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 rectifires

Voltage regulators

SSR- semiconductor relays

Welding inverters

Solbrakes

Temperature controlers

Batery chargers

Solar power

Traction inverters

Wind power

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/600V	FWC-6A10F	E330008	60 03 205
CH10/8A/600V	FWC-8A10F	F330009	60 03 205
CH10/10A/600V	FWC-10A10F	G330010	60 03 205
CH10/12A/600V	FWC-12A10F	H330011	60 06 306
CH10/16A/600V	FWC-16A10F	J330012	60 06 306
CH10/20A/600V	FWC-20A10F	K330013	60 06 306
CH10/25A/600V	FWC-25A10F	L330014	60 03 305
CH10/32A/600V	FWC-32A10F	V330278	-
SIZE 14 x 51			
CH14/10A/690V	FWP-10A14F	T093903	50 12 406
CH14/12A/690V	-	-	-
CH14/16A/690V	FWP-15A14F	W093905	50 12 406
CH14/20A/690V	FWP-20A14F	X093906	50 12 406
CH14/25A/690V	FWP-25A14F	Y093907	50 12 406
CH14/32A/690V	FWP-32A14F	Z093908	50 12 406
CH14/40A/690V	FWP-40A14F	A093909	50 12 406
CH14/50A/690V	FWP-50A14F	B093910	50 05 806
SIZE 22 x 58			
CH22/20A/690V	FWP-20A22F	-	50 14 006
CH22/25A/690V	FWP-25A22F	B093956	50 14 006
CH22/32A/690V	FWP-32A22F	Z094828	50 14 006
CH22/40A/690V	FWP-40A22F	S094822	50 14 006
CH22/50A/690V	FWP-50A22F	W094779	50 14 006
CH22/63A/690V	FWP-63A22F	T094823	50 14 006
CH22/80A/690V	FWP-80A22F	A094829	50 14 006
CH22/100A/500V	FWP-100A22F	Y094827	50 14 006

BS88 part 4 – 690V


ETI	Bussmann	Ferraz	GE
BS17			
BS17/63/25A/690V	ET25	J075885	GSB25
BS17/63/32A/690V	ET32	K075886	GSGB30
BS17/63/35A/690V	FE35	-	GSGB35
BS17/63/40A/690V	FE40	-	GSGB40
BS17/63/45A/690V	FE45	-	GSGB45
BS17/63/50A/690V	FE50	-	GSGB55
BS17/63/56A/690V	ET56	-	GSGB55
BS17/63/63A/690V	FE63	-	GSGB55
BS17/63/71A/690V	FE71	-	-
BS17/63/80A/690V	FE80	-	GSGB80
BS17/63/90A/690V	FE90	-	GSGB85
BS17/63/100A/690V	FE100	-	-
BS17D			
BS17D/70/90A/690V	EET90	A099959	GSGB85
BS17D/70/110A/690V	EET110	B099959	GSGB110
BS17D/70/120A/690V	FEE120	B099959	GSGB125
BS17D/70/140A/690V	FEE140	J075908	-
BS17D/70/160A/690V	FEE160	K075909	GSGB160
BS38			
BS38/83/160A/690V	MT160	Q097166	GSB100
BS38/83/180A/690V	FM180	-	GSGB170
BS38/83/200A/690V	FM200	-	GSGB190
BS38/83/250A/690V	FM250	-	GSGB235
BS38/83/315A/690V	FM315	-	GSGB300
BS38/83/350A/690V	FM350	-	GSGB325
BS38T			
BS38T/83/200A/690V	MMT200	F097272	-
BS38T/83/225A/690V	MMT225	J097275	-
BS38T/83/315A/690V	MMT315	K097276	-
BS38T/83/355A/690V	MMT355	S0972783	-
BS38T/83/400A/690V	FMM400	-	-
BS38T/83/450A/690V	FMM450	-	GSGB400
BS38T/83/500A/690V	FMM500	-	GSGB500
BS38T/83/630A/690V	FMM630	-	-
BS38T/83/700A/690V	FMM700	-	-



Square body type M: DIN 43620 – 690V

ETI	Bussmann	Ferraz	Siba
SIZE 00C			
M00/35A/690V	170M1562	X322043	-
M00/40A/690V	170M1563	B322047	-
M00/50A/690V	170M1564	F322051	-
M00/63A/690V	170M1585	K322055	-
M00/80A/690V	170M1566	Q320059	-
M00/100A/690V	170M1567	V320063	-
M00/125A/690V	170M1568	X320065	-
M00/160A/690V	170M1569	N320069	-
M00/200A/690V	170M1570	D320071	-
M00/250A/690V	170M1571	H320075	-
SIZE 1			
M1/63A/690V	170M3810	M320355	20 00 304
M1/80A/690V	170M3811	K320399	20 00 304
M1/100A/690V	170M3812	W320363	20 00 304
M1/125A/690V	170M3813	Y320365	20 00 304
M1/160A/690V	170M3814	C320369	20 00 304
M1/200A/690V	170M3815	E320371	20 00 304
M1/250A/690V	170M3816	J320375	20 00 304
M1/315A/690V	170M3817	N320379	20 00 304
M1/350A/690V	170M3818	P320380	20 00 304
M1/400A/690V	170M3819	S320383	20 00 304
SIZE 2			
M2/400A/690V	170M5808	B320483	20 00 404
M2/450A/690V	170M5809	D320485	20 00 404
M2/500A/690V	170M5810	F320487	20 00 404
M2/630A/690V	170M5812	H320489	20 00 404
SIZE 3			
M3/500A/690V	170M6808	P320587	20 00 504
M3/630A/690V	170M6810	R320589	20 00 504
M3/710A/690V	170M6811	S320590	20 00 504
M3/800A/690V	170M6812	T320591	20 00 504

Square body type G: DIN 43653 – 690V

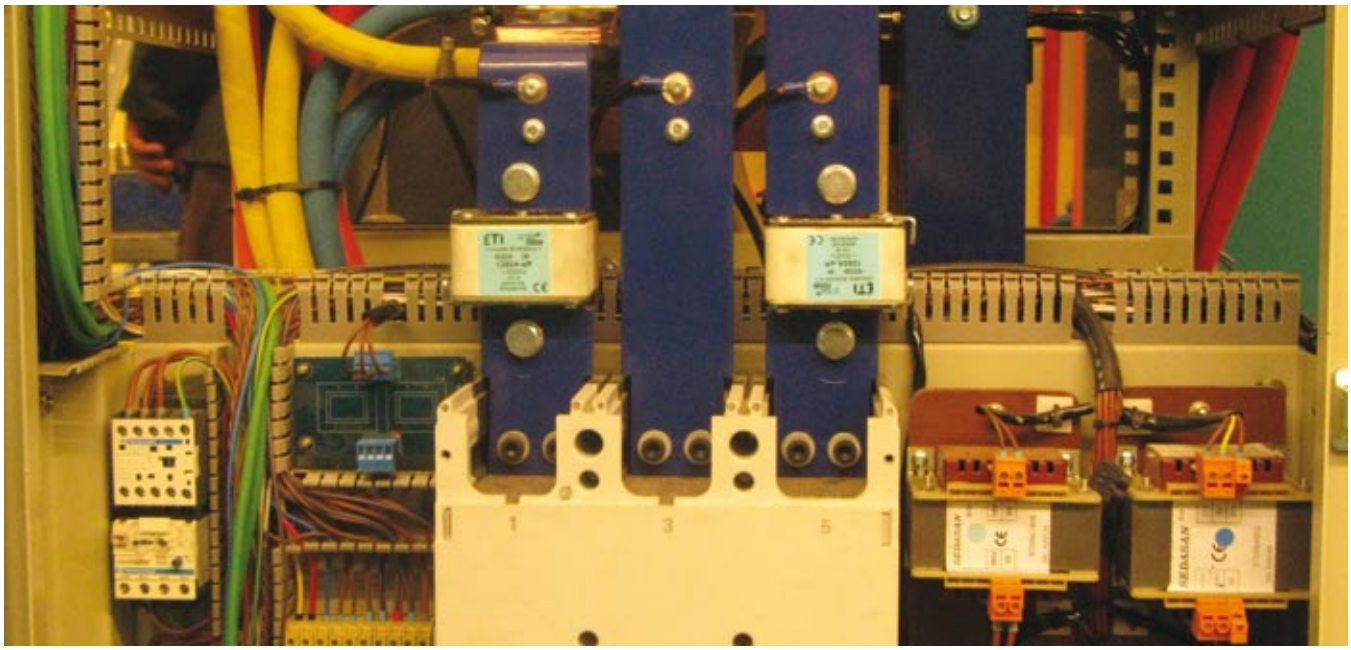
ETI	Bussmann	Ferraz	Siba
SIZE 1			
G1M/250A/690V	170M4459	Y300056C	20 325 20
G1M/315A/690V	170M4460	M302162C	20 325 20
G1M/350A/690V	170M4461	A300058C	20 325 20
G1M/400A/690V	170M4462	B300059C	20 325 20
G1M/450A/690V	170M4463	S300005C	20 325 20
G1M/500A/690V	170M4464	T300006C	20 325 20
G1M/550A/690V	170M4465	H300479	20 325 20
G1M/630A/690V	170M4466	W300008C	20 325 20
G1M/710A/690V	170M4467	K300481	20 325 20
SIZE 2			
G2M/500A/690V	170M5460	K300067C	20 334 22
G2M/550A/690V	170M5461	R300464	20 334 22
G2M/630A/690V	170M5462	L300068C	20 334 22
G2M/710A/690V	170M5463	N300070C	20 334 22
G2M/800A/690V	170M5464	P300071C	20 334 22
G2M/900A/690V	170M5465	W300468	20 334 22
G2M/1000A/690V	170M5466	X300469	20 334 22
SIZE 3			
G3M/630A/690V	170M6460	X300078	20 343 22
G3M/710A/690V	170M6461	Y300079C	20 343 22
G3M/800A/690V	170M6462	Z300080C	20 343 22
G3M/900A/690V	170M6463	B300450	20 343 22
G3M/1000A/690V	170M6464	B300082C	20 343 22
G3M/1250A/690V	170M6466	D300084C	20 343 22
G3M/1400A/690V	170M6467	F300454	20 343 22


Square body type S: DIN 43653 – 690V

ETI	Bussmann	Ferraz	Siba
SIZE 00C			
S00C/80/63A/690V	170M2662	R330272C	20 28 204
S00C/80/80A/690V	170M2663	A330073	20 28 204
S00C/80/100A/690V	170M2664	L330037	20 28 204
S00C/80/125A/690V	170M2665	M330038	20 28 204
S00C/80/160A/690V	170M2666	N330039	20 28 204
S00C/80/200A/690V	170M2667	P330040	20 28 204
S00C/80/250A/690V	170M2668	B330028	20 28 204
S00C/80/315A/690V	170M2669	A330188	20 28 204
S00/80/350A/690V	170M2670	B330189	20 28 204
S00/80/400A/500V	170M2671	E330192	20 28 204
SIZE 1			
S1M/110/250A/690V	170M4209	J300020C	20 27 134
S1M/110/315A/690V	170M4210	K300021C	20 27 134
S1M/110/350A/690V	170M4211	L302161C	20 27 134
S1M/110/400A/690V	170M4212	A300127C	20 27 134
S1M/110/450A/690V	170M4213	M300023C	20 27 134
S1M/110/500A/690V	170M4214	N300024C	20 27 134
S1M/110/550A/690V	170M4215	P200025C	20 27 134
S1M/110/630A/690V	170M4216	Q300026C	20 27 134
S1M/110/710A/690V	170M4217	R300027C	20 27 134
SIZE 2			
S2M/110/500A/690V	170M5210	S300258C	20 27 434
S2M/110/550A/690V	170M5211	S300189C	20 27 434
S2M/110/630A/690V	170M5212	T300190C	20 27 434
S2M/110/710A/690V	170M5213	R300027C	20 27 434
S2M/110/800A/690V	170M5214	H300709C	20 27 434
S2M/110/900A/690V	170M5215	X300193C	20 27 434
S2M/110/1000A/690V	170M5216	Y300194C	20 27 434
SIZE 3			
S3M/110/630A/690V	170M6210	V300260C	20 27 734
S3M/110/710A/690V	170M6211	W300261C	20 27 734
S3M/110/800A/690V	170M6212	X300262C	20 27 734
S3M/110/900A/690V	170M6213	Y300194C	20 27 734
S3M/110/1000A/690V	170M6214	Y300194	20 27 734
S3M/110/1250A/690V	170M6216	B300266C	20 27 734
S3M/110/1400A/690V	170M6217	C300267C	20 27 734

Ultra Quick Cross-Reference

Ultra Quick Application



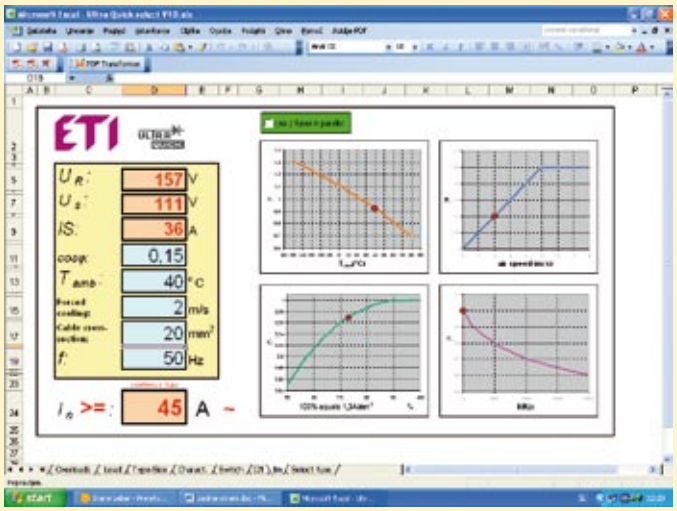
Support for Ultra Quick

Cross-reference on internet

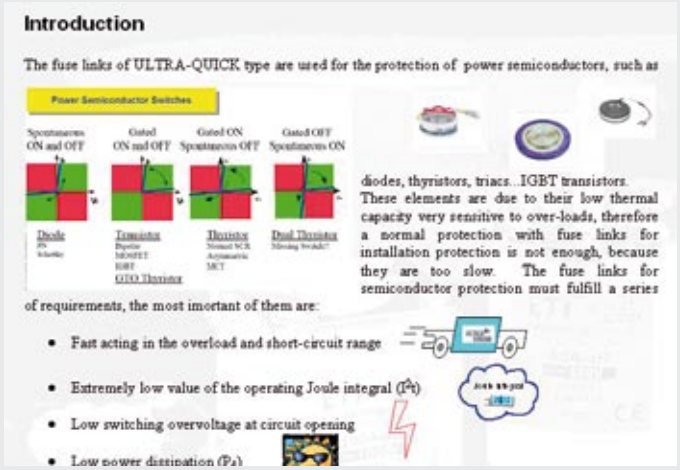
for MRO (maintenance replacement operation)

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

Software Ultra Quick select
for OEM (original equipment manufacturer)



Application guide



Introduction

The fuse links of ULTRA-QUICK type are used for the protection of power semiconductors, such as diodes, thyristors, triacs...IGBT transistors. These elements are due to their low thermal capacity very sensitive to over-loads, therefore a normal protection with fuse links for installation protection is not enough, because they are too slow. The fuse links for semiconductor protection must fulfill a series of requirements, the most imortant of them are:

- Fast acting in the overload and short-circuit range
- Extremely low value of the operating Joule integral (I^2t)
- Low switching overvoltage at circuit opening
- Low power dissipation (P_d)

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

g - full range
Opearates 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 householdand 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: Zusätliche 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 convertors against overcurrent by fuses". The object of this report is to advise on the specific fuse features and on the specific convertor features which are to be observed to ensure correct application of FSP in convertors, and to give specific recommendations for trouble-free operation of convertors 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 (Isem) should be lower or equal as the rated current of the selected fuse-link (Inv). For continuous duty the FSP can withstand this current indefinetly. In case of pulsed current, the user should consult ETI.

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

B: The operating voltage on the semiconductor (Usem) should be lower or equal as the rated voltage of the fuse-link (Unv). 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
D0		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	34
Accessories						35-36

Marking of fuses for semiconductor protection series ULTRA-QUICK:

1. **System D and D0**

D0-fuse links

size	trade mark	current
D01	UQ	2A
D02		max. 63A

D-fuse links

size	trade mark	current
DI	UQ	2A
DII		max. 200A
DIII		
DIV		
DV		

2. **System BS and NV/NH**

BS - fuse links

type	diameter (T-twin, D-double)	trade mark	length	current	voltage
BS	8	UQ	38	2A	240V
	17		41	max. 800A	690V
	17D		59		
	38		63		
	38T		64		
			70		
			83		

NV/NH - fuse links

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

3. **System C**

CH - fuse links

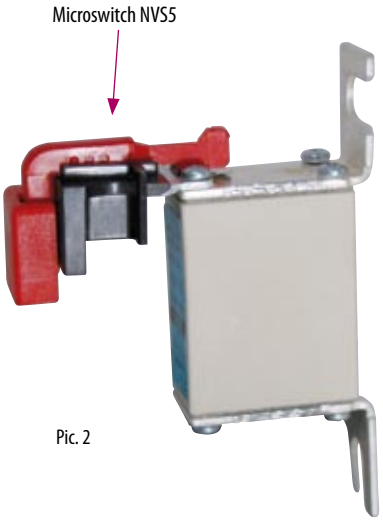
type	size	trade mark	current	voltage
CH	22	UQ	/2A	/600V
CH-S	14		max. 100A	690V
	10			500V

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.

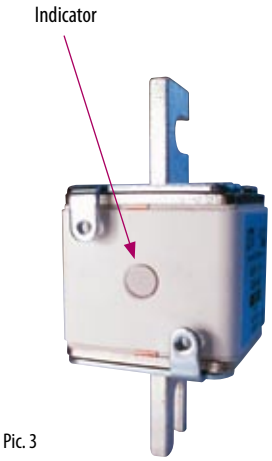
The indicator on pic.1 is a visual indication of fuse operating. When only indication is not enough, we offering possibility to add a microswitch NVS5 on the upper cover for remote signalling of fuse operating (Pic.2).

Pic. 1

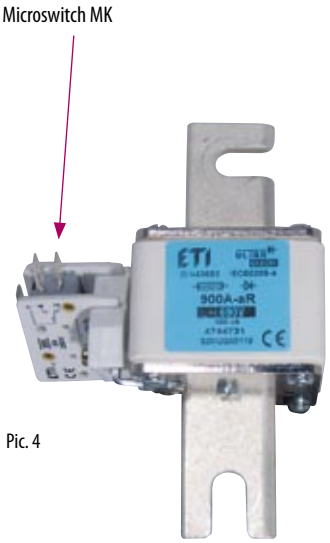


Pic. 2

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).

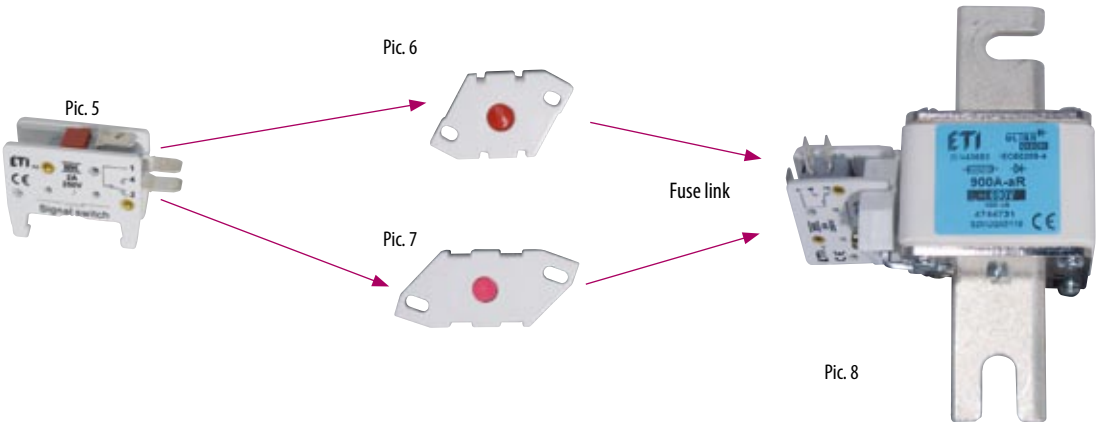


Pic. 3



Pic. 4

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



Pic. 8

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

index

index