

White Paper for PV Module Fuse Current Rating

光伏组件熔丝电流等级白皮书

Foreword

前言

Along with the continuous development of the PV technology, the efficiency and the power of a PV module is being improved constantly, the relevant electrical performance indicators are also increasing gradually and especially the increase of the short-circuit current is related to selection of the fuse current rating at a PV system application client. As a result, this White Paper aims to explain the fuse current rating of a PV module of Trina for the reference by the PV system application client.

随着光伏技术的不断发展，光伏组件的效率和功率不断提升，相关电性能指标也逐步攀升，尤其短路电流的提升关乎到光伏系统应用端的熔丝电流等级的配套选择，本白皮书旨在说明天合光伏组件的熔丝电流等级以供光伏系统应用端参考使用。

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1. Function of Fuse and Basis for Confirmation of Fuse Current Rating 熔丝的作用和电流等级确定依据

1.1 Function of Fuse 熔丝的作用

In a PV power station, a string of PV modules is connected in series to the DC combiner box which generally does not apply an anti-reflective diode but a fuse. When an earth fault is found in a string of PV modules due to factors such as animal's bite or any other external force, causing any other string of PV modules to make the current of the faulty string flow backward, the fuse will be blown under high current to prevent the current from flowing backward and avoid damaging the faulty string or any fire risk due to the current flowing backward.

在光伏电站中，光伏组件串接入直流汇流箱，通常直流汇流箱采用熔丝且未加装防反二极管，由于动物啃咬或其它外力等因素造成光伏组件串出现接地故障，造成其它正常光伏组件串对故障串进行电流倒灌，在大电流下，熔丝熔断，从而起到阻止电流倒灌的作用，避免因电流倒灌而损坏故障串或火灾危险。

1.2 Basis for Confirmation of Fuse Current Rating 熔丝电流等级确定依据

The fuse current rating is to be confirmed mainly according to the provisions in 2016 IEC61730 MST26 and 2004 UL1703, relating to fuse current.

主要依据 2016 IEC61730 MST26 和 2004 UL1703 对熔丝电流的规定。

The technological development of Trina and the improved power of the product shall be combined.

结合天合技术发展和产品功率提升。

Standard 标准	Content 内容
2016 IEC61730 MST26	Isc x 1.25 < Rated current (Rated current of the junction box) Isc x 1.25 < Rated current (接线盒额定电流)
	Fuse rating x 1.35 < Reverse current (Reverse current of the module) Fuse rating x 1.35 < Reverse current (组件反向电流)
2004 UL1703 28 款 28 types	Isc x 1.25 < Rated current (Rated current of the junction box) Isc x 1.25 < Rated current(接线盒额定电流)
	Fuse rating x 1.35 < Reverse current (Reverse current of the module) Fuse rating x 1.35 < Reverse current (组件反向电流)
	Fuse rating > Isc x 1.56

2. Fuse Current Rating of Trina's Module 天合组件熔丝电流等级

For the existing 5BB cell modules of Trina, the fuse current is as follows:

天合现行的 5BB 电池组件，熔丝电流如下：

Product branding name 产品品牌名	Product code name 产品型号	Fuse rating (A) 熔丝电流 (A)	Product branding name 产品品牌名	Product code name 产品型号	Fuse rating (A) 熔丝电流 (A)
Honey	TSM-PD05	20	Spacemax	TSM-DC03A.08(II)	20
Honey	TSM-PD05.05	20	Trinasmart	TSM-DD05A.082(II)	15
Honey	TSM-PD05.08	20	Trinasmart	TSM-DD05A.052(II)	15
Tallmax	TSM-PD14	20	Trinasmart	TSM-PD05.082	15
Duomax	TSM-PEG5	20	Trinasmart	TSM-PD05.08U	15
Duomax	TSM-PEG5.07	20	Trinasmart	TSM-DD05A.08U(II)	15
Duomax	TSM-PEG5.40	20	Trinasmart	TSM-DD05A.05U(II)	15
Duomax	TSM-PEG5.47	20	Trinaswitch	TSM-PD05.08S	15
Duomax	TSM-PEG14	20	Trinaswitch	TSM-DD05A.08S(II)	15
Duomax	TSM-PEG14.07	20	Trinamount I/II	TSM-DD05A.18(II)	20
Duomax	TSM-PEG14(II)	20	Trinamount I/II	TSM-DD05A.15(II)	20
Duomax	TSM-PEG14.40	20	Trinamount I/II	TSM-DD05A.10(II)	20
Duomax	TSM-PEG14.47	20	Trinamount I/II	TSM-PD14.18	20
Duomax	TSM-PEG40.07	20	Trinamount I/II	TSM-DD14A.18(II)	20
Duomax M Plus	TSM-DEG5(II)	20	Trinamount I/II	TSM-DD14A.10(II)	20
Duomax M Plus	TSM-DEG5.07(II)	20	Trinamount 3 D10	TSM-PD05.50	20
Duomax M Plus	TSM-DEG5.40(II)	20	Airmax	TSM-PC05B	20
Duomax M Plus	TSM-DEG5.47(II)	20	1500V	TSM-PE05A	20

Duomax M Plus	TSM-DEG14(II)	20	1500V	TSM-PE05A.08	20
Duomax M Plus	TSM-DEG14.07(II)	20	1500V	TSM-PE14A	20
Duomax M Plus	TSM-DEG14.40(II)	20	1500V	TSM-DE05A(II)	20
Duomax M Plus	TSM-DEG14.47(II)	20	1500V	TSM-DE05A.08(II)	20
Tallmax M Plus	TSM-DD14A(II)	20	1500V	TSM-DE14A(II)	20
Honey M Plus	TSM-DD05A(II)	20	Trinapeak	TSM-PD05.08D	15
Honey M Plus	TSM-DD05A.08(II)	20	Splitmax	TSM-DC06.08(II)	20
Honey M Plus	TSM-DD05A.05(II)	20	Off Grid	TSM-PC20	20
Trinaswitch	TSM-DD05A.05S(II)	15	Off Grid	TSM-PC22	20
Trinamount I/II	TSM-PD05.18	20	Off Grid	TSM-PC26	20

3 Fuse Application Mode 熔丝应用方式

Both the positive and the negative electrodes of each string of modules, which is connected to the DC combiner box, are provided with fuse protection, as shown in Fig. 1.

接入直流汇流箱的每一串组件的正负极都设置熔丝保护，如图 1 所示：

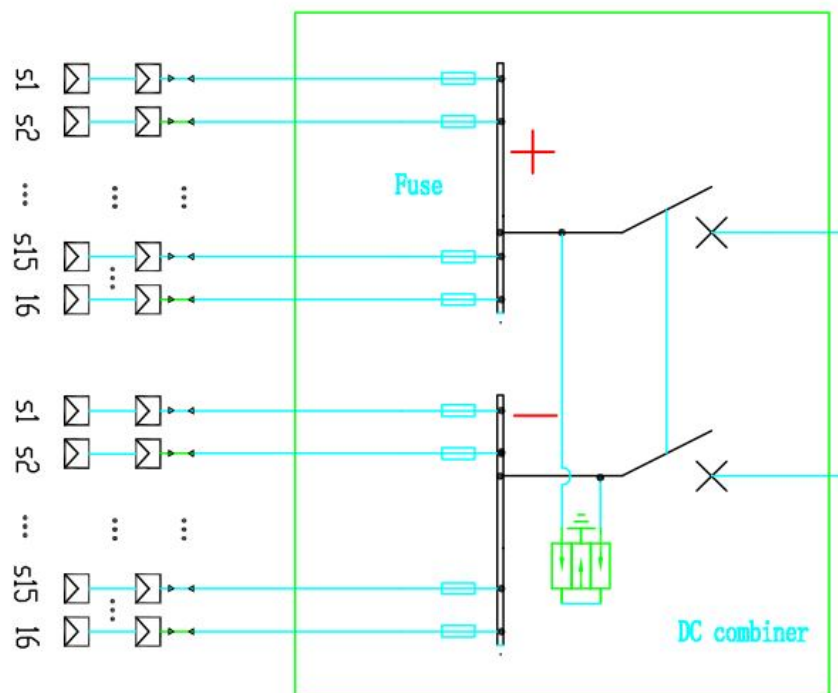


Fig. 1 Application Mode of Fuse of String of Modules

图 1 组串熔丝应用方式

It's recommended that the fuse cannot be connected to the combiner box with two or more strings connected in parallel, as shown in Fig.2

不建议两串或多串并联汇集后的再设置熔丝保护，如图 2 所示：

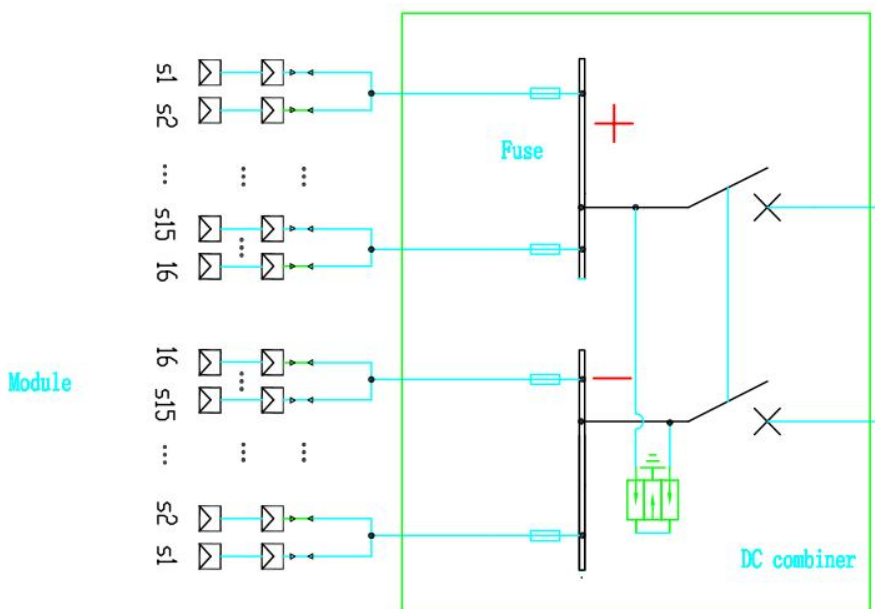


Fig. 2 Wrong Application Mode of Fuse of String of Modules

图 2 不建议组串熔丝应用方式

4. Fuse Replacement Method and Notes 熔丝更换方式与注意事项

Fuse replacement shall be done by a professional electrical technician with tools such as electrical safety protection equipment, insulating boots, and insulating gloves. Visual inspection or instrument shall be used to check whether the fuse is damaged. To replace the damaged fuse, the corresponding string of modules and the breaker inside the DC combiner box shall be cut off first. After replacement is completed, the string of modules and the combiner box shall be connected electrically and then the breaker shall be switched on.

更换熔丝必须要专业的电气技术人员操作，并配备电气安全防护工具，绝缘靴和绝缘手套等工具。采用外观或仪表检测熔丝损坏，更换时需要先断开直流汇流箱中的断路器和相应的组串，然后再进行更换。更换完成后，先接通组串与汇流箱的电气连接，然后合闸断路器。

For specific operations, electrical safety regulations and relevant codes shall be followed as well. 具体操作也应符合电气安全规范、相关法规。

5. Conclusion 结语

Fuse current involves the protection for strings of modules and both the positive and the negative electrodes of each string of modules, which are connected to the DC combiner box, shall be equipped with fuse; fuse shall not be connected to combiner box if two or more strings of modules are connected in parallel. The fuse current value of a Trina's module shall be confirmed in accordance with the existing IEC61730 and UL1703 standards. Trina Solar will continue to do research and monitoring and update the White Paper when appropriate.

熔丝电流涉及对组件串的保护，每一组串的正负极接入直流汇流箱均应配置熔丝，不建议两串或多串组件并联后再配置熔丝。天合组件的熔丝电流值依据 IEC61730 和 UL1703 现行标准确定。天合光能会持续不断进行研究和监控，并在适宜时候更新该白皮书。

The right to interpret the White Paper shall belong to Trina.

该白皮书解释权归属天合。

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