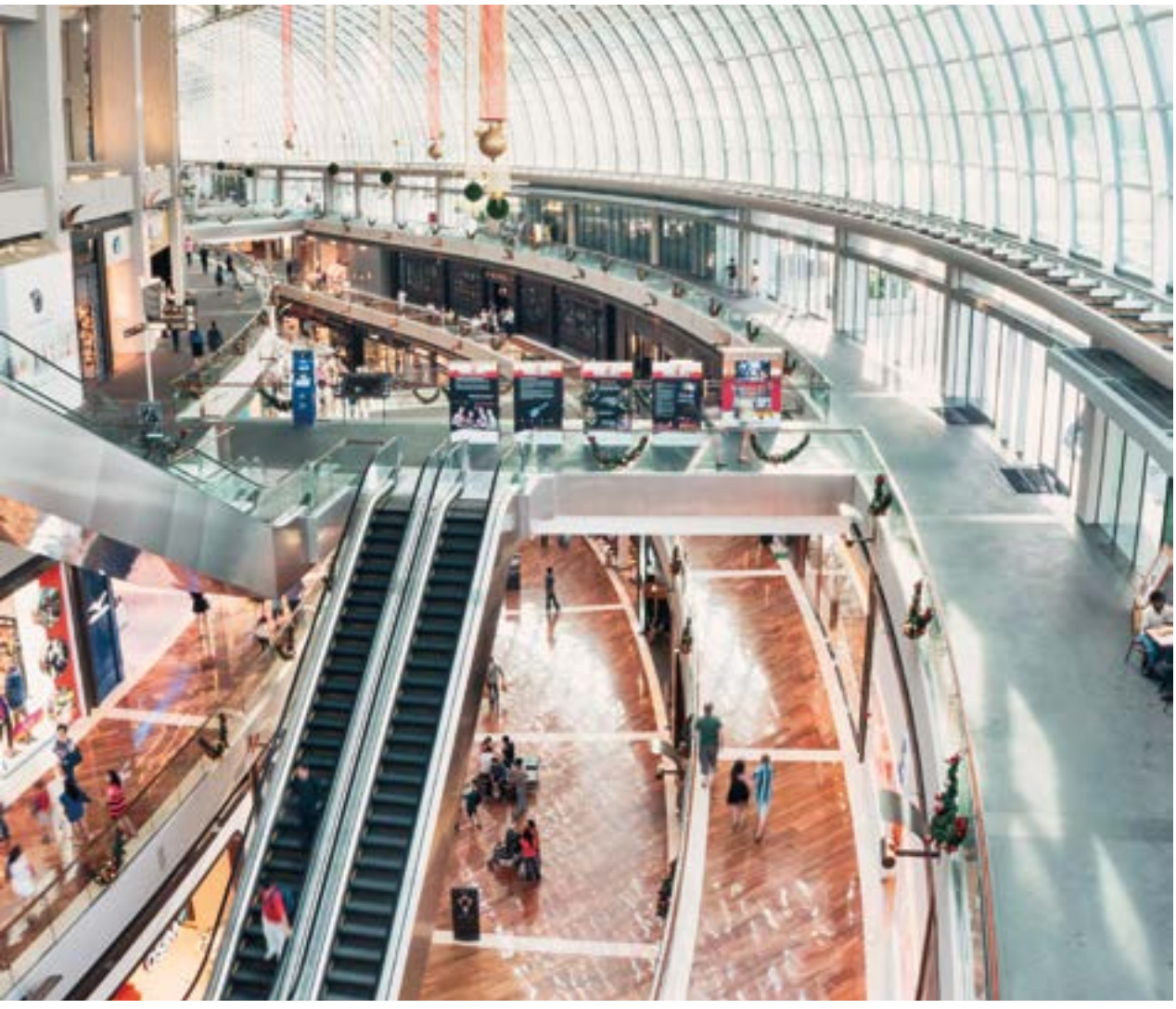
BROCHURE

E 90 range of fuse disconnectors and fuseholders

Uncompromising performance



- Quick, flexible and error-proof installation
- Protection and safety during maintenance
- International quality marks, navel type-approvals and UL certification

Designing simplicity
ABB competence serving the most demanding customers

Suitability for disconnection and switching, effective heat dissipation and certified compliance with several international standards are mandatory requirements to meet the needs of the most demanding customers.

ABB has dedicated its designers' passion, competence and creativity to the development of E 90 range of disconnectors and fuseholders, of E 90 50/125 series designed to ensure isolation and protection of circuits in big industrial plants, E 90 CC and E 90 J series specifically designed for the NAM markets. The result is the first AC-22B fuse disconnector, certified up to 32 A by the most outstanding marks and approvals all over the world.

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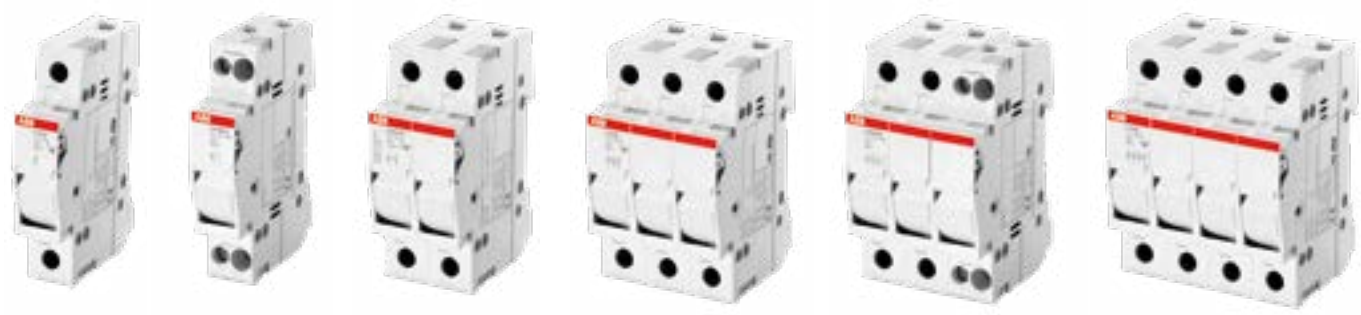
The ABB standard
Certified according to the most important international marks

A passport to the world. International quality marks, naval type-approvals and UL certification make E 90 the ideal range for designers and manufacturers of switchboards and installations “without frontiers”.







E 90 range
Designed by ABB for the most demanding customers

— 01 Industrial applications
— 02 Commercial applications

Industrial automation
E 90 fuse switch disconnectors
- Versions 1, 1N, 2, 3, 3N, 4
- Rated current 20 A and 32 A
- Rated voltage 400 V AC-22B and 690 V AC-20B (according to IEC 60947-3)
- Can be equipped with 8.5 x 31.5 mm and 10.3 x 38 mm aM and gG cylindrical fuses
- All the versions are available with optical blown fuse indicator
- Compatible with ABB busbars of S 200 series and Unifix plug-in system
- Approvals: IMQ, NF, cURus, CCC, EAC
- Designed for isolation and switching under load and for protection of secondary circuits of industrial plants

Distribution switchboards
E 90h fuseholders
- One pole plus neutral in one module
- Versions 1N, 3N
- Rated current 20 A and 32 A
- Rated voltage 400 V AC
- Can be equipped with 8.5 x 31.5 mm and 10.3 x 38 mm aM and gG cylindrical fuses
- All the versions are available with optical blown fuse indicator
- Compatible with ABB busbars of SN 201 series and Unifix plug-in system
- Approvals: IMQ, NF, CCC, EAC
- Designed for instruments and auxiliaries protection in switchboards and consumer units

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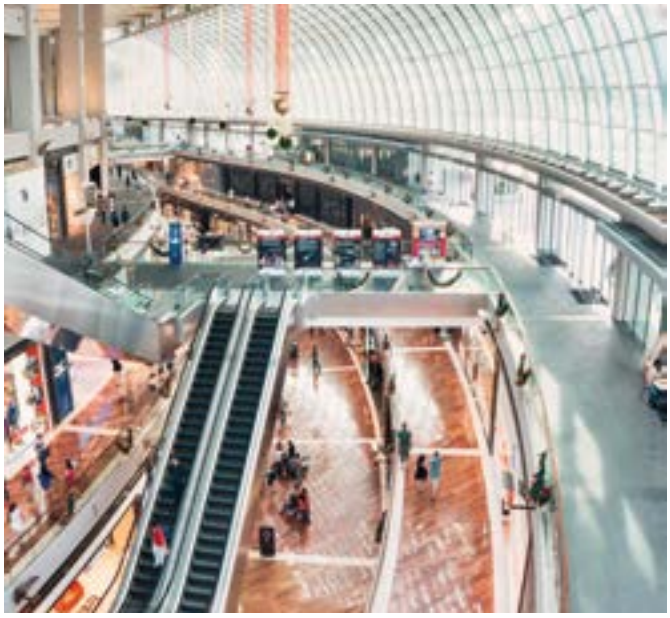

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01 Photovoltaic installations
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02 Industrial circuit protection

Photovoltaic installations
E 90 PV fuse disconnectors

- Versions 1 pole (1500 V DC) and 2 pole (1000 V DC)
- Rated current 32 A
- Rated voltage 1000 and 1500 V DC
- Can be equipped with gPV cylindrical fuses 10.3 x 38 mm (1000 V DC) and 10 x 85 or 10/14 x 85 mm (1500 V DC) cylindrical fuses
- 1000 V DC series available with optical blown fuse indicator
- Approvals: CCC, EAC, UL (1000 V DC); UL (1500 V DC), CCC
- Designed for isolation and protection of circuits in photovoltaic installations up to 1500 V DC

Industrial circuit protection
E 90 50/125 fuse-disconnector

- Versions 1, 1N, 2, 3, 3N
- Rated current 50 and 125 A
- Rated voltage 690 V AC
- Can be equipped with 14x51 mm and 22x58 mm aM and gG cylindrical fuses
- All the versions are available with optical blown fuse indicator
- Approvals: EAC, cURus, CCC
- Specifically designed for industrial circuit protection

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02



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01 Application in sports arenas
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02 Industrial installations in North America

Branch circuit protection in NAM market
E 90 CC fuseholders

- Versions 1, 1N, 2, 3, 3N, 4 poles
- Rated current 30 A
- Rated voltage 600 V AC/DC
- Can be equipped with Class CC 10.3 x 38 mm cylindrical fuses
- All the versions are available with optical blown fuse indicator
- Rejection member feature according to UL 4248-4
- Approvals: cULus, CSA
- Designed for branch circuit protection and supplementary protection

Industrial installation in the NAM market
E 90 30/60 J fuseholders

- Versions 1, 2 and 3 poles
- Rated current 30 and 60 A
- Rated voltage 600V AC
- Can be equipped with Class J 21 x 57 mm and 27 x 60 mm cylindrical fuses
- All the versions are available with optical blown fuse indicator
- Approvals: UL, CSA
- Designed for protecting transformers, motors, lighting, heating and general loads

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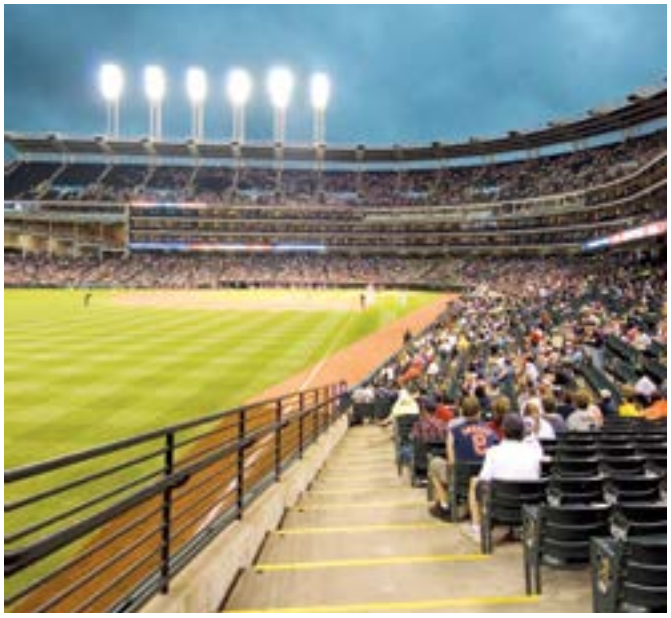

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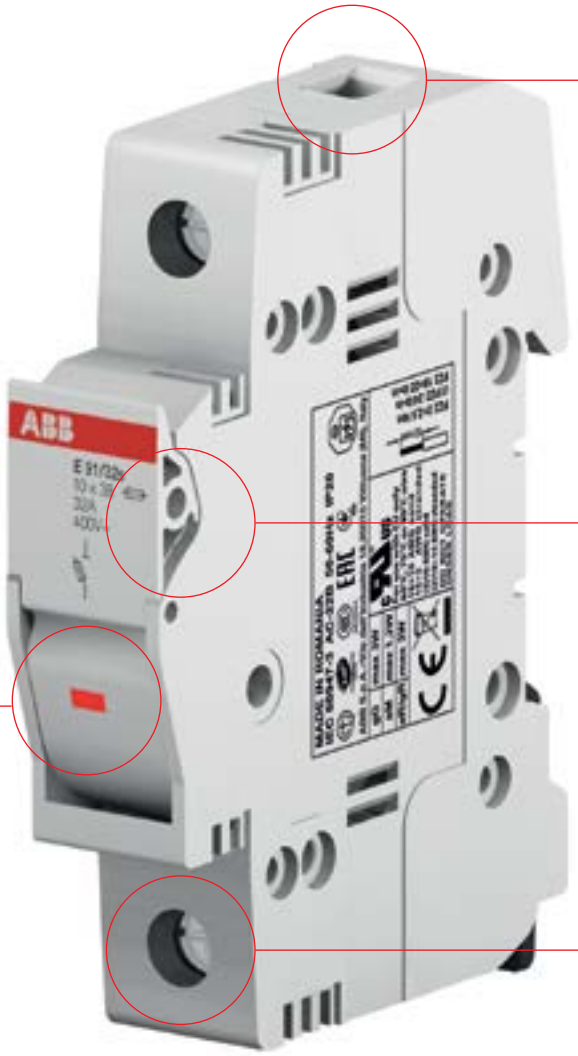
02



Smart protection for installations

ABB´s experience sets a new leading-edge performance standard

Tip-top performance
E 90 fuseholders (for AC applications) with rated current up to 32 A can be used in any field wherever you need to ensure electrical protection, isolation and switching of inductive or resistive loads in compliance with IEC 60947-3 Standard. Utilization category of this series is AC-22B up to 400V. The technology solutions applied to reduce power dissipation help to minimize module heating.



Reliability
Venting grooves and cooling chambers improve heat dissipation even in multiple-pole configurations.
The reduced operating temperature inside fuseholders ensures durability and reliability of the devices over time.

Compactness
The compact dimensions enable to close the switchboard door even when the fuseholder is open, thus ensuring total safety during maintenance. 1P+N versions in one module only and 3P+N in three modules only are available.

Completeness
The fuse tripping can be easily displayed, thanks to the special blown fuse indicator light.

Universal use
Screw holes have increased diameter to accommodate insulated screwdrivers and electric screwdrivers. In addition, with the Pozidrive PZ2 screws tightening can be performed by exerting less torque than conventional screws, and the same electric screwdriver can be used for all terminals. Moreover, the PS connection busbars facilitate the connecting operations, making the wiring both simple and safe and providing complete integration with S 200 and SN 201 System pro M compact® circuit-breakers.

Ease of installation
E 90 fuseholders are fully compatible with the Unifix-L wiring system



E 90 safe and smart range is designed for quick, flexible and error-proof installation, to ease the everyday use of devices. Thanks to its unique features, E 90 series sets a new safety standard.



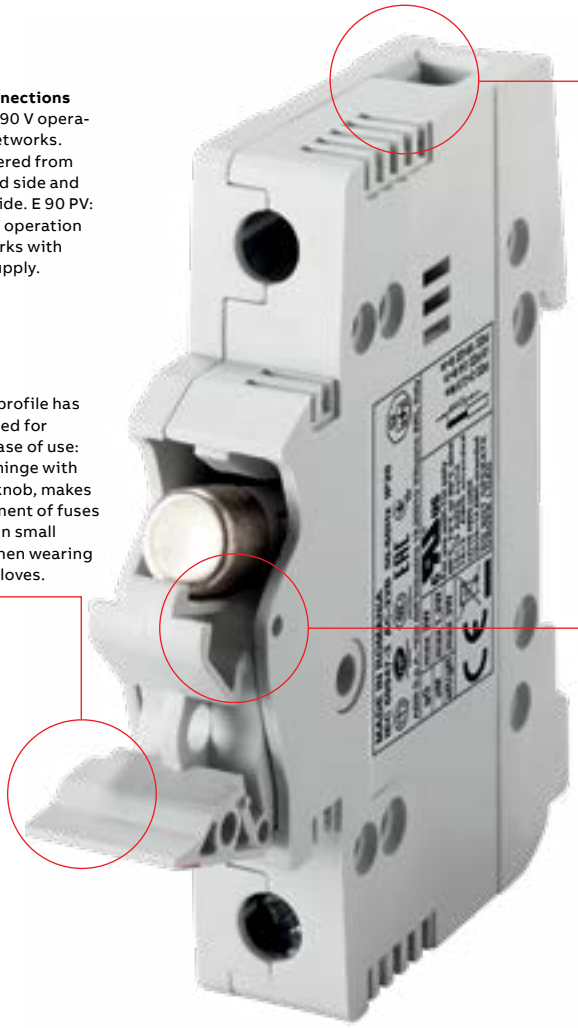






Flexible connections
E 90: 24 to 690 V operation in AC networks. Can be powered from both the load side and the supply side. E 90 PV: 24 to 1000 V operation in DC networks with upstream supply.

Ease of use
Fuseholder profile has been designed for maximum ease of use: the 90° flip hinge with ergonomic knob, makes the replacement of fuses easier even in small spaces or when wearing protective gloves.



Reliable connections
Wide terminals allow the use of cables with section up to 25 mm², whereas the antivibration knurling on the terminal cages ensures safe and reliable connections.

Safety
To ensure protection and safety during maintenance operations and avoid any accidental switching, fuseholders can be sealed in closed position, and padlocked in open position. The protection degree is IP20 when the unit is installed behind the switchboard slotting.

Environmental protection.

The fuseholders are compliant with RoHS (Restriction of Hazardous Substances) European directive, which prohibits the use of hazardous substances in the manufacture of electrical and electronic equipment.



E 90 20/32 protection and control
A range developed for automation and industry

Applications:
- automation switchboards and industrial cabinets to assure
  - protection of terminal circuits
  - switching of loads, even inductive
  - selectivity

Highlights:
- AC-22B up to 400 V according to IEC 60947-3
- compact design
- High temperature performance thanks to venting grooves and cooling chambers that improve heat dissipation also for multipole configurations
- optional blown fuse indicator
- sealeble in closed position and padlockable in open position

E 90 fuse disconnectors are designed for switching under load, ensuring isolation and protection against short circuit and overload, in compliance with the IEC 60947-3 Standard.

E 90 range is designed to comply with the strictest requirements of OEMs and panel builders. They are ideally installed in industrial automation switchboards to protect secondary circuits, primary and secondary of transformers, motors and other resistive or inductive loads.
Due to the AC-22B utilization category up to 400 V, according to the IEC 60947-3 Standard, E 90 fuse disconnectors are convenient, simple and reliable devices for loads switching and protection. Fuse disconnectors ensure selectivity, if equipped with appropriate fuses. Since they are uURus type-approved, they can be installed in UL-certified machines designed for the American market.

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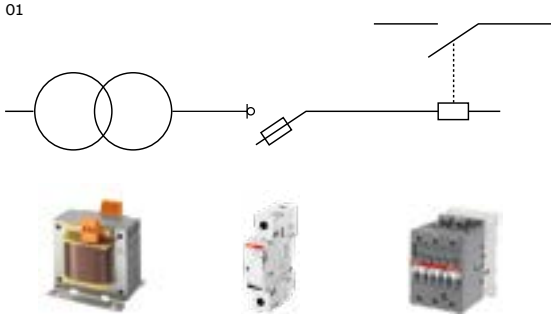

Application example
Here you can find a typical industrial control application. According to IEC 60364-1 Standard, the secondary winding of a control transformer must be protected against short circuits and overload. The transformer provides dedicated 230 V AC power supply to a battery of industrial contactors.

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02

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01 Application example
Here you can find a typical industrial control application. According to IEC 60364-1 Standard, the secondary winding of a control transformer must be protected against short circuits and overload. The transformer provides dedicated 230 V AC power supply to a battery of industrial contactors.
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02 Typical installation in the switchboard
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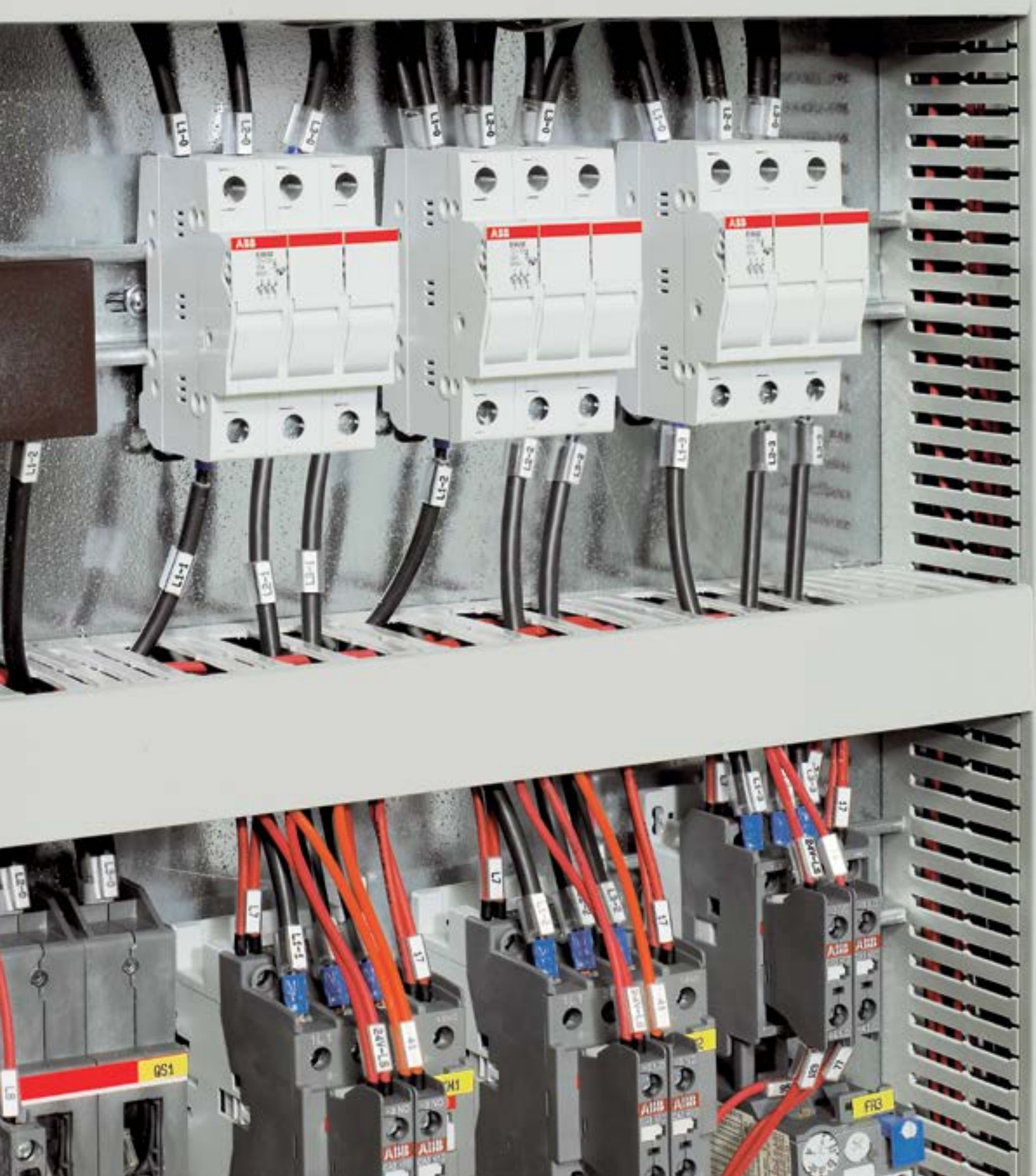
03 E91-, E92-, E93- and E94-fuse disconnector

Results you can trust
High performance of E 90 fuse disconnectors



E 90h fuseholders

Compact protection of electric auxiliaries in distribution switchboards

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01 Application example
—
02 Typical installation in the switchboard
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03 E91h- and E93h-fuse holders

Applications:
- In distribution switchboards and consumer units, for terminal protection of
  - Electric auxiliaries
  - Switchboard instrumentation
  - Surge arresters

Highlights:
- very compact design
- optional blown fuse indicator
- sealeble in closed position and padlockable in open position

E 90 Fuseholders – 1P+N in one module and 3P+N in three modules, respectively – are very compact in size and are the most suitable solution for protection of circuits and devices inside switchboards.

E 90h range is designed for protecting electrical devices both in single phase and in three-phase networks with neutral. They are particularly suitable inside switchboards and consumer units for protecting lighting circuits, modular sockets and electrical devices for monitoring, measuring and signalling.

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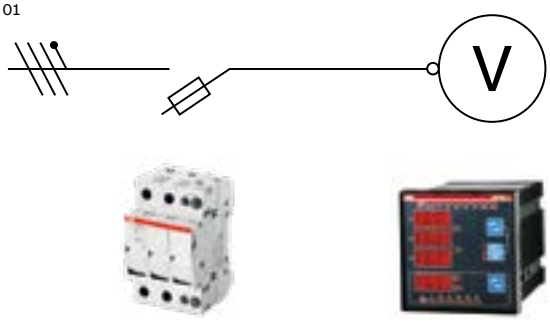

Application example
Here you can find a typical application inside a secondary distribution switchboard. Following the manufacturer's instruction, the voltmetric inputs of the multimeter are protected with fuses.

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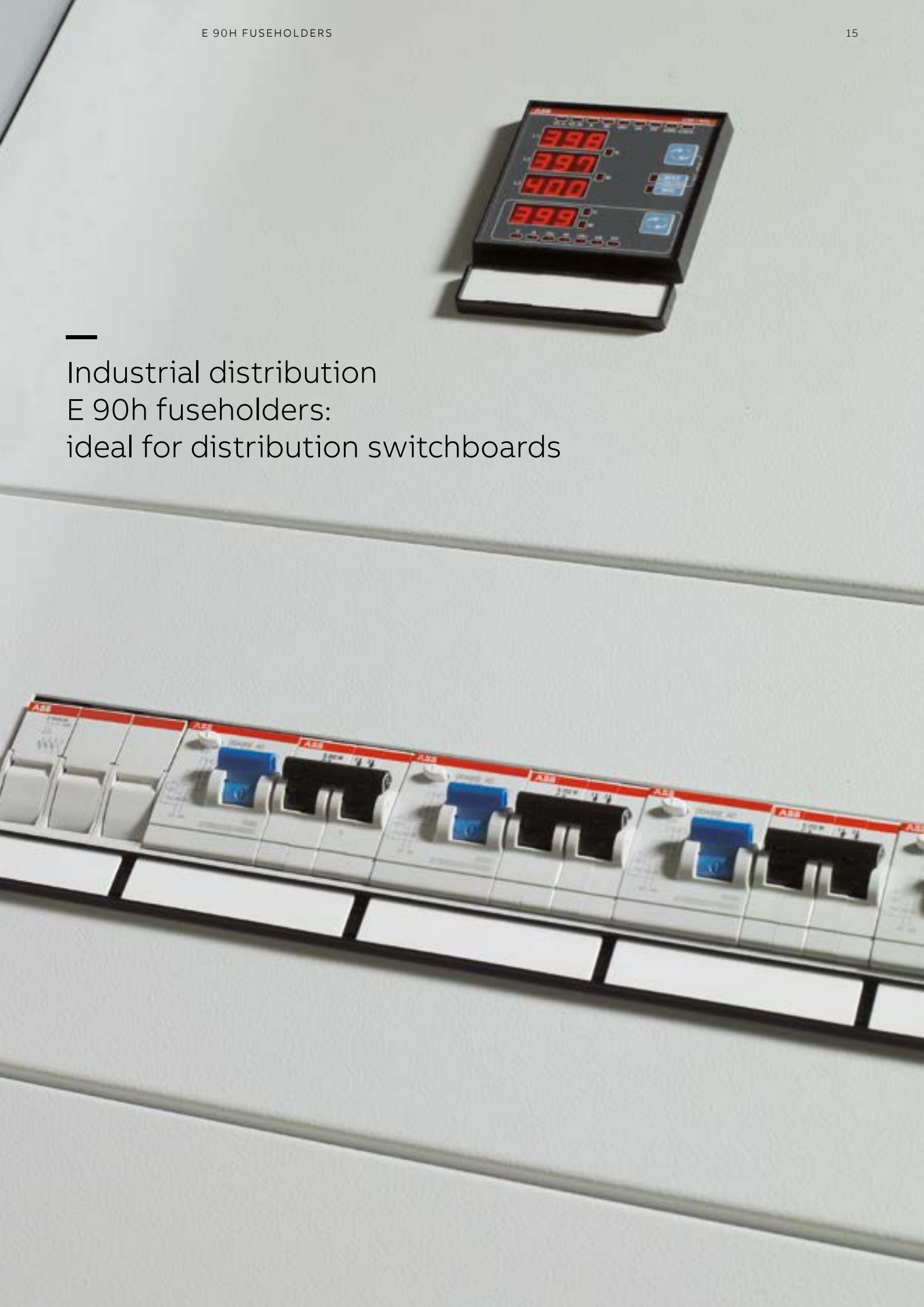

Industrial distribution
E 90h fuseholders:
ideal for distribution switchboards

E 90 PV fuse disconnectors for photovoltaic applications

Designed for industry professionals

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01 E 90 PV fuseholder for 1000 VDC 1500 VDC

Applications:

- String combiners and inverters to guarantee
  - string protection
  - surge arrester back-up protection
  - inverter DC side protection

Highlights:

- High temperature performance thanks to venting grooves and cooling chambers that improve heat dissipation also for multipole configurations
- finger safe feature which ensure personnel protection during maintenance (no possibility of getting in touch with live parts during fuse replacement)
- configuration in 1 or 2 poles for the 1000 V DC devices and 1 pole for the 1500 V DC product
- optional blown fuse indicator for 1000 V DC range

E 90 PV fuse disconnectors have been specifically designed for photovoltaic applications. Thanks to their rated voltage up to 1000 and 1500 V DC they are the ideal solution for protecting cells, inverters or surge arresters. In case of maintenance, they ensure isolation of circuits and strings up to 1500 V in direct current, in total safety.

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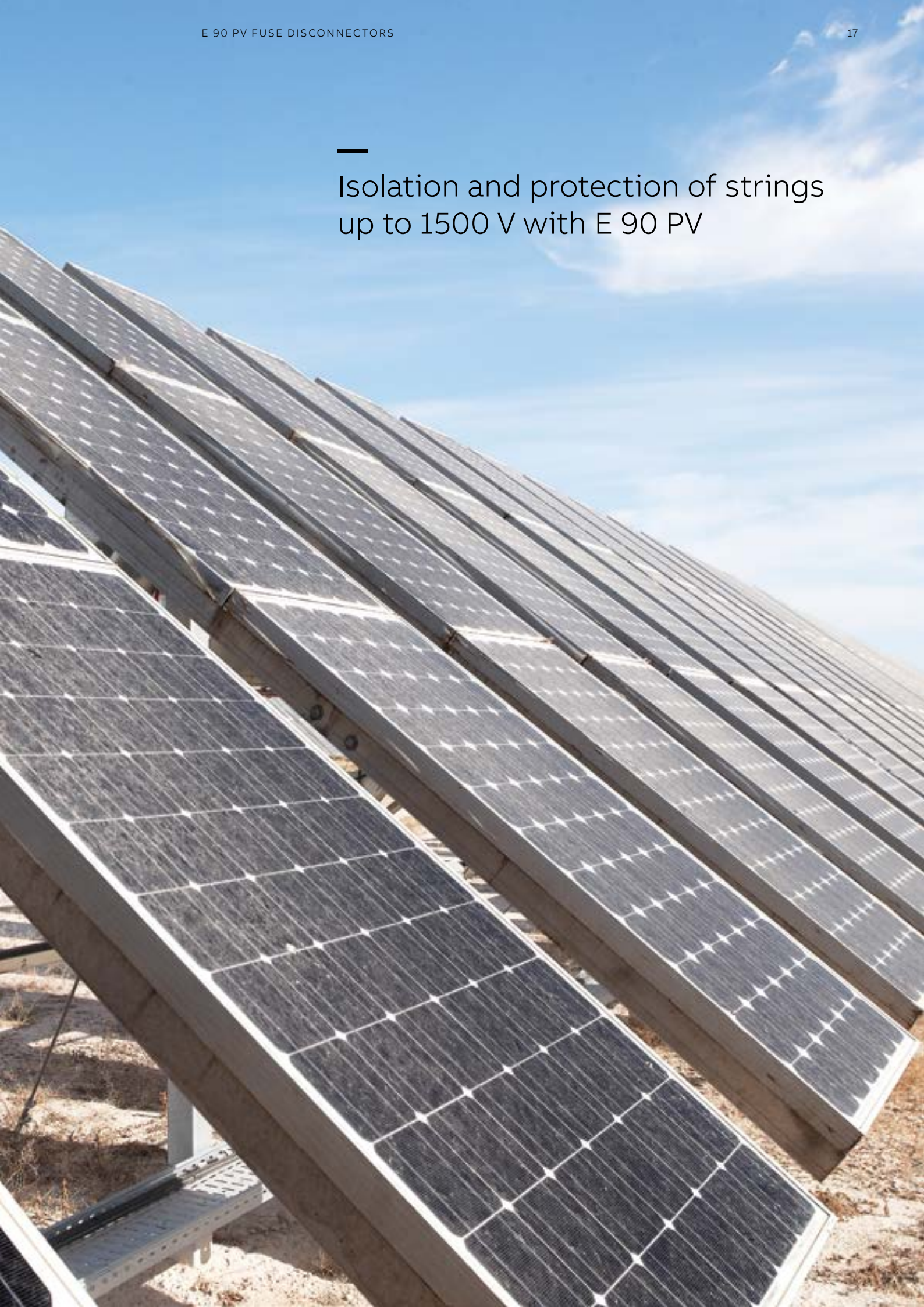
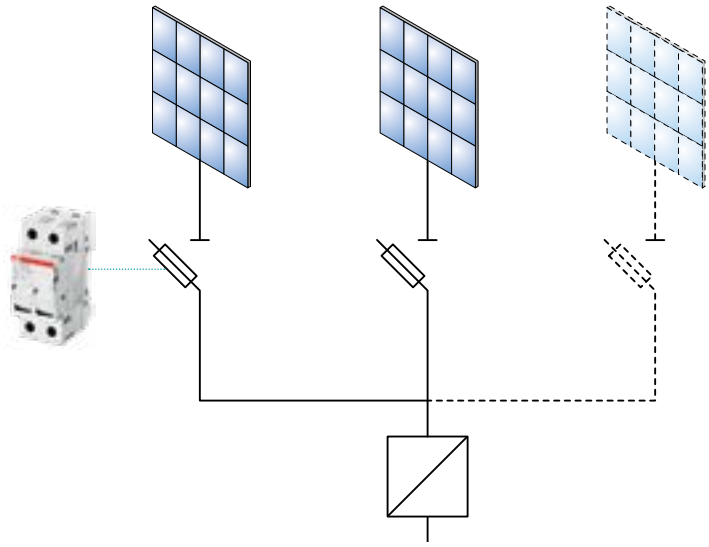
Isolation and protection of strings up to 1500 V with E 90 PV

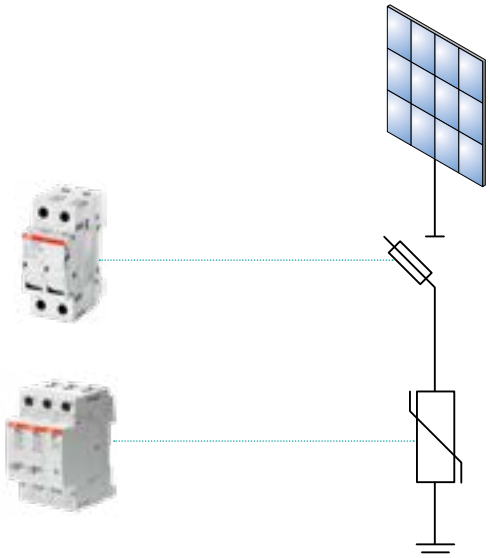


Isolation and protection of strings up to 1500 V
Application examples

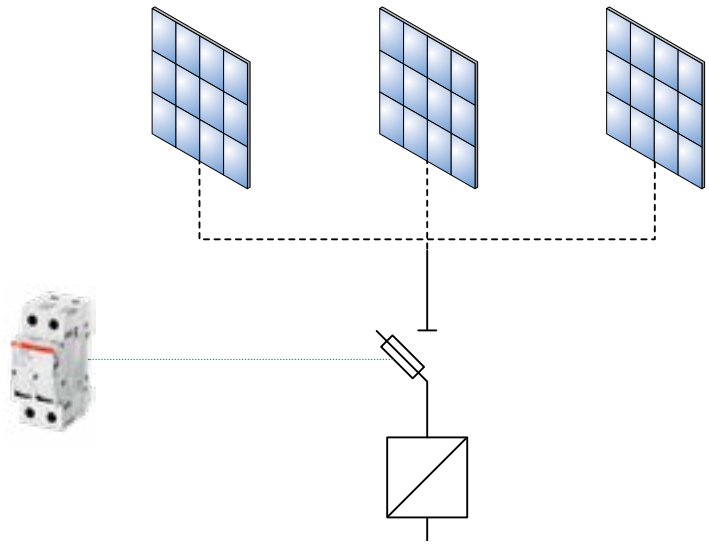
String protection
To prevent damage to the equipment in the direct current lines of photovoltaic installations and ensure that it remains isolated when maintenance work is performed, E 90 PV fuse disconnectors can be installed downstream of the inverter so as to protect each string. The fuses must be selected to suit the rated current of the line.



Surge arrester back-up
When the Icc short-circuit current at the installation point exceeds 100 A DC, OVR PV surge arresters require back-up protection with a specific gR-type fuse.



DC side of the inverter
In small photovoltaic installations, E 90 PV fuse disconnectors can be used to protect the direct current side of the inverter. Fuse cartridges should be selected according to the inverter rated current.







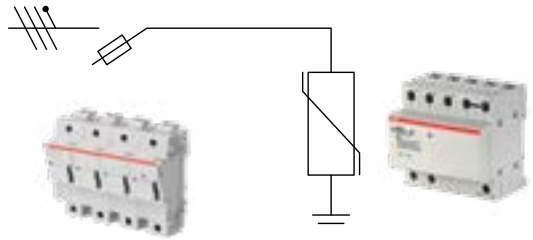
E 90 50/125 fuse disconnectors
Perfect integration, guaranteed innovation

Applications:
- Within industrial switchboard, intended mainly for
  - motors and transformers protection
  - overload and short circuit protection of high-current loads

Highlights:
- compact design
- High temperature performance thanks to venting grooves and cooling chambers that improve heat dissipation also for multipole configurations
- optional blown fuse indicator
- sealeble in closed position and padlockable in open position

E 90 50/125 ranges provides disconnection properties according to IEC 60947-3. The E 90 50/125 can be equipped with cylindrical fuses 14 x 51 (E 90/50) and 22x58 mm (E 90/125). For the usage of 125 A fuses within E 90/125 fuseholder refers to section "Question and answers".

The E 90/50 and E 90/125 fuse disconnectors have been designed for all applications which require protection and isolation of high-current loads: thanks to their compatibility with gG and aM cylindrical fuses, they offer maximum flexibility in terms of protection of installation with rated currents up to 125 A. The possibility to be padlocked in open position, ensures the safety of personnel who carry out maintenance operations. Furthermore the availability of optical blown fuse indicator in all versions of the new E 90 50/125 enables to easily and efficiently monitor distribution networks with high current ratings.



Application example
OVR PV back-up protection, shown on the left, is a typical application for the fuseholder of the E 90 50/125 series. They can also be used as protection of motors and transformers, as protection against overloads and short circuits in low voltage installations where currents are up to 125 A and in control circuits.





E 90 50/125 fuse disconnectors ensure reliable protection for industrial circuits

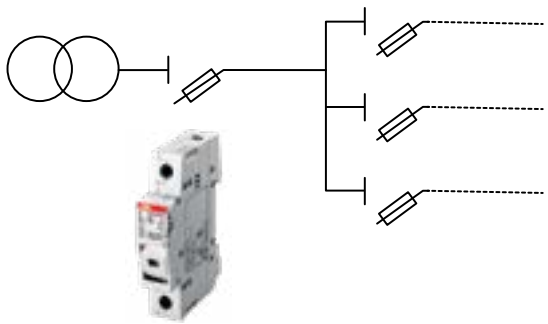
E 90 CC fuseholders
Specifically developed for branch circuit protection

Applications:
- Branch and supplementary protection according to UL 4248-1
  - Lighting feeders and control circuits
  - Small motor and transformers
  - Wires and cables

Highlights:
- Specifically designed for NAM market
- UL Listed according to UL 4248-1 and UL 4248-4
- Rejection member to allow just the insertion of a Class CC fuse
- optional blown fuse indicator

E 90 CC range has been designed to comply with North American market regulations and to enable worldwide manufacturers to sell their equipment in conformity with safety requirements also in these countries.

Class CC fuses have limiting characteristics dedicated to terminal protection of components and equipments against short-term overloads and dedicated to motors' protection against short-circuit. The limiting properties of the Class CC fuses are particularly appreciated in the North American market, allowing suitable protection even of equipment with limited resistance to short-circuit.



Application example
E 90 CC fuseholders have been developed to host Class CC fuses only. They are used in the NAM markets mainly as branch circuit protection. Here on the right side, an application example is showed.





Quality also speaks American
E 90 CC fuseholders, designed for the North American market

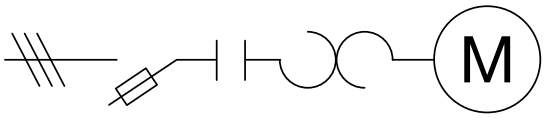
E 90 J fuseholders
Designed to be equipped with class J fuses

Applications:
Mainly intended for protection of
- Transformers
- Motors
- Industrial machinery
- Heating, lighting and control circuits

Highlights:
- Specifically designed for NAM market
- UL listed according to UL 4248-8
- suitable for Class J fuses only
- optional blown fuse indicator

E 90 J range has been designed to comply with North American market regulations. The E 90 J fuse carriers are the ideal solution for industrial installation, motors and transformers protection, heating systems and control circuits.

In accordance with the reference standard UL 4248-8, they come in voltage and current ratings up to 600V and 30/60A, respectively.
Fuseholders of the E 90 J series are available in multipole configuration, from 1 to 3 poles.
Versions with blown fuse indicator light provide a visual signal of the fuse break condition allowing a faster and safer maintenance of the installation. They can be padlocked open and sealed closed to ensure operator safety during maintenance operations.



Application example
On the left side, is showed a typical example of motors protection, E 90 J fuseholders are mainly used in the North American market as motors, alternators and transformers protection or as feeding, heating and light circuits protection.







A range dedicated to the North American market E 90 30/60 J fuseholders

Technical data
E 90 series – data according to IEC

Type		E 90/20	E 90/32	E 90hN/20
Rated current	[A]	20	32	20
Type of current		AC	AC	AC
Fuse	[mm]	8.5 x 31.5	10.3 x 38	8.5 x 31.5
Max power dissipation accepted	[W]	2.5	3	2.6
Rated frequency	[Hz]	50 - 60	50 - 60	50 - 60
Tightening torque	[Nm]	PZ 2 - 2.5	PZ 2 - 2.5	PZ2 0.8 - 1.2
Protection degree		IP20	IP20	IP20
Terminals section	[mm²]	25	25	16
Cross section rigid copper conductors	[mm²]	1.5 - 25	1.5 - 25	1.5 - 16
Cross section stranded copper conductors	[mm²]	1.5 - 26	1.5 - 26	1.5 - 10
Padlockable (when open)		•	•	•
Sealable (when closed)		•	•	•

Reference standards						
IEC 60947-3						
Utilization category		AC-22B	AC-20B(3)	AC-22B	AC-20B(3)	–
Rated voltage	[V]	400	690	400	690	–
IEC 60269-1						
Rated voltage	[V]	–	–	–		–
IEC 60269-3						
Rated voltage	[V]	–	–	–		400

Approvals	E 90/20	E 90/32	E 90hN/20
IMQ	•*(1)	•*(1)	•*
NF	•**(1)	•**(1)	•***
CCC - China	•*(1)	•*(1)	•*
RINA	•*(1)	•*(1)	•*
LLOYD	•*(1)	•*(1)	•*
BV	•(1)	•(1)	•
EAC	•	•	•

* = without LED version
** = no neutral and without LED version
*** = dedicated range with neutral on the left side
**** = IP20 also as standalone device installed on DIN rail, with respect to cables with a cross-section area ≥ 10 mm²

Shock and vibration (E 90/20 and E 90/32)

Vibration withstand on the 3 main axis
- Sinusoidal vibration testing according to IEC 60068-2-6
  2 to 13 Hz x= 1 mm peak
  13 to 100 Hz y= 0.7 g peak
- Random vibration testing according to IEC 61373 Category 1 Class B

Shock withstand on the 3 main axis:
- Shock testing according to IEC 60068-2-27 15g/11ms/18 shocks
- Shock testing according to IEC 61373 Category 1 Class B

E 90hN/32	E 90/32 PV 1000 V	E 90 32/PV 1500 V	E 90/50	E 90/125
32	30A	32	50	100(2) / 125(2b)
AC	DC	DC	AC	AC
10.3 x 38	10.3 x 38	10 x 85 and 10/14 x 85	14 x 51	22 x 58
3.2	3	6	5	9.5
50 - 60	–	–	50 - 60	50 - 60
PZ2 0.8 - 1.2	PZ2 2 - 2.5	PZ2 2-2.5 Nm	PZ2 3 - 3.5	PZ2 3.5 - 4
IP20	IP20	IP20	IP20 ****	IP20 ****
16	25	–	35	50
1.5 - 16	1.5 - 25	–	2.5 - 35	4 - 50
1.5 - 10	1.5 - 16	1 wire: 0.75 - 25 2 wires: 0.75 - 10	2.5 - 25	4 - 35
•	•		•	•
•	•		•	•

–	DC-20B	–	AC-20B	AC-20B
–	1000	–	690	690
–	–	1500		
400	–	–		

E 90hN/32	E 90/32 PV 1000 V	E 90 32/PV 1500 V	E 90/50	E 90/125
•*			•	•
•***				
•*	•	CCC	•	•
•*			•	•
•*			•	•
•	•		•	•
•	•		•	•

(1) = certified AC-22B at 400 V in compliance with IEC 60947-3
(2) = according to IEC 60269-2
(2b) = with aM-type fuses and in combination with a device that ensures overload protection
(3) = according to ABB factory declaration

Technical data
E 90 series – data according to UL

Type		**E 90/32**	**E 90/32 PV 1000 V**	**E 90/32 PV 1500 V**
Rated current	[A]	32	32	30
Rated voltage	[V]	690	1000	1500 V DC
Type of current		AC/DC	DC	DC
Fuse		10.3 x 38	10.3 x 38	10x30
Rated frequency	[Hz]	50 - 60	–	6
Tightening torque	[Nm]	PZ2 2 - 2.5	PZ2 2 - 2.5	PZ2 18-22 lb-in
Protection degree		IP20	IP20	IP20
Terminals section	[mm²]	25	25	–
Cross section rigid copper conductors	[AWG]	16÷10	not forseen	1 wire: 16-10 AWG
Cross section stranded copper conductors	[AWG]	16÷3	8÷3	1 wire: 0.75 -25 (18-4 AWG) 2 wires: 18-6 AWG
Cable temperature	[°C]		[°C] CU 60, 75, 90	max 90 (acc. UL)
Padlockable (when open)		•	•	
Sealable (when closed)		•	•	

Reference Standard	**E 90/32**	**E 90/32 PV 1000 V**	**E 90/32 PV 1500 V**
UL 4248-1	•		
UL 4248-4			
UL 4248-8			
UL 4248-18		•	•

Approvals	**E 90/32**	**E 90/32 PV 1000 V**	**E 90/32 PV 1500 V**
cULus			
UL		•	•
cURus	•		
CSA			

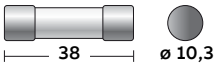
**** IP20 also as standalone device installed on DIN rail, with respect to cables with a cross-section area ≥ 10 mm²

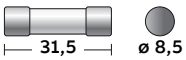
	E 90/50	E 90/125	E 90/30 CC	E 90/30 J	E 90/60 J
	50	125	30	30	360
	800	800	600	600	600
	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC
	14 x 51	22 x 58	Class CC 10.4 x 38	Class J 21 x 57	Class J 27 x 60
	50 - 60	50 - 60	60	60	60
	PZ2 3 - 3.5	PZ2 3.5 - 4	PZ2 2 - 2.5	PZ2 3.5 - 4	PZ2 3.5 - 4
	IP20 ****	IP20 ****	IP20	n.a.	n.a.
	35	50	25	50	50
	14÷10	14÷10	16÷10	14÷10	14÷10
	14÷2	14÷1	16÷3	14÷1	14÷1
	•	•	•	•	•
	•	•	•	•	•

	E 90/50	E 90/125	E 90/30 CC	E 90/30 J	E 90/60 J
	•	•	•	•	•
			•		
				•	•

	E 90/50	E 90/125	E 90/30 CC	E 90/30 J	E 90/60 J
			•	•	•
	•	•			
			•	•	•

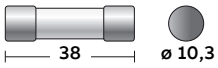
Ordering data
E 90 series

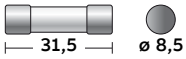




Poles	Rated current	Modules	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90 fuse disconnectors for 10.3 x 38 mm fuses							
1	32	1	009238	E 91/32	2CSM200923R1801	0.061	6
1	32	1	024835	E 91/32s*	2CSM202483R1801	0.062	6
1+N	32	2	008934	E 91N/32	2CSM200893R1801	0.130	3
1+N	32	2	515036	E 91N/32s*	2CSM251503R1801	0.131	3
2	32	2	008835	E 92/32	2CSM200883R1801	0.122	3
2	32	2	514930	E 92/32s*	2CSM251493R1801	0.123	3
3	32	3	047537	E 93/32	2CSM204753R1801	0.183	2
3	32	3	020639	E 93/32s*	2CSM202063R1801	0.184	2
3+N	32	4	047339	E 93N/32	2CSM204733R1801	0.252	1
3+N	32	4	514831	E 93N/32s*	2CSM251483R1801	0.254	1
4	32	4	047230	E 94/32	2CSM204723R1801	0.244	1
4	32	4	020530	E 94/32s*	2CSM202053R1801	0.245	1
E 90 fuse disconnectors for 8.5 x 31.5 mm fuses							
1	20	1	009832	E 91/20	2CSM200983R1801	0.061	6
1	20	1	024231	E 91/20s*	2CSM202423R1801	0.062	6
2	20	2	009535	E 92/20	2CSM200953R1801	0.122	3
2	20	2	896234	E 92/20s*	2CSM289623R1801	0.123	3
3	20	3	009436	E 93/20	2CSM200943R1801	0.183	2
3	20	3	896135	E 93/20s*	2CSM289613R1801	0.184	2

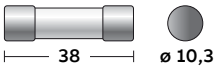
*s: version with blown fuse indicator





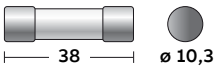
Poles	Rated current	Modules	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90h fuseholders for 10.3 x 38 mm fuses							
1+N	32	1	009139	E 91hN/32	2CSM200913R1801	0.070	6
1+N	32	1	065739	E 91hN/32s*	2CSM206573R1801	0.071	6
3+N	32	3	047438	E 93hN/32	2CSM204743R1801	0.192	2
3+N	32	3	743439	E 93hN/32s*	2CSM274343R1801	0.193	2
E 90h fuseholders for 8.5 x 31.5 mm fuses							
1+N	20	1	009634	E 91hN/20	2CSM200963R1801	0.070	6
1+N	20	1	007036	E 91hN/20s*	2CSM200703R1801	0.071	6
3+N	20	3	009337	E 93hN/20	2CSM200933R1801	0.192	2
3+N	20	3	896036	E 93hN/20s*	2CSM289603R1801	0.193	2

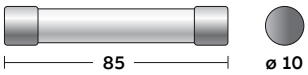
*s: version with blown fuse indicator



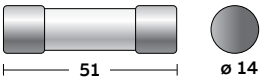
Poles	Rated current	Modules	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90 PV fuse disconnectors for 10.3 x 38 mm fuses (DC-20B)							
1	32	1	047131	E 91/32 PV	2CSM204713R1801	0.061	6
1	32	1	046936	E 91/32s PV*	2CSM204693R1801	0.062	6
2	32	2	047032	E 92/32 PV	2CSM204703R1801	0.122	3
2	32	2	569138	E 92/32s PV*	2CSM256913R1801	0.123	3

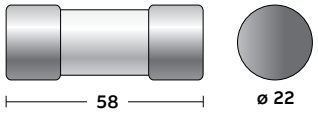
*s: version with blown fuse indicator





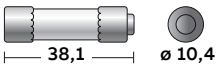
Poles	Rated current	Width	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90 PV fuse disconnectors for 10 x 85 mm and 10/14 x 85 mm fuses							
1	30	22.5	052456	E 91/32 PV1500	2CSM25245R1801	0.092	5





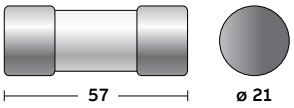
Poles	Rated current	Modules	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90/50 fuseholders for 14 x 51 mm fuses (AC-20B)							
1	50	1.5	790228	E 91/50	2CSM279022R1801	0.095	4
1	50	1.5	372028	E 91/50s*	2CSM237202R1801	0.095	4
1+N	50	3	779827	E 91N/50	2CSM277982R1801	0.19	2
1+N	50	3	023920	E 91N/50s*	2CSM202392R1801	0.19	2
2	50	3	779728	E 92/50	2CSM277972R1801	0.19	2
2	50	3	070320	E 92/50s*	2CSM207032R1801	0.19	2
3	50	4.5	779629	E 93/50	2CSM277962R1801	0.285	1
3	50	4.5	574828	E 93/50s*	2CSM257482R1801	0.285	1
3+N	50	6	779520	E 93N/50	2CSM277952R1801	0.38	1
3+N	50	6	563020	E 93N/50s*	2CSM256302R1801	0.38	1
E 90/125 fuseholders for 22 x 58 mm fuses (AC-20B)							
1	100	2	775720	E 91/125	2CSM277572R1801	0.135	4
1	100	2	896326	E 91/125s*	2CSM289632R1801	0.135	4
1+N	100	4	773528	E 91N/125	2CSM277352R1801	0.27	2
1+N	100	4	049425	E 91N/125s*	2CSM204942R1801	0.27	2
2	100	4	771326	E 92/125	2CSM277132R1801	0.27	2
2	100	4	049326	E 92/125s*	2CSM204932R1801	0.27	2
3	100	6	775027	E 93/125	2CSM277502R1801	0.405	1
3	100	6	049227	E 93/125s*	2CSM204922R1801	0.405	1
3+N	100	8	965329	E 93N/125	2CSM296532R1801	0.54	1
3+N	100	8	049128	E 93N/125s*	2CSM204912R1801	0.54	1

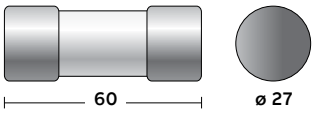
*s: version with blown fuse indicator



Poles	Rated current	Modules	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90 CC fuseholders for Class CC 10.4 x 38.1 mm fuses							
1	30	1	998723	E 91/30 CC	2CSM299872R1801	0.061	6
1	30	1	998822	E 91/30s* CC	2CSM299882R1801	0.062	6
1+N	30	2	998921	E 91N/30 CC	2CSM299892R1801	0.13	3
1+N	30	2	999027	E 91N/30s* CC	2CSM299902R1801	0.131	3
2	30	2	999126	E 92/30 CC	2CSM299912R1801	0.122	3
2	30	2	999225	E 92/30s* CC	2CSM299922R1801	0.123	3
3	30	3	999324	E 93/30 CC	2CSM299932R1801	0.183	2
3	30	3	999423	E 93/30s* CC	2CSM299942R1801	0.184	2
3+N	30	4	999522	E 93N/30 CC	2CSM299952R1801	0.252	1
3+N	30	3	999621	E 93N/30s* CC	2CSM299962R1801	0.253	1
4	30	4	999720	E 94/30 CC	2CSM299972R1801	0.244	1
4	30	4	999829	E 94/30s* CC	2CSM299982R1801	0.245	1

*s: version with blown fuse indicator



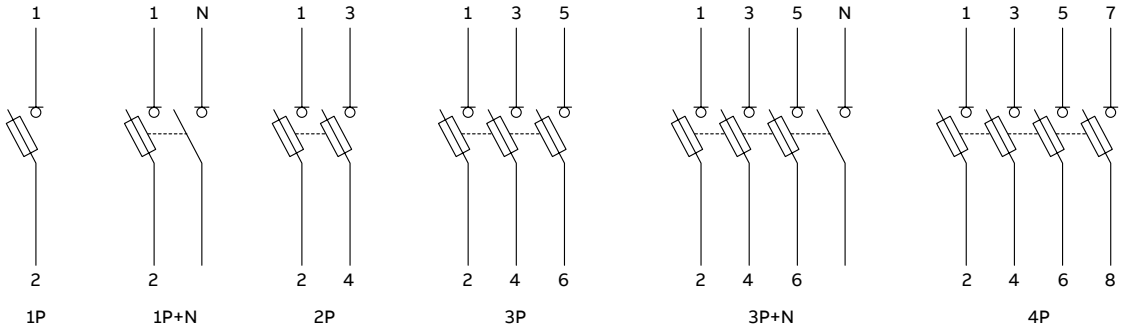


Poles	Rated current	Modules	Bbn 8012542	Order details		Piece weight	Pack unit
	In [A]		EAN	Type code	Order code	[kg]	pcs
E 90 J fuseholders for Class J 21 x 57 mm fuses							
1	30	2	048220	E 91/30 J	2CSM204822R1801	0.135	4
2	30	4	048121	E 92/30 J	2CSM204812R1801	0.27	2
3	30	6	048022	E 93/30 J	2CSM204802R1801	0.405	1
1	30	2	047926	E 91/30s J *	2CSM204792R1801	0.135	4
2	30	4	047827	E 92/30s J *	2CSM204782R1801	0.27	2
3	30	6	047728	E 93/30s J *	2CSM204772R1801	0.405	1
E 90 J fuseholders for Class J 27 x 60 mm fuses							
1	60	2.5	047629	E 91/60 J	2CSM204762R1801	0.175	3
2	60	5	049821	E 92/60 J	2CSM204982R1801	0.35	1
3	60	7.5	049722	E 93/60 J	2CSM204972R1801	0.525	1
1	60	2.5	049623	E 91/60s J *	2CSM204962R1801	0.175	3
2	60	5	049524	E 92/60s J *	2CSM204952R1801	0.35	1
3	60	7.5	738824	E 93/60s J *	2CSM273882R1801	0.525	1

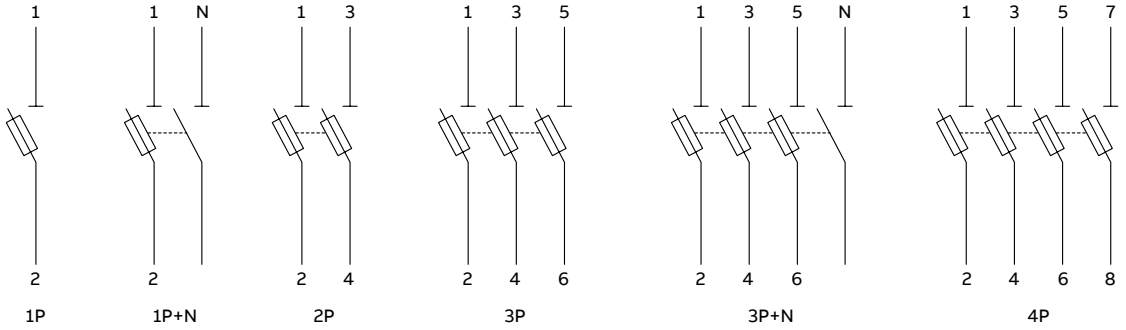
*s: version with blown fuse indicator

Wiring diagrams and overall dimensions
E 90 series

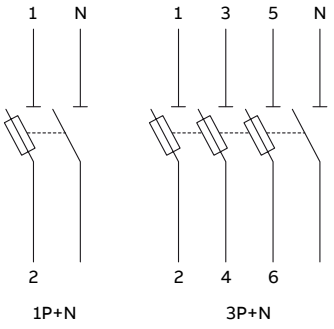
E 90 20/32 wiring diagrams



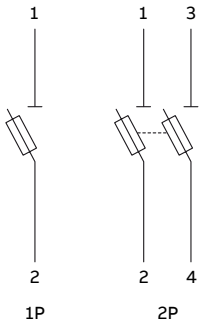
E 90 CC wiring diagrams



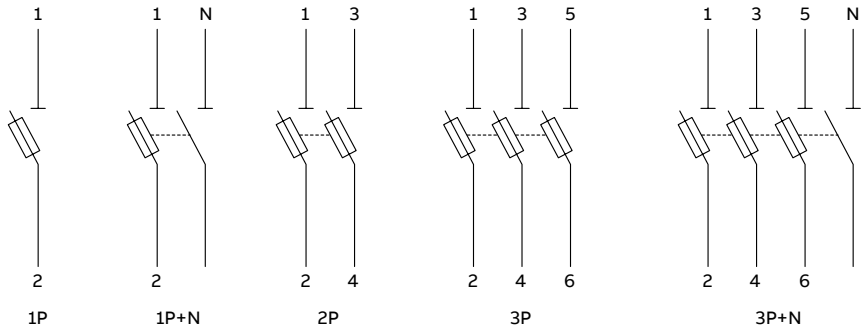
E 90 h wiring diagrams



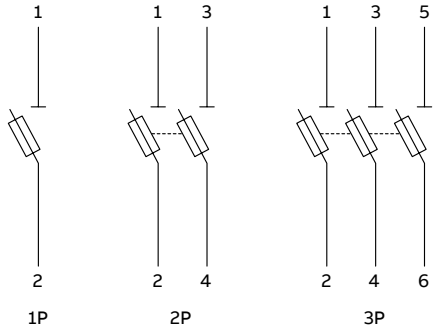
E 90 PV wiring diagrams



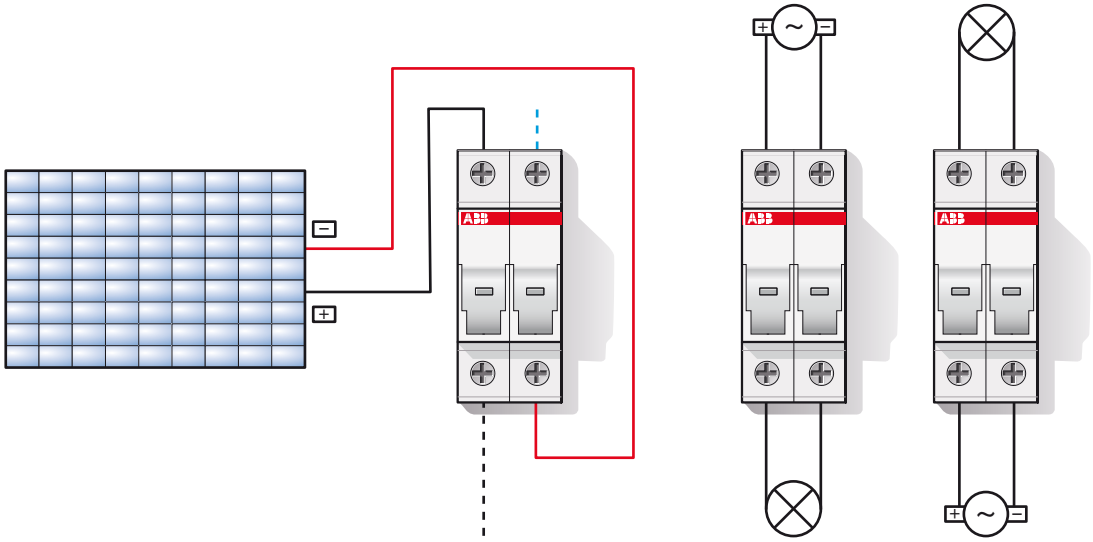
E 90 50/125 wiring diagrams



E 90 30/60 J wiring diagrams



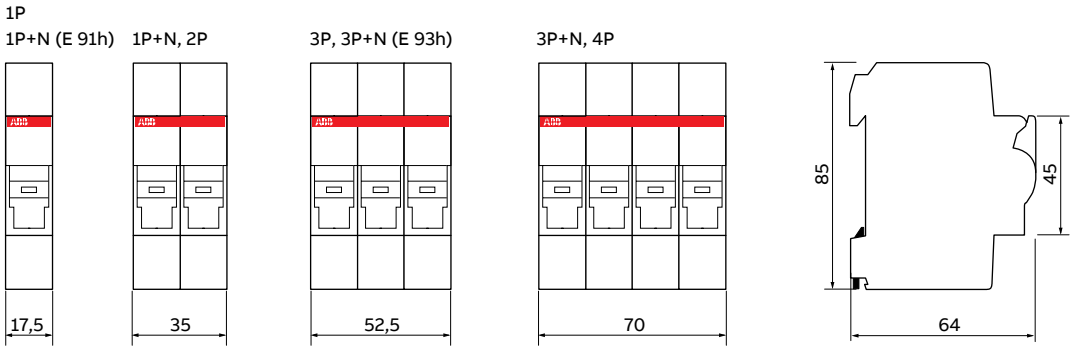
Wiring connection for devices with blown fuse indication



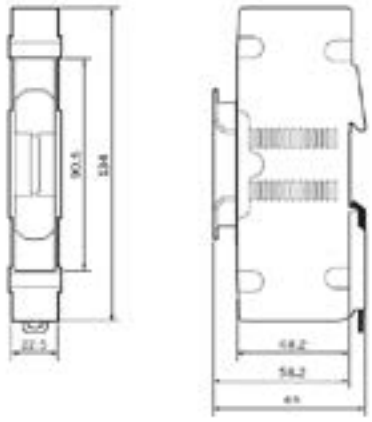
DC networks (1000 V DC series)

AC networks

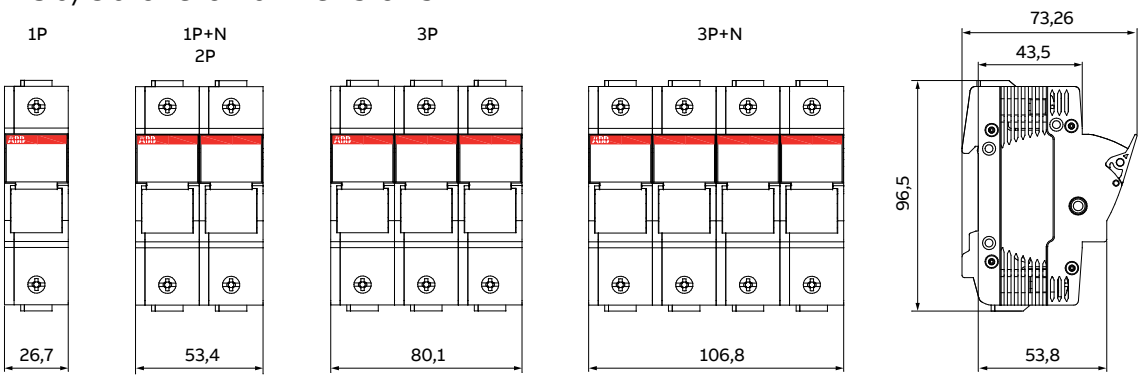
E 90 20/32, E 90 h, E90 CC, E90 PV (1000 V DC) overall dimensions



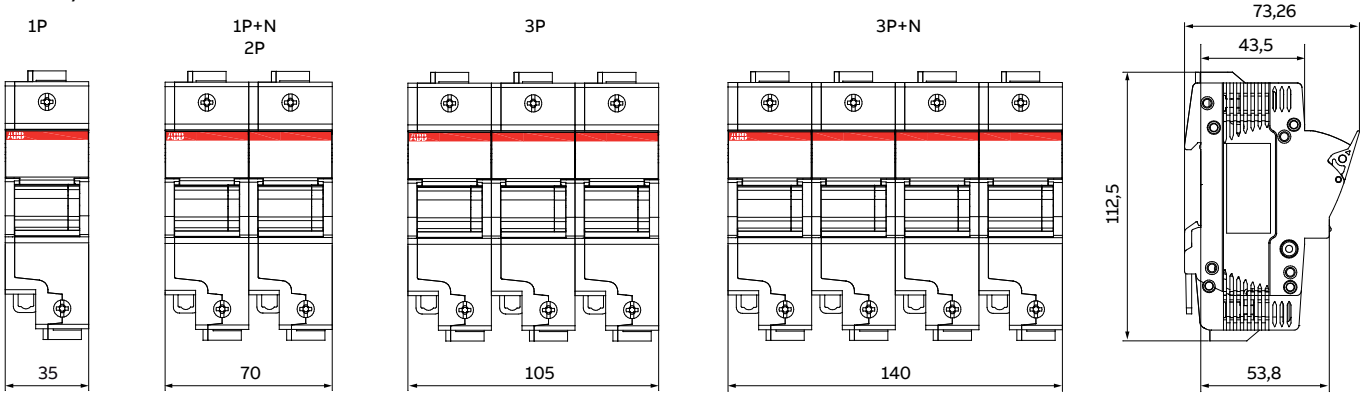
E90/32 PV 1500 overall dimensions



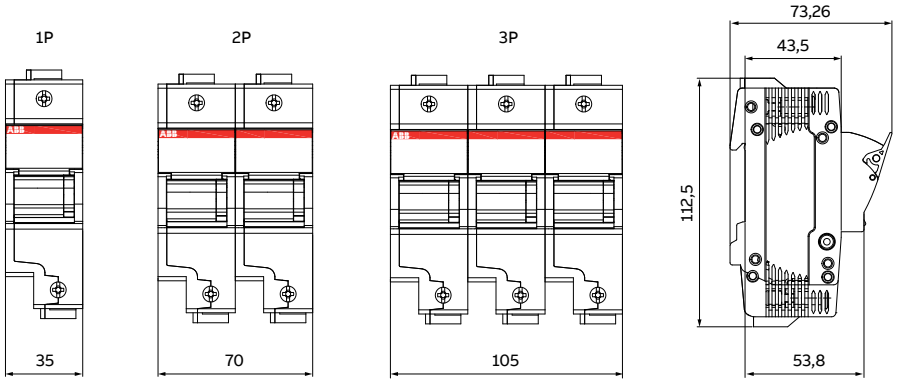
E 90/50 overall dimensions



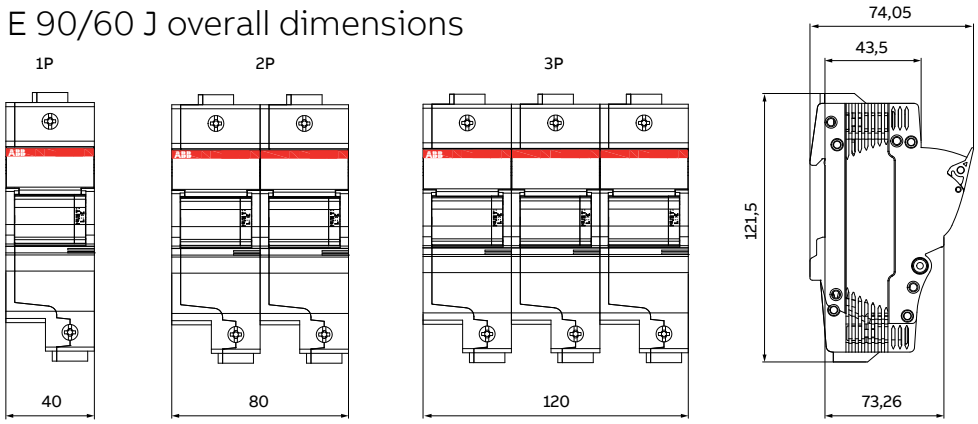
E 90/125 overall dimensions



E 90/30 J overall dimensions



E 90/60 J overall dimensions



How to choose the protection system

Maximum rated current value of the fuse
The maximum rated current values of the fuse that can be installed in the fuseholder are given in the table below.
These values depend on the rated voltage of the network and conform to the maximum limits of the power dissipated by the protection system, formed by the fuse and fuseholder.
ABB fuses and fuseholders allow all the requirements established by the standards to be met in full safety. The performance provided by ABB products allows a fuse with a rated current that exceeds the limit dictated by standard IEC 60269-2-1 to be installed in certain situations.

		Fuseholders			
Rated voltage	**Fuse curve**	**E 90/20 8.5 x 31.5 mm**	**E 90/32 10.3 x 38 mm**	**E 90/50 14 x 51 mm**	**E 90/125 22 x 58 mm**
400 V AC	gG	20 A	32 A		
	aM	10 A	32 A		
500 V AC	gG		25 A	50 A	100 A
	aM		20 A	50 A	125 A*
690 V AC	gG			25 A	80 A
	aM			25 A	80 A

* = to be used in combination with a device which guarantees protection against overload.

Derating values for E 90 fuseholders
The derating parameters in the table must be considered if several poles are installed side by side or if the equipment is installed in unusual climatic conditions.

Installation of single poles side by side					
E 90/32		**E 91hN/32**		**E 90 50/125**	
Poles	**Maximum current**	**Poles**	**Maximum current**	**Poles**	**Maximum current**
1…4	In	1…3	In	1…3	In
5…7	0.8 x In	4…9	0.7 x In	4…6	0.95 x In
More than 7	0.7 x In	More than 10	0.6 x In	More than 7	0.9 x In

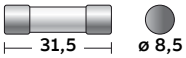
Climatic conditions			
E 90/32		**E 90 50/125**	
Maximum temperature	**Maximum current**	**Maximum temperature**	**Maximum current**
20 °C	In	20 °C	In
30 °C	95 %	30 °C	95 %
40 °C	90 %	40 °C	90 %
50 °C	80 %	50 °C	85 %



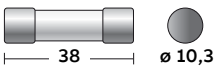
E 9F gG cylindrical fuses

The fastest protection for industrial automation switchboards

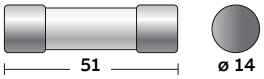
E 9F gG series fuses are the best way to protect against overloads and short-circuits together with series fuse E 90. They feature a fast tripping curve that is ideal for protecting electronic devices, transformers and electric cables. The E 9F gG series is available for all the main sizes (8.5 x 31.5 mm, 10.3 x 38 mm, 14 x 51 mm e 22 x 58 mm) and with a wide range of ratedcurrent values (from 1 A to 125 A and up to 690 V AC).
All the E 9F series fuses conform to the RoHS directive and are type-approved in accordance with the most important international naval marks.



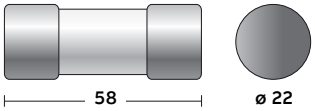
Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 8 gG 8.5 x 31.5 mm cylindrical fuses					
1	575733	E 9F8 GG1	2CSM257573R1801	0.004	10
2	563938	E 9F8 GG2	2CSM256393R1801	0.004	10
4	586630	E 9F8 GG4	2CSM258663R1801	0.004	10
6	574835	E 9F8 GG6	2CSM257483R1801	0.004	10
8	563037	E 9F8 GG8	2CSM256303R1801	0.004	10
10	775737	E 9F8 GG10	2CSM277573R1801	0.004	10
12	773535	E 9F8 GG12	2CSM277353R1801	0.004	10
16	771333	E 9F8 GG16	2CSM277133R1801	0.004	10
20	775034	E 9F8 GG20	2CSM277503R1801	0.004	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 10 gG 10.3 x 38 mm cylindrical fuses					
0.5	773337	E 9F10 GG05	2CSM277333R1801	0.007	10
1	771135	E 9F10 GG1	2CSM277113R1801	0.007	10
2	587231	E 9F10 GG2	2CSM258723R1801	0.007	10
4	575436	E 9F10 GG4	2CSM257543R1801	0.007	10
6	563631	E 9F10 GG6	2CSM256363R1801	0.007	10
8	586333	E 9F10 GG8	2CSM258633R1801	0.007	10
10	574538	E 9F10 GG10	2CSM257453R1801	0.007	10
12	562733	E 9F10 GG12	2CSM256273R1801	0.007	10
16	775430	E 9F10 GG16	2CSM277543R1801	0.007	10
20	773238	E 9F10 GG20	2CSM277323R1801	0.007	10
25	771036	E 9F10 GG25	2CSM277103R1801	0.007	10
32	587132	E 9F10 GG32	2CSM258713R1801	0.007	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 14 gG 14 x 51 mm cylindrical fuses					
2	775232	E 9F14 GG2	2CSM277523R1801	0.018	10
4	773030	E 9F14 GG4	2CSM277303R1801	0.018	10
6	770831	E 9F14 GG6	2CSM277083R1801	0.018	10
8	910039	E 9F14 GG8	2CSM291003R1801	0.018	10
10	909835	E 9F14 GG10	2CSM290983R1801	0.018	10
12	909637	E 9F14 GG12	2CSM290963R1801	0.018	10
16	587835	E 9F14 GG16	2CSM258783R1801	0.018	10
20	576037	E 9F14 GG20	2CSM257603R1801	0.018	10
25	564232	E 9F14 GG25	2CSM256423R1801	0.018	10
32	586937	E 9F14 GG32	2CSM258693R1801	0.018	10
40	575139	E 9F14 GG40	2CSM257513R1801	0.018	10
50	563334	E 9F14 GG50	2CSM256333R1801	0.018	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 22 gG 22 x 58 mm cylindrical fuses					
4	571834	E 9F22 GG4	2CSM257183R1801	0.048	10
6	592839	E 9F22 GG6	2CSM259283R1801	0.048	10
8	581031	E 9F22 GG8	2CSM258103R1801	0.048	10
10	569237	E 9F22 GG10	2CSM256923R1801	0.048	10
12	594031	E 9F22 GG12	2CSM259403R1801	0.048	10
16	582236	E 9F22 GG16	2CSM258223R1801	0.048	10
20	570431	E 9F22 GG20	2CSM257043R1801	0.048	10
25	595335	E 9F22 GG25	2CSM259533R1801	0.048	10
32	583530	E 9F22 GG32	2CSM258353R1801	0.048	10
40	571735	E 9F22 GG40	2CSM257173R1801	0.048	10
50	593935	E 9F22 GG50	2CSM259393R1801	0.048	10
63	582137	E 9F22 GG63	2CSM258213R1801	0.048	10
80	570332	E 9F22 GG80	2CSM257033R1801	0.048	10
100	595236	E 9F22 GG100	2CSM259523R1801	0.048	10
125	583431	E 9F22 GG125	2CSM258343R1801	0.048	10

Technical specifications		
Rated voltage	[V]	400, 500, 690 AC
Rated current	[A]	0.5…125
Breaking capacity	[kA]	20, 120
Overall dimensions	[mm]	8.5 x 31.5, 10.3 x 38, 14 x 51, 22 x 58
Weight	[g]	4, 7, 18, 48
Marks		LLOYD, BV
Standards		IEC 60269-2; ROHS 2002/98/CE

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 8 gG 8.5 x 31.5 mm cylindrical fuses			
E 9F8 GG1	1	400	20
E 9F8 GG2	2	400	20
E 9F8 GG4	4	400	20
E 9F8 GG6	6	400	20
E 9F8 GG8	8	400	20
E 9F8 GG10	10	400	20
E 9F8 GG12	12	400	20
E 9F8 GG16	16	400	20
E 9F8 GG20	20	400	20

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 10 gG 10.3 x 38 mm cylindrical fuses			
E 9F10 GG05	0.5	500	120
E 9F10 GG1	1	500	120
E 9F10 GG2	2	500	120
E 9F10 GG4	4	500	120
E 9F10 GG6	6	500	120
E 9F10 GG8	8	500	120
E 9F10 GG10	10	500	120
E 9F10 GG12	12	500	120
E 9F10 GG16	16	500	120
E 9F10 GG20	20	500	120
E 9F10 GG25	25	500	120
E 9F10 GG32	32	400	120

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 14 gG 14 x 51 mm cylindrical fuses			
E 9F14 GG2	2	690	120
E 9F14 GG4	4	690	120
E 9F14 GG6	6	690	120
E 9F14 GG8	8	690	120
E 9F14 GG10	10	690	120
E 9F14 GG12	12	690	120
E 9F14 GG16	16	690	120
E 9F14 GG20	20	690	120
E 9F14 GG25	25	690	120
E 9F14 GG32	32	500	120
E 9F14 GG40	40	500	120
E 9F14 GG50	50	500	120

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 22 gG 22 x 58 mm cylindrical fuses			
E 9F22 GG4	4	690	120
E 9F22 GG6	6	690	120
E 9F22 GG8	8	690	120
E 9F22 GG10	10	690	120
E 9F22 GG12	12	690	120
E 9F22 GG16	16	690	120
E 9F22 GG20	20	690	120
E 9F22 GG25	25	690	120
E 9F22 GG32	32	690	120
E 9F22 GG40	40	690	120
E 9F22 GG50	50	690	120
E 9F22 GG63	63	690	120
E 9F22 GG80	80	690	120
E 9F22 GG100	100	500	120
E 9F22 GG125	125	500	120

Power dissipation [W]				
In [A]	Size [mm]			
	8.5 x 31.5	10.3 x 38	14 x 51	22 x 58
0.5	0.55	0.07		
1	0.35	0.45	0.60	
2	0.45	0.50	0.75	0.90
4		0.85	1.10	1.25
6	0.83	0.95	1.25	1.40
8	1.00	1.15	1.45	1.60
10	1.20	1.30	1.65	1.90
12		1.40	1.80	2.00
16	1.70	1.90	2.35	2.50
20	2.00	2.40	2.75	3.40
25	2.40	2.70	3.10	3.50
32		2.80	3.60	3.70
40			4.00	4.30
50			4.80	5.30
63				6.30
80				7.40
100				8.30
125				11.3

It is important to make sure that the power dissipated by the fuse does not exceed the limit imposed by the fuseholder in which it is installed.

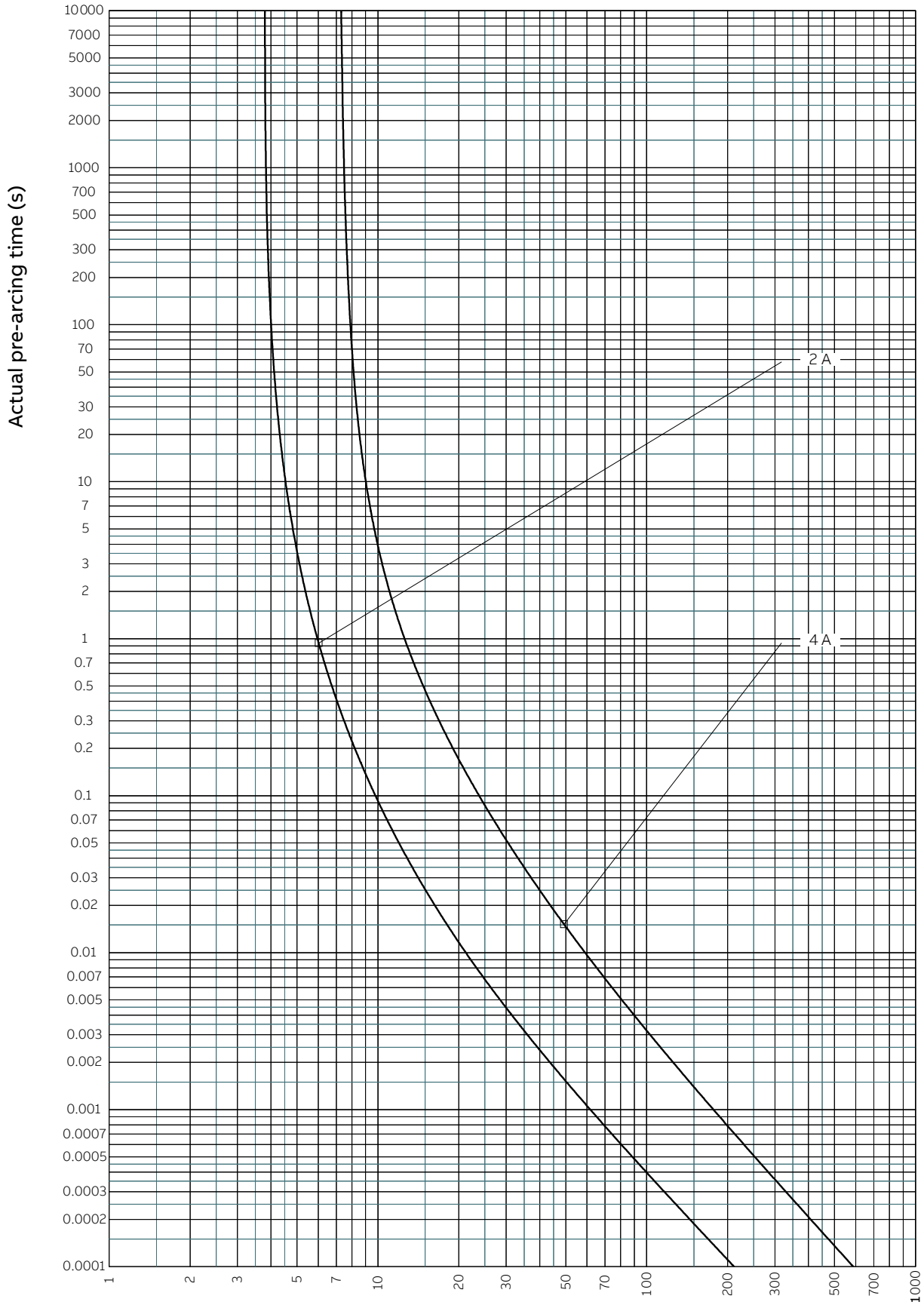
The maximum power dissipation values, in accordance with the specifications of the E 90 fuseholders series and IEC 60269-2 standard, are highlighted in red.

Maximum cable length according to the rated current and section of the conductor										
Copper conductor section [mm²]	Rated current In [A] of gG fuses									
	16	20	25	32	40	50	63	80	100	125
1.5	99/113	86/87	40/59	21/29	13/16	7/9				
2.5		134	110/122	67/84	41/51	25/33	13/20	8/11		
4			183	139	108/119	67/84	46/58	24/32	14/17	7.3/10
6				214	165	139	94/113	55/70	33/41	20/27
10					275	226	172	130	90/108	57/70
16							283	217	168	128
25								336	257	197
35									367	283
50										379

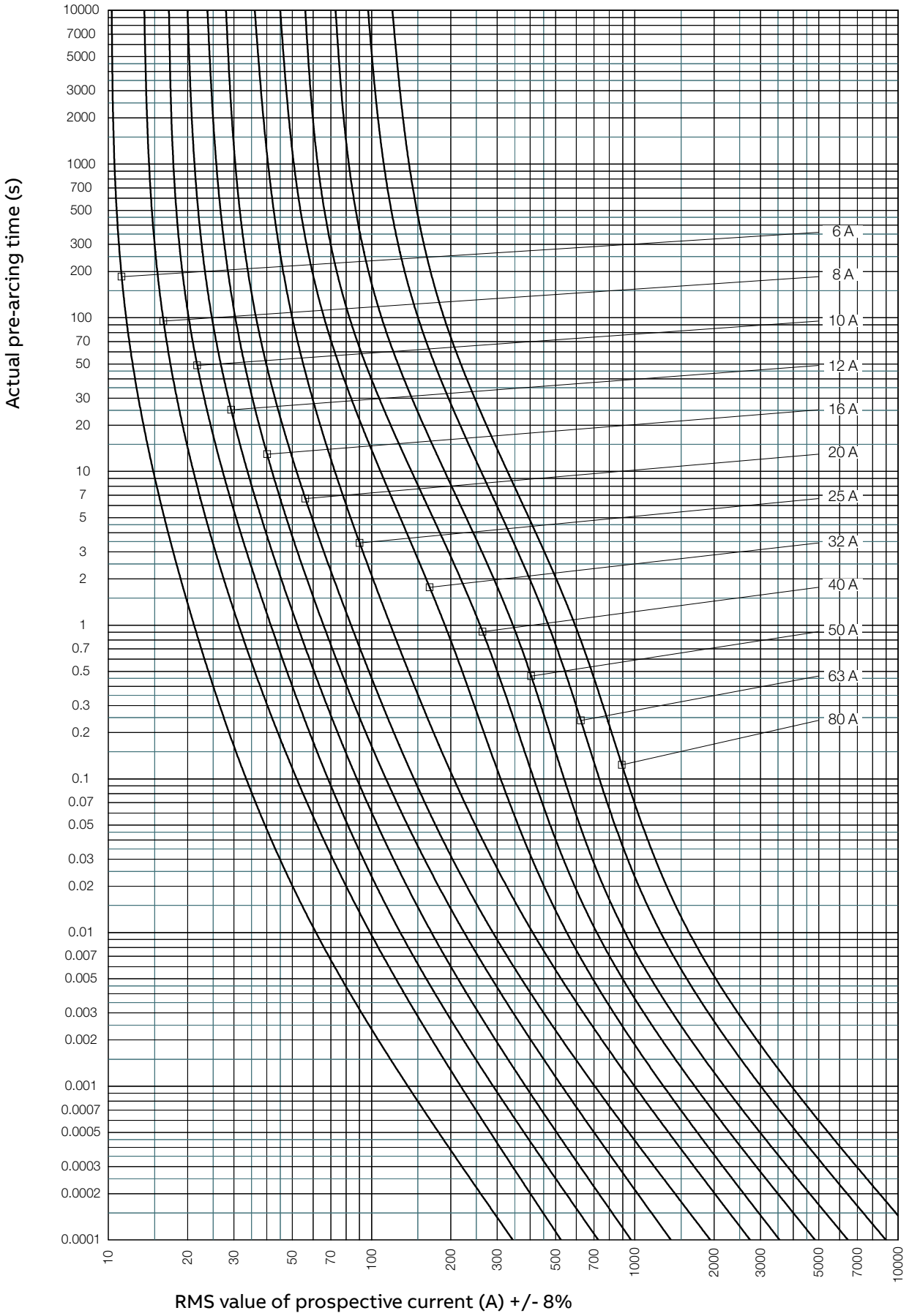
Use this table to find the cable length, in meters, that is protected by a fuse.

Just cross the rated current of the fuse (in the columns) with the section of the conductor (on the lines).
The resulting number corresponds to the protected length of the conductor: for example, a 32 A fuse can protect up to 139 meters of 6 mm² section cable.
When there are two values, it means that the maximum length of the cable is between the two numbers given in the table.

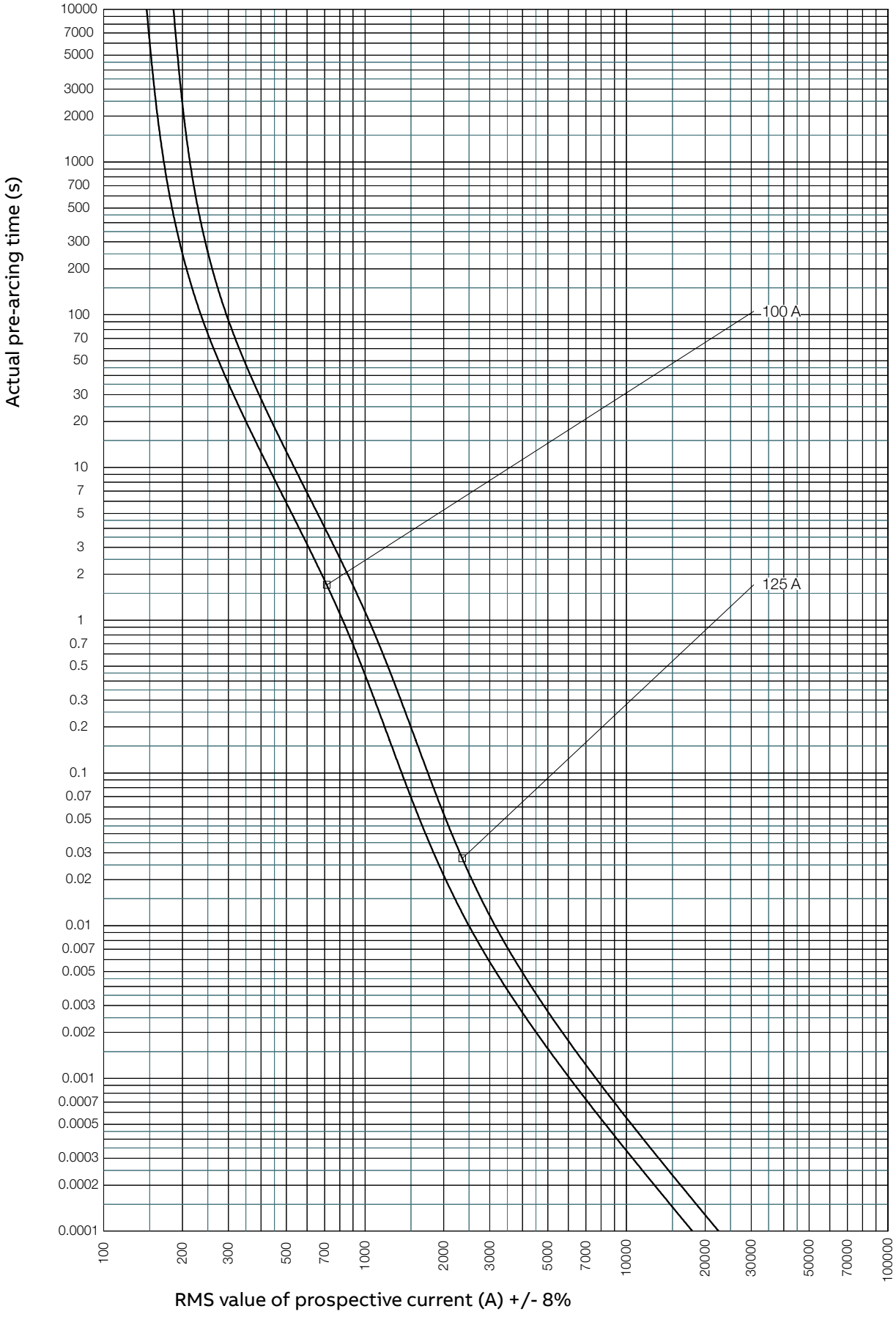
Time cuurent characteristic curves
E9F gG



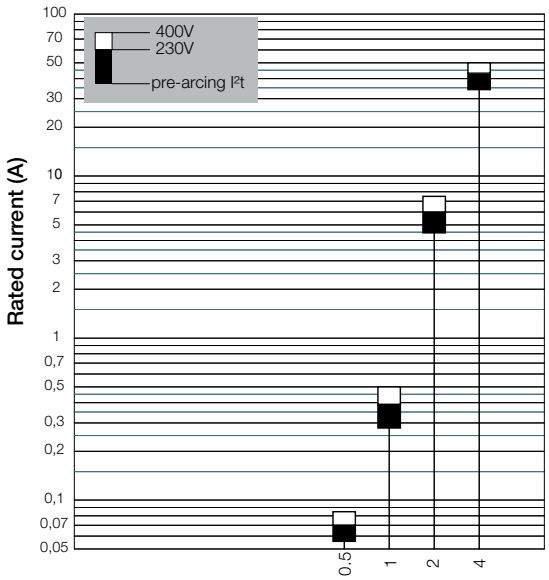
Time cuurent characteristic curves
E9F gG

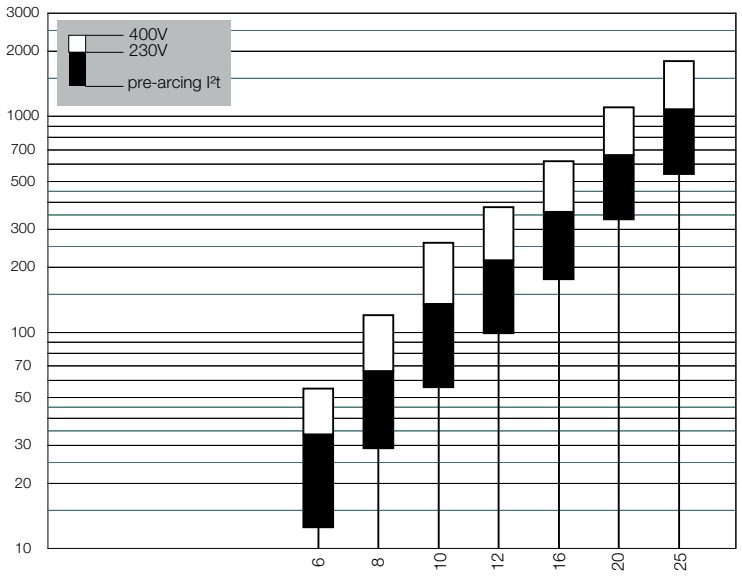


Time cuurent characteristic curves
E9F gG

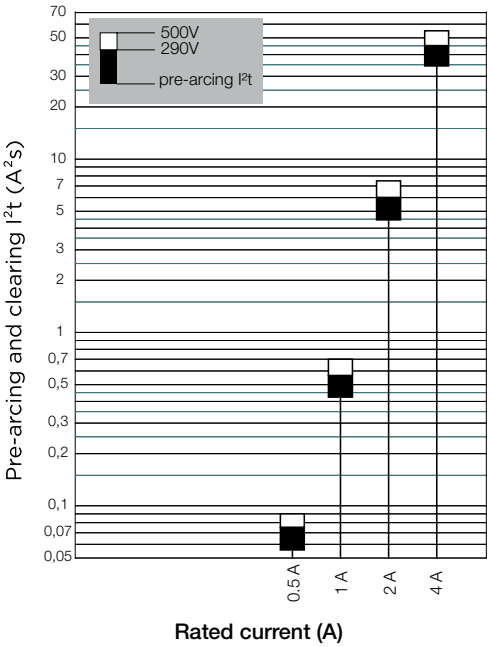


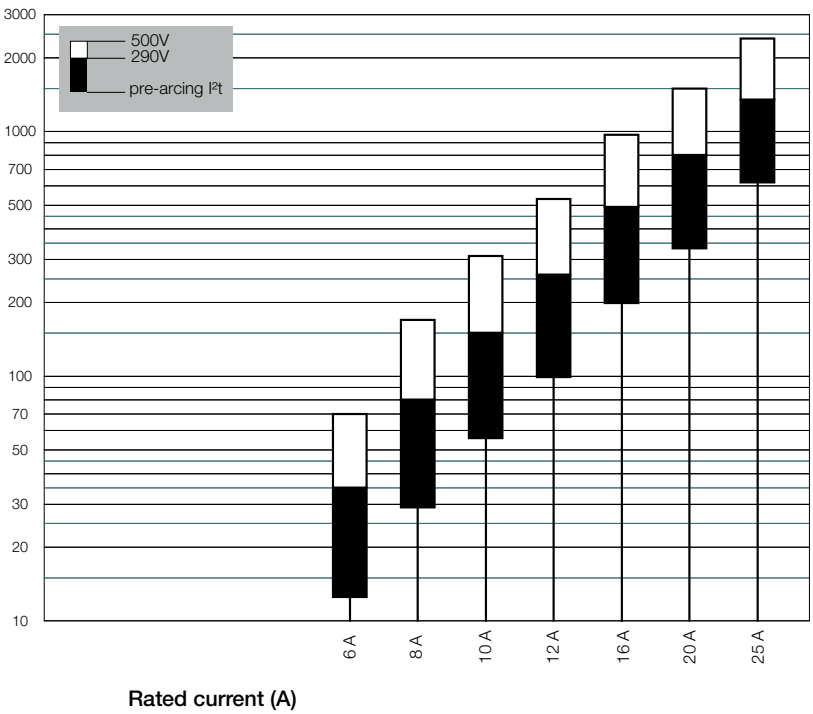
Operating I²T characteristics
E9F 8 gG



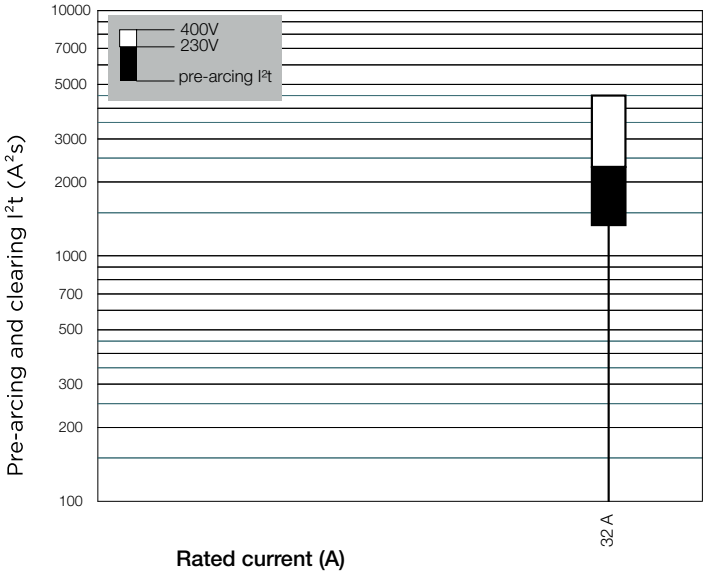


E9F 10 gG

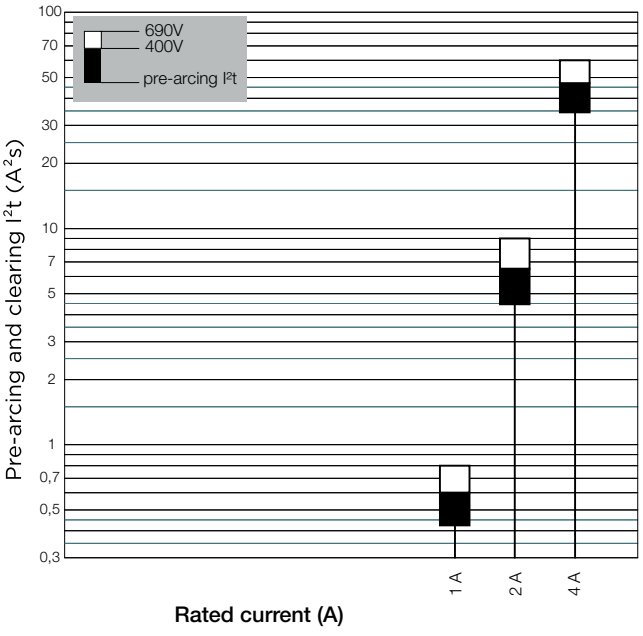


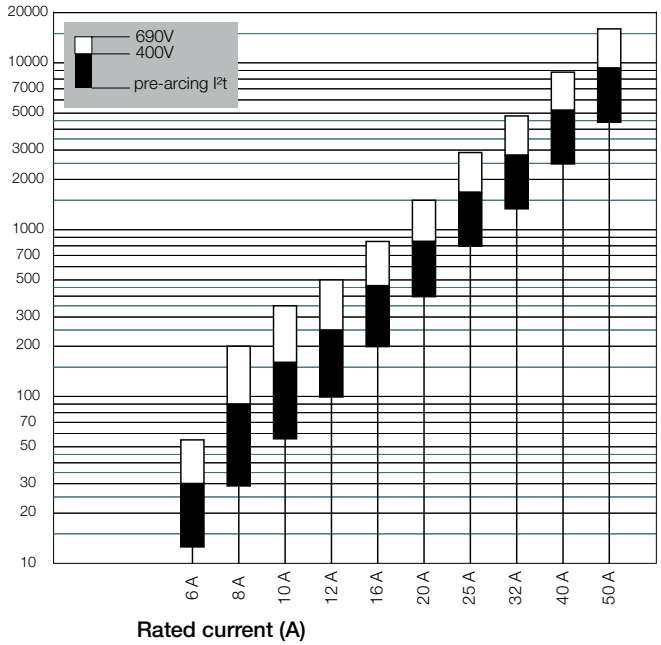


Operating I²T characteristics
E9F 10 gG

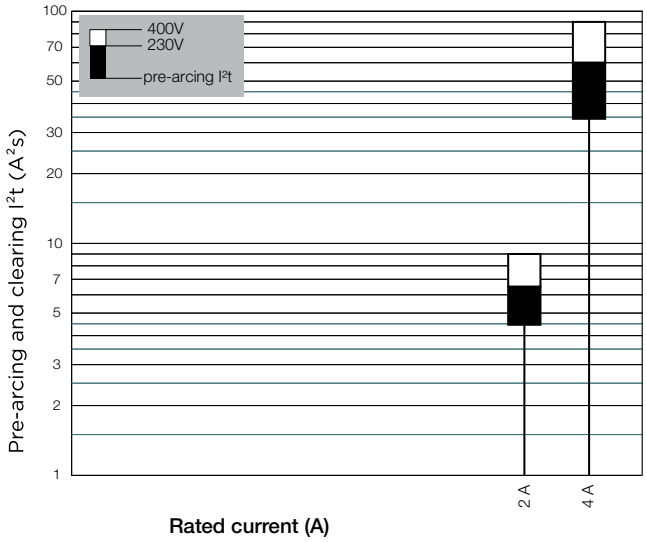


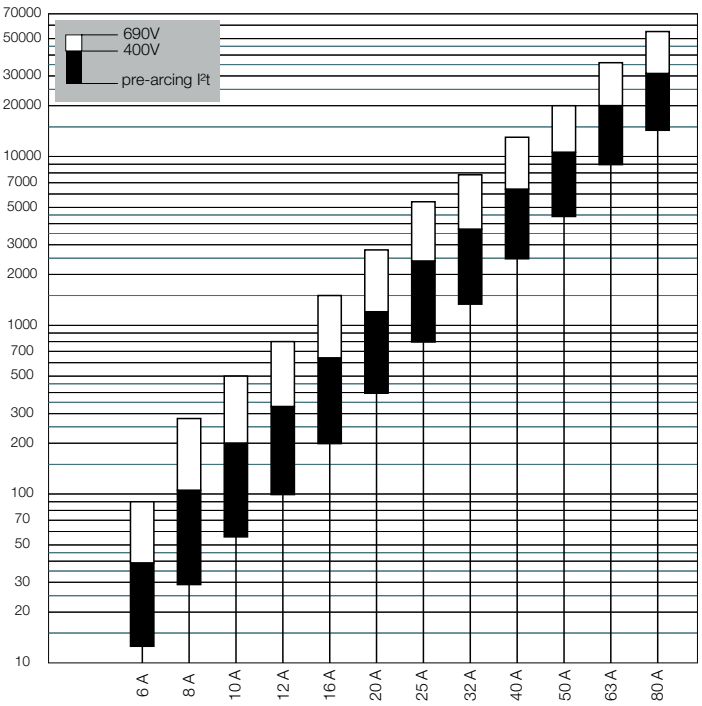
Operating I²T characteristics
E9F 14 gG



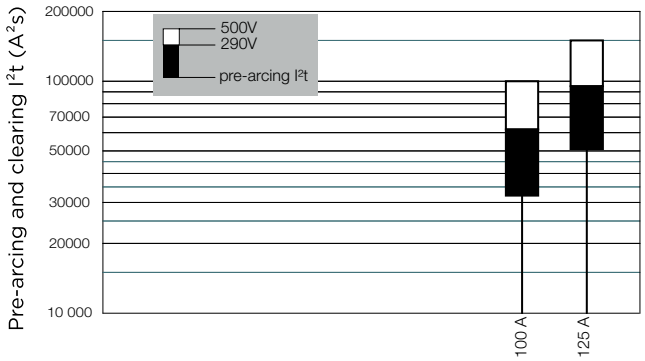


Operating I²T characteristics
E9F 22 gG

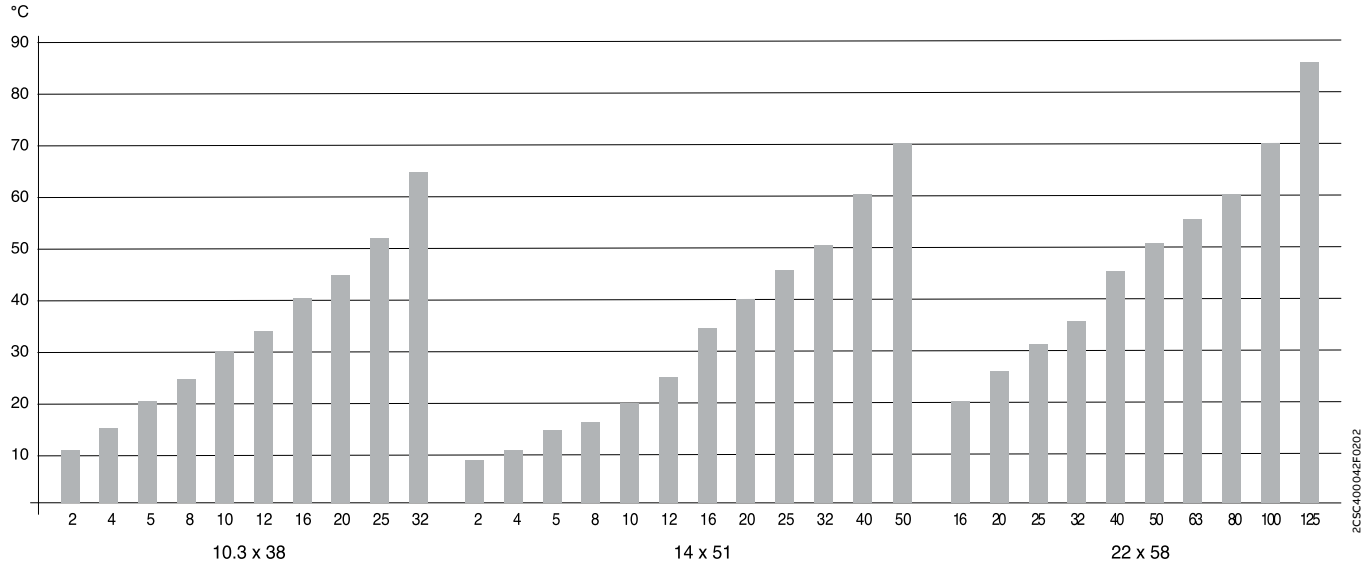




Operating I²T characteristics
E9F 22 gG

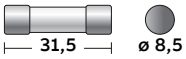


Temperature increase
E9F gG

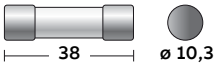


E 9F aM cylindrical fuses
Delayed protection for motor starts

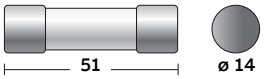
E 9F aM series fuses are the best way to protect against overloads and short-circuits together with series fuse E 90. They feature a delayed tripping curve and are therefore ideal for protecting industrial motors that require high inrush current during the starting phase. The E 9F aM series is available for all the main sizes (8.5 x 31.5 mm, 10.3 x 38 mm, 14 x 51 mm, 22 x 58 mm) and with a wide range of rated current values
(from 1 A to 125 A and up to 690 V AC). All the E 9F series fuses conform to the RoHS directive and are type-approved in accordance with the most important international naval marks.



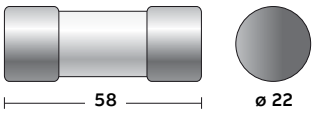
Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 8 aM 8.5 x 31.5 mm cylindrical fuses					
1	772835	E 9F8 AM1	2CSM277283R1801	0.004	10
2	770633	E 9F8 AM2	2CSM277063R1801	0.004	10
4	587439	E 9F8 AM4	2CSM258743R1801	0.004	10
6	575634	E 9F8 AM6	2CSM257563R1801	0.004	10
8	563839	E 9F8 AM8	2CSM256383R1801	0.004	10
10	586531	E 9F8 AM10	2CSM258653R1801	0.004	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 10 aM 10.3 x 38 mm cylindrical fuses					
0.5	574736	E 9F10 AM05	2CSM257473R1801	0.007	10
1	562931	E 9F10 AM1	2CSM256293R1801	0.007	10
2	775638	E 9F10 AM2	2CSM277563R1801	0.007	10
4	773436	E 9F10 AM4	2CSM277343R1801	0.007	10
6	771234	E 9F10 AM6	2CSM277123R1801	0.007	10
8	587330	E 9F10 AM8	2CSM258733R1801	0.007	10
10	575535	E 9F10 AM10	2CSM257553R1801	0.007	10
12	563730	E 9F10 AM12	2CSM256373R1801	0.007	10
16	586432	E 9F10 AM16	2CSM258643R1801	0.007	10
20	574637	E 9F10 AM20	2CSM257463R1801	0.007	10
25	562832	E 9F10 AM25	2CSM256283R1801	0.007	10
32	775539	E 9F10 AM32	2CSM277553R1801	0.007	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 14 aM 14 x 51 mm cylindrical fuses					
1	575337	E 9F14 AM1	2CSM257533R1801	0.018	10
2	563532	E 9F14 AM2	2CSM256353R1801	0.018	10
4	586234	E 9F14 AM4	2CSM258623R1801	0.018	10
6	574439	E 9F14 AM6	2CSM257443R1801	0.018	10
8	**562634**	**E 9F14 AM8**	**2CSM256263R1801**	**0.018**	**10**
10	**775331**	**E 9F14 AM10**	**2CSM277533R1801**	**0.018**	**10**
12	**773139**	**E 9F14 AM12**	**2CSM277313R1801**	**0.018**	**10**
16	**770930**	**E 9F14 AM16**	**2CSM277093R1801**	**0.018**	**10**
20	**587033**	**E 9F14 AM20**	**2CSM258703R1801**	**0.018**	**10**
25	**575238**	**E 9F14 AM25**	**2CSM257523R1801**	**0.018**	**10**
32	**563433**	**E 9F14 AM32**	**2CSM256343R1801**	**0.018**	**10**
40	586135	E 9F14 AM40	2CSM258613R1801	0.018	10
45	574330	E 9F14 AM45	2CSM257433R1801	0.018	10
50	562535	E 9F14 AM50	2CSM256253R1801	0.018	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F 22 aM 22 x 58 mm cylindrical fuses					
6	586036	E 9F22 AM6	2CSM258603R1801	0.048	10
8	574231	E 9F22 AM8	2CSM257423R1801	0.048	10
10	562436	E 9F22 AM10	2CSM256243R1801	0.048	10
12	775133	E 9F22 AM12	2CSM277513R1801	0.048	10
16	**772934**	**E 9F22 AM16**	**2CSM277293R1801**	**0.048**	**10**
20	**770732**	**E 9F22 AM20**	**2CSM277073R1801**	**0.048**	**10**
25	**774938**	**E 9F22 AM25**	**2CSM277493R1801**	**0.048**	**10**
32	**772736**	**E 9F22 AM32**	**2CSM277273R1801**	**0.048**	**10**
40	**770534**	**E 9F22 AM40**	**2CSM277053R1801**	**0.048**	**10**
50	**594130**	**E 9F22 AM50**	**2CSM259413R1801**	**0.048**	**10**
63	**582335**	**E 9F22 AM63**	**2CSM258233R1801**	**0.048**	**10**
80	570530	E 9F22 AM80	2CSM257053R1801	0.048	10
100	595434	E 9F22 AM100	2CSM259543R1801	0.048	10
125	583639	E 9F22 AM125	2CSM258363R1801	0.048	10

Technical specifications		
Rated voltage	[V]	400, 500, 690 AC
Rated current	[A]	0.5…125
Breaking capacity	[kA]	20, 120
Overall dimensions	[mm]	8.5 x 31.5, 10.3 x 38, 14 x 51, 22 x 58
Weight	[g]	4, 7, 18, 48
Marks		LLOYD, BV
Standards		IEC 60269-2; ROHS 2002/98/CE

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 8 aM 8.5 x 31.5 mm cylindrical fuses			
E 9F1 AM1	1	400	20
E 9F8 AM2	2	400	20
E 9F8 AM4	4	400	20
E 9F8 AM6	6	400	20
E 9F8 AM8	8	400	20
E 9F8 AM10	10	400	20

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 22 aM 22 x 58 mm cylindrical fuses			
E 9F14 AM1	1	690	120
E 9F14 AM2	2	690	120
E 9F14 AM4	4	690	120
E 9F14 AM6	6	690	120
E 9F14 AM8	8	690	120
E 9F14 AM10	10	690	120
E 9F14 AM12	12	690	120
E 9F14 AM16	16	690	120
E 9F14 AM20	20	690	120
E 9F14 AM25	25	690	120
E 9F14 AM32	32	500	120
E 9F14 AM40	40	500	120
E 9F14 AM50	50	500	120

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 14 aM 14 x 51 mm cylindrical fuses			
E 9F10 AM05	0.5	500	120
E 9F10 AM1	1	500	120
E 9F10 AM2	2	500	120
E 9F10 AM4	4	500	120
E 9F10 AM6	6	500	120
E 9F10 AM8	8	500	120
E 9F10 AM10	10	500	120
E 9F10 AM12	12	500	120
E 9F10 AM16	16	500	120
E 9F10 AM20	20	500	120
E 9F10 AM25	25	400	120
E 9F10 AM32	32	400	120

Type	Rated current [A]	Rated voltage [V AC]	Breaking capacity [kA]
E 9F 10 aM 10.3 x 38 mm cylindrical fuses			
E 9F22 AM6	6	690	120
E 9F22 AM8	8	690	120
E 9F22 AM10	10	690	120
E 9F22 AM12	12	690	120
E 9F22 AM16	16	690	120
E 9F22 AM20	20	690	120
E 9F22 AM25	25	690	120
E 9F22 AM32	32	690	120
E 9F22 AM40	40	690	120
E 9F22 AM50	50	690	120
E 9F22 AM63	63	690	120
E 9F22 AM80	80	690	120
E 9F22 AM100	100	500	120
E 9F22 AM125	125	500	120

Power dissipation [W]				
In [A]	**Size [mm]**			
	8.5 x 31.5	**10.3 x 38**	**14 x 51**	**22 x 58**
0.5		0.07	0.90	
1	0.09	0.10	0.13	0.20
2	0.15	0.14	0.18	0.25
4	0.26	0.28	0.28	0.35
6	0.35	0.38	0.42	0.45
8	0.47	0.55	0.55	0.60
10	0.55	0.62	0.65	0.75
12	0.70	0.82	0.75	0.85
16		0.87	1.05	1.15
20		1.05	1.30	1.35
25		1.20	1.55	1.70
32		1.80	2.05	2.20
40			2.65	2.70
45			2.85	
50			2.95	3.60
63				4.80
80				6.20
100				6.65
125				9.90

It is important to make sure that the power dissipated by the fuse does not exceed the limit imposed by the fuseholder in which it is installed.

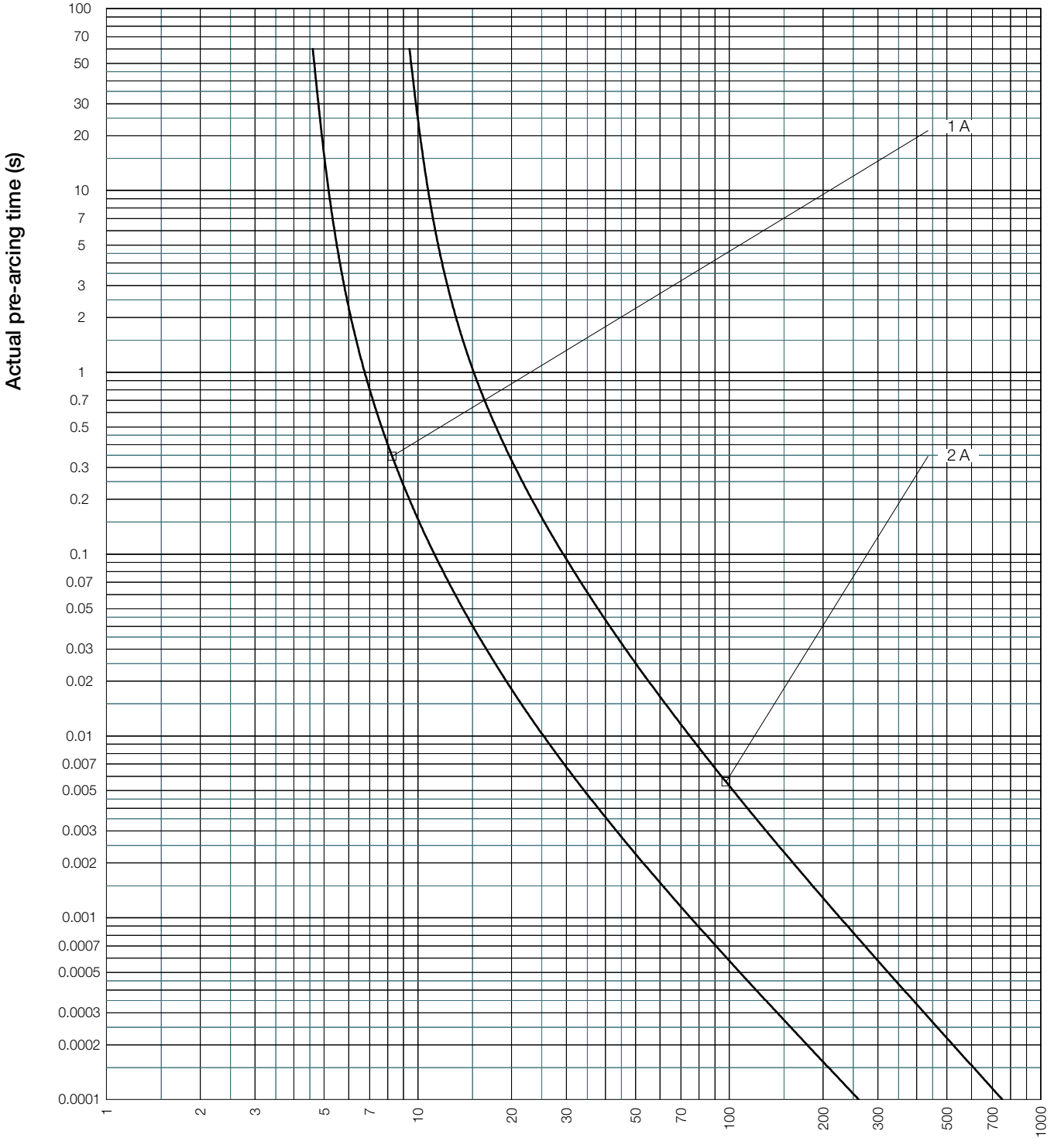
The maximum power dissipation values, in accordance with the specifications of the E 90 fuseholders series and IEC 60269-2 standard, are highlighted in red.

Maximum cable length according to the rated current and section of the conductor										
Copper conductor section [mm²]	**Rated current In [A] of aM fuses**									
	16	**20**	**25**	**32**	**40**	**50**	**63**	**80**	**100**	**125**
1.5	55/64	37-45	25/30	15/20						
2.5	116	84/94	58/68	40/49	26/32	17/20				
4	181	147	118	84/95	58/68	42/48	28/33	18/23		
6	273	223	178	139	105/117	79/89	55/64	37/42	26/31	14/20
10				227	181	147	113/125	80/94	57/69	40/47
16						236	189	151	120	83/97
25								231	185	147
35									262	210

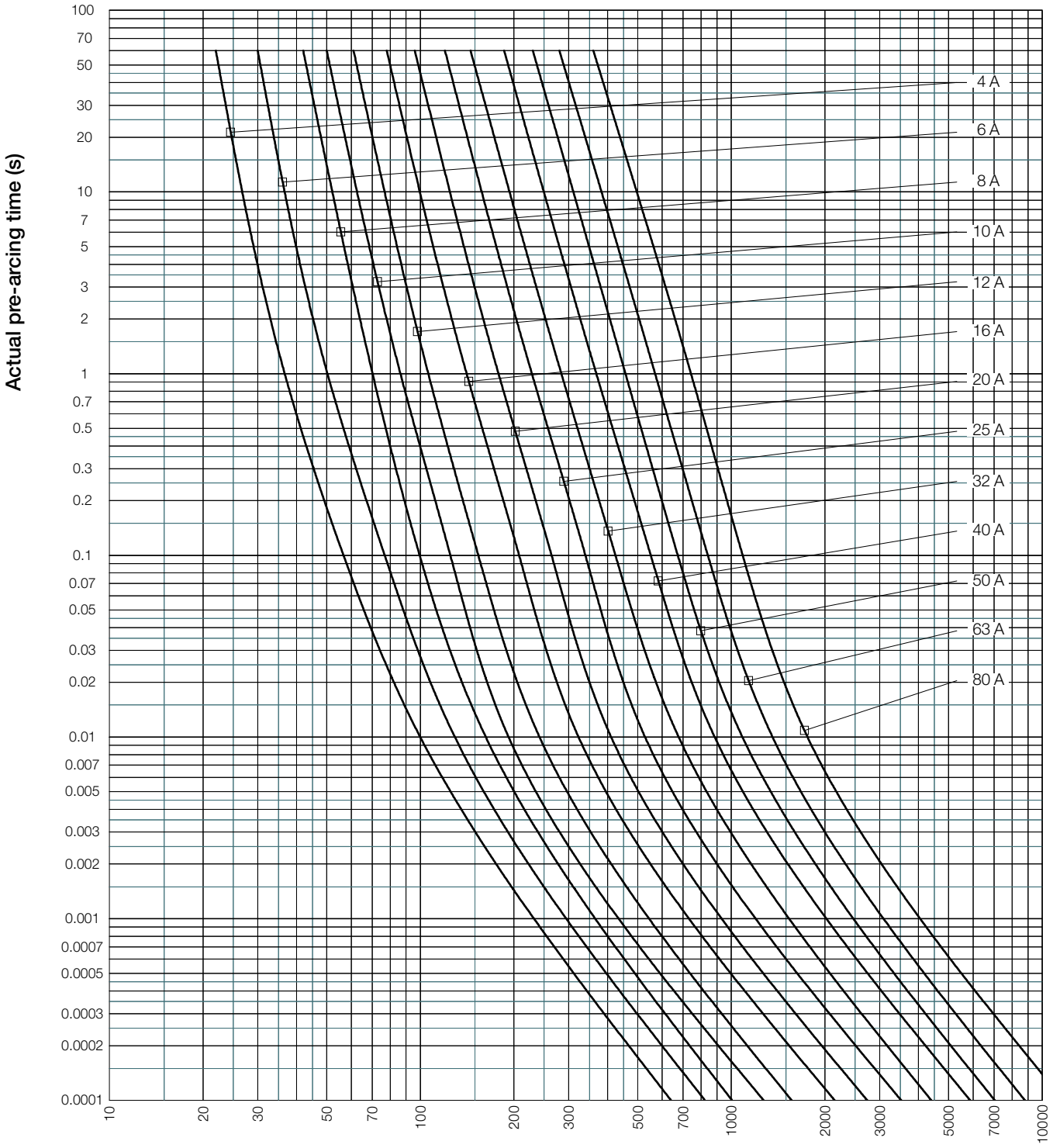
Use this table to find the cable length, in meters, that is protected by a fuse.

Just cross the rated current of the fuse (in the columns) with the section of the conductor (on the lines).
The resulting number corresponds to the protected length of the conductor: for example, a 32 A fuse can protect up to 139 meters of 6 mm² section cable.
When there are two values, it means that the maximum length of the cable is between the two numbers given in the table.

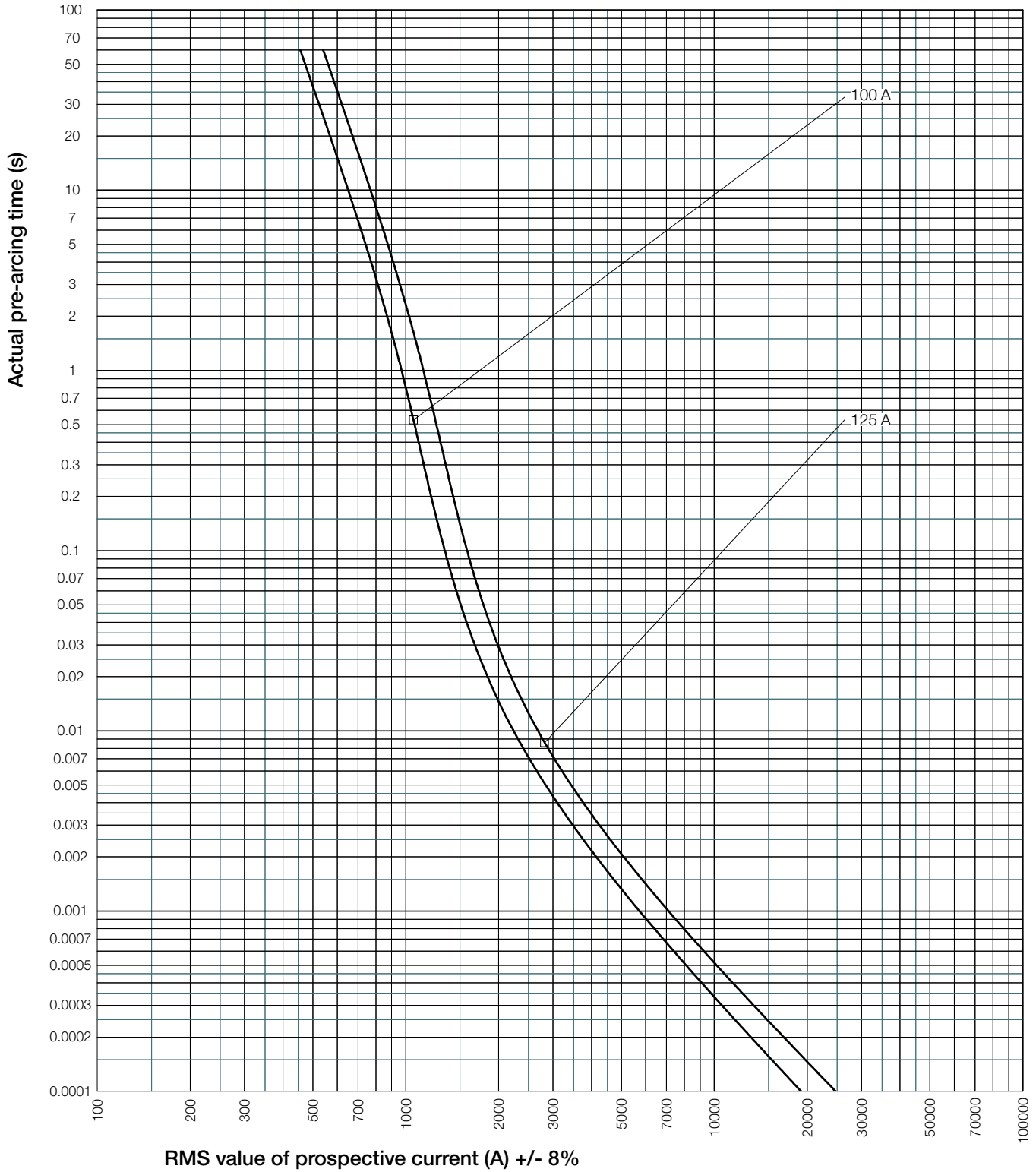
Time cuurent characteristic curves
E9F aM



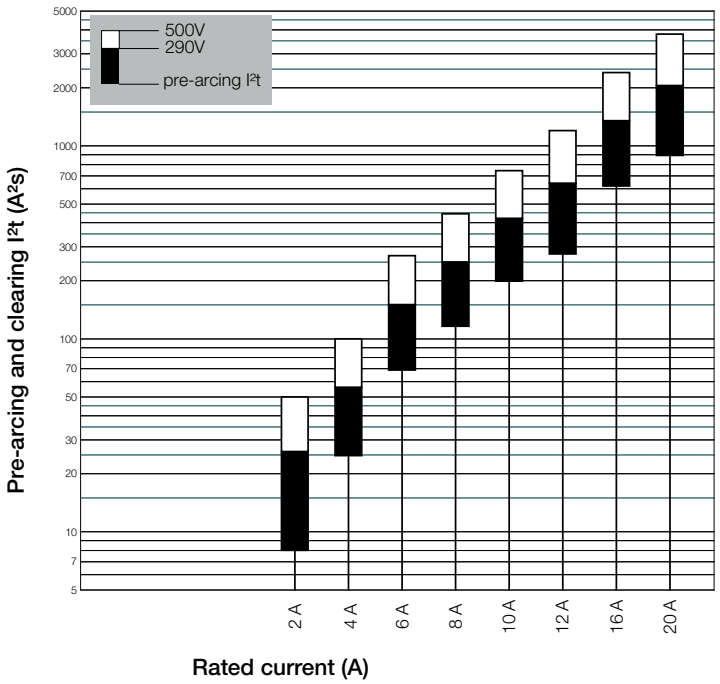
Time cuurent characteristic curves
E9F aM

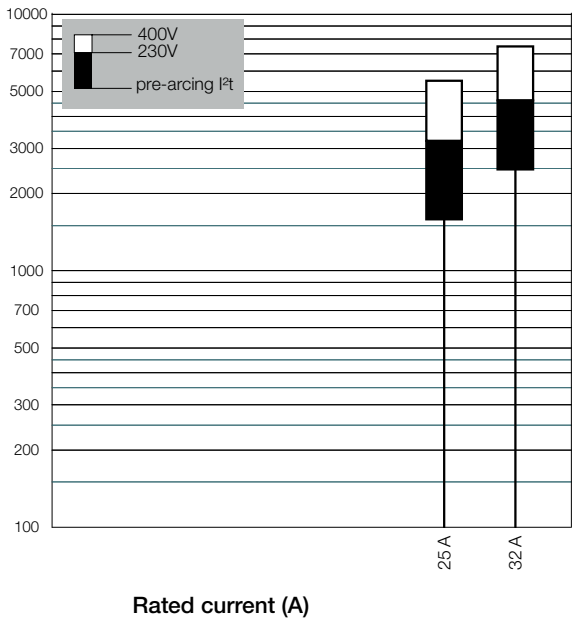


Time cuurent characteristic curves
E9F aM

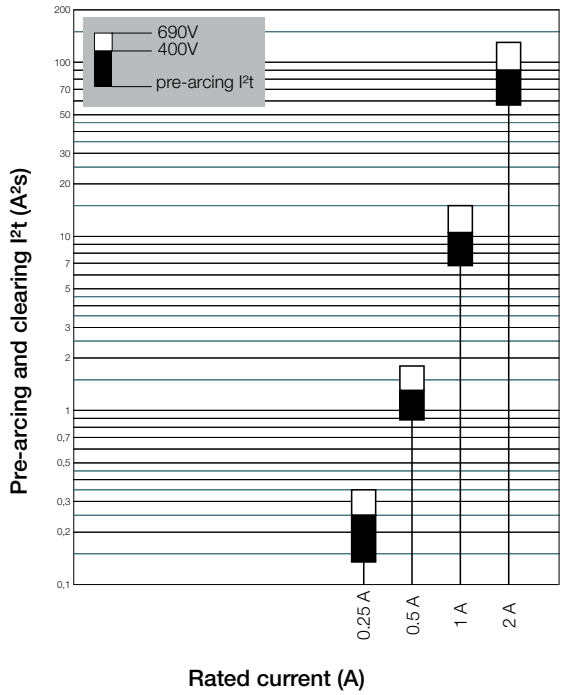


Operating I²T characteristics
E9F 8 aM



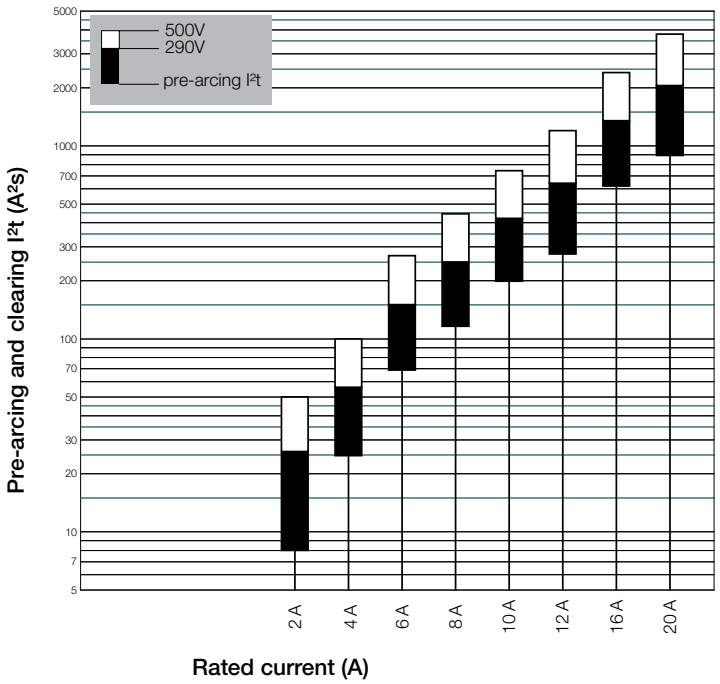


E9F 10 aM

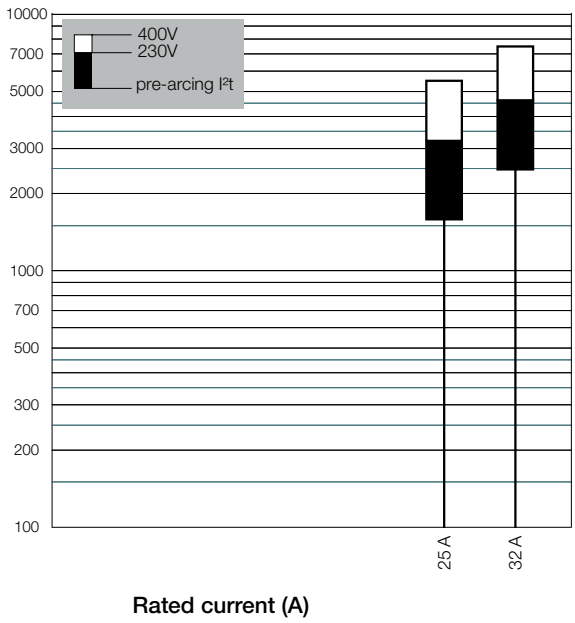


Operating I²T characteristics

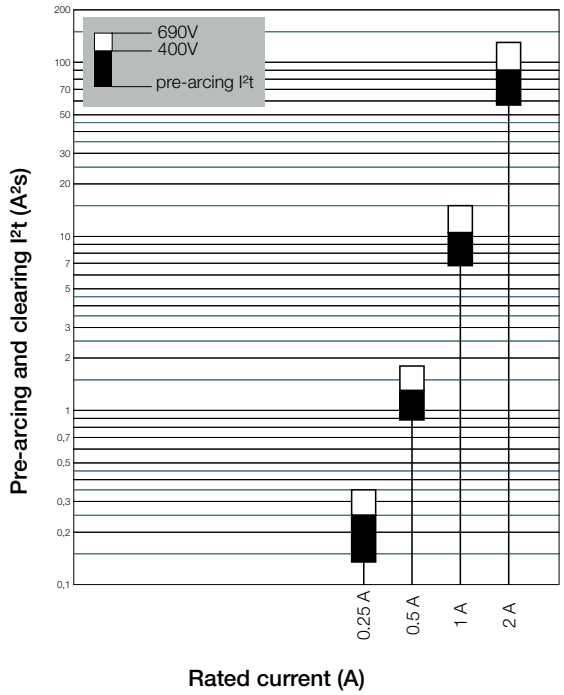
E9F 10 aM



E9F 10 aM

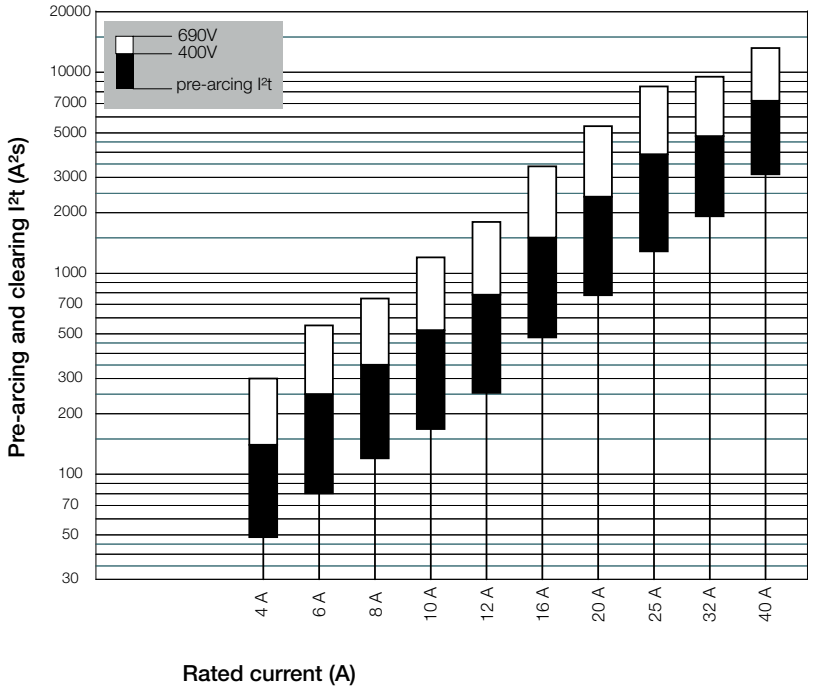


E9F 14 aM

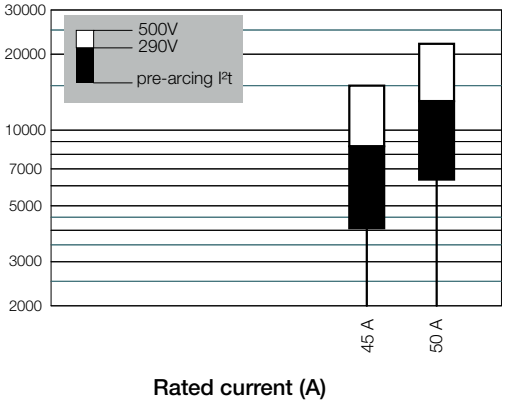


Operating I²T characteristics

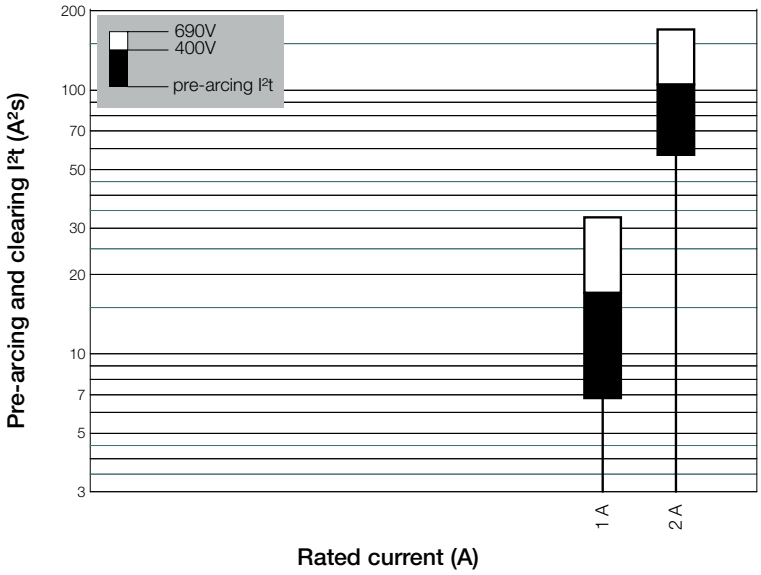
E9F 14 aM



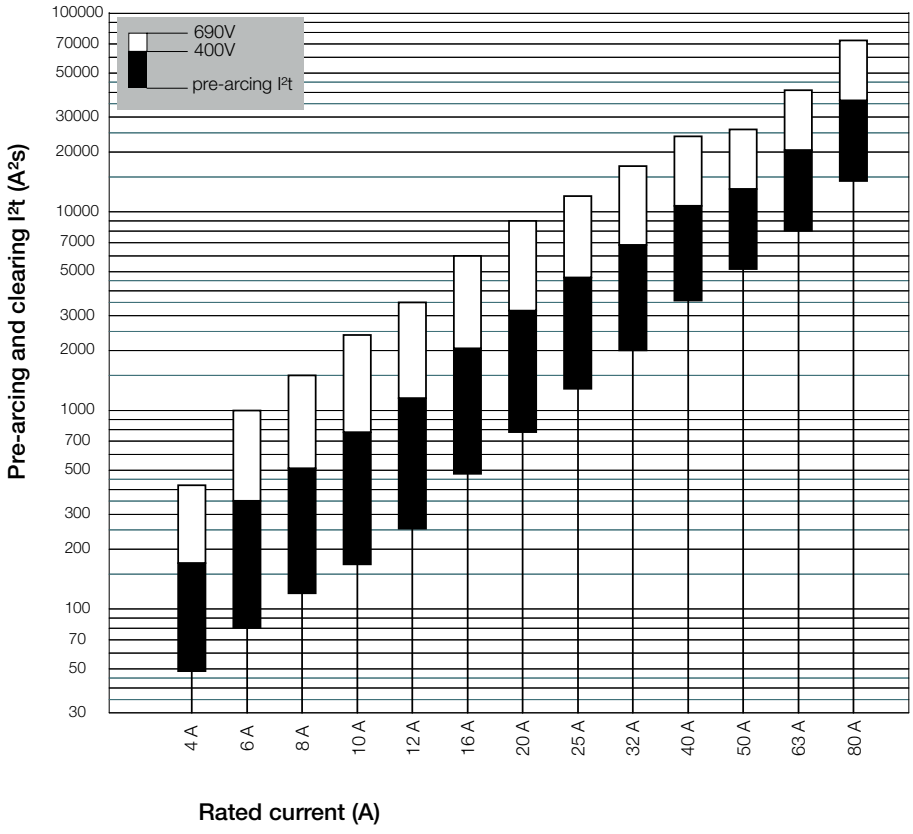
E9F 14 aM



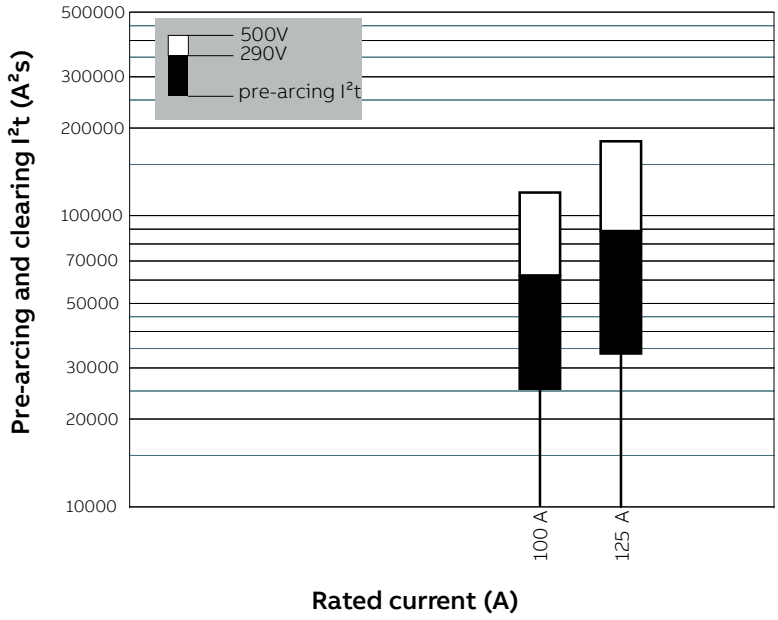
Operating I²T characteristics
E9F 22 aM



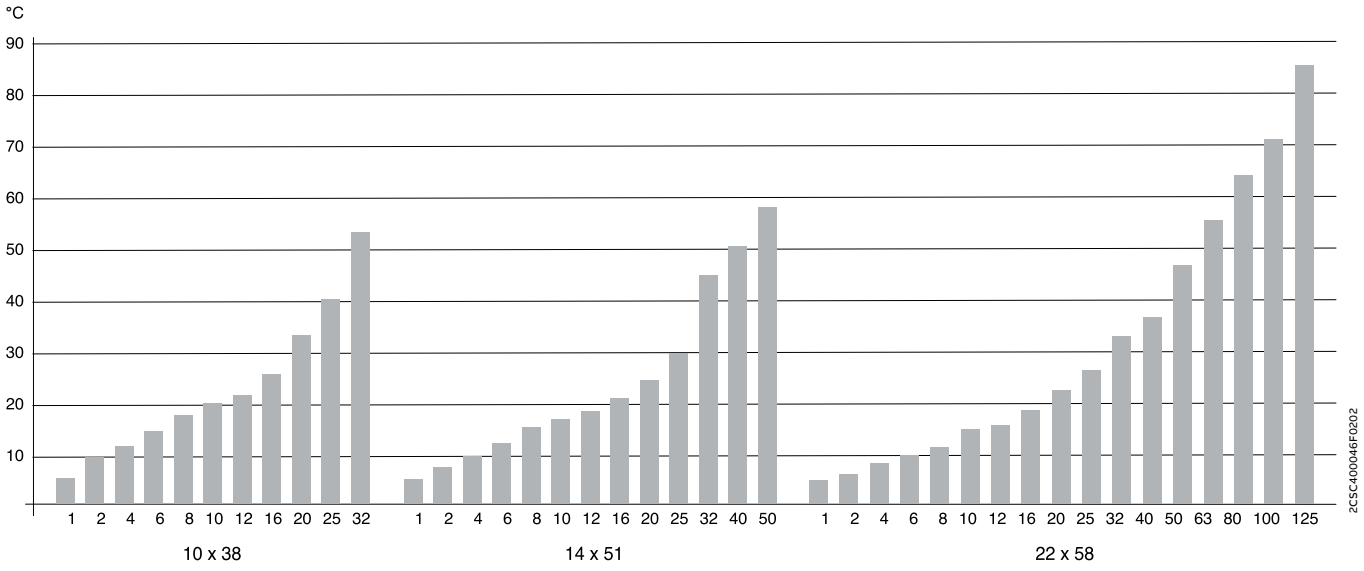
E9F 22 aM



Operating I^2T characteristics
E9F 22 aM



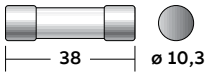
Temperature increase (testing in superior contact)
E9F aM



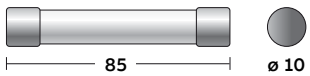
E 9F gPV cylindrical fuses

The best protection for direct current photovoltaic installations

The E 9F PV series of cylindrical fuses has been specifically designed for protecting direct current circuits up to 1500 V.
The range of E9F PV fuses is available in the 10.3 x 38 mm size for up to 30 A rated current values at a nominal voltage of 1000 V DC or in the 10x85 mm size up to 32 A rated current at a nominal voltage of 1500 V DC. They are the best way to protect the strings, inverters and surge arresters in photovoltaic installations according to IEC 60269-6 "Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems".



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E 9F gPV 10.3 x 38 mm cylindrical fuses					
1	134568	E 9F1 PV	2CSM213456R1801	0.007	10
2	134667	E 9F2 PV	2CSM213466R1801	0.007	10
3	134766	E 9F3 PV	2CSM213476R1801	0.007	10
4	134865	E 9F4 PV	2CSM213486R1801	0.007	10
5	134964	E 9F5 PV	2CSM213496R1801	0.007	10
6	135060	E 9F6 PV	2CSM213506R1801	0.007	10
7	135169	E 9F7 PV	2CSM213516R1801	0.007	10
8	135268	E 9F8 PV	2CSM213526R1801	0.007	10
10	135367	E 9F10 PV	2CSM213536R1801	0.007	10
12	135466	E 9F12 PV	2CSM213546R1801	0.007	10
15	135565	E 9F15 PV	2CSM213556R1801	0.007	10
20	135664	E 9F20 PV	2CSM213566R1801	0.007	10
25	135763	E 9F25 PV	2CSM213576R1801	0.007	10
30	135869	E 9F30 PV	2CSM213586R1801	0.007	10



Rated current	Bbn 8012542	Order details		Piece weight	Pack unit
In [A]	EAN	Type code	Order code	[kg]	pcs
E9F PV cylindrical fuses 10 x 85 mm cylindrical fuses					
4	2339410	E9F4 PV1500	2CSM233941R1801	0.010	5
5	2052852	E9F5 PV1500	2CSM205285R1801	0.010	5
6	2052951	E9F6 PV1500	2CSM205295R1801	0.010	5
7	2053057	E9F7 PV1500	2CSM205305R1801	0.010	5
8	2053156	E9F8 PV1500	2CSM205315R1801	0.010	5
10	2053255	E9F10 PV1500	2CSM205325R1801	0.010	5
12	2053354	E9F12 PV1500	2CSM205335R1801	0.010	5
15	2053453	E9F15 PV1500	2CSM205345R1801	0.010	5
20	2068754	E9F20 PV1500	2CSM206875R1801	0.010	5
25	2068952	E9F25 PV1500	2CSM206895R1801	0.010	5
30	2069058	E9F30 PV1500	2CSM206925R1801	0.010	5
32	2069256	E9F32 PV1500	2CSM206925R1801	0.010	5

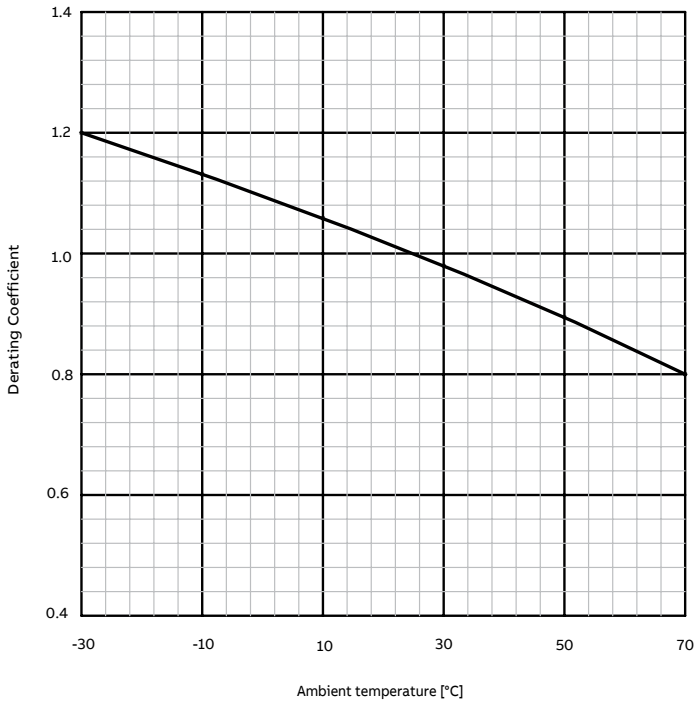
Protection and safety technical details
E 9F fuses

E9F gPV 1000 V DC 10.3 x 38 mm cylindrical fuses

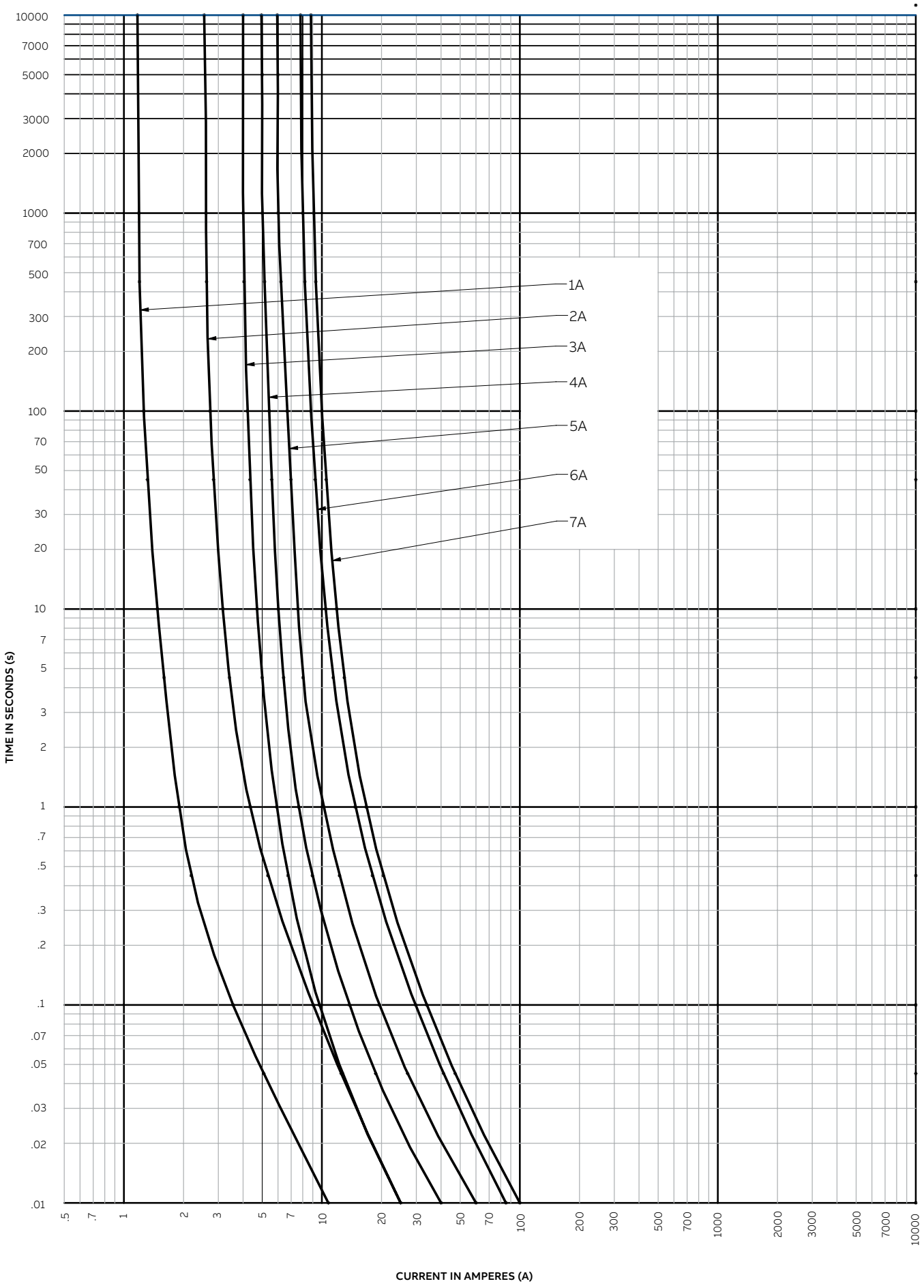
Type	Rated current [A]	Dissipated power 0.7 In [W]	Dissipated power 0.8 In [W]	Dissipated power In [W]
E 9F1 PV	1	0.125	0.175	0.250
E 9F2 PV	2	0.160	0.250	0.320
E 9F3 PV	3	0.66	0.87	1.36
E 9F4 PV	4	0.69	0.8	1.25
E 9F5 PV	5	0.59	0.73	1.12
E 9F6 PV	6	0.42	0.67	1.05
E 9F7 PV	7	0.40	0.64	1.0
E 9F8 PV	8	0.77	0.88	1.48
E 9F10 PV	10	0.67	0.90	1.5
E 9F12 PV	12	0.72	1.0	1.8
E 9F15 PV	15	0.9	1.3	2.2
E 9F20 PV	20	1.1	1.5	2.8
E 9F25 PV	25	1.3	1.8	3.0
E 9F30 PV	30	1.5	1.9	3.7

The power dissipation of the fuse cannot exceed the maximum power dissipation accepted by the fuseholder

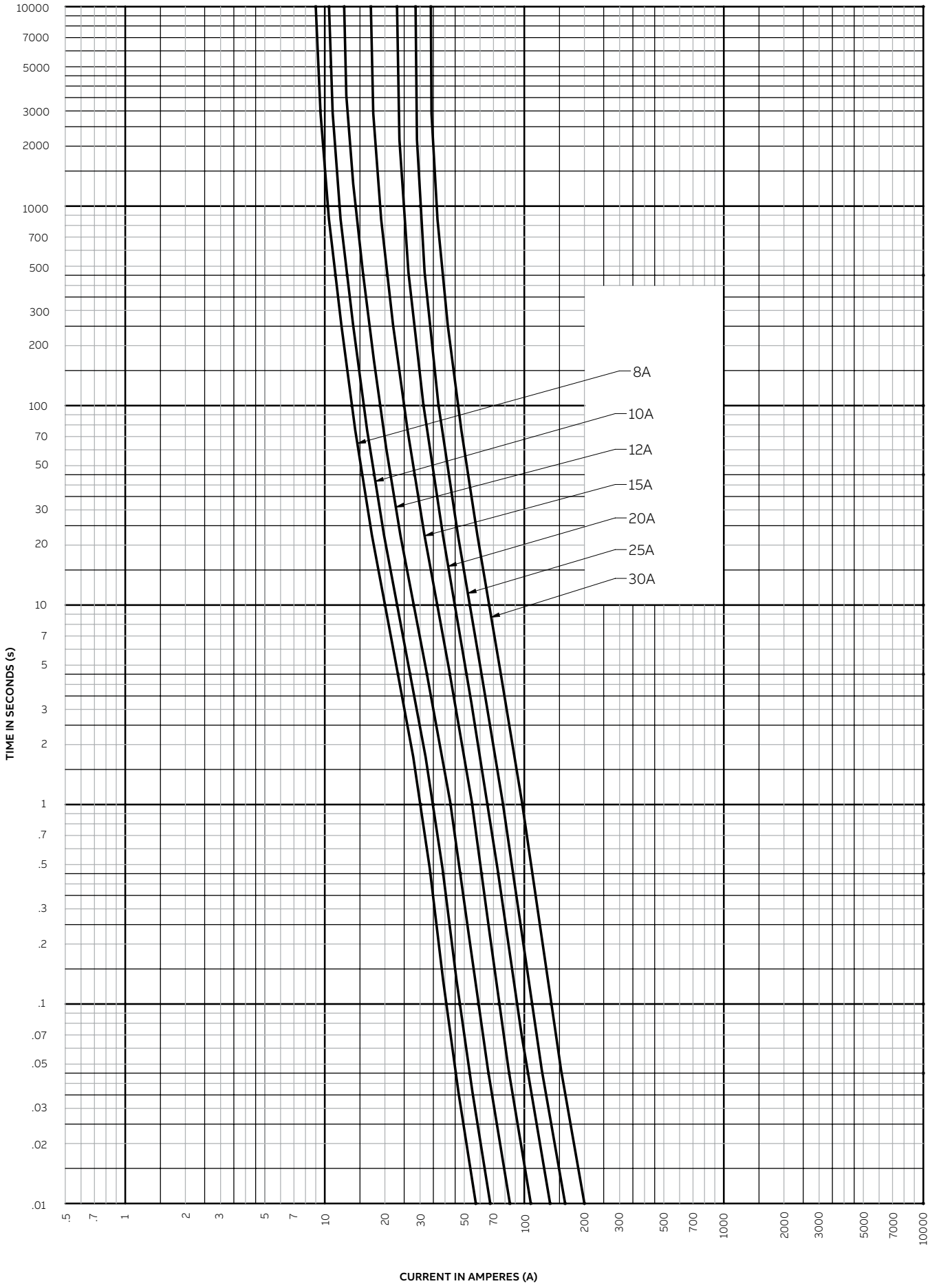
Derating in combination with ambient temperature



Time current characteristic curves



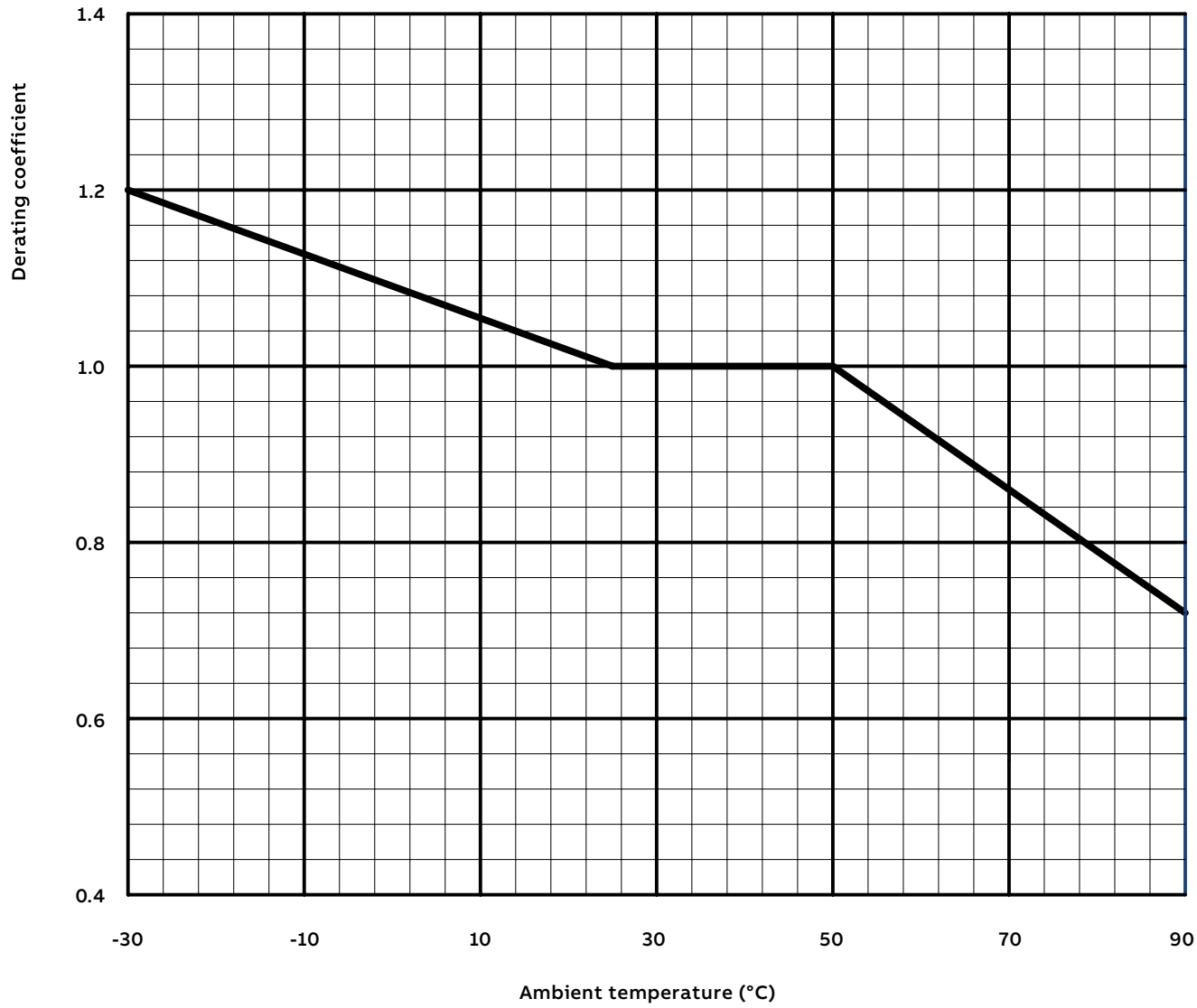
Time current characteristic curves



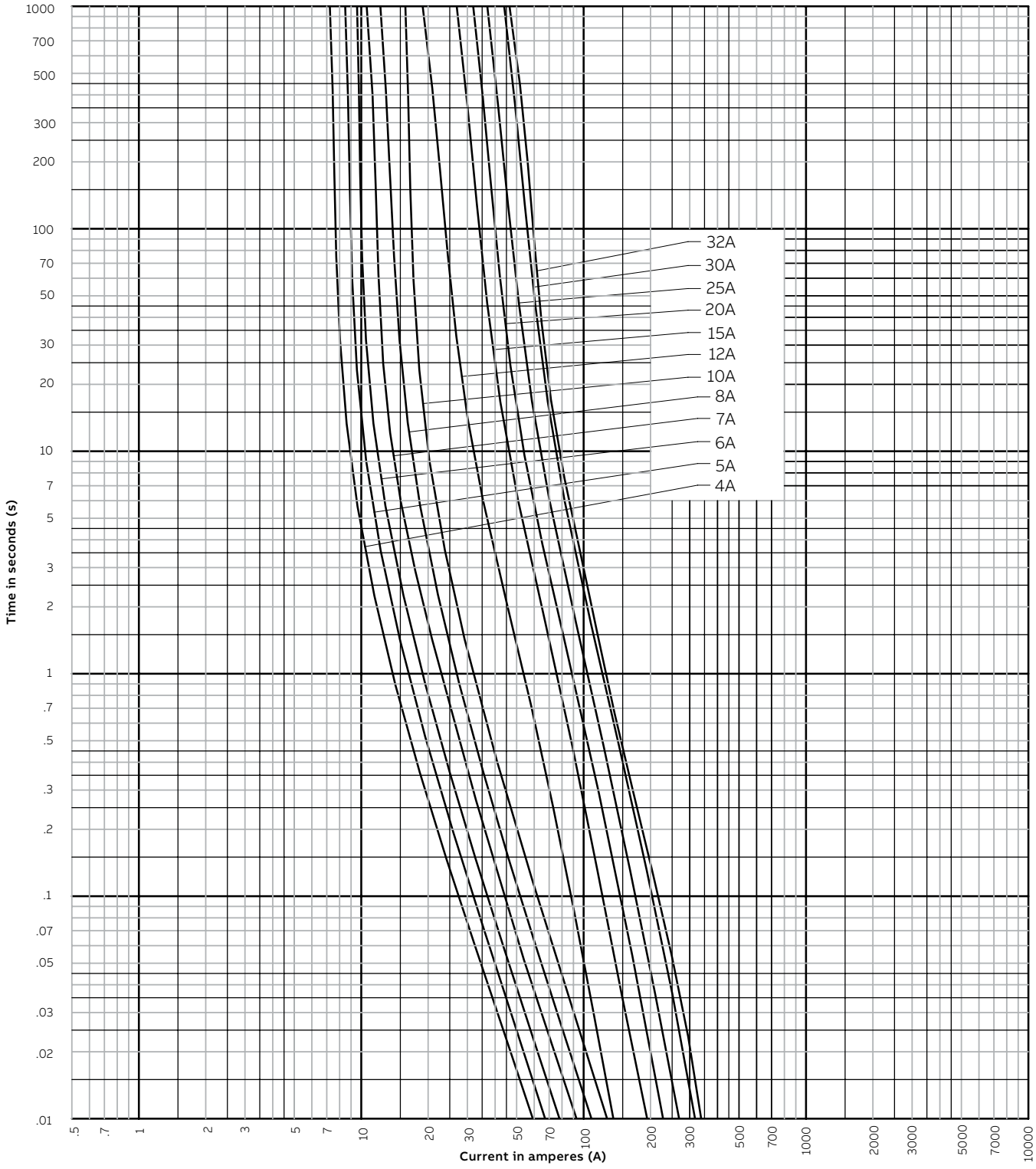
E9F gPV 1500 V DC 10 x 85 mm cylindrical fuses

Type	Rated current In [A]	Power dissipation at 0.7xIn [W]	Power dissipation at 0.8xIn [W]	Power dissipation at 1.0xIn [W]
E9F4 PV1500	4	0.84	1.16	1.97
E9F5 PV1500	5	0.84	1.16	1.97
E9F6 PV1500	6	0.97	1.37	2.42
E9F7 PV1500	7	0.97	1.37	2.43
E9F8 PV1500	8	1.04	1.50	2.60
E9F10 PV1500	10	1.23	1.77	3.09
E9F12 PV1500	12	1.15	1.70	2.89
E9F15 PV1500	15	1.39	1.91	3.48
E9F20 PV1500	20	1.71	2.47	4.28
E9F25 PV1500	25	2.13	3.08	5.35
E9F30 PV1500	30	2.56	3.61	6.40
E9F32 PV1500	32	2.56	3.61	6.40

Ampere rating vs. Ambient temperature



Time current characteristic curves



Questions & answers
Technical and regulatory details concerning the E 90 range

IEC 60947-3: switches, disconnectors, switch-disconnectors and fuse-combination units

This standard establishes the requirements of a device to ensure its suitability for disconnection and operation.



Disconnector
A disconnector is a mechanical control device which, when open, meets the prescriptions for the disconnection function laid down by the international IEC 60947-3 standard.
Opening a disconnector ensures that downstream the circuit is electrically isolated from upstream. This condition is necessary if you need to operate on a network component, e.g. during maintenance. Pursuant to the IEC 60364 standard, any maintenance operations on the installation are prohibited unless circuits have been previously disconnected.



Fuse-disconnector
This defines a fuseholder that also performs disconnecting functions. Not all fuseholders are also disconnectors: to meet this definition they must meet the requirements and pass the tests provided for in the IEC 60947-3 standard.



Fuse-switch-disconnector
According to the IEC 60947-3 standard, this definition concerns a fuse-disconnector that enables switching under load. Not all fuse-disconnectors enable this operation: to be considered as a fuse-switch-disconnector a device must have utilization category equal to AC-21B or above.

Utilization categories
Not all devices intended for disconnection have the same performance. The type of operation allowed depends on a designation that specifically defines the methods of use, i.e. the utilization category.

This identifies:
a. The nature of current (AC/DC)
b. The type of switching allowed (no load, resistive loads, highly inductive loads, etc.)
c. The operation frequency
E 90 fuse-switch-disconnectors have AC-22B utilization category up to 400V and utilization category AC-20B up to 690 V. The E 90 PV fuse-disconnectors have DC-20B utilization category. E 90 50/125 fuse-disconnectors have utilization category AC-20B.

Current nature	Utilization category		Typical applications
	A	B	
Alternating current	AC-20A	AC-20B	Connecting and disconnecting under no-load conditions
	AC-21A	AC-21B	Switching of resistive loads including moderate overloads
	AC-22A	AC-22B	Switching of mixed resistive and inductive loads, including moderate overload
	AC-23A	AC-23B	Switching of motor loads or other highly inductive loads
Direct current	DC-20A	DC-20B	Connecting and disconnecting under no-load conditions
	DC-21A	DC-21B	Switching of resistive loads including moderate overloads
	DC-22A	DC-22B	Switching of mixed resistive and inductive loads, including moderate overloads (e.g. shunt motors)
	DC-23A	DC-23B	Switching of highly inductive loads? (e.g. series motors)

Which loads can be disconnected using a product with AC-22B utilization category?
The AC-22B utilization category allows occasional operation of mixed, resistive and inductive loads with moderate overloads in alternating current circuits. Mixed loads include: transformers, corrected motors, capacitor batteries, discharge lamps, heating, etc.

Which loads can be disconnected using a product with AC-20B utilization category?
The AC-20B utilization category does not allow operation under load. Disconnection is possible only by first disconnecting the load through an appropriate switch.

IEC 60269-1: Fuses with voltage not exceeding 1000 V in alternating current and 1500 V in direct current
This standard establishes the requirements of low voltage fuses, and as a result the requirements of fuseholders as devices intended to accommodate fuses.
This standard includes two different sections, with different requirements depending on the type of individual using the equipment:

IEC 60269-2
supplementary requirements for fuses for use by skilled persons (mainly for industrial application).

IEC 60269-3
supplementary requirements for fuses for use by unskilled persons (mainly for household and similar applicationss).

What is the difference between an IEC 60947-3-compliant fuseholder and an IEC 60947-2-compliant fuseholder?
These are two complementary standards:
IEC 60269-2 establishes the characteristics of fuses, and, from these general requirements for fuseholders are derived. It is the reference standard for overcurrent protection but not for disconnection and switching.

Are fuseholders marked UR and UL equivalent to each other?
They are different products and they comply with equally different requirements. E 90/32 switch disconnectors conform to IEC standards and accommodate midget fuses. However, since they are recognized by the UL laboratories, by means of the UR mark, they can be used as components in UL-certified machines designed for the American market.
On the other hand, E 90/30 CC fuseholders are specifically designed and tested in accordance with the American standards. They are able to accommodate Class CC cylindrical fuses, which possess particular limitation characteristics.
This means that it is forbidden to use 10.3 x 38 fuses that conform to IEC standards in E 90/30 CC fuseholders.

Maximum rated current for cylindrical fuses according to IEC 60269-2

Size of fuse [mm]	400 V a.c.		500 V a.c.		690 V a.c.	
	gG	aM	gG	aM	gG	aM
	I_n A	I_n A	I_n A	I_n A	I_n A	I_n A
8.5 x 31.5	25	12	–	–	–	–
10.3 x 38	32	32	25	20	16	12
14 x 51	–	–	50	50	50	40
22 x 58	–	–	100	100	80	80

Maximum rated current for fuse holders according to IEC 60269-2

Fuse size [mm]	I_n [A]
8.5 x 31.5	25
10.3 x 38	32
14 x 51	50
22 x 58	100

The E 90 series were designed and certified in accordance with the IEC 60269-2 standard which sets forth the maximum rated current values envisaged for fuses and fuseholders as summarized in the tables above.
Therefore, the characteristics according to which the units were certified are shown on their rating plates.

Can fuses with rated current values higher than the one indicated in the table be used?
For example, can a 22 x 58 mm 125 A fuse be used in an E 90/125 fuseholder?
Yes, in compliance with the instructions provided by the manufacturer, a fuse with a higher rated current than the one indicated in the tables above can be used: it is necessary to verify that the power dissipation value of the fuse does not exceed the maximum acceptable power value of the fuseholder. In this specific case, if a 22 x 58 mm fuse used at 125 A dissipates a maximum power which is equal to or less than 9.5 W, it can be used in an E 90 125 fuseholder at a rated current of 125 A.
Since the above statement is generally valid for aM-type fuses, it has not to be forgotten the need to associate to it an overload protection devices. In fact, the aM-type fuses, unlike the gG-type ones, are designed to provide protection only against short-circuits and would act on overloads only after a long time, thus pushing the product beyond its own physical limits, beyond which it would no longer be possible to guarantee its proper operation.

Can instead, a 10.3 x 38 mm 32 A gG fuse be used in a 10.3 x 38 mm E 90/32 fuseholder with a rated voltage exceeding 400 V?
In this specific case, an E 9F10 GG32 fuse dissipates 2.8 W at 400 V rated voltage. Since an E 90/32 series fuseholder for 10.3 x 38 mm fuses achieves 3 W thermal dissipation, the fuse in question can be used at 400 V rated voltage or less. On the other hand, use of rated voltage exceeding 400 V fails to allow the equipment to comply with the maximum dissipated power limit.

Maximum values of rated power dissipation of a fuse-link according to IEC 60269-2

Characteristic curve	Size of fuse			
	8.5 x 31.5	10.3 x 38	14 x 51	22 x 58
gG	2.5 W	3 W	5 W	9.5 W
aM	0.9 W	1.2 W	3 W	7 W
gPV		3 W		

The table above gives the maximum dissipated power values of the fuses, considering their size and characteristic curve, and ate the same time the minimum power acceptace to be tolerated by a fuseholder.

The rated acceptable power dissipation of a fuseholder is displayed in the next table.

Size of fuse	8.5 x 31.5	10.3 x 38	14 x 51	22 x 58
Maximum acceptable power dissipation	2.5 W	3 W	5 W	9.5 W

The E 90 series were designed and certified in accordance with the IEC 60269-2 standard which sets forth the maximum rated current values envisaged for fuses and fuseholders as summarized in the tables above.
Therefore, the characteristics according to which the units were certified are shown on their rating plates.

Additional information
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