组件安装手册

PV Module Installation manual

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1. 基本信息 Basic Information

1.1 概述 Summary

首先感谢您选择使用明阳光伏的太阳能电池组件，为了正确的安装和获得稳定的电力输出，安装及使用组件前请仔细阅读下面的安装说明。请记住你使用的是一款发电产品，因此为了避免意外事故的发生，需要采用相应的安全措施。

Firstly, thanks for choosing Mingyang Solar PV modules. In order to ensure the PV modules to be installed correctly and to have power output stability, please read the following operation instructions carefully before installing and using. Please remember that you are using an electricity generation product, in order to avoid any accident, it should apply relative security measures.

请确保组件连接以后产生的电流、电压值在此阵列所连接的其他装置的电流、电压值的适用范围之内，太阳能组件能承受的最大系统电压为 1500V DC。如果组件安装在屋顶的话，必须安装在具有一定防火能力的屋顶上，可以咨询当地的建筑部门来决定使用何种屋顶材料。

Second, make sure that the current and voltage values which generated after the connection of the module are within the range of the current and voltage values of the other devices connected to the PV array. The maximum permitted system voltage (DC) of the modules is 1500V DC. If installed on the rooftop, modules must be installed on fireproofing materials. Please consult your local building department to determine the t roofing material to be applied.

太阳能组件应用等级为 A：危险电压（IEC 61730:高于 50V DC；EN 61730：高于 120V），危险功率（高于 240 W），根据 EN IEC 61730-1 和-2 标准，组件质量满足安全要求且安全等级为 II。

PV module application class is A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: Higher than 120V), hazardous power (higher than 240W), according to EN IEC61730-1 & -2 standards, the quality of PV modules can meet the safety requirements and safety level II.

1.2 应用产品 Products application

此文件适用于明阳光伏如下系列产品：

MYMH-72HD、MYMP-72HD、MYMP-72HS

This document is applicable to the series of Mingyang solar module as listed below:

MYMH-72HD、MYMP-72HD、MYMP-72HS

1.3 警告 Warning

1) 当组件暴露在太阳光或者其他光源下，组件内有直流电流产生，此时与组件的电气部分接触可能会发生触电危险。

When Module exposed to sunshine or other lights, it can produce DC, in this case it may cause electric shock hazard to physical touch.

2) 不要用镜子或透镜聚焦阳光照射到太阳电池组件上。

Focus sunlight on to PV module via mirror or lenses is prohibited.

3) 太阳能电池组件的前玻璃和后玻璃具有保护组件的作用，破损的太阳能组件具有电危险性（电击和着火），这样的组件不能修复或维修，应该立即更换掉。

Front glass and backsheet have protective effect. Broken PV modules have electrical hazard (electric shock and burnt) which, should be replaced immediately and not be fixed or repaired.

4) 普通室外条件下，组件产生的电流和电压与参数表中列出的有所不同。参数表是在标准测试条件下测得，所以在确定光伏发电系统中其它部件的额定电压、导线容量、保险丝容量、控制器容量等和组件功率输出有关联的参数时，

参照标在组件上的短路电流和开路电压的值，并按 125%的值设计和安装。

Under nominal outdoor condition, the current and voltage produced by module are different to datasheet. The parameters in datasheet is tested under STC condition, therefore when determining other components rated voltage, wire capacity, fuse rate, controller capacity and parameter relevant to PV module power output, please refer to the short circuit current and open circuit voltage of the PV module to which use 125% value to design and install the system.

5) 为降低发生电击或燃烧的风险，可以在安装太阳电池组件时用不透光材料覆盖在组件表面。

In case to lower electric shock or firing risk, it's better to cover the PV modules by opaque material when installing.

6) 组件阵列的安装工作必须在具有隔离太阳光装置的情况下进行，并且由有资质的专业人员才能进行组件的安装和维护。

PV array installation should be conducted under isolating sunlight condition and maintenance also shall be implemented by professionals.

7) 如果光伏系统用到蓄电池，与组件的配置应遵循蓄电池厂家的意见。

If power bank equipped in the PV system, it should comply with battery supplier's suggestions.

8) 组件不能用于替代屋顶及墙体材料，部分替代也不允许。

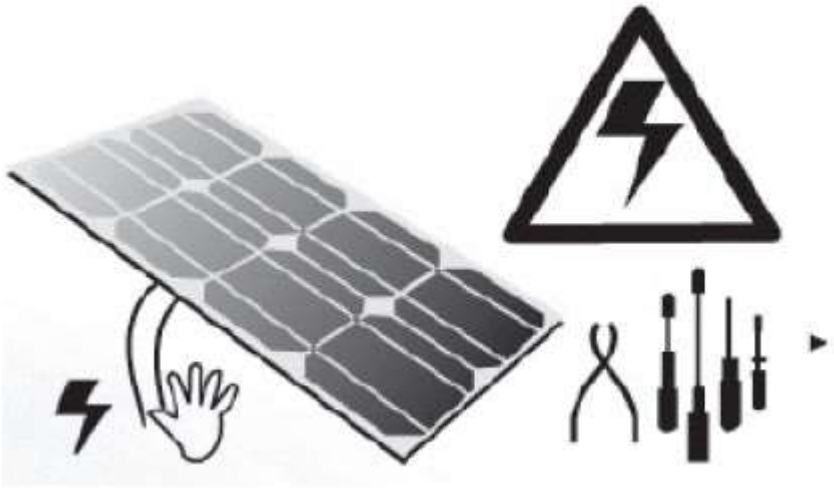
PV modules shall not substitute rooftop and wall material in any circumstances.

9）不能将组件安装于可能有可燃性气体的区域。

Don't install PV modules in the area where combustible gases may exist.

10) 禁止用手直接接触组件的电气部分，应使用绝缘工具进行电气连接。

Direct hand touch on PV module's electrical part directly is prohibited. Instead, insulating tools shall be used when connect the electrical parts.



使用符合电力
安装工作绝缘要求的工具
Use tools that meet the insulation
requirements of power installation

11) 不能私自拆除明阳光伏提供的太阳电池组件的任何零部件。

Don’t dismantle any components of Mingyang Solar PV module without MINGYANG’s approve.

12) 安装、接线及维护组件前必须阅读并理解所有的安装指导说明。

Please read and comprehend all the installation instructions before Installation, connection and maintenance.

13) 不要使用提拉接线盒或连接线的方式把组件抬起来。

Don’t lift modules by junction box or connecting cables.

14) 所有的组件系统都需接地，如果没有特殊规定的话，请遵照国际电工标准或者其它的国际标准。

All the modules system should be grounded. Provided without particular regulations, please refer to International Electrical Standard or other International Standards.

15) 当组件运到安装地以后，所有的部件都应该小心的拆包。

After modules delivered to the installation site, all the components should be unpacked carefully.

16)不要站、坐、趴在组件上面，这样会损坏组件，并有对人造成伤害的风险。

Please do not stand, sit, or lie on modules, it may damage modules and also have injury risks.

17) 同尺寸同规格型号的组件才可以串联在一起。

Only identical size and specification modules can be connected together.

18) 在所有的运送过程中，请确保运输工具或组件不会受到大的震动，因为震动可能会损坏组件或者对组件内的电池片造成隐裂。

During delivery please make sure transport tools or modules are not subjected to large vibrations since vibrations may cause modules damage or microcrack inside solar cells of modules.

19) 在所有的运送过程中，千万不要让组件从运输工具，房子上，或者手中掉落到地上，因为这会损坏组件或组件内的电池片。

During all the delivery, do not allow modules to fall from transport tools, house or hand, this will damage modules or cells inside.

20) 不要用有腐蚀性的化学药剂来擦拭组件。

Do not wipe the module with corrosive chemicals.

21) 当负载工作时，不要擅自断开组件的连接。

Please do not disconnect the modules in working status.

2. 安装 Installation

2.1 安装安全 Installation Safety

◆安装的时候要戴上防护头套、绝缘手套，穿上橡胶绝缘鞋。

◆Please wear protective helmet, insulated gloves, and rubber shoes during installation work.

◆安装的时候再把组件拆包。

◆Keep the PV module packed until installation begins.

◆在安装过程中，避免不必要地去触摸组件，组件的表面可能很热，这会有烧伤或者电击的危险。

◆To avoid unnecessary physical touching of the PV module during installation, given that the surface of modules may over heat and it has risk of burning and electric shock.

◆不要在下雨，下雪或者大风的天气条件下安装。

◆Do not install in raining, snowing or windy weather conditions.

◆由于有电击的危险，如果组件的接线盒端子是湿的，请不要执行安装作业。

◆Due to the risk of electric shock, please do not proceed the installation work if junction box was wet.

◆使用绝缘干燥的工具，不要使用湿的工具。

◆Use insulated and dry tools, do not use wet tools.

◆安装时，不要乱摔任何物体（如组件或工具）。

◆Do not throw any objects during installation (such as PV module or tools).

◆请确保安装地点附近，不会有或者不会产生可燃性气体。

◆Make sure that combustible gasses are not generated or present near the installation site.

◆正确无误地连接公母连接头，检查接线状况，所有的连接线不得脱离组件。

◆Correctly connect the male and female connectors , inspect the wiring status and all the cables must not be separated from the PV module.

◆不管组件有没有连接到光伏系统，在安装过程或者是有光照照在组件上的时候，请不要裸手接触接线盒或者公母头。

◆Do not touch junction box and the end of the connectors (male and female) with bare hands during installation or under sunlight, regardless the PV module is connected or disconnected to the PV system.

◆ 不要在组件表面加过重的力或者物体。

◆Do not expose the PV module to excessive loads on the surface of the PV module.

◆不要在组件的玻璃放过重的物体或者进行撞击，这可能会损坏电池片或者造成电池片隐裂。

◆Do not strike or put excessive loads on the glass or back sheet, this may break the cells or cause micro crack.

◆不要使用尖锐的工具去擦洗组件的玻璃，这会在组件上留下划痕。

◆Do not use sharp tools to wipe the glass of PV module. It would leave scratches on the module.

◆不要擅自在组件边框上进行钻孔。

◆Do not drill holes on the frame of PV module.

◆对于 BIPV（即光伏建筑一体化）或是安装在屋顶的结构，请尽量遵循“从上到下”和/或“从左到右”的安全原则，请不要站到组件上面去，因为那样会损坏组件，也会对人身安全造成危险。

◆For BIPV (building integrated photovoltaic) or rooftop mounting structure installation, please try to follow the “from top to bottom” and/or “from left to right”

principle, and do not step on the module that will damage the module and would be dangerous for personal safety.

2.2 安装条件选择 Installation Condition

1） 气候条件 Climatic Condition

a.推荐的安装环境温度在-40 ℃ to 85 ℃（-4 ℉ to 185 ℉）之间。

a. Recommended installation ambient temperature is between -40 ℃ to 85 ℃ (-4 ℉ to 185 ℉).

b.不要将组件安装在有可能被水浸没的地方。

注意：组件机械载荷（包括风和雪的压力）是基于安装方法和安装地点的，在计算机械载荷时必须由专业的安装人员根据系统的设计要求来计算。

b. Do not install PV modules in a area where may be flooded

Note: The PV module's mechanical load (including the wind and snow pressure) is based on the installation method and installation site. During the collection of mechanical load, it must be calculated by a professional installer according to the requirements of system design.

2) 安装地点选择 Installation Site Selection

一般情况下，太阳能组件应安装在全年接受到光照最多的位置。在北半球，组件最好朝南放置，而在南半球，组件最好朝北放置。如果组件倾斜的角度偏离正南（或正北）方向 30 度将损失大约 10%至 15%的功率输出；如果组件倾斜的角度偏离正南（或正北）方向 60 度将损失大约 20%至 30%的功率输出。在选择位置的时候，要避免树木、建筑或其他障碍物对组件产生阴影。尽管厂家已经安装了适当的旁路二极管以最小化此损失，但是阴影仍会造成输出功率的减少。

In general, the PV modules should be installed in the place with the maximum sun radiation throughout the year. In the northern hemisphere, modules should be placed toward south as the first choice, while in the southern hemisphere, it should be placed toward north. If the angle of the modules deviate 30°angle away from the South (or

North) direction, the power output would lose about 10% to 15%; if modules angle deviation is 60°, loss rate is about 20% to 30% of power output. The installation site should avoid shadows of tree, building and other obstacles. Module manufacturer have already installed the bypass diode to minimize the loss, but the shadow will still reduce the output.

当光伏发电系统用到蓄电池，则蓄电池必须安装正确，这样可以保护系统的运行及确保用户的安全使用；请遵照蓄电池生产商关于安装指导说明、运行和维护的建议；总的来说，电池（或电池组）应该远离人和动物的主要交通要道；在保证蓄电池正常工作的同时，应避免阳光直射、雨雪侵蚀，同时保持良好的通风；大多数电池在充电时会产生氢气，很容易发生爆炸，务必不要在电池周围点明火或者制造火花；如果电池装在户外，必须放置在特别设计的地方，且绝缘和通风性能良好。

When the PV system equipped with batteries, it must be installed correctly, which can protect the system operation and ensure the safety of user during their using; Please follow the recommendations of the battery manufacturer regarding installation instructions, operation and maintenance; To ensure that the battery is working properly, which should avoid direct sunlight, rain and snow erosion, meanwhile maintaining good ventilation; Most battery recharging could release hydrogen in which explosion could easily take place. Do not set fire or make spark around the batteries. If the battery installed outdoors, which must the placed in a specially designed area with insulation and ventilation.

不要将组件安装在靠近明火或者是易燃材料的地方。

Do not install the PV modules where there is fire or flammable material.

不要把组件安装在会浸泡在水里的地方或是持续暴露在水车、喷泉旁的地方。

Do not install the PV modules in places where it would be immersed in water or continually exposed to water from a sprinkler or fountain etc.

3) 倾斜角的选择 Angle Selection

太阳能组件的倾斜角指的是组件表面与地平面之间的夹角（如下图 1），组

件正对着太阳的时候功率输出最大。

The angle of the PV modules refers to the angle between module surface and the ground (Figure 1), the output power will be maximized when modules are facing the sun in vertical.

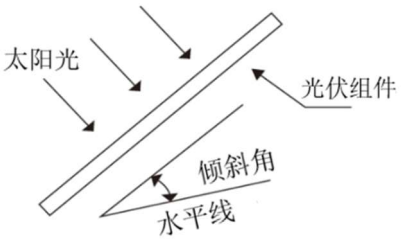


Figure 1: the installation angle of PV Module

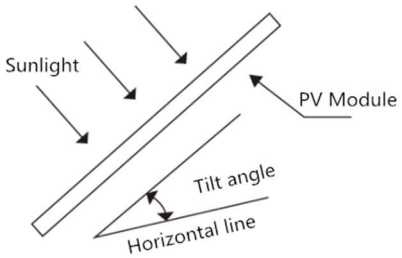


Figure 1: the installation angle of PV Module

如果连接到独立光伏系统，组件的安装角度应该根据季节和光照的情况来获得最大化的功率输出，一般来讲，如果组件的输出在一年内光照强度最低的情况下也可以满足的话，那所选择这个角度的组件输出就能满足全年的需求；对于并网连接的系统，组件的安装角度应该基于全年的输出最大化这个基础原则来选择。

If connected to the independent PV system, modules angle should be based on seasons and sunshine condition to obtain the maximized power output. Normally, if module's power output could be satisfied during the lowest sunshine intensity of a year, then this installation angle can meet the demands of the whole year; For grid-connected PV system, the installation angle selection of the modules should be based on maximum of annual power output.

2.3 安装方法介绍 Instruction of Installation

PV 模块可以使用通过安装的防腐蚀 M8 螺栓安装到下部结构上。孔后部的模块或专门设计的模块夹具。不管固定方法，模块的最终安装必须确保：

PV modules can be mounted to the substructure using either corrosion-proof M8 bolts placed through the mounting via holes on the rear of the module or specially designed module clamps. Regardless of the fixing method the final installation of the modules must ensure that:

1) 在模块框架和墙壁或屋顶的表面之间提供至少 120 毫米（推荐）的间隙。如果采用其他安装方式，这可能会影响 UL 列表或火灾等级等级。

A clearance of minimum 120 mm (recommended) is provided between modules frame and the surface of the wall or roof. If other mounting means are employed this may affect the UL Listing or the fire class ratings.

2) 两个模块之间的最小距离为 10 mm（0.4 in）。

The minimum distance between two modules is 10 mm (0.4 in).

3) 安装方法不会堵塞组件排水孔。

The mounting method does not block the module drainage holes.

4) 面板不受超过最大允许载荷的风或雪载荷的影响，并且不会由于支撑结构的热膨胀而受到过大的力。

Panels are not subjected to wind or snow loads exceeding the permissible maximum loads, and are not subject to excessive forces due to the thermal expansion of the support structures.

◆螺丝安装方法 Screws installation method

1) 每个模块的框架有 8-ϕ9×14 mm 和 4-ϕ7×10 mm 的安装孔，理想地放置以优化负载处理能力，以确保模块支持结构。

The frame of each module has 8-ϕ9×14 mm and 4-ϕ7×10 mm mounting holes, ideally placed to optimize the load handling capability and to secure supporting structure of the modules

2) 用 M8 螺栓和平板垫圈、弹簧垫圈和螺母固定在每个固定位置的模块，如图 1 所示，并拧紧到 16～20 N.m（140～180 lbf.in）的扭矩。

Secure the module in each fixing location with an M8 bolt and a flat washer, spring washer and nut as shown in Figure 1 and tighten to a torque of 16~20 N.m (140-180 lbf.in.).

3) 与框架接触的所有部件均应使用厚度最小为 1.8 mm 的扁平不锈钢垫圈，外径为 20~24 mm（0.79～0.94 in）。

All parts in contact with the frame should use flat stainless steel washers of

minimum 1.8 mm thickness with an outer diameter of 20-24 mm (0.79-0.94 in).

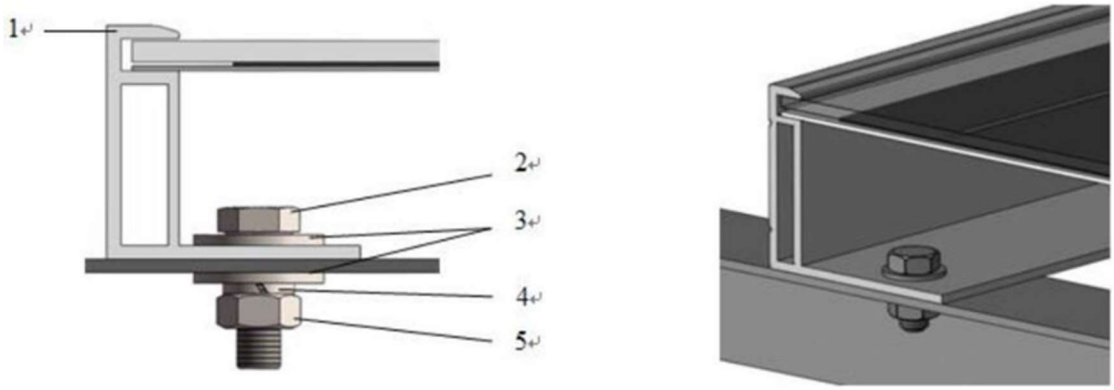


图1. 采用螺栓装配方法安装光伏组件
1）铝合金框架　　2）M8不锈钢螺栓
3）不锈钢平垫圈　　4）弹簧不锈钢垫圈
5）六角不锈钢螺母

Figure 1. PV module installed with Bolt fitting method
1) Aluminum Frame　　2) M8 Stainless Bolt
3) Flat Stainless Washer　　4) Spring Stainless Washer
5) HEX Stainless Nut

组件型号 PV Module	功率 Power （W）	功率范围 Rated Power （W）	尺寸 Dimension （mm）	组件厚度 Module thickness （mm）	安装孔径 Installation hole pitch （mm）
MYMH-72HD	560	560-565	2278*1134*30	30	400；1100；1400
	565	565-570			
	570	570-575			
	575	575-580			
	580	580-585			
	585	585-590			
MYMP-72HD	530	530-535	2278*1134*30	30	400；1100；1400
	535	535-540			
	540	540-545			
	545	545-550			
	550	550-555			
MYMP-72HS	535	535-540	2278*1134*35	35	400；1100；1400
	540	540-545			
	545	545-550			
	550	550-555			
	555	555-560			

◆ 夹具安装方法 ◆Clamps Mounting Methods

1) 夹具必须与模块框架重叠至少 7 mm，但不超过 11 mm。

The clamp must overlap the module frame by at least 7 mm but no more than 11 mm.

2) 使用至少 4 个夹具来固定安装导轨上的模块。

Use at minimum 4 clamps to fix modules on the mounting rails.

3) 模块夹不应接触前玻璃，不能使框架变形。

Modules clamps should not come into contact with the front glass and must not deform the frame.

4) 一定要避免来自模块夹具的遮蔽效应。

Be sure to avoid shadowing effects from the module clamps.

5) 模块框架在任何情况下都不需要修改。

The module frame is not to be modified under any circumstances.

6) 在选择这种类型的夹具安装方法时，在每个模块上使用至少四个夹子，在模块的每个长边(用于纵向方向)或模块的每一个短边上都应该安装两个夹具(用于景观方向）。根据当地的风和雪负荷，可能需要额外的夹具，以确保模块可以承受负载。72P 光伏组件长边上的四个夹子到短边框距离不小于 340 mm。

When choosing this type of clamp-mounting method, use at least four clamps on each module and two clamps should be attached on each long sides of the module (for portrait orientation) or each short sides of the module (for landscape orientation). Depending on local wind and snow loads, additional clamps may be required to ensure that modules can bear the load. the distance from the four clamps on the long side of the 72P PV module to the short frame is not less than 340 mm.

7) 外加扭矩应参照螺栓使用的机械设计标准，EX:M8 6～20 N.m（140～180 lbf.in）。

Applied torque should refer to mechanical design standard according to the bolt customer is using, ex: M8-16～20N.m (140-180 lbf.in)

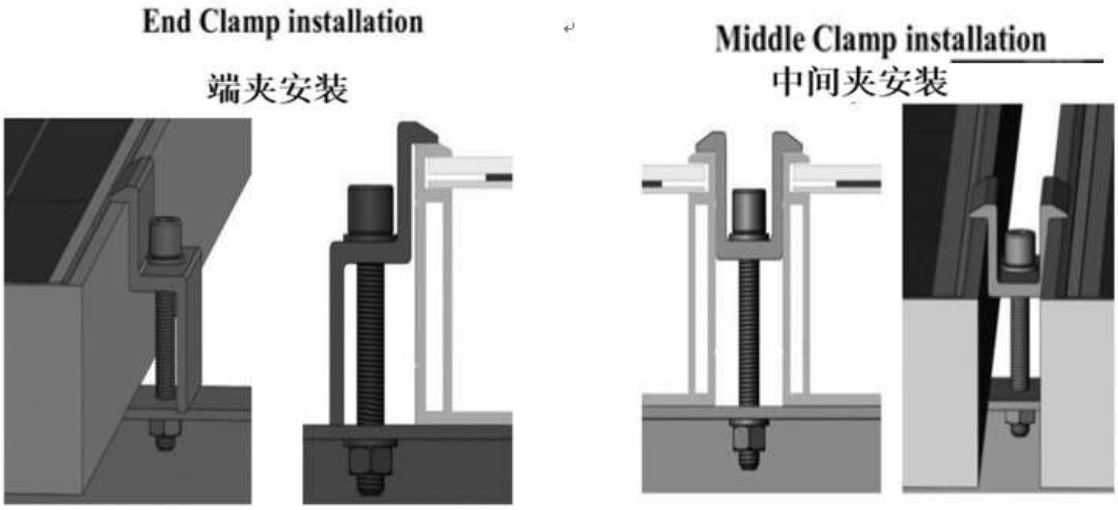


图2. 采用夹具安装法安装光伏组件

Figure 2. PV module installed with clamp fitting method

注意 Notes:

1) 这里介绍的所有安装方式只供参考，明阳光伏不负责提供相关的安装部件，组件系统的设计、安装。机器载荷和安全性必须由专业的系统安装商或者有经验的人来完成。

   All mentioned clamp mounting methods here are only for reference, Mingyang Solar will not be responsible for the system design and installation. The mechanical loads and its safety must be operated and completed by the professional solar system installer and experienced installation team.

2) 安装前，还需要确认以下重要的几项：

   Please ensure the following points before the clamps mounting:

a. 安装之前需检查是否有虫子或其它杂物以及接线盒的安全性能，如果有的话，需擦除。

   Before the mounting, please check the safety performance of the junction box. Any objects such as insects or others on the surface of solar panels must be removed.

b. 检查组件的序列号是否正确。

   Please check and ensure the PV modules serial number is correct.

3) 明阳光伏太阳能组件（只针对本说明书中涉及到的组件型号）（雪/风载荷）产品规范正面设计载荷的负荷 5400 帕，背面设计负荷 2400 帕，安全系数 1.5 倍。如果组件安装地环境为多雪和强风，在组件安装时应采取特殊的防护，

来满足实际要求。

Snow/wind load for Mingyang Solar PV module (only refers to the model involved in this specification): front side 5400 Pa, back sheet load 2400 Pa and safety factor 1.5 times. If modules installed in the snowy and strong windy environment, the special protection actions should be applied to meet the installation requirements.

3. 接线和连接 **Wiring and Connection**

3.1 开始安装之前请仔细阅读太阳能系统的操作手册，根据用户对于系统功率、电流和电压的要求，使用多口连接线串联或并联组件。

Before the installation, please read carefully the operation instructions of PV system. Using multi-connecting cables to make the PV modules in series or parallels, which is determined by the customers' requirements on the solar system power, current and voltage etc.

3.2 串联时，须选择同档位电流的太阳能组件进行连接，串联在一起的组件产生的电压不能高于系统允许的最高电压. 每串组件的数量由系统设计，逆变器类型及环境情况而定。

Please connect similar current level modules for series connection, and output voltage should not be higher than permitted system maximum voltage. Module number of each series depends on the system design, inverter type and the installation environment.

3.3 每串组件最大额定熔丝电流值标识在产品标签及规格参数表中。额定熔丝电流对应的是组件最高能承受的反向电流值，基于最大熔丝电流及当地电性能安装要求，请匹配合适的熔丝以保护电路中的串并联的组件。

The maximum rated fuse current of each series is marked on the label of each module and also in the specification sheet. The rated fuse current refers to the highest reverse current that each module can bear. Based on the maximum fuse

current and installation requirements of the local electrical performance, please match and choose the suitable fuse to protect the PV modules in series or parallels connection.

3.4 按照 PV 控制体系的安装说明，打开控制系统的连接器，将 PV 阵列的导线连接到连接器上。导线的横截面积和容量必须满足于 PV 阵列的最大短路电流（对于单个组件，导线的横截面积为 4 mm²，额定电流应大于 10A），否则导线和连接器会过热。请特别注意：电缆线的温度上限为 85 ℃。

Open the connector of control system and connect the cables from the PV arrays to the connector in accordance with the installation instruction of the PV control systems. The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of PV system (For single module, we recommend 4 mm² cross-sectional cable is and the rated current of connectors more than 10A). Otherwise the connecting cables and connectors will be overheated. Please pay attention that the temperature limit of the cables is 85℃.

3.5 电气连接应遵循安装地的相关电气法规。

The electrical connections must properly comply with local and national electrical rules.

3.6 组件中装有旁路二极管，如出现不正确的安装，二极管、电缆和接线盒可能会受到损坏。

All PV modules are equipped with the bypass diodes. Please notice that the diodes, cables and junction boxes maybe damaged by the incorrect installation.

4. 维护和保养 Maintenance

组件需要进行定期的检查和维护，特别是在保修期间内。为了确保组件能达到最佳性能，明阳光伏建议采用以下维护措施：

PV modules need to be inspected and maintained regularly, especially during the warranty period. In order to make sure modules could demonstrate excellent performance, Mingyang Solar adopts following maintenance measures:

4.1 外观检查 Appearance Inspection

请仔细检查组件是否存在外观缺陷。重点观察以下几点：

Please kindly check the PV modules carefully, ensure the modules are without appearance defects and particularly pay attention to following points:

1) 组件玻璃是否有破损。

   Module glass was damaged or not.

2) 是否有尖锐物体接触组件表面。

   Whether sharp-pointed objects in touch with panels surface.

3) 组件是否被障碍物、异物遮挡。

   Whether solar panel is blocked by obstacle and other objects .

4) 电池片栅线附近是否有腐蚀情况。这种腐蚀情况是由于组件表面封装材料在安装或运输过程中遭到破损，导致水汽渗透到组件内部所造成。

   Whether corrosion appeared near fingers solar cell. This is caused by steam penetrated into the module resulted from the damage of laminates surface during the installation or transportation.

5) 检查组件与支架间的固定螺丝是否有松动或损坏，并进行及时调整或修复。

   Check whether the screws were loose or damaged between modules and mounting structures. If so, adjust it or repair it in time.

4.2 清洁 Cleaning

1) 组件表面的灰尘或污垢累积会减少发电输出，尽可能每年进行一次定期清洁工作（具体间隔时间取决于安装现场的条件）。清洁时须使用柔软的布，干燥或潮湿的均可。不推荐使用含有矿物质的水进行清洗，以免在玻璃表面留下污垢。

Dust or dirt on the modules glass will decrease power output. Clean modules preferably once per year if possible (depend on site conditions). Use a soft cloth dry or wet are workable. Mineral water is not recommended for cleaning.

2) 任何情况下不得使用表面粗糙的材料进行组件清洁。

Never use abrasive material to clean the modules under any circumstances.

3) 为了减少潜在的电击或灼伤，明阳光伏建议在光照不强且组件温度较低的清晨或傍晚时进行光伏组件的清洁工作，特别是对于气温较高的地区。

In order to reduce or avoid potential electric shock or burning risks, Mingyang Solar suggests to do the cleaning during the earlier morning or dusk with lower temperature, especially in the high temperature area.

4) 不要试图清理有玻璃破损或存在裸露电线等特征的光伏组件，这都将有受到电击的危险。

Do not try to clean the panel which has broken glass or uncovered wires. This may lead to electric shock.

4.3 连接器和电缆线的检查 Connector & Wires Inspection

推荐每六个月进行一次以下的预防性维护：

It is recommended that the following preventive maintenance be carried out every six months:

1) 检查接线盒的密封胶，确保没有裂纹或缝隙。

Inspect the sealant gel to make sure there is no flaw or chink.

2) 检查光伏组件的老化迹象。包括可能的啮齿动物破坏、气候老化，以及所有连接器是否连接紧密、有无腐蚀现象。检查组件是否接地良好。

Inspect whether have aging phenomenon of modules, including possible breakage by the bites of rodent, climate aging, and all the connectors are connected tightandhave corrosion appearance. Inspect the grounding connection status.

5. 电气安装 Electrical Installation

组件的电性能参数如 Isc，Voc 和 Pmax 的标称值与在标准测试条件下存在±3%的误差。组件标准测试条件：辐照度 1000 W/m²、电池温度 25℃、大气质量 AM1.5。

Electrical performance parameter of module ,such as nominal value of Isc、Voc and Pmas has ±3% random error compared with value of STC. The standard Testing Environment of module is :Irradiance 1000/m2、Cell temperature 25℃and Spectrum AM 1.5.

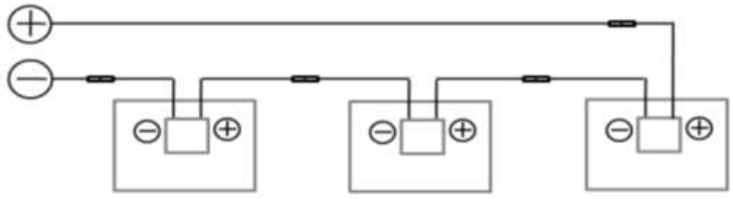
正常情况下，组件产品产生的电流和电压值，可能会相对于组件标准测试条件下得到的值偏高。所以在确定光伏发电系统配件时，如额定电压，导线容量，保险丝容量和组件功率输出有关联的参数时，应将相应的短路电流和开路电压放大 1.25 倍方可应用。

Normally ,the current and voltage of module, will be a little higher compared with the value under STC, so when confirmed the associated parameters of solar system accessories, such as rated voltage、cable capacity、fuse capacity and module power, the corresponding short circuit current and open circuit voltage should be amplified by 1.25 times.

串联、并联线路电气图 Series, parallel circuit electrical diagram：

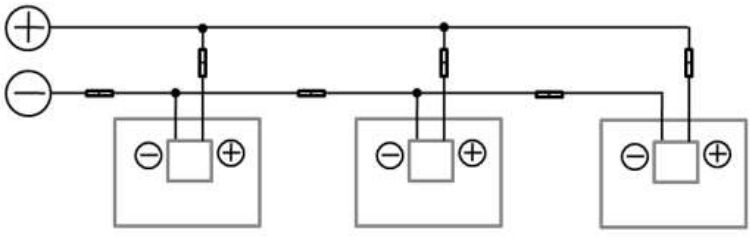
串联连接

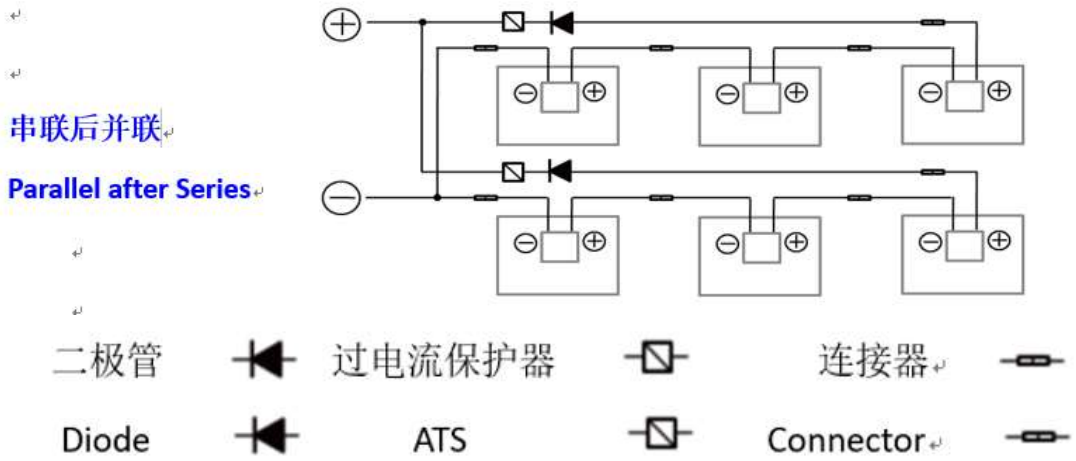
Series Connection



并联连接

Parallel Connection





每串组件最大可以串联的数量必须根据相关规定的要求计算，其开路电压在当地预计的最低气温条件下的值不能超过组件规定的最大系统电压值（根据 IEC61730 安全测试鉴定，明阳光伏组件最大系统电压为 DC1500V）和其他直流电器部件要求值。

The maximum number of modules per series string must be calculated according to the requirements. The value of the Voc in the local expected minimum temperature cannot exceed the maximum system voltage value specified of the module(According to IEC61730 safety test, the maximum system voltage of Mingyang Solar Module is DC1500V) and Other DC electrical components require values.

开路电压修正因子可以根据下面的公式来计算：CVoc=1-βVoc×(25-T)。T 是在系统安装位置预期的最低环境温度，β(% /℃)是所选的组件 Voc 的温度系数(参阅相应的组件参数表)。

The Voc correction factor can be calculated according to the following formula: CVoc=1-βVoc×(25-T), T is The minimum ambient temperature expected for the installation of the system and β(% /℃) is the temperature coefficient of the selected module Voc (According to the corresponding Module Data sheet).

如果可能有超过组件最大保险丝电流的反向电流通过组件，必须使用相等规格的过电流保护装置来保护组件。如果并联数量大于等于 2 串，在每串组件上必须有一个过电流保护装置。

If the reverse current which probably exceed the maximum fuses current of module passed through the module, the modules must be protected by an equivalent current protection device. If the number of parallel is more than or equal to 2 strings, there must be equipped with an over current protection device on each series of modules.

6. 免责申明 Disclaimer

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