

gPV

NH XL 1500V DC

fuse links



**PROTECTING
THE WORLD**





RATED VOLTAGE
1500V DC

RATED CURRENT
315A...400A

BREAKING CAPACITY
30kA

STANDARDS

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



KNIFE BLADE

NH XL 1500V DC fuse links for photovoltaic applications

NH3 L gPV 1500 VDC fuse links for photovoltaic installations from DF Electric have been developed to offer a safety protection solution in sub-array, array or inverter DC input of photovoltaic installations.

The range comprises the following fuse links:

→ Size NH3 L 1500V DC 315A to 400A

There are two versions of contacts, knife type to use in fuse bases and bolted version to mount directly on busbar.

They provide protection against overloads as well as short-circuits (gPV class according to IEC60269 and UL248-19 Standards, with a minimum fusing current of 1,35In.

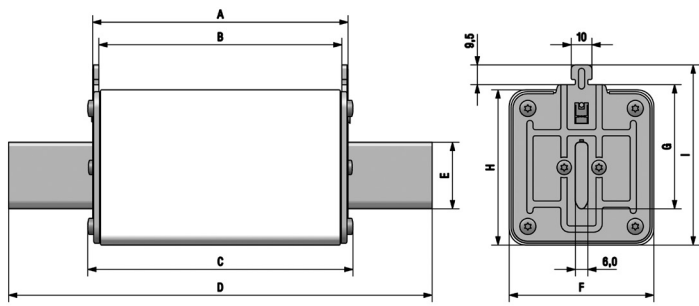
Made with ceramic body with high withstand to internal pressure and thermal shock. Contacts are made in silver plated copper or brass and melting elements are made in pure silver in order to avoid the aging and thus keep unalterable the electric characteristics. They have a low power losses values to get a good efficiency.

For these fuse links we recommend the utilization of **1500V DC NH3 L ST fuse bases**.

UL Listed (File E355019).



Dimensions



A	B	C	D	E	F	G	H	I
123,6	117,6	128,3	205	32	70	60	75	87

Weight 1,65kg

Range

In (A)	REFERENCE	PACKING Uni /BOX
315	372445	1/10
350	372448	1/10
355	372450	1/10
400	372455	1/10



BOLTED BLADE

RATED VOLTAGE

1500V DC

RATED CURRENT

315A...400A

BREAKING CAPACITY

30kA

STANDARDS

IEC/EN 60269-1

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UL248-1

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BOLTED BLADE

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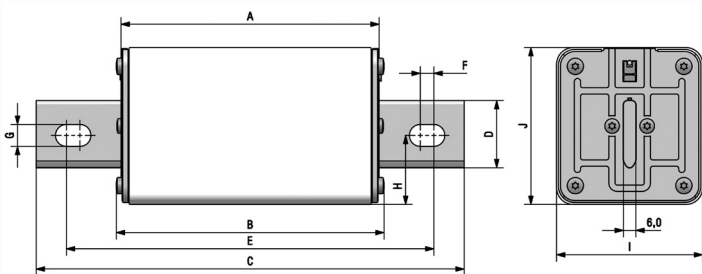
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UL Listed (File E355019).



Dimensions



A	B	C	D	E	F	G	H	I	J
123,6	128,3	205	32	176	6,5	10,5	33	70	75

Range

In (A)	REFERENCE	PACKING Uni /BOX
315	372445B	1/10
350	372448B	1/10
355	372450B	1/10
400	372455B	1/10

Weight	1,60kg
Recommended torque for connection screws (M10)	30...35Nm
Minimum recommended distance between fuse links	15mm



Technical data

Rated voltage	1500V DC
Rated current	315A...400A
Rated breaking capacity	30kA
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

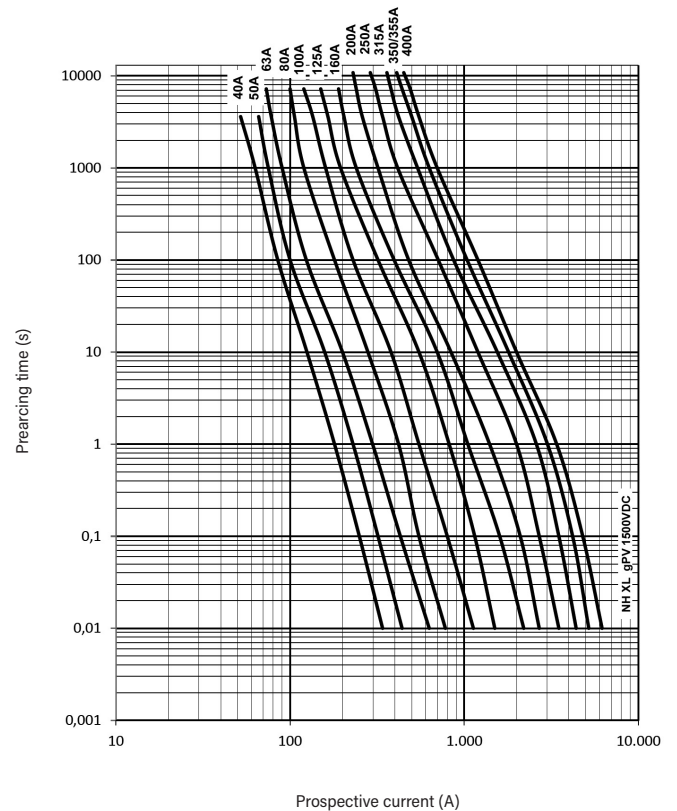
IEC/EN 60269-1
IEC/EN 60269-6
UL248-1
UL248-19
RoHS Compliant



Materials

Body	Ceramics
Contact blades	Copper or brass (silver plated)
Plates	Aluminium
Screws	Zinc plated steel

t-I characteristics

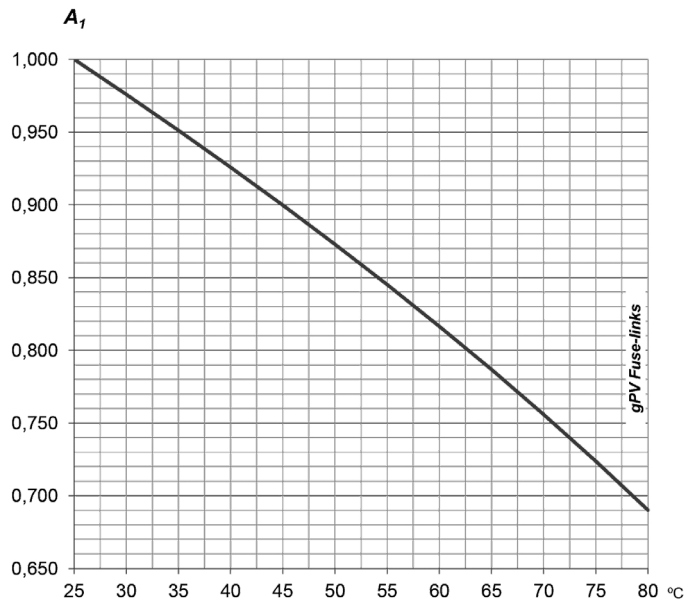


Power dissipation

I _n	PREARcing I _t	OPERATING I _t	POWER DISSIPATION 0.7 · I _n	POWER DISSIPATION I _n
(A)	(A ² S)	(A ² S)	(W)	(W)
315	114000	172080	25	61
350	159230	240350	26	66
355	159230	240350	27	68
400	212000	320000	30	75



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 application's 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:

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

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

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

$$I_N(\text{fuse link}) \geq 1,40 \cdot I_{SC\ STC} \cdot N_S$$



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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.

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