



组件安装手册

PV Module Installation manual

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2021 年 12 月版

Dec.2021

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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大恒能源科技有限公司的太阳能电池组件,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 DAH 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 a electricity generation product, in order to avoid any accident, it should adopt 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。

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 material,please consult your local building department to determine which roofing material to use.

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 240W), 根据 EN IEC61730-1 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 Application Products

此文件适用于大恒如下系列产品:

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

PV Module	Rated Power (W)	Dimension	Installation hole pitch
DHP60-xxxW	260-280	1650*991*32*35	860; 1360; 941
DHM60-xxxW	275-305	1650*991*32*35	860; 1360; 941
DHP72-xxxW	315-335	1956*991*32*35	1176; 1676; 941
DHM72-xxxW	330-365	1956*991*32*35	1176; 1676; 941
DHM72-xxxW	325-370	1956*991*32*35	1176; 1676; 941
DHM60xxxW	275-310	1650*991*32*35	860; 1360; 941
DHM72X-xxxW	370-390	1979*1002*32	1689; 1189
DHM60X-xxxW	310-325	1665*1002*32	1375; 875
HCM72-xxxW	350-390	2000*991*32	1760; 1160

HCM60-xxxW	290-325	1678*991*32	1388; 888
HCM78X9-xxxW	415-455	2172*1002*32	1882; 1332
HCM72X9-xxxW	385-420	2010*1002*32	1720; 1220
HCM60X9-xxxW	320-350	1686*1002*32	1406; 906
DHM-72L9-xxxW	430-465	2094*1038*30/35	1300; 1040
		2108*1048*30/35	1300; 1040
DHM-66L9-xxxW	405-425	1924*1038*30/35	1300; 1040
DHM-60L9-xxxW	360-385	1755*1048*30/35	1300; 1040
		1765*1048*30/35	1300; 1040
DHM-72X10-xxxW	525-555	2279*1134*30/35	1400; 1140
		2256*1134*30/35	1400; 1140
DHM-66X10-xxxW	485-505	2094*1134*30/35	1300; 1040
		2074*1134*30/35	1300; 1040
DHM-60X10-xxxW	440-460	1910*1134*30/35	1400; 1140
		1891*1134*30/35	1400; 1140
DHM-54X10-xxxW	400-415	1722*1134*30/35	1300; 1040
DHP72-xxxW	310-335	1956*991*32	1670; 1170
DHP60-xxxW	260-280	1650*991*32	1360; 860
HCP78X9-xxxW	370-415	2172*1002*32	1882; 1332
HCP72X9-xxxW	340-380	2010*1002*32	1720; 1220
HCP60X9-xxxW	285-320	1686*1002*32	1046; 906
DHM-T72X10-xxxW	525-555	2279*1134*32	1400; 1140
DHM-T60X10-xxxW	440-460	1910*1134*32	1400; 1140
DHM-72X10/FS-xxxW	525-555	2279*1134*32	1400; 1140
		2256*1134*32	1400; 1140
DHM-66X10/FS-xxxW	485-505	2094*1134*32	1300; 1040
		2074*1134*32	1300; 1040
DHM-60X10/FS-xxxW	440-460	1910*1134*32	1400; 1140
		1891*1134*32	1400; 1140
DHM-54X10/FS-xxxW	400-415	1722*1134*32	1300; 1040
DHM-T72X10/FS-xxxW	525-555	2279*1134*32	1400; 1140
DHM-T60X10/FS-xxxW	440-460	1910*1134*32	1400; 1140
DHM-66L9/FS-xxxW	405-420	1924*1038*32	1300; 1040

1.3 警告 Warning

a) 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 if touch electrical parts.

b) 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.



c) 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。
Temple's glass and backsheet have protective effect, broken PV modules have electrical risks (electric shock and burnt), this kind of modules can not be fixed or repaired, should be replaced in time.

d) 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 with datasheet. The parameters in datasheet is tested under STC condition, therefore when determining other components rated voltage, wire capacity, fuse rate, controller capacity and PV module power output relative data of PV system, please refer to the short circuit current and open circuit voltage of the PV module, and design and install the system in 125% of the value as well.

e) 为降低发生电击或燃烧的风险，可以在安装太阳能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 burnt risk, it's better to cover the PV modules by opaque material when installing.

f) 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 job should be operated under isolating sunlight condition, installation and maintenance also should be handled by professionals.

g) 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 batteries bank equipped in the PV system, it should comply with battery supplier's suggestion.

h) 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 replace rooftop and wall material, partial replacement is also not allowed.

i) 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 may has combustible gases.

j) 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。

Touch PV module's electrical part by hand directly is prohibited, should use insulating tools to handle the electrical connecting.



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

- k) 不能私自拆除大恒能源科技有限公司提供的太阳能电池组件的任何零部件。
Don't dismantle any components of DAH Solar PV module personally.
- l) 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 well understand all the installation instructions before Installation, connection and maintenance.
- m) 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.
- n) 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 connected to ground,if without special stipulations,please refer to International Electrical Standard or other International Standards.
- o) 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 installing site,all the components should be unpacked carefully.
- p)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,lying on modules,it may damage modules and also have injured risks.



- q) 同尺寸同规格型号的组件才可以串联在一起。
Same size and specification models modules can only be connected together.
- r) 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, vibrations may cause modules damage or cells microcrack inside of modules.

s) 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, don't allow modules to fall onto ground from transport tools, house or hand, this will damage modules or cells inside.

t) 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.

u) 当负载工作时，不要擅自断开组件的连接。

When loads are working, please do not disconnect the modules.

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 headcoats, insulated gloves, and rubber insulated shoes during installation job.

◆安装的时候再把组件拆包。

Keep the PV module packed until installation.

◆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 touching of the PV module during installation. The surface of modules may over heated, it has risk of burnt 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, 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 of whether the PV module is connected to or disconnect from the 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 photovoltaics) 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

2.2.1 气候条件

Climatic Condition

1) 推荐的安装环境温度在 -40°C to 85°C (-4°F to 185°F) 之间。

Recommended installation ambient temperature is between -40°C to 85°C (-4°F to 185°F).

2) 不要将组件安装在有可能被水浸没的地方。

Do not install PV modules in a flooded risk area.

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。

Note: The PV module 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.

2.2.2 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 sunlight 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 will lose about 10% to 15%; if modules angle deviate is 60 degrees, lose 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 reduced output power.

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 bank, 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 kinds of battery charging could release hydrogen which explosion easily happen. It must avoid a fire or make a spark around the batteries bank. 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 close the naked light or flammable materials.

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.

2.2.3 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 maximum when modules are facing the sun in vertical.

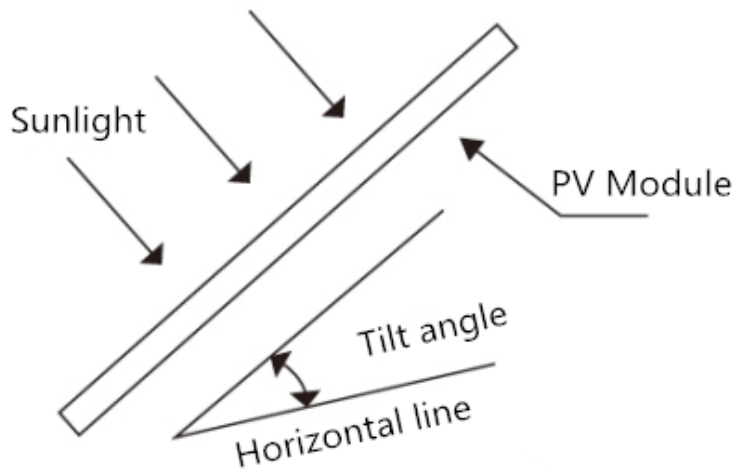


Figure 1: the installation angle of PV Module

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 connect to the independent PV system, modules angle should be based on season and sunshine condition to obtain the maximum 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 tie PV system, the installation angle selection of the modules should be based on annual power output maximization.

2.3 安装方法介绍

Instruction of Installation Methods

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：

- 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。
- 2、两个模块之间的最小距离为 10mm（0.4in）。
- 3、安装方法不会堵塞模块排水孔。
- 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。

PV modules can be mounted to the substructure using either corrosion-proof M8 bolts placed through the mounting

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、 A clearance of at least 120mm(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、The minimum distance between two modules is 10mm(0.4in).

3、The mounting method does not block the module drainage holes.

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

◆ 螺丝安装方法

Screws installing method

每个模块的框架有 4 - 9×14 毫米的安装孔，单块组件安装至少需要四个对称位置螺栓，以理想地放置优化负载处理能力，确保组件支撑结构。

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（140~180LBF 英寸）的扭矩。

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

The frame of each module has 4- $\phi 9 \times 14$ mm mounting holes, a minimum of four symmetrically positioned bolts are required for installation of one module, ideally placed to optimize the load handling capability, to secure the modules to supporting structure.

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(140-180lbf.in.).

All parts in contact with the frame should use flat stainless steel washers of minimum 1.8mm thickness with an outer diameter of 20-24mm(0.79-0.94in).

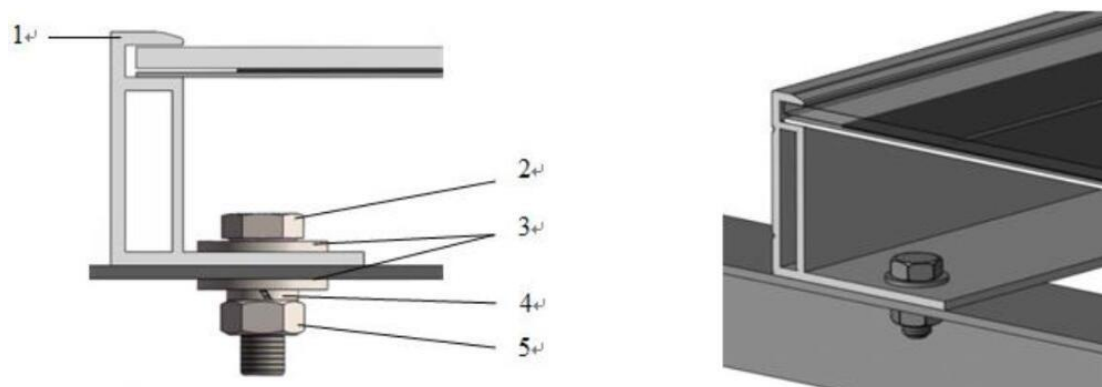


Figure 1. PV module installed with Bolt fitting method

- | | |
|--------------------------|----------------------------|
| 1) Aluminum Frame | 2) M8 Stainless Bolt |
| 3) Flat Stainless Washer | 4) Spring Stainless Washer |
| 5) HEX Stainless Nut | |

● ◆ 夹具安装方法

Clamps Mounting Methods

1、夹具必须与组件边框重叠至少 7mm，但不超过 11mm。

2、使用至少 4 个夹具来固定安装导轨上的模块。

3、模块夹不应接触前玻璃，不能使框架变形。

4、一定要避免来自组件夹具的遮蔽效应。

5、组件框架在任何情况下都不需要修改。

6、在选择这种类型的夹具安装方法时，在每个组件上使用至少四个夹子，夹子长度大于 40mm，夹子的夹紧区域应大于夹子自身长度。长度在组件的每个长边（用于纵向安装）或组件的每一个短边上都应该安装两个夹具（用于横向安装）。根据当地的风和雪负荷，可能需要额外的夹具，以确保组件可以承受负载。

纵向安装：54P 和 60P 光伏组件长边上的四个夹子到短边框距离不小于 300mm；72P 光伏组件长边上的四个夹子到短边框距离不小于 340mm。78P 光伏组件长边上的四个夹子到短边框距离不小于 360mm。

横向安装：组件短边上的四个夹具到长边的距离 250~300mm，长边方向应具有横梁贯穿。

7、外加扭矩应参照螺栓使用的机械设计标准，EX:M8--16-20N.M（140~180LBF 英寸）。

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

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

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

4、Be sure to avoid shadowing effects from the module clamps.

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

6、When choosing this type of clamp-mounting method, use at least four clamps on each module, 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). If the length of the clamp is more than 40mm, the clamping area of the clamp shall be larger than the length of the clamp itself.

Depending on local wind and snow loads, additional clamps may be required to ensure that modules can bear the load. The distance between the four clamps on the long side of the 54/60P PV module is not less than 300mm; the distance from the four clamps on the long side of the 72P PV module to the short frame is not less than 340mm; the distance from the four clamps on the long side of the 78P PV module to the short frame is not less than 360mm.

When choosing lateral installation method, distance from the four clamps on the short side of the assembly to the long side is 250 ~ 300mm. Long side direction shall have beam penetration.

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

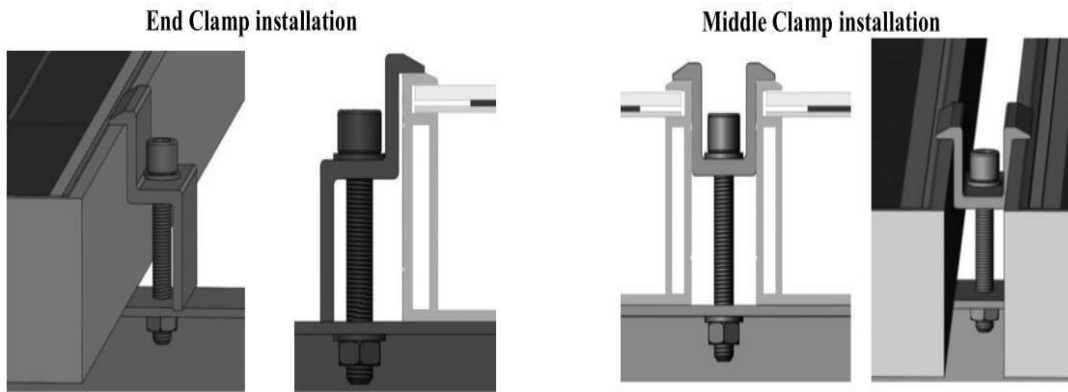


Figure 2. PV module installed with clamp fitting method

注意:

Notes:

1、这里介绍的所有安装方式只供参考，大恒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, DAH 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：

1. 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 body like insects or other things on the surface of solar panels, please remove it.

b) 检查组件的序列号是否正确。

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

3、大恒能源太阳能组件（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 3600 帕，背面设计负荷 1600 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。

3. DAH Solar PV module (only for the component model involved in this specification) (snow / wind load) product specification load 3600 PPA load, back design load of 1600 PPA, safety factor 1.5 times. If modules installed in the snowy and strong windy environment, the special protection actions should be taken to meet the installation requirements.

3. 接线和连接

a) 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, voltage etc.

b) 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.

c) 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 max 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 max 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.

d) 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 mm^2 ，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°C 。

Opening the connector of control system and connect the cables from the PV arrays to the connector in accordance with the installation indication of the PV control systems. The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of PV system (For a single component, we recommended the cross-sectional area of cables is 4mm^2 and the rated current of connectors is more than 10A), otherwise the connecting cables and connectors will be over heating. Please pay attention that the temperature limit of the cables is 85°C .

e) 电气连接应遵循安装地的相关电气法规。

The electrical connections must be properly in accordance with local and national electrical rules.

f) 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 included with the bypass diodes. Please notice that the diodes, cables and junction boxes maybe damaged caused by the wrong 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，大恒能源建议采用以下维护措施：

PV modules need to be inspected and maintenance regularly, especially during the warranty period. In order to make sure modules reaching the excellent performance, DAH 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 faultiness. Especially pay attention to following points:

a) 双玻护角作为运输保护部分，不做外观管控，客户自行选择拆卸或者保留；
Double glass protector works as the protection during the transportation, it does not belongs to appearance controlling ,buyers can tear them off or save by themselves;

b) 组件玻璃是否有破损；

Module's glass damaged or not;

c) 是否有尖锐物体接触组件表面；

Whether have scratches of sharp objects hit panels surface;

d) 组件是否被障碍物、异物遮挡；

Whether solar panel is blocked by obstacle and other objects or not;

f) 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 have corrosion near grid finger of solar cell. This is caused by the damage of laminates surface during the installation or transportation, steam filter into inside of laminates.

g) 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。

Checking whether the fixed screws are loose or damaged between modules and brackets or not, and then adjust it or repair it in time.

4.2 清洁

Cleaning

a) 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) . Using a soft cloth dry or damp are workable. Mineral water is not recommended for cleaning, to any dirt on glass after cleaning job.

b) 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 do the clearness under any circumstances.

c) 为了减少潜在的电击或灼伤，大恒能源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 burnt, DAH Solar suggest to do the clearness during the earlier morning or dusk with lower temperature, especially in the areas with high temperature.

d) 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 the danger of 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

a) 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

b) 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. Includes potential broken caused by the bites of rodent, climate aging, and all the connectors are connected tighten, have corrosion phenomenon or not. Inspect the grounding connection in good condition or not.

5. 电气安装

Electrical Installation

组件的电性能参数如 I_{sc} , V_{oc} 和 P_{max} 的标称值与在标准测试条件下存在 $\pm 3\%$ 的误差。组件标准测试条件：辐照度 1000 W/m^2 、电池温度 25°C 、大气质量 AM1.5。

Electrical performance parameter of module ,such as nominal value of I_{sc} 、 V_{oc} and P_{mas} has $\pm 3\%$ random error compared with value of STC. The standard Testing Environment of module is :Irradianc $1000/\text{m}^2$ 、Cell temperature 25°C 、Spectrum AM 1.5。

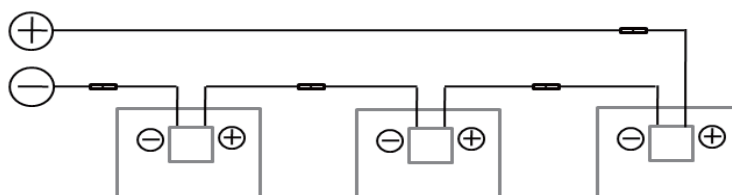
正常情况下，组件产品产生的电流和电压值，可能会相对于组件标准测试条件下得到的值偏高。所以在确定光伏发电系统配件时，如额定电压，导线容量，保险丝容量和组件功率输出有关联的参数时，应将相应的短路电流和开路电压放大 1.25 倍方可应用。

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

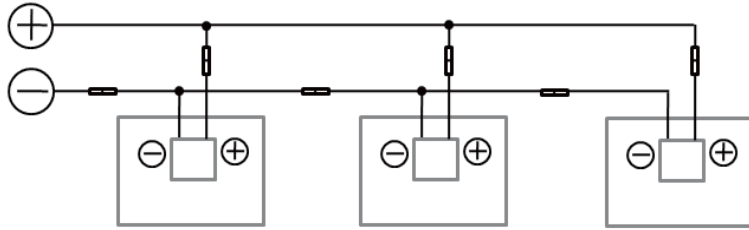
串联、并联线路电气图

Series, parallel circuit electrical diagram

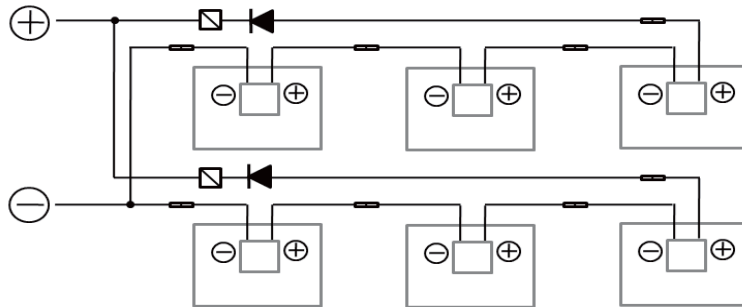
串联连接
Series Connection



并联连接
Parallel Connection



串联后并联
Parallel after Series



二极管 
Diode

过电流保护器 
ATS

连接器 
Connector

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，大恒能源组件最大系统电压为 DC1500V，如安装地在澳大利亚，安装还应符合 AS/NZS 3000 和 AS/NZS 5033 的要求。）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 DAH Solar Module is DC1500V. In Australia installations should be in accordance to AS/NZS 3000 and AS/NZS 5033.) 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： $C_{Voc} = 1 - \beta V_{oc} \times (25 - T)$ 。T 是在系统安装位置预期的最低环境温度， β (%/°C) 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: $C_{Voc} = 1 - \beta V_{oc} \times (25 - T)$, T is The minimum ambient temperature expected for the

installation of the system, $\beta(\% / ^\circ\text{C})$ 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 an over current protection device on each series of modules

6. 接地安装 *Grounding*

组件是设计过程中，使用了阳极氧化抗腐蚀的铝边框作为刚性支撑，为了使用安全、避免组件受到雷电和静电伤害，组件边框必须接地。接地时，必须将接地装置与铝合金内部充分接触，穿透边框表面氧化膜。严禁在组件的边框上添加任何附加的接地孔。接地导体或者连接线可以是铜、铜合金或任何其他符合相应的《国家电器规范》要求用作电导体的材料，接地导体必须通过合适的接地电极连接到大地上。边框上已标记接地标识的孔，只可用于接地，不可用于组件安装。

In design of modules, the anodized corrosion resistant aluminum alloy frame is applied for rigidity support. For safety utilization and to protect modules from lightning and static-electricity damage, the module frame must be grounded.

The grounding device must be in full contact with inner side of the aluminum alloy and penetrate surface oxide film of the frame.

Do not drill additional grounding holes on module frame.

The grounding conductor or wire may be copper, copper alloy, or any other material acceptable for application as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to ground with a suitable ground electrode.

Holes marked with a grounding mark on the frame can only be used for grounding but not for mounting.

Frameless double glass modules have no exposed conductor, and therefore according to regulations it did not need to be grounded.

7. 免责声明 *Disclaimer*

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