



Photovoltaic fuses

gPV curve

from 1 to 600 A, up to 1500 VDC

Fuse protection



The solution for

- Photovoltaic protection



Strong points

- High breaking capacity up to 1500 VDC
- Product dedicated to photovoltaic installations
- High reliability
- Improved safety

Large range

- Associated range of switches and fuse bases, dedicated combs and connection accessories

Compliance with standards

- IEC 60269-6
- IEC 60269-1
- IEC 60269-2



Function

SOCOMECS' **gPV fuses** protect photovoltaic installations against overcurrents caused by reverse currents that can occur in PV applications.

Advantages

High breaking capacity

Up to 50 kA to 1000 VDC,
30 kA to 1500 VDC.

Product dedicated to photovoltaic installations

Operating ranges adapted to low overcurrents specific to photovoltaic systems.

High reliability

- Absolute protection over time guaranteed by the simplicity of manufacture and function (Joule effect).
- No downgrading of fuse characteristics over time.

Improved safety

The energy released whilst eliminating the fault (fuse blowing) is contained within the cartridge (no degassing).

What you need to know

Characteristics used

- I_{SC} : short circuit current of the string.
- $I_{SC\ MAX}$: short circuit current of the string related to maximum sunlight density.
- I_{RM} : maximum admitted reverse current.
- I_n : fuse rating or fuse rated current (at 25°C in a RM fuse base).
- N_c : number of strings in parallel.
- U_g : fuse maximum operating voltage.
- $U_{OC\ MAX}$: maximum open circuit voltage in the lowest temperature conditions.

When to protect

A PV string requires an overcurrent protection when its own maximum admissible reverse current characteristic (I_{rm}) is less than the current generated by the rest of the installation (current generated by the other "Nc-1" strings).

How to protect

Protection against overcurrents has to be applied to both polarities, regardless of whether the DC installation is earthed or not.

How to choose the right fuse protection

Voltage

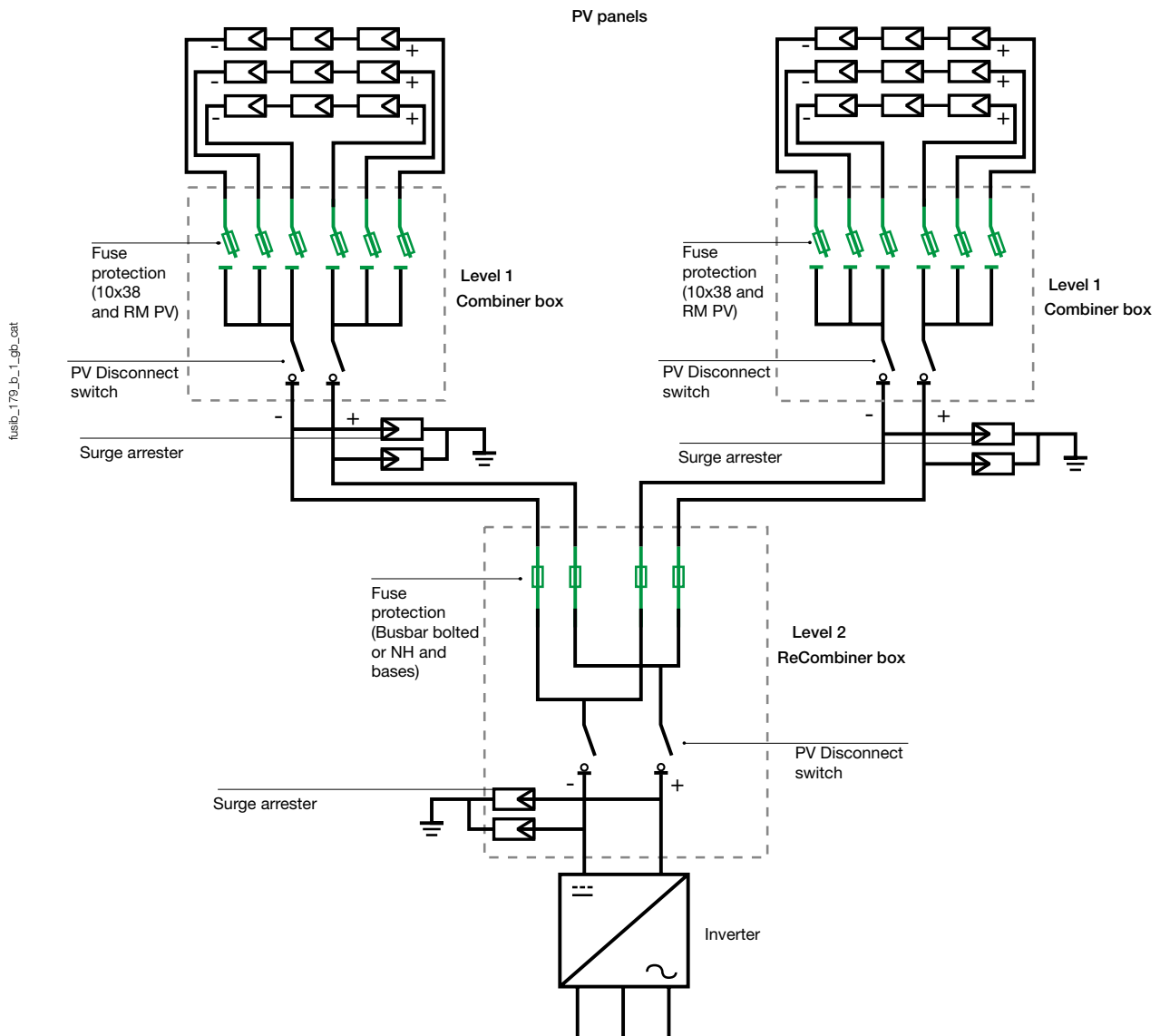
$$U_o > U_{OC\ MAX}$$

In the absence of complementary information use $U_{OC\ MAX} = 1.2 U_{OC}$

Fuse rating determination

Determination of the fuse rated current consists of choosing a protection capable of:

- Supporting without fusing the normal overload current during the periods of maximum sunlight density at the ambient temperature of the enclosure in which the fuse is installed, $I_n > I_{SC\ MAX}$
In the absence of complementary information use $I_{SC\ MAX} = 1.4 I_{SC}$
- Melting and reliably clearing the fault before the PV modules are damaged by the reverse current. $I_n < I_{RM}$



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References

Rated voltage 1000 VDC

Rating (A)	Fuse size	Dissipated power		Breaking capacity	Reference
		W @ In	W @ 0.8 In		
gPV cylindrical fuses					
1	10 x 38	0.76	0.43	30 kA	60PV 0001
2	10 x 38	1.54	0.84	30 kA	60PV 0002
3	10 x 38	1.35	0.74	30 kA	60PV 0003
4	10 x 38	1.84	1.08	30 kA	60PV 0004
6	10 x 38	2.50	1.40	30 kA	60PV 0006
8	10 x 38	2.57	1.47	30 kA	60PV 0008
10	10 x 38	2.58	1.51	30 kA	60PV 0010
12	10 x 38	2.61	1.42	30 kA	60PV 0012
15	10 x 38	2.44	1.08	30 kA	60PV 0015
16	10 x 38	2.70	1.56	30 kA	60PV 0016
20	10 x 38	2.99	1.75	30 kA	60PV 0020
25	14 x 51	5.1	2.7	10 kA	60PV 0C25
32	14 x 51	6.2	3.3	10 kA	60PV 0C32
gPV knife edge fuse					
32	NH1	8.5	4.3	50 kA	60PV 0032
40	NH1	9	4.6	50 kA	60PV 0040
50	NH1	10.5	5.4	50 kA	60PV 0050
63	NH1	12	6.1	50 kA	60PV 0063
80	NH1	15.5	7.9	50 kA	60PV 0080
100	NH1	16.5	8.4	50 kA	60PV 0100
125	NH1	17.5	8.9	50 kA	60PV 0125
160	NH1	24	12.2	50 kA	60PV 0160
200	NH1	25	13	50 kA	60PV 1200
250	NH2	35	23	50 kA	60PV 1250
315	NH3	44	27	50 kA	60PV 1315
400	NH3	50	30	50 kA	60PV 1400
500	3 L	85	50	50 kA	60PV 0500
600	3 L	118	92	50 kA	60PV 0600

Rated voltage 1500 VDC

Rating (A)	Fuse size	Dissipated power			Breaking capacity	Reference
		W @ In	W @ 0.7 In	W @ 0.8 In		
gPV cylindrical fuses						
2	10x85	3.42	1.28		10	61PV 0002
4	10x85	2.91	1.16		10	61PV 0004
6	10x85	2.65	1.1		10	61PV 0006
8	10x85	2.79	1.16		10	61PV 0008
10	10x85	4.38	1.81		10	61PV 0010
12	10x85	4.43	1.83		10	61PV 0012
16	10x85	4.13	1.75		10	61PV 0016
20 ⁽¹⁾	10x85	5.14	2.13		10	61PV 0020 ⁽¹⁾
25 ⁽¹⁾	10x85	5.48	2.28		10	61PV 0025 ⁽¹⁾
gPV knife edge fuse						
200	1XL	61		31	30	61PV 0200
400	3L	91		49	30	61PV 0400

(1) Rated voltage 1200 VDC.

Accessories

Accessories	Size NH1 Reference	Size NH2 Reference	Size NH3 Reference	Size 1XL Reference	Size 3L Reference
Fuse blown auxiliary contact	56PV 9901	56PV 9901	56PV 9901	56PV 9901	56PV 9901
Fuse base recommended	65PV 1011	65PV 1002	65PV 1003	-	65PV 1113

Adjustment due to ambient temperature

$$I_{nf} = I_{scgen} / K_t$$

I_{nf} - gPV fuse rated current.

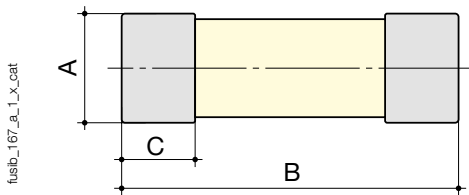
I_{scgen} - short-circuit current of PV generator in STC conditions.

K_t - derating factor.

Max. ambient temperature (°C)	Kt: derating factor
20	1
40	0.92
45	0.90
50	0.87
55	0.85
60	0.82
65	0.79
70	0.76

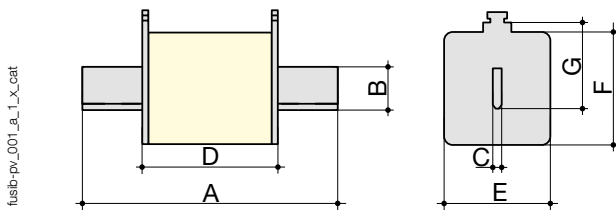
Standard dimensions (mm) as per IEC 60269-2

gPV cylindrical fuses



Fuse size	Striker	A	B	C
10 x 38	Without	10.3	38	10.5
14 x 51	Without	14.3	51.5	10.10
10 x 85	Without	10.3	85	10.5

gPV knife edge fuse

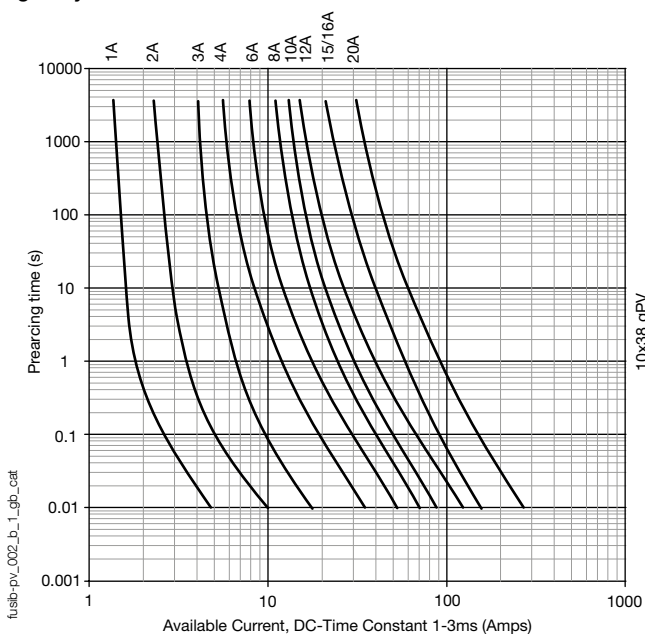


Fuse size	Striker	A max	B	C	D max	T max	F max	G
NH1	Without	137	20	6	68	40	53	40
NH2	Without	152	25	6	75	60	61	48
NH3	Without	152	32	6	75	70	75	60
1XL	Without	190	20	6	128	51	51	40
3L	Without	205	32	6	123	74	74	60

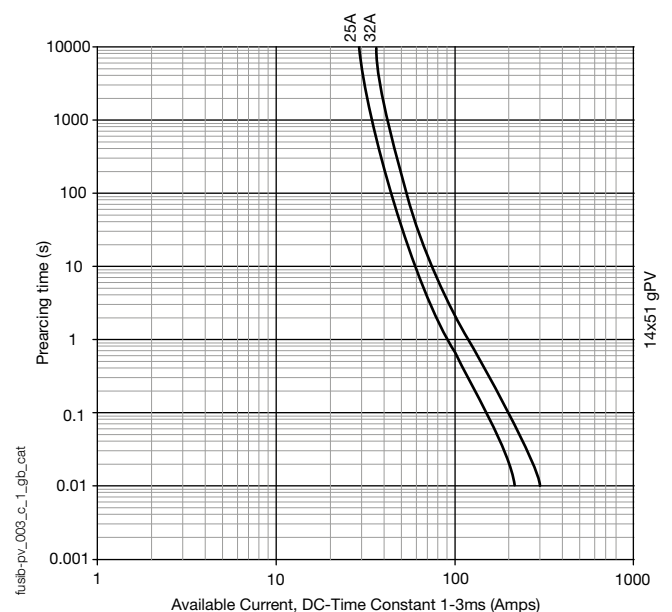
Time/current operation characteristics

Rated voltage 1000 VDC

gPV cylindrical fuses 10x38



gPV cylindrical fuses 14x51



Photovoltaic fuses

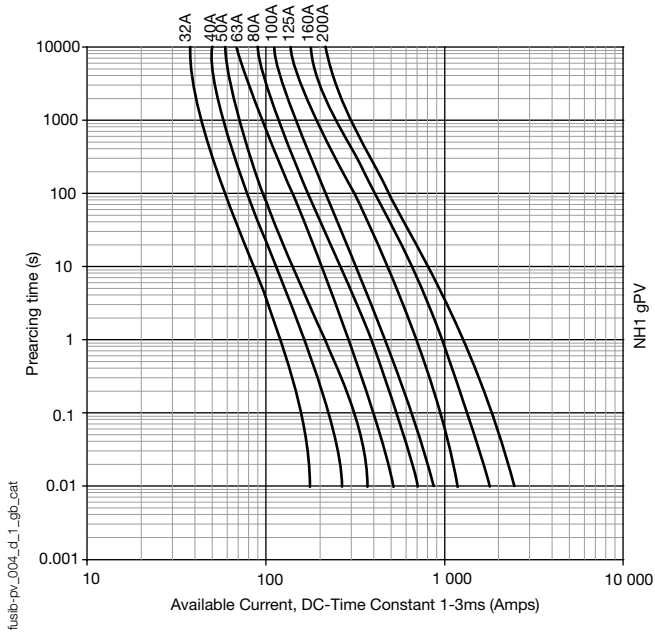
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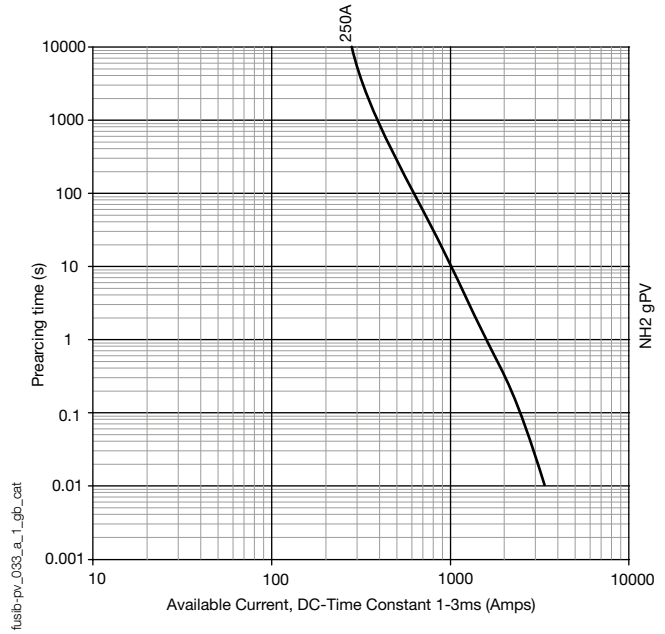
Time/current operation characteristics (continued)

Rated voltage 1000 VDC

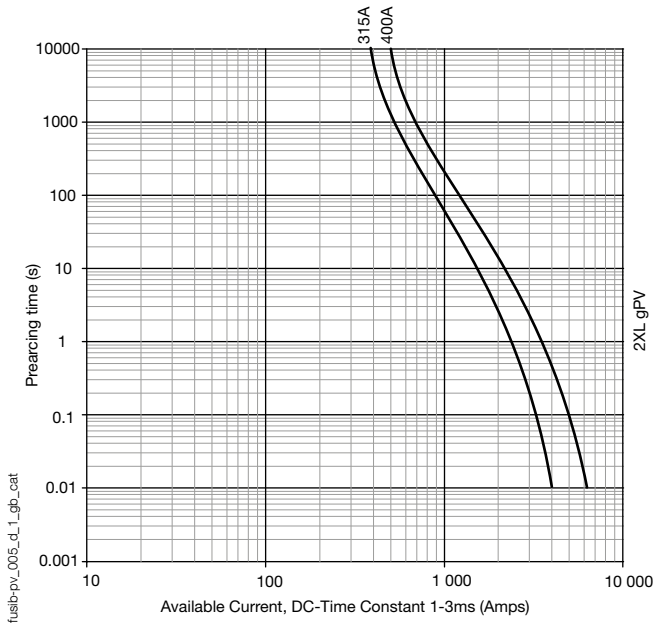
gPV NH1 knife edge fuses



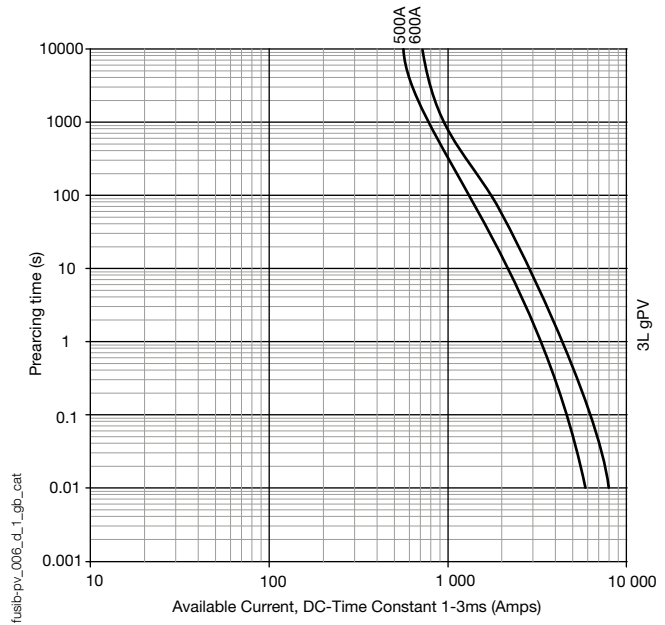
gPV NH2 knife edge fuses



gPV NH3 knife edge fuses

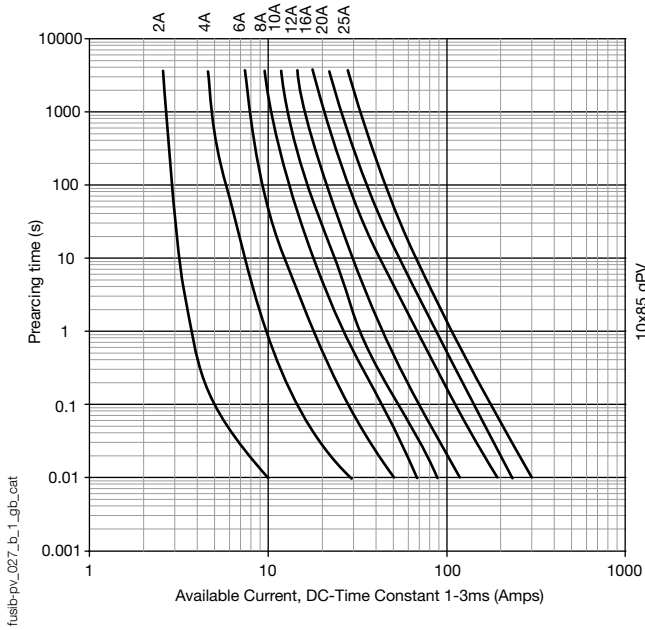


gPV 3L knife edge fuses

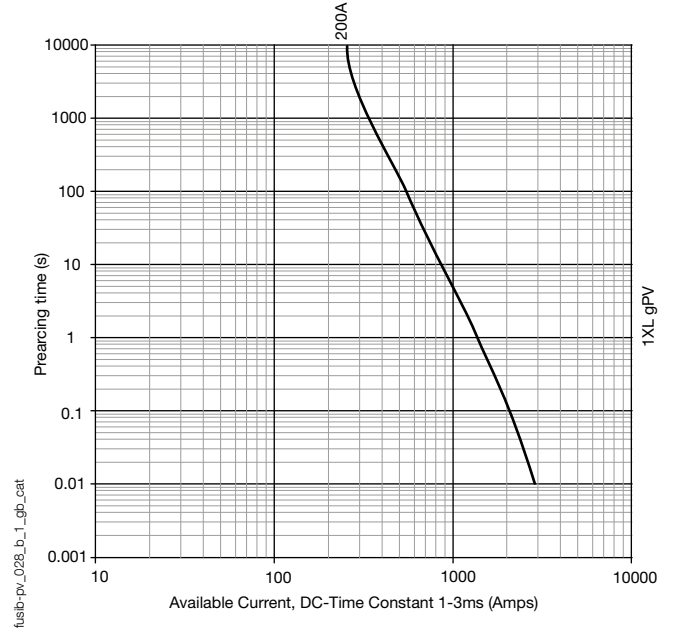


Rated voltage 1500 VDC

gPV cylindrical fuses 10x85



gPV 1XL knife edge fuses



gPV 3L knife edge fuses

