



PHOTOVOLTAIC

FUSE LINKS & FUSE HOLDERS FOR PHOTOVOLTAIC APPLICATIONS

gPV CYLINDRICAL fuse links

CYL 10x85



10x38

14x51

10x85

10/14x85

22x65

**PROTECTING
THE WORLD**





RATED VOLTAGE
1500V DC
1200V DC

RATED CURRENT
2A...16A
20A | 25A

BREAKING CAPACITY
30kA
10kA

STANDARDS
IEC/EN 60269-1
IEC/EN 60269-6
UL248-1
UL248-19



Cylindrical fuse links for photovoltaic applications

gPV 10x85 cylindrical fuse links from DF Electric have been developed to offer a compact, safety and economic protection of photovoltaic modules (string protection) with voltages up to 1.500V DC.

The range comprises the following fuse links:

- Size 10x85 1500V DC 2A to 16A
- Size 10x85 1200V DC 20A and 25A

They provide protection against overloads as well as short-circuit (gPV class according to the requirements of IEC60269-6 and UL248-19 Standards).

Made with ceramic tube with high withstand to internal pressure and thermal shock, that allows a high breaking capacity in a reduced physical space.

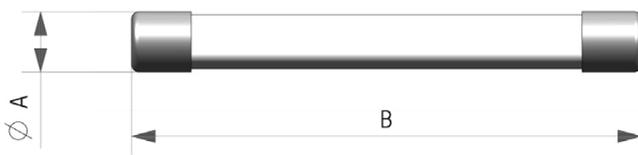
Contacts are made in silver plated copper and melting elements are made in pure silver in order to avoid the aging and thus keep unalterable the electric characteristics.

For these fuse links we recommend the utilization of **PML fuse holders**.

UL Listed (File E355019).



Dimensions



A	B
10,3	85

Weight 14,5gr

Range

U (V DC)	I _n (A)	REFERENCE	PACKING Uni /BOX
1500	2	492202	10/50/1000
	4	492205	10/50/1000
	6	492210	10/50/1000
	8	492215	10/50/1000
	10	492220	10/50/1000
	12	492225	10/50/1000
	15	492229	10/50/1000
	16	492230	10/50/1000
1200	20	492235	10/50/1000
	25	492240	10/50/1000



Technical data

Rated voltage	1500V DC 1200V DC
Rated current	1500V DC → 2A...16A 1200V DC → 20A 25A
Rated breaking capacity	1500V DC → 30kA 1200V DC → 10kA
Utilization category	gPV
Minimum interrupt rating	1,35·I _n
Non fusing current	1,13·I _n
Storage temperature	-40°C ... 90°C
Operating temperature *	-40°C ... 80°C

* For ambient temperatures higher than 25°C it is necessary to apply a derating in maximum current.

Standards

IEC/EN 60269-1
IEC/EN 60269-6
UL248-1
UL248-19
RoHS Compliant



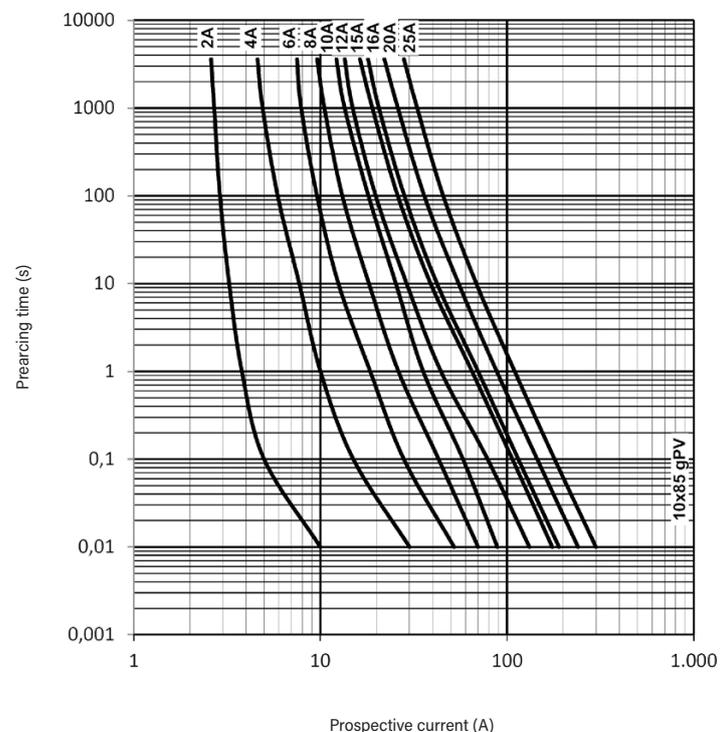
Certifications



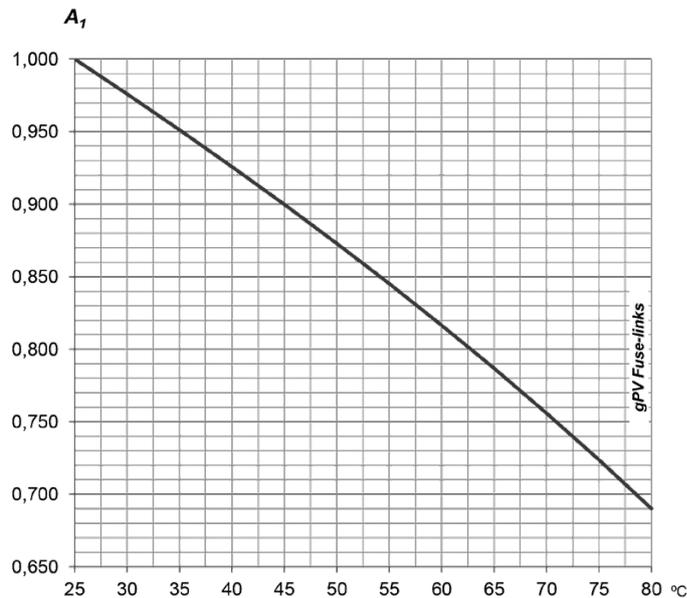
Power dissipation

I _n	PREARCING I ² t	OPERATING I ² t	POWER DISSIPATION 0,7 · I _n	POWER DISSIPATION I _n
(A)	(A ² S)	(A ² S)	(W)	(W)
2	0,8	1,1	1,28	3,2
4	13	17	1,16	2,9
6	65	84	1,04	2,6
8	175	225	1,13	2,8
10	44	72	1,36	3,4
12	78	129	1,56	3,9
15	121	201	1,79	4,5
16	175	290	1,92	4,8
20	242	478	2,04	5,1
25	545	1075	2,20	5,5

t-I characteristics



Ambient temperature derating factor



ta (°C)	A1
25	1,00
30	0,98
35	0,95
40	0,93
45	0,90
50	0,87
55	0,84
60	0,82
65	0,79
70	0,76
75	0,72
80	0,69

Selection and applications guide

In photovoltaic plants, there are a special installation and working conditions that must be considered to select the appropriate fuse links.

These fuses are usually placed inside plastic watertight boxes, where high ambient temperatures are reached. This condition force to reduce the maximum current that can circulate through the fuse links, otherwise it would be have premature aging. To avoid nondesired operation of fuse links it is necessary to apply a derating when select the appropriate rated current.

On the other hand, the day/night cycles as well as the pass of clouds cause a constant current changes that generates continuous heating and cooling, and this cause a thermal stress in fuselinks materials, especially in the melting elements. To avoid premature aging another derating must be applied (DF Electric recommend a value of 0,80 for this application).

With these considerations it is possible to select the suitable fuse.

To verify that the rated voltage of fuse link is sufficient, the following points must be taken into account:

- Open circuit voltage $V_{OC\ STC}$ of PV modules.
- Numbers of modules connected in series (M).
- Safety factor (20%) to take into account the rise of open circuit voltage at very low temperatures.

According to this, rated voltage in DC of fuse links must be:

$$V_{DC}(\text{fuse link}) \geq V_{OC}(\text{STC}) \cdot M \cdot 1,2$$

Open circuit voltage $V_{OC\ STC}$ of PV modules is the maximum voltage that a Photovoltaic module can deliver when is working without load, measured under standard test conditions (STC).

This information is given by the manufacturer of PV modules.

To choose rated current of fuse links, points to be taken into account are the following:

- Short circuit current of PV modules $I_{SC\ STC}$.
- Derating factor for ambient temperature (A_1).
- Derating factor for current variation (A_2).

Short circuit current of PV modules $I_{SC\ STC}$ is the maximum current that one module can deliver measured under standard test conditions (STC). This data is also given by the manufacturer of PV modules.

Recommended derating factor for current variation (A_2): 0,80.

Ambient temperature inside boxes where are placed protections can reach easily 40°C or 45°C (for tropical countries it is necessary to consider higher values).

It should be applied a derating factor (A_1) as function of ambient temperature.

With previous considerations, rated current of fuse-link should be:

$$I_N(\text{fuse link}) \geq \frac{I_{SC\ STC}}{A_1 \cdot A_2}$$

For example, if we consider a maximum ambient temperature of 45°C, the rating to use would be:

$$I_N(\text{fuse link}) \geq \frac{I_{SC\ STC}}{0,90 \cdot 0,80} \geq I_{SC\ STC} \cdot 1,4$$



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The data reflected in this technical record are subject to the correct installation of the product in accordance with manufacturer's instructions, relevant installation standards and professional practices, maintained and used in applications for which they were made.

The products described in this document have been designed, developed and tested in accordance with specific standard. They are considered components that are integrated as part of installation, machine or equipment. The correct general operation of the referred product is responsibility of the manufacturer of the installation, machine or equipment.

DF ELECTRIC cannot guarantee the characteristics of an installation, machine or equipment that has been designed by a third party. Once a product has been selected, the user must verify that it is appropriate for its application, through the verifications and/or tests that it deems appropriate.

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