Bussmann series fuses
photovoltaic application guide

BUSSMANN SERIES

Complete and reliable solar fusible circuit protection

Powering Business Worldwide

Eaton has more than 100 years of proven technical innovation to help make your operation more productive while protecting your equipment.

Solar Photovoltaic (PV) systems have evolved into a mature, sustainable and adaptive technology. The growth in installations and demand for PV systems necessitate effective electrical protection. PV systems, as with all electrical power systems, must have appropriate overcurrent and overvoltage protection.

Eaton has worked closely with solar system manufacturers, and through coordinated research and development, has produced revolutionary photovoltaic fuse links which work in combination with solar array combiner systems to offer a complete protection for PV applications.

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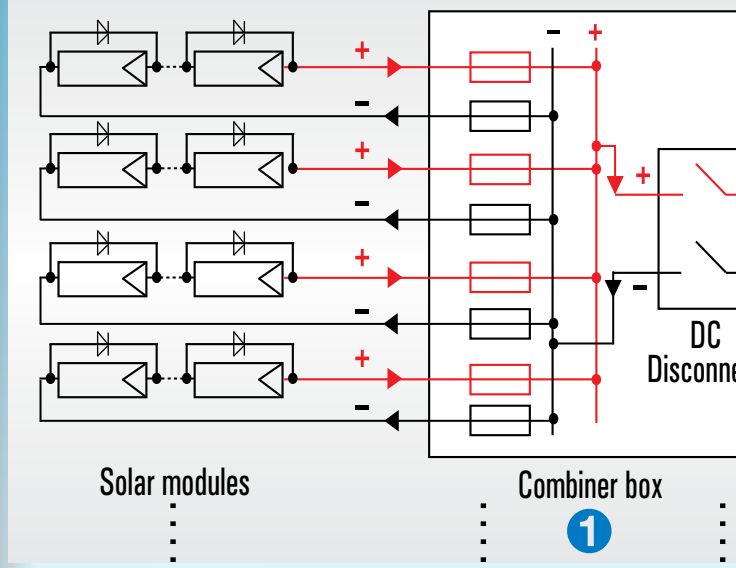

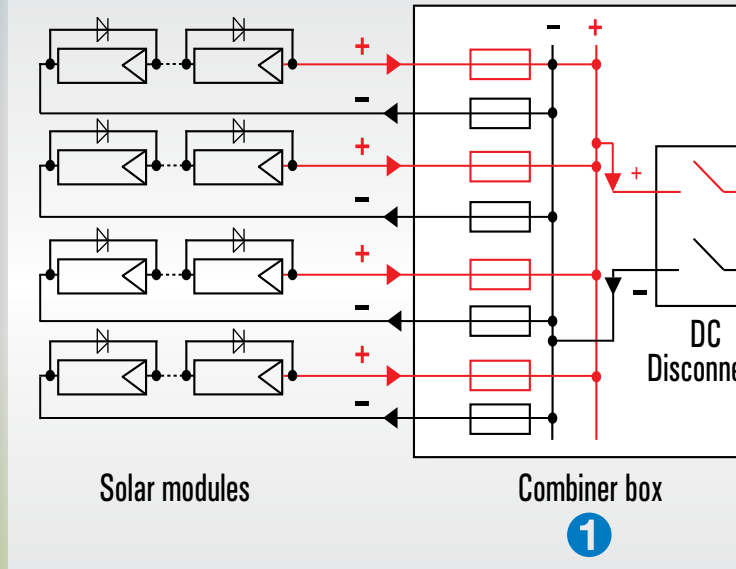

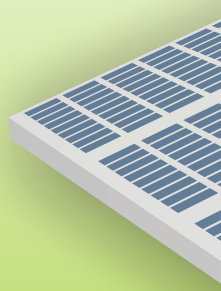

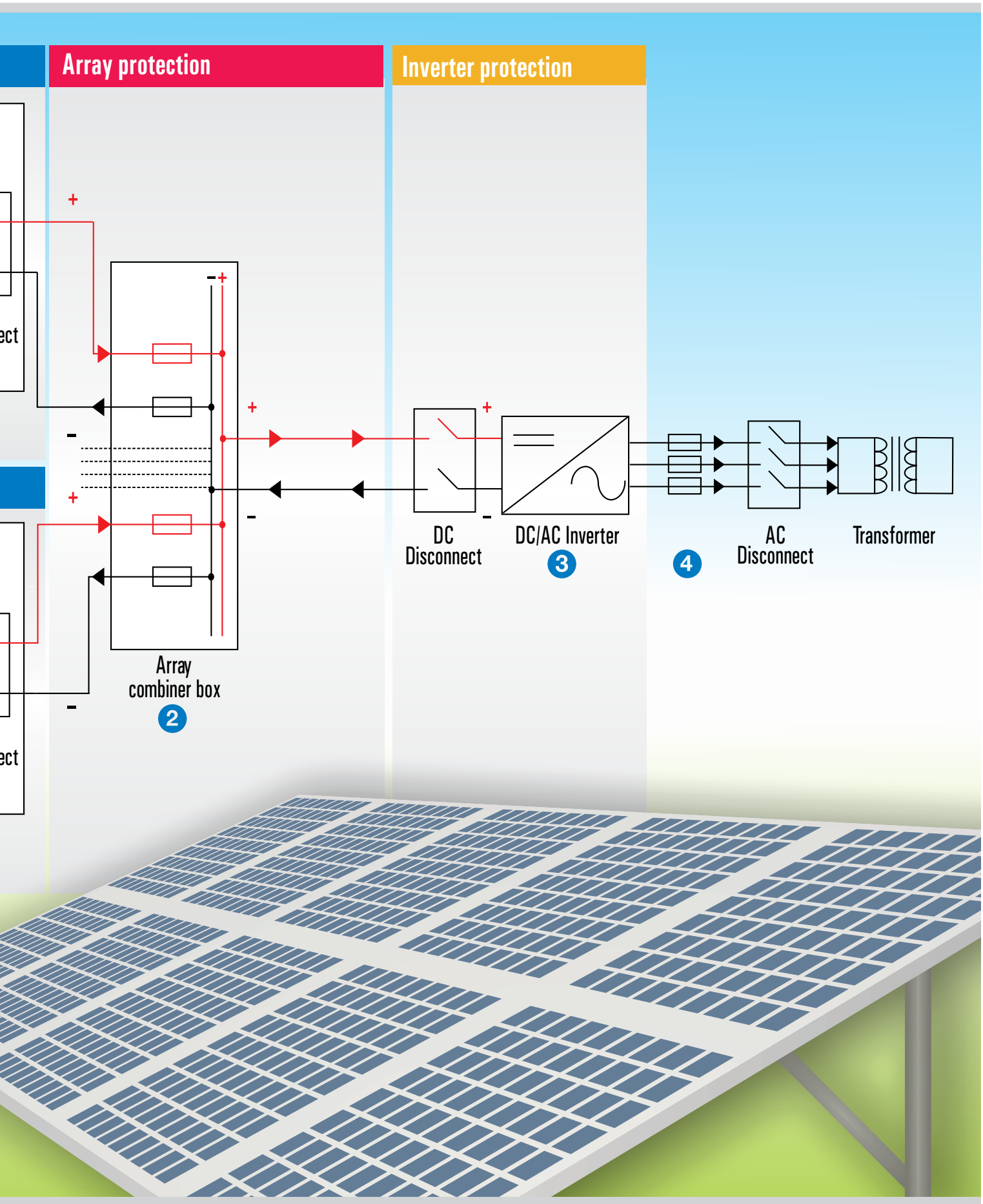
Array protection
Inverter protection
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-
+
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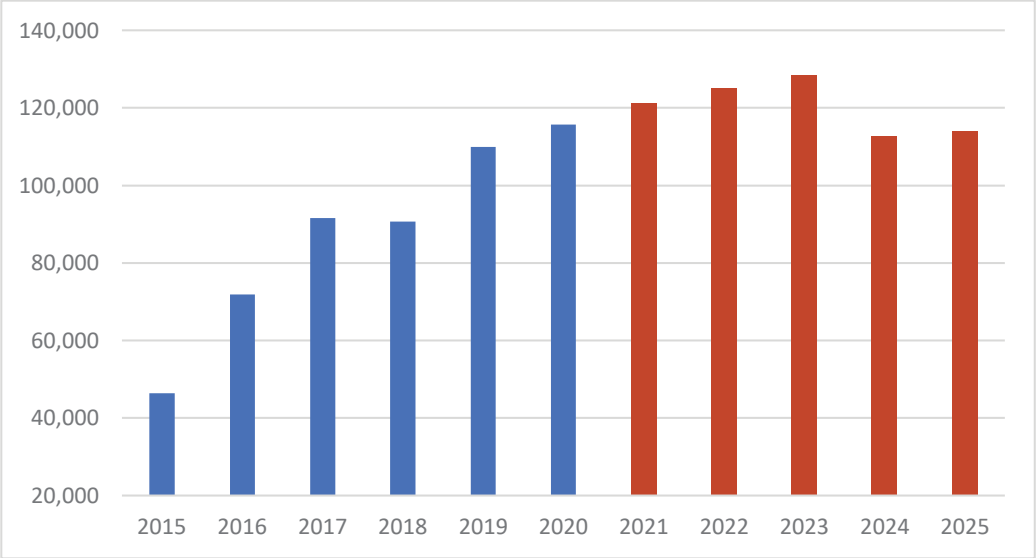
Introduction

The global transition from fossil fuels to renewable sources is well under way. Photovoltaic (PV) have proven to offer an environmentally sustainable solution to our ever increasing energy demands while also being cost competitive. This has led to the increase of installed capacity of PV systems from 574 GW in 2019 growing to 1064 GW expected by 2023. This rapid growth size and output capacity of these installations has challenged system designers, manufacturers and standards organisations due to the specific demands associated with PV installation in terms of current, voltage, and ambient temperature. These requirements have also been considered in the development of international protection standards for PV installations, which Eaton, the leading name in electrical protection, has used to develop PV specific protection devices.



Global annual photovoltaic installations (Megawatt). Source: EPIA

IEC 60269-6 gPV standard

Unlike typical grid connected AC systems, the available short-circuit current within PV systems is limited and the overcurrent protective devices need to operate effectively on low levels of fault current. For this reason Eaton has conducted extensive research and development of fuse links that are specifically designed and tested to safely protect PV systems with high DC voltages and low fault currents.

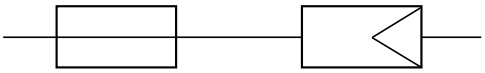


Figure 1

The International Electrotechnical Commissions (IEC) recognise the protection of PV systems is different to standard electrical installations. This is reflected in IEC 60269-6 which defines specific characteristics that a fuse link is required to meet for protecting PV systems, utilisation class gPV. Eaton's Bussmann series string and branch PV fuse links have been specifically designed to meet this standard. However, Eaton's Bussmann series PV fuse links exceed the requirements of IEC 60269-6 as they operate at 1.35 x I_n (1.35 times the nominal current). They also meet the requirements of UL 2579 and are thus suitable for protecting PV modules in reverse current situations.

Whilst the standard does not recognise a specific symbol, the combination of the symbols for fuse link and strings are often used to indicate a fuse link is suitable for protecting strings in PV systems, see Figure 1.

Photovoltaic module construction

- A photovoltaic (PV) cell is usually between 4” and 6” square.
- A number of individual cells are combined in a module (often called a panel).
- A number of PV modules in series is referred to as a string.
- A number of strings in parallel is referred to as an array.

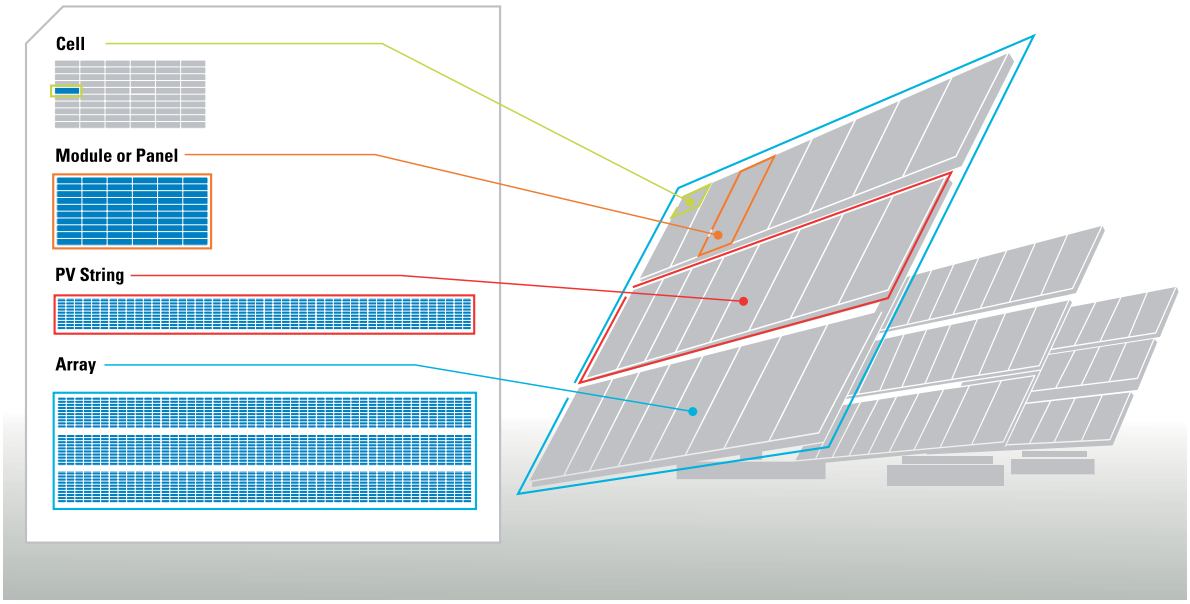


Figure 2

Photovoltaic module output

The voltage output of a PV module is defined by the number of cells in series that form the module.

The current output of a PV module is dependent on the area of a cell.

The most widely used solar modules are made with 4”, 5” and 6” poly-crystalline silicon cells. This type of module using 6” cells, can achieve approximately 8 Amps maximum power point (MPP) current per module with a typical voltage output of around 30 Volts.

With thin film technology typical output is 2.5 Amps and 40 Volts.

The maximum power point current of the modules vary between manufacturers of equal solar cell dimensions. When selecting the appropriate fuse links, the specified Short Circuit Current (I_{SC}) and reverse current characteristics specified by the manufacturers should be used.

The specifications provided by the module manufacturer should be consulted to confirm the output currents and voltages of the modules under the range of conditions expected for the proposed
installation. These conditions are influenced by the ambient temperature, the incident angle of sunlight and the amount of solar energy reaching the module. These are usually mentioned as coefficients on the manufacturer’s specifications.

Manufacturers also suggest the maximum series fuse rating or a reverse current rating. Both of these are based on modules surviving 1.35 time this rating for two hours.

Overview of string protection

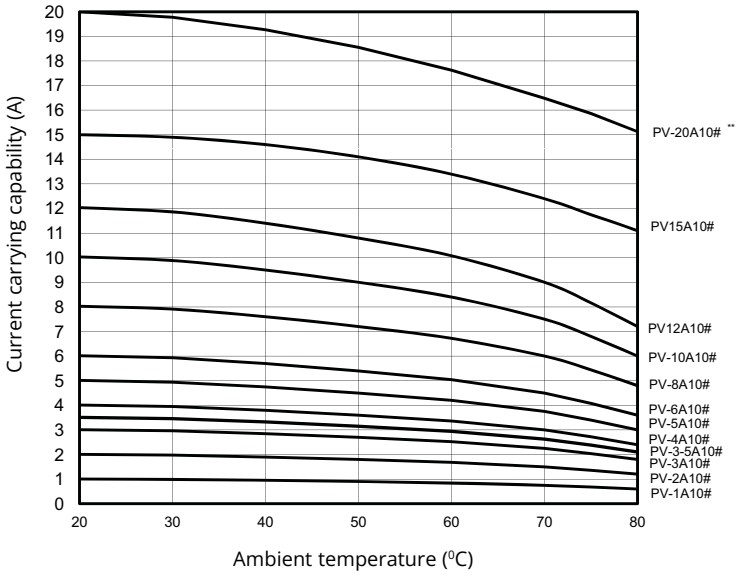
Depending on the desired capacity of the Photovoltaic (PV) system, there may be several PV strings connected in parallel to achieve higher currents and subsequently more power.

PV systems that have three or more strings connected in parallel need to have each string protected. Systems that have less than three strings will not generate enough current to damage the modules in the event of a fault. Therefore they do not present a safety hazard, provided the conductor is sized correctly, based on local codes and installations requirements.

Where three or more strings are connected in parallel, a fuse link in each string will protect the cables and modules from overcurrent faults and help minimise any safety hazards. It will also isolate the faulted string so that the rest of the PV system can continue to generate electricity.

It should be remembered that PV modules current output changes with the module temperature as well as the amount of sun they are exposed to. The exposure is dependant on irradiance level, incline as well as shading effect from trees, buildings or clouds. In operation, fuse links, as thermal devices, are influenced by ambient temperature. The current capability of Eaton's Bussmann series PV string fuse links should be derated according to the curves below.

PV String fuse link derating with temperature

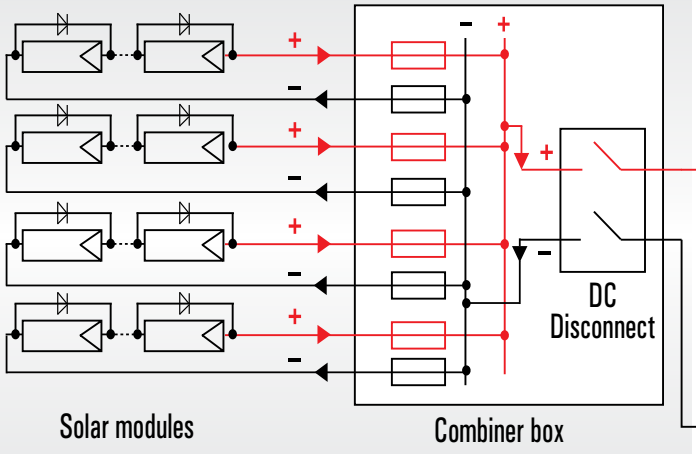


PVM, 10 x 38, 10 x 85, 14 x 51, 14 x 65, 22 x 65 mm photovoltaic fuse links. Rated voltage: from 600 V d.c. to 1500 V d.c.

CHPV fuse holder, Rated voltage: up to 1500 V d.c.

BM series fuse block

String protection



How to select fuse links for string protection

Whilst a full study of all the parameters is recommended, the following factors should be used: 1.56 for current and 1.2 for voltage when selecting the fuse link. These cover most variations due to installation. The same method should be adopted for crystalline and thin film modules.
If your PV installation is subject to extremes of high altitude, high irradiance, or low temperature, please consult Eaton's Field Application Engineers: bulehighspeedtechnical@eaton.com.

Define the specifications of the PV module

Criteria

I_{sc}: Short-circuit current of the module at Standard Test Conditions (STC) - Data provided by the PV Manufacturer

V_{oc}: Open circuit voltage of one module at STC - Data provided by the PV Manufacturer

N_s: Number of modules in series per string

N_p: Number of strings in parallel per array

$I_{mod\_max\_OCPR}$: The PV module maximum overcurrent protection rating specified by IEC 61730-2 (this is often specified by module manufacturers as the maximum series fuse rating)

If $N_p \leq 3$ and the cable is rated at 1.56 x I_{sc}

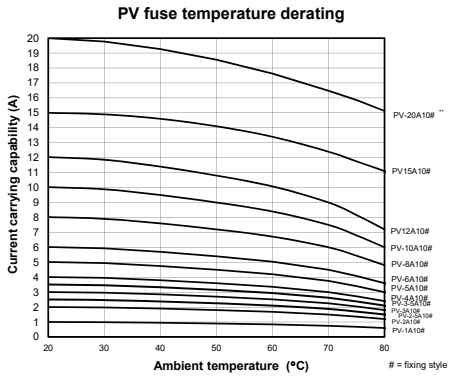
For PV installations with three or less parallel strings and string cables adequately sized, fusing might be needed if local installation
regulations or codes require them.

However Eaton recommends fuse links protection in all PV systems as unpredicted fault currents may occur in the event of inverter
failure where batteries are connected to the strings.

If $N_p > 3$

The fuse link's rating should be selected as follows:

- Voltage rating ≥ 1.20 x V_{oc} x N_s
- Current rating ≥ 1.56 x I_{sc}
- Check the current carrying capability of the selected fuse after derating at the ambient temperature of the fuse still satisfies the above criteria
- Current rating ≤ $I_{mod\_max\_OCPR}$
- Current rating ≤ I_z = string cable rating



For PV application with fuse links installed at high altitudes, there is reduced cooling effect on the fuse as the density of the atmospher reduces. For above 2000 metre sea level, every 100 metre increase will have 0.5% de-rate on the fuse current. Please consult Eaton's Fuse Application Engineers for further information: bulehighspeedtechnical@eaton.com

Cable protection

Fuse links are required to protect cables and PV modules to prevent fires and ensure the fuse could open a fault circuit safely during an overcurrent fault.

For $N_p \leq 3$, a fuse might not be required as stated above, but cable should be rated at 1.56 x I_{sc} or higher.

For $N_p > 3$, a fuse is needed to protect both the PV modules and the cables. The cable should be rated big enough to carry the load
current. If cable rating is too small, there is a risk of nuisance tripping. Also it is important to ensure the fuse link current rating < string cable rating for fuse to protect the cables.

String protection — worked example

Once it has been determined that the maximum short-circuit current exceeds the cable's continuous current rating, the recommendations for selecting the correct PV string fuse link are as follows:

Manufacturer's PV Module specifications

PV Module description

- Maximum system voltage: 1000 V d.c.

Electrical data

- Open circuit voltage (V_{oc}): 43.1 V
- Short-circuit current (I_{sc}): 5.37 A
- Maximum series fuse rating: ($I_{mod\_max\_OCPR}$): 15 A

PV Installation set-up

- 18 modules in series per string (N_s = 18)
- Maximum 60°C module
- Minimum -30°C module
- Maximum 45°C ambient fuse link
- 4 strings in parallel (N_p = 4)
- Cable size: 2.5 mm² ≥ cable rating I_z = 11.5 A at 60°C (manufacturer's data)

Calculation

- Cable rating ≥ 1.56 x I_{sc} = 1.56 x 5.37 = 8.38 A. Selected cable I_z = 11.5 A ➔ The selected cable is suitable

- String max short-circuit current I_{sc_string} = (N_p -1) x 1.25* x I_{sc}
  = (4 - 1) x 1.25* x 5.37
  = 20.1 A

I_{sc_string} (20.1 A > I_z (11.5 A), therefore string fuse links are needed.

* NEC states the maximum circuit current for PV circuit is defined as 1.25 multiplied by PV model rated short-circuit current I_{sc} or the sum of parallel PV module rated short-circuit.

- Minimum fuse current rating In ≥ 1.56 x I_{sc}
  = 1.56 x 5.37 = 8.38 A

- Maximum fuse current rating $I_n \leq I_{mod\_max\_OCPR}$ = 15 A

  $I_n \leq I_Z$ cable rating = 11.5 A

- Minimum fuse voltage rating $U_n \geq 1.2 \times V_{oc} \times N_s$
  = 1.2 x 43.1 x 18 = 931 V

The selected fuse link needs to be rated at 10 A and 1000 V d.c.

Eaton's Bussmann series catalogue is PV-10A10F

The selected fuse link has current carrying capability of 9.3 A at 45°C ambient temperature, which is greater than the minimum fuse current rating (8.38 A). Therefore the fuse link selected will protect the cables and the modules against reverse current faults.

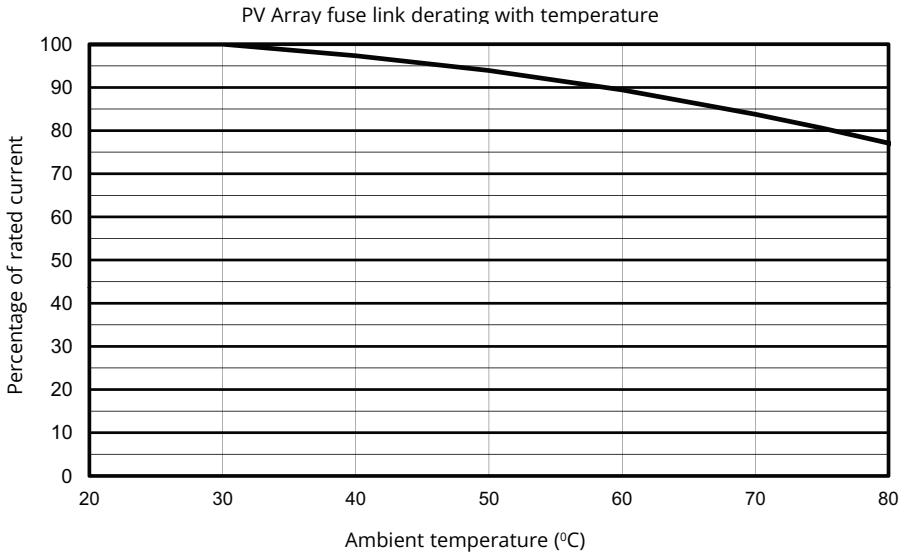
Overview of array protection

Depending on the desired capacity of the Photovoltaic (PV) system, there may be several PV strings connected in parallel to achieve higher currents and subsequently more power.

A fuse link on each array will protect the cables from fault current and help minimise any safety hazards. It will also isolate the faulted array so that the rest of the PV system can continue to generate electricity.

A fuse link positioned in the cable that carries the combined output of a number of strings should be protected by array fuse links. If a number of arrays are subsequently combined then a further fuse link should be incorporated.

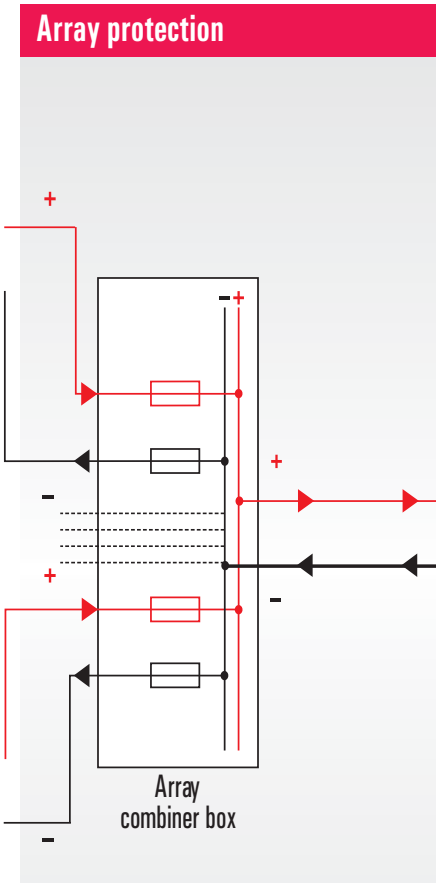
It should be remembered that the characteristics of PV modules vary with module temperature as well as irradiance level. In operation fuse links are influenced by ambient temperature.



PV Flush end fuse links. Rated voltage: 1000 V d.c.

NH Style photovoltaic fuse links and fuse holders. Rated voltage: 1000 V d.c.

XL Style photovoltaic fuse links and fuse bases. Rated voltage: 1000 and 1500 V d.c.



How to select fuse links for array protection

Whilst a full study of all the parameters is recommended, in general the following factors should be used: 1.56 for current and 1.2 for voltage when selecting the fuse link. These cover most variations due to installation. If your have concerns that your PV installation may be subject to extremes of high altitude, high irradiance, high or low temperature, please consult Eaton's technical team (bulehighspeedtechnical@eaton.com).

Define the specifications of the PV module

Criteria

I_{sc}: Short-circuit current of the module at Standard Test Conditions (STC) - Data provided by the PV Manufacturer

V_{oc}: Open circuit voltage of one module at STC - Data provided by the PV Manufacturer

N_s: Number of modules in series per string

N_p: Number of strings in parallel per array

N_A: Number of arrays in parallel

According to IEC 62548, 6.5.5.2 PV sub-array overcurrent protection. The nominal rated current (In) of overcurrent protection devices for PV sub-arrays shall be determined with following formula:

$$I_n > 1.25 \times I_{sc\_Array} \text{ and } I_n \leq 2.4 \times I_{sc\_Array}$$

In accordance with the National Electrical Code (NEC) fuses are selected using 1.56 x I_{sc}. As fuse manufacturer, Eaton's recommends the array fuse selection method below in order to satisify both IEC and NEC requirements.

The fuse link's ratings should be selected as follows:

- Voltage rating ≥ 1.20 x V_{oc} x N_s
- Current rating ≥ 1.56 x I_{sc} x N_p
- Check the current carrying capability of the selected fuse link, after derating at the ambient temperature of the fuse still satisfies the above criteria
- Current rating ≤ I_z = array cable rating

Eaton recommends using Eaton's Bussmann series fuse links in both positive and negative cables, each with adequate voltage rating (as above). Selectivity with string fuse links may not be achieved under some fault conditions.

Array protection — worked example

Manufacturer's PV Module specifications

- I_{sc} = 5.37 A
- V_{oc} = 43.1 V
- Temperature coefficient of short-circuit current α = 0.053 % / °C

PV Installation set-up

- Maximum irradiance level 1000W/m² ≥ Irradiance factor F2 = 1
- 18 modules in series per string (N_s = 18)
- Maximum 60°C module Temperature factor F1 = 1 + α x (T -25°C) = 1.02
- Minimum -30°C module
- Maximum 45°C ambient fuse link. Derating factor for array fuses current carrying capability is 0.95 at 45°C ambient temperature
- Array cable size: 25 mm² ≥ cable rating I_z = 98 A at 60°C (Manufacturer's data)
- 8 strings in parallel (N_p = 8)
- 4 arrays in parallel (N_A = 4)

Calculation

- Cable rating ≥ 1.56 x I_{sc} x N_p
  = 1.56 x 5.37 x 8 = 67 A

Selected cable I_z = 98 A ➔ The selected cable is suitable

- Array max short-circuit current I_{sc_Array} = (N_A -1) x N_p x I_{sc} x F1 x F2
  = (4-1) x 8 x 5.37 x 1.02 x 1 = 131 A

- I_{sc_Array} (131 A) > I_z = 98 A (therefore array fuse links are required)

- Minimum fuse current rating In ≥ 1.56 x I_{sc} x N_p
  = 1.56 x 5.37 x 8 = 67 A

For PV application with fuse links installed at high altitudes, there is reduced cooling effect on the fuse as the density of the atmospher reduces. For above 2000 metre sea level, every 100 metre increase will have 0.5% de-rate on the fuse current. Please consult Eaton's Fuse Application Engineers for further information: bulehighspeedtechnical@eaton.com

- Maximum fuse current rating: $I_n \leq I_z$ = 98 A

- Minimum fuse voltage rating: U_n = 1.2 x V_{oc} x N_s
  = 1.2 x 43.1 x 18 = 931 V

The selected fuse link needs to be rated at 80 A and 1000 V d.c. Eaton's Bussmann series part number would be PV-80ANH1 or PV-80-A-01XL. The selected fuse link has current carrying capability of 80 x 0.95 = 76 A at 45oC ambient temperature, which is greater than the minimum fuse current rating (67 A).

Solar fuse links overview - By voltage rating

Fuse type	Body size	Fixings/Tags	Catalogue number	Rated current	Fuse holder	Fuse bases	Fuse blocks	Fuse clips	Microswitches	Inline holders
600 V d.c.										
Ferrule	10x38 mm	N/A	PVM-(amps)	4 A to 30 A	CHPV		BMM	1A3400		HEB
1000 V d.c.										
Ferrule	10x38 mm	N/A	PV-(amps)A10F	1 A to 20 A	CHPV			1A3400		HPV-DV
		Bolt	PV-(amps)A10-T							
		PCB (one pin)	PV-(amps)A10-1P							
		PCB (two pins)	PV-(amps)A10-2P							
		Crimp terminal	PV-(amps)A10F-CT							
NH	1	Blade without bolt holes	PV-(amps)ANH1	32 A to 200 A		SD1-D-PV			170H0236 and 170H238	
		Blade with bolt holes	PV-(amps)ANH1-B							
		Blade with bolt holes and lugs	PV-(amps)ANH1-BL							
NH	2	Blade without bolt holes	PV-(amps)ANH2	160 A to 250 A		SD2-D-PV			170H0236 and 170H238	
		Blade with bolt holes	PV-(amps)ANH2-B							
		Blade with bolt holes and lugs	PV-(amps)ANH2-BL							
NH	3	Blade without bolt holes	PV-(amps)ANH3	300 A to 400 A		SD3-D-PV			170H0236 and 170H238	
		Blade with bolt holes	PV-(amps)ANH3-B							
		Blade with bolt holes and lugs	PV-(amps)ANH3-BL							
Flush end	2	N/A	PV-(amp)AF2	160 A to 250 A						
Flush end	3	N/A	PV-(amp)AF3	315 A to 400 A						
XL	01XL	Bladed	PV-(amps)A-01XL	63 A to 160 A		SD1XL-S-PV			170H0236 and 170H0238	
		Bolted	PV-(amps)A-01XL-B						170H0069	
XL	2	Bladed	PV-(amps)A-2XL	160 A to 355 A		SD2XL-S-PV			170H0236 and 170H0238	
		Bolted	PV-(amps)A-2XL-B						170H0069	
			PV-(amps)A-2XL-3B							
XL	3L	Bladed	PV-(amps)A-3L	350 A to 600 A		SD3L-S-PV			170H0236 and 170H0238	
		Bolted	PV-(amps)A-3L-B						170H0069	
1000 / 1100 V d.c.										
Ferrule	14x51 mm	N/A	PV-(amps)A14F	15 A to 32 A	CHPV141(I)U			FW14-PCB		

Solar fuse links overview - By voltage rating

Fuse type	Body size	Fixings/Tags	Catalogue number	Rated current	Fuse holder	Fuse bases	Fuse blocks	Fuse clips	Microswitches	Inline holders
1300 / 1500 V d.c.										
Ferrule	14x65 mm	N/A	PV-(amps)A14LF	15 A to 32 A	CHPV15H85					
		With tags	PV-(amps)A14L-T							
		With 10 mm fixings	PV-(amps)A14LF10F							
1500 V d.c.										
Ferrule	10x85 mm	N/A	PV-A10F85L	2.25 A to 30 A	CHPV15H85					
Ferrule	22 x 65 mm	N/A	PV-(amp)22F65L	32 A to 50 A	CHPV22-65					
XL	01	Bladed with top indicator	PV-(amps)A-01XL-15	50 A to 125 A		SD1XL-S-PV			170H0236 and 170H0238	
		Bolted with side indicator	PV-(amps)A-01XL-B-15						170H0069	
XL	1	Bladed with top indicator	PV-(amps)A-1XL-15	100 A to 200 A		SD1XL-S-PV			170H0236 and 170H0238	
		Bolted with side indicator	PV-(amps)A-1XL-B-15						170H0069	
XL	2	Bladed with top indicator	PV-(amps)A-2XL-15	125 A to 250 A		SD2XL-S-PV			170H0236 and 170H0238	
		Bladed without top indicator	PV-(amps)A-2XL-U-15			SD2XL-S-PV				
		Bolted with side indicator	PV-(amps)A-2XL-B-15 PV-(amps)A-2XL-3B-15						170H0069	
		Bolted without side indicator	PV-(amps)A-2XL-BU-15 PV-(amps)A-2XL-3BU-15							
XL	3	Bladed with top indicator	PV-(amps)A-3L-15	250 A to 500 A		SD3L-S-PV			170H0236 and 170H0238	
		Bladed without top indicator	PV-(amps)A-3L-U-15			SD3L-S-PV				
		Bolted with side indicator	PV-(amps)A-3L-B-15						170H0069	
		Bolted without side indicator	PV-(amps)A-3L-BU-15							
PVS	3L	Bladed with top indicator	PVS(amps)A-3L-15	250 A to 400 A		SD3L-S-PV			170H0236 and 170H0238	
		Bladed without top indicator	PVS(amps)A-3L-U-15			SD3L-S-PV				
		Bolted with side indicator	PVS(amps)A-3L-B-15						170H0069	
		Bolted without side indicator	PVS(amps)A-3L-BU-15							
800 V a.c.										
NH	1	Bladed with lugs	170M7350 to 170M7358	32 A to 200 A		SD1-D			170H0236 and 170H0238	
		Blade with bolt holes no lug	170M7353-B to 170M7358-B	63 A to 200 A						
NH	2	Bladed with lugs	170M7397 to 170M7399	160 A to 250 A		SD2-D			170H0236 and 170H0238	
		Blade with bolt holes no lug	170M7397-B to 170M7399-B	160 A to 250 A						
NH	3	Bladed with lugs	170M7400 to 170M7402	315 A to 400 A		SD3-D			170H0236 and 170H0238	
		Blade with bolt holes no lug	170M7400-B to 170M7402-B	315 A to 400 A						
NH	1	Blade with bolt holes	(amps)NHG1B-800	32 A to 160 A	NHW-SLS-1				170H0236 and 170H0238	
NH	2	Blade with bolt holes	(amps)NHG2B-800	160 A to 250 A	NHW-SLS-2				170H0236 and 170H0238	

Solar fuse links overview - By fuse body type and size

Body size	Fixings/Tags	Catalogue number	Rated voltage	Rated current	Fuse holder	Fuse bases	Fuse blocks	Fuse clips	Microswitches	Inline holders
Ferrule fuse links										
10x38 mm	N/A	PVM-(amps)	600 V d.c.	4 A to 30 A	CHPV		BMM	1A3400		HEB
	N/A	PV-(amps)A10F	1000 V d.c.	1 A to 20 A	CHPV			1A3400		HPV-DV
	Bolt	PV-(amps)A10-T								
	PCB (one pin)	PV-(amps)A10-1P								
	PCB (two pins)	PV-(amps)A10-2P								
	Crimp terminal	PV-(amps)A10F-CT								
10x85 mm	N/A	PV-A10F85L	1500 V d.c.	2.25 A to 30 A	CHPV15H85					
14x51 mm	N/A	PV-(amps)A14F	1100 / 1000 V d.c.	15 A to 32 A	CHPV141(I)U			FW14-PCB		
14x65 mm	N/A	PV-(amps)A14LF	1500 / 1300 V d.c.	15 A to 32 A						
	With tags	PV-(amps)A14L-T								
	With 10 mm fixings	PV-(amps)A14LF10F			CHPV15H85					
22 x 65 mm	N/A	PV-(amp)22F65L	1500 V d.c.	32 A to 50 A	CHPV22-65					
NH Fuse links										
1	Bladed with lugs	170M7350 to 170M7358	800 V a.c.	32 A to 200 A		SD1-D			170H0236 and 170H0238	
	Blade with bolt holes no lug	170M7353-B to 170M7358-B		63 A to 200 A						
2	Bladed with lugs	170M7397 to 170M7399		160 A to 250 A		SD2-D			170H0236 and 170H0238	
	Blade with bolt holes no lug	170M7397-B to 170M7399-B		160 A to 250 A						
3	Bladed with lugs	170M7400 to 170M7402		315 A to 400 A		SD3-D			170H0236 and 170H0238	
	Blade with bolt holes no lug	170M7400-B to 170M7402-B		315 A to 400 A						
1	Blade with bolt holes	(amps)NHG1B-800		32 A to 160 A		NHW-SLS-1			170H0236 and 170H0238	
2	Blade with bolt holes	(amps)NHG2B-800		160 A to 250 A		NHW-SLS-2			170H0236 and 170H0238	
1	Blade without bolt holes	PV-(amps)ANH1	1000 V d.c.	32 A to 200 A		SD1-D-PV			170H0236 and 170H238	
	Blade with bolt holes	PV-(amps)ANH1-B								
	Blade with bolt holes and lugs	PV-(amps)ANH1-BL								
2	Blade without bolt holes	PV-(amps)ANH2	1000 V d.c.	160 A to 250 A		SD2-D-PV			170H0236 and 170H238	
	Blade with bolt holes	PV-(amps)ANH2-B								
	Blade with bolt holes and lugs	PV-(amps)ANH2-BL								
3	Blade without bolt holes	PV-(amps)ANH3	1000 V d.c.	300 A to 400 A		SD3-D-PV			170H0236 and 170H238	
	Blade with bolt holes	PV-(amps)ANH3-B								
	Blade with bolt holes and lugs	PV-(amps)ANH3-BL								
Flush end										
2	N/A	PV-(amp)AF2	1000 V d.c.	160 A to 250 A						
3	N/A	PV-(amp)AF3		315 A to 400 A						

Solar fuse links overview - By fuse body type and size

Body size	Fixings/Tags	Catalogue number	Rated voltage	Rated current	Fuse holder	Fuse bases	Fuse blocks	Fuse clips	Microswitches	Inline holders
XL Fuse links										
01XL	Bladed	PV-(amps)A-01XL	1000 V d.c.	63 A to 160 A		SD1XL-S-PV			170H0236 and 170H0238	
	Bolted	PV-(amps)A-01XL-B							170H0069	
2	Bladed	PV-(amps)A-2XL	1000 V d.c.	160 A to 355 A		SD2XL-S-PV			170H0236 and 170H0238	
	Bolted	PV-(amps)A-2XL-B							170H0069	
		PV-(amps)A-2XL-3B								
3L	Bladed	PV-(amps)A-3L	1000 V d.c.	350 A to 600 A		SD3L-S-PV			170H0236 and 170H0238	
	Bolted	PV-(amps)A-3L-B							170H0069	
01	Bladed with top indicator	PV-(amps)A-01XL-15	1500 V d.c.	50 A to 125 A		SD1XL-S-PV			170H0236 and 170H0238	
	Bolted with side indicator	PV-(amps)A-01XL-B-15							170H0069	
1	Bladed with top indicator	PV-(amps)A-1XL-15	1500 V d.c.	100 A to 200 A		SD1XL-S-PV			170H0236 and 170H0238	
	Bolted with side indicator	PV-(amps)A-1XL-B-15							170H0069	
2	Bladed with top indicator	PV-(amps)A-2XL-15	1500 V d.c.	125 A to 250 A		SD2XL-S-PV			170H0236 and 170H0238	
	Bladed without top indicator	PV-(amps)A-2XL-U-15				SD2XL-S-PV				
	Bolted with side indicator	PV-(amps)A-2XL-B-15 PV-(amps)A-2XL-3B-15							170H0069	
	Bolted without side indicator	PV-(amps)A-2XL-BU-15 PV-(amps)A-2XL-3BU-15								
3	Bladed with top indicator	PV-(amps)A-3L-15	1500 V d.c.	250 A to 500 A		SD3L-S-PV			170H0236 and 170H0238	
	Bladed without top indicator	PV-(amps)A-3L-U-15				SD3L-S-PV				
	Bolted with side indicator	PV-(amps)A-3L-B-15							170H0069	
	Bolted without side indicator	PV-(amps)A-3L-BU-15								
3L	Bladed with top indicator	PVS(amps)A-3L-15	1500 V d.c.	250 A to 400 A		SD3L-S-PV			170H0236 and 170H0238	
	Bladed without top indicator	PVS(amps)A-3L-U-15				SD3L-S-PV				
	Bolted with side indicator	PVS(amps)A-3L-B-15							170H0069	
	Bolted without side indicator	PVS(amps)A-3L-BU-15								

600 V DC

10 x 38 mm, 4 to 30 A, PVM

Description

A range of UL 2579 fast-acting 600 V d.c. Midget fuses specifically designed to protect solar power systems in extreme ambient temperature, high cycling and low level fault current conditions (reverse current, multi-array fault).

Catalogue number

PVM-(amp rating)

Technical data

Fuse size: 10 x 38 mm

Rated voltage: 600 V d.c. to UL 2579

Rated current: 4 A to 30 A

Interrupting rating: 50 kA DC

Standard/Approvals

UL Listed 2579, Guide JFGA, File E335324
CSA Component Certified C22.2

Packaging

10

Recommended fuse blocks / fuse holders

Fuse blocks: BMM (data sheet 10241)

Modular fuse holder: CHPV (data sheet 720147)

Fuseclips: 1A3400 Series (data sheet 2131)

In-line fuse holders: HEB (data sheets 2127)

BMM

CHPV

1A3400

HEB

Technical data

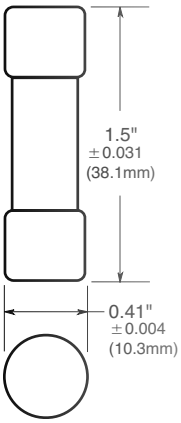
Catalogue number	Rated current (A)	Rated voltage (V d.c.)	Power loss (Watts)		Compatible fuse blocks	Compatible modular fuse holders	Compatible fuse clips	Compatible in-line fuse holders
			0.8 I_n	I_n				
PVM-4	4	600 (UL)			BMM	CHPV	1A3400	HEB
PVM-5	5							
PVM-6	6							
PVM-7	7							
PVM-8	8							
PVM-9	9							
PVM-10	10		1	1.9				
PVM-12	12							
PVM-15	15		1	1.7				
PVM-20	20							
PVM-25	25							
PVM-30	30		1.6	2.9				

Data sheet: 2153

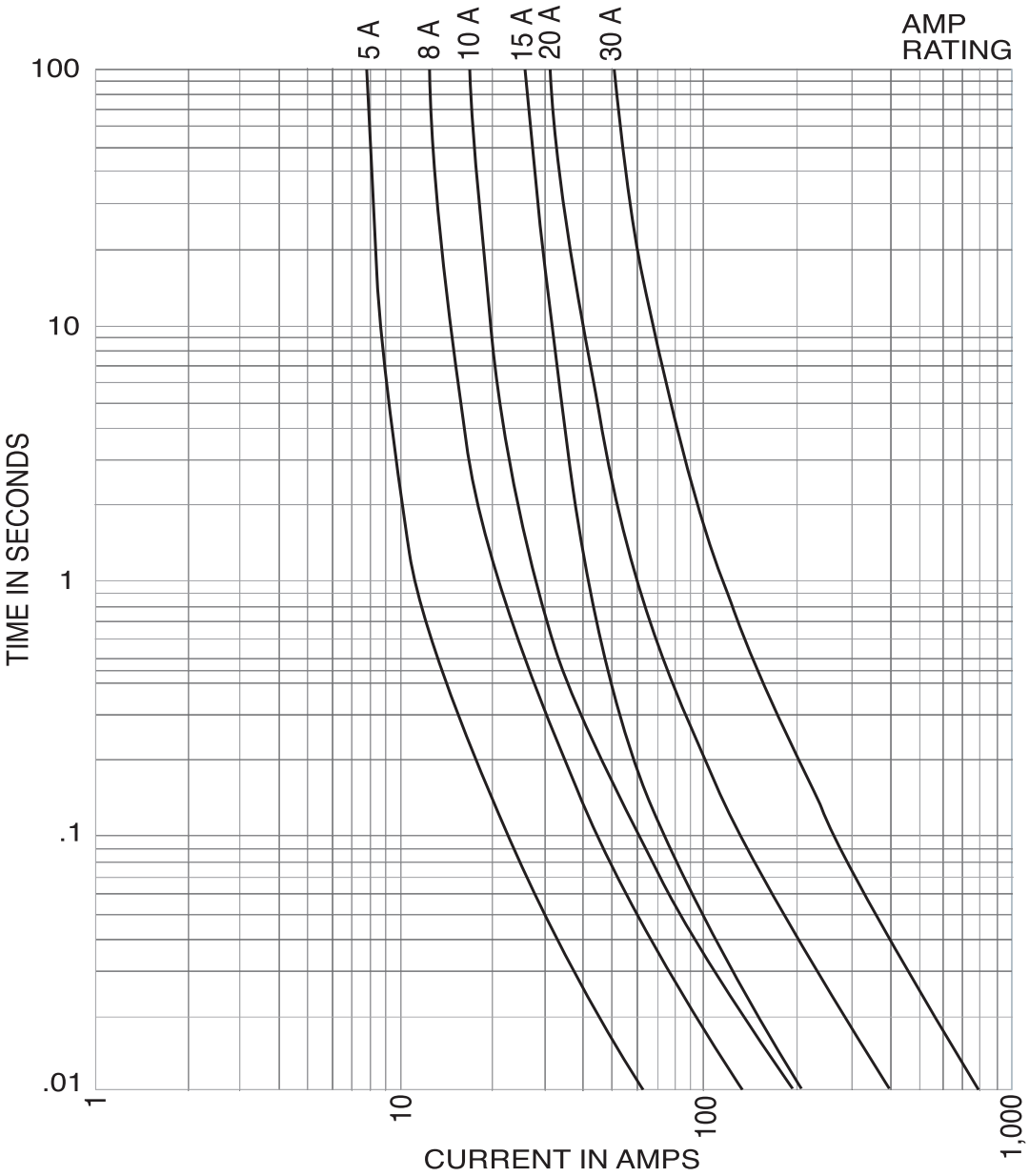
600 V DC

10 x 38 mm, 4 to 30 A, PVM

Dimensions in (mm)



Time current curve



Please contact FUSETECH@eaton.com for further information

Data sheet: 2153

1000 V DC

10 x 38 mm, 1 to 20 A, PV-A10

Description

A range of fuse links in a 10 x 38 mm package specifically designed for the protection and isolation of photovoltaic strings. The fuse links are capable of interrupting low overcurrents associated with faulted PV (reverse current, multi-array fault) strings.

Catalogue number

Cylindrical: PV-(amp rating)A10F

Bolt fixing: PV-(amp rating)A10-T

PCB fixing 1 pin: PV-(amp rating)A10-1P

PCB flxing 2 pin: PV-(amp rating)A10-2P

PCB fixing double pin sliver cap: PV-(amp rating)A10-2PS

In-line with crimp terminal: PV-(amp rating)A10F-CT

Technical data

Fuse size: 10 x 38 mm

Rated voltage: 1000 V d.c.

Rated current: 1 A to 20 A

Breaking capacity: 50 kA

Operating class: gPV and UL PV Fuse links

Min interrupting rating: 1.3 x I_n for 1 to 15 A, 1.5 x I_n for 20 A

Time constant: 1 - 3 ms

PV Fuse coordination with thin film cells and 4”, 5” and 6” crystalline silicon cells

Standards/Approvals

IEC 60269-6

UL 2579 (File number E335324)

CCC (1 to 15A), RoHS compliant

Packaging

MOQ: 10

Packaging 100% recyclable

Recommended fuse holders and clips

See table

Data sheet: 720110

1000 V DC

10 x 38 mm, 1 to 20 A, PV-A10

Technical data - Cylindrical, Bolt fixing and In-line with crimp terminal

		I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers		
Rated voltage	Rated current (Amps)	Pre-arcing	Total at 1000 V d.c.	0.8 I_n	I_n	Cylindrical	Bolt fixing	In-line with crimp terminal
1000 V d.c. (UL/IEC)	1	0.2	0.4	0.8	1.5	PV-1A10F	PV-1A10-T	PV-1A10F-CT
	2	1.2	4	0.6	1.0	PV-2A10F	PV-2A10-T	PV-2A10F-CT
	2.5	3	9	0.6	1.0	PV-2-5A10F	PV-2-5A10-T	PV-2-5A10F-CT
	3	4	11	0.8	1.3	PV-3A10F	PV-3A10-T	PV-3A10F-CT
	3.5	6.6	18	0.9	1.4	PV-3-5A10F	PV-3-5A10-T	PV-3-5A10F-CT
	4	9.5	26	1.0	1.5	PV-4A10F	PV-4A10-T	PV-4A10F-CT
	5	19	50	1.0	1.6	PV-5A10F	PV-5A10-T	PV-5A10F-CT
	6	30	90	1.1	1.8	PV-6A10F	PV-6A10-T	PV-6A10F-CT
	8	3	32	1.2	2.1	PV-8A10F	PV-8A10-T	PV-8A10F-CT
	10	7	70	1.2	2.3	PV-10A10F	PV-10A10-T	PV-10A10F-CT
	12	12	120	1.5	2.7	PV-12A10F	PV-12A10-T	PV-12A10F-CT
	15	15	160	1.7	2.9	PV-15A10F	PV-15A10-T	PV-15A10F-CT
	16	19	200	1.8	3	PV-16A10F	PV-16A10-T	PV-16A10F-CT
	20	34	350	2.1	3.6	PV-20A10F	PV-20A10-T	PV-20A10F-CT

Cylindrical

With bolt fixing

In-line with crimp terminal

Technical data - PCB

		I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers		
Rated voltage	Rated current (Amps)	Pre-arcing	Total at 1000 V d.c.	0.8 I_n	I_n	PCB fixing single pin	PCB fixing double pin	PCB fixing double pin silver cap
1000 V d.c. (UL/IEC)	1	0.2	0.4	0.8	1.5	PV-1A10-1P	PV-1A10-2P	PV-1A10-2P-S
	2	1.2	4	0.6	1.0	PV-2A10-1P	PV-2A10-2P	PV-2A10-2P-S
	2.5	3	9	0.6	1.0	PV-2-5A10-1P	PV-2-5A10-2P	PV-2-5A10-2P-S
	3	4	11	0.8	1.3	PV-3A10-1P	PV-3A10-2P	PV-3A10-2P-S
	3.5	6.6	18	0.9	1.4	PV-3-5A10-1P	PV-3-5A10-2P	PV-3-5A10-2P-S
	4	9.5	26	1.0	1.5	PV-4A10-1P	PV-4A10-2P	PV-4A10-2P-S
	5	19	50	1.0	1.6	PV-5A10-1P	PV-5A10-2P	PV-5A10-2P-S
	6	30	90	1.1	1.8	PV-6A10-1P	PV-6A10-2P	PV-6A10-2P-S
	8	3	32	1.2	2.1	PV-8A10-1P	PV-8A10-2P	PV-8A10-2P-S
	10	7	70	1.2	2.3	PV-10A10-1P	PV-10A10-2P	PV-10A10-2P-S
	12	12	120	1.5	2.7	PV-12A10-1P	PV-12A10-2P	PV-12A10-2P-S
	15	15	160	1.7	2.9	PV-15A10-1P	PV-15A10-2P	PV-15A10-2P-S
	16	19	200	1.8	3	PV-16A10-1P	PV-16A10-2P	PV-16A10-2P-S
	20	34	350	2.1	3.6	PV-20A10-1P	PV-20A10-2P	PV-20A10-2P-S

PCB 1 Pin

PCB 2 Pin

Data sheet: 720110

1000 V DC

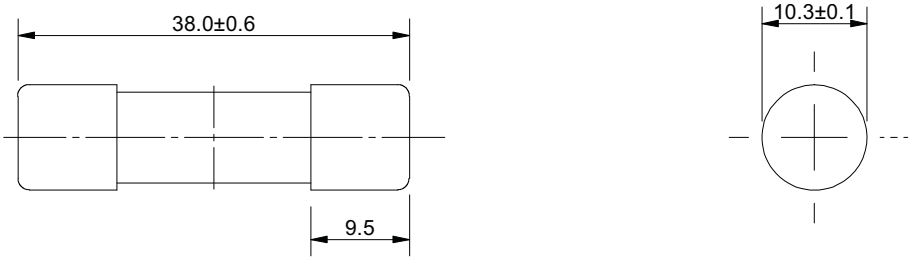
10 x 38 mm, 1 to 20 A, PV-A10

Compatible fuse holders and clips

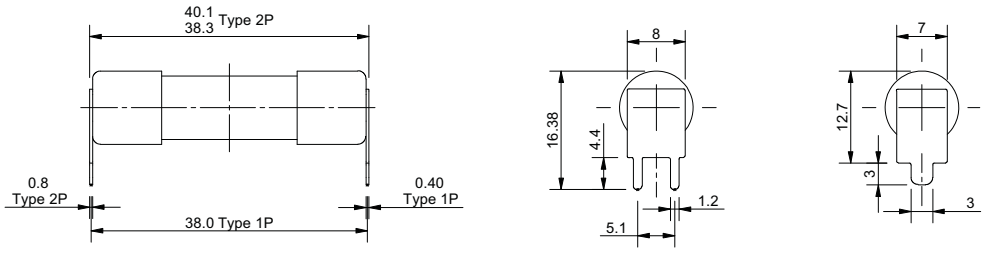
Rated voltage	Fuse type	Catalogue number	Compatible in-line holders	Compatible modular fuse holders	Compatible fuse clips
1000 V d.c.	Cylindrical	PV-1A10F	HPV-DV-**	CHPV	1A3400
		PV-2A10F	HPV-DV-**	CHPV	1A3400
		PV-2-5A10F	HPV-DV-**	CHPV	1A3400
		PV-3A10F	HPV-DV-**	CHPV	1A3400
		PV-3-5A10F	HPV-DV-**	CHPV	1A3400
		PV-4A10F	HPV-DV-**	CHPV	1A3400
		PV-5A10F	HPV-DV-**	CHPV	1A3400
		PV-6A10F	HPV-DV-**	CHPV	1A3400
		PV-8A10F	HPV-DV-**	CHPV	1A3400
		PV-10A10F	HPV-DV-**	CHPV	1A3400
		PV-12A10F	HPV-DV-**	CHPV	1A3400
		PV-15A10F	HPV-DV-**	CHPV	1A3400
		PV-16A10F	HPV-DV-**	CHPV	1A3400
		PV-20A10F	HPV-DV-**	CHPV	1A3400

Please note no fuse holders and/or clips are compatible with the Bolt fixing, in-line crimp terminal and PCB fixings versions

Dimensions (mm) Cylindrical PV-A10F**

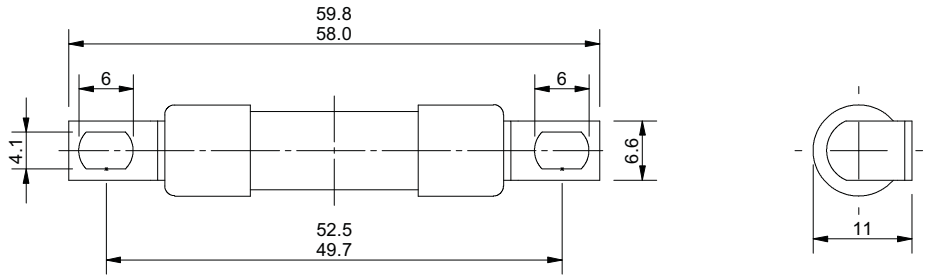


Dimensions (mm) PCB fixing PV-A10-xP**



Type 2P Type 1P

Dimensions (mm) Bolt fixing PV-A10-T**

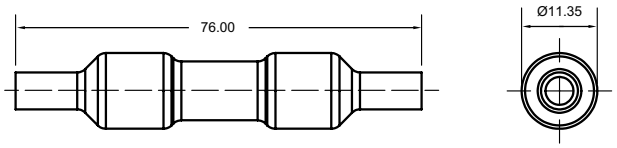


Data sheet: 720110

1000 V DC

10 x 38 mm, 1 to 20 A, PV-A10

Dimensions (mm) In-line with crimp terminal PV-A10F-CT**



The in-line crimp terminal version can be electrically insulated with customer supplied overmolding or approved heat-shrink.

Operating temperature range

- -40°C to 90°C

Wire range and type

- Single conductor, 12-10AWG 75°C/90°C Cu stranded PV

Overmolding temperature parameters

- 233°C for 180 sec Max

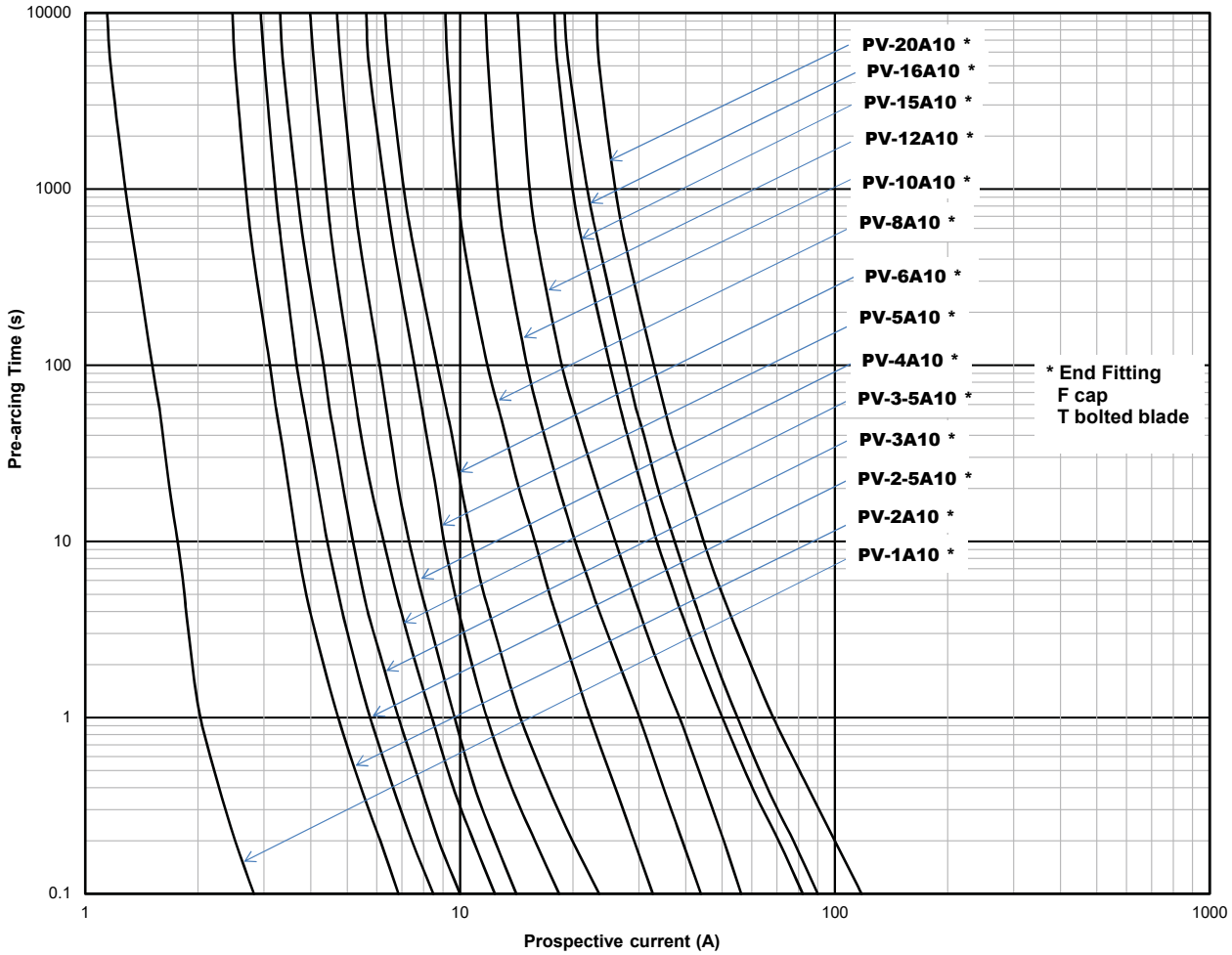
Terminals

- Crimp terminal for 12-10AWG PV copper conductors

Recommended tools

- Sta-Kon® terminal crimping tool, catalog number ERG4002

Time current curve

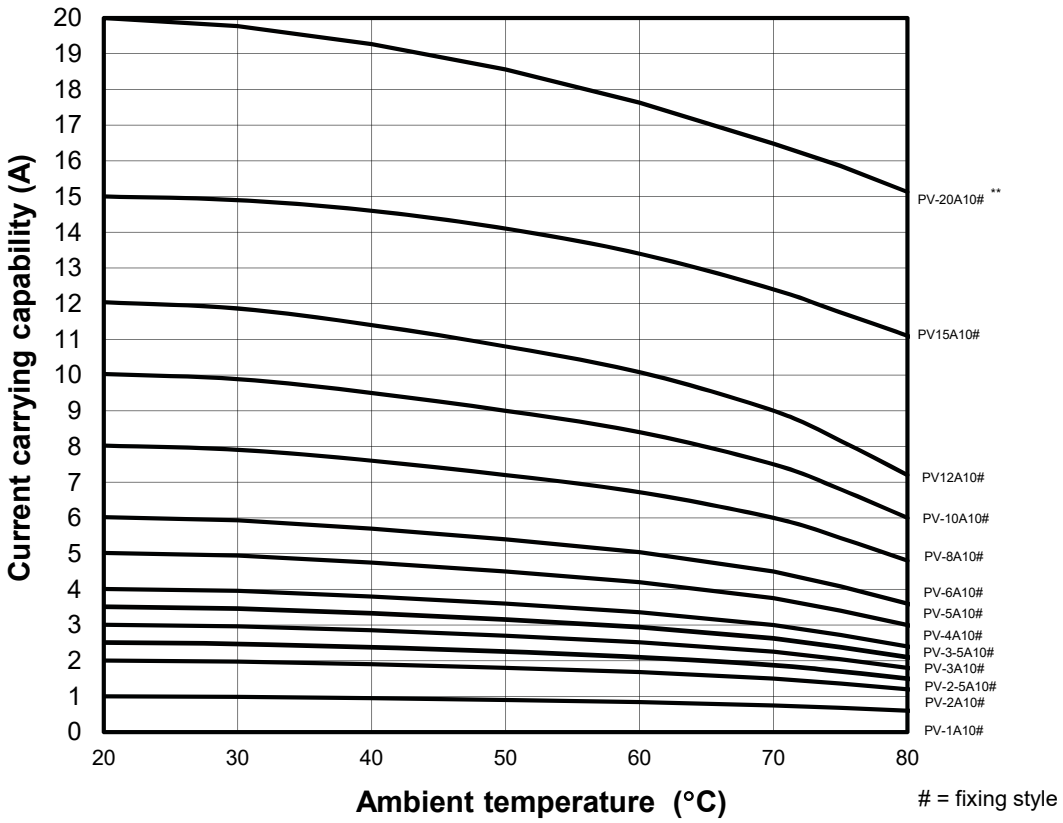


Data sheet: 720110

1000 V DC

10 x 38 mm, 1 to 20 A, PV-A10

Temperature derating



Data sheet: 720110

1000 V DC

Modular fuse holders, CHPV, 32A (IEC), 30 A (UL)

Description

Compact DIN-Rail mounting fuse holders specifically designed for 10 x 38 mm cylindrical photovoltaic fuse links.

Catalogue numbers

CHPV1U 1-pole modular fuse holder

CHPV2U 2-pole modular fuse holder

CHPV1IU 1-pole modular fuse holder with neon indicator

CHPV2IU 2-pole modular fuse holder with neon indicator

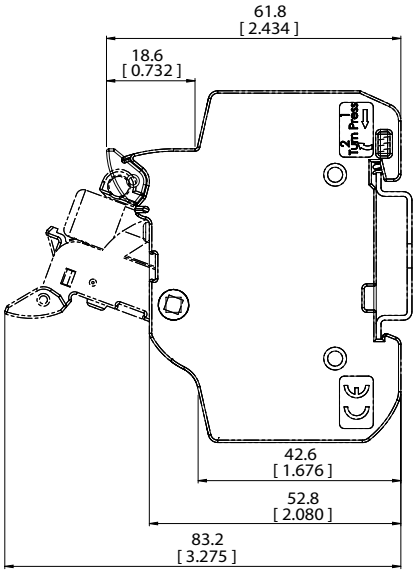
Technical data

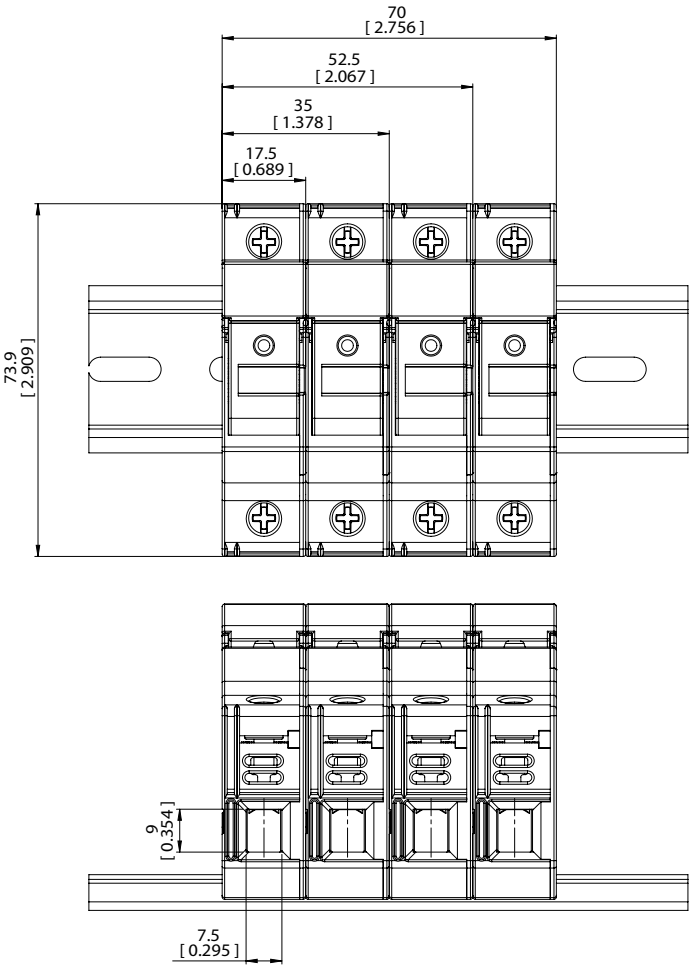
IEC		UL				
Rated voltage	Rated current	Rated voltage	Rated current	Terminal rating	Rated breaking withstand capactiy	Compatible Bussmann series fuse links
1000 V d.c.	32 A	1000 V d.c.	30 A	IEC 1 to 25 mm^2 70°C PVC Copper cable (solid stranded or fine stranded) Spade lug Comb bus bar	33 kA rms sym	Solar PV range: PVM, PV-A10F Cylindrical

Standards / Agency information

IEC	UL	CSA	CCC	CE
IEC 60269-1	UL 4248-1 UL4248-19 UL file E14853	C22.2 No 4248.1 C22.2 No 4248.19	GB 13539.1	DCB 272

Dimensions mm (in)





Data sheet: 720147

1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Description

A range of NH size fuse links specifically designed for protecting and isolating photovoltaic array combiners and DC disconnects. These fuse links are capable of interrupting low overcurrents
associated with faulted PV systems (reverse current, multi-array fault).

Catalogue number
PV-(amp rating)ANH(size)

Technical data
Rated voltage: 1000 V d.c.
Rated current: 32 A to 400 A
Breaking capacity: 50 kA
Operating class: gPV and UL PV fuse links

Standards / Approvals
IEC 60269-6
UL 2579 (File number E335324)
CSA Listed
RoHS compliant

Packaging
MOQ: 3
Packaging 100% recyclable

Recommended microswitches and fuse bases
See table overleaf

Microswith

NH Bases

Data sheet: 720133

1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Technical data

			I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers		
Fuse link body size	**Rated voltage**	**Rated current (Amps)**	**Pre-arcing**	**Total at 1000 V d.c.**	**0.8 I_n**	**I_n**	**Blade without bolt holes**	**Blade with bolt holes**	**Blade with bolt holes and lugs**
NH1	1000 V d.c. (IEC/UL)	32	80	720	4	8	PV-32ANH1	PV-32ANH1-B	
		40	185	1670	5	9	PV-40ANH1	PV-40ANH1-B	
		50	400	3600	6	11	PV-50ANH1	PV-50ANH1-B	
		63	470	4300	6	12	PV-63ANH1	PV-63ANH1-B	PV-63ANH1-BL
		80	640	5760	8	15	PV-80ANH1	PV-80ANH1-B	PV-80ANH1-BL
		100	1300	11700	8	16	PV-100ANH1	PV-100ANH1-B	PV-100ANH1-BL
		110	2100	18900	9	18.5	PV-110ANH1		
		125	2600	23400	9	17	PV-125ANH1	PV-125ANH1-B	PV-125ANH1-BL
		160	5200	46800	14	27	PV-160ANH1	PV-160ANH1-B	PV-160ANH1-BL
		175	8300	74700	15	29	PV-175ANH1		
		200	10200	82000	13	25	PV-200ANH1	PV-200ANH1-B	PV-200ANH1-BL
NH2	1000 V d.c. (IEC/UL)	160	4600	37000	14	28	PV-160ANH2	PV-160ANH2-B	PV-160ANH2-BL
		200	9500	76000	16	32	PV-200ANH2	PV-200ANH2-B	PV-200ANH2-BL
		250	17000	136000	19	38	PV-250ANH2	PV-250ANH2-B	PV-250ANH2-BL
NH3	1000 V d.c. (IEC/UL)	300	32000	260000	24	40	PV-300ANH3		
		315	32000	260000	26	44	PV-315ANH3	PV-315ANH3-B	PV-315ANH3-BL
		350	44500	370000	27	45	PV-350ANH3		
		355	44500	370000	28	46	PV-355ANH3		
		355	38000	310000	29	48		PV-355ANH3-B	PV-355ANH3-BL
		400	67500	550000	30	50	PV-400ANH3		
		400	61000	490000	32	50		PV-400ANH3-B	PV-400ANH3-BL

Data sheet: 720133

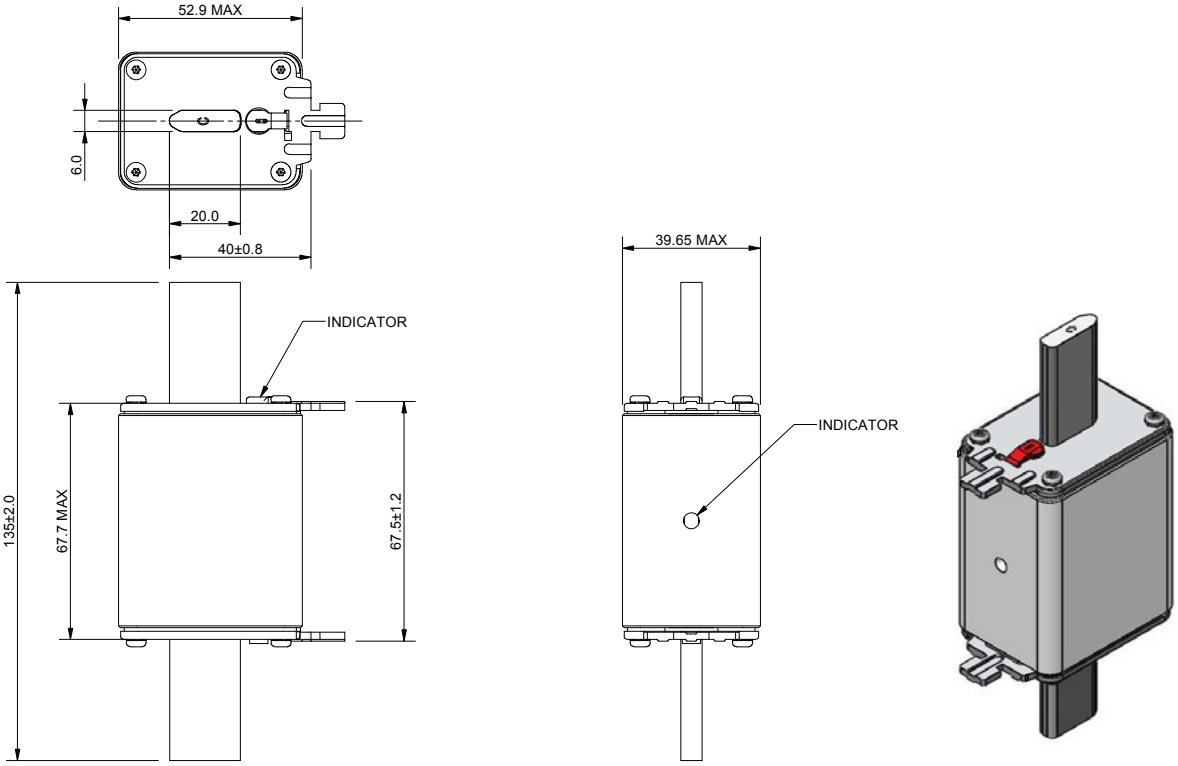
1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Compatible NH fuse bases and microswitches

Fuse link body size	Rated voltage	Rated current (Amps)	Catalogue numbers			Compatible NH fuse bases	Compatible micro-switches
			Blade without bolt holes	Blade with bolt holes	Blade with bolt holes and lugs		
NH1	1000 V d.c. (IEC/UL)	32	PV-32ANH1	PV-32ANH1-B		SD1-D-PV	170H0236 and 170H0238
		40	PV-40ANH1	PV-40ANH1-B		SD1-D-PV	170H0236 and 170H0238
		50	PV-50ANH1	PV-50ANH1-B		SD1-D-PV	170H0236 and 170H0238
		63	PV-63ANH1	PV-63ANH1-B	PV-63ANH1-BL	SD1-D-PV	170H0236 and 170H0238
		80	PV-80ANH1	PV-80ANH1-B	PV-80ANH1-BL	SD1-D-PV	170H0236 and 170H0238
		100	PV-100ANH1	PV-100ANH1-B	PV-100ANH1-BL	SD1-D-PV	170H0236 and 170H0238
		110	PV-110ANH1			SD1-D-PV	170H0236 and 170H0238
		125	PV-125ANH1	PV-125ANH1-B	PV-125ANH1-BL	SD1-D-PV	170H0236 and 170H0238
		160	PV-160ANH1	PV-160ANH1-B	PV-160ANH1-BL	SD1-D-PV	170H0236 and 170H0238
		175	PV-175ANH1			SD1-D-PV	170H0236 and 170H0238
		200	PV-200ANH1	PV-200ANH1-B	PV-200ANH1-BL	SD1-D-PV	170H0236 and 170H0238
NH2	1000 V d.c. (IEC/UL)	160	PV-160ANH2	PV-160ANH2-B	PV-160ANH2-BL	SD2-D-PV	170H0236 and 170H0238
		200	PV-200ANH2	PV-200ANH2-B	PV-200ANH2-BL	SD2-D-PV	170H0236 and 170H0238
		250	PV-250ANH2	PV-250ANH2-B	PV-250ANH2-BL	SD2-D-PV	170H0236 and 170H0238
NH3	1000 V d.c. (IEC/UL)	300	PV-300ANH3			SD3-D-PV	170H0236 and 170H0238
		315	PV-315ANH3	PV-315ANH3-B	PV-315ANH3-BL	SD3-D-PV	170H0236 and 170H0238
		350	PV-350ANH3			SD3-D-PV	170H0236 and 170H0238
		355	PV-355ANH3			SD3-D-PV	170H0236 and 170H0238
		355		PV-355ANH3-B	PV-355ANH3-BL	SD3-D-PV	170H0236 and 170H0238
		400	PV-400ANH3			SD3-D-PV	170H0236 and 170H0238
		400		PV-400ANH3-B	PV-400ANH3-BL	SD3-D-PV	170H0236 and 170H0238

Dimensions (mm) NH1 Blade without bolt holes

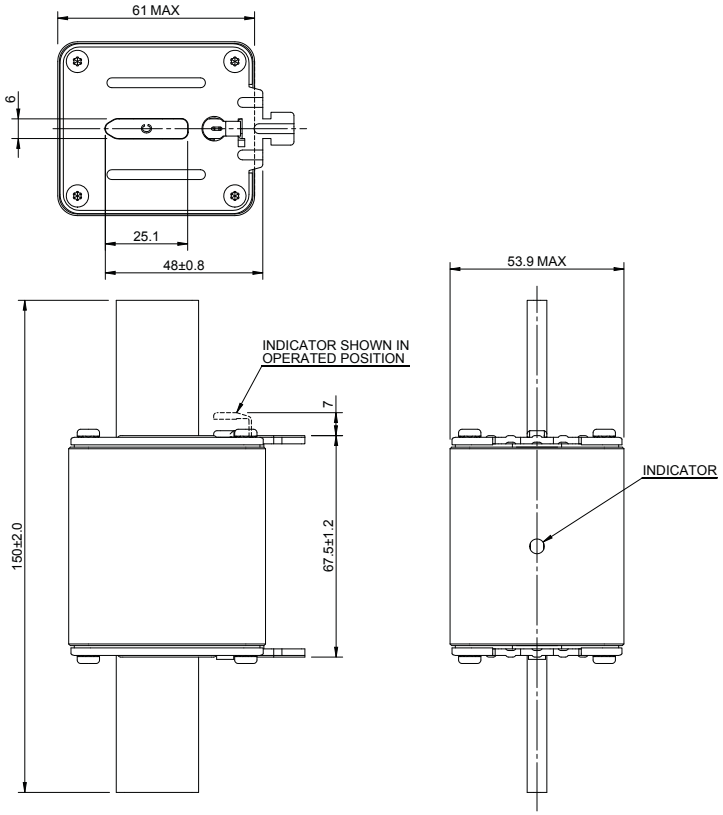


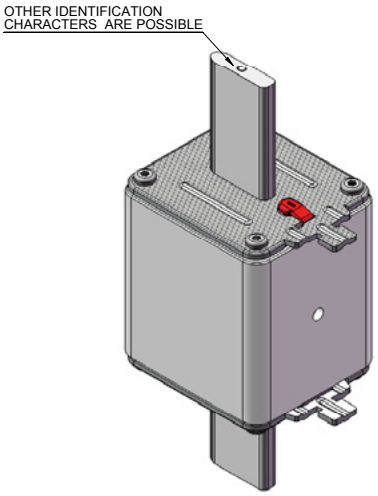
Data sheet: 720133

1000 V DC

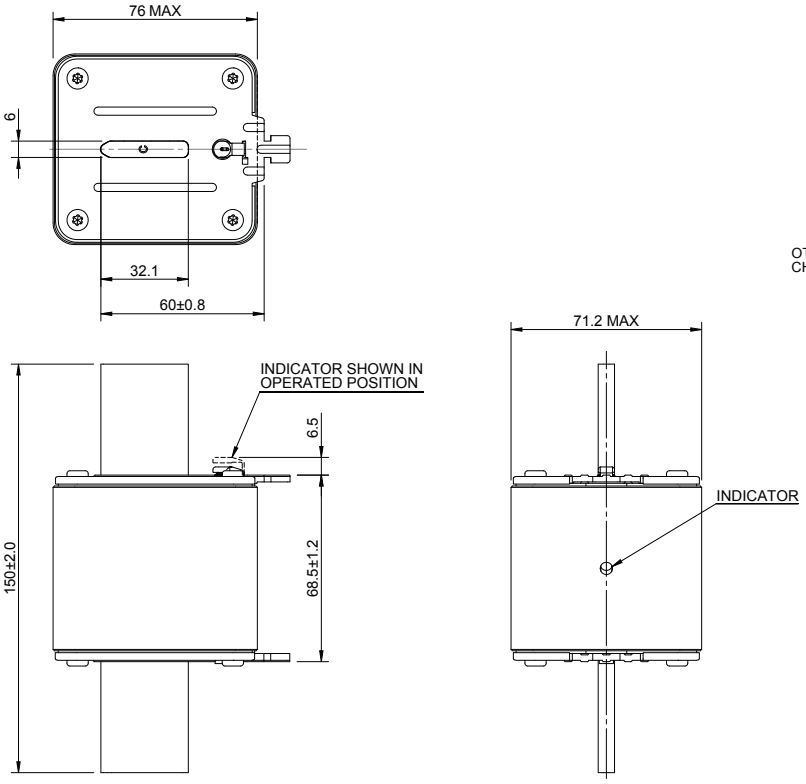
PV-ANH, NH fuse links, 32 to 400 A

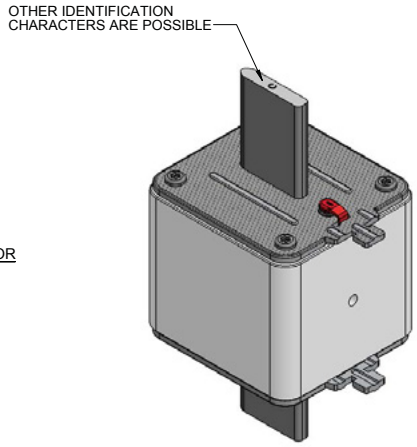
Dimensions (mm) NH2 Blade without bolt holes





Dimensions (mm) NH3 Blade without bolt holes



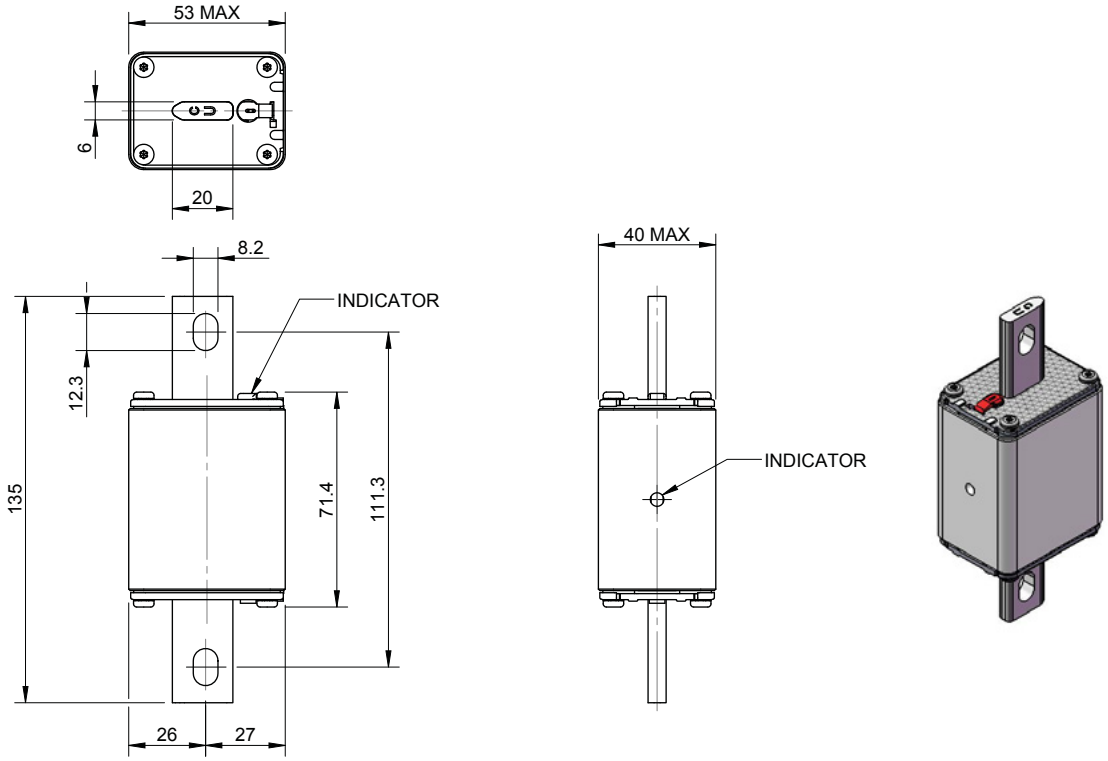


Data sheet: 720133

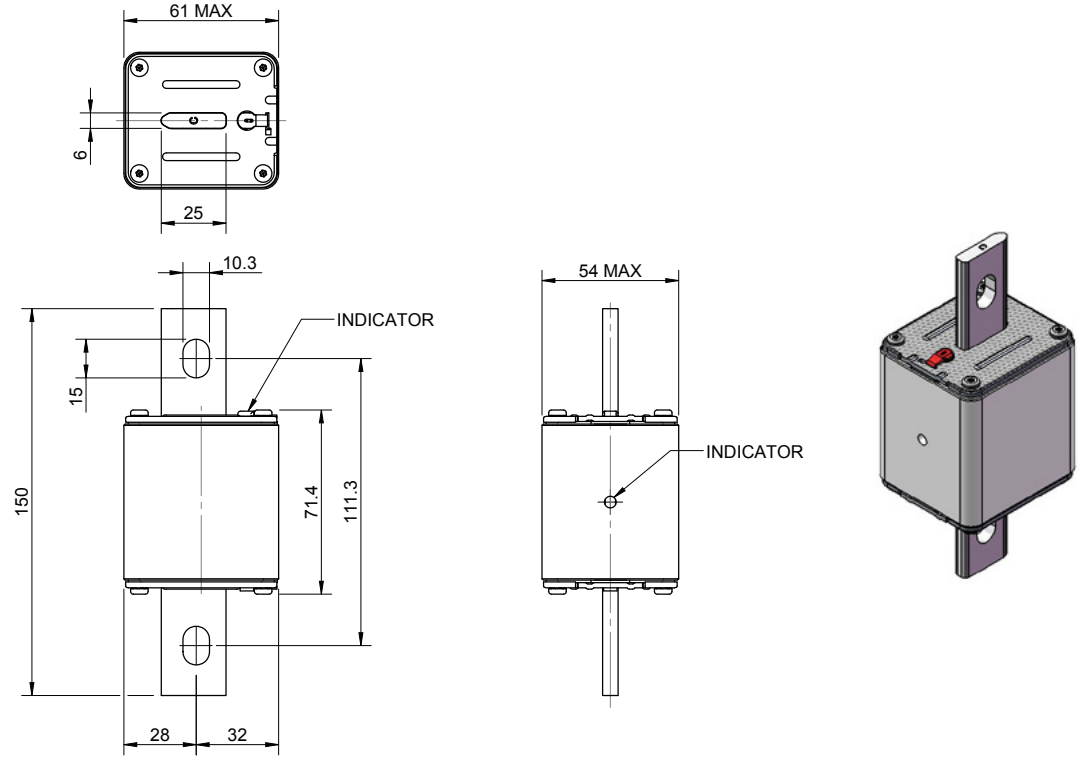
1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Dimensions (mm) NH1 Blade with bolt holes



Dimensions (mm) NH2 Blade with bolt holes

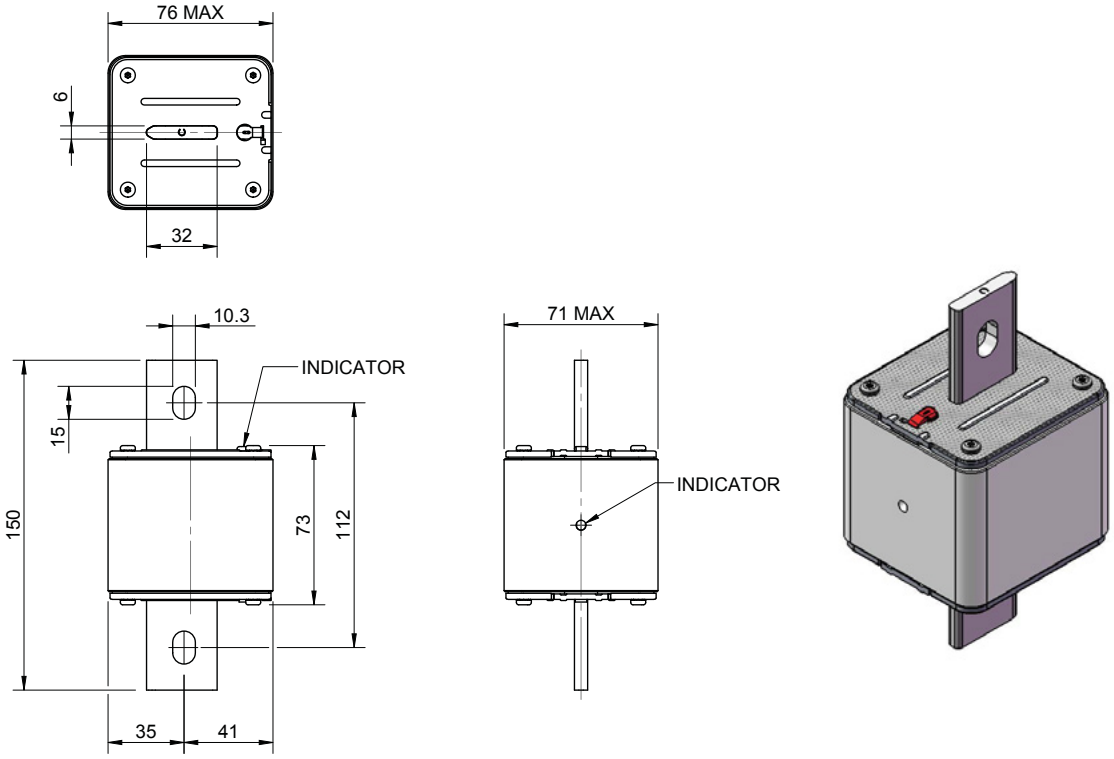


Data sheet: 720133

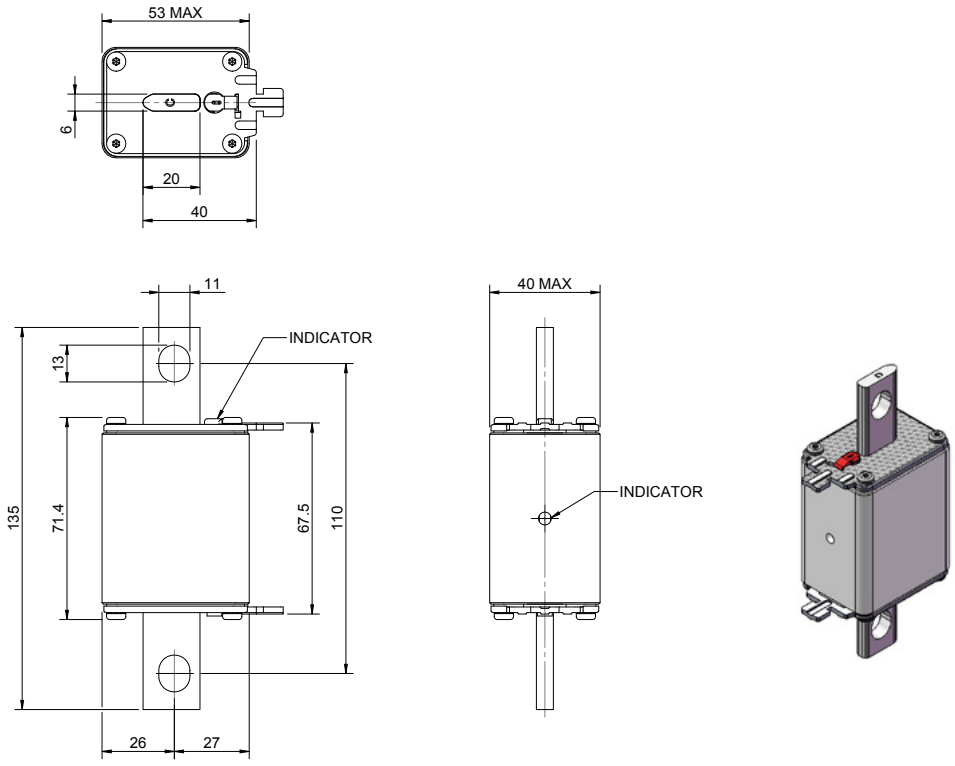
1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Dimensions (mm) NH3 Blade with bolt holes



Dimensions (mm) NH1 Blade with bolt holes and lugs

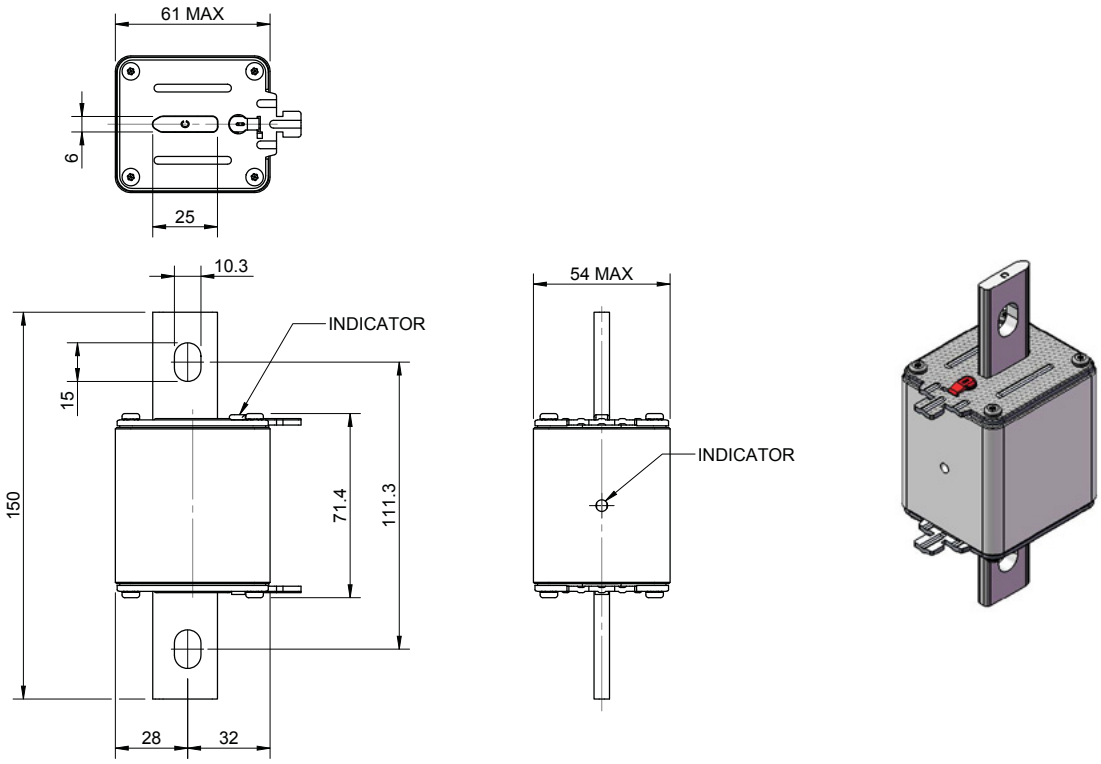


Data sheet: 720133

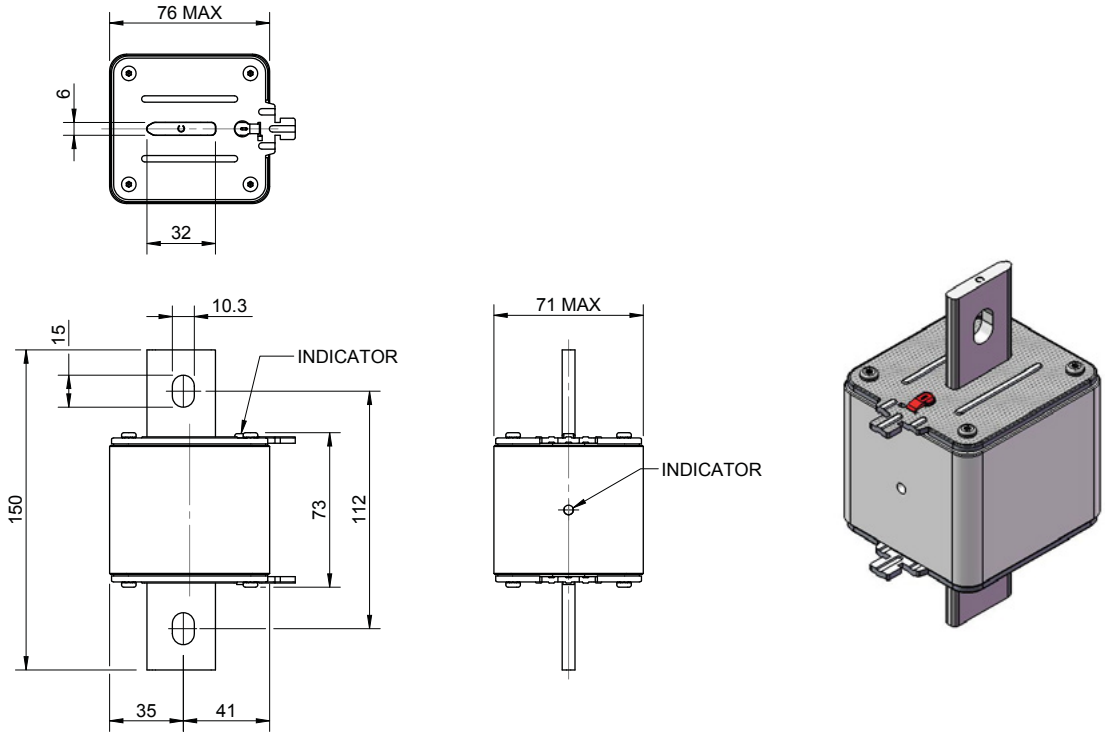
1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Dimensions (mm) NH2 Blade with bolt holes and lugs



Dimensions (mm) NH3 Blade with bolt holes and lugs

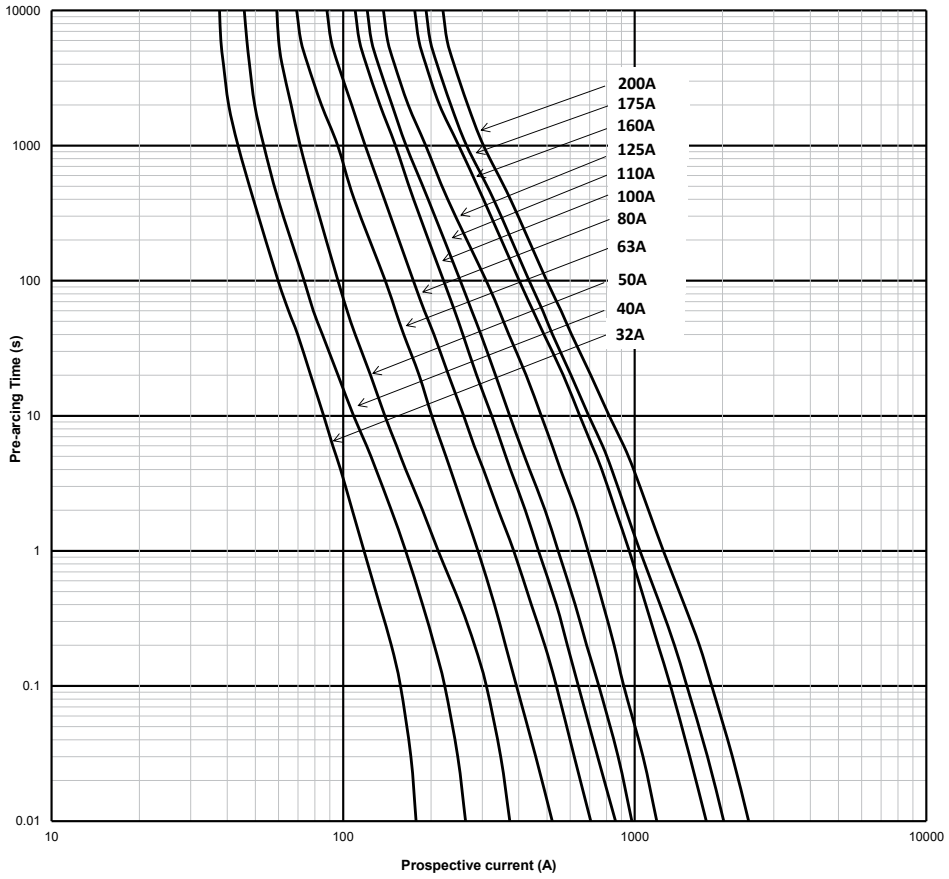


Data sheet: 720133

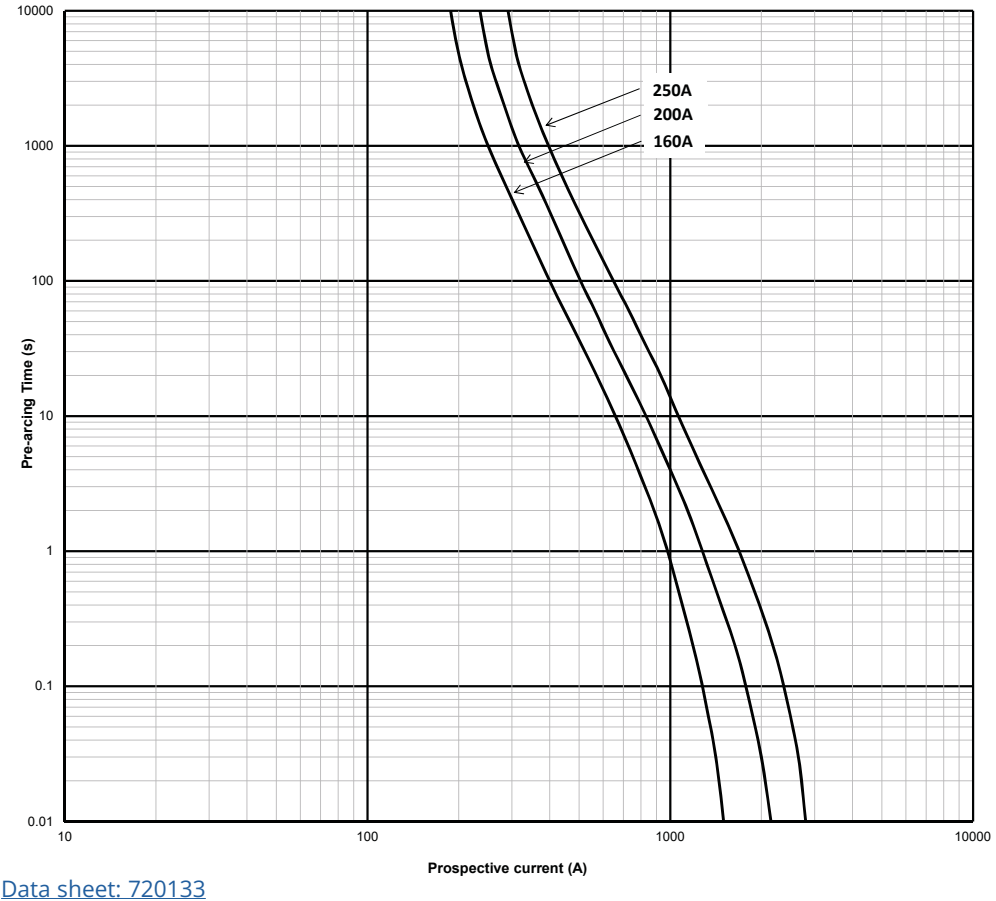
1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Time-current curve size 1 - 32 A to 200 A



Time-current curve size 2 - 160 A to 250 A

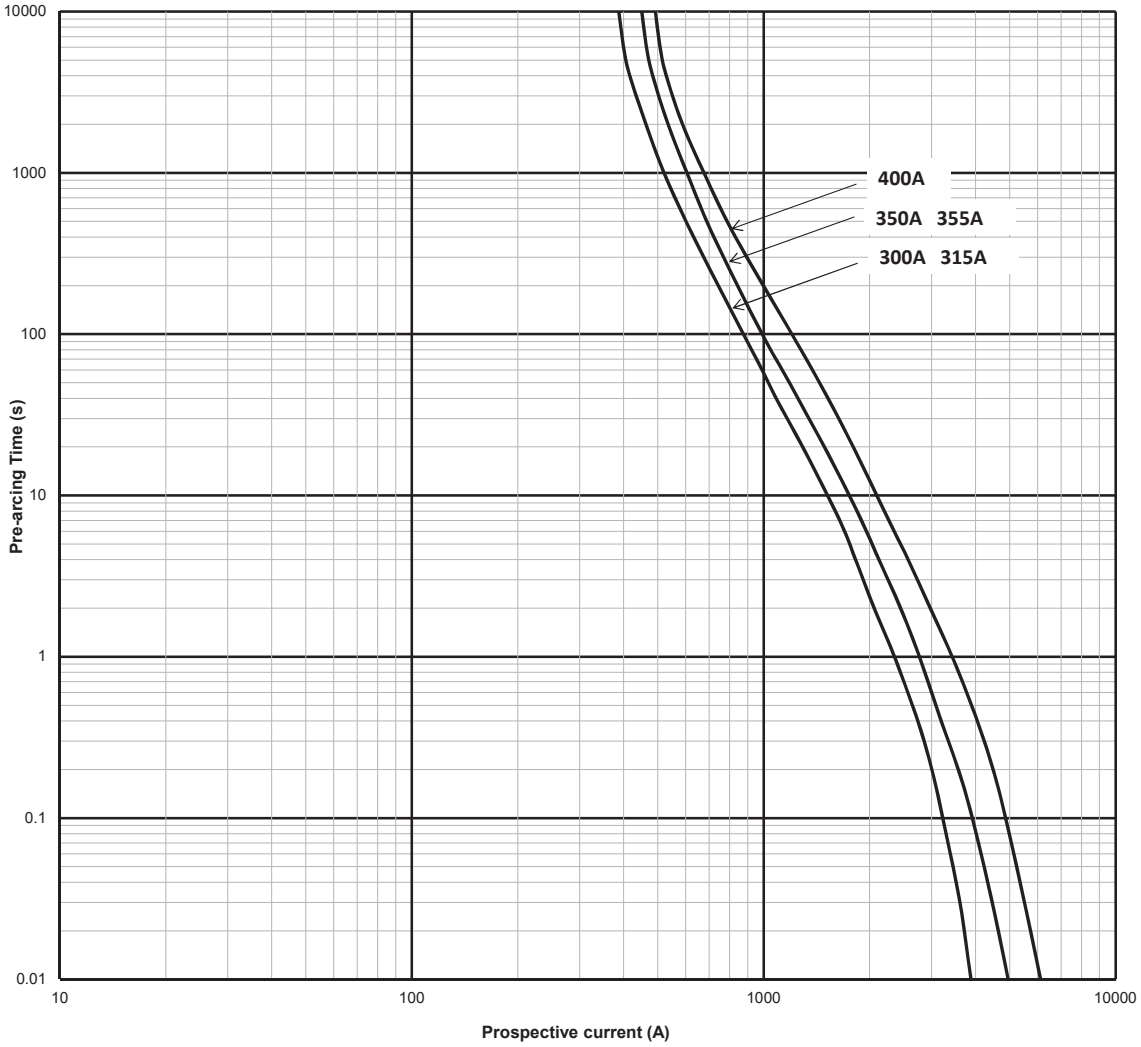


Data sheet: 720133

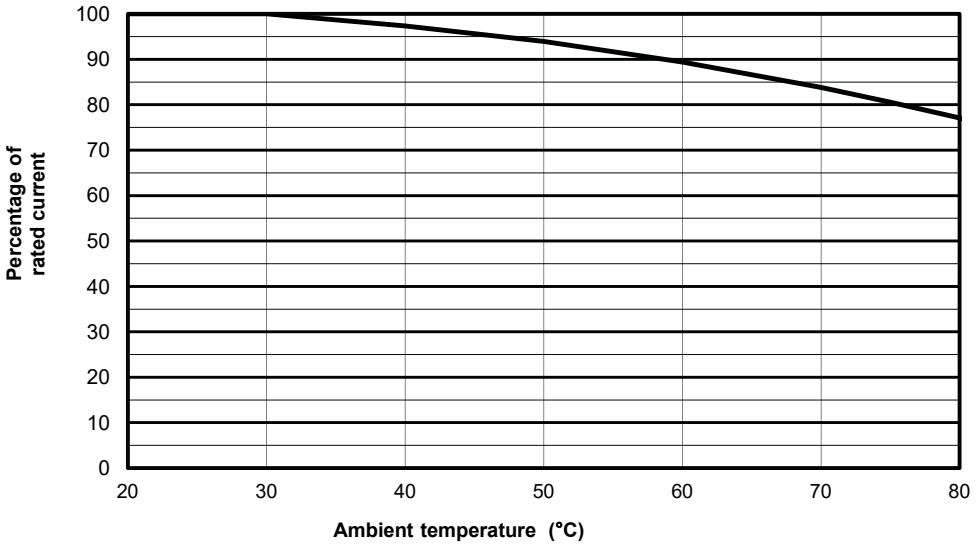
1000 V DC

PV-ANH, NH fuse links, 32 to 400 A

Time-current curve size 3 - 300 A to 400 A



Temperature derating curve - sizes 1 to 3



Data sheet: 720133

1000 V DC

Flush end, PV-AF Series, 160 to 400 A

Description

A range of flush end package fuse links specifically designed for protecting and isolating photovoltaic array combiners and disconnects. These fuse links are capable of interrupting low overcurrents associated with faulted PV systems (reverse current, multi-array fault).

Catalogue number

PV-(amp rating)AF2 - size 2

PV-(amp rating)AF3 - size 3

Class of operation

gPV

Technical data

Rated voltage: 1000 V d.c. (IEC and UL)

Rated current: 160 A to 400 A

Breaking capacity: 50 kA

Operating class: gPV and UL PV fuse links

Optional microswitches

170H0069

Standards / Approvals

Tested to IEC 60269-6

UL 2579 (file number E335324)

CSA
RoHS compliant

Packaging

MOQ: 2 for size 2 (PV-xAF2), 1 for size 3 (PV-xAF3)

Packaging 100% recyclable.

Technical data

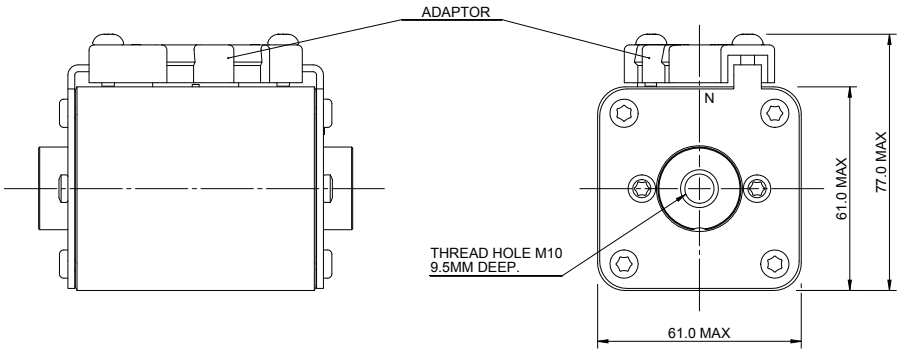
				I^2t (A^2 Sec)		Watts loss (W)		
Fuse link type	Fuse link body size	Rated voltage	Rated current (Amps)	Pre-arcing	Total at 1000 V d.c.	0.8 I_n	I_n	Catalogue numbers
Flush end	2	1000 V d.c.(IEC/UL)	160	4600	37,000	15	30	PV-160AF2
			200	9500	76,000	17	34	PV-200AF2
			250	17,000	136,000	19	38	PV-250AF2
	3	1000 V d.c.(IEC/UL)	315	27,000	240,000	30	49	PV-315AF3
			355	37,000	350,000	31	51	PV-355AF3
			400	61,500	550,000	32	52	PV-400AF3

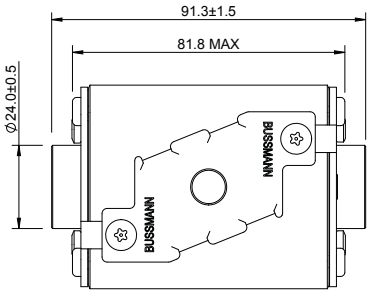
Data sheet: 10370

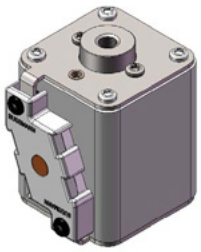
1000 V DC

Flush end, PV-AF Series, 160 to 400 A

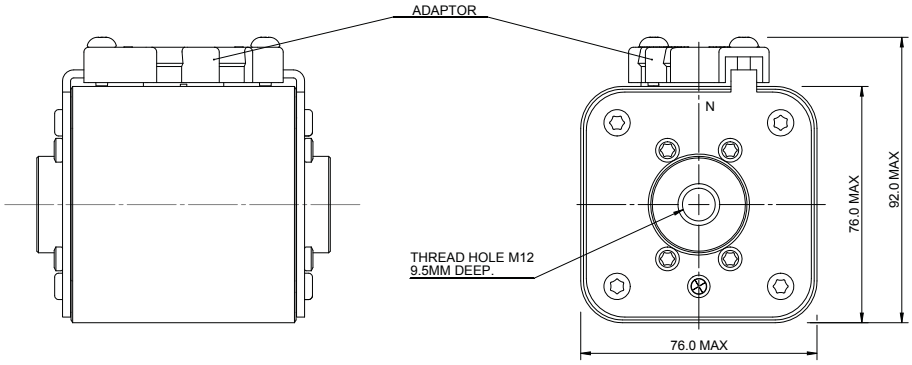
Dimensions (mm) - size 2

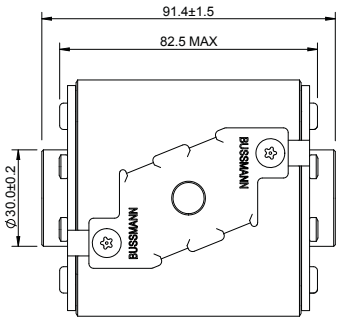






Dimensions (mm) - size 3



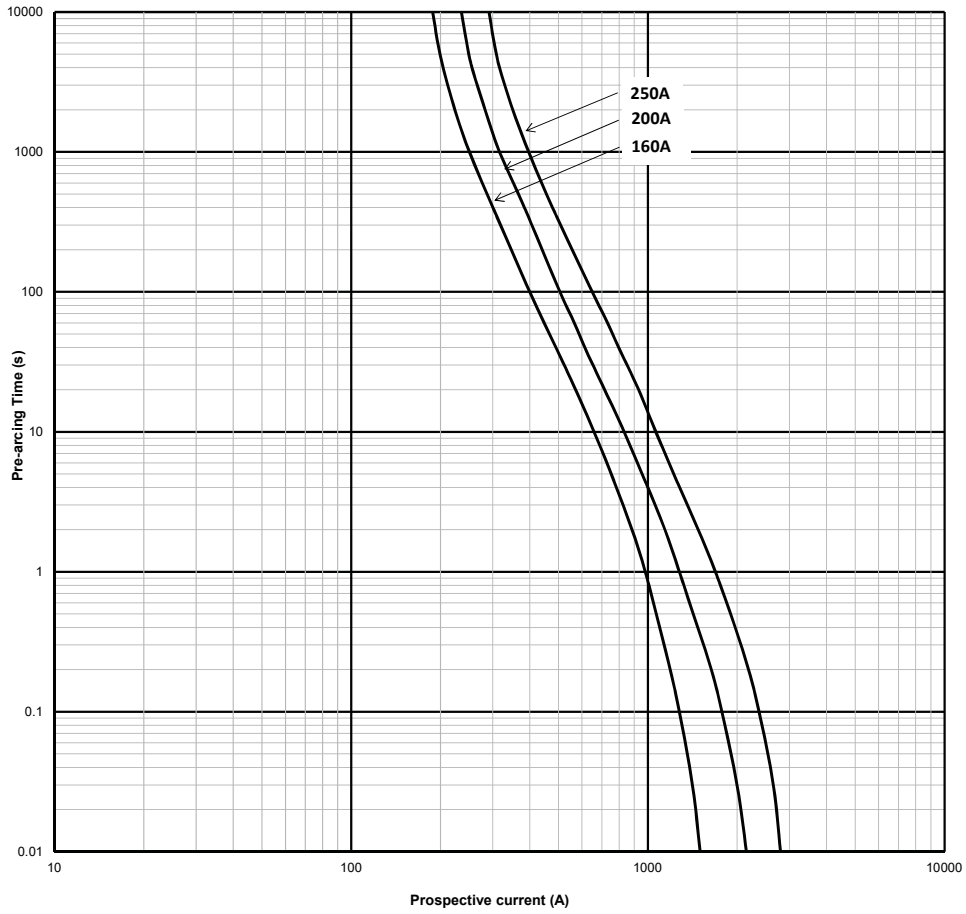


Data sheet: 10370

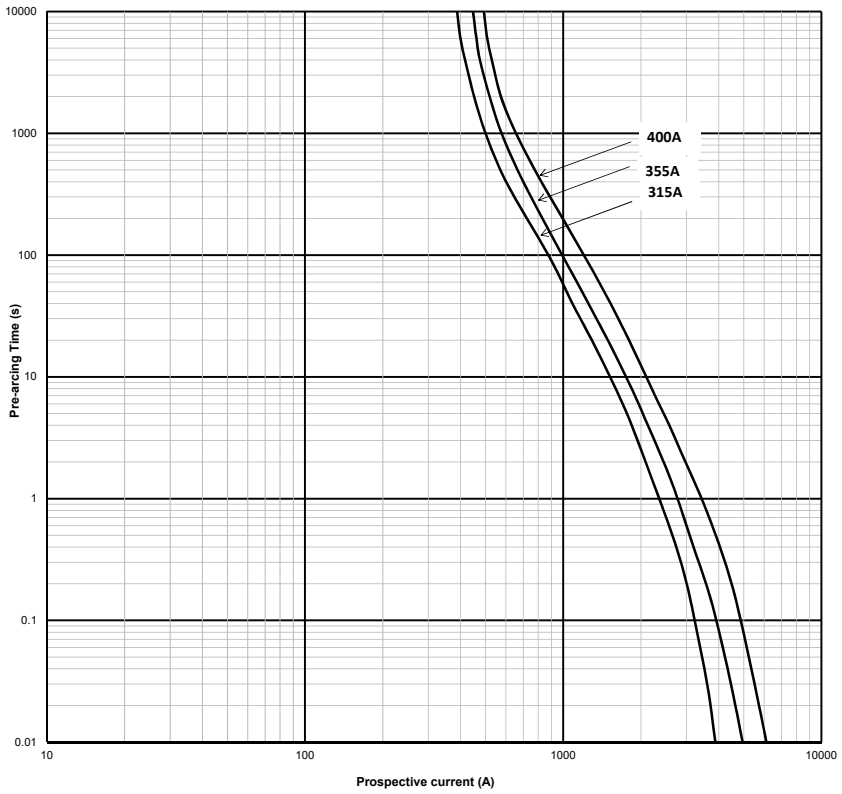
1000 V DC

Flush end, PV-AF Series, 160 to 400 A

Time-current curve size 2 - 160 A to 250 A



Time-current curve size 3 - 315 A to 400 A



Data sheet: 10370

1000/1100 V DC

14 x 51 mm fuse links, 15 to 32 A, PV-14AF

Description

A range of 14 x 51 mm fuse links specifically designed for protecting and isolating photovoltaic strings. These fuse links are capable of interrupting low overcurrents associated with faulted PV
systems (reverse current, multi-array fault).

Catalogue number

PV-(amp rating)A14F

Technical data

Fuse size: 14 x 51 mm

Rated voltage:

- 1100 V d.c. (IEC and UL for 15 A and 20 A)
- 1000 V d.c. (IEC and UL for 25 and 32 A)

Rated current: 15, 20, 25 and 32 A

Breaking capacity: 30 kA

Operating class: gPV and UL PV Fuse links

Standards / Approvals

IEC 60269-6

UL 2579 (File number E335324)

RoHS compliant

Packaging

MOQ: 10

Packaging 100% recyclable.

Recommended modular fuse holders

- Without indicator: CHPV141U
- With indicator: CHPV141IU

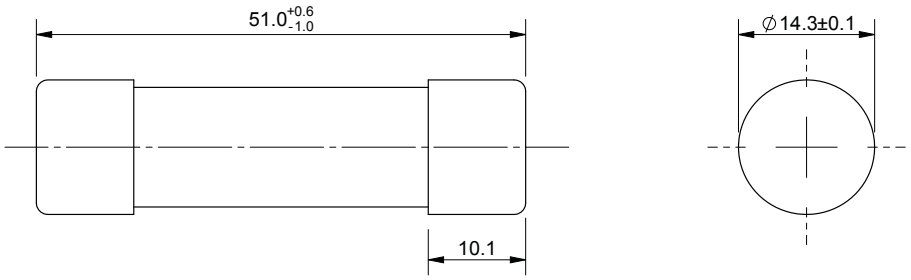
Recommended modular fuse clips

FW14-PCB

Catalogue numbers

Catalogue number	Rated current (Amps)	Rated voltage (V d.c.)	Energy integrals I^2t (A^2s)		Watts loss		Compatible moduar fuse holder		
			Pre-arcing	Total at rated voltage	08 I_n	I_n	Without indicator	Without indicator	Compatible fuse clip
PV-15A14F	15	1100	14	265	2.1	4	CHPV141U	CHPV141IU	FW14-PCB
PV-20A14F	20	1100	27	568	2.7	5	CHPV141U	CHPV141IU	FW14-PCB
PV-25A14F	25	1000	65	943	2.7	5.1	CHPV141U	CHPV141IU	FW14-PCB
PV-32A14F	32	1000	120	1740	3.3	6.2	CHPV141U	CHPV141IU	FEW14-PCB

Dimensions (mm)

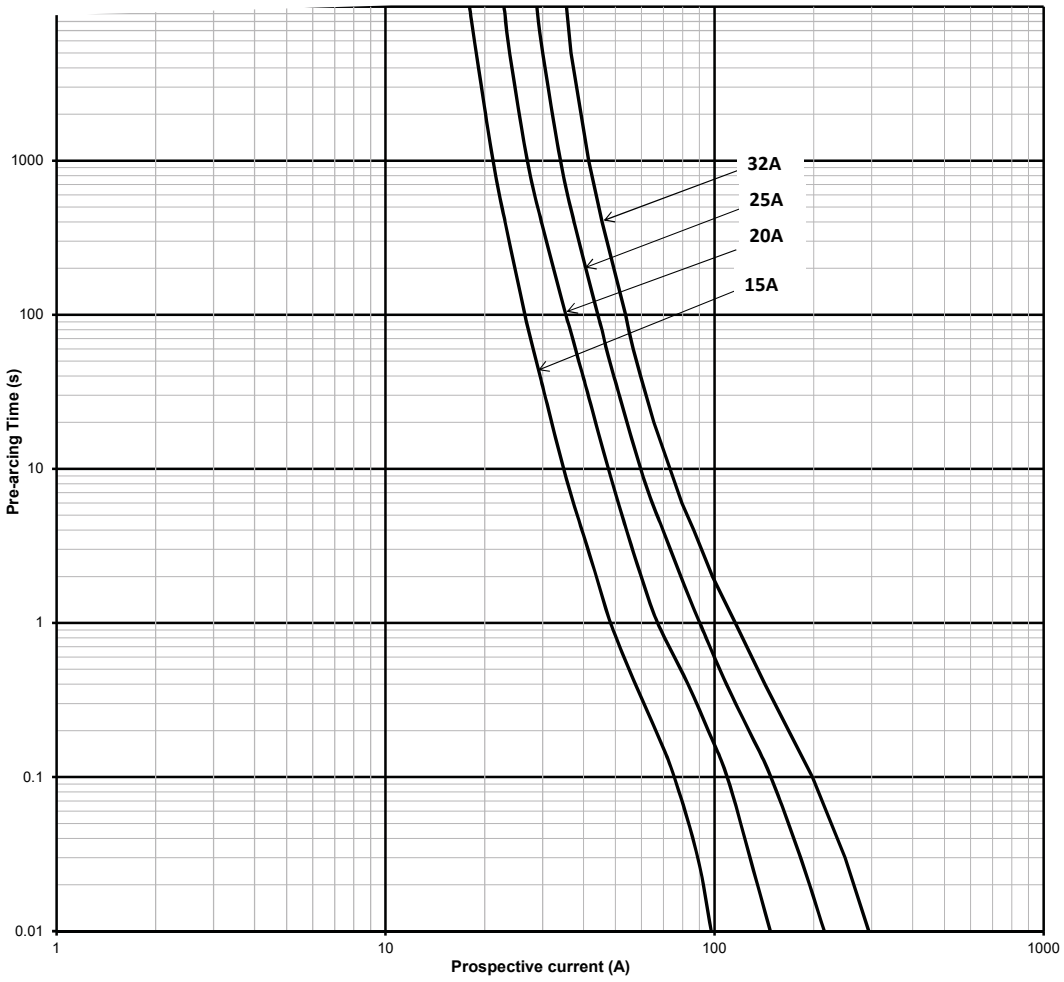


Data sheet: 720132

1000/1100 V DC

14 x 51 mm fuse links, 15 to 32 A, PV-14AF

Time current curve



Data sheet: 720132

1300/1500 V DC

14 x 65 mm fuse links, 3.5 to 32 A, PV-A14L

Description

A range of 14 x 65mm fuse links specifically designed for protecting and isolating photovoltaic strings. These fuse links are capable of interrupting low overcurrents associated with faulted PV
systems (reverse current, multi-array fault).

Catalogue number

Cylindrical: PV-(amp rating)A14LF

Cylindrical with tags: PV-(amp rating)A14L-T

Cylindrical with 10mm fixings: PV-(amp rating)A14LF10F

Technical data

Fuse size: 14 x 65 mm

Rated current:

- 1500 V d.c. (IEC and UL, 2.25 A to 20 A
- 1300 V d.c. (IEC and UL, 25 A and 32 A)

Rated current: 2.25 A to 32 A

Rated breaking capacity: 10 kA

Operating class: gPV and UL PV Fuse links

Minimum interrupting rating: 2 x In

PV Fuse coordination w/ Thin film cells 4", 5" and 6" crystalline

Time constant: 1-3 ms

Standards / Approvals

IEC 60269-6, UL 2579

(File number E335324)

RoHS compliant

Packaging

MOQ: 10

Packaging 100% recyclable.

Recommended fuse holders and clips

See compatible fuse holders and clips table

Technical data

		I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers		
Rated voltage	Rated current (Amps)	Pre-arcing	Total at rated voltage	0.8 I_n	I_n	Cylindrical	Cylindrical with tags	Cylindrical with 10mm fixings
1500 V d.c. (IEC/UL)	2.25	4	8	1.4	2.3	PV-2.25A14LF	N/A	PV-2.25A14LF10F
	2.5	5	10	1.5	2.5	PV-2.5A14LF	PV-2.5A14L-T	PV-2.5A14LF10F
	3	8	14	1.7	2.8	PV-3A14LF	PV-3A14L-T	PV-3A14LF10F
	3.5	12	23	1.8	3.0	N/A	N/A	PV-3.5A14LF10F
	4	18	34	2	3.3	PV-4A14LF	PV-4A14L-T	PV-4A14LF10F
	15	16	190	2.9	5.1	PV-15A14LF	PV-15A14L-T	PV-15A14LF10F
	20	34	400	3.8	6.9	PV-20A14LF	PV-20A14L-T	PV-20A14LF10F
1300 V d.c. (IEC/UL)	25	65	550	4.1	7.5	PV-25A14LF	PV-25A14L-T	PV-25A14LF10F
	32	105	900	5.7	10.4	PV-32A14LF	PV-32A14L-T	PV-32A14LF10F

Data sheet: 720139

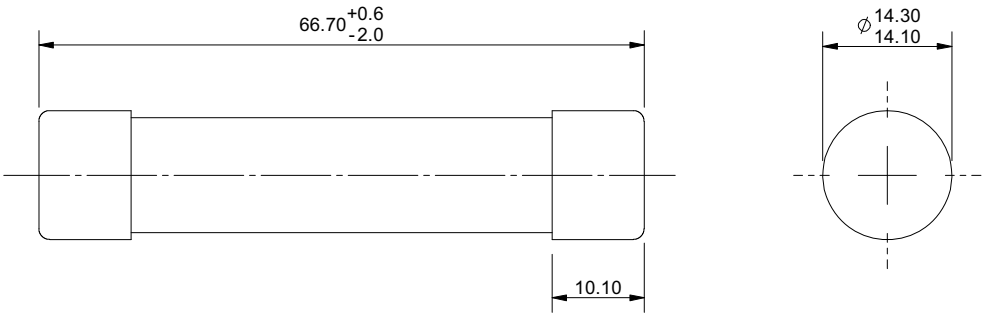
1300/1500 V DC

14 x 65 mm fuse links, 3.5 to 32 A, PV-A14L

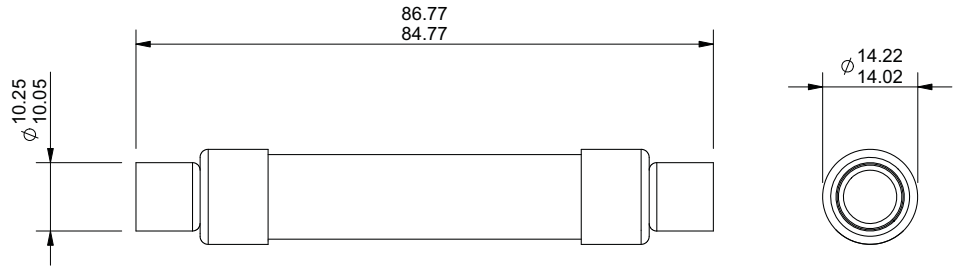
Compatible fuse holders and fuse clips

Rated voltage	Fuse type	Catalogue numbers	Compatible fuse holders	Compatible fuse clips
1500 V d.c	Cylindrical	PV-2.25A14LF		5592-01
		PV-2.5A14LF		5592-01
		PV-3A14LF		5592-01
		PV-4A14LF		5592-01
		PV-15A14LF		5592-01
		PV-20A14LF		5592-01
1300 V d.c.		PV-25A14LF		5592-01
		PV-32A14LF		5592-01
1500 V d.c.	Cylindrical with tags	PV-2.5A14L-T		
		PV-3A14L-T		
		PV-4A14L-T		
		PV-15A14L-T		
		PV-20A14L-T		
1300 V d.c.		PV-25A14L-T		
		PV-32A14L-T		
1500 V d.c	Cylindrical with 10 mm fixings	PV-2.25A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-2.5A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-3A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-3.5A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-4A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-15A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-20A14LF10F	CHPV15H85	5960-07 and 5960-09
1300 V d.c.		PV-25A14LF10F	CHPV15H85	5960-07 and 5960-09
		PV-32A14LF10F	CHPV15H85	5960-07 and 5960-09

Dimensions (mm) Cylindrical PV-*A14LF



Dimensions (mm) Cylindrical with 10 mm Fixings PV-*A14LF10F

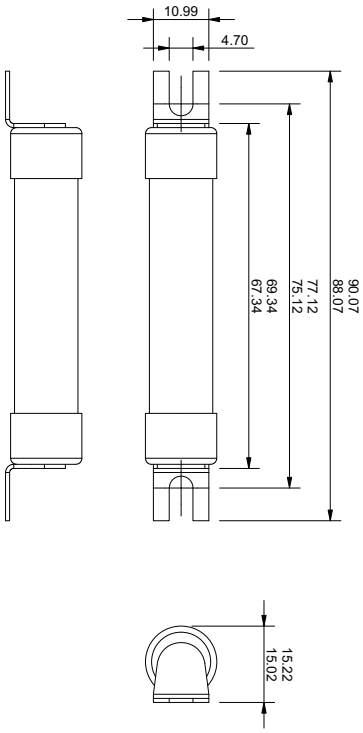


Data sheet: 720139

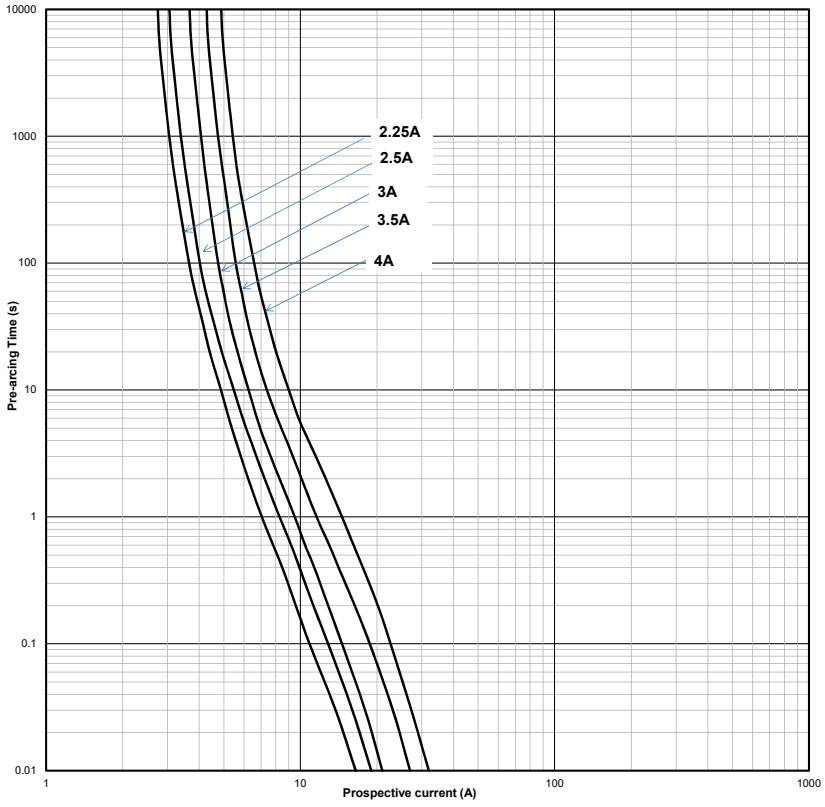
1300/1500 V DC

14 x 65 mm fuse links, 3.5 to 32 A, PV-A14L

Dimensions (mm) Cylindrical with tags PV-*A14L-T



Time-current curve 2.25 A to 4 A

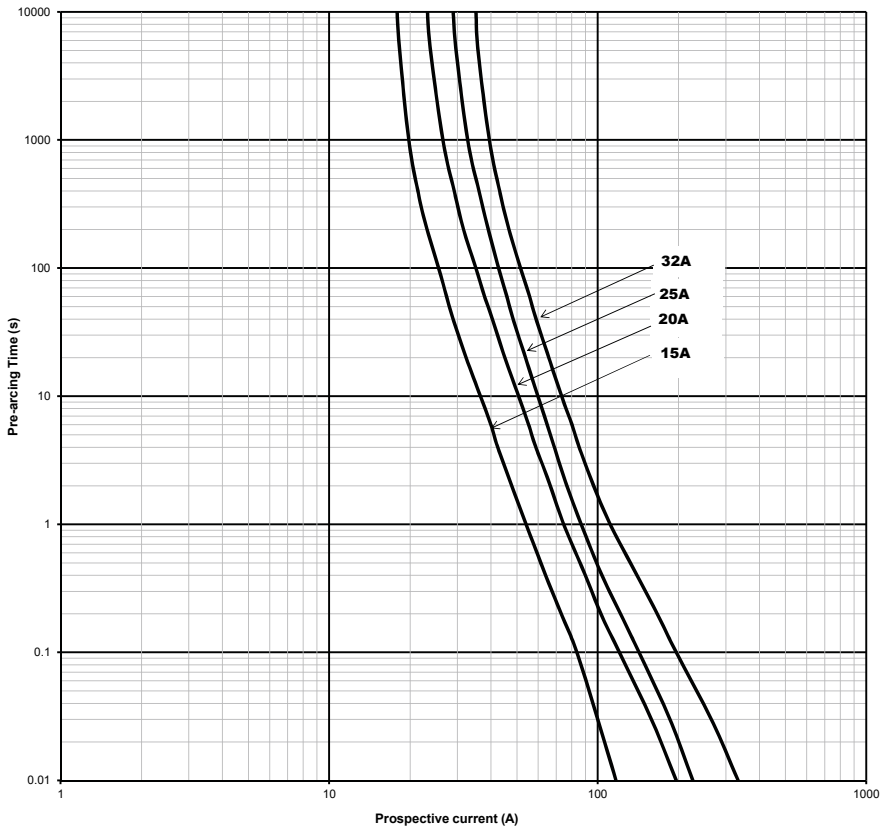


Data sheet: 720139

1300/1500 V DC

14 x 65 mm fuse links, 3.5 to 32 A, PV-A14L

Time-current curve 15 A to 32 A



Data sheet: 720139

1500 V DC

10 x 85 mm fuse links, 2.25 to 30 A, PV-A10F85L

Description

A range of fuse links in a 10 x 85 mm package specifically designed for the protection and isolation of photovoltaic strings.

Catalogue number

PV-(amp rating)A10F85L

Technical data

Fuse size: 10 x 85 mm

Rated voltage: 1500 V d.c.

Rated current: 2.25 A to 30 A

Breaking capacity: 30 kA at 1 ms

Operating class: gPV

Standards/Approvals

IEC 60269-6

UL 248-19

RoHS compliant

Packaging

MOQ: 10

Packaging 100% recyclable

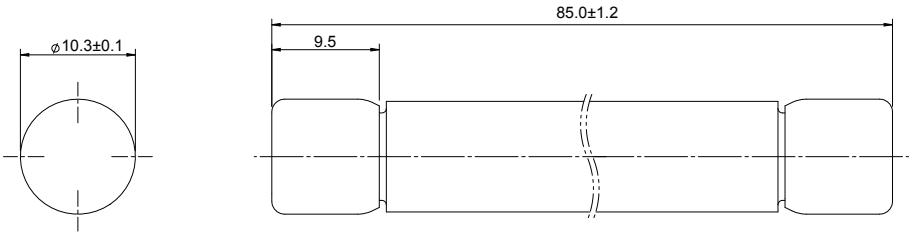
Recommended fuse holder

CHPV15H85

Technical data

		I^2t (A^2 Sec)		Watts loss (W)			
Rated voltage	Rated current (Amps)	Pre-arcing	Total at 1500 V d.c.	0.8 I_n	I_n	Catalogue numbers	Comaptible fuse holder
1500 V d.c. (IEC/UL)	2.25	3	10	1.4	2.4	PV-2-25A10F85L	CHPV15H85
	2.5	4	10	1.3	2.1	PV-2.5A10F85L	CHPV15H85
	3	7	20	1.3	2.2	PV-3A10F85L	CHPV15H85
	3.5	10	20	1.6	2.6	PV-3.5A10F85L	CHPV15H85
	4	15	30	1.7	2.8	PV-4A10F85L	CHPV15H85
	5	33	60	1.7	2.8	PV-5A10F85L	CHPV15H85
	12	19	240	2.1	3.5	PV-12A10F85L	CHPV15H85
	15	42	300	2.2	3.6	PV-15A10F85L	CHPV15H85
	16	48	350	2.1	3.5	PV-16A10F85L	CHPV15H85
	20	108	800	2.7	4.5	PV-20A10F85L	CHPV15H85
	25	190	1400	3.4	5.6	PV-25A10F85L	CHPV15H85
	30	485	3500	4	6.6	PV-30A10F85L	CHPV15H85

Dimensions (mm)

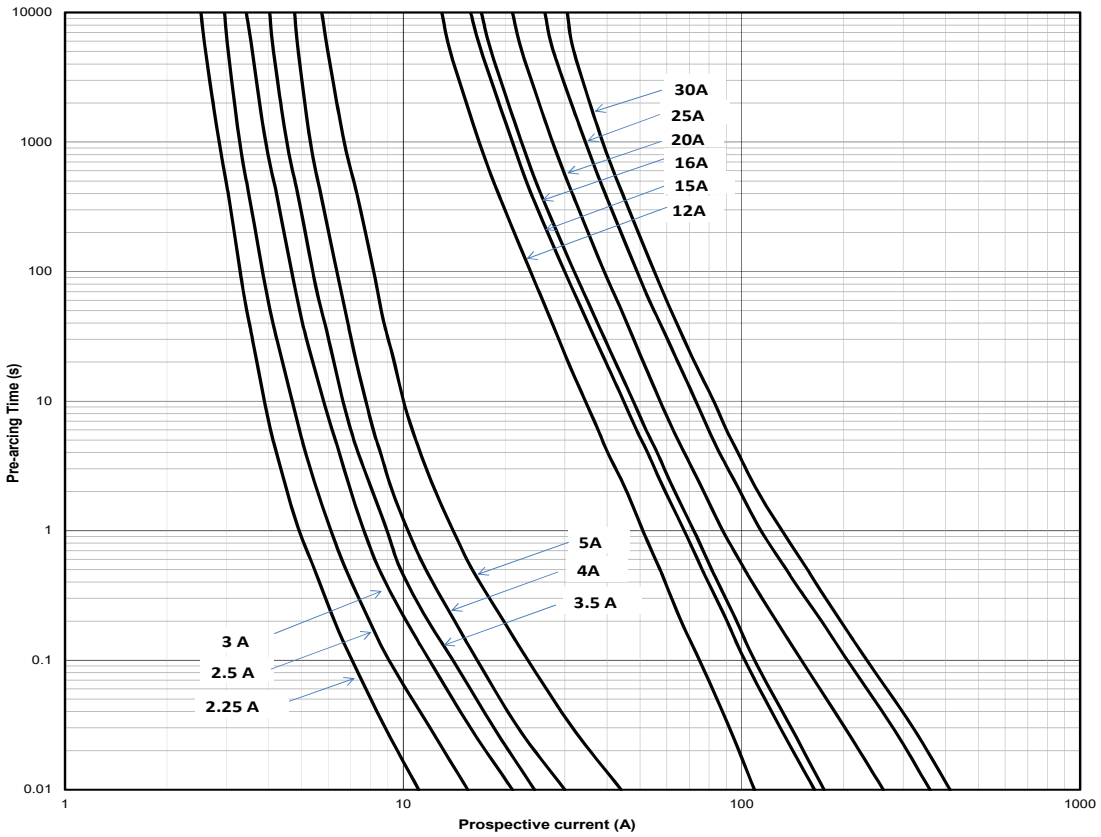


Data sheet: 10658

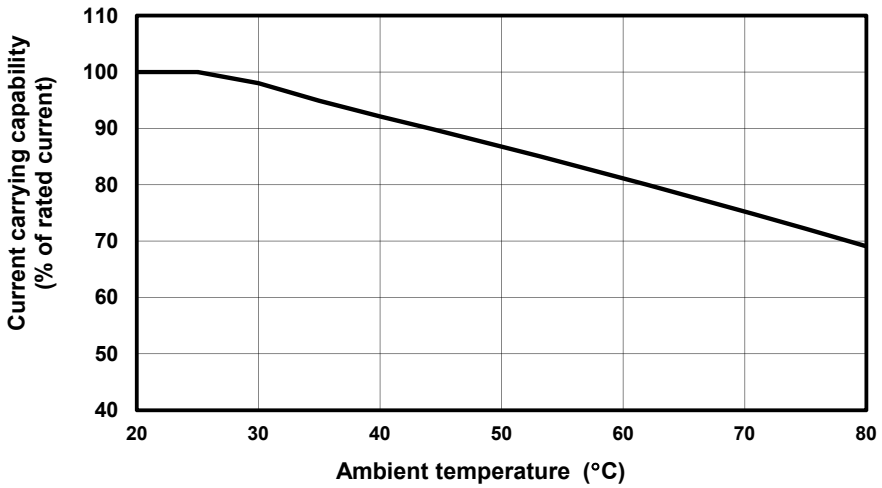
1500 V DC

10 x 85 mm fuse links, 2.25 to 30 A, PV-A10F85L

Time current curve



Temperature derating curve



Note: Temperature derating curve generated using the CHPV15H85 fuse holder

Data sheet: 10658

1500 V DC

Fuse holder, CHPV15H85, 32 A (IEC/UL)

Description

Eaton's Bussmann series 10 x 85 mm fuse holders are suitable for use with 10 x 85 mm and 14 x 85 mm cylindrical gPV fuse links. The unique design offers high degree of safety. There is no possibility of any accidental contact with live parts during replacement of the fuse links. When the fuse carrier is extracted, a spring loaded cover moves out covering the live parts hence protecting against accidental damage.

Catalogue number

CHPV15H85

Technical data

Rated voltage: 1500 V d.c.

Rated current: 32 A

Breaking capacity: 50 kA

Operating class: gPV

Standards/Approvals

IEC 60269-1

IEC 60269-6

UL 4248 Edition 1 (File number 348242)

UL 4248-19 Edition 1

Packaging

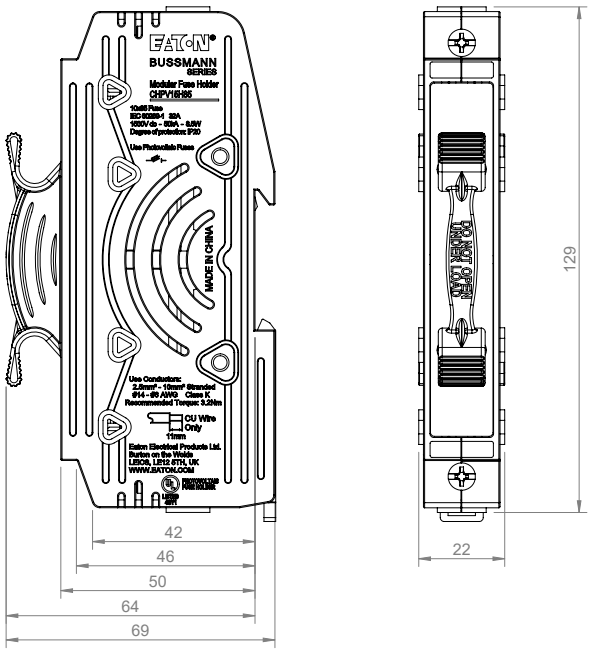
MOQ: 10

Compatible fuse links

10 x 85 mm fuse links: PV-A10F85L

14 x 85 mm fuse links: PV-A14LF

Dimensions (mm)



Data sheet: TD135010

1500 V DC

22 x 65 mm, 32 to 50 A, PV-A22F65L

Description

A range of 22 x 65mm fuse links specifically designed for protecting and isolating photovoltaic strings. These fuse links are capable of interrupting low overcurrents associated with faulted PV systems (reverse current, multi-array fault).

Catalogue number
PV-(amp rating)A22F65L

Technical data
Rated voltage: 1500 V d.c.
Rated current: 32 A to 50 A
Breaking capacity: 50 kA
Operating class: gPV and UL PV fuse links

Standards / Approvals
IEC 60269-6
UL 2579 (File number E335324)
CSA Listed
RoHS compliant

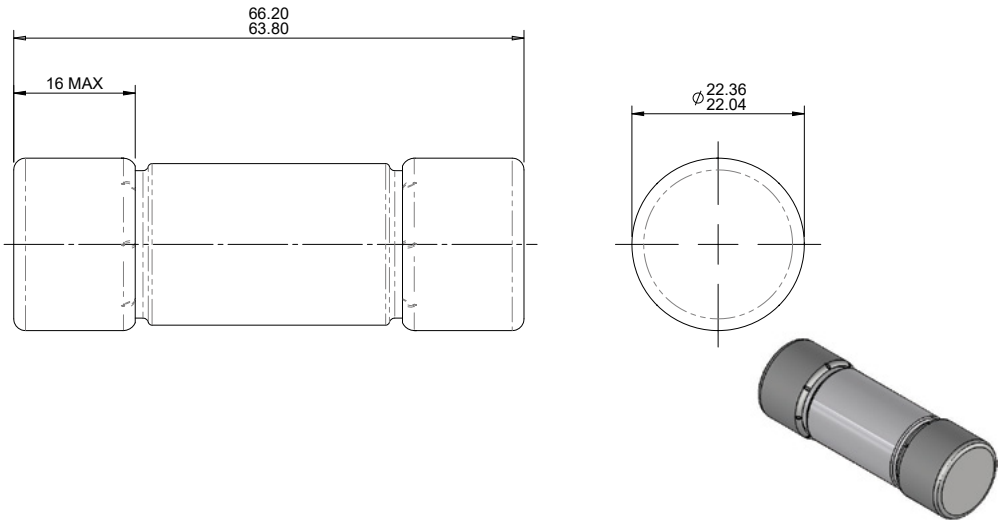
Packaging
MOQ: 10
Packaging 100% recyclable

Compatible fuse holder
CHPV22-65

Technical data

		I^2t (A^2 Sec)		Watts loss (W)		
Rated voltage	Rated current (Amps)	Pre-arcing	Total at rated voltage	0.7 I_n	I_n	Catalogue numbers
1500 V d.c. (IEC/UL)	32	1650	3990	2.7	6.7	PV-32A22F65L
	35	2900	7080	2.5	6.1	PV-35A22F65L
	40	3450	8310	3.0	7.3	PV-40A22F65L
	45	4600	11,100	3.4	8.3	PV-45A22F65L
	50	6600	16,000	3.8	9.3	PV-50A22F65L

Dimensions (mm)

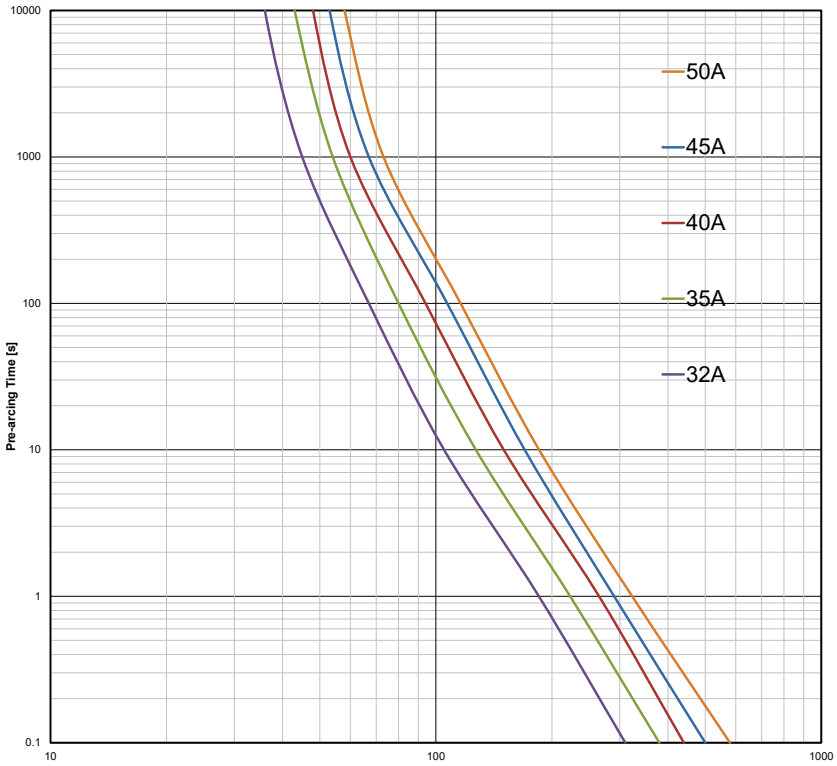


Data sheet: TD135022

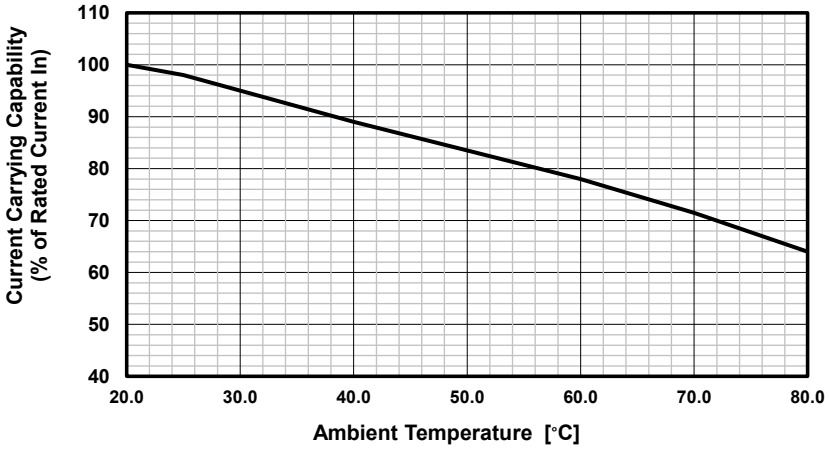
1500 V DC

22 x 65 mm, 32 to 50 A, PV-A22F65L

Time-current curve



Temperature derating curve



Data sheet: TD135022

1500 V DC

Fuse holder, CHPV22-65, 80 A (IEC)

Description
Eaton's Bussmann series 22 x 65 mm fuse holder is suitable for use with 22 x 65 mm cylindrical gPV fuse links.

The unique design offers high degree of safety.There is no possibility of any accidental contact with live parts during replacement of the fuselinks. When the fuse carrier is in the extractedposition the carrier covers the live parts hence protecting against any accidental contact.

Catalogue number

CHPV22-65

Technical data

Rated voltage: 1500 V d.c.

Rated current: 80 A

Breaking capacity: 50 kA

Standards/Approvals

IEC 60269-1

UL (Pending), please contact bulehighspeedtechnical@eaton.com

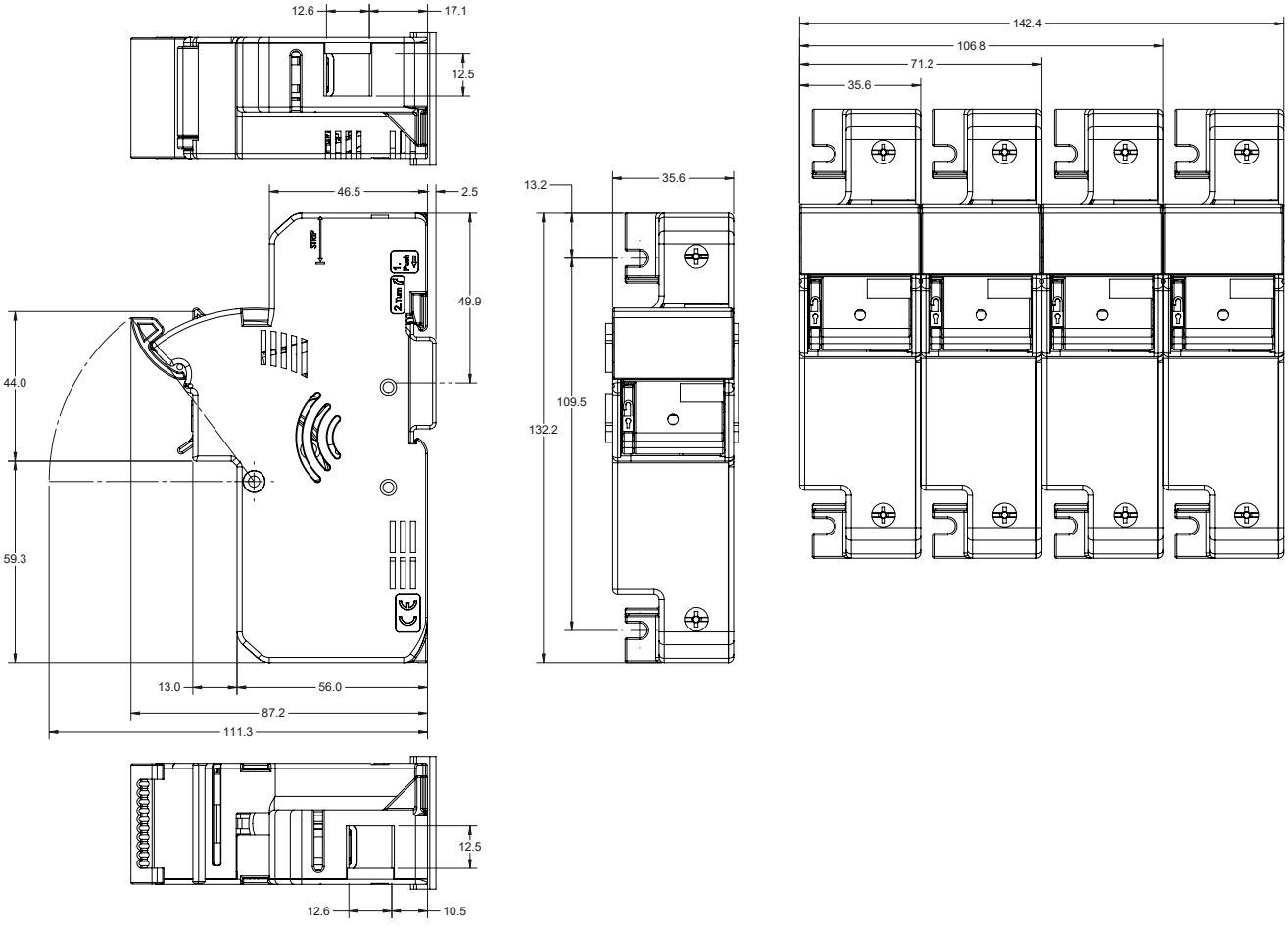
Packaging

MOQ: 6

Compatible fuse links

22 x 65 mm CHPV(amp)A22F65L

Dimensions (mm)



Data sheet: TD135024EN

1500 V DC

Modular fuse holders, CHPV14 , 50 A

Description

Compact DIN-Rail mounting fuse holders specifically designed for 14 x 51 mm photovoltaic fuse links.

Catalogue number

CHPV141U 1-pole without indicator

CHPV142 2-pole without indicator

CHPV141IU 1-pole with indicator

CHPV142IU 2-pole with indicator

Technical data

IEC		UL					
Rated voltage	Rated current	Rated voltage	Rated current	Agency markings	Terminal rating	Rated breaking withstand capactiy	Compatible Bussmann series fuse links
1500 V d.c.	1500 V d.c.	50 A (a.c. and d.c.)	50 A	IEC 60269-1 and 2 UL Listed file number E348242	Cable size: 1.5-50 mm^2 Recommended torque setting: 3.5 Nm Maximum torque setting: 3.5 Nm Mounting 35 mm DIN-Rail or 2 x M4 panel mounting screws	10 kA d.c.	PV-A14F

Standards / Approvals

IEC 60269-1 and 2

UL Listed number E348242

Packaging

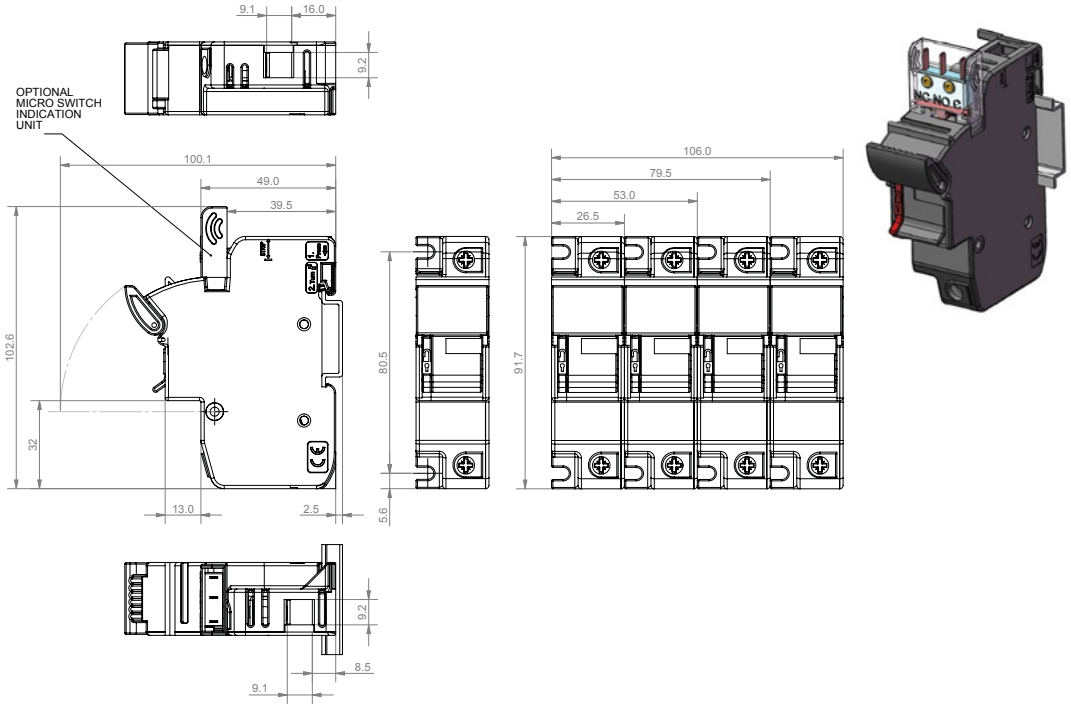
MOQ: 10

Packaging 100% recyclable

Accessories

Catalogue numbers	Description	Unit packing
JV-L	Multi-pole connector kit. One kit will gang up to 4-poles together	12
CH14-CTP	IP20 Protection accessory, provides IP20 protection to terminals with 10mm^2 or less cable	12

Dimensions - mm



Data sheet: 10080

1500 V DC

FW14-PCB, Mountable fuse clips

Description

Compatible with our 14 x 51 mm PV-(amps)A14F fuse links

Please note deratings apply to fuse links with watts loss greater than 6 Watts, contact bulehighspeedtechnical@eaton for application assistance.

Catalogue number

FW14-PCB

Technical data

Maximum rated power acceptance: 6 Watts

Material: Copper Alloy CuSn

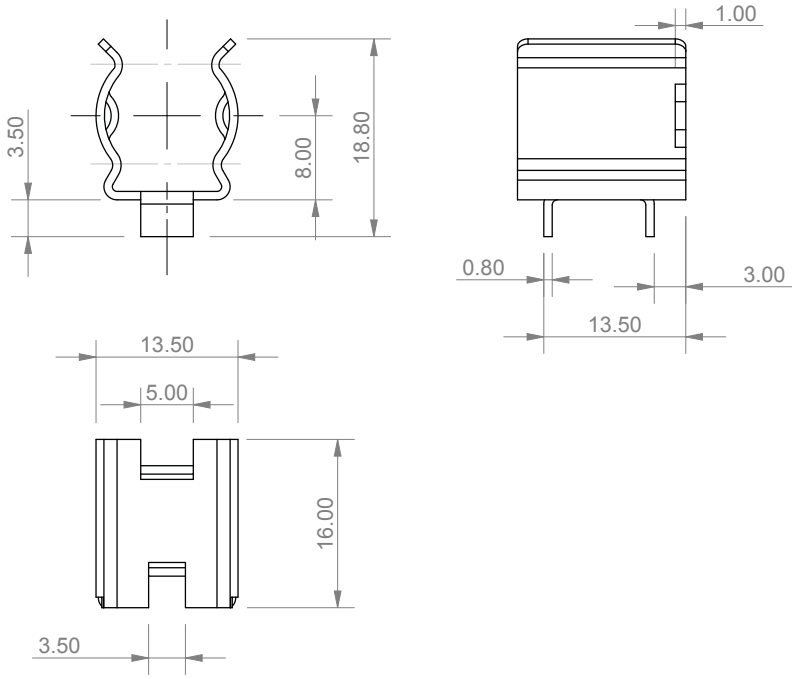
Tin plated

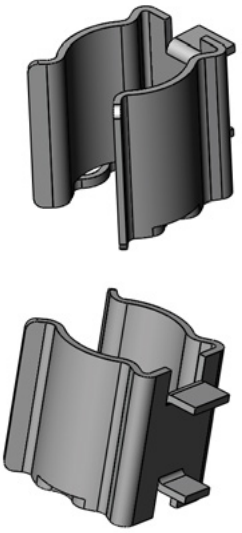
Weight: 5 grams each

Standard: IEC 60269-1

Pack quantity: 500

Dimensions - mm





Note : Appropriate creepage and clearances distances between clips should be maintained when mounting on the PCB.

Data sheet: 10818

1500 V DC

SD-D-PV, NH Bases, SD-D-PV 250 to 630 A

Description

Sizes 1 to 3 NH Fuse bases specifically designed for use with Bussmann series range of NH PV (Photovoltaic) fuse links.

Technical data

Rated voltage:

- 1500 V d.c. (IEC)
- 1000 V d.c. (UL/CSA)

Rated current:

- 250 A (SD1)
- 400 A (SD2)
- 630 A (SD3)

Fuse base sizes: 1 to 3

Withstand: 50 kA

Power acceptance

- SD1: 32 W
- SD2: 45 W
- SD3: 60 W

Standards / Agency information

IEC 60269-1

UL Listed - UL File #E348242,

CSA file #47235

Accessories:

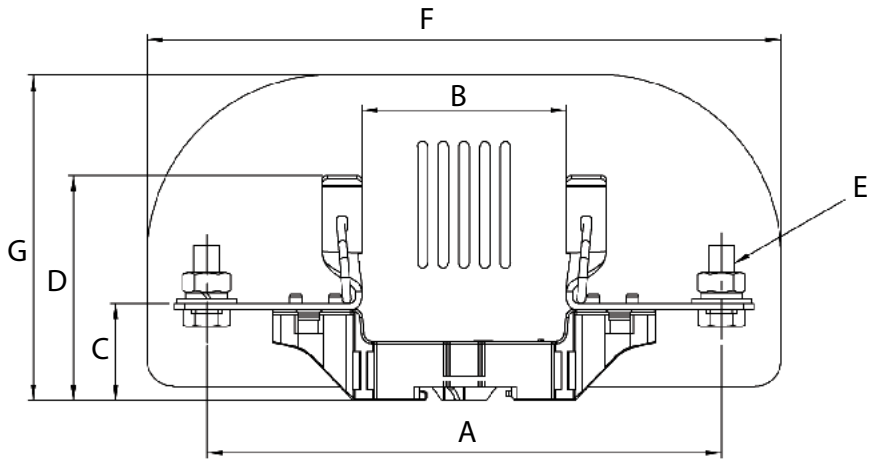
Microswitches - 170H0236, 170H0238 or BVL50

BVL50 IP20 Finger-Safe Protection Kit - TD1-IP20, TD2-IP20, TD3-IP20.

Fuse extraction handle

Shroud kits

Dimensions (mm) 1-pole with phase barriers



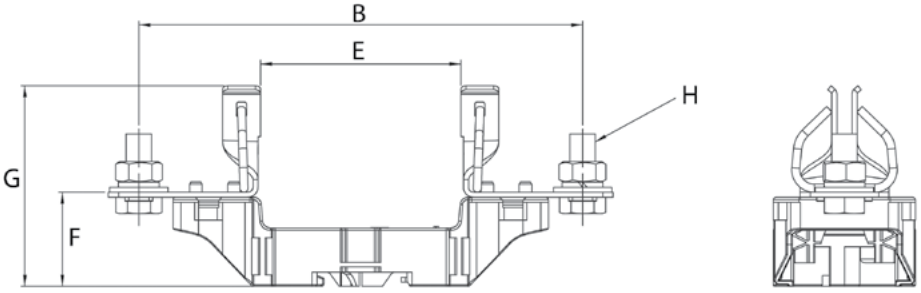
Catalogue numbers	Poles/Type	A	B	C	D	E	F	G
SD1-D-PV	1-pole	175	79	37	78	M10x25	245	125.5
SD2-D-PV	1 pole	199	79	37.5	86	M10x25	245	125.5
SD3-D-PV	1-pole	209	82	37.5	88	M12x30	260	137.5

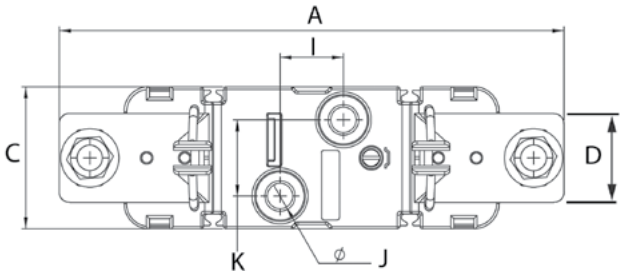
Data sheet: 720149

1500 V DC

SD-D-PV, NH Bases, SD-D-PV 250 to 630 A

Dimensions (mm) 1-pole without phase barriers





Catalogue numbers	Poles	A	B	C	D	E	F	G	H	I	J	K
SD1-D-PV	1-pole	199	175	56	35	79	37	78	M10x25	25	10	30
SD2-D-PV	1 pole	224	199	56	35	79	37.5	86	M10x25	25	10	30
SD3-D-PV	1-pole	239	209	56	36	82	37.5	88	M12x30	25	10	30

Data sheet: 720149

1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Description

A range of XL package fuse links specifically designed for protecting and isolating photovoltaic array combiners and disconnects. These fuse links are capable of interrupting low overcurrents associated with faulted PV systems (reverse current, multi-array fault).

Catalogue number

See details in Technical data table

Technical data

Rated voltage:

- 1000 V d.c. (IEC and UL 63 to 600 A)
- 1500 V d.c. (IEC and UL 50 to 400 A)

Rated current: 50 A to 600 A

Breaking capacity:

- See Technical data table

Operating class: gPV and UL PV fuse links

Fuse size

01XL, 1XL, 2XL and 3L

Standards / Approvals

IEC 60269-6,

UL 2579 (File number E335324)

RoHS compliant

Packaging

MOQ: 1

Packaging 100% recyclable

Recommended single-pole fuse bases and microswitches

See overleaf

170H0236

170H0069

SD_XL-S

Data sheets PV-XL 10201 and PVS-3L TD135020EN

1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Technical Data - 1000 V d.c. - Bladed version

Fuse link body size	Rated voltage	Rated current (Amps)	Breaking capacity (kA)	I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers		
				Pre-arcing	Total at 1000 V d.c.	0.7 I_n	I_n	Bladed version	Compatible fuse bases	Compatible microswitches
01	1000 V d.c.	63	50	260	1900	10	24	PV-63A-01XL	SD1XL-S-PV	170H0236/170H0238
		80	50	490	3600	12	29	PV-80A-01XL	SD1XL-S-PV	170H0236/170H0238
		100	50	870	6300	13	32	PV-100A-01XL	SD1XL-S-PV	170H0236/170H0238
		125	50	1930	13,900	16	40	PV-125A-01XL	SD1XL-S-PV	170H0236/170H0238
		160	50	3900	28,100	18	44	PV-160A-01XL	SD1XL-S-PV	170H0236/170H0238
2	1000 V d.c.	160	33	2780	21,000	18	44	PV-160A-2XL	SD2XL-S-PV	170H0236/170H0238
		200	33	4950	37,000	20	50	PV-200A-2XL	SD2XL-S-PV	170H0236/170H0238
		250	33	9450	70,000	24	60	PV-250A-2XL	SD2XL-S-PV	170H0236/170H0238
		315	33	16,600	123,000	26	66	PV-315A-2XL	SD2XL-S-PV	170H0236/170H0238
		355	33	26,000	192,000	27	68	PV-355A-2XL	SD2XL-S-PV	170H0236/170H0238
3	1000 V d.c.	350	50	31,000	161,200	26	65	PV-350A-3L	SD3L-S-PV	170H0236/170H0238
		400	50	44,500	231,400	33	82	PV-400A-3L	SD3L-S-PV	170H0236/170H0238
		500	50	85,000	442,000	34	85	PV-500A-3L	SD3L-S-PV	170H0236/170H0238
		600	50	137,000	712,400	43	108	PV-600A-3L	SD3L-S-PV	170H0236/170H0238

Technical Data - 1000 V d.c. - Bolted version

Fuse link body size	Rated voltage	Rated current (Amps)	Breaking capacity (kA)	I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers
				Pre-arcing	Total at 1000 V d.c.	0.7 I_n	I_n	Bolted version
01	1000 V d.c.	63	50	260	1900	10	24	PV-63A-01XL-B
		80	50	490	3600	12	29	PV-80A-01XL-B
		100	50	870	6300	13	32	PV-100A-01XL-B
		125	50	1930	13,900	16	40	PV-125A-01XL-B
		160	50	3900	28,100	18	44	PV-160A-01XL-B
2	1000 V d.c.	160	33	2780	21,000	18	44	PV-160A-2XL-B
		200	33	4950	37,000	20	50	PV-200A-2XL-B
		250	33	9450	70,000	24	60	PV-250A-2XL-B
		315	33	16,600	123,000	26	66	PV-315A-2XL-B
		355	33	26,000	192,000	27	68	PV-355A-2XL-B
		160	33	2780	21,000	18	44	PV-160A-2XL-3B[1]
		200	33	4950	37,000	20	50	PV-200A-2XL-3B[1]
		250	33	9450	70,000	24	60	PV-250A-2XL-3B[1]
		315	33	16,600	123,000	26	66	PV-315A-2XL-3B[1]
		355	33	26,000	192,000	27	68	PV-355A-2XL-3B[1]
3	1000 V d.c.	350	50	31,000	161,200	26	65	PV-350A-3L-B
		400	50	44,500	231,400	33	82	PV-400A-3L-B
		500	50	85,000	442,000	34	85	PV-500A-3L-B
		600	50	137,000	712,400	43	108	PV-600A-3L-B

[1] PV-*A-2XL-3B and PV-*A-2XL-3B-15 have revised bolting patterns, which are identical to size 3L bolting pattern. This allows utilisation of both size 2XL and size 3L fuse links without changing the dimensional layout of the inverter, combiners and disconnects.

Data sheets PV-XL 10201 and PVS-3L TD135020EN

1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Technical Data - 1500 V d.c. - Bladed version

Fuse link body size	Rated voltage	Rated current (Amps)	Breaking capacity (IEC/UL) (kA)	I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers	
				Pre-arcing	Total at 1500 V d.c.	0.7 I_n	I_n	Bladed with top indicator	Bladed without top indicator
01	1500 V d.c.	50	30	175	1000	10	25	PV-50A-01XL-15	
		63	30	362	2250	10	26	PV-63A-01XL-15	
		80	30	565	3300	14	35	PV-80A-01XL-15	
		100	30	1100	6600	16	40	PV-100A-01XL-15	
		125	30	2200	10,500	18	44	PV-125A-01XL-15	
1	1500 V d.c.	100	30	1250	6000	24	43	PV-100A-1XL-15	
		125	30	1950	9360	25	52	PV-125A-1XL-15	
		160	30	4200	20,160	26	54	PV-160A-1XL-15	
		200	30	9400	45,120	31	60	PV-200A-1XL-15	
2	1500 V d.c.	125	30	2200	15,000	18	44	PV-125A-2XL-15	PV-125A-2XL-U-15
		160	30	5000	32,000	19	48	PV-160A-2XL-15	PV-160A-2XL-U-15
		200	30	8800	51,000	23	57	PV-200A-2XL-15	PV-200A-2XL-U-15
		250	30	16,600	85,000	28	70	PV-250A-2XL-15	PV-250A-2XL-U-15
3	1500 V d.c.	250	100	90,000	350,000	24	43	PVS250A-3L-15	PVS250A-3L-U-15
		315	100	175,000	460,000	22	55	PVS315A-3L-15	PVS315A-3L-U-15
		350	100	250,000	970,000	23	57	PVS350A-3L-15	PVS350A-3L-U-15
		355	100	250,000	970,000	23	59	PVS355A-3L-15	PVS355A-3L-U-15
		400	100	315,000	1,100,000	27	71	PVS400A-3L-15	PVS400A-3L-U-15
		450	100[2]	412,000	1,470,000	27	67	PV-450A-3L-15	PV-450A-3L-U-15
		500	100[2]	532,000	1,890,000	29	73	PV-500A-3L-15	PV-500A-3L-U-15

Compatible fuse bases and microswitches - 1500 V d.c.- Bladed

Fuse type	Fuse link body size	Rated voltage	Compatible XL Bases	Compatible microswitches
Bladed with top indicator	01	1500 V d.c.	SD1XL-S-PV	170H0236/170H0238
	1	1500 V d.c.	SD1XL-S-PV	170H0236/170H0238
	2	1500 V d.c.	SD2XL-S-PV	170H0236/170H0238
	3	1500 V d.c.	SD3L-S-PV	170H0236/170H0238
Bladed without top indicator	2	1500 V d.c.	SD2XL-S-PV	
	3	1500 V d.c.	SD3L-S-PV	

Data sheets PV-XL 10201 and PVS-3L TD135020EN

1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Technical Data - 1500 V d.c. - Bolted version

Fuse link body size	Rated voltage	Rated current (Amps)	Breaking capacity (IEC/UL) (kA)	I^2t (A^2 Sec)		Watts loss (W)		Catalogue numbers	
				Pre-arcing	Total at 1500 V d.c.	0.7 I_n	I_n	Bolted version with side indicator	Bolted without side indicator
01	1500 V d.c.	50	30	175	1000	10	25	PV-50A-01XL-B-15	
		63	30	362	2250	10	26	PV-63A-01XL-B-15	
		80	30	565	3300	14	35	PV-80A-01XL-B-15	
		100	30	1100	6600	16	40	PV-100A-01XL-B-15	
		125	30	2200	10,500	18	44	PV-125A-01XL-B-15	
1	1500 V d.c.	100	30	1250	6000	24	43	PV-100A-1XL-B-15	
		125	30	1950	9360	25	52	PV-125A-1XL-B-15	
		160	30	4200	20,160	26	54	PV-160A-1XL-B-15	
		200	30	9400	45,120	31	60	PV-200A-1XL-B-15	
2	1500 V d.c.	125	30	2200	15,000	18	44	PV-125A-2XL-B-15	PV-125A-2XL-BU-15
		160	30	5000	32,000	19	48	PV-160A-2XL-B-15	PV-160A-2XL-BU-15
		200	30	8800	51,000	23	57	PV-200A-2XL-B-15	PV-200A-2XL-BU-15
		250	30	16,600	85,000	28	70	PV-250A-2XL-B-15	PV-250A-2XL-BU-15
		125	30	2200	15,000	18	44	PV-125A-2XL-3B-15[1]	PV-125A-2XL-3BU-15[1]
		160	30	5000	32,000	19	48	PV-160A-2XL-3B-15[1]	PV-160A-2XL-3BU-15[1]
		200	30	8800	51,000	23	57	PV-200A-2XL-3B-15[1]	PV-200A-2XL-3BU-15[1]
		250	30	16,600	85,000	28	70	PV-250A-2XL-3B-15[1]	PV-250A-2XL-3BU-15[1]
3	1500 V d.c.	250	100	90,000	350,000	16	42	PVS250A-3L-B-15	PVS250A-3L-BU-15
		315	100	175,000	460,000	21	52	PVS315A-3L-B-15	PVS315A-3L-BU-15
		350	100	250,000	970,000	21	54	PVS350A-3L-B-15	PVS350A-3L-BU-15
		355	100	250,000	970,000	22	57	PVS355A-3L-B-15	PVS355A-3L-BU-15
		400	100	315,000	1,100,000	25	66	PVS400A-3L-B-15	PVS400A-3L-BU-15
		450	100[2]	412,000	1,470,000	27	67	PV-450A-3L-B-15	PV-450A-3L-BU-15
		500	100[2]	532,000	1,890,000	29	73	PV-500A-3L-B-15	PV-500A-3L-BU-15

[1] PV-*A-2XL-3B and PV-*A-2XL-3B-15 have revised bolting patterns, which are identical to size 3L bolting pattern. This allows utilisation of both size 2XL and size 3L fuse links without changing the dimensional layout of the inverter, combiners and disconnects.

[2] 100 kA at time constant 6 mS.

Compatible fuse bases and microswitches - 1500 V d.c.- Bolted

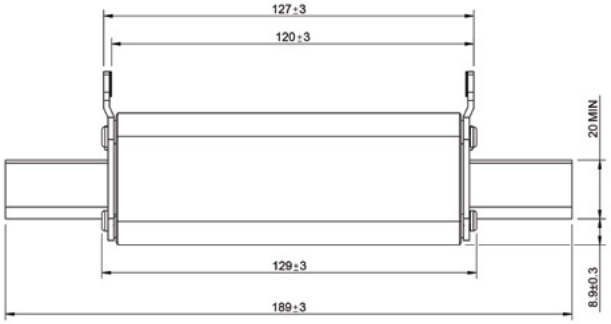
Fuse type	Fuse link body size	Rated voltage	Rated current (Amps)	Catalog numbers	Compatible microswitches
Bolted version with side indicator	01	1500 V d.c.	50	PV-50A-01XL-B-15	170H0069
	1	1500 V d.c.	100	PV-100A-1XL-B-15	170H0069
	2	1500 V d.c.	125	PV-125A-2XL-B-15	170H0069
	3	1500 V d.c.	250	PV-125A-2XL-3B-15	170H0069

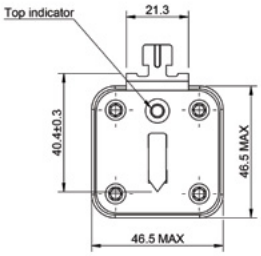
Data sheets PV-XL 10201 and PVS-3L TD135020EN

1500 V DC

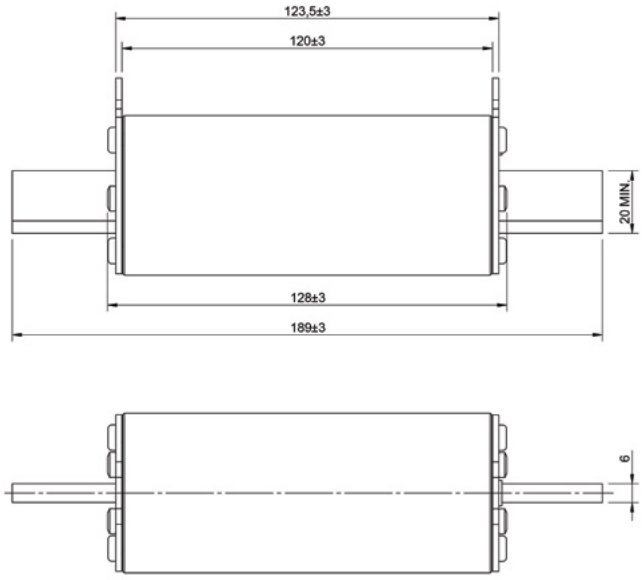
XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

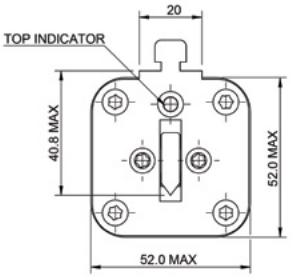
Dimensions (mm)- size 01 Bladed

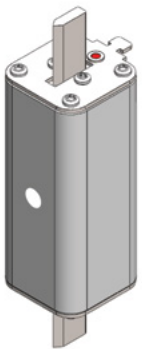




Dimensions (mm) - size 1 Bladed





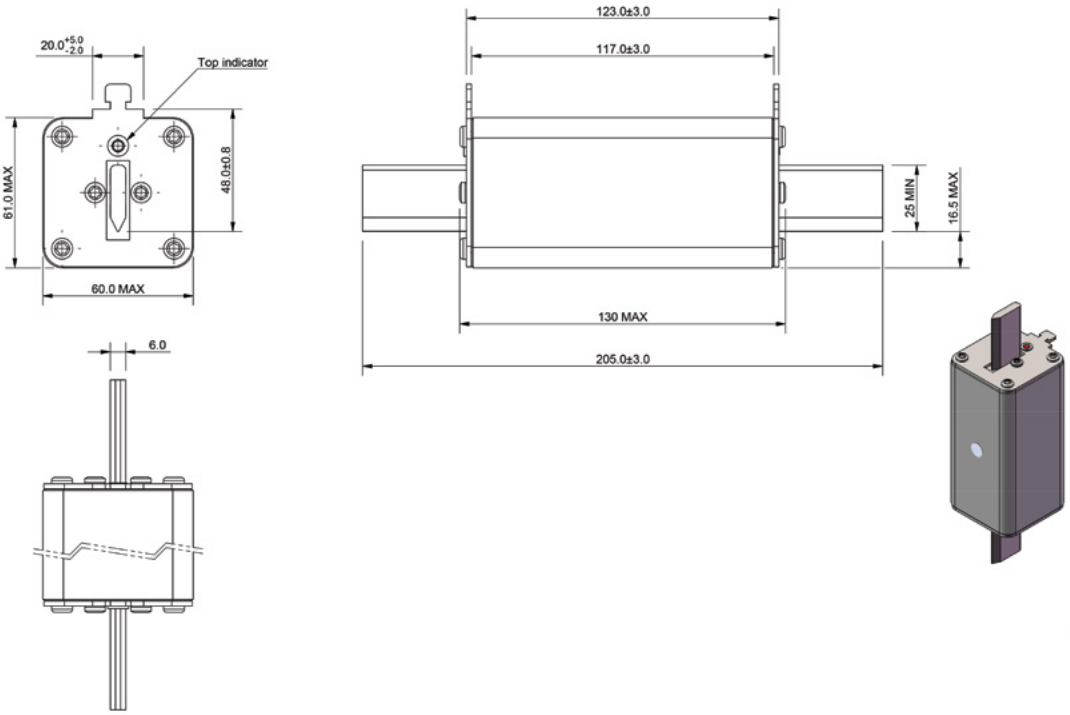


Data sheets PV-XL 10201 and PVS-3L TD135020EN

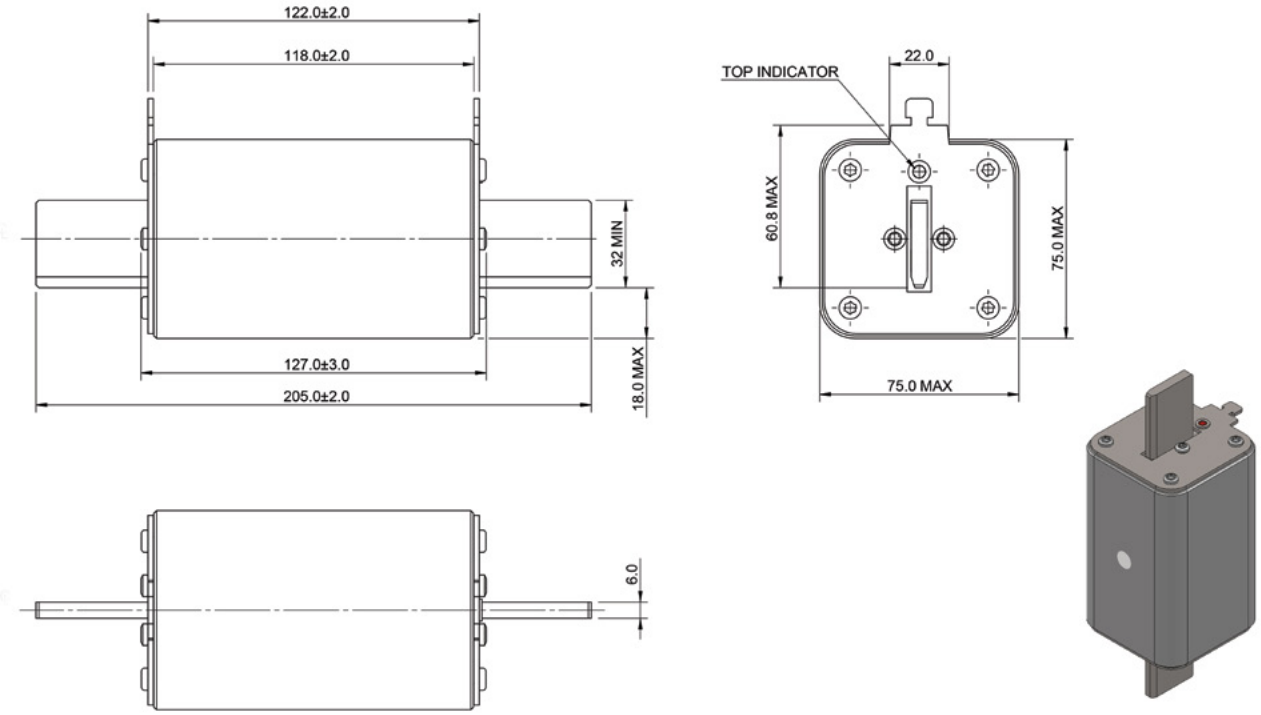
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Dimensions (mm) - size 2 Bladed



Dimensions (mm) - size 3 Bladed

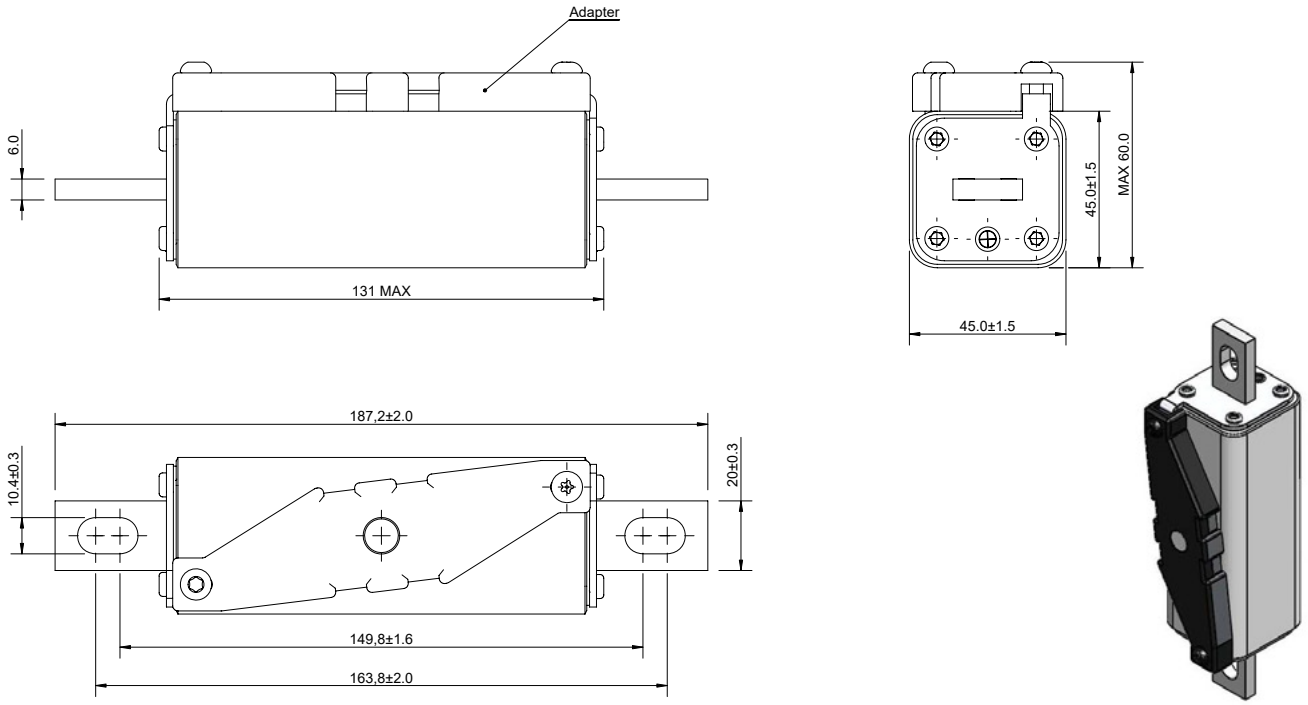


Data sheets PV-XL 10201 and PVS-3L TD135020EN

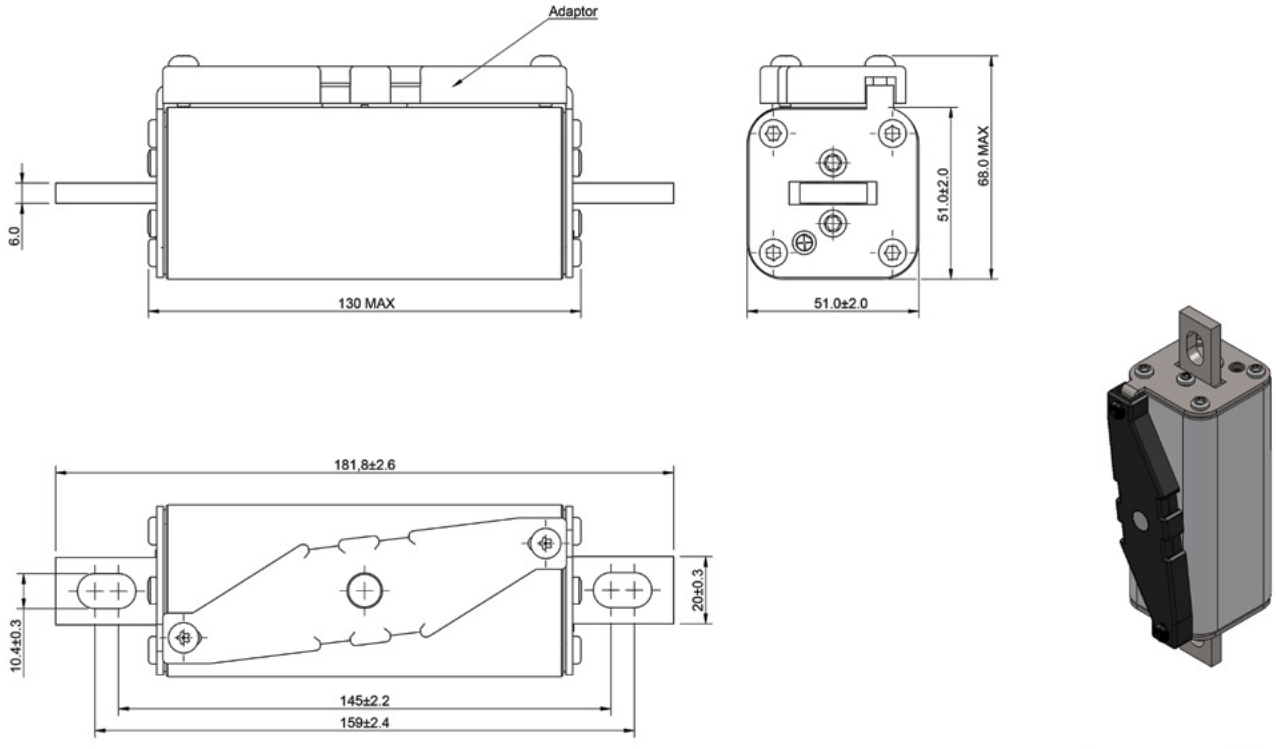
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Dimensions (mm) - size 01 Bolted



Dimensions (mm) - size 1 Bolted

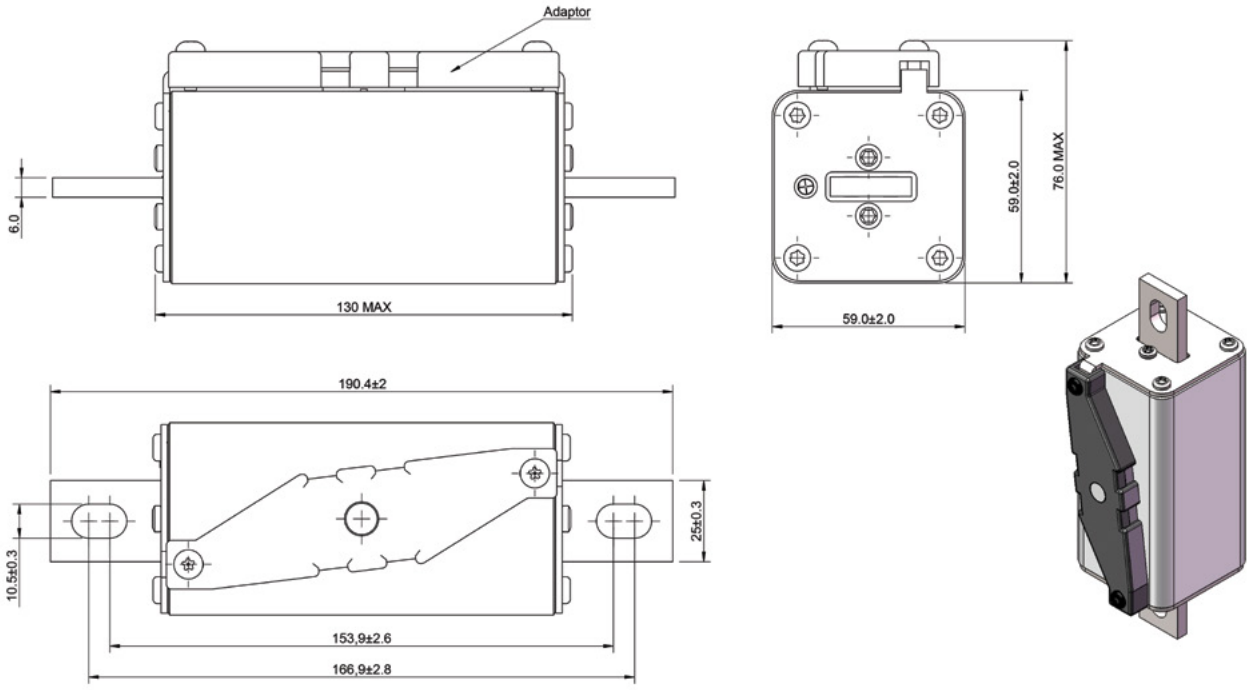


[Data sheets PV-XL 10201 and PVS-3L TD135020EN](#)

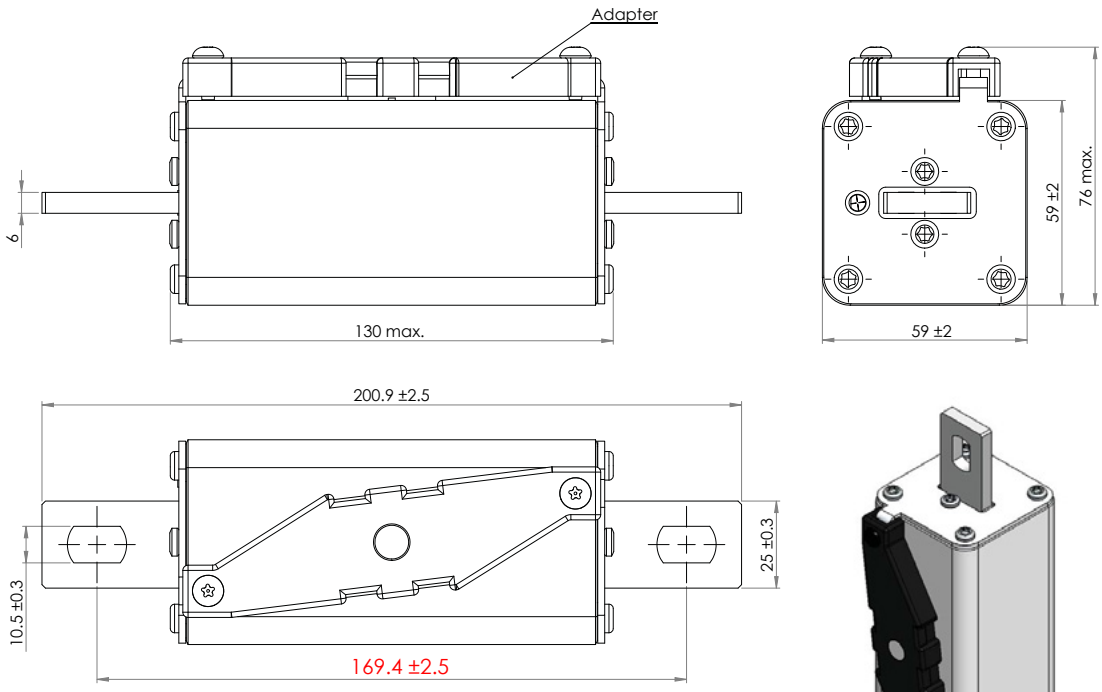
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Dimensions (mm) - size 2 Bolted



Dimensions (mm) - size 2XL-3B Bolted



PV-*A-2XL-3B and PV-*A-2XL-3B-15 have revised bolting patterns, which are identical to size 3L bolting pattern. This allows utilisation of both size 2XL and size 3L fuse links without changing the dimensional layout of the inverter, combiners and disconnects.

Mounting dimensions comparison

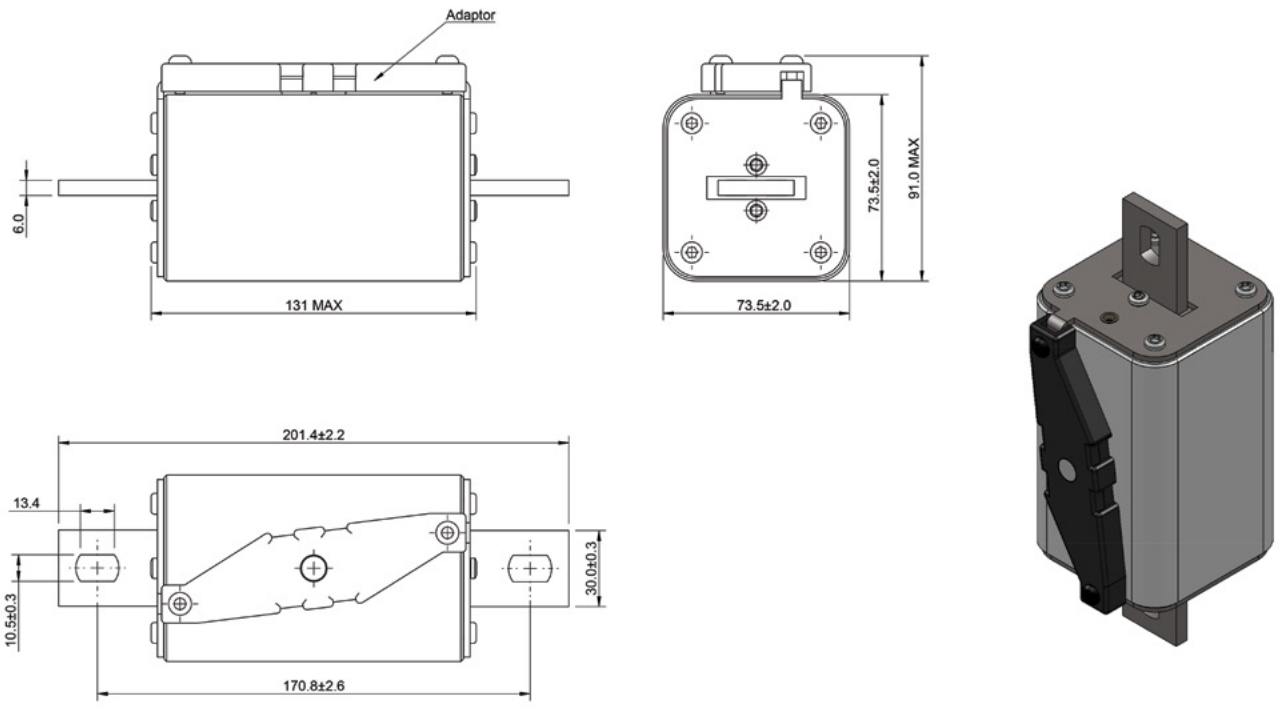
2XL-3B	3L
169.4	170.8

Data sheets PV-XL 10201 and PVS-3L TD135020EN

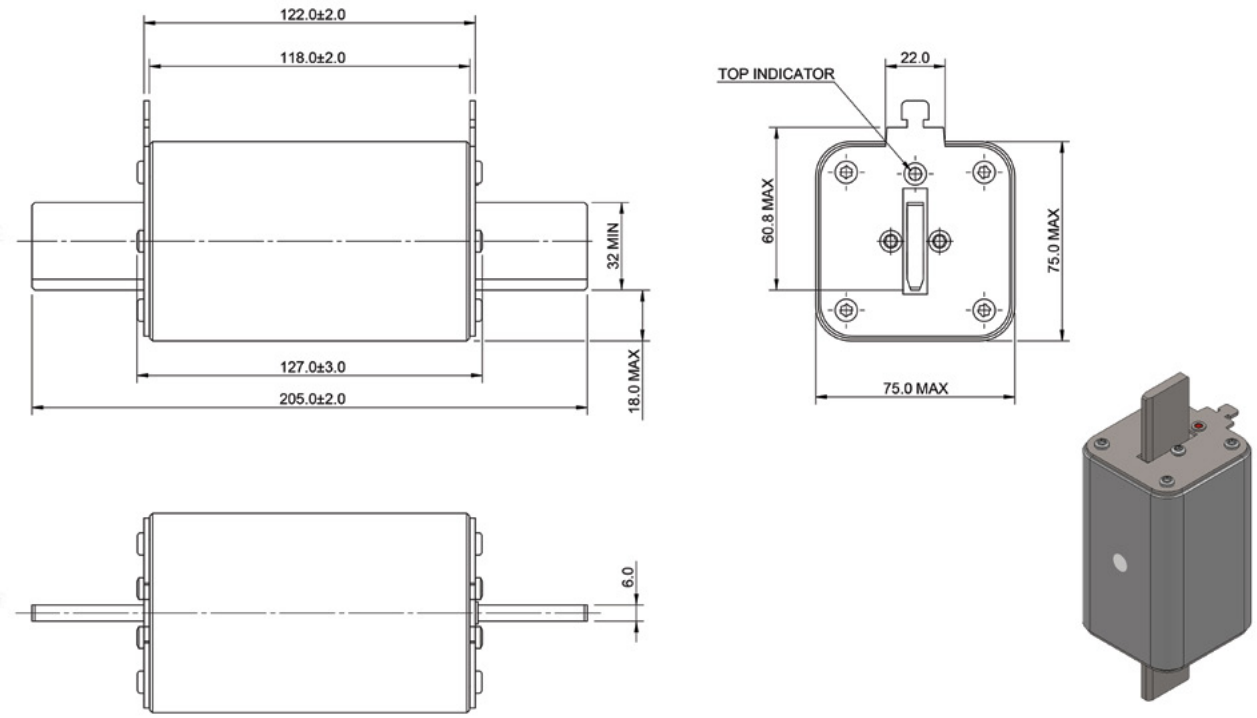
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Dimensions (mm) - size 3 Bolted



Dimensions (mm) - Size 3L Bladed with and without top indicator

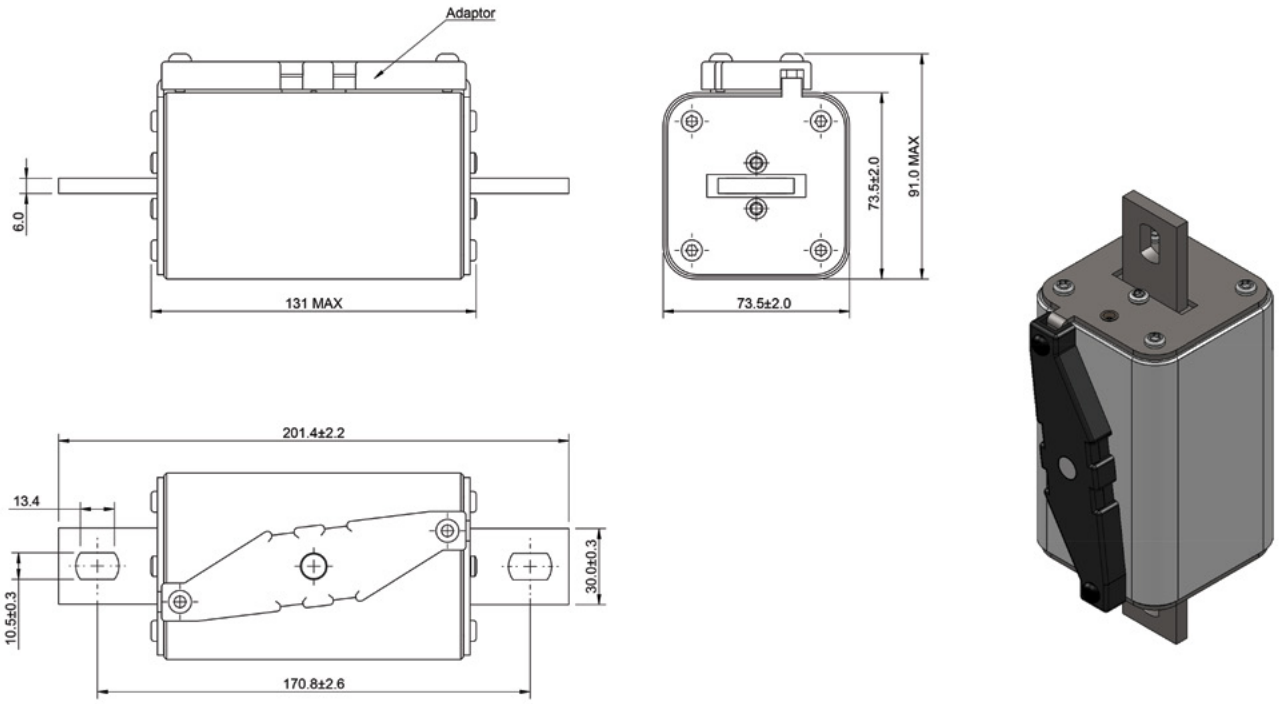


[Data sheets PV-XL 10201 and PVS-3L TD135020EN]

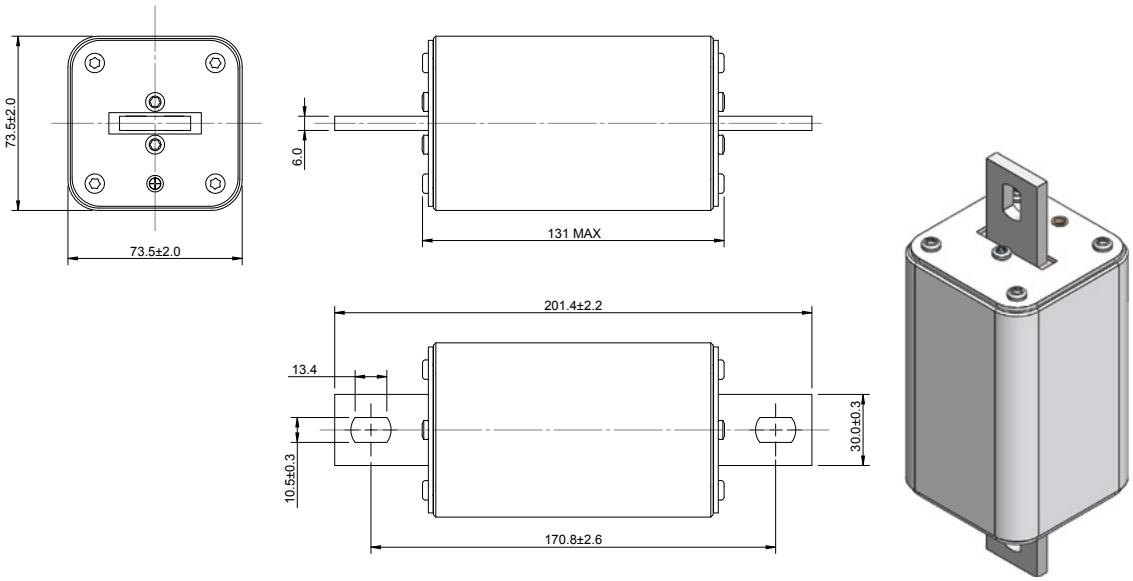
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Dimensions (mm) - Size 3L Bolted with side indicator



Dimensions (mm) - Size 3L Bolted without side indicator

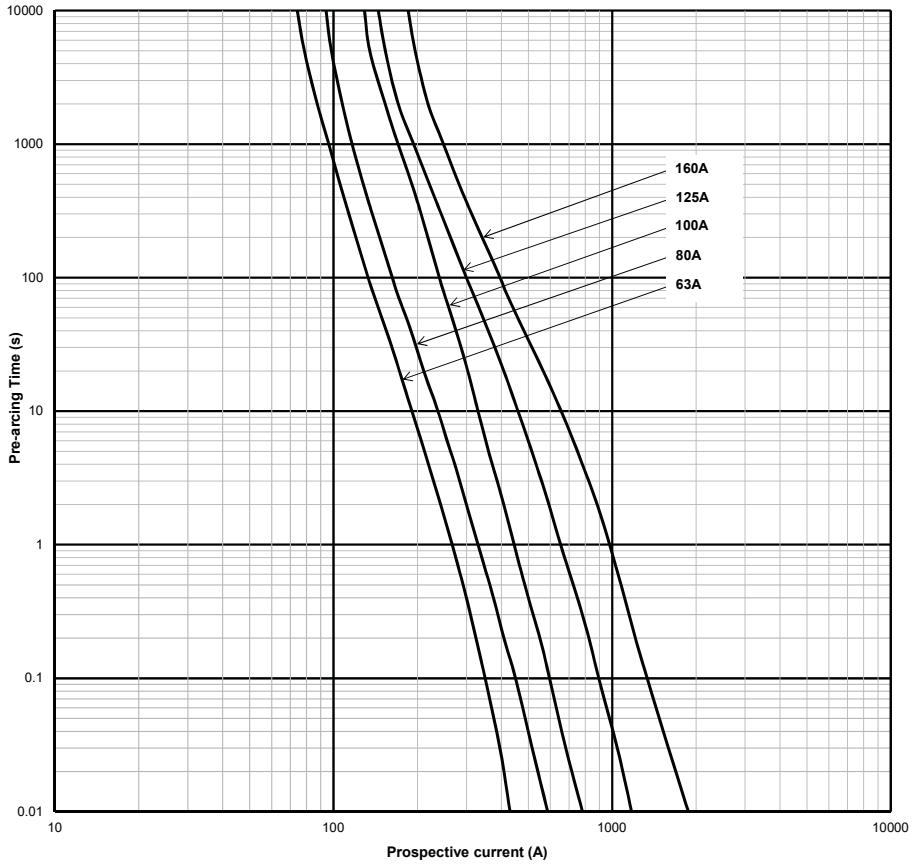


Data sheets PV-XL 10201 and PVS-3L TD135020EN

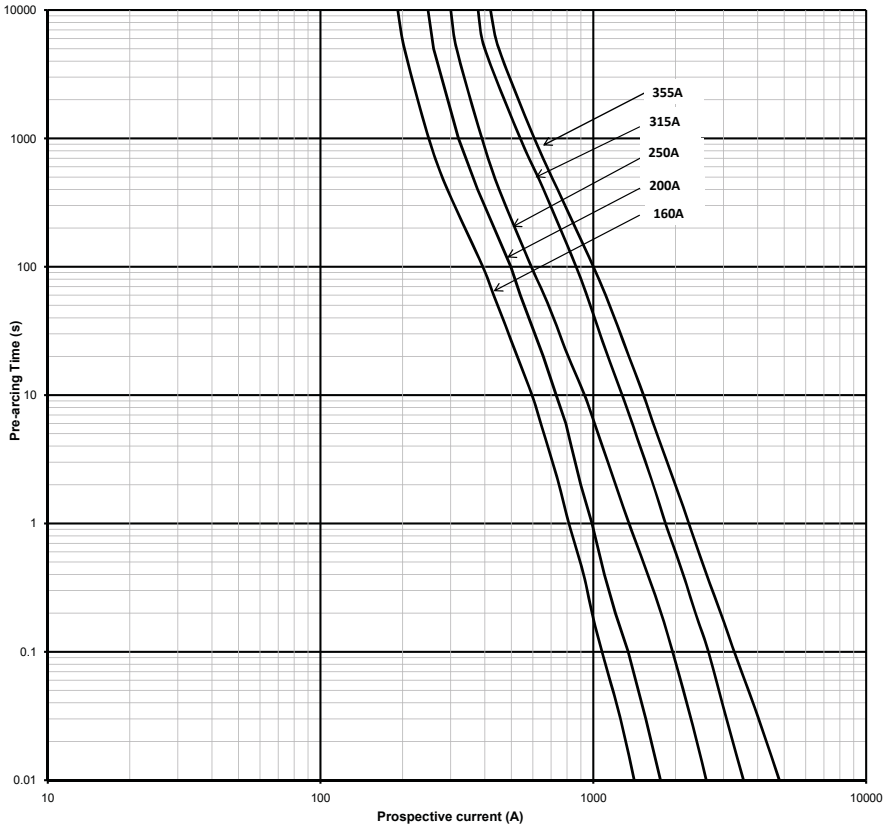
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Time-current curve - 1000 V d.c. - 01XL - Bladed and bolted - 63 A to 160 A



Time-current curve - 1000 V d.c. - 2XL - Bladed and bolted - 160 A to 355 A

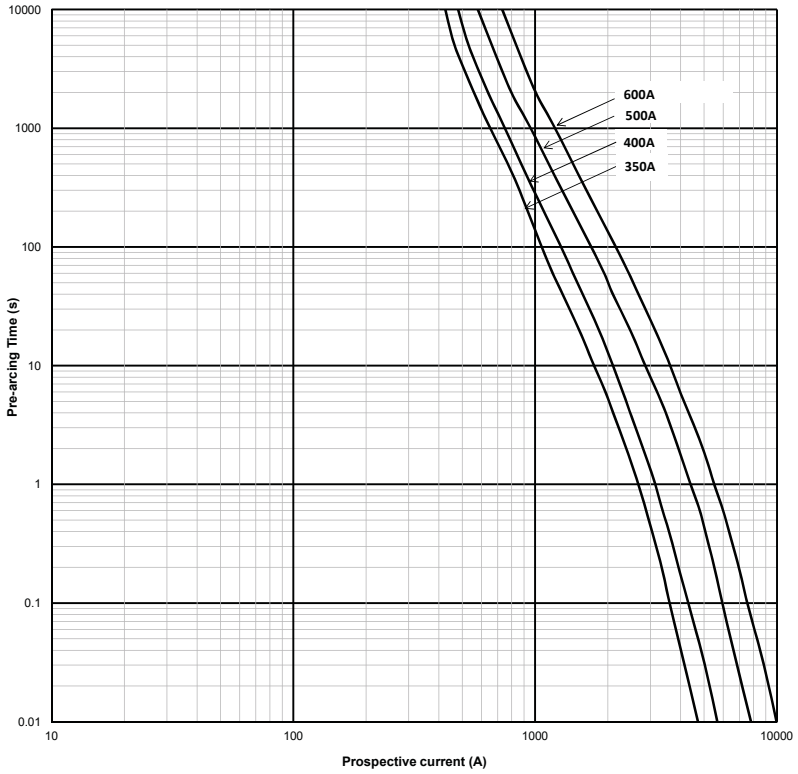


Data sheets PV-XL 10201 and PVS-3L TD135020EN

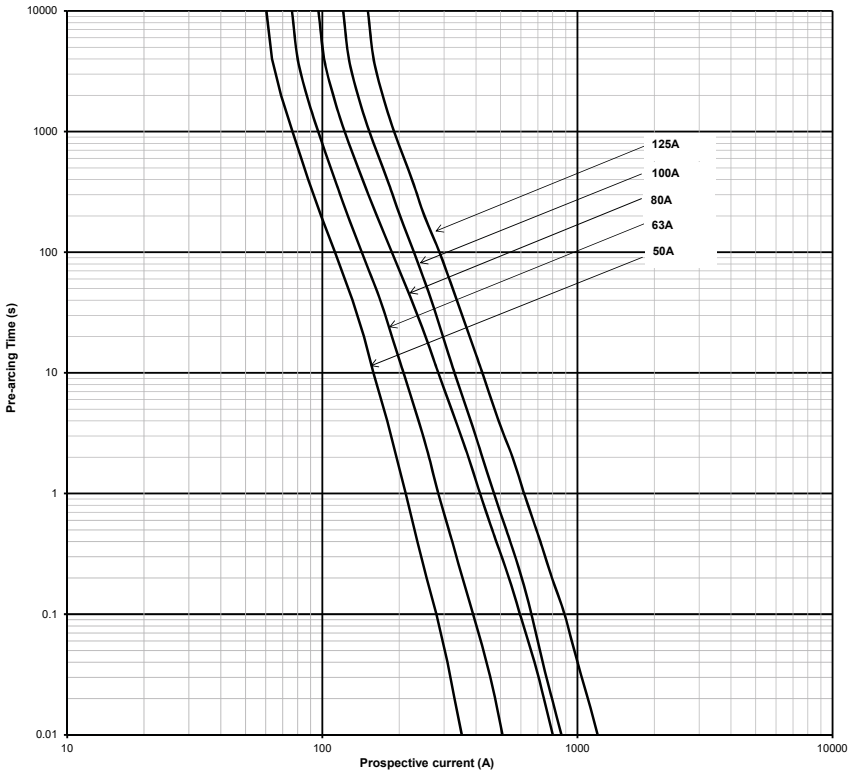
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Time-current curve - 1000 V d.c. - 3L - Bladed and bolted - 350 A to 600 A



Time-current curve - 1500 V d.c. - 01XL - Bladed and bolted - 50 A to 125 A

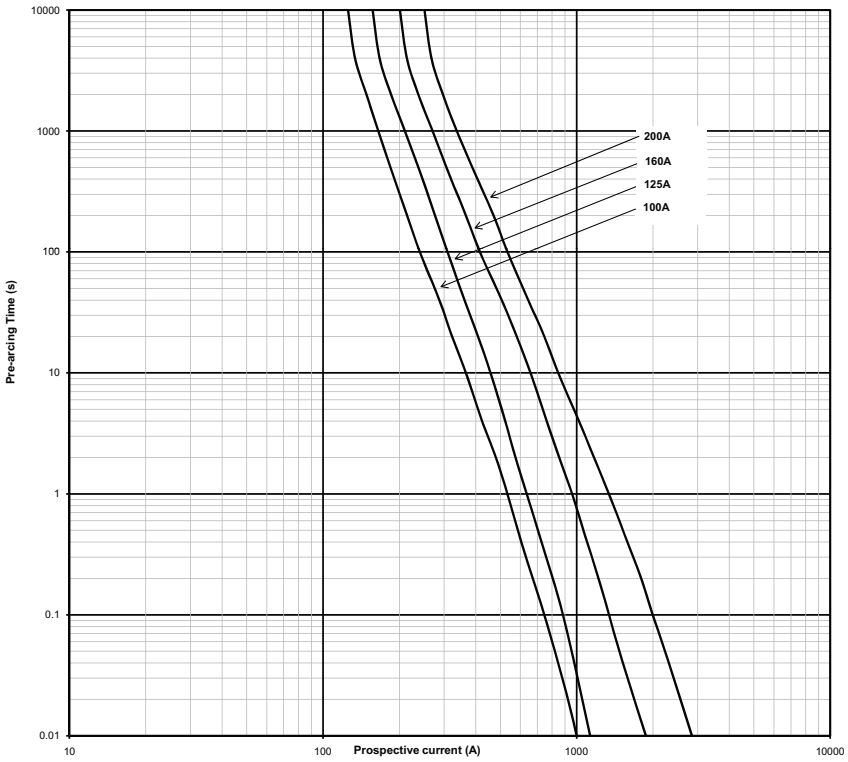


Data sheets PV-XL 10201 and PVS-3L TD135020EN

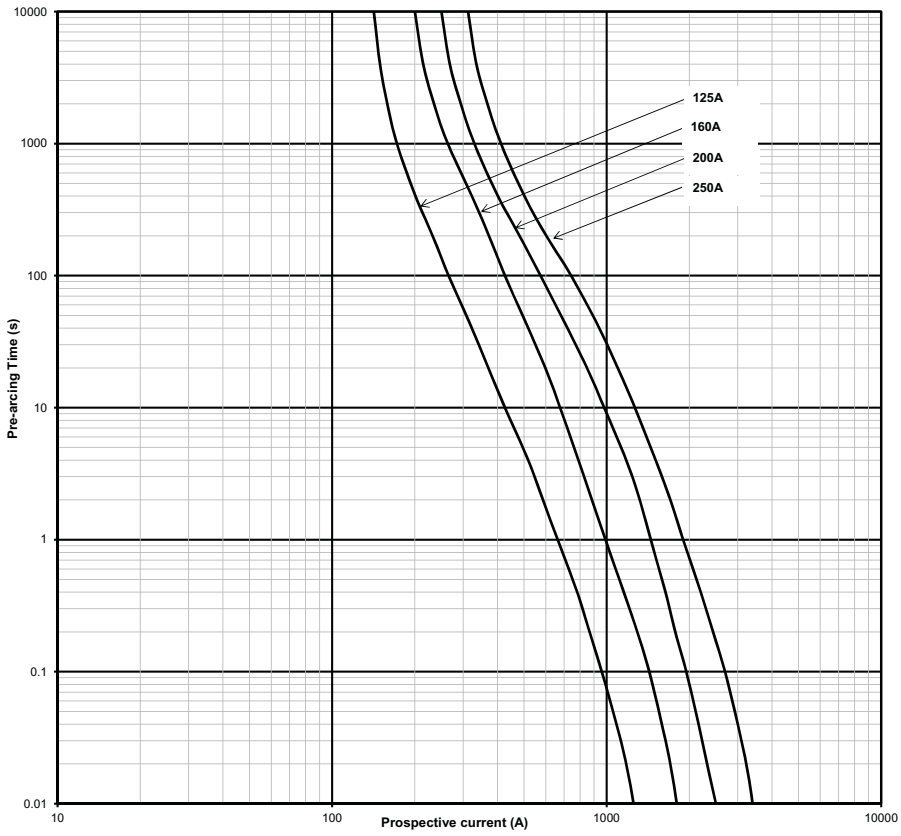
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Time-current curve - 1500 V d.c. - 1XL - Bladed and bolted - 100 A to 200 A



Time-current curve - 1500 V d.c.- 2XL - Bladed and bolted - 125 A to 250 A

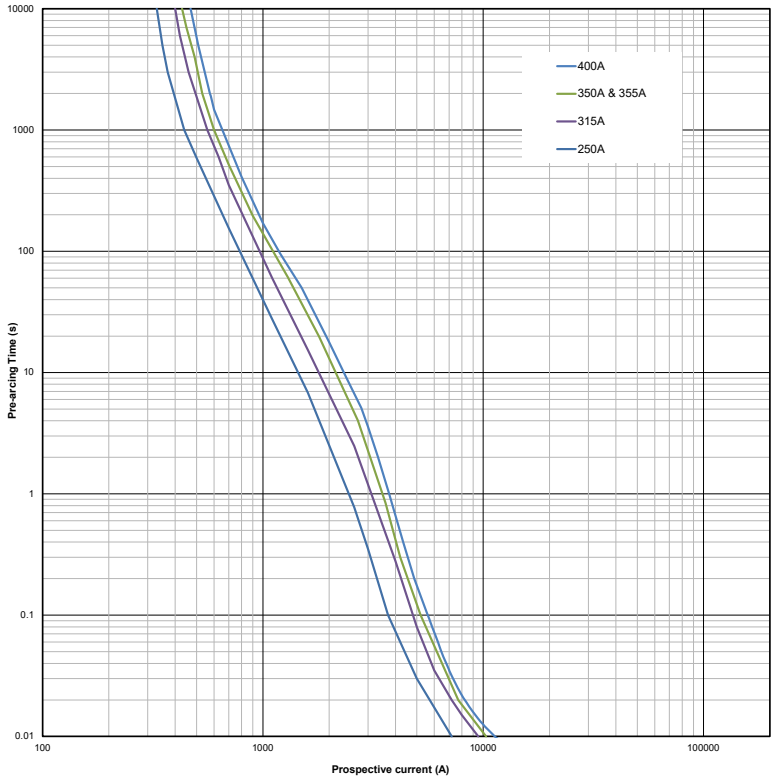


Data sheets PV-XL 10201 and PVS-3L TD135020EN

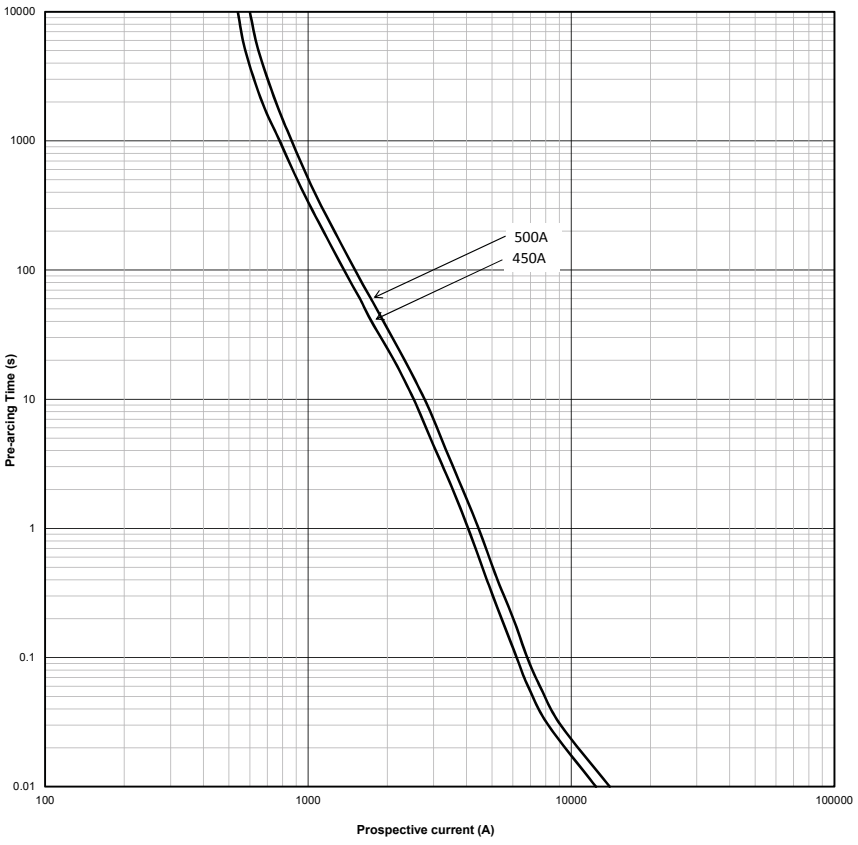
1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Time-current curve - PVS-3L 1500 V d.c., 250 A to 400 A



Time-current curve - Size 3L, bladed and bolted, 1500 V d.c., 450 A and 500 A

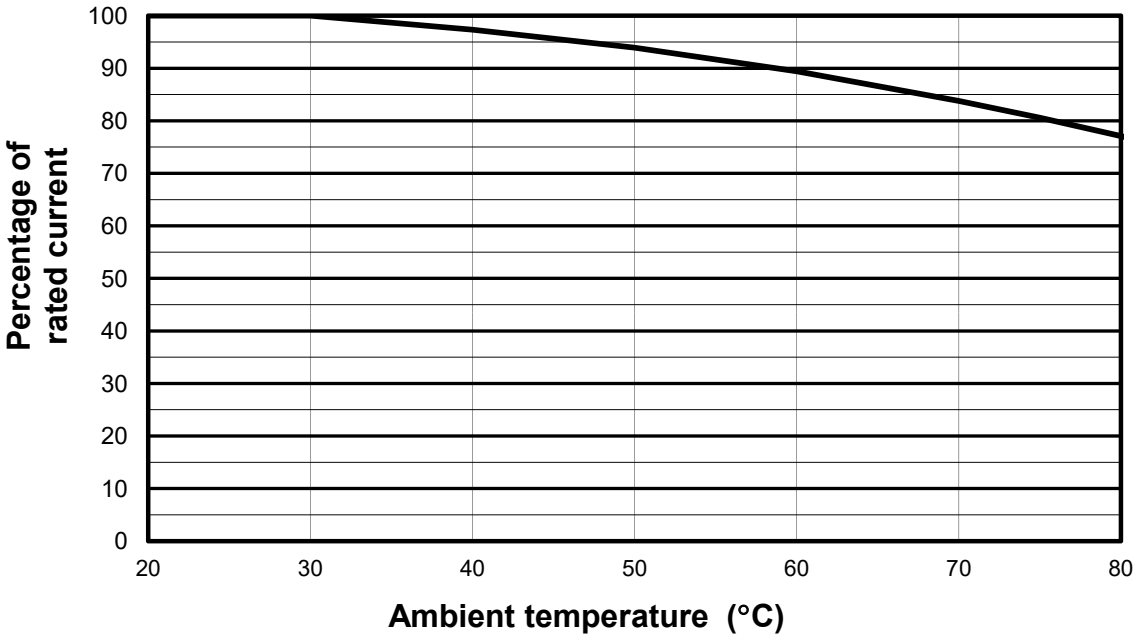


Data sheets PV-XL 10201 and PVS-3L TD135020EN

1500 V DC

XL and 3L Style fuse links, PV-XL and PVS-3L, 50 to 600 A

Temperature derating curve



Data sheets PV-XL 10201 and PVS-3L TD135020EN

1500 V DC

SD-S-PV, XL bases for XL and 3L style fuse links, 200 to 500 A

Description

Sizes 1 to 3 XL Fuse bases specifically designed for use with the Bussmann series range of XL PV (Photovoltaic) fuse links.

Technical data

Rated voltage: 1500 V d.c. (IEC)

Rated current: 200, 400 and 500 A

Fuse base size: 1 to 3

Standards / Agency information

IEC 60269-1

UL Listed (file number E348242)

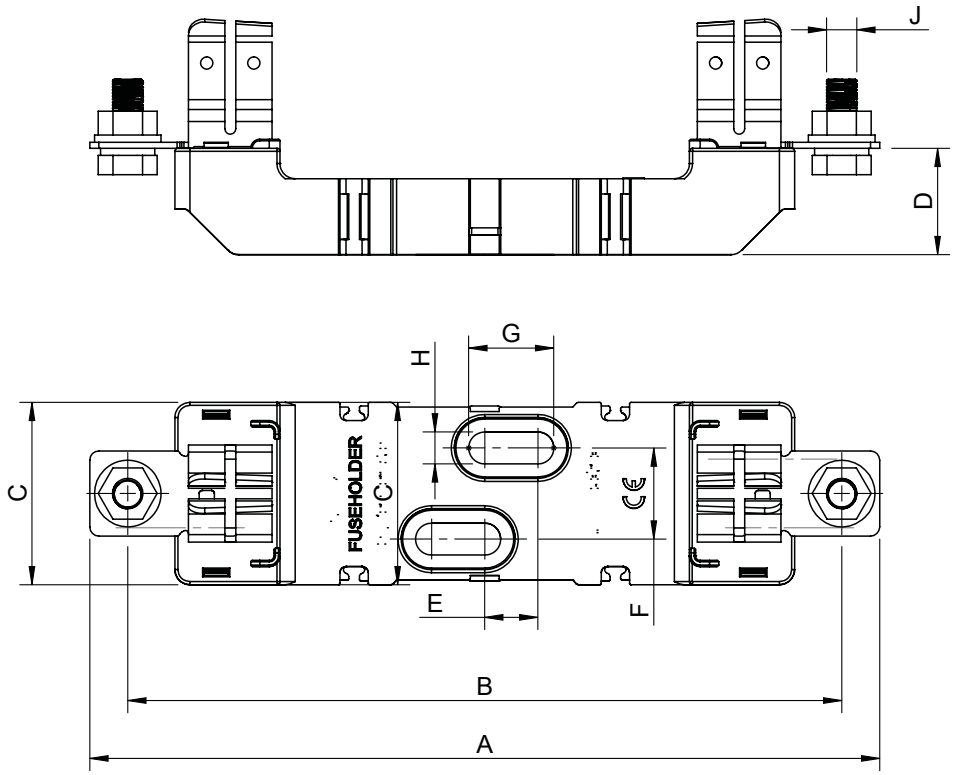
Accessories:

Fuse extraction handle available in sizes 01XL to 3L

Part numbers: FEH1500B

Unit packing: 1

Dimensions (mm)



Catalogue numbers	XL Style fuse link size	Maximum fuse rated current (Amps)	Power acceptance	A	B	C	D	E	F	G	H	J
SD1XL-S-PV	01XL, 1XL	200	57W	260	235	60	35	17.5	30	28	10.5	M10
SD2XL-S-PV	2XL	400	75W	285	260	60	35	17.5	30	28	10.5	M12
SD3L-S-PV	3L	500	108W	300	270	60	35	17.5	30	28	10.5	M12

Data sheet: 10066

800 V AC

NH fuse links, 170M, 32 A to 400 A

Description

Eaton's Bussmann series NH size 800 V a.c. fuse links are specifically designed to meet the needs of branch circuit and transformer protection in photovoltaic inverter systems. The fuse links are capable of interrupting low overcurrents associated with faulted PV systems (reverse current, multi-array fault).

Technical data

Rated voltage: 800 V a.c.

Rated current: 32 A to 400 A

Breaking capacity: 65 kA

Operating class: gR

Standards / Agency information

UL 248-13 (file number E125085)

IEC 60269-4 (see details below)

Catalogue numbers - Bladed with lugs

			I^2t (A^2 Sec)		Watts loss (W)	Catalogue numbers		
Fuse link body size	Rated voltage	Rated current (Amps)	Pre-arcing	Total at 800 V a.c.	I_n	Bladed with lugs	Compatible fuse base	Compatible microswitches
NH1	800 V a.c.	32	80	2000	8	170M7350	SD-1-D	170H0236 and 170H0238
		40	185	3000	9	170M7351	SD-1-D	170H0236 and 170H0238
		50	400	6000	11	170M7352	SD-1-D	170H0236 and 170H0238
		63	470	7000	12	170M7353*	SD-1-D	170H0236 and 170H0238
		80	640	9000	15	170M7354	SD-1-D	170H0236 and 170H0238
		100	1300	17000	16	170M7355	SD-1-D	170H0236 and 170H0238
		125	2600	34000	17	170M7356*	SD-1-D	170H0236 and 170H0238
		160	5200	68000	27	170M7357*	SD-1-D	170H0236 and 170H0238
		200	10200	140000	25	170M7358*	SD-1-D	170H0236 and 170H0238
NH2	800 V a.c.	160	4600	36800	28	170M7397	SD-2-D	170H0236 and 170H0238
		200	9500	76000	32	170M7398	SD-2-D	170H0236 and 170H0238
		250	17000	136000	38	170M7399	SD-2-D	170H0236 and 170H0238
NH3	800 V a.c.	315	32000	230000	44	170M7400*	SD-3-D	170H0236 and 170H0238
		355	44500	320000	46	170M7401*	SD-3-D	170H0236 and 170H0238
		400	67500	480000	50	170M7402*	SD-3-D	170H0236 and 170H0238

*UL 248-13 and IEC 60269-4

Data sheet: 10784

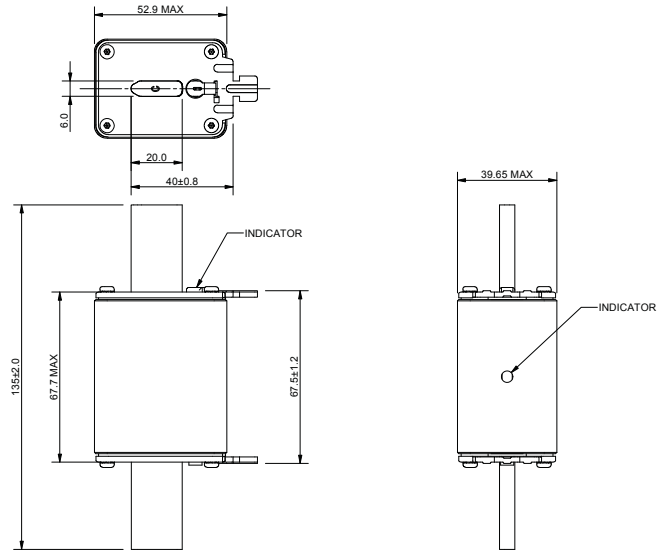
800 V AC

NH fuse links, 170M, 32 A to 400 A

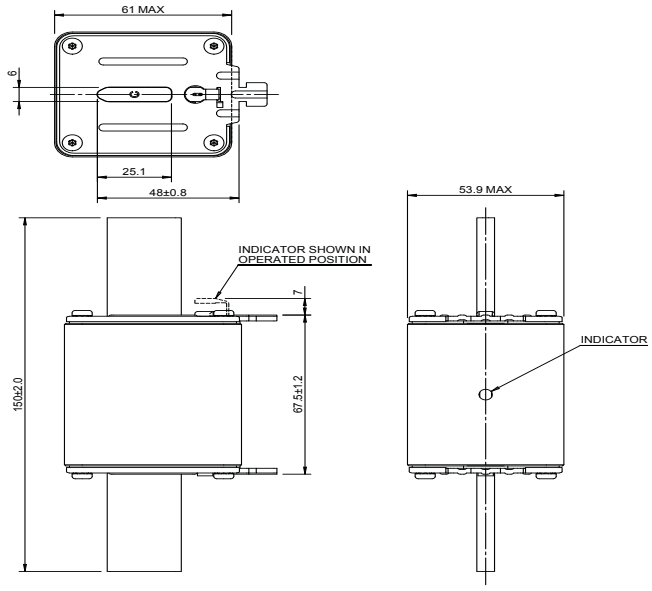
Catalogue numbers - Blade with bolt holes no lugs

Fuse link body size	Rated voltage	Rated current (Amps)	I^2t (A^2 Sec) Pre-arcing	I^2t (A^2 Sec) Total at 800 V a.c.	Watts loss (W) I_n	Catalogue numbers Blade with bolt holes no lugs
NH1	800 V a.c.	63	470	7000	12	170M7353-B*
		80	640	9000	15	170M7354-B
		100	1300	17000	16	170M7355-B
		125	2600	34000	17	170M7356-B*
		160	5200	68000	27	170M7357-B*
		200	10200	140000	25	170M7358-B*
NH2	800 V a.c.	160	4600	36800	28	170M7397-B
		200	9500	76000	32	170M7398-B
		250	17000	136000	38	170M7399-B
NH3	800 V a.c.	315	32000	230000	44	170M7400-B*
		355	38000	270000	48	170M7401-B*
		400	61000	430000	50	170M7402-B*

Dimensions (mm), NH1 Bladed with lugs



Dimensions (mm), NH2 Bladed with lugs

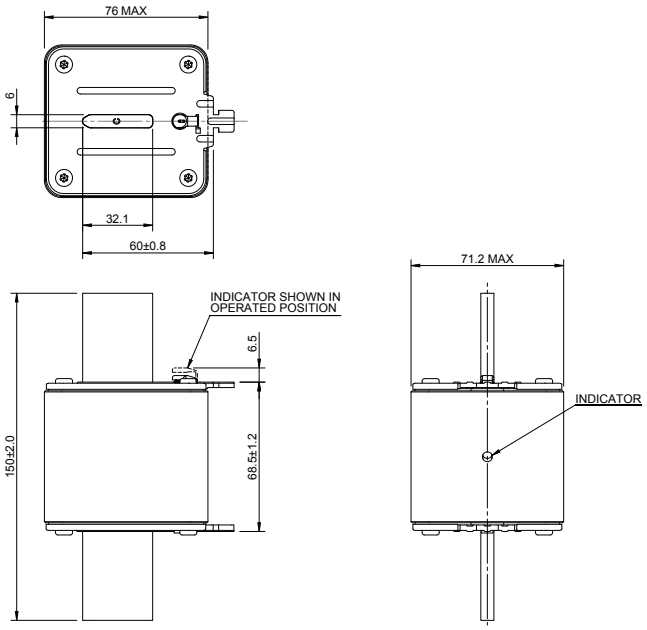


Data sheet: 10784

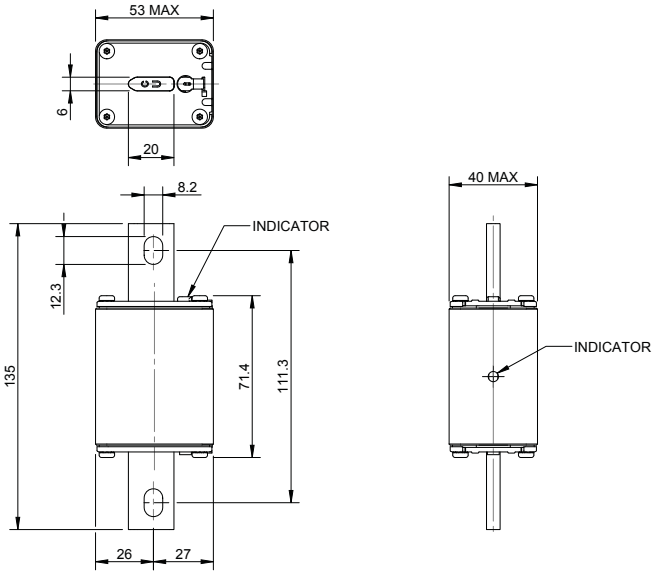
800 V AC

NH fuse links, 170M, 32 A to 400 A

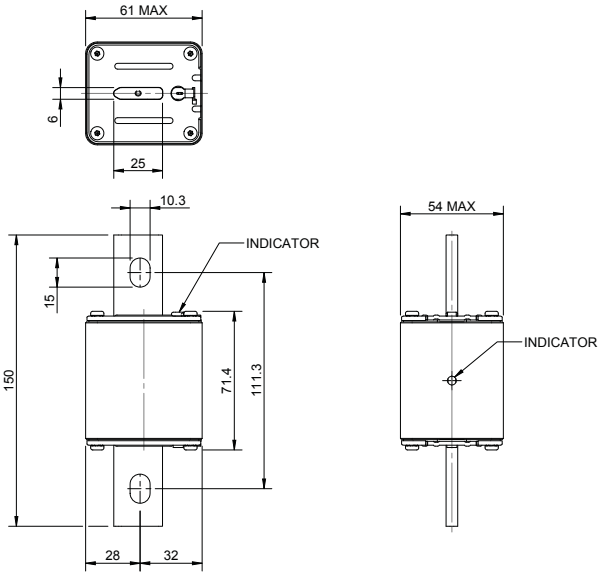
Dimensions (mm), NH3 Bladed with lugs



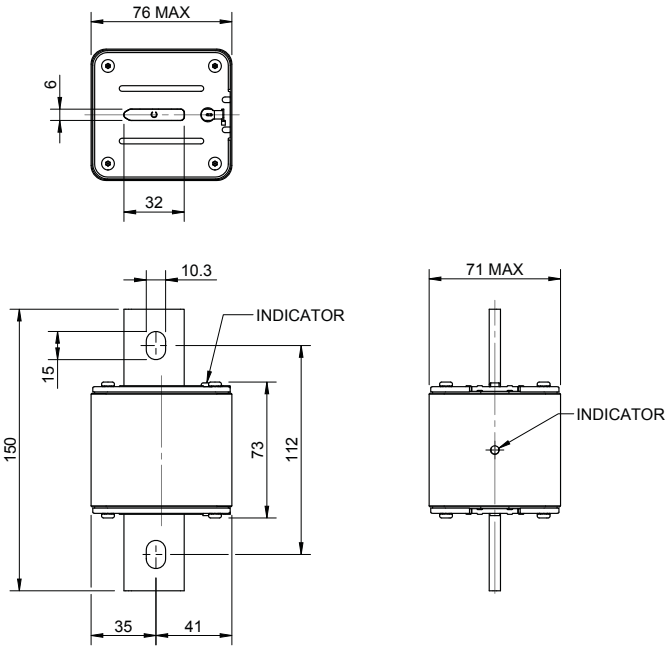
Dimensions (mm), NH1 Bolt holes no lugs



Dimensions (mm), NH2 Bolt holes no lugs



Dimensions (mm), NH3 Bolt holes no lugs

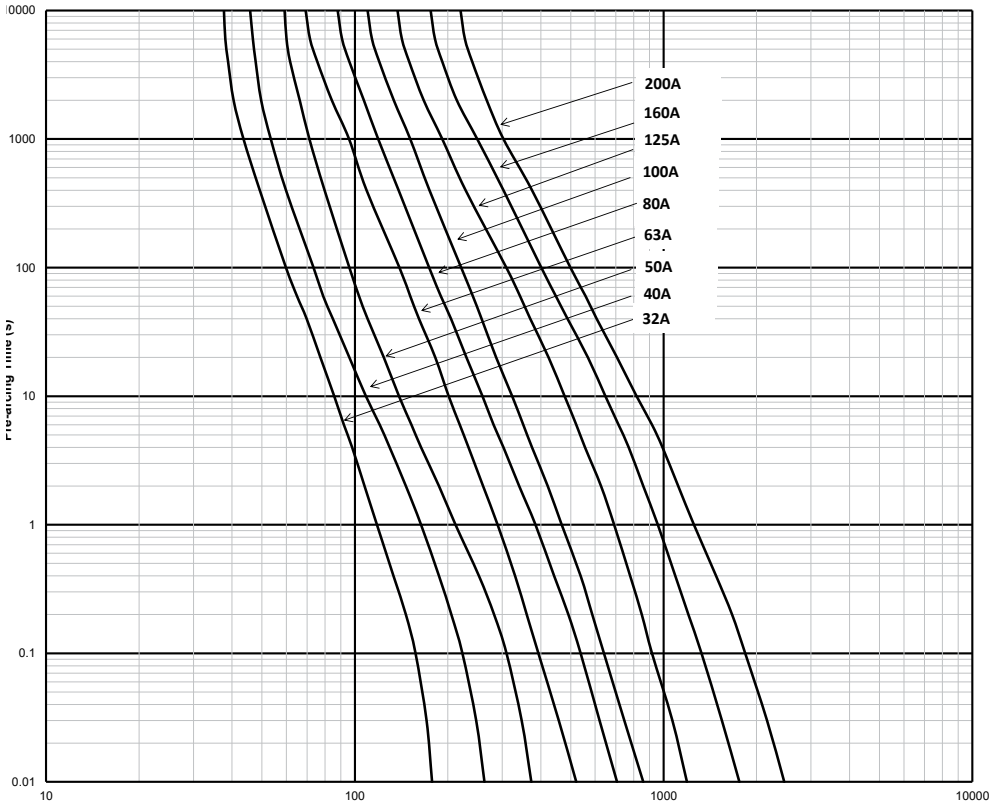


Data sheet: 10784

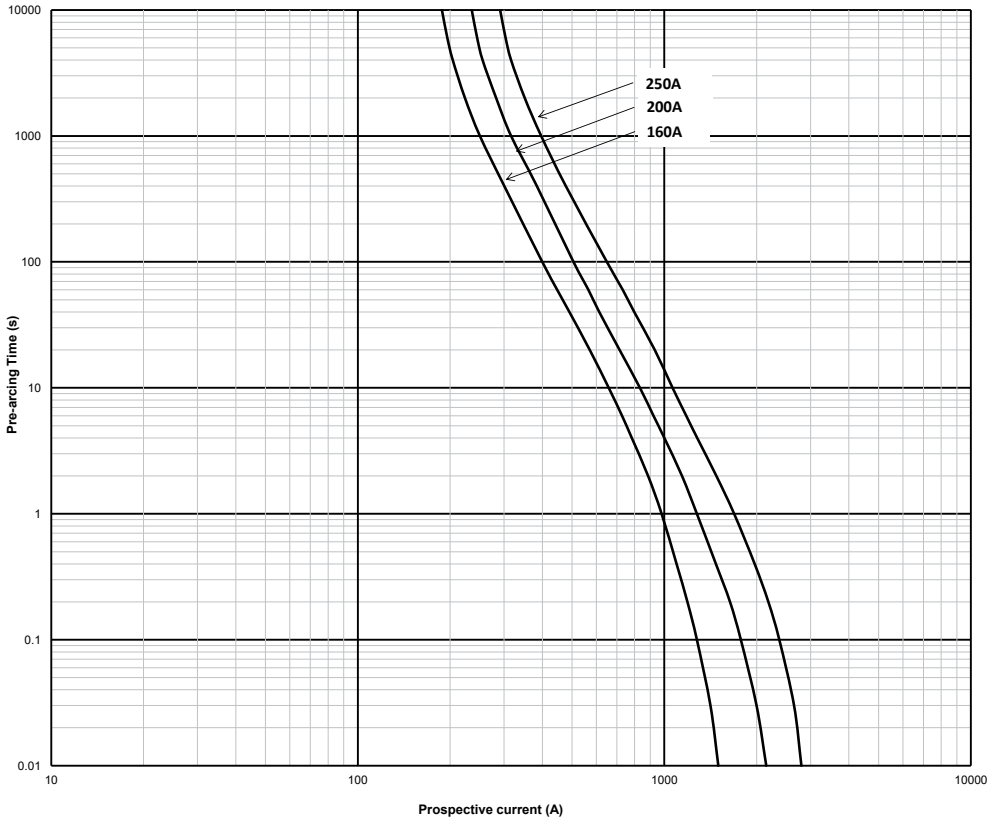
800 V AC

NH fuse links, 170M, 32 A to 400 A

Time-current curve size 1 - 32 A to 200 A



Time-current curve size 2 - 160 A to 250 A

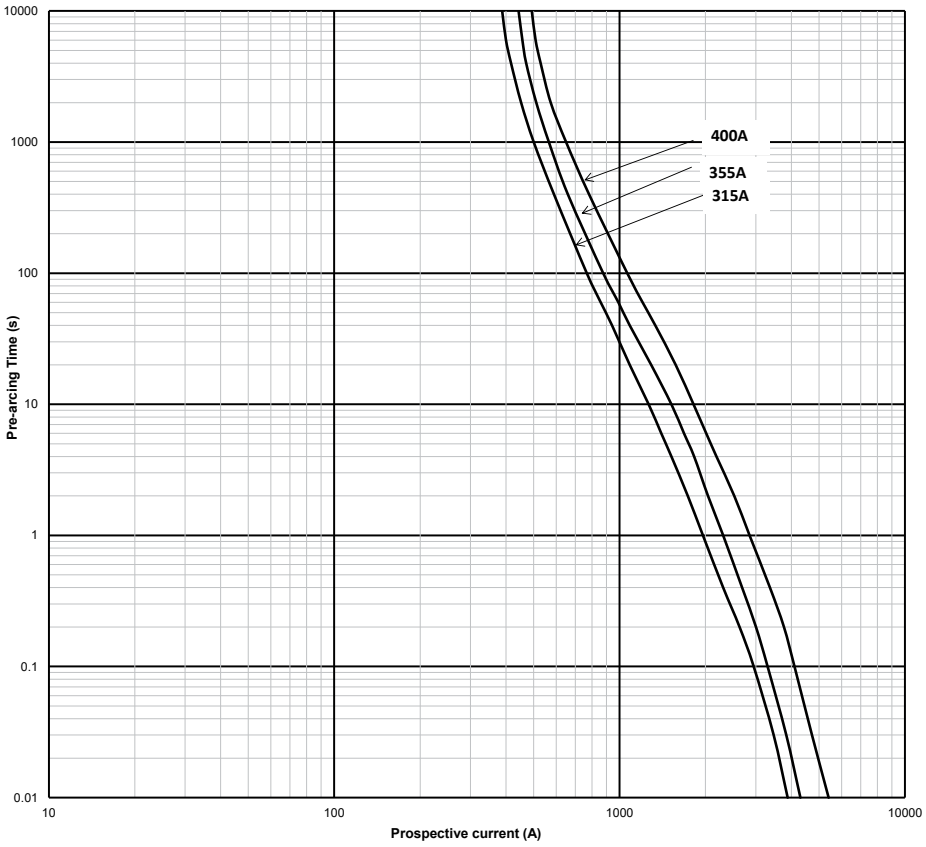


Data sheet: 10784

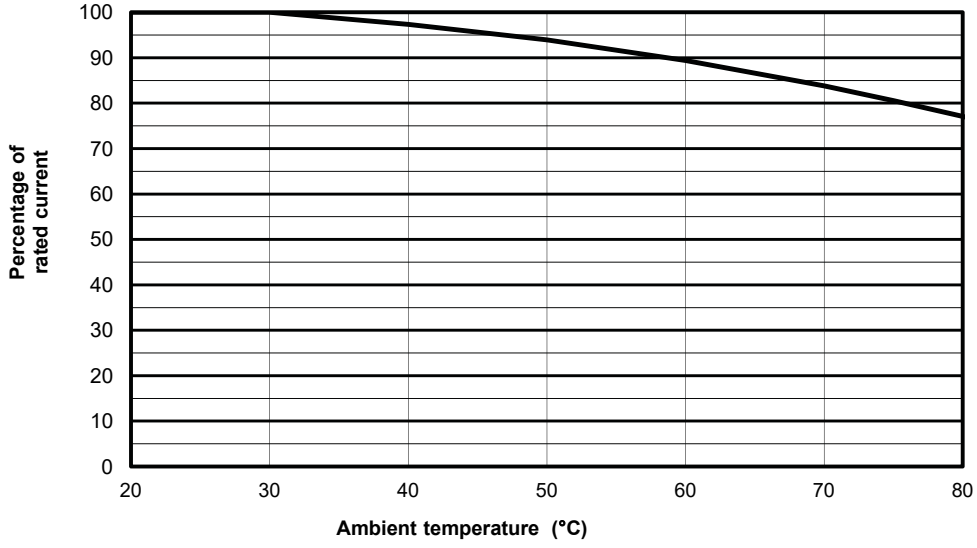
800 V AC

NH fuse links, 170M, 32 A to 400 A

Time-current curve size 3 - 315 A to 400 A



Temperature derating curve



Data sheet: 10784

800 V AC

NH fuse links, 32 A to 250 A

Description
Eaton's Bussmann Series NH gG fuse links are designed to ensure cable protection up to 800 V a.c.
They are also ideally suited for the cable protection on the AC side of solar string inverters with outputs up to 800 V a.c.

Technical data

Rated voltage: 800 V a.c.

Rated current: 32 A to 400 A

Breaking capacity: 80 kA

Operating class: gG

Fuse size

DIN Style NH 1 and 2

Standards / Agency information

IEC 60269-2

Catalogue numbers

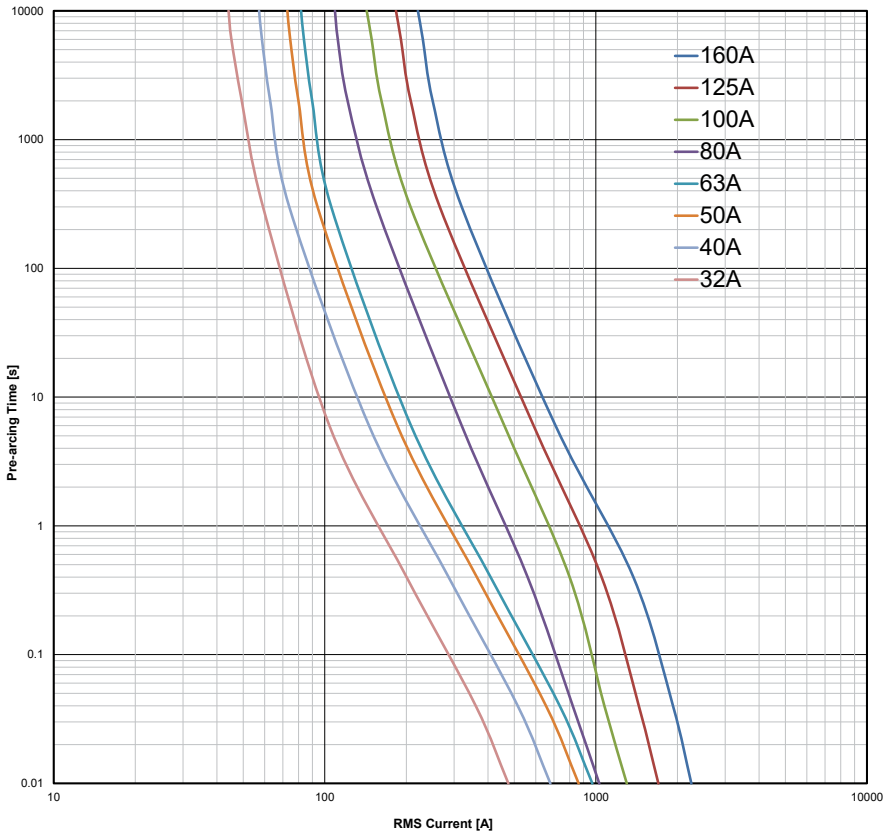
Fuse link body size	Rated voltage	Rated current (Amps)	I^2t (A^2 Sec)		Watts loss (W)	Catalogue numbers	Compatible fuse holder		Compatible microswitches
			Pre-arcing	Total at 800 V a.c.	I_n	Metal gripping lugs	Article number	Model code	
NH1	800 V a.c.	32	1400	12,500	3.3	32NHG1B-800	179756	NHW-SLS-1	BVL50, 170H0236, 170H0238
		40	2000	18,500	4.1	40NHG1B-800			
		50	3700	32,500	5.0	50NHG1B-800			
		63	5600	49,500	6.5	63NHG1B-800			
		80	6500	36,000	9.6	80NHG1B-800			
		100	11,000	59,000	11.8	100NHG1B-800			
		125	23,500	125,000	12.4	125NHG1B-800			
		160	40,000	215,000	16.5	160NHG1B-800			
NH2	800 V a.c.	160	53,000	340,000	15.7	160NHG2B-800	179757	NHW-SLS-2	
		200	86,000	390,000	18.6	200NHG2B-800			
		250	154,000	690,000	23.5	250NHG2B-800			

Data sheet: TD134002EN

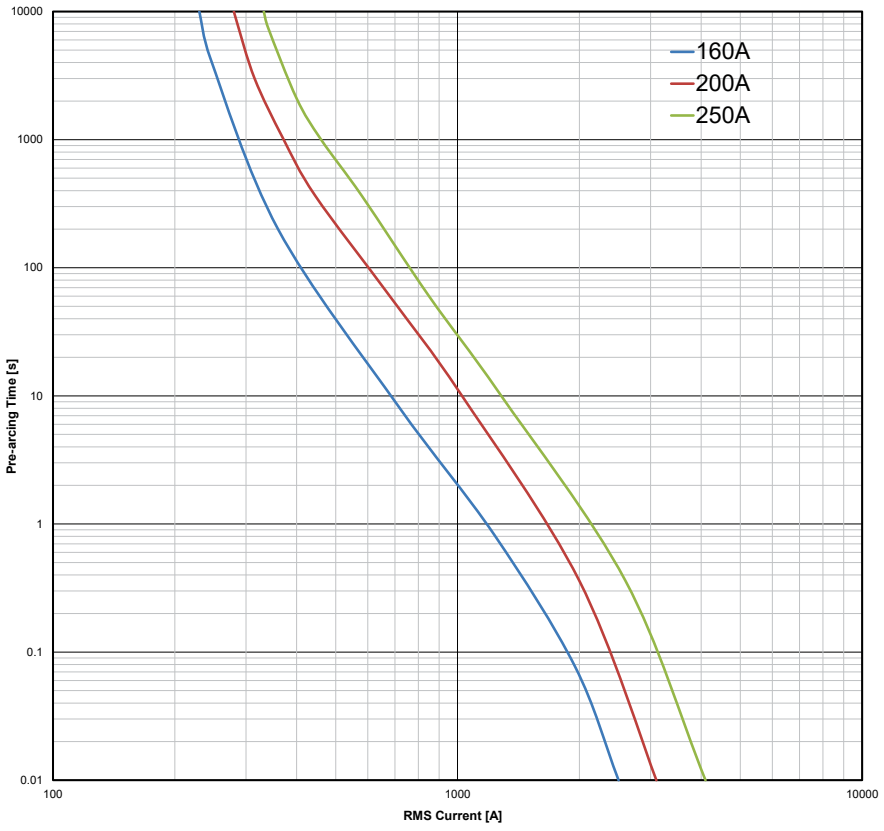
800 V AC

NH fuse links, 32 A to 250 A

Time-current curve size 1 - 32 A to 200 A



Time-current curve size 2 - 160 A to 250 A

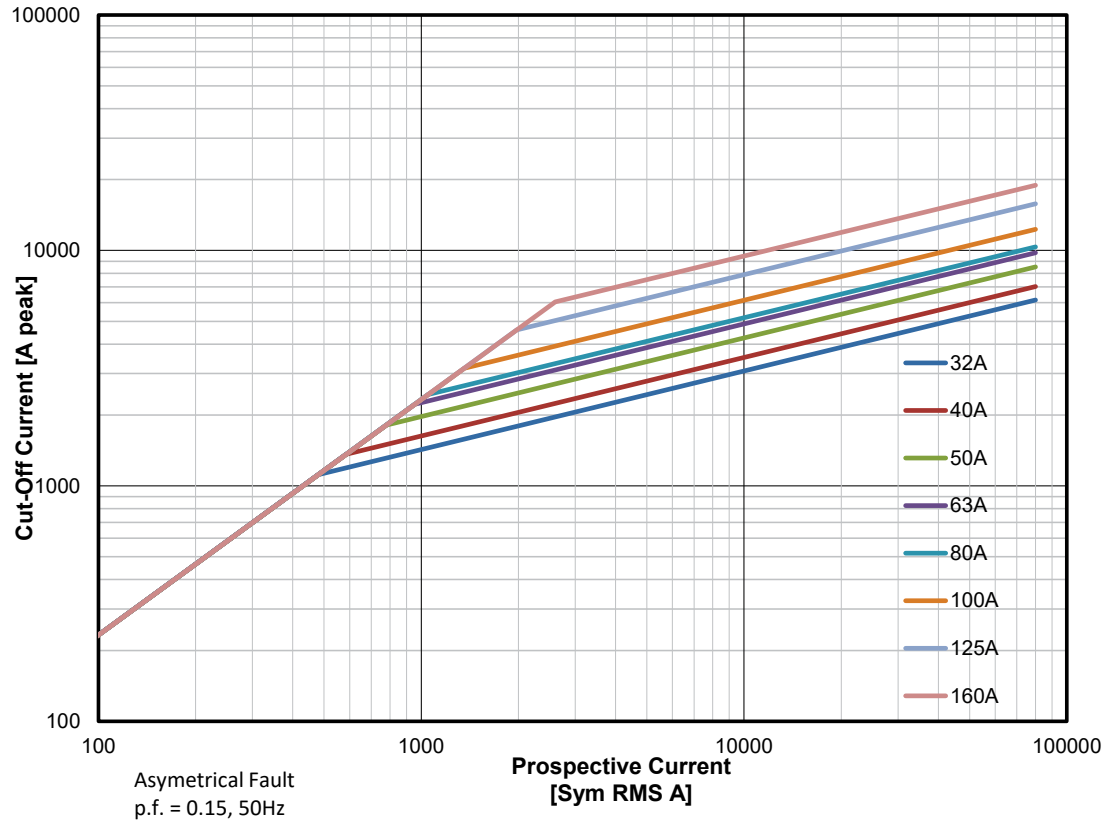


Data sheet: TD134002EN

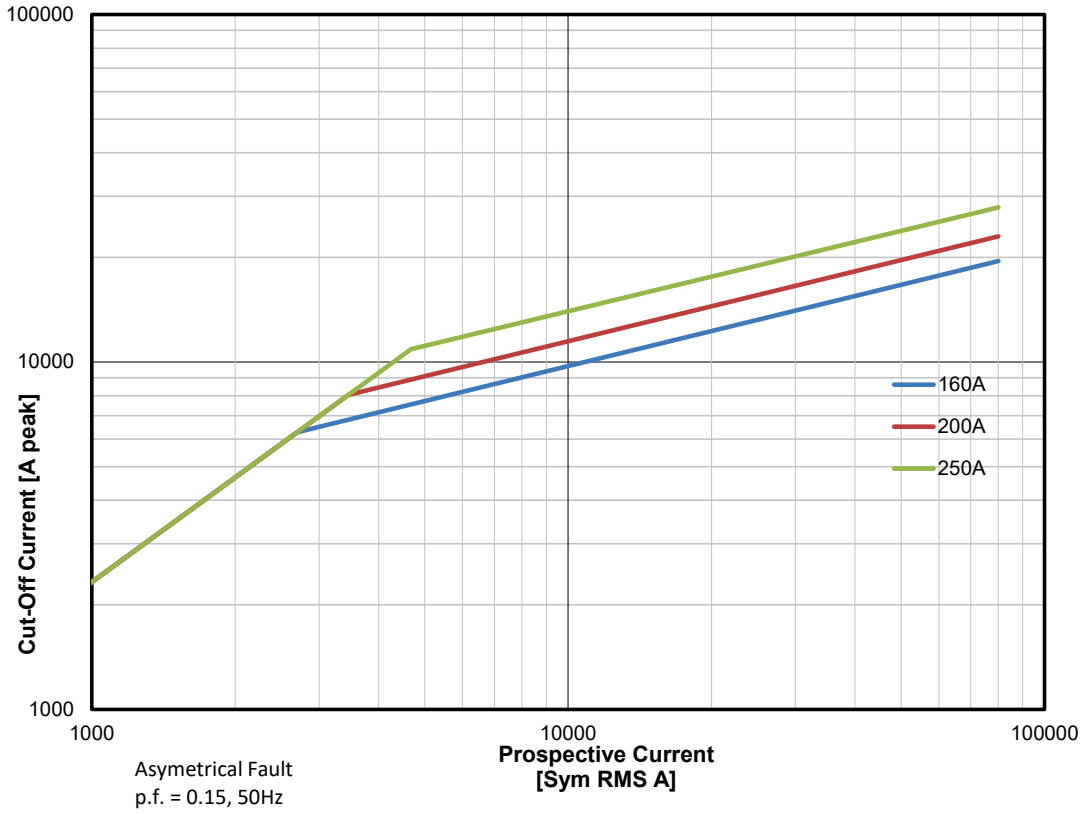
800 V AC

NH fuse links, 32 A to 250 A

Cut-off curve size 1 - 32 A to 200 A



Cut-off curve size 2 - 160 A to 250 A



Data sheet: TD134002EN

Microswitches

Description

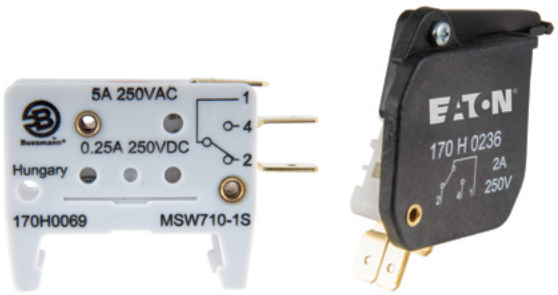
Eaton's microswitches are used for remote electrical indication of fuse link operations. All microswitches have one normally open and one normally closed contact.

170H0236 and 170H0238 - Type T Indicator

The indicator is situated on one cover plate with a cover plate tag to accomodate an auxiliary switch. The minimum rated voltage for operating the indicator is 20 V. A special low rated voltage indicator (1.5V) is available on request).

170H0069 - Type K Indicator

The indicator is situated on the fuse link body. It is covered by an adaptor for snap-on mounting of an auxiliary switch. The operating Rated voltage of the indicator is 1.5V. As a matter of safety, the factory mounted adaptor must not be removed from the fuse link.

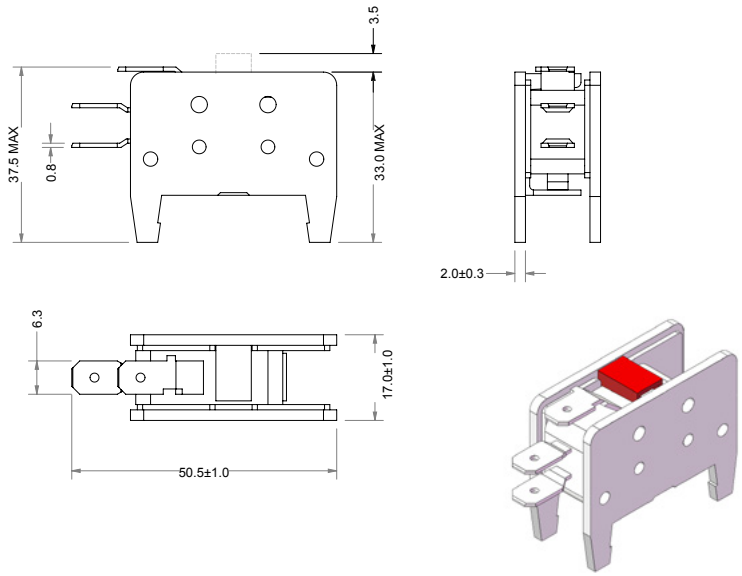


Compatible fuse links

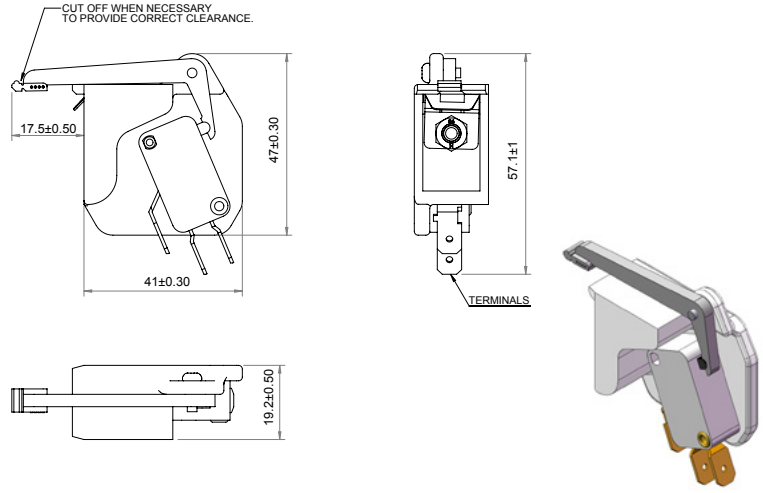
Body size	Fixings/Tags	Catalogue number	Rated voltage	Rated current	Microswitches
NH Fuse links					
1	Bladed with lugs	170M7350 to 170M7358	800 V a.c.	32 A to 200 A	170H0236 and 170H0238
2	Bladed with lugs	170M7397 to 170M7399		160 A to 250 A	170H0236 and 170H0238
3	Bladed with lugs	170M7400 to 170M7402		315 A to 400 A	170H0236 and 170H0238
1	Blade without bolt holes	PV-(amps)ANH1	1000 V d.c.	32 A to 200 A	170H0236 and 170H238
	Blade with bolt holes	PV-(amps)ANH1-B			
	Blade with bolt holes and lugs	PV-(amps)ANH1-BL			
2	Blade without bolt holes	PV-(amps)ANH2	1000 V d.c.	160 A to 250 A	170H0236 and 170H238
	Blade with bolt holes	PV-(amps)ANH2-B			
	Blade with bolt holes and lugs	PV-(amps)ANH2-BL			
3	Blade without bolt holes	PV-(amps)ANH3	1000 V d.c.	300 A to 400 A	170H0236 and 170H238
	Blade with bolt holes	PV-(amps)ANH3-B			
	Blade with bolt holes and lugs	PV-(amps)ANH3-BL			
XL Fuse links					
01XL	Bladed	PV-(amps)A-01XL	1000 V d.c.	63 A to 160 A	170H0236 and 170H0238
	Bolted	PV-(amps)A-01XL-B			170H0069
2	Bladed	PV-(amps)A-2XL	1000 V d.c.	160 A to 355 A	170H0236 and 170H0238
	Bolted	PV-(amps)A-2XL-B			170H0069
		PV-(amps)A-2XL-3B			
3	Bladed	PV-(amps)A-3L	1000 V d.c.	350 A to 600 A	170H0236 and 170H0238
	Bolted	PV-(amps)A-3L-B			170H0069
01	Bladed with top indicator	PV-(amps)A-01XL-15	1500 V d.c.	50 A to 125 A	170H0236 and 170H0238
	Bolted with side indicator	PV-(amps)A-01XL-B-15			170H0069
1	Bladed with top indicator	PV-(amps)A-1XL-15	1500 V d.c.	100 A to 200 A	170H0236 and 170H0238
	Bolted with side indicator	PV-(amps)A-1XL-B-15			170H0069
2	Bladed with top indicator	PV-(amps)A-2XL-15	1500 V d.c.	125 A to 250 A	170H0236 and 170H0238
	Bolted with side indicator	PV-(amps)A-2XL-B-15 PV-(amps)A-2XL-3B-15			170H0069
3	Bladed with top indicator	PV-(amps)A-3L-15	1500 V d.c.	250 A to 500 A	170H0236 and 170H0238
	Bolted with side indicator	PV-(amps)A-3L-B-15			170H0069
3L	Bladed with top indicator	PVS(amps)A-3L-15	1500 V d.c.	250 A to 400 A	170H0236 and 170H0238
	Bolted with side indicator	PVS(amps)A-3L-B-15			170H0069

Microswitches

Dimensions (mm) - 170H0069



Dimensions (mm) - 170H0236 and 170H0238 for straight tags



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Contact details

Customer Satisfaction team

Eaton's Customer Satisfaction team is available to answer questions regarding Bussmann series products.

Calls can be made between:

Monday - Friday: 7.30 a.m. - 5.00 p.m. GMT

The Customer Satisfaction team can be reached via:

Phone: 00 44 (0) 1509 882 600

Email: GBBURsales@eaton.com

Application engineering

Application Engineering assistance is available to all customers. The Application Engineering team is staffed by university-qualified electrical engineers who are available with technical and application support.

Calls can be made between:

Monday - Thursday: 8.30 a.m. - 4.30 p.m. GMT

Friday: 8.30 a.m. - 4.00 p.m. GMT

Application Engineering can be reached via:

Phone: 00 44 (0) 1509 882 699

Enquiries related to High speed fuses: bulehighspeedtechnical@eaton.com

General technical enquiries: buletechnical@eaton.com

Eaton is an intelligent power management company dedicated to protecting the environment and improving the quality of life for people everywhere. We make products for the data center, utility, industrial, commercial, machine building, residential, aerospace and mobility markets. We are guided by our commitment to do business right, to operate sustainably and to help our customers manage power today and well into the future. By capitalizing on the global growth trends of electrification and digitalization, we're helping to solve the world's most urgent power management challenges and building a more sustainable society for people today and generations to come.

Founded in 1911, Eaton has continuously evolved to meet the changing and expanding needs of our stakeholders. With revenues of nearly $25 billion in 2024, the company serves customers in more than 160 countries. For more information, visit www.eaton.com. Follow us on LinkedIn.

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