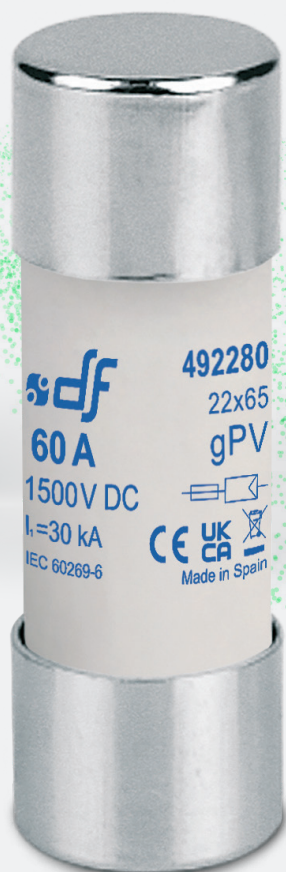


**HORUS**  
PHOTOVOLTAIC  
PROTECTION



**PROTECTING  
THE WORLD**

# PHOTOVOLTAIC

FUSE LINKS & FUSE HOLDERS FOR PHOTOVOLTAIC APPLICATIONS

## gPV CYLINDRICAL fuse links

CYL

22x65



10x38

14x51

10x85

10/14x85

22x65



RATED VOLTAGE  
1500V DC

RATED CURRENT  
40A...60A

BREAKING CAPACITY  
30kA

#### STANDARDS

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



## Cylindrical fuse links for photovoltaic applications

gPV 22x65 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 22x65 1500V DC 40A to 60A

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

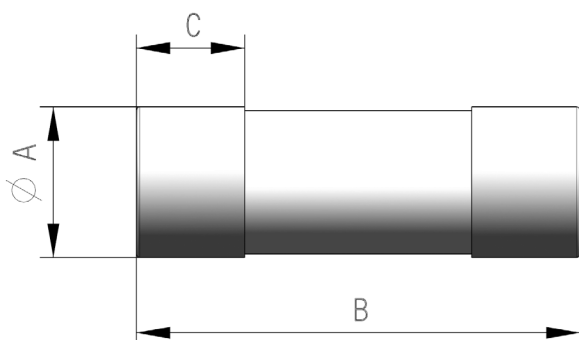
Made with ceramic tube with high withstand to internal pressure and thermal shock, that allows a high breaking capacity in a reduced physical space.

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 **22x65 PMX-PV fuse holders**.



## Dimensions



A	B	C
22,3	65	15,5

Weight 58gr

## Range

I <sub>n</sub> (A)	REFERENCE	PACKING Uni /BOX
40	<b>492270</b>	10/260
45	<b>492272</b>	10/260
50	<b>492275</b>	10/260
55	<b>492278</b>	10/260
60	<b>492280</b>	10/260

## Technical data

Rated voltage	1500V DC
Rated current	40A...60A
Rated breaking capacity	30kA
Operating class	gPV
Minimum interrupt rating	1,35·I <sub>n</sub>
Non fusing current	1,13·I <sub>n</sub>
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

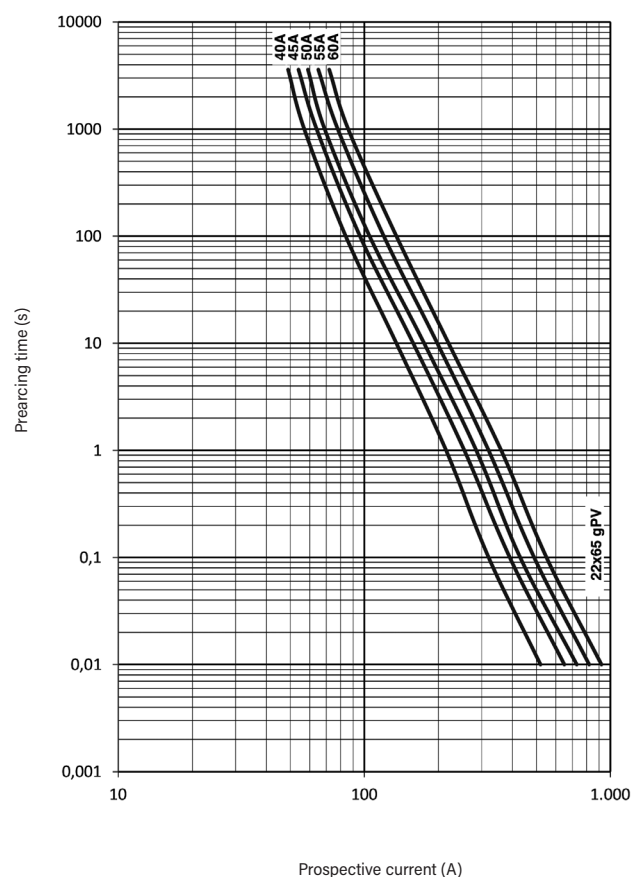
IEC/EN 60269-1  
IEC/EN 60269-6  
UL248-1  
UL248-19  
RoHS Compliant



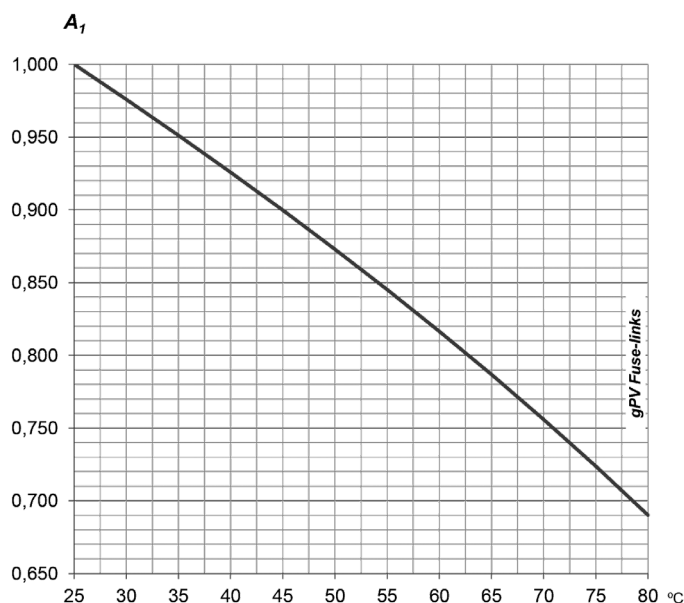
## Power dissipation

I <sub>n</sub>	PREARcing I <sup>2</sup> <sub>t</sub>	OPERATING I <sup>2</sup> <sub>t</sub>	POWER DISSIPATION 0,7 · I <sub>n</sub>	POWER DISSIPATION I <sub>n</sub>
(A)	(A <sup>2</sup> S)	(A <sup>2</sup> S)	(W)	(W)
40	590	1.355	3,80	9,5
45	1.050	2.400	3,80	9,5
50	1.330	3.050	4,00	10,0
55	1.325	3.100	4,70	11,7
60	1.800	3.900	4,95	12,5

## t-I characteristics



## Ambient temperature derating factor



$t_a$ (°C)	$A_1$
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 undesired 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:

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





# PROTECTING THE WORLD

## HEAD OFFICE AND FACTORY

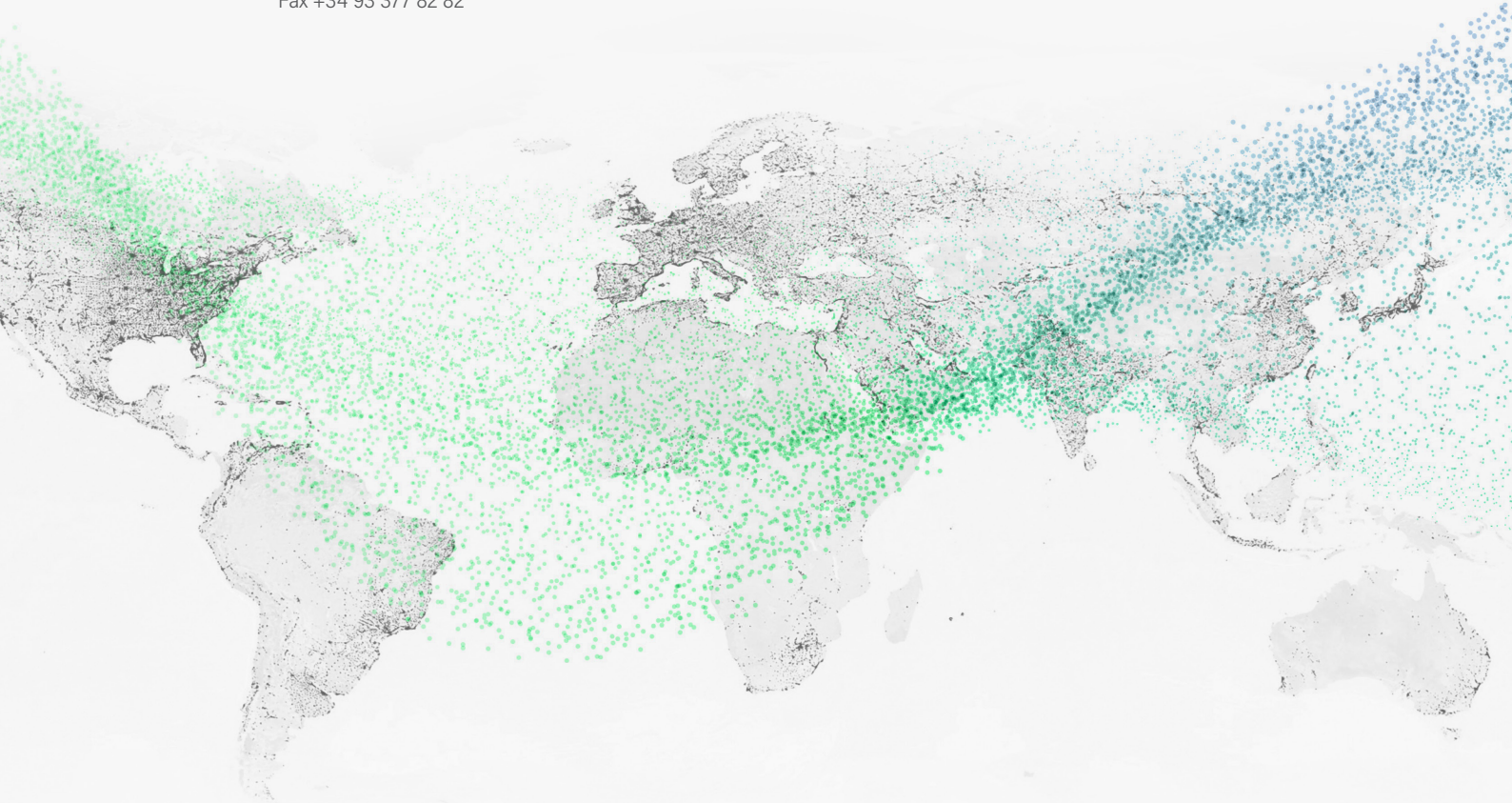
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The "electro technical expert" logo marked on the products included in this data sheet indicates that the installation of these products must be carried out by expert personnel with specialized knowledge.



To prevent electrical hazards, carry out the installation without voltage.



**Safety notice**  
Please capture the following QR code and read our safety notice carefully before installing our products.



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.

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