

# Fuses for railway applications

## Application:

- ✓ for protection of railway installations
- ✓ for protection of high voltage switchgear



**ETI Elektroelement d.d.**

Obrezija 5, SI - 1411 Izlake  
Slovenija

Tel. + 386 03 56 57 570

Faks + 386 03 56 74 077

eti@eti.si

# Fuses for railway applications

## Advantages

ETI's Railway Fuses successfully combine two usually conflicting fuse requirements:

- ✦ **low operating joule integral**, necessary for the protection of semiconductors,
- ✦ **low power dissipation**, allowing for lower energy losses and thus **lower operating costs**, following the latest ecological trends.

These unique technical characteristics are achieved by a completely **new design of the ceramic body**, a special construction developed on the basis of long standing expert knowledge, which allows for significantly better cooling of the fuse.

The operation of fuses is especially **adapted for railway applications**, as they have **improved resistance to current cyclic loading**, a phenomenon that causes unnecessary fuse operating in these applications. This way, ETI's Railway Fuses help **decrease downtime** significantly, leading to further **cost savings** and **improved efficiency**.

The melting element inside Railway Fuses is made of silver, which makes them **highly insensitive to ageing** processes.

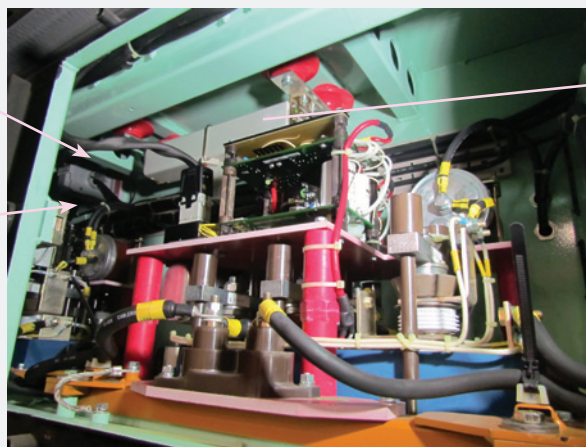
ETI Railway fuse-links ensure short circuit protection from minimum breaking capacity ( $5 \times I_n$ ) up to maximum breaking capacity 30kA d.c. at time constant 15ms.

## Application

Protection of DC link and semiconductor devices (diodes, thyristors, GTO) in railway inverters.

## Standards

ETI Railway Fuses comply with the IEC 60269-4 and IEC 60077-5 standards.



Application of DC 4000V fuse links inside a railway inverter

# NH1S/394/DC 4000V aR-fuse link

General characteristics	
Rated voltage	4000V d.c. (L/R=15ms)
Breaking capacity	30kA d.c.
Characteristics	aR
Standard	IEC 60269-4 , IEC 60077-5
Application	Heating system in railway vagon

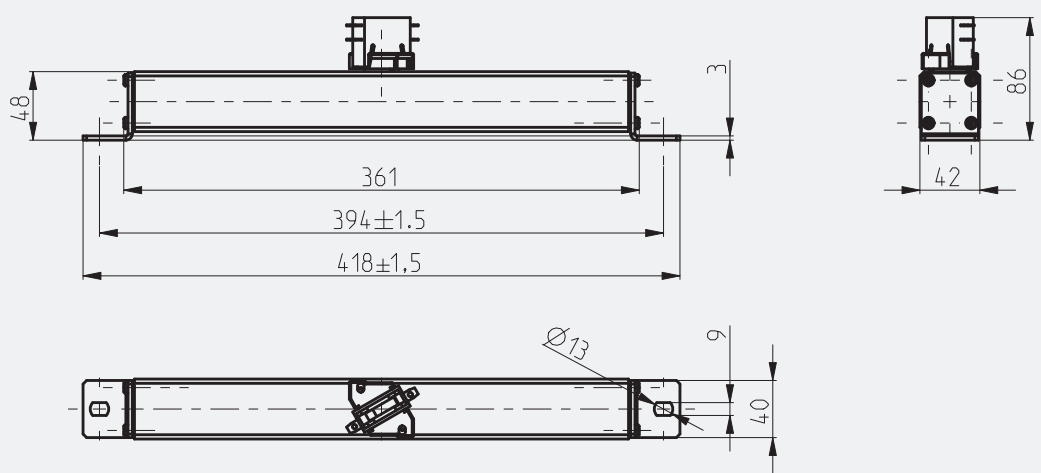
RAILWAY fuse link							
$I_n$ [A]	Code No. Type with centre trip indicator for microswitch MK	Code No. Type without centre trip indicator for microswitch MK	Power dissipation [W]	Pre-arcing Joule integral [A <sup>2</sup> s]	Operating Joule integral [A <sup>2</sup> s] (L/R=15ms)	Weight [g]	Pack. [pcs]
25	004735615	004735627	43	28	150	1800	1/1
32	004735616	004735628	65	40	300		
40	004735617	004735629	88	63	600		
50	004735618	004735630	105	112	1.400		
63	004735619	004735631	105	252	2.500		
80	004735620	004735632	114	494	5.500		
100	004735621	004735633	115	1.147	10.000		
125	004735622	004735634	132	2.168	19.000		
150	004735623	004735635	155	3.388	31.000		

Note: microswitch MK and adapter AMK1 must be ordered separately

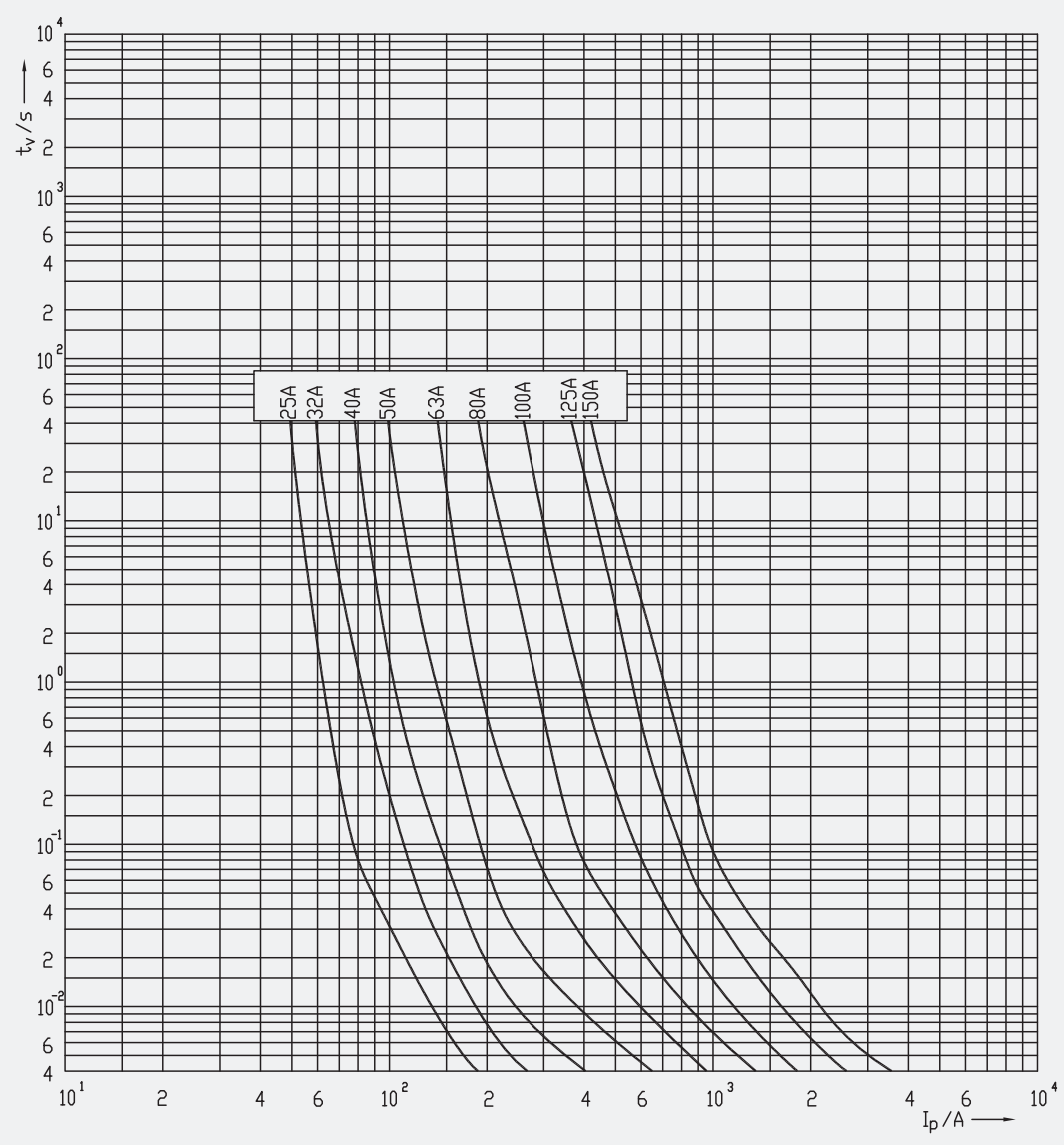
Accessories				
$I_n$ [A]	Type	Code No.	Weight [g]	Pack. [pcs]
2A	Microswitch MK 	004349003	10	1/1
	Adapter AMK1 	004349001	15	1/1



## Dimensions



## I/t characteristics




# NH2 S/394/ DC 4000V aR - fuse link

General characteristics	
Rated voltage	4000V d.c. (L/R=15ms), rated test voltage 4200V d.c.
Breaking capacity	30kA d.c.
Characteristic	aR
Standards	IEC 60269-4, IEC 60077-5
Application	Fuse link for DC link protection of railway inverter.

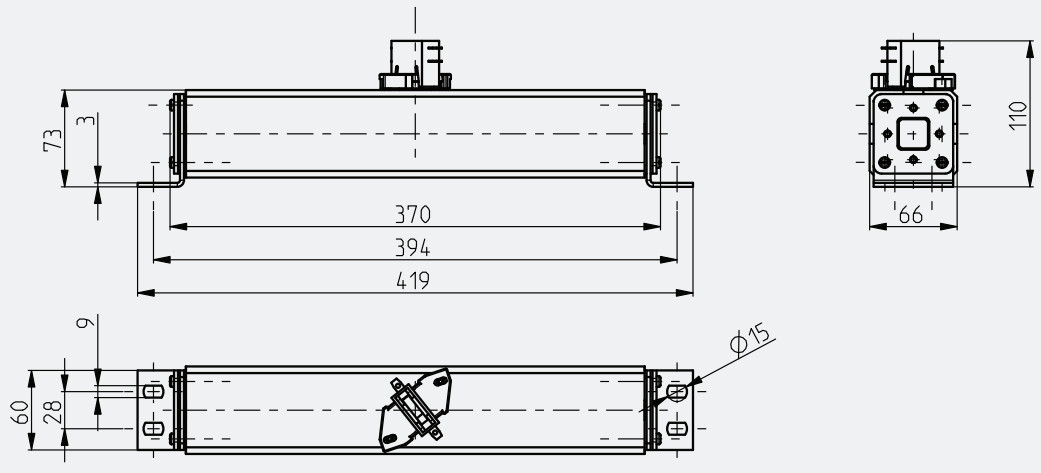
RAILWAY fuse link							
I <sub>n</sub> [A]	Code No. Type with centre trip indicator for microswitch MK	Code No. Type without centre trip indicator for microswitch MK	Power dissipation [W]	Pre-arcing Joule integral [A <sup>2</sup> s]	Operating Joule integral [A <sup>2</sup> s] (L/R=15ms)	Weight [g]	Pack. [pcs]
100	004735601	004735606	58	2.300	20.000	3500	1/1
125	004735602	004735607	82	3.700	33.000		
160	004735603	004735608	100	5.800	55.000		
200	004735604	004735609	127	10.000	100.000		
250	004735605	004735610	160	21.000	180.000		

Note: microswitch MK and adapter AMK2 must be ordered separately

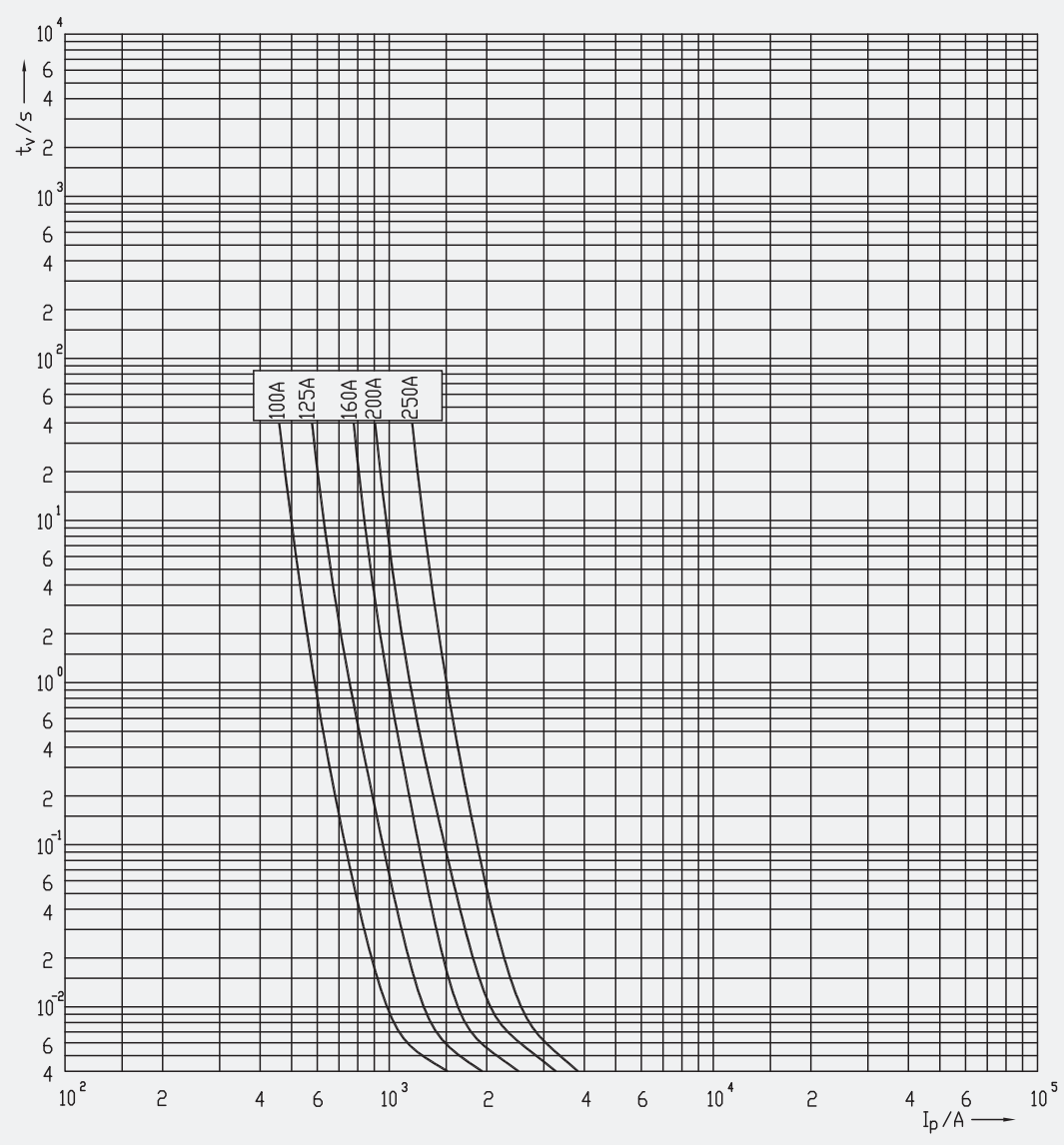
Accessories				
I <sub>n</sub> [A]	Type	Code No.	Weight [g]	Pack. [pcs]
2A	Microswitch MK 	004349003	10	1/1
	Adapter AMK2 	004349002	23	1/1



## Dimensions



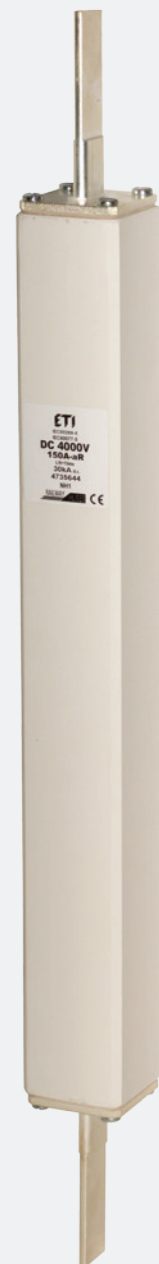
## I/t characteristics



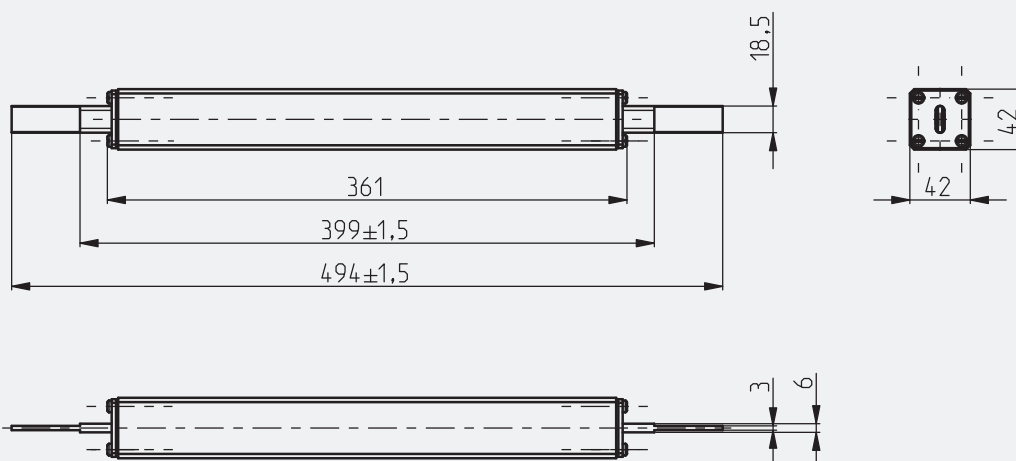
# NH1 /350/DC 4000V aR-fuse link

General characteristics	
Rated voltage	4000V d.c. (L/R=15ms)
Breaking capacity	30kA d.c.
Characteristics	aR
Standard	IEC 60269-4, IEC 60077-5
Application	Heating system in railway vagon

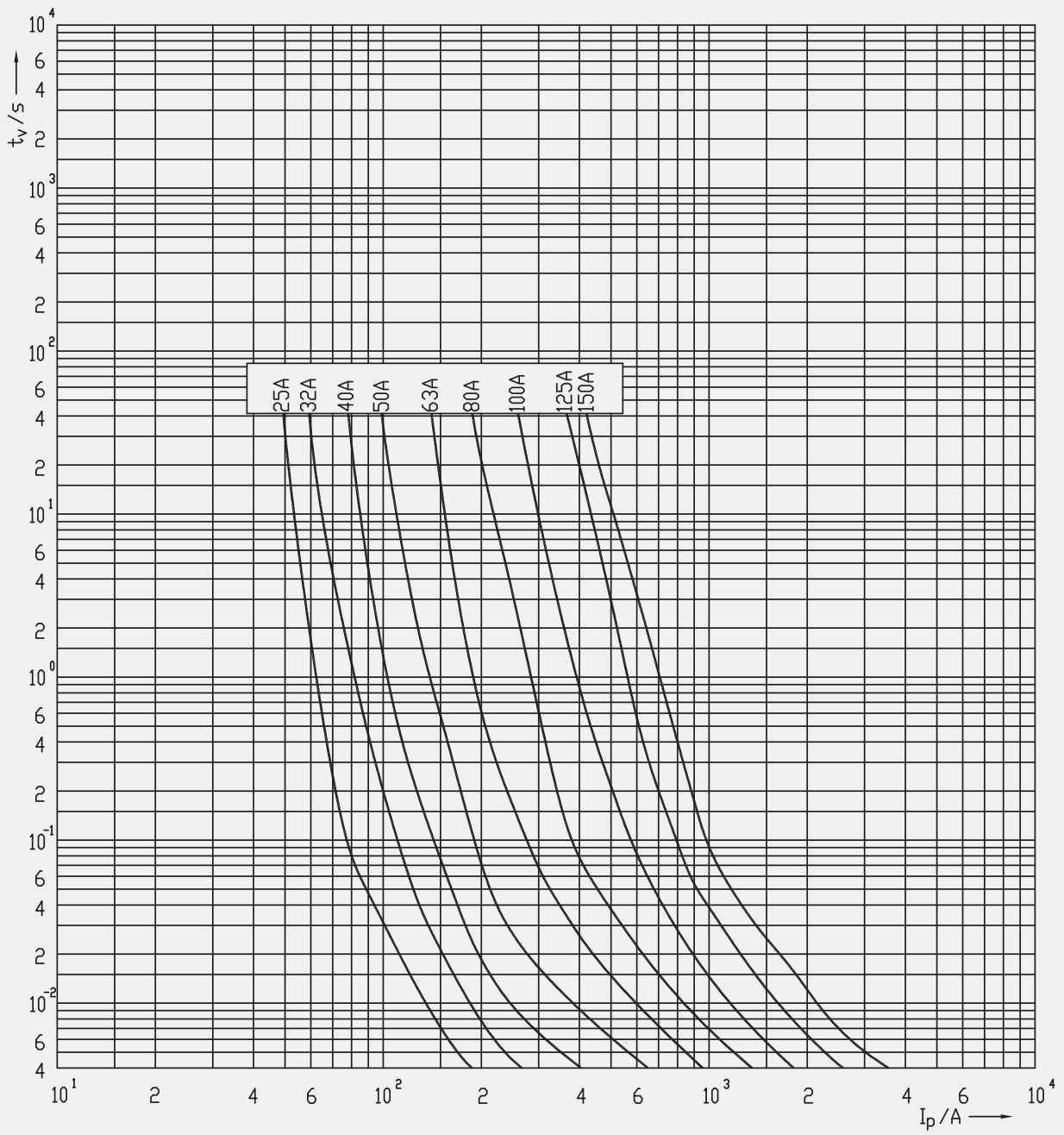
RAILWAY fuse link						
$I_n$ [A]	Code No.	Power dissipation [W]	Pre-arcing Joule integral [A <sup>2</sup> s]	Operating Joule integral [A <sup>2</sup> s] (L/R=15ms)	Weight [g]	Pack. [pcs]
25	004735636	43	28	150	1800	1/1
32	004735637	65	40	300		
40	004735638	88	63	600		
50	004735639	105	112	1.400		
63	004735640	105	252	2.500		
80	004735641	114	494	5.500		
100	004735642	115	1.147	10.000		
125	004735643	132	2.168	19.000		
150	004735644	155	3.388	31.000		



## Dimensions



### I/t characteristics





# NH1 / 130 / DC 1000V gR - fuse link

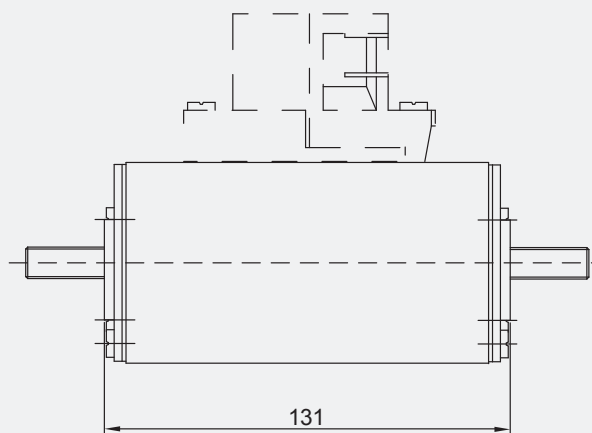
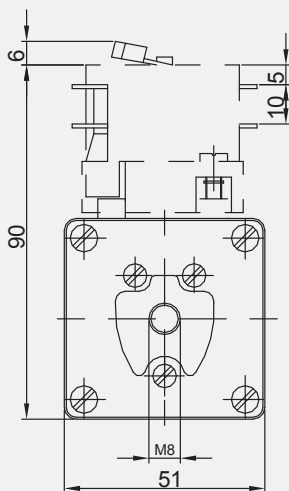
## General characteristics

Rated voltage	1000V d.c. (L/R=10ms)
Breaking capacity	30kA d.c.
Characteristic	gR
Standards	IEC 60269-4
Application	Railway inverter protection

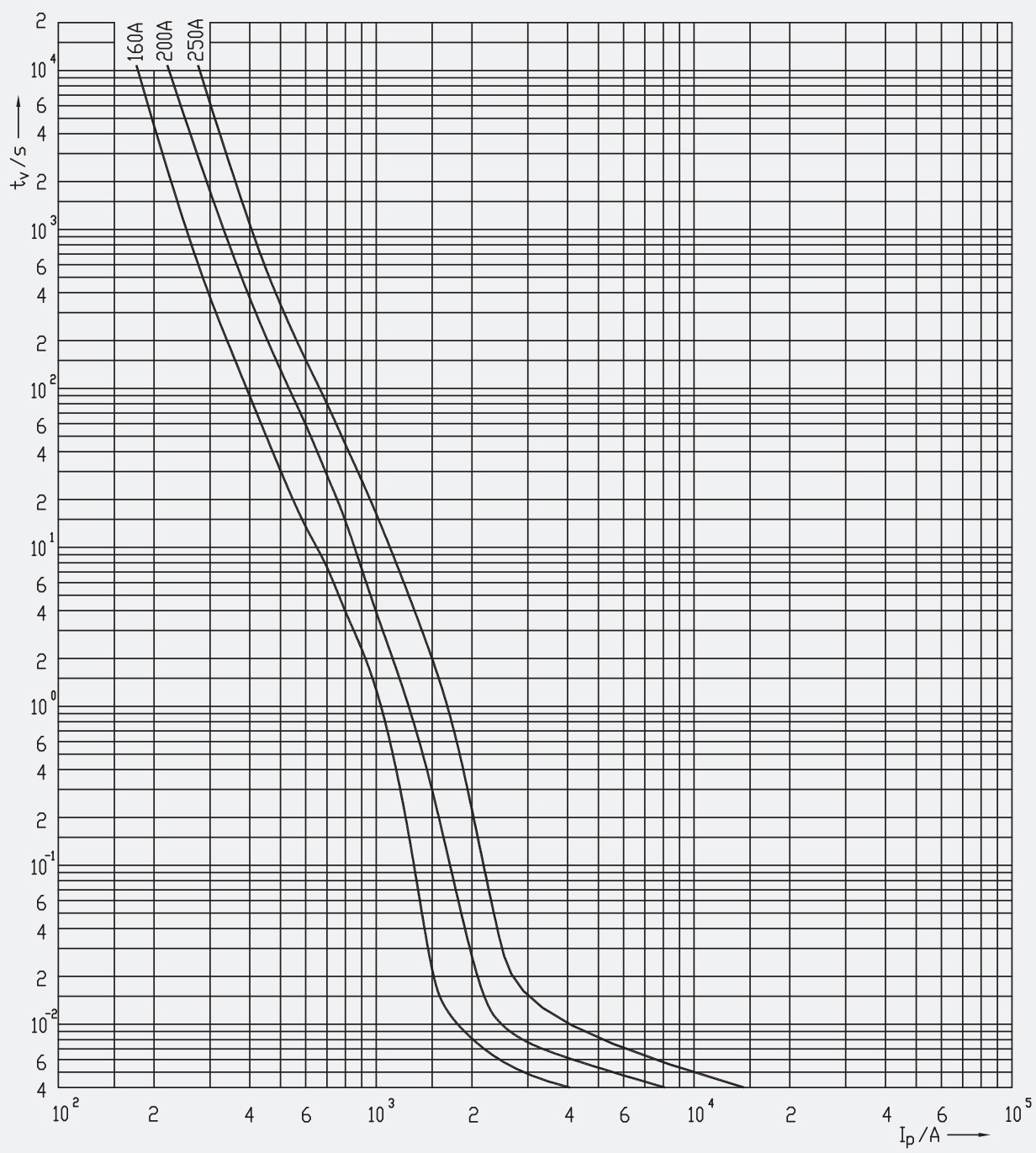
## NH DC 1000V gR

$I_n$ [A]	Code No.	Code No. Type with centre trip indicator for microswitch MK+AMK2	Power dissipation ( $0,7 \times I_n$ ) [W]	Power dissipation $I_n$ [W]	Pre-arcing Joule integral [A <sup>2</sup> s]	Operating Joule integral [A <sup>2</sup> s] (L/R=10ms)	Weight [g]	Pack. [pcs]
160	004303530	004303527	15,3	36,5	10.000	16.000	900	1/16
200	004303531	004303528	17,5	42,6	18.000	38.000		
250	004303532	004303529	23,6	56	30.000	60.000		

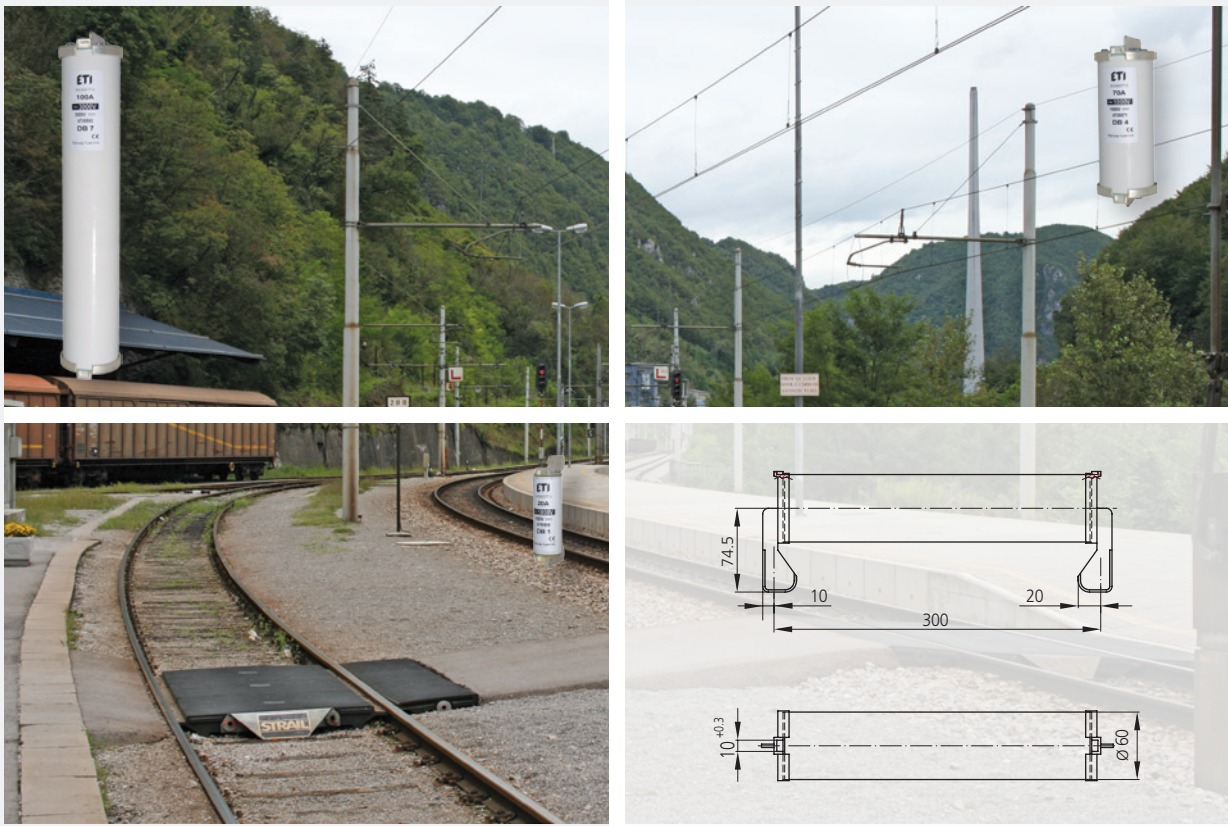
## Dimensions



### I/t characteristics



## Fuses for high-voltage switchgear



### Fuses for high-voltage switchgear DB, S<sub>368</sub> Series

For the protection of high-voltage switchgear ETI offers a complete range of high-voltage fuses. The series-connected fuses provide failsafe surge protection for the downstream equipment in every situation. This is true for short circuits and also for overcurrents exceeding five times the value of the nominal current ( $5xI_n$ ).

DB, S<sub>368</sub> series fuses are main fuses designed for nominal currents of 7,5 A to 125 A.

DB, S<sub>368</sub> series fuses are available for the following voltage ratings:

- ✓ 1 kV AC and 1 kV DC
- ✓ 1,5 kV AC and 1,5 kV DC
- ✓ 3 kV AC and 3 kV DC
- ✓ 5 kV DC

This range of fuses covers all existing train line voltages of the European railway systems.

### Features

- ✓ Compact design
- ✓ 4 different sizes
- ✓ Fuses designed for 5 kV DC
- ✓ Standards: UIC 550, EN 50163 and IEC 60077-5.

### Applications

- ✓ Main fuses for power supplies of rail vehicles, e.g. electric equipment and heating system
- ✓ Distribution fuses for branch circuits

Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 1	1000	7,5	004735555	270	4
		10	004735556		
		16	004735557		
		20	004735558		
		25	004735559		
		30	004735560		
		35	004735561		
		40	004735562		



Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 2	1000	50	004735564	450	4



Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 3	1000	60	004735566	690	2
	1500	7,5	004735567		
		20	004735568		



Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 4	1000	70	004735571	1000	2



Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 5	1500	40	004735573	994	2
		60	004735575		
		10	004735576		
	3000	15	004735577		
		20	004735578		
		30	004735580		
		50	004735581		



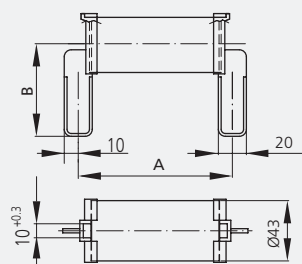
Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 6	1000	100	004735583	2050	2
		125	004735584		
		10	004735585		
		20	004735586		
	3000	30	004735587		
		40	004735588		
		50	004735589		
		60	004735590		
		70	004735591		

Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
DB 7	3000	100	004735593	2250	1

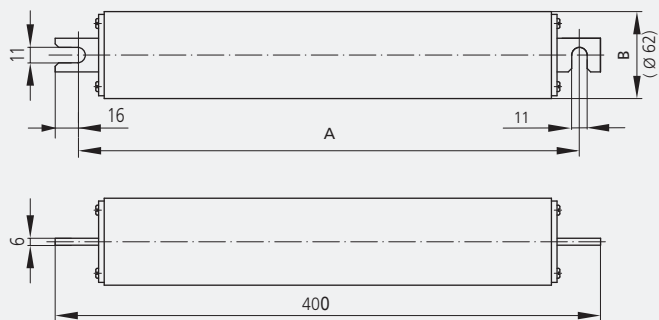
Size	U <sub>n</sub> [V]	I <sub>n</sub> [A]	Code No.	Weight [g]	Packaging [pcs]
S <sub>368</sub>	5000	20	004735594	3000	1
		30	004735595		
		40	004735596		
		50	004735597		
		60	004735598		
		70	004735599		
		100	004735600		



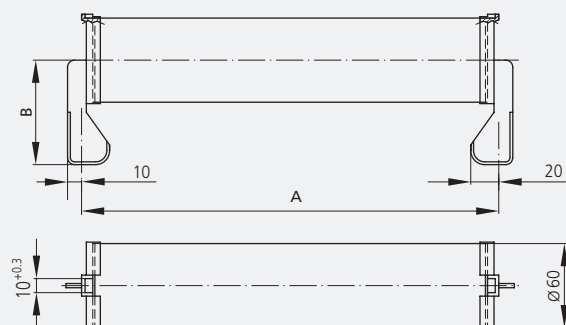
Size 1, 2, 3 and 5: Main fuses DB 1/2/3/5



Size 8: Main fuses S<sub>368</sub>

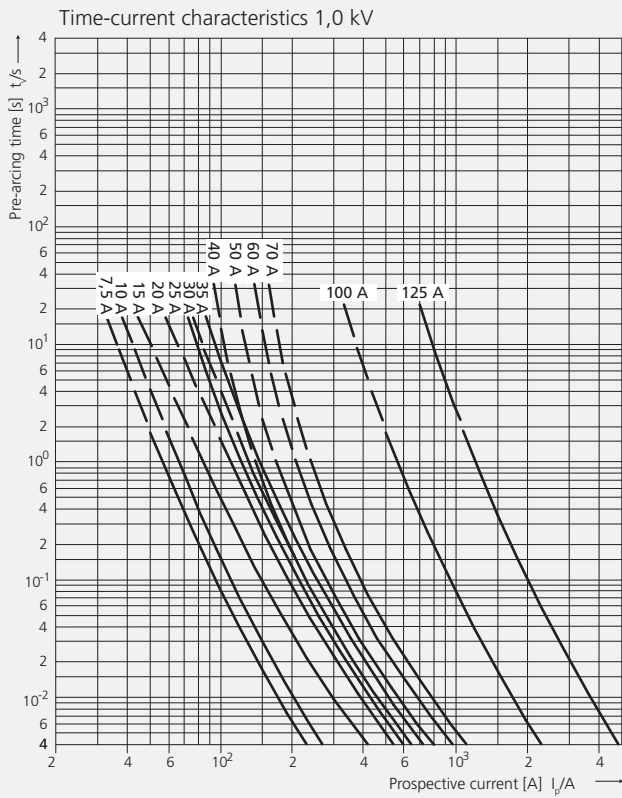


Size 4, 6 and 7: Main fuses DB 4/6/7

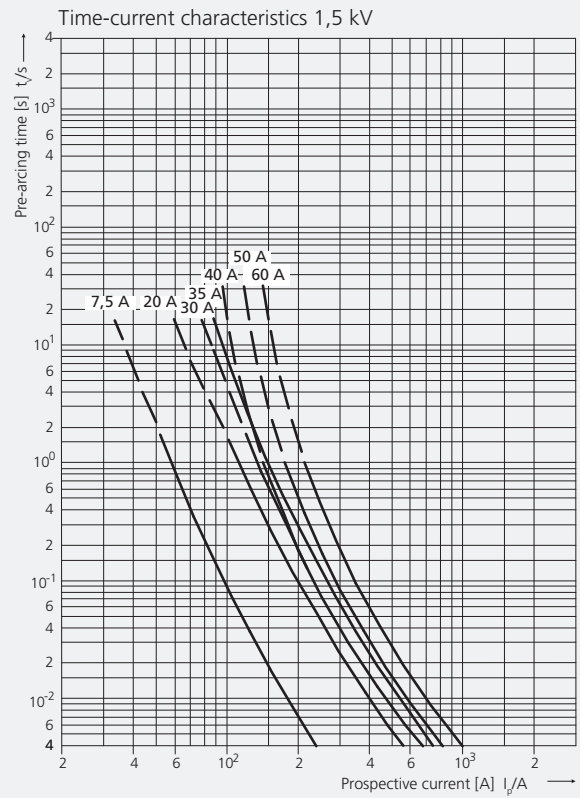


Size	Dimensions	
	A	B
DB 1	110	61
DB 2	110	61
DB 3	170	66
DB 4	170	74,5
DB 5	260	66
DB 6	300	74,5
DB 7	350	74,5
S <sub>368</sub>	368	62

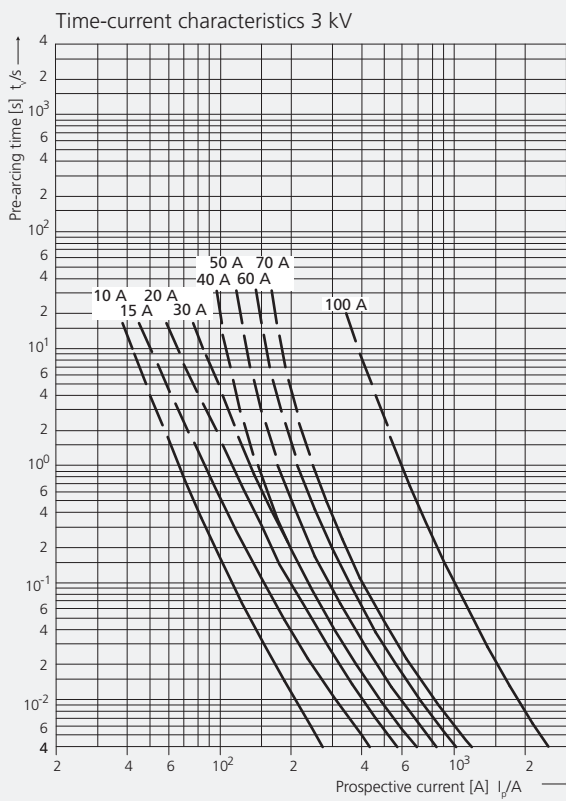
### DB series 1.0 kV



### DB series 1.5 kV



### DB series 3.0 kV



### S<sub>368</sub> series 5 kV

