


Typical applications protected by Ultra Quick fuse-links

more info in "Ultra Quick industry application.pdf"

DC drives			Power controls
Soft- starters			AC servo regulators-brushless
Frequency inverters			Thyristor switches
UPS			Variable power regulators
Power rectifiers			Voltage regulators
SSR- semiconductor relays			Welding inverters
Solbrakes			Temperature controlers
Batery chargers			Solar power
Traction inverters			Wind power

Ultra Quick Cross-Reference

The products on this cross-reference table are some of the most commonly used fuses for semiconductor protection.

Cylindrical

ETI	Bussmann	Ferraz	Siba
SIZE 10 x 38			
CH10/6A/690V	FMC 6A10F	E330088	603205
CH10/8A/690V	FMC 8A10F	F330039	603205
CH10/10A/690V	FMC 10A10F	G330110	603205
CH10/12A/690V	FMC 12A10F	H330011	603206
CH10/16A/690V	FMC 16A10F	K330012	603206
CH10/20A/690V	FMC 20A10F	K330013	603206
CH10/25A/690V	FMC 25A10F	L330014	603205
CH10/32A/690V	FMC 32A10F	V330278	-
SIZE 14 x 51			
CH14/10A/690V	FMP 10A14F	T093903	5012406
CH14/16A/690V	FMP 16A14F	W093905	5012406
CH14/20A/690V	FMP 20A14F	X093906	5012406
CH14/25A/690V	FMP 25A14F	Y093907	5012406
CH14/32A/690V	FMP 32A14F	Z093908	5012406
CH14/40A/690V	FMP 40A14F	A093909	5012406
CH14/50A/690V	FMP 50A14F	B093910	5058306
SIZE 22 x 58			
CH22/20A/690V	FMP 20A22F	-	5014006
CH22/25A/690V	FMP 25A22F	B093956	5014006
CH22/32A/690V	FMP 32A22F	Z094828	5014006
CH22/40A/690V	FMP 40A22F	S094822	5014006
CH22/50A/690V	FMP 50A22F	W094779	5014006
CH22/63A/690V	FMP 63A22F	T094823	5014006
CH22/80A/690V	FMP 80A22F	A094829	5014006
CH22/100A/500V	FMP 100A22F	Y094827	5014006



BS88 part 4 – 690V

ETI	Bussmann	Ferraz	GE
BS17			
BS17/63/25A/690V	ET25	M75985	G825
BS17/63/32A/690V	ET32	M075886	G5680
BS17/63/35A/690V	FE35	-	G5685
BS17/63/40A/690V	FE40	-	G5690
BS17/63/45A/690V	FE45	-	G5695
BS17/63/50A/690V	FE50	-	G5685
BS17/63/56A/690V	ET56	-	G5685
BS17/63/63A/690V	FE63	-	G5685
BS17/63/71A/690V	FE71	-	G5680
BS17/63/80A/690V	FE80	-	G5685
BS17/63/90A/690V	FE90	-	G5685
BS17/63/100A/690V	FE100	-	-
BS17D			
BS17D/70/90A/690V	ET90	A093959	G5685
BS17D/70/100A/690V	ET100	B093959	G56810
BS17D/70/120A/690V	FE120	B093959	G568125
BS17D/70/140A/690V	FE140	M75908	-
BS17D/70/160A/690V	FE160	M75909	G568160
BS38			
BS38/63/160A/690V	M160	0097166	G38100
BS38/63/180A/690V	M180	-	G56810
BS38/63/200A/690V	M200	-	G568190
BS38/63/250A/690V	M250	-	G568235
BS38/63/315A/690V	M315	-	G568300
BS38/63/350A/690V	M350	-	G568325
BS381			
BS381/83/200A/690V	MIM200	F097272	-
BS381/83/250A/690V	MIM250	0097275	-
BS381/83/315A/690V	MIM315	K097276	-
BS381/83/355A/690V	MIM355	S097278	-
BS381/83/400A/690V	MIM400	-	-
BS381/83/450A/690V	MIM450	-	G568400
BS381/83/500A/690V	MIM500	-	G568500
BS381/83/630A/690V	MIM630	-	-
BS381/83/700A/690V	MIM700	-	-



Square body type M: DIN 43620 – 690V

ETI	Bussmann	Ferraz	Siba
SIZE 00C			
M00/55A/690V	T0M162	X32043	-
M00/60A/690V	T0M163	X32047	-
M00/65A/690V	T0M164	F32051	-
M00/70A/690V	T0M165	F32055	-
M00/75A/690V	T0M166	G32059	-
M00/80A/690V	T0M167	V32063	-
M00/85A/690V	T0M168	X32065	-
M00/90A/690V	T0M169	D32069	-
M00/95A/690V	T0M170	R32071	-
M00/100A/690V	T0M171	H32075	-
SIZE 1			
M1/63A/690V	T0M3810	M32055	20.03.04
M1/68A/690V	T0M3811	K32039	20.03.04
M1/70A/690V	T0M3812	M32063	20.03.04
M1/75A/690V	T0M3813	X32065	20.03.04
M1/80A/690V	T0M3814	G32069	20.03.04
M1/85A/690V	T0M3815	E32071	20.03.04
M1/90A/690V	T0M3816	X32075	20.03.04
M1/95A/690V	T0M3817	M32079	20.03.04
M1/100A/690V	T0M3818	P32080	20.03.04
M1/105A/690V	T0M3819	S32083	20.03.04
SIZE 2			
M2/400A/690V	T0M5808	B32088	20.04.04
M2/450A/690V	T0M5809	D32085	20.04.04
M2/500A/690V	T0M5810	F32087	20.04.04
M2/630A/690V	T0M5812	H32089	20.04.04
SIZE 3			
M3/500A/690V	T0M6808	P32087	20.05.04
M3/630A/690V	T0M6810	R32089	20.05.04
M3/700A/690V	T0M6811	S32090	20.05.04
M3/800A/690V	T0M6812	T32091	20.05.04

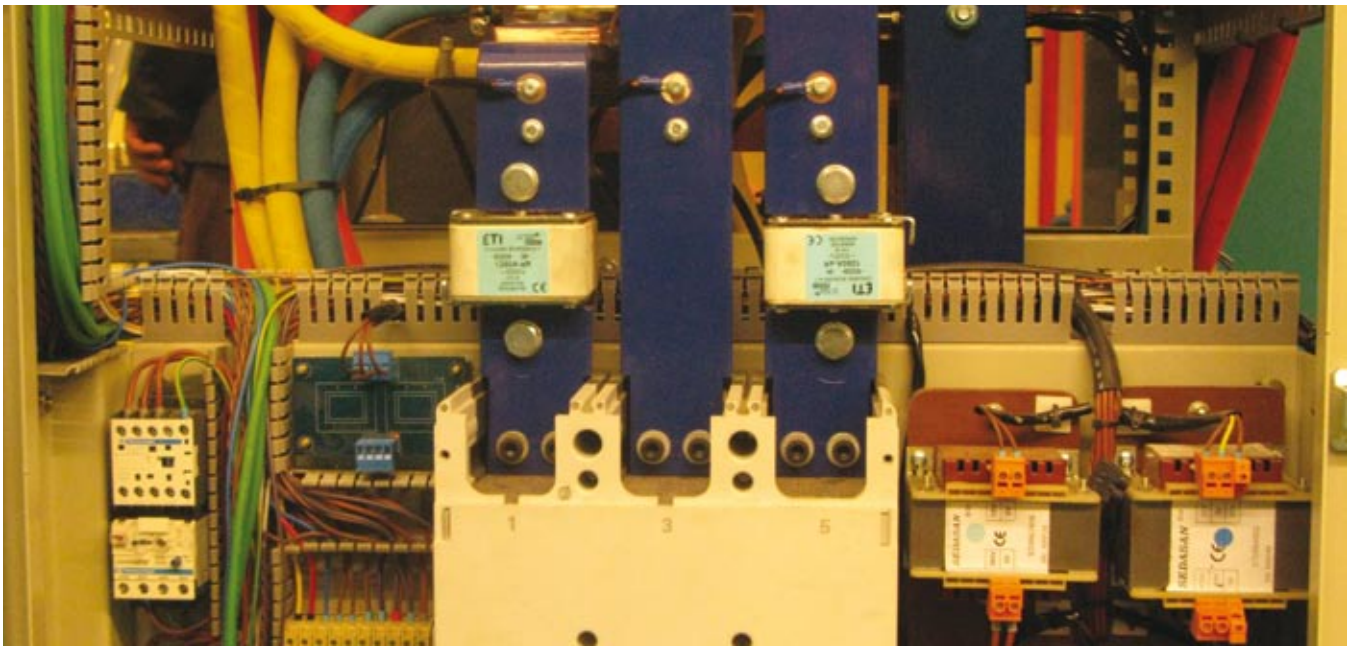


Square body type S: DIN 43653 – 690V

ETI	Bussmann	Ferraz	Siba
SIZE 00C			
S00C/80/63A/690V	T0M6262	R33027C	20.28.04
S00C/80/80A/690V	T0M6263	A330073	20.28.04
S00C/80/100A/690V	T0M6264	L330037	20.28.04
S00C/80/125A/690V	T0M6265	M330038	20.28.04
S00C/80/160A/690V	T0M6266	N330039	20.28.04
S00C/80/200A/690V	T0M6267	P330040	20.28.04
S00C/80/250A/690V	T0M6268	B33028	20.28.04
S00C/80/315A/690V	T0M6269	A330188	20.28.04
S00/80/350A/690V	T0M6270	B330189	20.28.04
S00/80/400A/690V	T0M6271	E330192	20.28.04
SIZE 1			
S1M/110/250A/690V	T0M6209	B00020C	20.27.34
S1M/110/315A/690V	T0M6210	K00021C	20.27.34
S1M/110/350A/690V	T0M6211	L02161C	20.27.34
S1M/110/400A/690V	T0M6212	A00027C	20.27.34
S1M/110/450A/690V	T0M6213	M00023C	20.27.34
S1M/110/500A/690V	T0M6214	N00024C	20.27.34
S1M/110/550A/690V	T0M6215	P00025C	20.27.34
S1M/110/630A/690V	T0M6216	Q00026C	20.27.34
S1M/110/700A/690V	T0M6217	R00027C	20.27.34
SIZE 2			
S2M/110/950A/690V	T0M6210	S00028C	20.27.34
S2M/110/550A/690V	T0M6211	S00018C	20.27.34
S2M/110/630A/690V	T0M6212	T00019C	20.27.34
S2M/110/700A/690V	T0M6213	R00027C	20.27.34
S2M/110/800A/690V	T0M6214	H00019C	20.27.34
S2M/110/900A/690V	T0M6215	X00019C	20.27.34
S2M/110/1000A/690V	T0M6216	Y00019C	20.27.34
SIZE 3			
S3M/110/630A/690V	T0M6210	V00026C	20.27.34
S3M/110/700A/690V	T0M6211	W00026C	20.27.34
S3M/110/800A/690V	T0M6212	X00026C	20.27.34
S3M/110/900A/690V	T0M6213	Y00019C	20.27.34
S3M/110/1000A/690V	T0M6214	Z00019C	20.27.34
S3M/110/1250A/690V	T0M6216	B00026C	20.27.34
S3M/110/1400A/690V	T0M6217	C00026C	20.27.34



Ultra Quick Application



Support for Ultra Quick

Cross-reference on internet

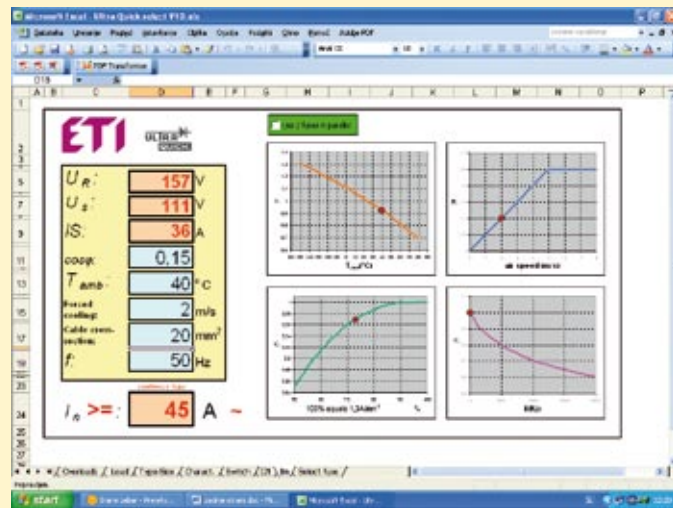
for MRO (maintenance replacement operation)

Find fuse, technical data in catalogue by press button "Search ETI part number"

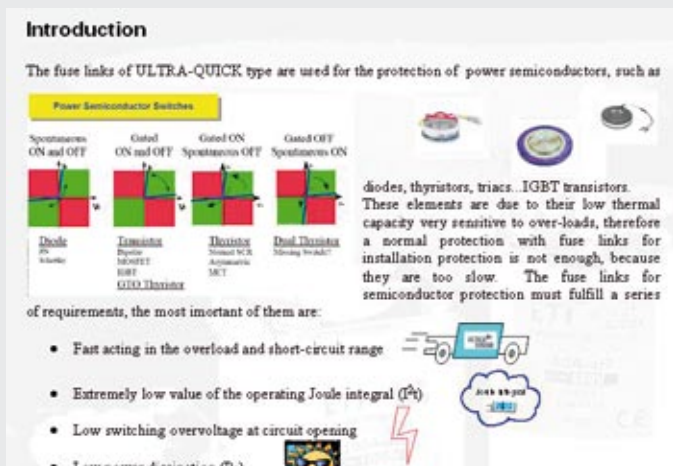


Software Ultra Quick select

for OEM (original equipment manufacturer)



Application guide



Fuses for semiconductor devices protection

General information

Fuses are the oldest protective devices in the electrical industry. Because of the advantageous features, fuses have been and are used in an extensive fields of applications – one of them is protection of semiconductor devices (diodes, thyristors, power transistors, GTO) in current and frequency converters. Semiconductor devices are being produced with high maximum continuous currents and peak inverse voltages. Unfortunately, that devices still have poor overload capacities and continue to need sensitive and fast-acting protection.

ETI fuses for semiconductor protection series ULTRA-QUICK are optimal solution for the protection of power semiconductors.

General informations about fuse marking

Fuse marking consists of two letters, where the first letter describes the breaking ranges

a - partial range

Operates by all currents between the lowest current indicated on its operating time current characteristic and its rated breaking capacity.

g - full range

Operates by all currents which cause the melting of the fuse element up to its rated breaking capacity

The second letter describes the applications (characteristics or utilization category).

- L** – mainly for conductor protection
- B** – mining equipment
- M** – motor circuit and switching devices protection
- R** – semiconductor protection
- Tr** – transformers protection

The combination of “breaking ranges” and “applications” indicate many combinations describes in standards and technical report IEC TR 61818 “Application-guide for low voltage fuses”

- | | | |
|----------------|-------------------------|--|
| gL: | Full range | - general application, mainly for conductor protection |
| aM: | Partial range (back-up) | - short-circuit protection of motor circuit |
| gR, gS: | Full range | - semiconductor protection |
| aR: | Partial range (back-up) | - semiconductor protection |
| gB: | Full range | - mining equipment protection |
| gTr: | Full range | - transformer protection |

ETI fuses for semiconductor protection series “ULTRA-QUICK” comply with the IEC 60269 and VDE 0636 series standard. A list of the standards for characteristics and dimensions is included below:

- IEC 60269-4: Supplementary requirements for fuselinks for the protection of semiconductor devices
- IEC 60269-4-1: Examples of standardized fuses
- IEC 60269-3-1: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications)
- IEC 60269-2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) for the protection of semiconductor devices
- DIN 43 620, DIN 43 653
- VDE 0636-201 Niederspannungssicherungen (NH-System)
- DIN EN 60269-4, VDE 0636 Teil 40 Niederspannungssicherungen Teil 4: Zusätzliche Anforderung an
- BS 88 Part 4

Fuse-links as protective equipment for semiconductors should ensure that the following conditions are met:

- Interruption should be effected quickly enough to prevent damage to other devices
- Interruption should take place before damage to semiconductor devices – quick action
- High rated breaking capacity
- High d.c. switching capacity
- High current limitation
- Operation of the protective equipment should not cause unacceptably high over-voltages to be impressed on any of the semiconductor devices – low arc voltage

Selecting the fuses for semiconductor protection (FSP)

What the user should know about FSP to be able to select the best FSP for his special purpose?

In practice, there exist no common regulations covering FSPs, except IEC60146-6, “Applications guide for the protection of semiconductor converters against overcurrent by fuses”. The object of this report is to advise on the specific fuse features and on the specific converter features which are to be observed to ensure correct application of FSP in converters, and to give specific recommendations for trouble-free operation of converters protected by fuses.

Before the fuse selection the user must be fully aware of the conditions under which the FSP is to function. This applies to normal service conditions as well as to conditions during fault. Here is few basic suggestions for FSP selection:

A: The load current through the semiconductor (I_{sem}) should be lower or equal as the rated current of the selected fuse-link (I_{nv}). For continuous duty the FSP can withstand this current indefinitely. In case of pulsed current, the user should consult ETI.

$$I_{sem} \leq I_{nv}$$

B: The operating voltage on the semiconductor (U_{sem}) should be lower or equal as the rated voltage of the fuse-link (U_{nv}). Consult ETI with respect to a.c. and d.c. applied voltage, time constant and power factor.

$$U_{sem} \leq U_{nv}$$

C: The operating (pre-arcing + arcing) I^2t values of the selected fuse-link (I^2t_{opv}) should be lower than I^2t of the semiconductor (I^2t_{sem}). Consult ETI with respect to parallel operation, discrimination and loss of coordination at higher fault levels

$$I^2t_{opv} < I^2t_{sem}$$

D: For other current rating, which are not included in this catalogue, please consult ETI R&D department.

Short product range review of fuses for semiconductor protection series ULTRA-QUICK

Systems	Types	Sizes	Rated current	Rated voltage	Characteristic	Pages
DO		D01, D02	2A – 63A	400V	gR	6
D		DI, DII, DIII, DIV, DV	2A – 200A	500V	gR	7
C		CH10	6A – 32A	600V	aR	8
		CH14, CH-S 14	6A – 50A	690V	aR	8
		CH22, CH-S 22	20A – 100A	690V	aR	8
BS		BS8, BS17, BS38, BS38T	6A – 800A	240V	aR	9
		BS8, BS17, BS17D, BS38, BS38T	6A – 700A	690V	aR	10
NV/NH 50 kA	M	00C, 00, 0, 1, 2, 3	6A – 630A	690V	aR/gR	11-12
	S80mm	00C, 00	6A – 160A	690V	aR/gR	13
	S97mm	0	6A – 160A	690V	aR/gR	13
	S110mm	1, 2, 3	35A – 630A	690V	aR/gR	14
NV/NH 200 kA	M	00	10A – 250A	690V	aR	15
		1, 2, 3	63A – 800A	690V	aR	16
	S80mm	00C, 00	10A – 400A	690V	aR	17
		1, 2, 3	80A – 1400A	690V	aR	18
	S110mm	1, 2, 3	80A – 1400A	690V	aR	19
	G	1, 2, 3	80A – 1400A	690V	aR	20
	M	0	32A – 160A	1000V	aR	21
		1, 2, 3	80A – 630A	1200V	aR	22
	S80mm	00	32A – 315A	1000V	aR	23
	S110mm	1, 2, 3	63A – 1250A	1000V	aR	24
	G	1, 2, 3	63A – 1250A	1000V	aR	25
	M, striker	00C	10A – 160A	690V	gR	26
		1, 2, 3	35A – 630A	690V	gR	27
	M, S150mm	4, 4a	800A – 1600A	500V	gR	28
	S80mm	00C	10A – 160A	690V	gR	29
	S110mm	1, 2, 3	80A – 630A	690V	gR	30
	G	1, 2, 3	35A – 630A	500V	gR	31
	M	00C, 00	16A-160A	690V	gS	32
		1, 2, 3	160A - 630A	690V	gS	33
		S110mm	1,2,3	160A-630A	690V	gS
Accessories					35-36	

Marking of fuses for semiconductor protection series ULTRA-QUICK:

1. System D and D0

D0-fuse links

D01	UQ	2A
D02		max. 63A

size trade mark current

D-fuse links

DI	UQ	2A
DII		max. 200A
DIII		
DIV		
DV		

size trade mark current

2. System BS and NV/NH

BS - fuse links

BS	8	UQ	38	2A	240V
	17		41	max. 800A	690V
	17D		59		
	38		63		
	38T		64		
			70		
			83		

type diameter (T-twin, D-double) trade mark length current voltage

NV/NH - fuse links

S	00	M	UQ	U	/80	/10A	/690V
M	0	*		U-N	110	max. 1600A	500V
G	00C				97		1000V
	1						1200V
	2						
	3						
	4						
	4a						

type size micro-switch trade mark 50kA breaking capacity distance current voltage

3. System C

CH - fuse links

CH	22	UQ	/2A	/600V
CH-S	14		max. 100A	690V
	10			500V

type size trade mark current voltage

Operation indicators of ULTRA-QUICK fuse links

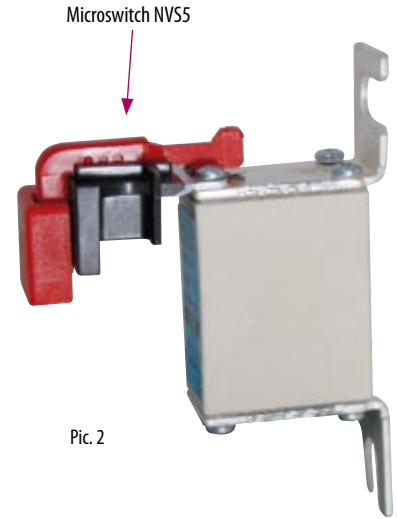
The operation-sensing device is a fine wire which is connected in parallel with the fuse melting element. This wire is used to hold in a flag (made of thin metal band) usually placed on the upper cover. When the wire breaks because of fuse operate, the flag is pushed out and in this way an indication of operation is given.

The indicator on pic.1 is a visual indication of fuse operating. When only indication is not enough, we offering possibility to add a microswitch NV55 on the upper cover for remote signalling of fuse operating (Pic.2).

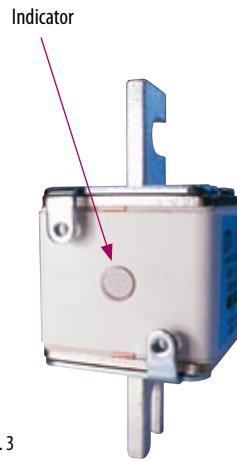
Another type of signalling of fuse operating is indicator, called "middle". It is located in the center of the ceramic body in front of the fuse link. After fuse operation, the particular plastic striker is pushed out from the ceramic body (Pic.3).



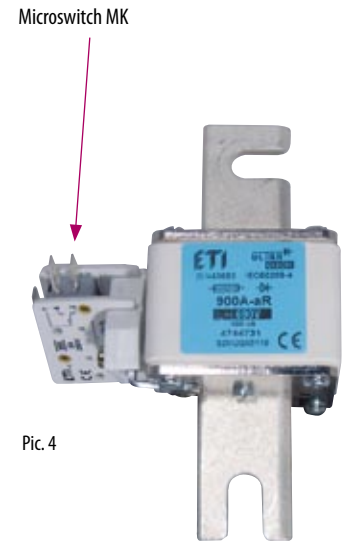
Pic. 1



Pic. 2

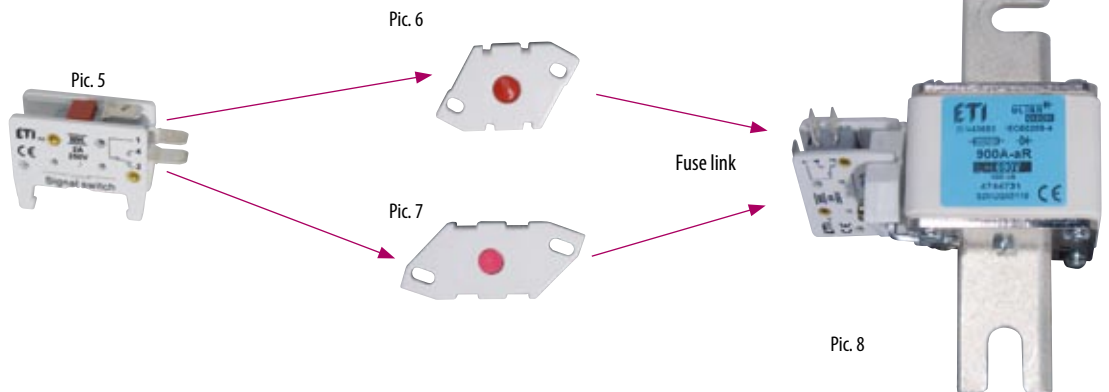


Pic. 3



Pic. 4

For remote signaling we offering microswitch MK (Pic.4 and Pic.5) mounted on additional adapters AMK (Pic.6 and Pic.7)



The purpose of adapters AMK1 and AMK2 are microswitch type MK setting up on the fuse link body of sizes for 690V and 1000V.

index

Code no.	page	Code no.	page	Code no.	page	Code no.	page
00262		004301121	23	004304522	25	004312005	6
002625005	8	004303112	24	004304523	25	00432	
002625006	8	004303113	24	004304525	25	004321001	7
002625007	8	004303114	24	004304526	25	004321002	7
002625008	8	004303115	24	004304527	25	004321003	7
002625009	8	004303116	24	004304528	25	004321004	7
002625011	8	004303117	24	004304621	25	004321005	7
002625013	8	004303119	24	004304622	25	004321006	7
002625015	8	004303121	24	004304623	25	004321007	7
00263		004303122	24	004304625	25	004322001	7
002635007	8	004303123	24	004304626	25	004322002	7
002635008	8	004303125	24	004304627	25	004322003	7
002635009	8	004303126	24	004304628	25	004322004	7
002635011	8	004303512	25	004304721	24	004322005	7
002635013	8	004303513	25	004304722	24	004322006	7
002635015	8	004303514	25	004304723	24	004322007	7
002635017	8	004303515	25	004304725	24	004322008	7
002635019	8	004303516	25	004304726	24	004323001	7
002635107	8	004303517	25	004304727	24	004323002	7
002635108	8	004303519	25	004304728	24	004323003	7
002635109	8	004303521	25	004305126	24	004324001	7
002635111	8	004303522	25	004305128	24	004324002	7
002635113	8	004303523	25	004305129	24	004325001	7
002635115	8	004303525	25	004305130	24	004325002	7
002635117	8	004303526	25	004305132	24	004325003	7
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002645017	8	004303617	25	004305532	25	004331007	13
002645019	8	004303619	25	004305533	25	004331008	13
002645021	8	004303621	25	004305534	25	004331009	13
002645023	8	004303622	25	004305626	25	004331010	13
002645025	8	004303623	25	004305628	25	004331011	13
002645111	8	004303625	25	004305629	25	004331012	13
002645113	8	004303626	25	004305630	25	004331013	13
002645115	8	004303712	24	004305632	25	004331014	13
002645117	8	004303713	24	004305633	25	004331018	11
002645119	8	004303714	24	004305634	25	004331019	11
002645121	8	004303715	24	004305726	24	004331020	11
002645123	8	004303716	24	004305728	24	004331021	11
002645125	8	004303717	24	004305729	24	004331022	11
00430		004303719	24	004305730	24	004331023	11
004301108	23	004303721	24	004305732	24	004331024	11
004301110	23	004303722	24	004305734	24	004331025	11
004301111	23	004303723	24	00431		004331026	11
004301112	23	004303725	24	004311001	6	004331027	11
004301113	23	004303726	24	004311002	6	004331028	11
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004301115	23	004304122	24	004311004	6	004331102	13
004301116	23	004304123	24	004311005	6	004331103	13
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