**	**Volts**
*1		1$^{1}/_{2}$		* 3$^{2}/_{10}$	
*2	250	2		* 3$^{1}/_{2}$	
*3		2$^{1}/_{2}$		* 4	
4		3		* 4$^{1}/_{2}$	
5		3$^{1}/_{2}$		* 5	
8		4		* 5$^{6}/_{10}$	250
10		5		* 6$^{1}/_{4}$	
15		6		* 7	
20		7		* 8	
25	32	8	600	* 9	
30		9	(KLM	* 10	
		10	500V	* 12	125
BAF		12	dc)	* 15	
*$^{1}/_{2}$		15		20	
*1		20		25	32
*1$^{1}/_{2}$		25		30	
*2		30		**FNQ**	
*2$^{1}/_{2}$				*$^{1}/_{10}$	
*3		**KTK-R**		*$^{1}/_{8}$	
*4		*$^{1}/_{10}$		*$^{15}/_{100}$	
*5	250	*$^{1}/_{8}$		*$^{3}/_{16}$	
*6		*$^{2}/_{10}$		*$^{2}/_{10}$	
*6$^{1}/_{4}$		*$^{1}/_{4}$		*$^{1}/_{4}$	
*7		*$^{3}/_{10}$		*$^{3}/_{10}$	
*8		*$^{1}/_{2}$		*$^{4}/_{10}$	
*9		*$^{3}/_{4}$		*$^{1}/_{2}$	
*10		*1		*$^{6}/_{10}$	
*12		*1$^{1}/_{2}$		*$^{8}/_{10}$	500
*15		*2		*1	
20		*2$^{1}/_{2}$		*1$^{1}/_{8}$	
25	125	*3	600	*1$^{1}/_{4}$	
30		*3$^{1}/_{2}$		*1$^{1}/_{2}$	
BAN		*4		*1$^{6}/_{10}$	
$^{2}/_{10}$		*5		*2	
$^{4}/_{10}$		*6		*2$^{1}/_{4}$	
$^{3}/_{4}$		*7		*2$^{1}/_{2}$	
$^{8}/_{10}$		*8		*3	
1		*9		*3$^{2}/_{10}$	
1$^{1}/_{2}$		*10		**Time-Delay**	
1$^{6}/_{10}$		*12		**FNQ**	
1$^{8}/_{10}$		*15		*3$^{1}/_{2}$	
3		*20 & 30		*4	
4	250	**Dual-Element**		*4$^{1}/_{2}$	
5		**FNM**		*5	
6		*$^{1}/_{10}$		*5$^{6}/_{10}$	
7		*$^{15}/_{100}$		*6	
8		*$^{2}/_{10}$		*6$^{1}/_{4}$	
10		*$^{3}/_{10}$		*7	
15		*$^{4}/_{10}$		*8	500
20		*$^{1}/_{2}$		*9	
25		*$^{6}/_{10}$		*10	
30		*$^{8}/_{10}$		*12	
◆ **KTK, KLM**		*1	250	*14	
$^{1}/_{10}$		*1$^{1}/_{8}$		*15	
$^{1}/_{8}$		*1$^{1}/_{4}$		*20	
$^{2}/_{10}$		*1$^{4}/_{10}$		*25	
$^{1}/_{4}$	600	*1$^{6}/_{10}$		*30	
$^{3}/_{10}$	(KLM	*1$^{8}/_{10}$		**FNW**	
$^{1}/_{2}$	500V	*2		*12	
$^{3}/_{4}$	dc)	*2$^{1}/_{4}$		*15	
1		*2$^{1}/_{2}$		*20	250
		*2$^{8}/_{10}$		*25	
				*30	

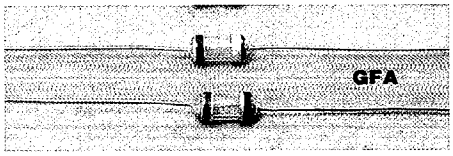
*UL Listed. ◆ KTK—UL Listed; CSA Listed as follows:
BAF 0A-15A (250V); **KTK** 0A-15A (600V);
FNM 0A-10A (250V); **FNM** 12A-15A (125V);
FNQ 0A-15A (500V).

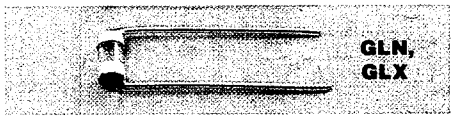
Time current curves for **FNQ, FNM, KTK, KLM, BAF,** and **BAN** at end of this section.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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 (1½") can feed thru wire forming machine.
- Radial leads spaced for easy assembly on printed circuit chassis.

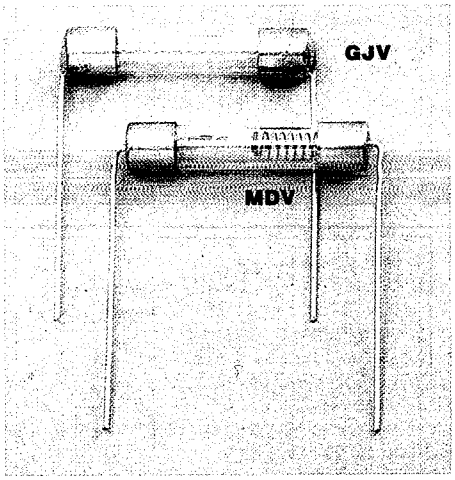
Ratings		Test Spec.			Color Code	
Amps	Volts	GFA	GLN	GLX	One End	Other End
***GFA, GLN**						
1/200	125	A	A		Red	Blk
1/100		A	A		Red	Orn
1/64		A	A		Red	Grn
1/32		A	A		Red	Brn
1/20		A	A		Yel	Yel
1/16		A	A		Brn	Brn
1/10		A	A		Red	Red
1/8		A	A		Orn	Orn
***GFA, GLN, GLX**						
15/100	125	B	A	B	Red	Yel
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)

¼" x 1¼" 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 1¼", **GJV;** 1½", **MDV** (minimum lengths), are #20 tinned wire for circuit connection.
- U.L. Listed and CSA Listed.

No Time-Delay GJV		Dual-Element MDV		Dual-Element MDV	
Amps	Volts	Amps	Volts	Amps	Volts
1/16	250	1/100	250	1 1/4	125
1/8		1/32		1 1/2	
1/4		1/16		1 6/10	
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 8/10	
1 1/2		2/10		3	
1 3/4		1/4		3 2/10	
2		3/10		4	
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.

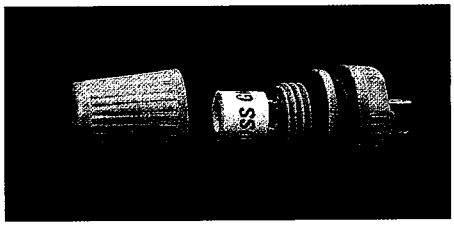
Test Specifications	
Load	Opening Time
110%	4 hours (min.)
135%	1 hour (max.)

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			Wire Lead Size	
Load	Opening Time "A"	Opening Time "B"	No.	Fuse
100%	4 hours (min.)		24	**GLN, GLX, GFA** (1/200 to 5A)
150%	—	*10 sec.		
200%	*10 sec.	—	18	**GFA** (7 to 12A)
				GLN (7 to 15A)
			16	**GFA** (15A)

*Maximum time.

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			

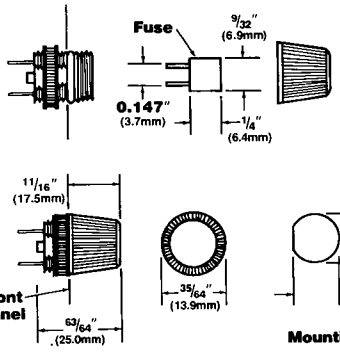
***GMW** 0 to 5 amps; U.L. Recognized under the Components Program.

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.)

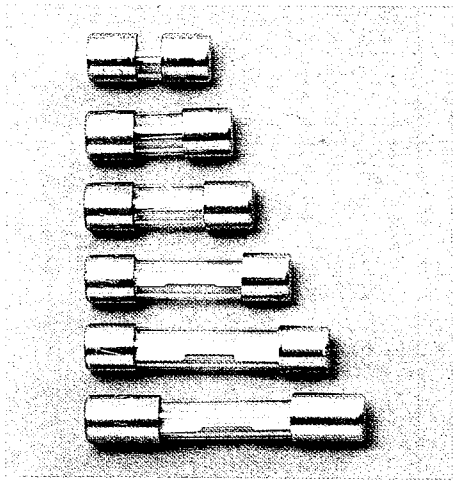
Request latest blueprints before tooling.



Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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

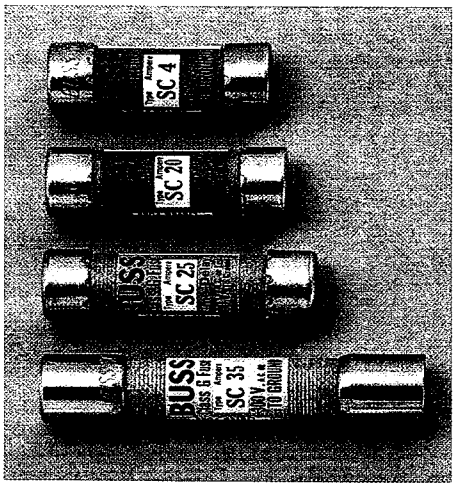
Amps	Volts	Length		Ship. Wt. per 100	
		Inches	mm	Lbs.	Grams
4		5/8	15.9	.73	331
6		3/4	19.0	.75	340
7 1/2		7/8	22.2	.80	363
9	32	7/8	22.2	.80	363
14		1 1/16	27.0	.82	372
20		1 1/4	31.7	.87	395
30		1 7/16	36.5	1.60	726

Carton quantity: 5. Shelf package: 100.

Test Specifications

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

13/32" 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 13/32" clips.
- For more information request Bulletin **SCS.**

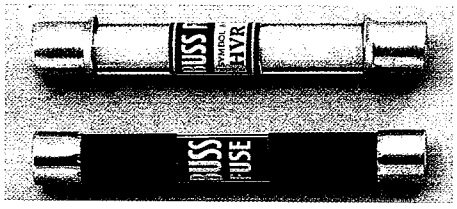
SC

Amps	Volts	Length		Ship. Wt. per 100		Cart. Qty.
		In.	mm	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 6/10	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.)

13/32" and 13/16" 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.**

Amps		Dia.	Length In.	Length mm	*Wt./100 Lbs.	*Wt./100 Kg
HVA (1000 Volts)						
3/8	1					
1/2	1 1/2	13/32"	3	76.1	2	0.91
3/4	2					
HVB (2500 Volts)						
1/2	1 1/2					
3/4	2	13/32"	4 1/2	114.2	3	1.36
1						
HVJ (5000 Volts)						
1/16	3/4					
1/8	1					
1/4	1 1/2	13/16"	5	126.9	9	4.08
3/8	2					
1/2						
HVL (10,000 Volts)						
1/16	3/4					
1/8	1					
1/4	1 1/2	13/16"	10	253.8	15	6.80
3/8	2					
1/2						
HVR (1000 Volts) (max. S.C. KVA-500)						
1/2	3					
1	4	13/32"	3	76.1	3	1.36
1 1/2	5					
2						
HVT (2500 Volts) (max. S.C. KVA-1250)						
1/2	3					
1	4	13/32"	4 1/2	114.2	4	1.81
1 1/2	5					
2						
HVU (5000 Volts) (max. S.C. KVA-2500)						
1/2	3					
1	4	13/16"	5	126.9	19	8.62
2	5					
HVW (1200 Volts) (max. S.C. KVA-5000)						
1/2	3					
1	4	13/32"	2 1/4	57.1	2	0.91
2	5					
HVX (10,000 Volts) (max. S.C. KVA-12,000)						
1/2	3					
1	4	13/16"	10	253.8	36	16.33
1 1/2	5					
2						

Carton quantity: 10. *Shipping.

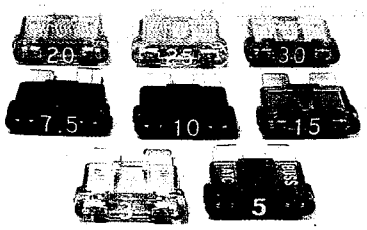
Test Specifications

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

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

Buss ATC Fuses for Automotive Use

Buss ATC Fuses For Automotive Use



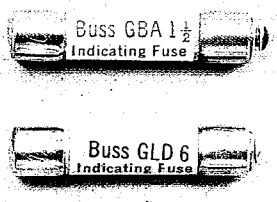
- For mounting in especially designed fuseblocks for automobiles and trucks.
- **Non-Time-Delay** Type.
- Totally enclosed fuse link confines arc.
- Transparent for visual inspection of element.

ATC	
Amps	**Volts**
3	32
5	
7½	
10	
15	
20	
25	
30	

Test Specifications	
Load	**Opening Time**
110%	4 Hours (min.)
135%	.75 to 1800 Seconds
200%	.15 to 5 Seconds
350%	.08 Seconds (min.)

Ferrule Fuses, Pin Indicating

¼" x 1¼"
(6.35mm x 31.8mm)



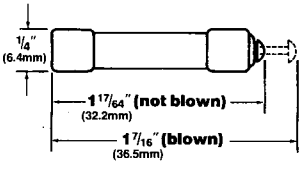
- **Non-Time-Delay** fuses for electronic circuits where a fuse opening must be quickly apparent.
- **GBA** Type have red pin for easy visual indication of open fuse.
- **GLD** Type have Albaloy-plated pin for positive signal activation.
- Time current curves on back pages.
- Mounting: Fuseblocks—¼" x 1¼" 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**
* **½**	125	* **4**	125	**15**	32
* **¾**		* **5**		**GLD**	
* **1**		**6**		† **20**	
* **1½**		**8**		† **25**	
* **2**		**10**		† **30**	
* **3**		**12**			

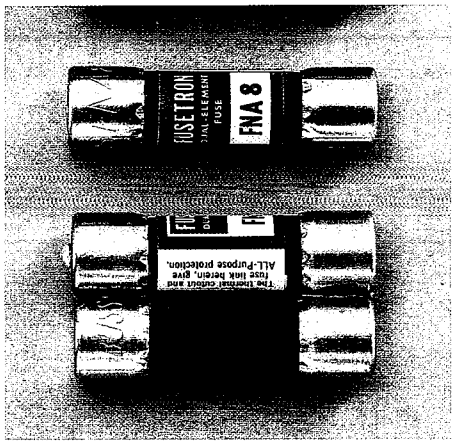
*UL Listed. †Dual tube construction. CSA Listed: **GLD** 0A-4A.

Carton quantity: 5. Shelf package: 100.
Shipping wt. per 100: ½A 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.)



13/32" x 1½"
(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—13/32" x 1½".
  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	* 4/10	250	* 3 2/10	125
2		* ½		* 3½	
3		* 6/10		* 4	
5		* 8/10		* 4½	
10		* **1**		* **5**	
15		* 1⅛		* 5 6/10	
20		* 1¼		* **6**	
25	32	* 1 4/10		* 6¼	
30		** 1½		* **7**	
Dual-Element		* 1 6/10	125	* **8**	
FNA		* 1 8/10		* **10**	
* 1/10	250	* **2**		†* **12**	32
* 15/100		* 2¼		†* **15**	
* 2/10		* 2½		† **20**	
* ¼		* 2 8/10		† **25**	
* 3/10		* **3**		† **30**	

◆Type **MIC** U.L. Listed (up to 15 amps). *U.L. Listed. [CSA Listed **FNA** 0-8/10 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.)

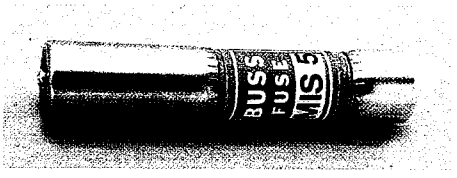
Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

$^{13}/_{32}$" 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.

$^{13}/_{32}$" 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).

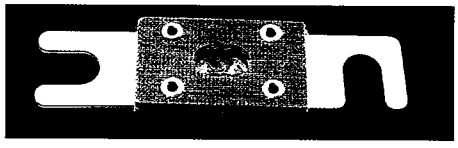
MIS		MIS	
Amps	**Volts**	**Amps**	**Volts**
1		**6**	
2	600 ac	**8**	600 ac
3	(250 dc)	**10**	(250 dc)
4		**12**	
5			

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 $^{11}/_{32}$" (8.7mm); distance between slot centers $2^{7}/_{16}$" (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

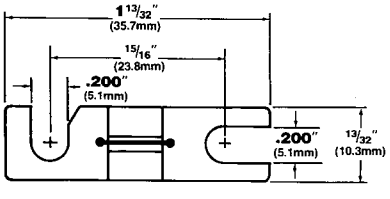
- For mounting with #10 screws.
- **Non-Time-Delay** type.
- Visible link element.
- U.L. recognized under the components program.

WER		WER		WER	
Amps	**Volts**	**Amps**	**Volts**	**Amps**	**Volts**
$^{1}/_{4}$		**$1^{1}/_{3}$**		**4**	
$^{1}/_{2}$	32	**2**	32	**5**	32
$^{3}/_{4}$		**3**		**8**	
1		**$3^{1}/_{2}$**		**10**	

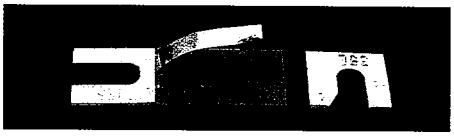
Carton quantity: 20.
Shipping wt. per 100: 25 lbs. (113.4 g).

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 telecommunications 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	$1^{1}/_{3}$		**35J**	$^{1}/_{2}$	
35B	$1^{1}/_{3}$		**35K**	$1^{1}/_{3}$	
35B	2		**35L**	2	
35C	2		**35M**	3	160
35D	$1^{1}/_{3}$	90	**35N**	5	
35E	3		**35P**	$^{3}/_{4}$	
35F	$^{1}/_{2}$		**35R**	$^{18}/_{100}$	90
35G	3		**35S**	$^{1}/_{4}$	160
35H	5		**35T**	$^{65}/_{100}$	90

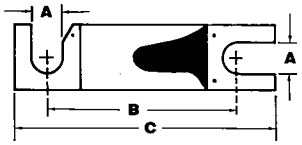
Test Specifications

Fuse	Load	Opening Time (Seconds—max.)
35E,H,N	133%	300
35A,B1⅓,D,F,J,P,R,S		90
35B2,C,K,L	150%	180
35G,M		300
35T	170%	180

Physical Data

Fuse	Color Code	Dimensions A*	B	C	Mtg. 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

Types LKB and LKC
Solder Direct into Circuit

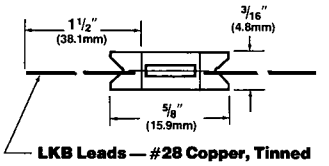
- Types **LKB** and **LKC** small component fuses for soldering directly to circuit.
- Ideal for small motors, appliances, coils of solenoids and non-energy limiting transformers, Class 2, or other low energy circuits.
- **Non-Delay** Fuse.
- Visual indication of link element.
- Because of possible confined 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		**1**		**3**	
3/10		**1 1/4**		**3 2/10**	125
4/10		**1 1/2**		**4**	
1/2	125	**2**	125	**LKC**	
6/10		**2 1/4**		**5**	125
3/4		**2 1/2**		**8**	
7/8		**2 3/4**			

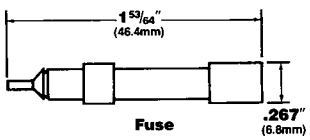
Test Specifications

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.)

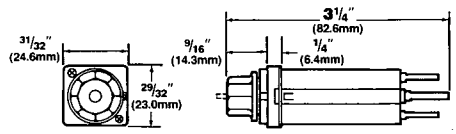
Carton quantity: 100.
Shipping wt.: 3/4 oz. (21.3g).



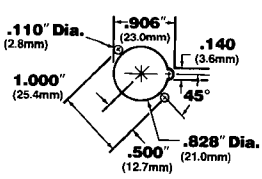
LKB Leads — #28 Copper, Tinned
LKC 5 Leads — #24 Copper, Tinned
LKC 8 Leads — #20 Copper, Tinned



Fuse



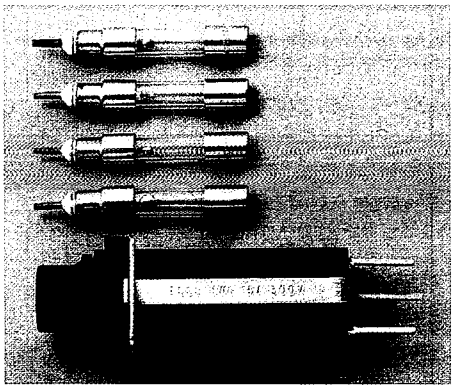
Fuseholder



Mounting Hole

Type 70

Type 70 Indicating Fuse and HWG Panelholder Combination for Telecommunications...



- 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.

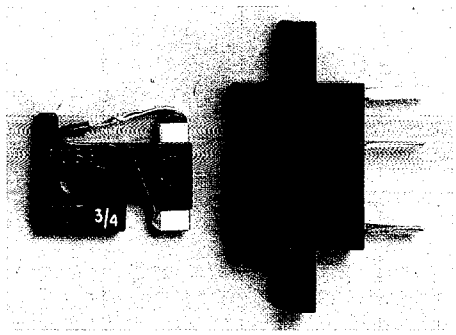
Type	Amps	Volts	Color Code
70P	1/10		Grey & Wh
70R	15/100		Red & Wh
70E	18/100		Yel
70X	2/10		Blk
70F	1/4	300	Vio
70K	1/4		Vio & Wh
70G	1/2		Red
70H	3/4		Brn
GKB	1		Pink
70A	1 1/3		Wh
70B	2		Orn
70C	3		Blu
70J	3 1/2		Blk & Wh
70D	5		Grn
71A	6		Grn & Wh
70M	8		Tan & Wh
GKB	10		Pur & Yel
Holder			
HWG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

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



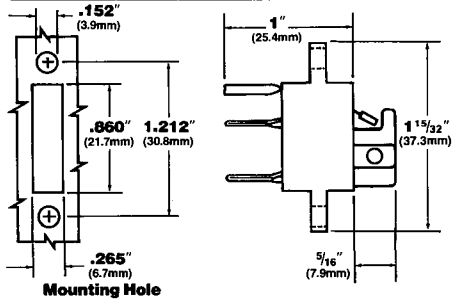
- Type **GMT** indicating fuse mounts in **HLT** holder.
- For telecommunications, computer or control circuits. **Non-Delay** Type.
- Visual spring indicating and alarm circuit activating.
- Color-coded flag for ampere size identification.
- **HLT** holder can be panel mounted as small as 1/4"(6.35mm) 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 Component Program.

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

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.)



Mounting Hole

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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			N		
Amps	Volts	Holder*	Amps	Volts	Holder*
1/32	250	HC 3/10 (For 1/32 to 3/10A Fuses)	1/16	250	HN 3/10 (For 1/16 to 3/10A Fuses)
1/16			1/10		
1/8			15/100		
13/16			2/10		
1/4			1/4		
3/10			3/10		
3/8	250	HC 1/2 (3/8-1/2A)	4/10	250	HN 1/2 (4/10-1/2A)
1/2			1/2		
3/4	250	HC 3/4	6/10		
1	250	HC 1/4 (1-1 1/4A)	7/10	250	HN 3/4 (7/10-3/4A)
1 1/4			3/4		
1 1/2	250	HC 1 1/4 (1 1/2-1 3/4A)	8/10	250	HN 1 1/4 (8/10-1 1/4A)
1 3/4			1		
2	250	HC 2 1/2 (2-2 1/2A)	1 1/4		
2 1/2			1 1/2	125	HN 1 3/4 (1 1/2-1 3/4A)
3	250	HC 3 1/2 (3-3 1/2A)	1 6/10		
3 1/2			1 3/4		
4	250	HC 5 (4-5A)	2	125	HN 2 1/2 (2-2 1/2A)
5			2 1/2		
6	250	HC 7 (6-7A)	2 8/10	125	HN 3 1/2 (2 8/10-3 1/2A)
7			3		
8	250	HC 10 (8-10A)	3 2/10		
10			3 1/2		
Dual-Element			4	125	HN 5 (4-5A)
N			5		
1/100	250	HN 3/10 (1/100-1/32A)	6	125	HN 7 (6-7A)
1/32			7		

*Voltage rating of holder—250V.

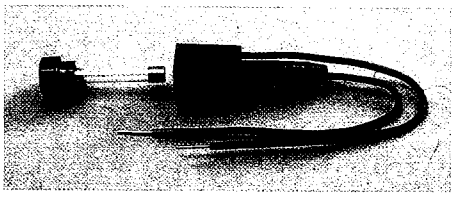
Carton quantity: fuses—5; holders—10.

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

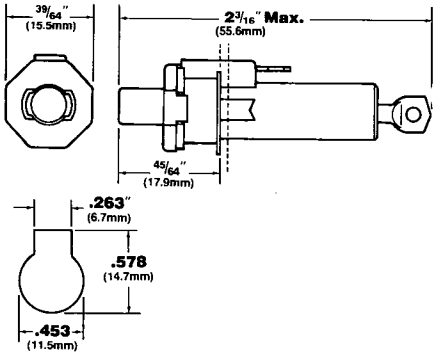


- Integral one-piece fuse and insulating knob.
- Type **GMF, GRF,** and **GMQ** fuses are FUSETRON **Dual-Element Time-Delay** units
- For fluorescent fixtures, single-size Type **GLR, GMF** and **GRF** mount in single-size holder Type **HLR.**
- Varying size Type **GLQ** and **GMQ** fuses mount into 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

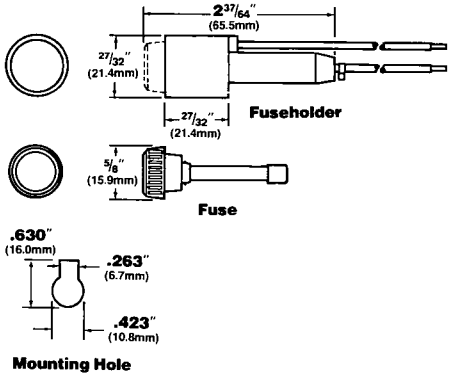
Non-Delay			Dual-Element		
GLR			GMF		
Amps	Volts	Holder	Amps	Volts	Holder
1/2	300	HLR (15A)	1/2	300	HLR (15A)
1			6/10		
1 1/2			8/10		
1 6/10			1		
2			1 1/4		
2 1/2			1 6/10		
3			2		
4			2 1/2		
5			2 8/10		
6			3		
7			3 2/10		
8			4		
9			GMQ		
10			1/2	300	HLQ 1/2
12			6/10	300	HLQ 1 6/10
15	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

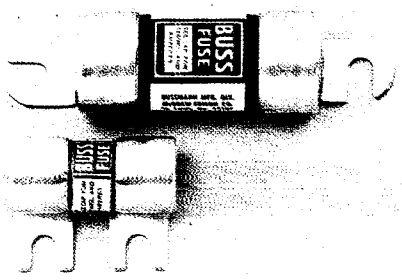
Load	Opening Time
110%	4 Hours (min.)
135%	1 Hour (max.)



Mounting Hole

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

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		**25**		**140**	
10	250	**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**		
	Slot †C-C	**Dia**	**Slot †C-C**	**Dia.**	**Block No.**
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).

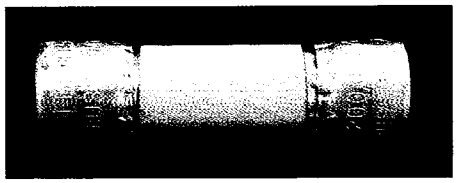
Test Specifications

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*
ACL, HSK	200%	60 Seconds*
	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 I^2t and Ip 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		
20	700	(Other units are available in 1A to 1000A sizes; 200V, 250V, 500V, and 700V.)
25		
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

* GBB	
Amps	Volts
1/4	
1	
1/4	
2	
3	
4	
5	
6	
7	60
8	
9	
10	
12	
15	
20	
25	
30	

KAB, KAX	
Amps	Volts
1/2	
1	
2	
3	
4	
5	
6	
7	
8	250
9	
10	
12	
15	
17 1/2	
20	
25	
30	

KAW	
Amps	Volts
1	
2	
3	
4	
5	
6	
7	
8	130
9	
10	
12	
15	
20	
25	
30	

KAA	
1/2	
1	
2	
3	
4	
5	
6	
7	130
8	
9	
10	
12	
15	
20	
25	
30	

KAC	
1	
2	
3	
4	
5	
6	
7	
8	600
9	
10	
12	
15	
17 1/2	
20	
25	
30	

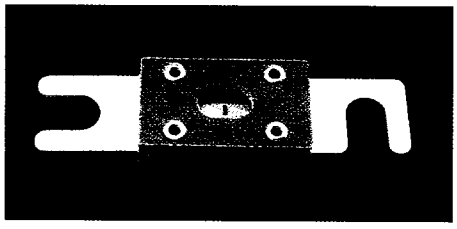
KBC	
1	
2	
3	
4	
5	
6	
7	
8	600
9	
10	
12	
15	
17 1/2	
20	
25	
30	

* 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



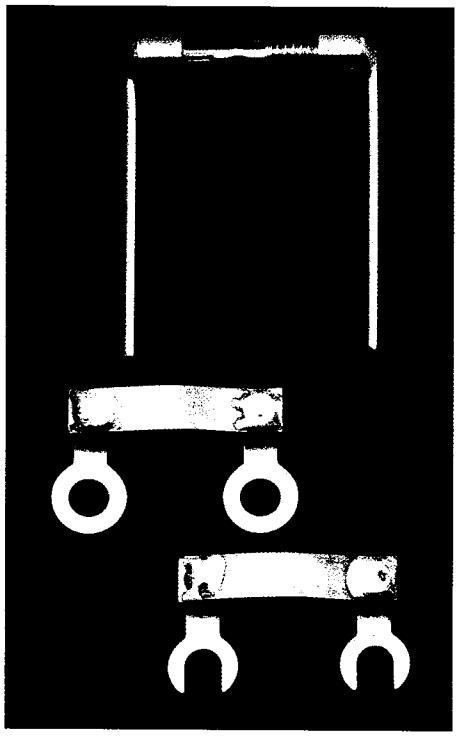
- Type **ANN** is very fast-acting fuse for protection of semiconductor devices.
- Visual indication of link element.
- Mica window slot width 11/32" (8.7mm), distance between slot centers 2 7/16" (61.9mm).
- Mount in block **4164.**

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 fuseholder 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

Symbol	Terminal	Amps	Ambient Temperatures Holding F°/C°	† Opening 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 (Side)	15	150°/66°	200°/93°
WKK			200°/93°	250°/121°
WKH			235°/113°	285°/141°
WKL	Hole (Side)	15	310°/154°	360°/182°
WKU			235°/113°	285°/141°
WQL	Spade (Side)	30	360°/182°	410°/210°
WTK			235°/113°	285°/141°
WWE	Spade (End)	30	150°/66°	200°/93°
WWX	Hole (Side)	30	200°/93°	250°/121°
WWZ			260°/127°	310°/154°

*1/4" x 1 1/4"
† With No Current
Carton quantity: 10

Fuse Time-Current Characteristic Curves * and Temperature Effects

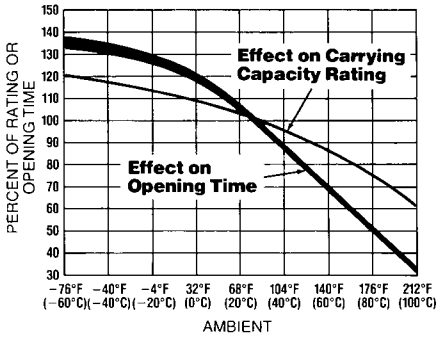
*Average Total Clearing Time

Effects of Ambient Temperatures

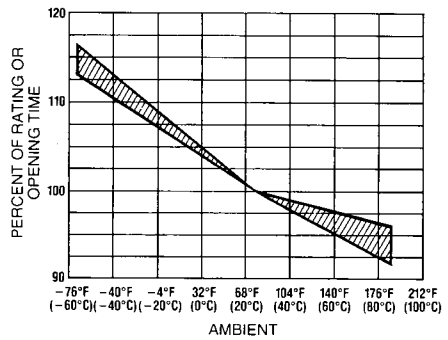
The operating characteristics of fuses are based on a nominal ambient temperature level. Higher ambients will, to some extent, reduce the current carrying compacity and the fuse opening time. Conversely, lower ambients result in a somewhat increased current carrying capacity and opening time.

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.

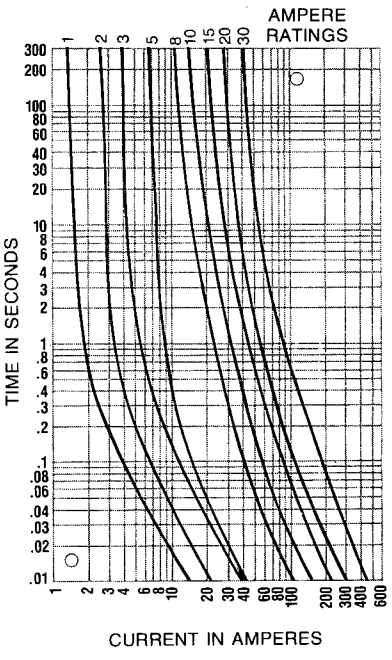


Effects of Ambient Temperature on the Operating Characteristics of Fusetron Dual-Element Fuses. Nominal Fuse Ratings Based on Ambient Temperatures in the Range of 70°F (21.0°C) thru 80°F (26.7°C). Change in Opening Time Occurs with Loads of 500% (or less) of the Nominal Current Rating of the Fuse.

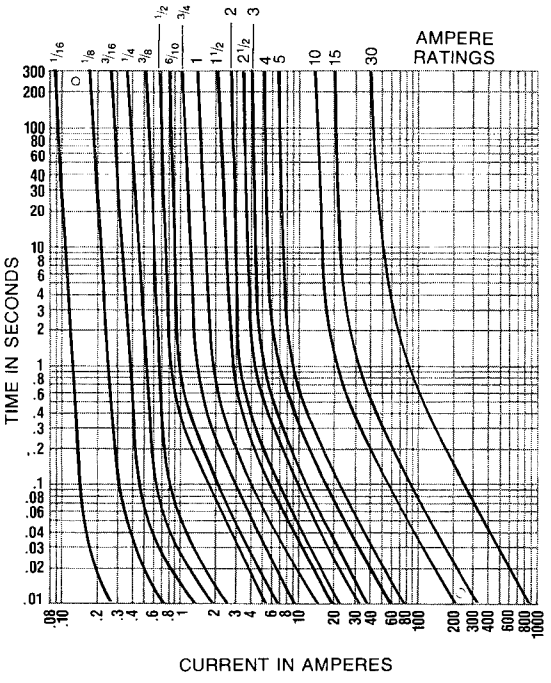


Effects of Ambient Temperatures on the Operating Characteristics of Non-Time-Delay Fuses. The Single Curve Reflects the Effects of Ambient Temperature on both the Current Carrying Capacity and Opening Time Relative to Ratings Based on a Nominal 75.2°F (24°C) Ambient.

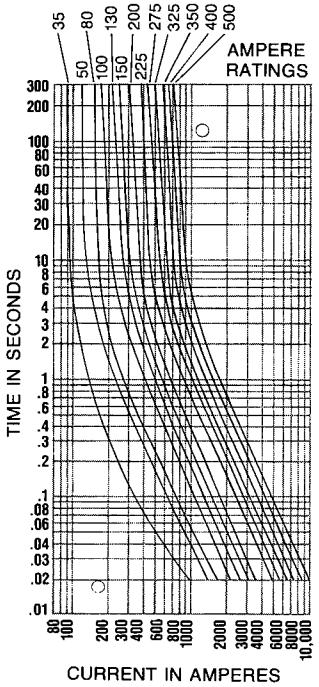
Type ABC Fuses, 1/4" x 1 1/4"
(6.4mm x 31.8mm)



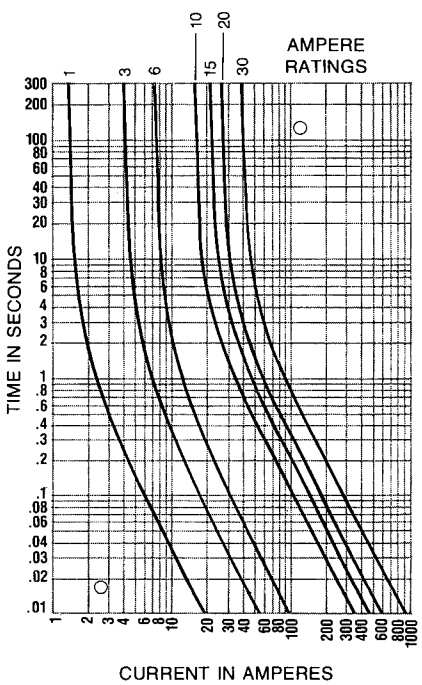
Type AGC Fuses, 1/4" x 1 1/4"
(6.4mm x 31.8mm)



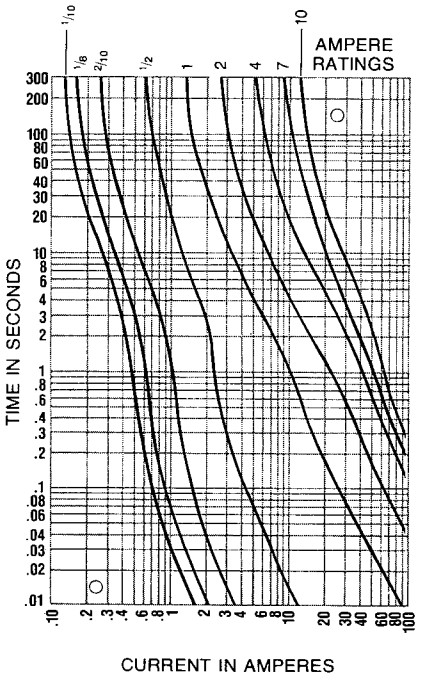
Type ANL Limiters



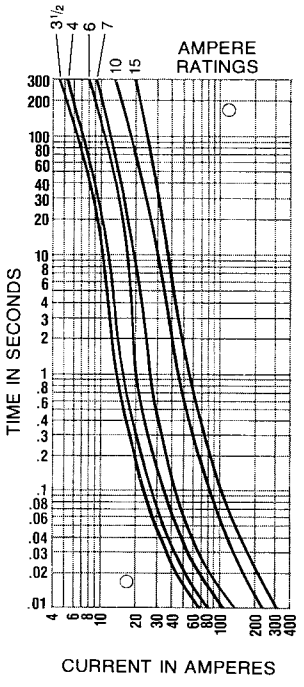
Type BAF, BAN Fuses, 13/32" x 1 1/2"
(10.3mm x 38.1mm)



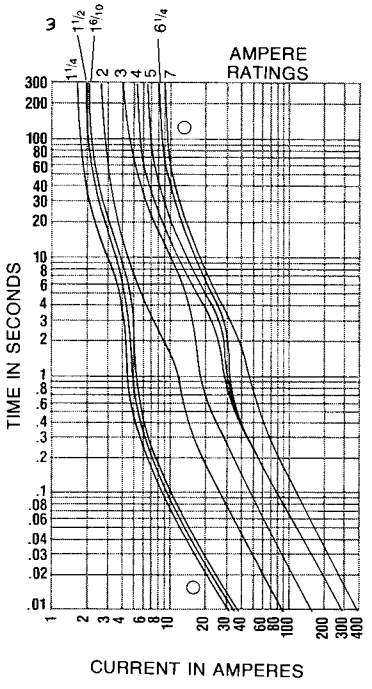
Fusetron FNA Dual-Element, Indicating Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)



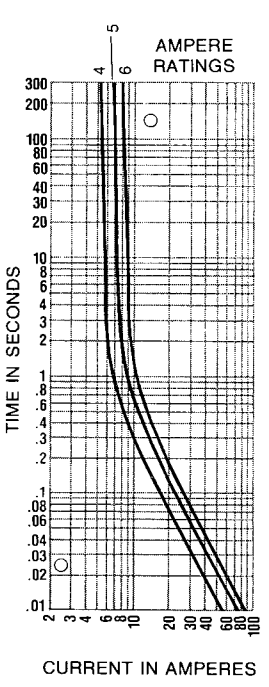
Type FNQ Time-Delay Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)



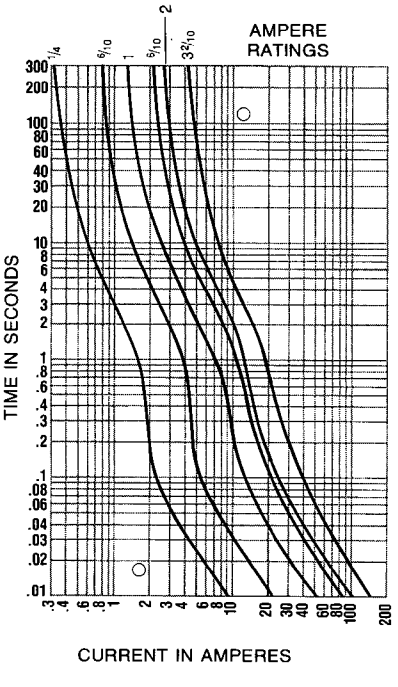
Fusetron MDX, and MDQ Dual-Element Fuses, 1/4" x 1 1/4" (6.4mm x 31.8)



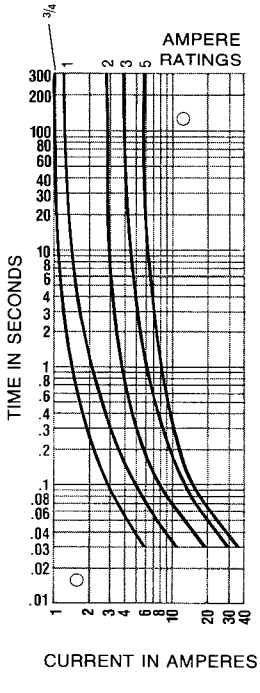
Type MTH Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



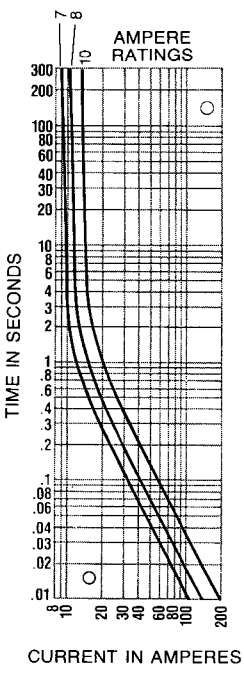
Fusetron FNQ Dual-Element Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)



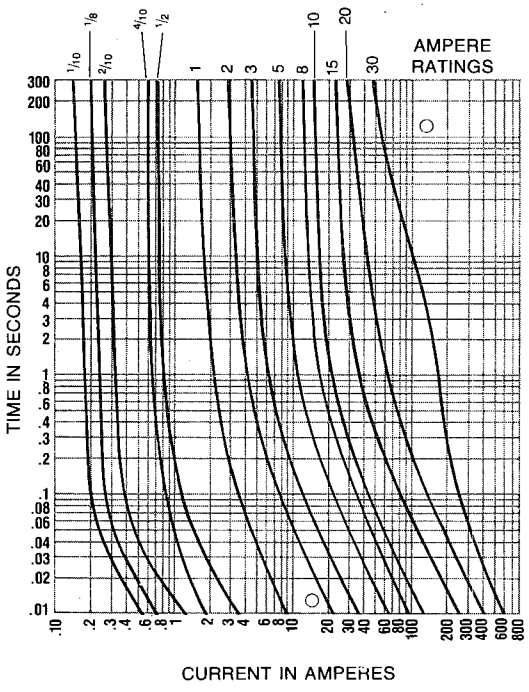
Type GBA, GLD Indicating Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



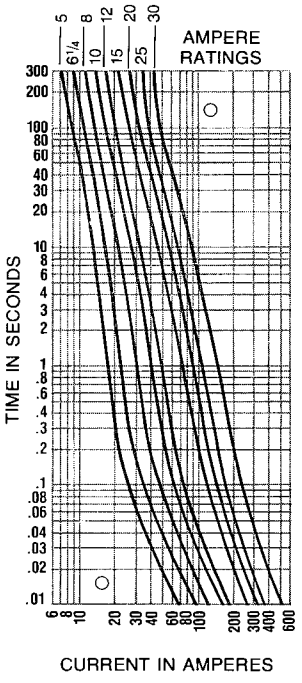
Type GLH Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



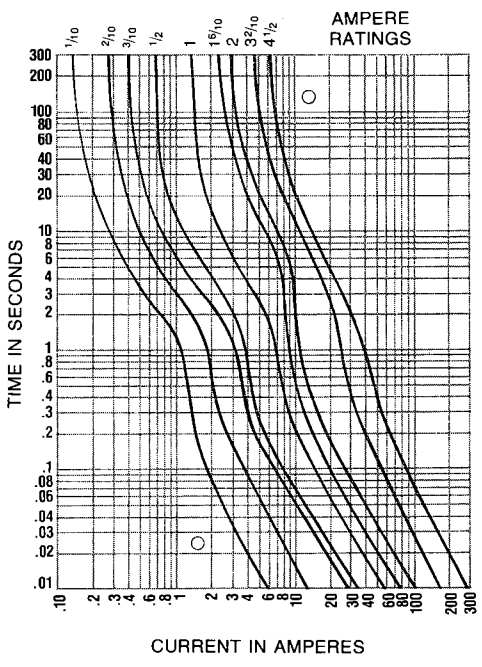
Limitron Fast-Acting KLM, KTK Fuses, $^{13}/_{32}$" **x 1** $^{1}/_{2}$" (10.3mm x 38.1mm)



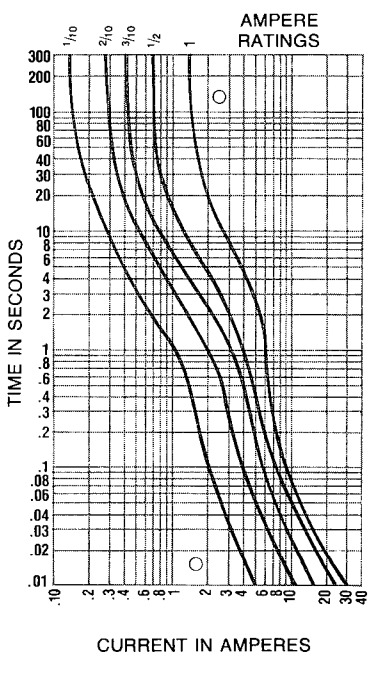
Type MDA Time-Delay Fuses, $^{1}/_{4}$" **x 1** $^{1}/_{4}$" (6.4mm x 31.8mm).



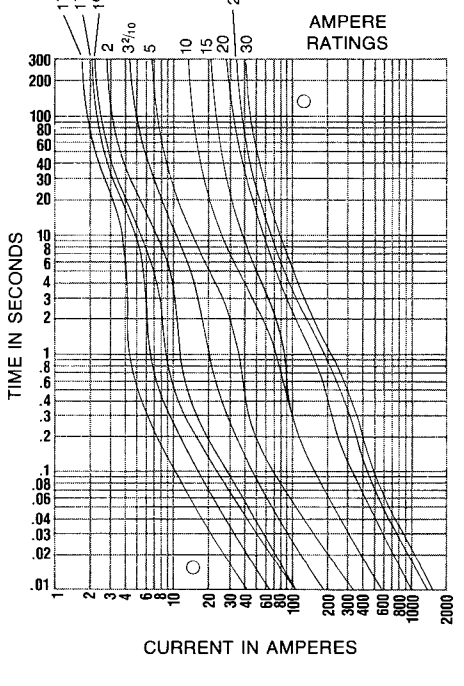
Fusetron MDA Dual-Element Fuses, $^{1}/_{4}$" **x 1** $^{1}/_{4}$" (6.4mm x 31.8mm)



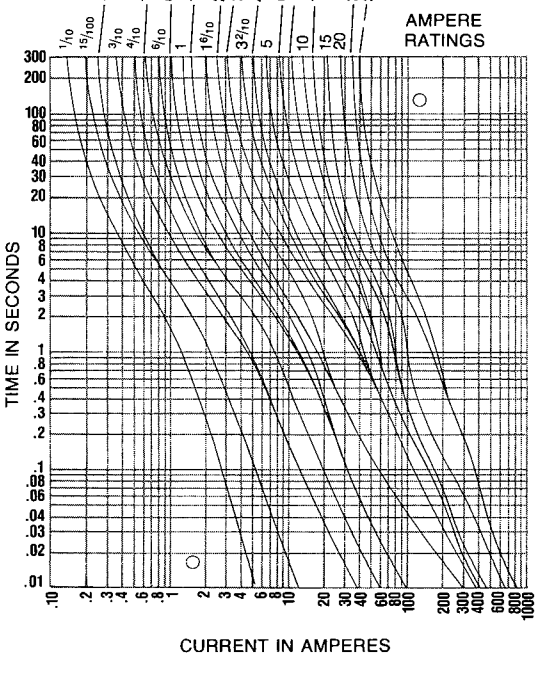
Fusetron MDL, MDV Dual-Element Fuses, $^{1}/_{4}$" **x 1** $^{1}/_{4}$" (6.4mm x 31.8mm)



Fusetron MDL, MDV Dual-Element Fuses, $^{1}/_{4}$" **x 1** $^{1}/_{4}$" (6.4mm x 31.8mm)

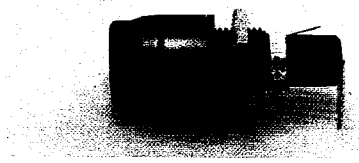


Fusetron FNM Dual-Element Fuses, $^{13}/_{32}$" **x 1** $^{1}/_{2}$" (10.3mm x 38.1mm)



Fuseholders—Panel Mounted (General Types)

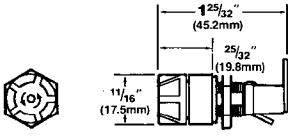
Space Saver for 1/4" x 1 1/4" Fuses
(6.4mm x 31.8mm)



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

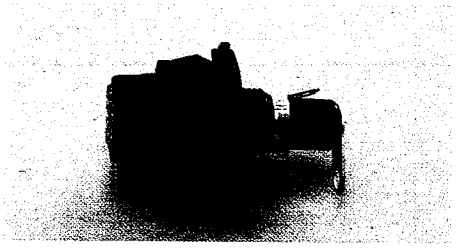
Symbol	Amps	Volts	Features
HTA	15	250	Bayonet Type; easy grip knob
HMM			Screw Type; screw driver slotted knob
HTA-DD			Bayonet Type; 3/16" (4.8mm) quick-connect terminals
HTA-HH			Bayonet Type; 1/4" (6.4mm) quick-connect terminals

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)



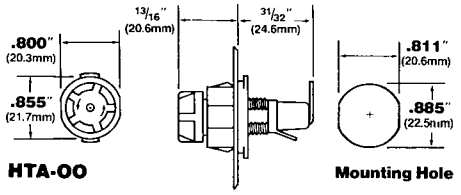
- Can easily be pre-wired and quickly snapped into place from rear of panel.
- Mounts in 1/2" holes or knock outs of electrical boxes.
- For panels 0.025" to 0.85" thick (0.64mm to 21.6mm).
- U.L. Recognized under Components Program.

(Data continued in next column.)

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

*CSA Listed.

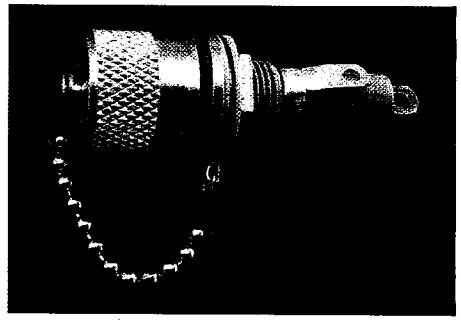
Note: When tooling up for mounting, get latest Bussmann drawing.



HTA-OO **Mounting Hole**

(See Mounting Arrangement A, end of Section)

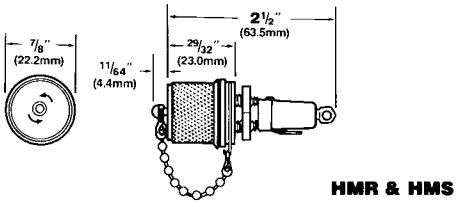
RFI Shielded for 1/4" x 1" and 1 1/4" Fuses
(16.4mm x 25.4 and 31.8mm)



- 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	125	For 1/4" x 1" fuses; high amps
HJM-CC			[-CC, 3/32" (2.4mm) shorter behind panel]
HJM-HH			Quick connect terminals

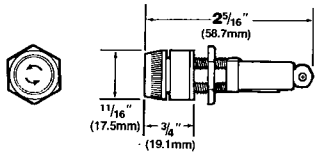
* U.L. Recognized under the Components Program.

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.

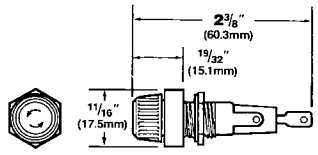
Carton quantity: 10

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



HKP

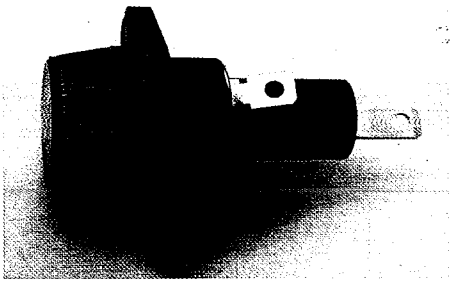
(See Mounting Arrangement A, end of Section)



HJM

(See Mounting Arrangement A, end of Section)

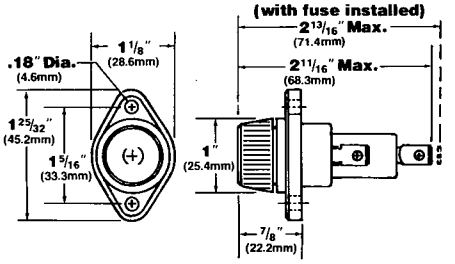
HPF Series—Standard For 13/32" (10.3mm) Diameter Fuses by Various Lengths



- One piece side terminal and threaded insert eliminates two-piece solder fabrication.
- Combination 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 1/2" (38.1mm)
HPF-L	5		1 3/8" (34.9mm)
HPF-EE	15	300	SC 0 to 15, 1 5/16" (33.3mm)
HPF-JJ	20		SC 20; 1 13/32" (35.7mm)
HPF-FF	30		SC 25 & 30; 1 5/8" (41.3mm)
HPF-RR	30	600	KTK-R

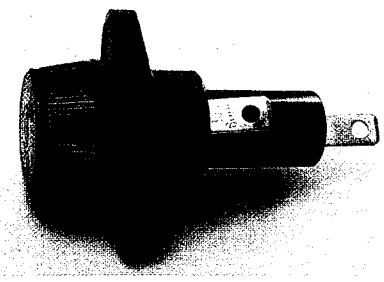
Carton quantity: 10 Shipping wt. per 100: 6 3/4 lbs. (3.06kg)



(See Mounting Arrangement C, end of Section)

Standard for 13/32"D x 1 3/8" and 1 1/2" Fuses and Type SC and KTK-R Fuses

(10.3mmD x 34.5mm and 38.1mm)

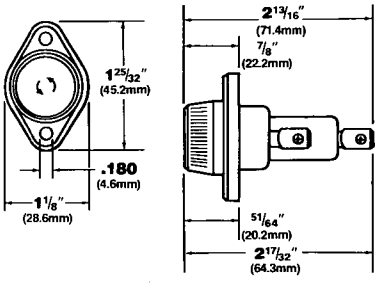


- Quick-connect terminals (1/4" wide) (6.4mm wide).
- Terminals can be used as solder type. (Holders with standard solder type terminals available).
- Bayonet type knob.

(Data continued in next column.)

Symbol	Amps	Volts	Fuse
* **HPS-L**	5	600	1 3/8"
* **HPS**	30		1 1/2"
† **HPS-EE**	15	300	SC 0 to 15 (1 5/16")
† **HPS-JJ**	20		SC 20 (1 13/32")
† **HPS-FF**	30		SC25 & 30 (1 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.

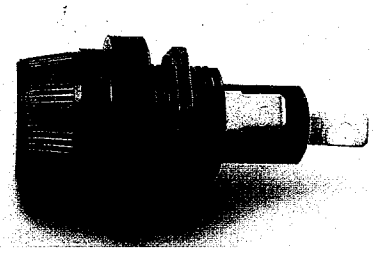


HPS

(See Mounting Arrangement C, end of Section)

Standard for 13/32" x 1 1/2" Fuses

(10.3mm x 38.1mm)

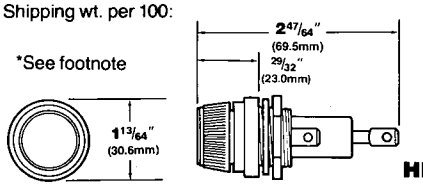


- For supplementary protection (transformers, relays, ballasts, solenoids, small motors, etc.).
- Mounts in 1/2" (12.7mm) knock-out with lock nut.
- Screw type knob.

Symbol	Amps	Volts	Terminals
HPL-B	30	600	Solder type
* **HPM**			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



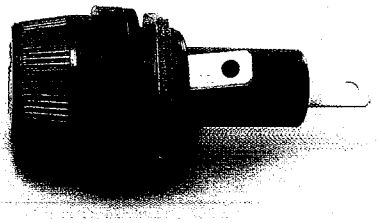
HPM

(See Mounting Arrangement B, end of Section)

*O-ring seal is incorporated in panel flange.

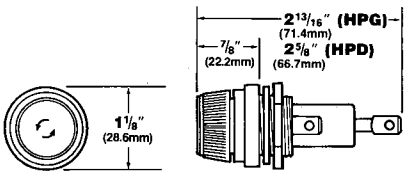
Standard for 13/32" x 1 1/2" Fuses

(10.3mm x 38.1mm)



- Combination quick-connect terminals, 1/4" (6.4mm).
- Mount in 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.

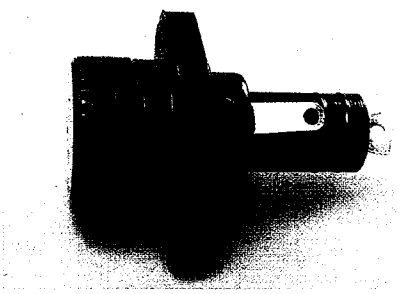
Symbol	Amps	Volts	Features
HPG	30	600	—
HPD			Quick-connect side terminal (1/4"); short rear solder terminal. (Length 3/16" shorter than **HPG**).



(See Mounting Arrangement B, end of Section)

Waterproof for 13/32" x 1 1/2" Fuses

(10.3mm x 38.1mm)

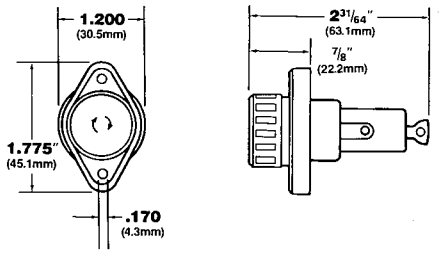


- "O" ring in flange for underwater waterproofing.
- For panels up to 1/4" (6.4mm) thick.
- Military version designated **FHN23W.**
- U.L. Recognized under the Components Program.

(Data continued on following page.)

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)

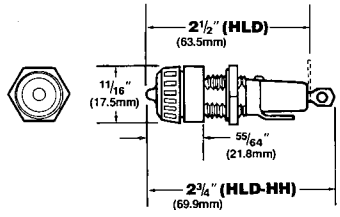
Fuseholders—Panel Mounted (Indicating Types)

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.

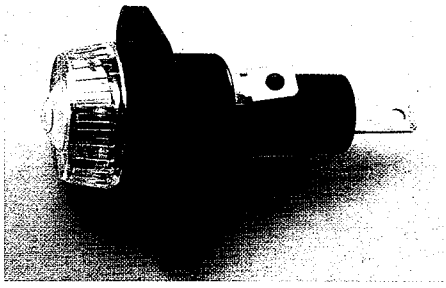
Symbol	Amps	Volts	Features
***HLD**	15	250	Solder terminals
HLD-HH			With quick-connect terminals

*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)

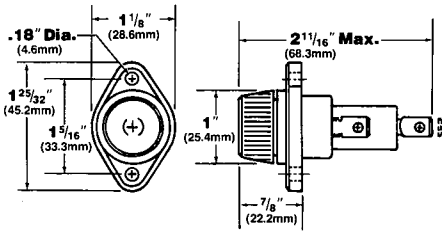
For Pin-Indicating Fuses (13/32" x 1 1/2")
(10.3mm x 38.1mm)



- 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.**

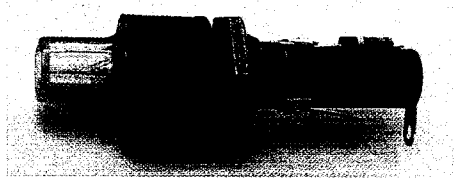
Symbol	Amps	Volts	Fuse
HPF-C	15	250	Transparent Knob

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)

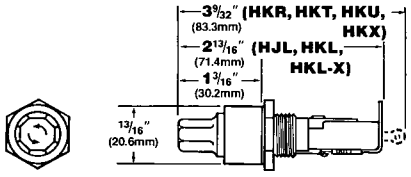


- **HJL** for 1/4" x 1" fuses.
- **HK** for 1/4" x 1 1/4" fuses.
- For panels up to 3/16" 4.8mm) thick.
- Bayonet type knob.
- Vibration resistant.
- Military versions available such as **FHL17G1** and **FHL18G1-1** thru **-9.**
- Drip-proof types also available.
- Knobs are octagonal (Oct) or flat-sided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

(Data continued in next column.)

Symbol	Amps	Lamp Volts	Lamp Type	Knob Color	Knob Type
HJL	20	90			Oct
***HKL**	15	to	Neon	Clear	Oct
HKL-X		250			F-S
HKR	20	22 to 30	In-	Amber	Oct
HKT		13 to 22	can-		Oct
HKU		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).



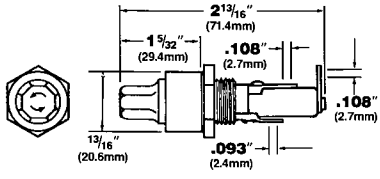
(See Mounting Arrangement D, end of Section)

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.

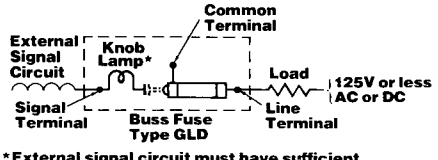
Symbol	Amps	Volts	Features
HKA	5	125	—
HKA-W			With "O" ring for drip proofing.

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)

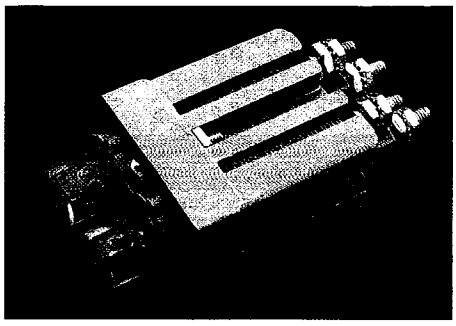


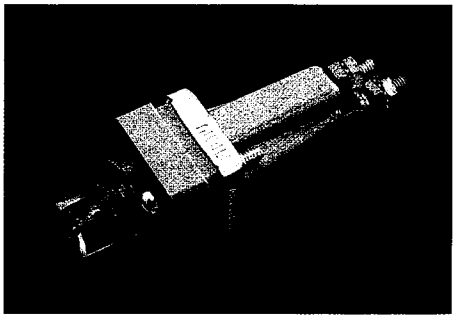
***External signal circuit must have sufficient impedance to limit lamp voltage to 10-24 volts AC or DC.**

Wiring Diagram

Lamp Indicating Type for 1/4" x 1 1/4" and 13/32" x 1 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 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 to 250	120K	2	1/4 x 1 1/4	Oct
HGA-C			2		F-S
HGB			1		Oct
HGB-C			1		F-S
HGC	90 to 500	330K	1	13/32 x 1 1/2	Oct

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

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

Carton quantity: 10.

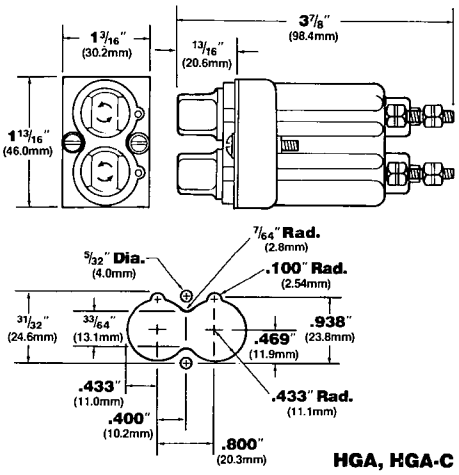
Shipping wt. per 100:

HGA, HGA-C—30.5 lbs.(14.29kg)

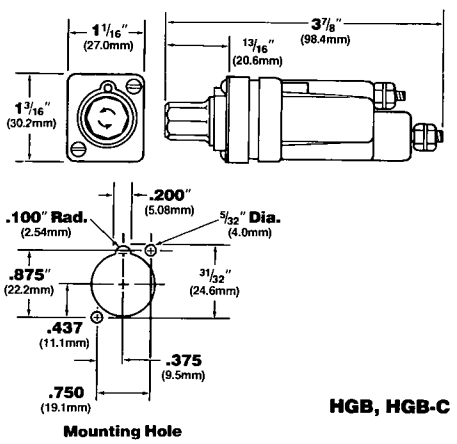
HGB, HGB-C—20.5 lbs.(9.30kg)

HGC—30 lb.(13.61kg)

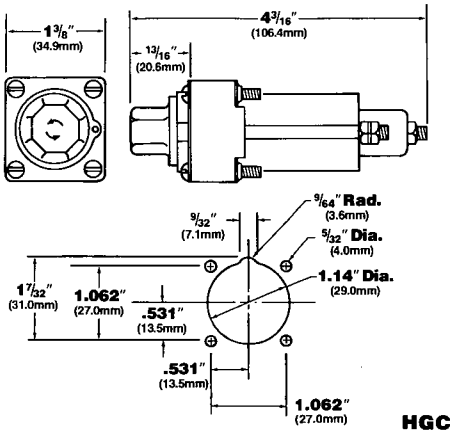
(Data continued in next column.)



HGA, HGA-C



HGB, HGB-C

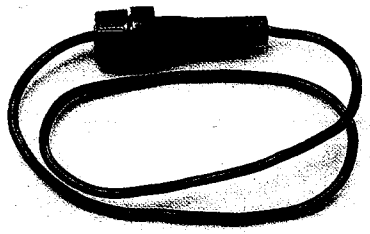


HGC

Fuseholders, Panel Mounted or In-The-Line

For Mounting Type SFE and 1/4"D x 1 1/4", 1 1/16", 7/8", 3/4" 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 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.

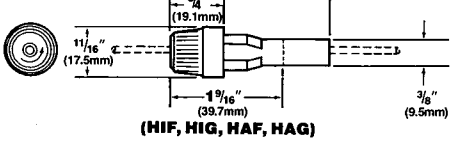
Complete Assembly With Fuse and Wire Lead

Wire Length	Symbols *Ass'y	Fuse	†Holder
	HRJ	**SFE 20**	**HHJ**
	HRI	**SFE 14**	**HHI**
19"	**HRH**	**SFE 9**	**HHH**
(#14	**HRE**	**SFE 7½**	**HHH**
Wire)	**HRG**	**SFE 6**	**HIG**
	HRF	**SFE 4**	**HIF**
	HMJ	**SFE 20**	**HDJ**
	HMI	**SFE 14**	**HDI**
8"	**HMH**	**SFE 9**	**HDH**
(#14	**HME**	**SFE 7½**	**HDH**
Wire)	**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

Fuseholder and Wire Contacts Only

Wire Size Contacts				Fuse
#18 to #20		#14 to #16		Lgth.
Phenolic Ears	Metal Ears	Phenolic 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"

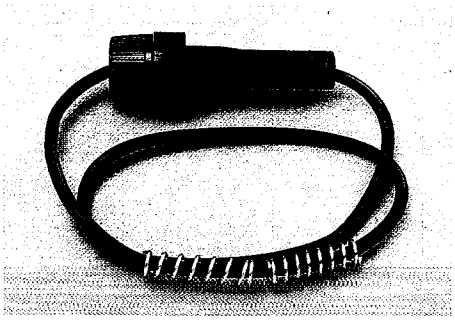
Carton quantity: 10

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, HRH, HRE: 7.2 lbs. (3.27kg).
HRG, HRF: 6.6 lbs. (2.99kg).
HMJ, HMI, HMH, 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)

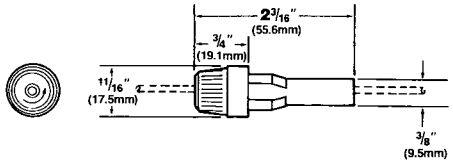


- Accepts fuses of different lengths via the use of different size springs.
- Furnished with three springs.
- Holders includes 8" (203mm) wire lead staked and soldered to holder contacts.

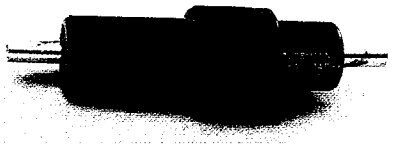
Symbol	Amps	Volts
HRK	15	32

Carton quantity: 10

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



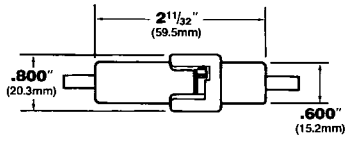
Waterproof for 1/4" x 1 1/4" Fuses
(6.4mm x 31.8mm)



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

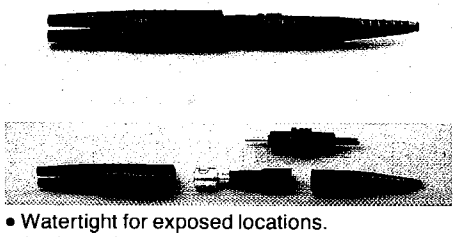
Symbol	Amps	Volts	Terminals
HFA	20	250	Crimp
HFA-HH			Quick-connect

Carton quantity: **HFA**—50
HFA-HH—5



HFA

Waterproof Tron Fuseholders for 13/32" 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 (13/32" 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	13/32" x 1 1/2
† HEX			
HEC	30		SC 25 to SC 30
*HEH	20	300	SC 20
HEG	15		SC 0 to SC 15
HEJ	60	300	SC 35 to SC 60
	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.

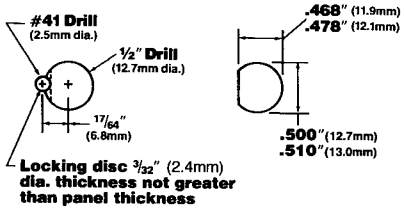
Terminals for HEB and HEJ Fuseholders

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

A, B, C, D, E, and **W** CSA Listed with **HEB** and **HEH**.

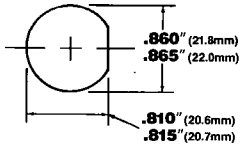
Panel Mounting Arrangements

Drilled Hole **Punched Hole**



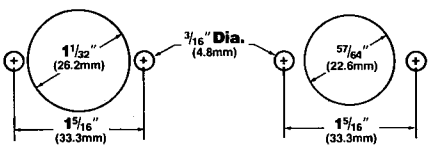
Mounting Hole A

Punched Hole



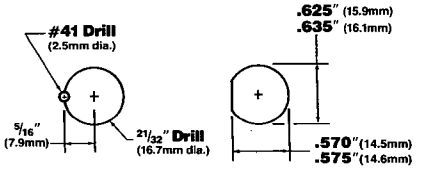
Mounting Hole B

Flange Rear of Panel **Flange Front of Panel**



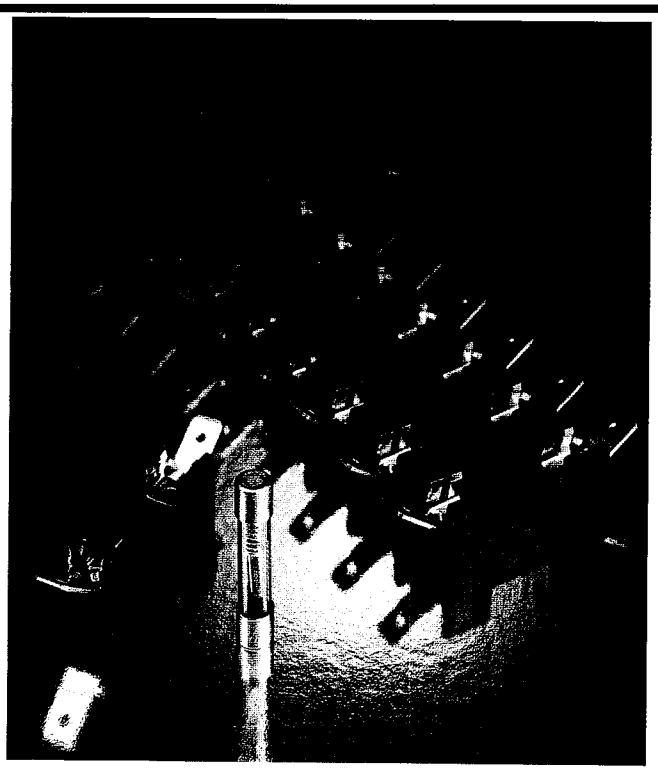
Mounting Hole C

Drilled Hole **Punched Hole**



Mounting Hole D

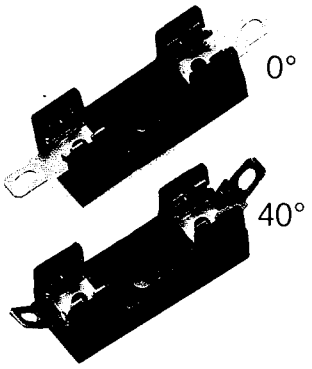
Small Dimension Fuseblocks
¼" × 1¼"—Series 8000



- For low-cost, tight cluster mounting of ¼" x 1¼" 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

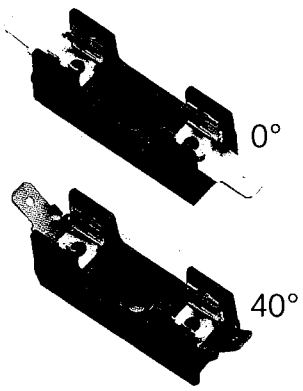
Solder



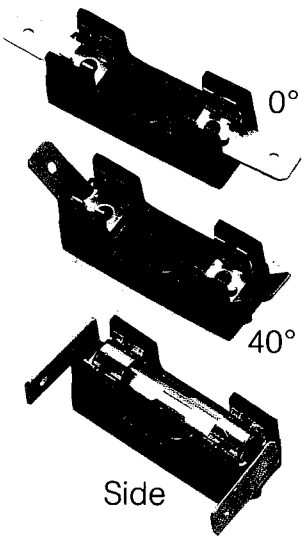
Screw

Quick Connect

3/16 Inch

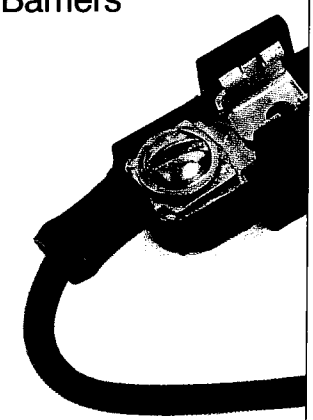


¼ Inch



Exclusive Features

"Anti-Pivot" Barriers

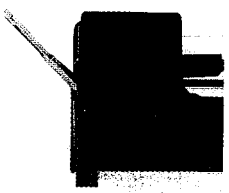


Screw terminal models have "anti-pivot" side barriers. Prevents lead connectors from twisting to side when tightening terminal screws.

Solid Mount Clips

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

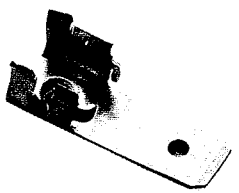
Totally Sealed Base



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 ¼" 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 ¼" 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

Catalog Data

Catalog Code

BK/ | S-8 | 0 | 00 | -00

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

Catalog Numbers.

Terminals Type	Size	Angle	*Basic Cat. No.	Poles (Suffix)
Solder	—	(0°)	S-8001-	
		40°	S-8002-	
Quick-Connect	3/16"	(0°)	S-8101-	
		40°	S-8102-	1-12
	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.

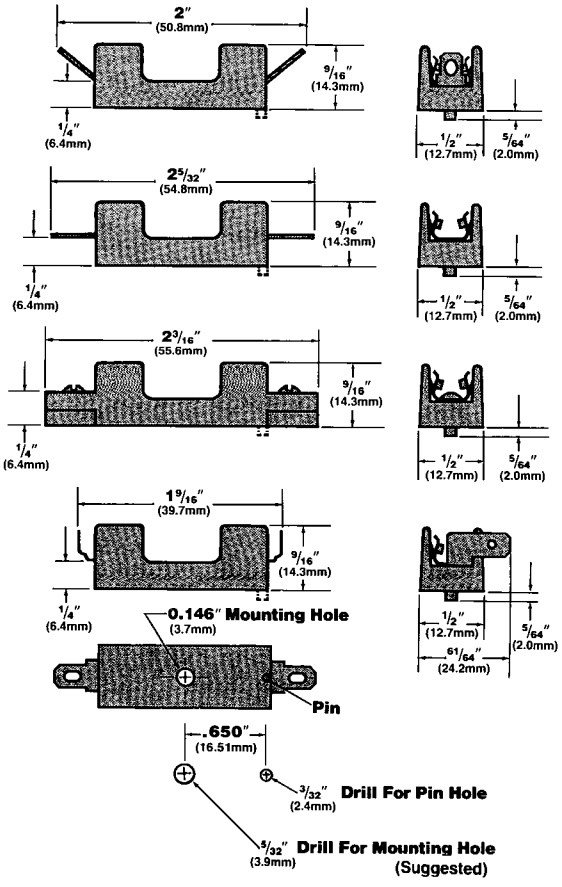
Standard Blocks (No Side Barriers)	Series 8000 Blocks
2245-1 thru -12	S-8002-1 thru -12
2430-1 thru -12	S-8202-1 thru -12
2480-1 thru -12	S-8102-1 thru -12
2799	S-8101-1
2839	S-8202-1
2841	S-8201-1
3823-1 thru -12	S-8002-1 thru -12
3833-1 thru -12	S-8301-1 thru -12
3998	S-8002-1
4405	S-8001-1
4407	S-8301-1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

Current Ratings.

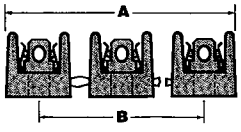
Series	Terminal	Amperes
8000	Solder	25A
8100	3/16" Quick Connect	15A
8200	1/4" Quick Connect	20A
8300	Screw	30A

Dimensional and Mounting Data

Single Pole



Multiple Pole



Dimensions.

No. of Poles	Inches A	Inches B	Millimeters A	Millimeters 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

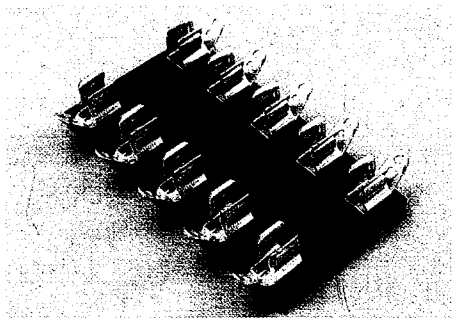
*See outline drawings.

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories
(For ¼" x 1¼" Fuses)

Fuse Blocks for ¼" x 1¼" Fuses
(6.4mm x 31.8mm)

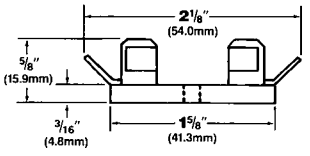
Multiple Pole
(Rated 30 Amps, 250 Volts; Phenolic Base; Spring Bronze, Albaloy Plated Clips)

Series 3823—Solder Terminals

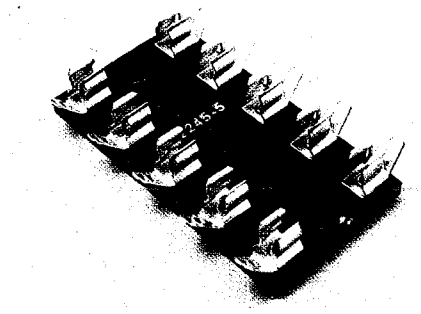


Cat. No.	No. of Poles	*Base Length Inches	mm
3823-1	1	½"	12.7
3823-2	2	1⅛"	28.6
3823-3	3	1¾"	44.5
3823-4	4	2⅜"	60.3
3823-5	5	3"	76.2
3823-6	6	3⅝"	92.1
3823-7	7	4¼"	108.0
3823-8	8	4⅞"	123.8
3823-9	9	5½"	139.7
3823-10	10	6⅛"	155.6
3823-11	11	6¾"	171.5
3823-12	12	7⅜"	187.3

*Small phenolic base; base width 1⅝" (41.3mm).



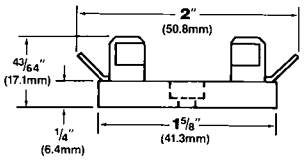
Type 2245—Solder Terminals
(Beryllium copper clips)



(Data continued in next column.)

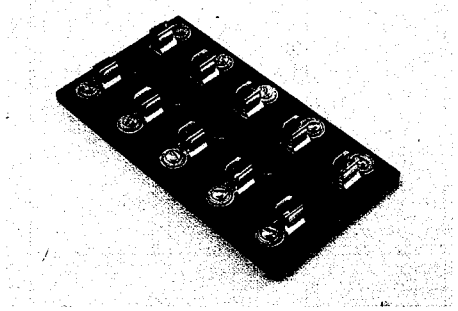
Cat. No.	No. of Poles	† Base Length Inches	mm
*2245-1	1	½"	12.7
*2245-2	2	1⅛"	28.6
*2245-3	3	1¾"	44.5
2245-4	4	2⅜"	60.3
2245-5	5	3"	76.2
2245-6	6	3⅝"	92.1
2245-7	7	4¼"	108.0
2245-8	8	4⅞"	123.8
2245-9	9	5½"	139.7
2245-10	10	6⅛"	155.6
2245-11	11	6¾"	171.5
2245-12	12	7⅜"	187.3

*CSA Listed at 15 amps, 250 volts.
† Small phenolic base; base width 1⅝" (41.3mm).



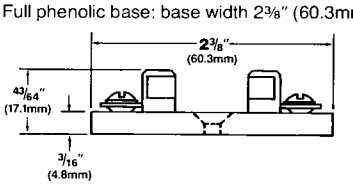
U.L. Recognized under Components Program.

Type 3833—Screw Terminals

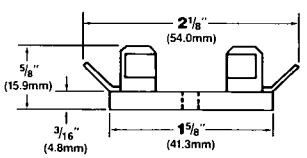


Cat. No.	No. of Poles	*Base Length Inches	mm
3833-1	1	25/32"	19.8
3833-2	2	1 11/16"	42.9
3833-3	3	2 19/32"	65.9
3833-4	4	3 1/2"	88.9
3833-5	5	4 13/32"	111.9
3833-6	6	5 5/16"	134.9
3833-7	7	6 7/32"	158.0
3833-8	8	7 1/8"	181.0
3833-9	9	8 1/32"	204.0
3833-10	10	8 15/16"	227.0
3833-11	11	9 27/32"	250.0
3833-12	12	10 3/4"	273.1

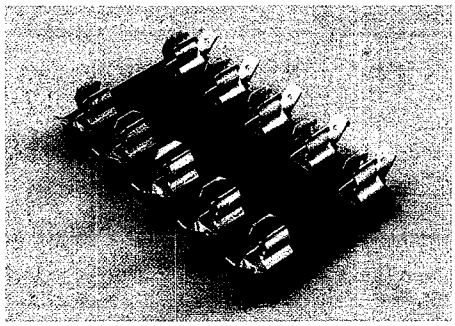
*Full phenolic base; base width 2⅜" (60.3mm).



U.L. Recognized under Components Program.

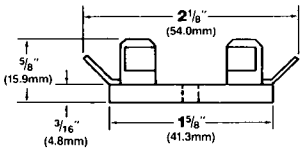


Type 2480—Quick Connect Terminals—3/16" (4.8mm)

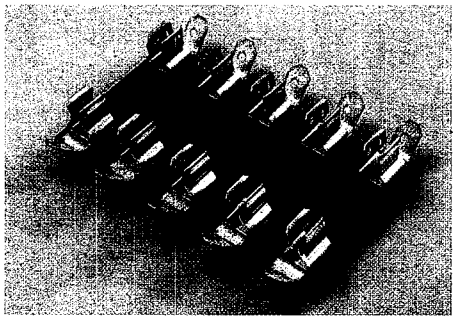


Cat. No.	No. of Poles	*Base Length Inches	mm
2480-1	1	1/2"	12.7
2430-1	2	1⅛"	28.6
2480-3	3	1¾"	44.5
2480-4	4	2⅜"	60.3
2480-5	5	3"	76.2
2480-6	6	3⅝"	92.1
2480-7	7	4¼"	108.0
2480-8	8	4⅞"	123.8
2480-9	9	5½"	139.7
2480-10	10	6⅛"	155.6
2480-11	11	6¾"	171.5
2480-12	12	7⅜"	187.3

*Small phenolic base; base width 1⅝" (41.3mm).



Type 2430—Quick Connect Terminals—¼" (6.4mm)



Cat. No.	No. of Poles	*Base Length Inches	mm
2430-1	1	½"	12.7
2430-2	2	1⅛"	28.6
2430-3	3	1¾"	44.5
2430-4	4	2⅜"	60.3
2430-5	5	3"	76.2
2430-6	6	3⅝"	92.1
2430-7	7	4¼"	108.0
2430-8	8	4⅞"	123.8
2430-9	9	5½"	139.7
2430-10	10	6⅛"	155.6
2430-11	11	6¾"	171.5
2430-12	12	7⅜"	187.3

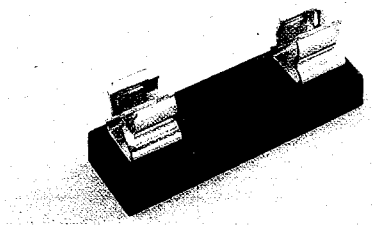
*Small phenolic base; base width 1⅝" (41.3mm).

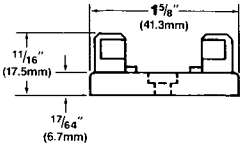
Note—Unless otherwise indicated, diameter of mounting screw holes is 0.147" (3.7mm); counterbores, 0.314" (8.0mm); and countersinks, 0.312" (7.9mm).

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories
(For ¼" x 1¼" Fuses)

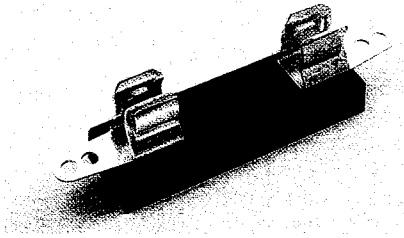
Single Pole
(Unless Otherwise Indicated - Small Bakelite Base; Spring-Bronze, Albaloy-Plated Clips; Rated 30 Amps, 250 Volts; Base Width ½") (12.7mm)

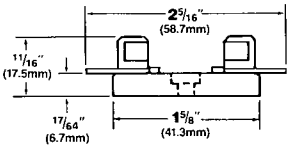
No. 4574—Spare Fuse Block



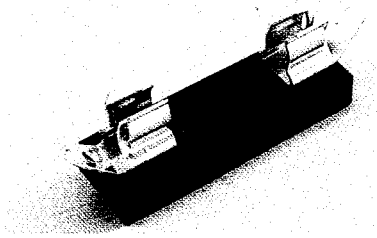


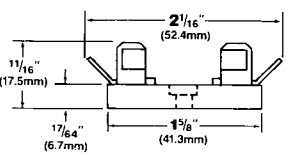
No. 4405—One Piece Solder Terminals



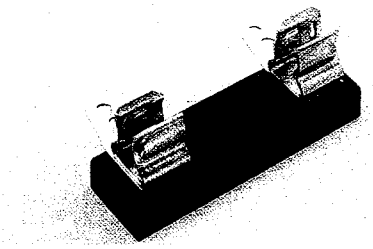


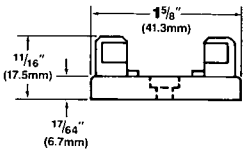
No. 3998—One Piece Solder Terminals



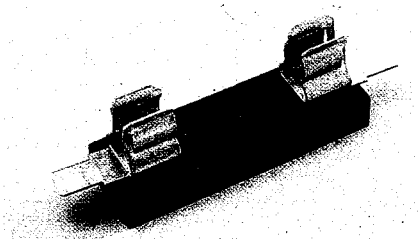


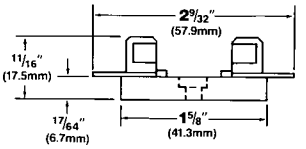
No. 4406—Side Solder Terminals



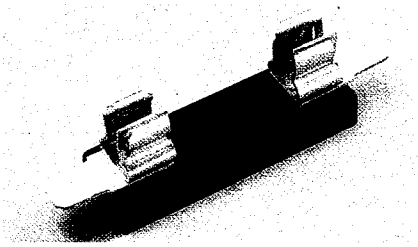


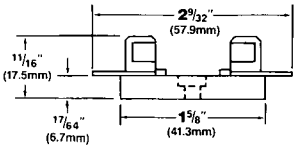
No. 2799—Quick Connect Terminals, 3/16" (4.8mm)



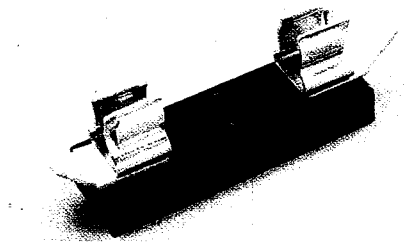


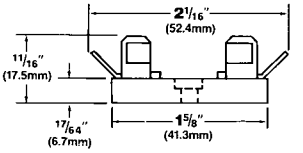
No. 2841—Quick Connect Terminals, ¼" (6.4mm)



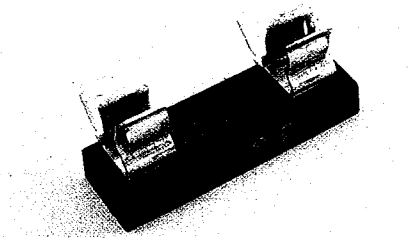


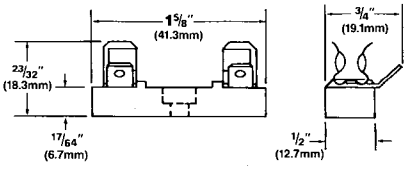
No. 2839—Quick Connect Terminals, ¼" (6.4mm)
(Rated 15 Amps; U.L. Recognized under Components Program)



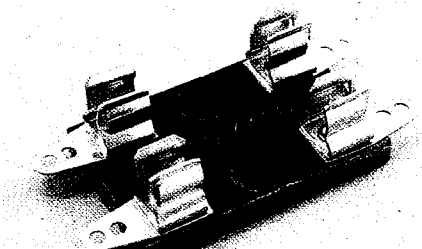


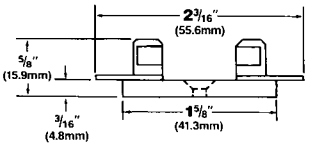
No. 2499—Side Quick Connect Terminals, ¼" (6.4mm)
(Rated 15 Amps; U.L. Recognized under Components Program)





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

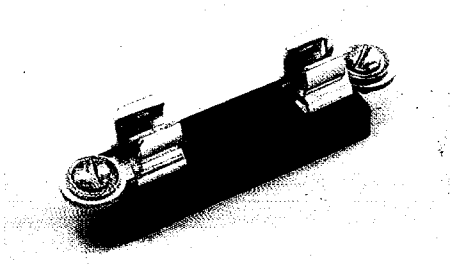


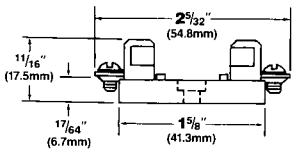


Note—Unless otherwise indicated, diameter of mounting screw holes is 0.147" (3.7mm); counterbores, 0.314" (8.0mm); and countersinks, 0.312" (7.9mm)

Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

No. 4407—Screw Terminals

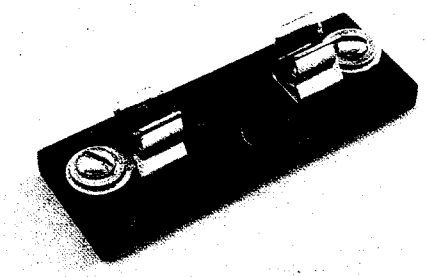


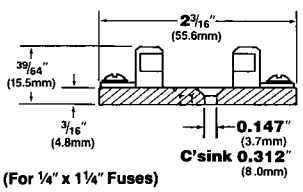


(For ¼" x 1¼" Fuses)

No. 4512—Screw Terminals

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

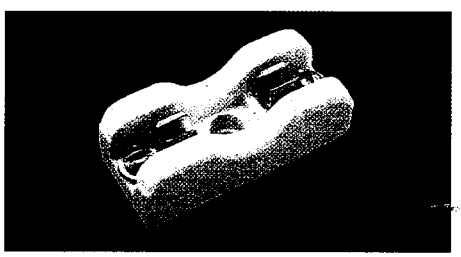


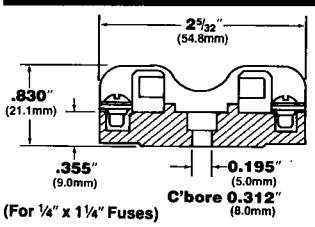


(For ¼" x 1¼" Fuses)

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)

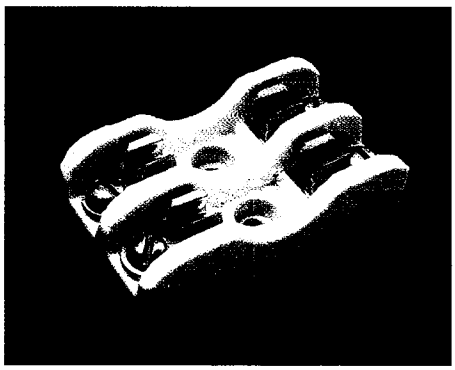


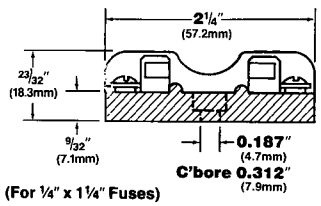


(For ¼" x 1¼" Fuses)

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)





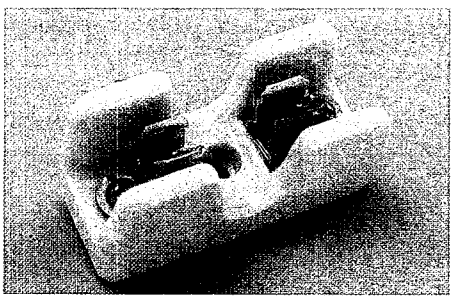
(For ¼" x 1¼" Fuses)

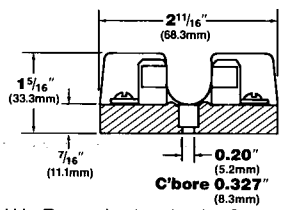
Fuse Blocks for 13/32" x 1 3/8" Fuses

(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 13/32" x 1 1/2" Fuses

(10.3mm x 38.1mm)

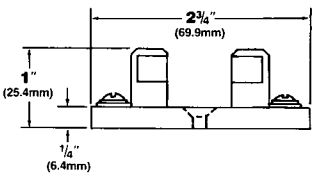
Without Side Barriers

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

Type 3835—Multiple Pole; Screw Terminals

Cat. No.	No. of Poles	*Base Length Inches	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

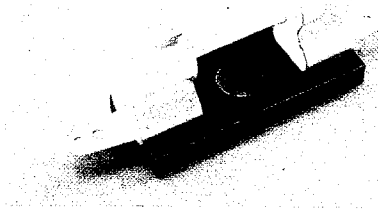
*Full phenolic base; base width 2¾" (69.9mm).

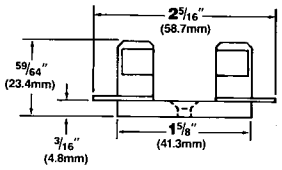


Note—unless otherwise indicated, diameter of mounting screw holes is 0.147" (3.7mm); counterbores, 0.314" (8.0mm); and countersinks, 0.312" (7.9mm).

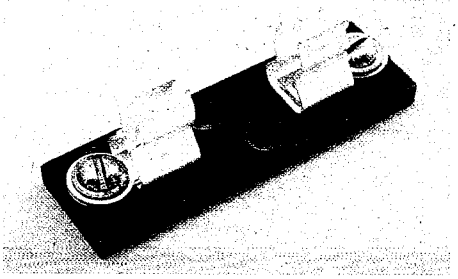
Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories
(For 13/32" x 1 1/2" Fuses)

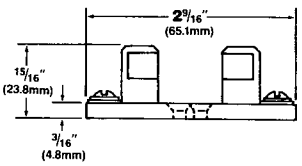
No. 4421—Single Pole; Solder Terminals
(Small Base; Base Width, 5/8") (15.9mm)





No. 4515—Single Pole; Screw Terminals
(Full Bakelite Base, Base Width, 3/4") (19mm)



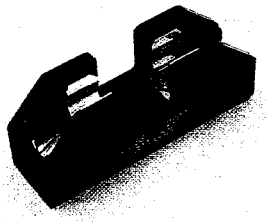


With Side Barriers
(Molded Phenolic Base,; Screw or Pressure Terminals; Spring Bronze, Albaloy Plated Clips; Rated 30A, 600V; U.L. Recognized under Component Program)

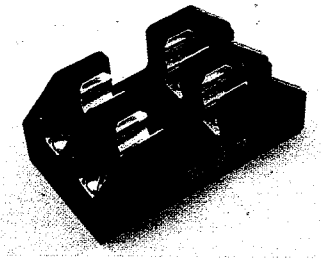
No. of Poles	Fuse Block Cat. No. Versus Terminal Type Screw	Box	*Teeter	Base Width Inches	mm
1	2807	2810	2096	55/64"	21.8
2	2808	2811	2097	1 5/8"	41.3
3	2809	2812	2098	2 3/8"	60.3

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

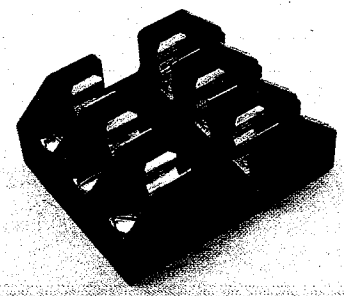
No. 2807



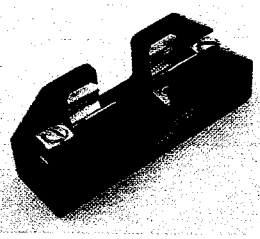
No. 2808

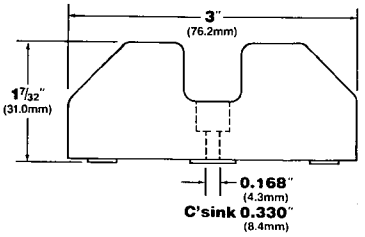


No. 2809

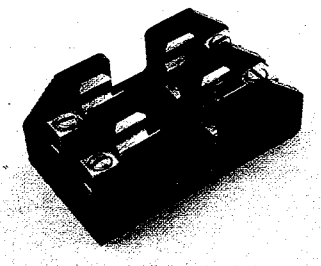


No. 2810

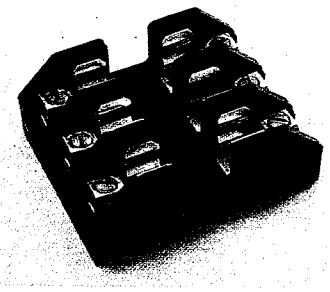




No. 2811

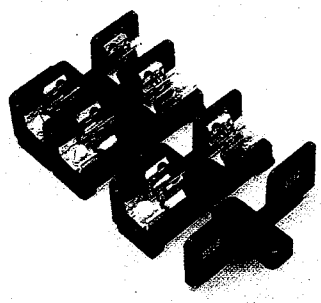


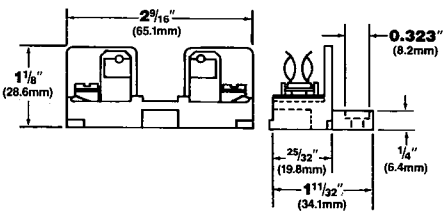
No. 2812



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 3/8" (23.8cm) lengths for add-on blocks.

Note—Unless otherwise indicated, diameter of mounting screw holes is 0.147" (3.7mm); counterbores, 0.314" (8.0mm); and countersinks, 0.312" (7.9mm).

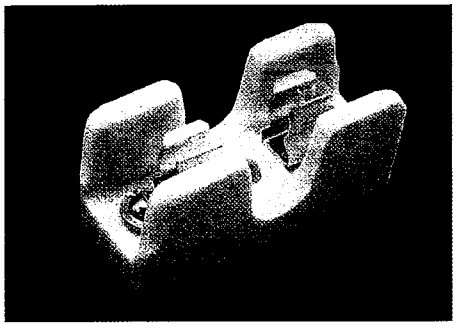
Small Dimension Fuses, Fuseholders, Fuse Blocks, and Accessories

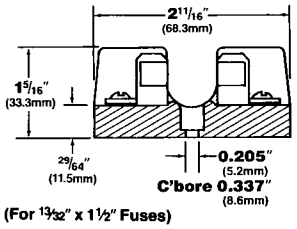
Fuse Blocks with Porcelain Base

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

No. 3792—Single Pole, 600 Volts

(Base width $1^{5}/_{32}$", 29.4mm)

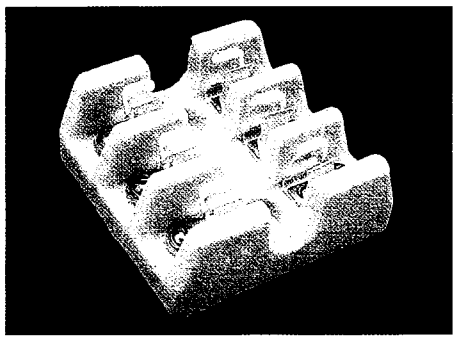


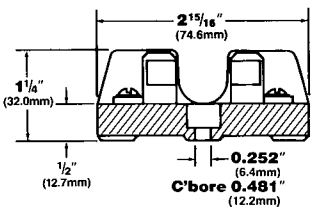


(For $^{13}/_{32}$" x 1½" Fuses)

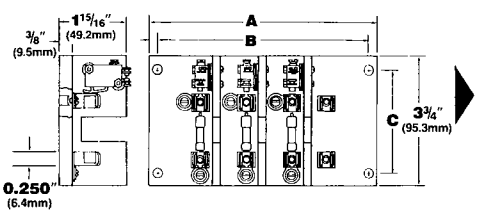
No. 4439—Three Pole, 250 Volts

Base width $2^{15}/_{16}$", 74.6mm)



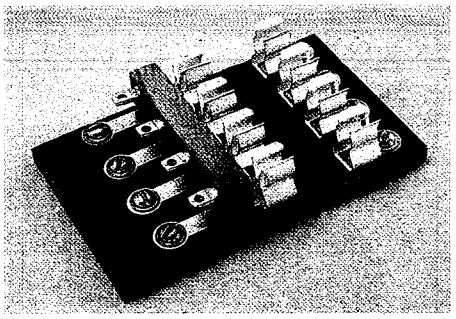


(For $^{13}/_{32}$" x 1½" Fuses)

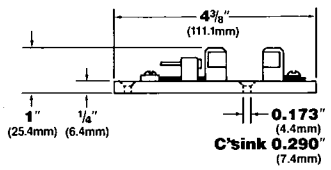


BUSS Signal Blocks for Pin Indicating Fuses and Devices

No. 3839—Four Pole Signal-Fuse Block

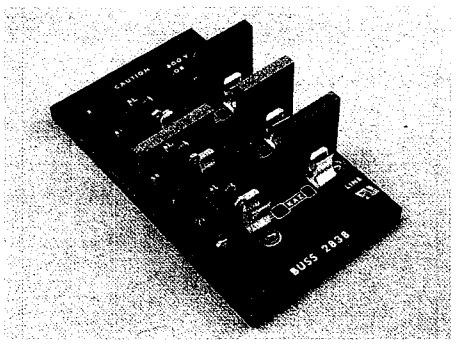


(Screw terminals; beryllium copper, silver-plated slips; Fuse case size, $^{13}/_{32}$" x $1^{1}/_{2}$", 10.3mm x 38.1mm; accepts **FNA, MIC** and **MIN** units. Block rating, 30A, 250V. Base width $2^{11}/_{16}$", 68.3mm)



(For $^{13}/_{32}$" x 1½" Fuses)

Blocks with Miniture Signaling Switches for BUSS KAZ Actuator Devices (For $^{13}/_{32}$" x 2" Fuses)



Cat. No.	No. of Poles	Dimensions ± 1/32" (0.8mm) Inches/(mm's) A	B	C
2778	1	1¾ (44.5)	—	2½ (63.5)
2837	2	5 5/16 (134.9)	4 13/16 (122.2)	3 (76.2)
2838	3	6 5/8 (168.3)	6 1/8 (155.6)	3 (76.2)
2788-3	3	5 3/8 (136.5)	4 7/8 (123.8)	3 (76.2)

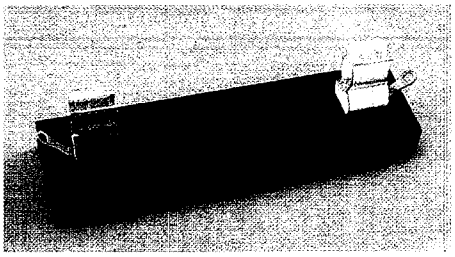
U.L. Recognized under Components Program.

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

Fuse Blocks for High Voltage Instrument Type Fuses

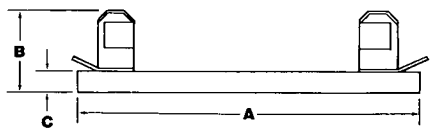
For BUSS High Voltage Fuses (1000 to 10,000 Volts)

(Bakelite base; alloy plated terminals)



For Fuse Sym.	Block Cat. No.	*Dimensions Inches/(mm's) A	B	C	Base Width
HVA **HVR**	**4528**	3¾" (95.3)	1 1/8" (28.6)	3/8" (9.5)	1" (25.4)
HVB **HVT**	**4529**	5 1/4" (133.4)	1 1/8" (28.6)	3/8" (9.5)	1" (25.4)
HVJ **HVV**	**4530**	6 1/2" (165.1)	1 21/32" (42.1)	1/2" (12.7)	1 3/8" (34.9)
HVL **HVX**	**2960**	11 7/16" (290.5)	1 29/32" (48.4)	3/4" (19.1)	1 3/8" (34.9)

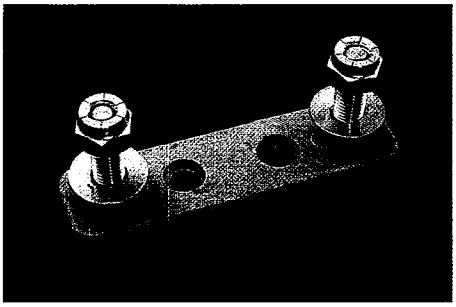
* Two mounting holes: Use #8 screws on blocks **4528** and **4529**; #10 screws on blocks **4530** and **2960**.



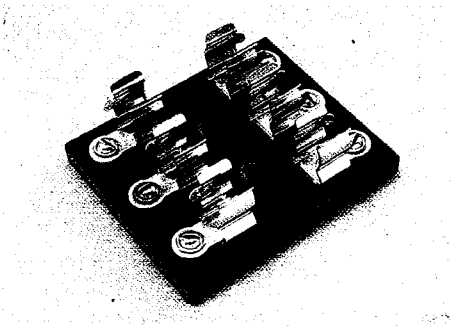
Fuse Blocks for ANN Fuses and ANL Limiters

No. 4164

Single pole; stud terminal; free running lock nut; molded alkyd base; metal components cadmium plated. Stud center-to-center dimensions $2^{7}/_{16}$" (68.3mm); base width $^{15}/_{16}$" (23.8mm); length $3^{13}/_{32}$" (86.5mm); height $1^{37}/_{64}$" (40.1mm)



Fuse Blocks for Rectifier Fuses



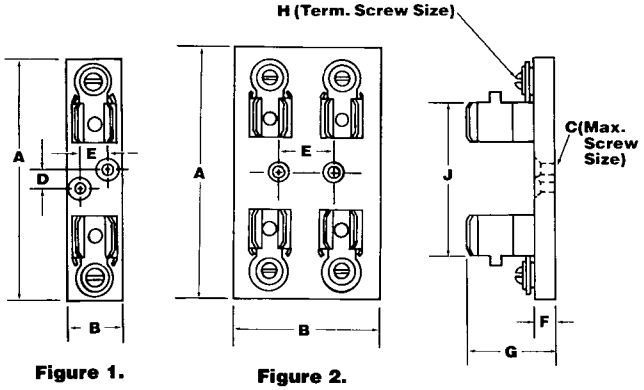


Figure 1. Figure 2.

Tron Rectifier Fuseblocks

Fuse	Volts	Amps	Poles	Block	Fig.	A	B	C	*D	*E	F	G	H	J	A	B	C	*D	*E	F	G	H	J
						Dimensions in Inches									Dimensions in Metric (mm)								
KAA or KAW	130	1/2 to 30	1	4515	1	2 9/16	3/4	#6	1/4	3/8	3/16	15/16	#8	1 9/16	65.1	19.1	3.5	6.4	9.5	4.8	23.8	4.2	39.7
			2	4525			1 5/16		—							33.3		—	15.9				
			3	4535			2 1/16		—	5/8						52.4		—					
KAB or KAX	250	1 to 30	1	4386	1	3 1/4	3/4	#6	1/4	3/8	3/8	15/16	#8	2 1/16	82.6	19.1	3.5	6.4	9.5	9.5	33.3	4.2	52.4
			2	4287	2	3 1/2	2		—	1	1/4	13/16			88.9	50.8		—	25.4	6.4	30.2		
			3	3959			3		—		3/8	15/16				76.2		—		9.5	33.3		

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

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

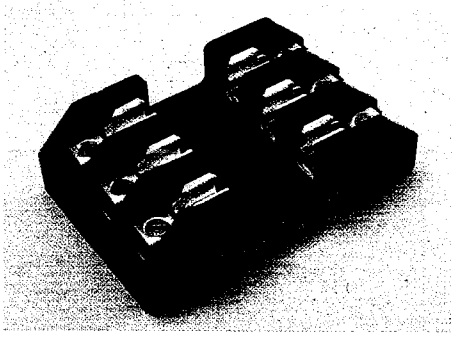
Fuse Blocks for SC Fuses

- 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 Terminal Type *Teeter	Screw	Box	Fig.	A	B	C	D	E	A	B	C	D	E
							Dimensions in Inches					Dimensions (mm)				
300	1	1	2087	2961	2891	1	3	55/64	.360	1/4	1 7/32	76.2	21.8	9.1	6.4	31.0
	to	2	2090	2917	2894	2		1 5/8	.765	27/64			41.3	19.4	10.7	
	15	3	2093	2965	2897			2 3/8	1.530				60.3	38.9		
	20	1	2088	2962	2892	1	3	55/64	.360	1/4	1 7/32	76.2	21.8	9.1	6.4	31.0
		2	2091	2918	2895	2		1 5/8	.765	27/64			41.3	19.4	10.7	31.0
		3	2094	2966	2898			2 3/8	1.530				60.3	38.9		
	25	1	2089	2963	2893	1	3	55/64	.360	1/4	1 7/32	76.2	21.8	9.1	6.4	31.0
	to	2	2092	2919	2896	2		1 5/8	.765	27/64			41.3	19.4	10.7	
	30	3	2095	2967	2899			2 3/8	1.530				60.3	38.9		
	35	1	—	—	2964	1	4 1/4	31/32	.437	17/64	1 19/64	108.0	24.6	11.1	6.7	32.9
	to	2	—	—	2920	2		1 25/32	.830	31/64			45.2	21.1	12.3	
	60	3	—	—	2968			2 5/8	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.



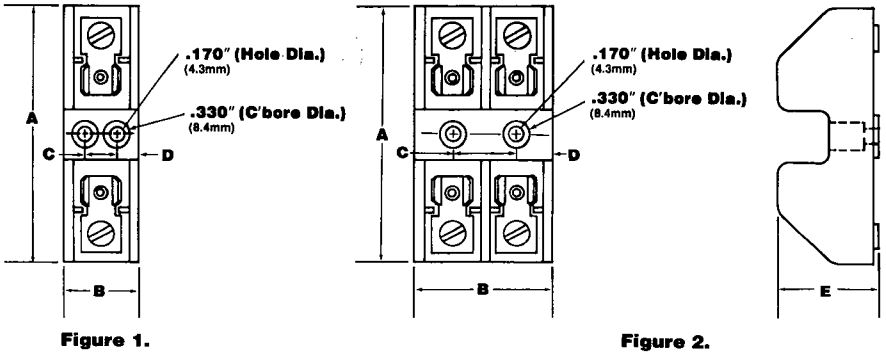


Figure 1. Figure 2.

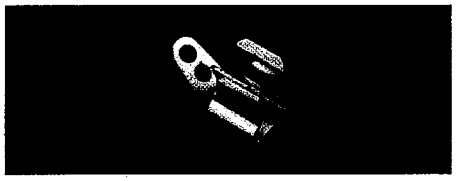
Fuse Clips

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.

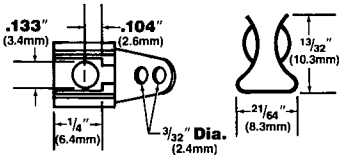
The highest quality clip metal is beryllium copper. Gives lasting spring pressure and high conductivity.

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)

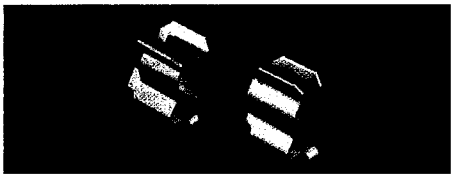


Carton quantity: 10
Shipping wt. per 100: 0.3 lbs (135.1g).



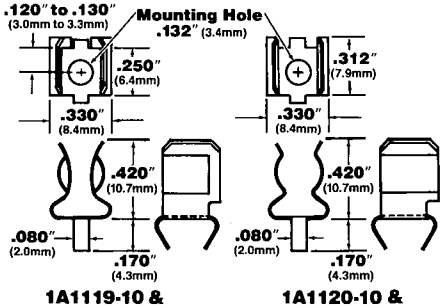
Tron Clips (1/4", 6.4mm) for Printed Circuit Boards

(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

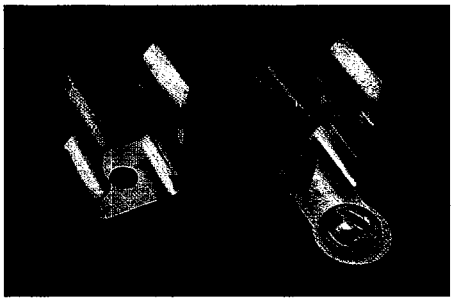
Carton quantity: Shipping wt. per 100:



1A1119-10 & 1A1119-05 **1A1120-10 & 1A1120-05**

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).

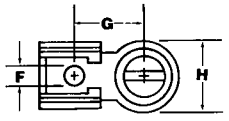


Fuse Dia.	Ass'y. Cat. No.	*Clip No.	Mount. Screw (Steel)	Term. Screw (Brass)
1/4"	**4431**	**5682-44**	4-40	
(6.4mm)	**4432**	**5682-02**	1/4"	6-32
	4567	**5682-44**	—	3/16"
	4583	**5682-02**		
9/32"	**4560**	**5674-41**		
(7.1mm)	**4585**	**5674-01**		
13/32"	**4561**	**5960-63**	8-32	8-32
(10.3mm)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

*See Tron fuse clips for detail data.

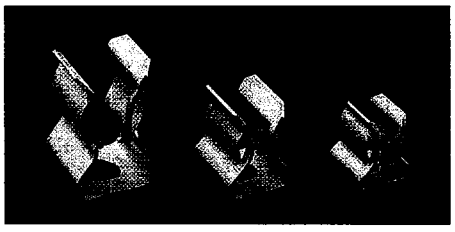
Ass'y. Cat. No.	Dimensions Inches/(mm's) F	G	H	Wt./100 Lbs.	Gm's.
4431	.089	.3575	.3775	1	454
4432	(2.3)	(9.1)	(9.6)		
4567	.1325	.3575	.3775	1	454
4583	(3.4)	(9.1)	(9.6)		
4560	.136	.4425	.445	1.6	726
4585	(3.5)	(11.2)	(11.3)		
4561	.136	.4425	.445	1.6	726
4586	(3.5)	(11.2)	(11.3)		
4208	.136	.5705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

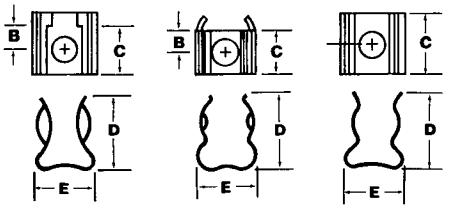
(6.4mm, 7.1mm, 10.3mm, and 14.3mm)



- 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"		Spg Br	**5682-44**		
(6.4	Yes	Bery Cu	**5682-02**		
mm)		Spg Br	**5682-41**	0.3	136
		Bery Cu	**5682-01**		
	—	Spg Br	**5681-15**		
9/32"	Yes	Spg Br	**5674-41**	0.5	227
(7.1		Bery Cu	**5674-01**		
mm)	—	Spg Br	**5672-11**	0.4	181
13/32"		Spg Br	**5960-63**	0.7	318
(10.3	Yes	Bery Cu	**5960-09**	0.6	272
mm)		Spg Br	**5960-61**	0.7	318
		Bery Cu	**5960-07**	0.6	272
	—	Spg Br	**5956-16**	0.5	227
9/16"		Spg Br	**5591-42**	1.4	635
(14.3	Yes	Spg Br	**5591-52**	1.4	635
mm)	—	Spg Br	**5592-33**	1.2	544

* Spg Br—Spring Bronze; Bery Cu—Beryllium Copper.
† See dimensional data for further differentiation of clip types.

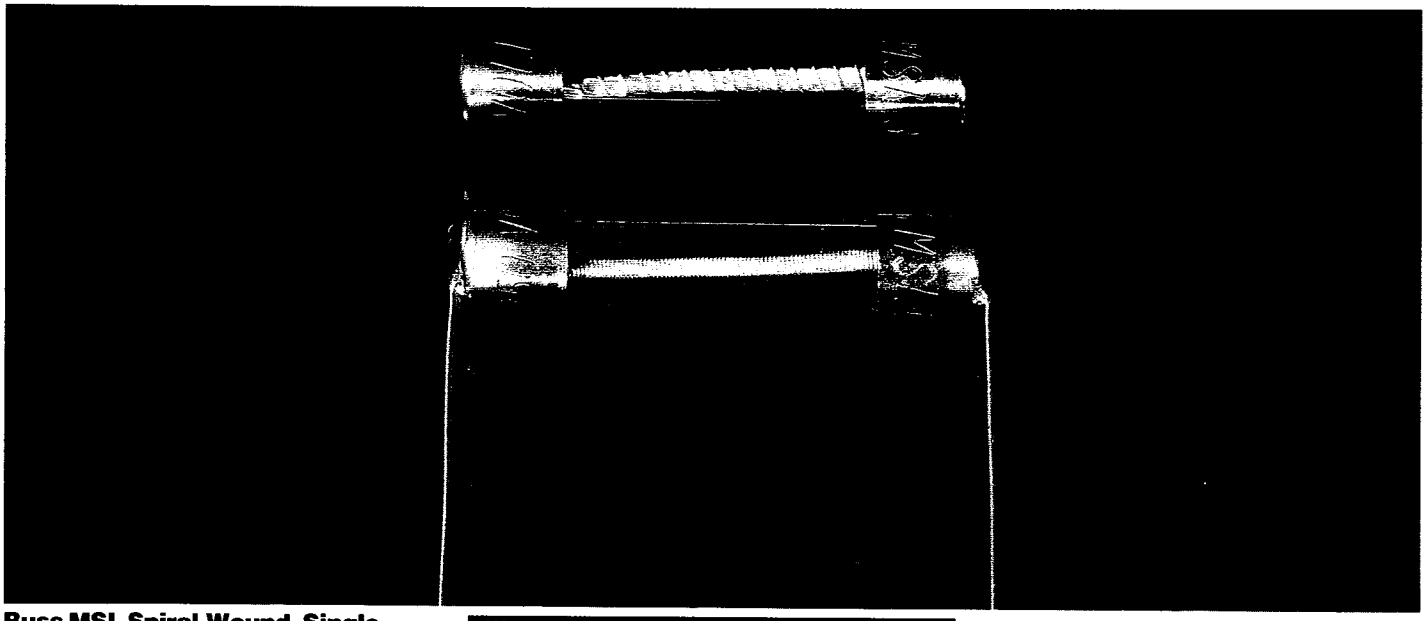


1/4" & 9/32" (with end stop) 13/32" & 9/16" (with end stop) 9/16" (without end stop)

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" (6.73)	.430" (10.92)	.335" (8.51)
5674-41	*.177"	.360"	.525"	.385"
5674-01	(4.50)	(9.14)	(13.33)	(9.78)
5672-11	† —	.358" (9.09)	.525" (13.33)	.385" (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" (7.80)	.743" (18.87)	.464" (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



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

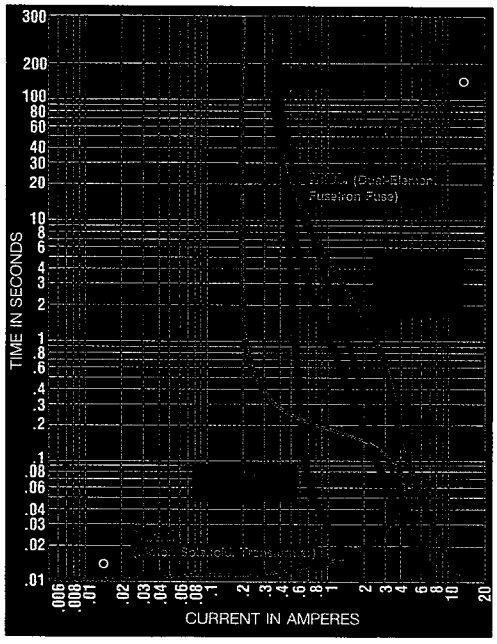
- MSL and MSV ¼" x 1¼" fuses are spiral-wound, single-element time-delay fuses for protection of less demanding circuits that are subject to high inrush currents. When there are critical parameters of resistance, low voltage, and/or amplitude and duration of inrush currents, use Fusetron dual-element 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 (1¼"; 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 (¼A—1A)
  100A @ 250V (1¼A—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.



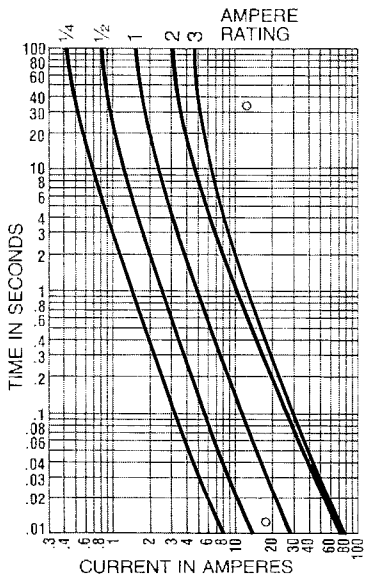
The above graph compares the actual time/current characteristics of four different ¼ ampere fuses together with a load curve which represents the "severe" current excursions that can be evidenced when an inductive device such as a motor, solenoid, or transformer is energized (as can be noted, in this 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-¼	MSV-¼	MSL-2	MSV-2
MSL-3/10	—	MSL-2½	MSV-2½
MSL-⅜	MSV-⅜	MSL-3	MSV-3
MSL-4/10	—	MSL-3 2/10	MSV-3 2/10
MSL-½	MSV-½	MSL-4	MSV-4
MSL-6/10	—	MSL-5	MSV-5
MSL-¾	—	MSL-6	—
MSL-8/10	—	MSL-6¼	MSV-6¼
MSL-1	MSV-1	MSL-7	MSV-7
MSL-1¼	—	MSL-7½	MSV-7½
MSL-1½	MSV-1½	MSL-8	MSV-8
MSL-1 6/10	—	—	—

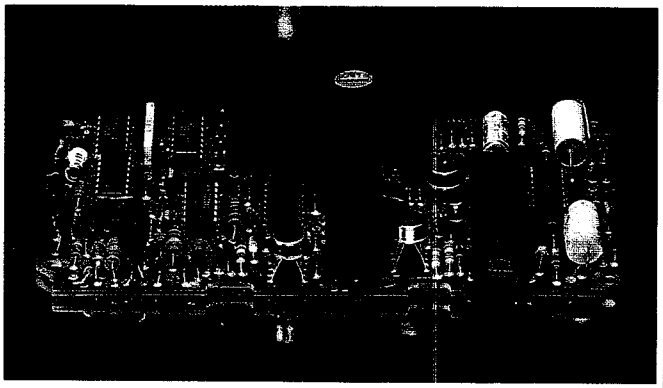
Carton Quantity: 5
Shelf Package: 100
Bulk Packaging: 1000 per shipping carton
(1000 minimum per catalog number).

*For bulk package orders, prefix "BK/" to basic catalog number (i.e. BK/MSL-¼).

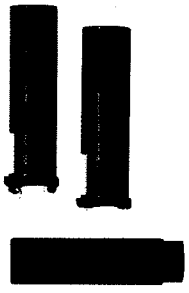


MSL and MSV time-current curves.
(Contact Bussmann for data on 3.2A to 8A fuses.)

Small Dimension Fuseholders
PC Board (5mm × 20mm & ¼" × 1¼")

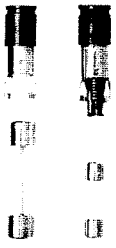


Models For Vertical and Horizontal Mounting



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.

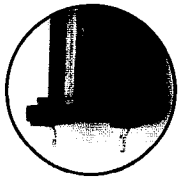
Fuse Carriers For 5mm × 20mm and ¼" × 1¼" Fuses



Carriers fit all three body models. Carrier knobs are color coded for easy identification—gray for ¼" 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 consistant 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.

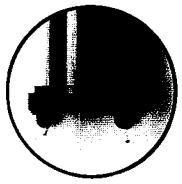
***Individual Components—PC Board Fuseholders**

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	
¼" × 1¼"	**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. HBW 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.

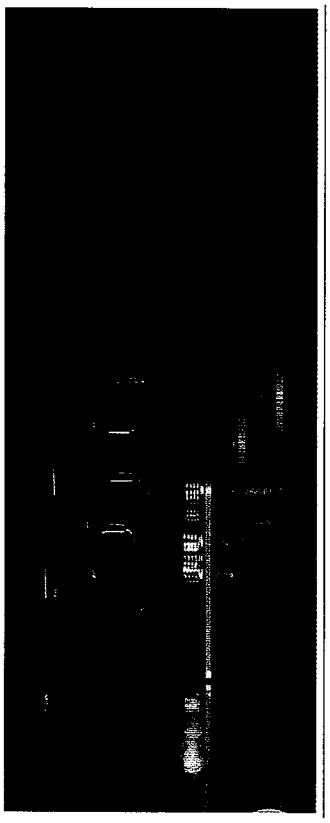
Model	Fuse Size	*Cat. No.	*Agency Listings	Dimensions	Mounting Dimensions
Horizontal Mount	¼" × 1¼"	HBH-I	UL CSA VDE SEMKO	.437(11.1), 1.77(45), .480(12.2), .490(12.4), .140(3.5), .197(5.0), .244(6.2), .040(1.0)	.469(12.0), .250(6.4) Panel; .050 Dia. 3 Holes (1.3), .700(17.8), .600(15.2) PC Board
		HBH-M			
	5mm × 20mm				
Vertical Mount With Stability Pins	¼" × 1¼"	HBV-I	UL CSA VDE SEMKO	.510(13.0), 1.855(47), .140(3.5), .040(1.05), .580(14.9), .580(14.9), .580(14.9)	.531(13.5) Panel; .200(5), .200(5), .400(10), .050 Dia. 2 Holes (1.3), .100 Dia. 4 Holes (2.54) PC Board
		HBV-M			
	5mm × 20mm				
Vertical Mount Without Stability Pins	¼" × 1¼"	HBW-I	UL CSA VDE SEMKO		.531(13.5) Panel; .400(10), .050 Dia. 2 Holes (1.3) PC Board
		HBW-M			
	5mm × 20mm				

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

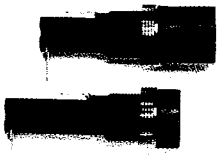
Small Dimension Fuseholders

Panel-Mounted (5mm × 20 mm & ¼″ × 1¼″)

(New)

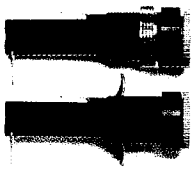


Two Front-Panel Mounting Exposures



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 ¼″ × 1¼″ fuses and one for 5mm × 20mm fuses. They both fit all fuseholder bodies. Carrier knobs are color-coded for easy identification (gray for ¼″ 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-94VO 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).

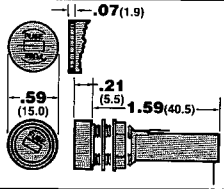
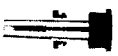
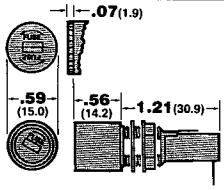
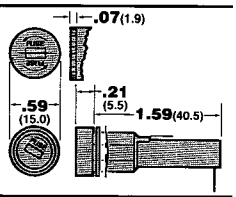
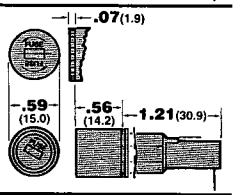
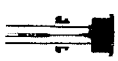
Note: Voltage ratings of fuseholders in A.C.

****Individual Components—Panel-Mounted Fuseholders**

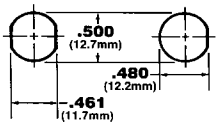
Fuseholder Body Only		Cat. No.
Smooth (for speed-nut)	Low Profile	HSL
	High Profile	HSH
Threaded (for hex-nut)	Low Profile	HFL
	High Profile	HFH
Fuseholder Carrier Only		
¼″ × 1¼″	Screwdriver Slot	FCI
	Finger Grip	FCI-F
5mm × 20mm	Screwdriver Slot	FCM
	Finger Grip	FCM-F
Hardware		
Washer, Threaded or 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	¼″ × 1¼″	 Screwdriver Slot	HFL-I	UL, CSA, SEMKO, and * VDE *With solder terminals.	
			Finger Grip	HFL-IF		
		5mm × 20mm	 Screwdriver Slot	HFL-M		
			Finger Grip	HFL-MF		
	 High Profile	¼″ × 1¼″	 Screwdriver Slot	HFH-I	UL, CSA, SEMKO, and * VDE *With solder terminals.	
			Finger Grip	HFH-IF		
		5mm × 20mm	 Screwdriver Slot	HFH-M		
			Finger Grip	HFH-MF		
Speed Nut On Smooth Body	 Low Profile	¼″ × 1¼″	 Screwdriver Slot	HSL-I	UL, CSA, and SEMKO	
			Finger Grip	HSL-IF		
		5mm × 20mm	 Screwdriver Slot	HSL-M		
			Finger Grip	HSL-MF		
	 High Profile	¼″ × 1¼″	 Screwdriver Slot	HSH-I	UL, CSA, and SEMKO	
			Finger Grip	HSH-IF		
		5mm × 20mm	 Screwdriver Slot	HSH-M		
			Finger Grip	HSH-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)

McGRAW-EDISON

Buss

Bussmann Division
McGraw-Edison Company
St. Louis, Missouri 63178
314 394 2877 Telex 44 841