
中节能晶硅光伏组件产品
安装手册

Installation Manual of
CECEP's Crystalline Silicon
PV Module Product

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第 1 部分 手册使用说明

Part 1 Manual Use Instructions

1-1 关于本手册的使用

1-1 About Use of This Manual

首先非常感谢您选用中节能光伏组件产品。

First of all thank you very much for choosing CECEP's PV module product.

本手册基于中节能太阳能科技(镇江)有限公司（以下简称“CECEP”）长期实践和测试精心制作而成，详细说明了 CECEP 生产的晶硅光伏组件（以下简称“组件”）的安装、使用、维护等内容。为了提高组件安装过程中的安全性，请将此手册提供给光伏发电系统购买者作为参考。在光伏组件安装作业开始之前，请您熟悉并理解本手册内容。在采取必要的安全防护措施、遵守当地安全法规的前提下，依据本手册相关内容，按照操作规程进行安装。安装完成后，请将此手册交予组件产品的操作或维护人员保管。

This Manual is prepared elaborately based on the long-term practice and tests of CECEP Solar Energy Technology (Zhenjiang) Co., Ltd. (hereinafter referred to as "CECEP") and describes in detail the installation, application, maintenance, etc. of crystalline silicon PV

module (hereinafter referred to as "the module") produced by CECEP. To enhance safety during module installation, please provide the buyer of PV power generation system this Manual for reference. Please be familiar with and understand contents of this Manual before installation of PV module. On the premise that necessary protective measures are taken and local safety regulations are followed, installation shall be performed as per this Manual and the operation procedures. After installation, please give this Manual to the operation or maintenance personnel of the module.

若在使用过程中存在疑问或建议，敬请垂询。

In case of any suggestion or doubt during application, please contact us.

修订记录表

Revision History

版本 Version	修改页 Revised Page	修改章节内容、理由 Revised Section/Content and Reason	修订日期 Date of Revision
A/0	初版 First edition	新版作成 New version compiled	2021年9月10日 Sept. 10, 2021

1-2 免责声明

1-2 Disclaimer

本手册不具备任何意义的质保书含义。客户在安装组件过程中未按照本手册中所列出的要求操作,会导致产品的质保失效,CECEP 不对任何由此所引起的损失负责。

This Manual does not have any meaning of warranty. CECEP will not be responsible for any loss resulting from void product warranty resulting from failure of the customer to operate according to the requirements listed in this Manual during module installation.

光伏发电系统设计人员和组件安装人呢元必须熟悉组件的机械和电气要求,因设计缺陷或安装人员失误造成的产品损坏,CECEP 有权拒绝赔偿。

The designer of PV power generation system and module installation personnel must be familiar with mechanical and electrical requirements of the module. CECEP has the right to refuse to compensate for any product damage caused by design defect or fault of the installation personnel.

本手册内容将会根据产品情况进行改进更新,届时恕不另行通知,

敬请谅解。

This Manual will be updated depending on product development without any notice. We appreciate for your understanding.

第 2 部分 安全注意事项

Part 2 Safety Precautions

在本手册中，安全注意事项内容分为 [注意] 和 [危险]。

In this Manual, safety precautions fall into [Caution] and [Danger].



注意 Attention: 错误使用时，会发生危险情况，可能造成轻伤，中度的人身伤害和设备损坏，也可能引起重大事故，请务必引起注意并遵守。



注意 Attention: A misuse will bring a danger and may lead to minor injury and moderate personal injury or equipment damage, or major accident.

Please pay attention to and follow such precautions.



危险 Danger: 错误使用时，会发生危险情况，可能造成设备不可逆转的损坏或人身伤亡。



危险 Danger: A misuse will bring a danger and may lead to irreversible equipment damage or personal injury/death.

2-1关于开箱

2-1 About Unpacking



- 开箱环境应在干燥，通风，避阴区域，并做好防潮防水措施。
- Unpacking shall be conducted in a dry, ventilated, shaded area with moisture-proof measures taken.
- 检查组件的序列号或规格型号，型号不一致的组件应分开并做好标示，防止在安装时将不同型号的组件组合在一起，影响系统的整体发电量。
- Check serial number or specification/model of modules. Modules of different modules shall be stored separately and marked to avoid influence on the overall generating capacity of the system due to combination of different models of modules during installation.
- 有损坏或者变形的组件需分开并完整保存，返厂进行处理，严禁拆解移动任何附件。
- Any damaged or deformed module shall be kept separately and completely and returned to the factory for handling. No disassembling or movement of any accessory is allowed.
- 避免组件表面产生不均匀阴影，被遮阴的电池片会发热（热斑效应）从而导致组件永久损坏。
- Uneven shadow on the module surface shall be prevented because shaded cell may generate heat (hot spot effect) and thus cause permanent module damage.

2-2关于安装

2-2 About Installation



- 光伏发电系统的安装需要专业的技能和知识，必须由专业的工程师来完成。
- The installation of PV power generating system requires professional skills and knowledge and must be completed by professional engineers.
- 组件安装时不要穿戴金属戒指，手表等金属饰物，防止有触电的危险。
- Do not wear such metal jewelry such as ring and watch during module installation to prevent electric shock.
- 安装之前应仔细检查支架的平行度，平整度，牢固度以及支架的接地是否正常。
- Before installation, check the bracket for parallelism, evenness, firmness, and normal grounding.
- 穿戴好防护用品，做好安全防护措施，如安全帽，安全鞋，安全带等必要的安全防护用具。
- Take safety protection measures and wear such necessary protective equipment as helmet, safety shoes and safety belt.
- 安装时确保组件的水平度和垂直度，在有光照的情况下严禁用手或身体其他部位触碰到接线部位的任何金属附件，或有触电的危险。
- During installation, guarantee levelness and perpendicularity of modules. With light, do not touch any metal accessory at any connection with hand or other part of the body to prevent possible electric shock.
- 组件安装完成后做好防护，避免类似油漆或其他粘合剂污染组件，影响系统的发电量。
- After module installation, protect installed modules from contamination by paint or adhesive to prevent influence on the generating capacity of the system.
- 在不利的环境下（如大风，大雨等）请不要进行安装作业。
- Do not conduct installation in an unfavorable environment (such as gale and heavy rain).



- 组件安装过程中，严禁踩踏在组件上面，否则会对组件造成不可逆转的损坏，也会造成人身伤害。
- During module installation, do not step on any module, or irreversible damage to the module and personal injury may be caused.
- 安装组件之间的连接线时必须佩戴相应等级的绝缘手套，否则会有触电伤人的危险。
- Wear insulating gloves of corresponding grade during installation of connecting wires between modules, or electric shock may occur.
- 安装组件或进行接线时，必须用不透明的材料覆盖组件正面，否则会有触电伤人的危险。
- During module installation or wiring, cover the front face of each module with opaque materials, or personal injury may occur due to electric shock.
- 安装组件时，禁止在组件的任何地方打孔或切割，否则质保失效。
- During module installation, do not conduct drilling or cutting at any place of a module, or the warranty will become void.
- 严禁人工聚光照射组件正面，否则对组件造成不可逆转的损坏，同时也会造成人身伤害。
- No module exposure to manually concentrated light, or irreversible damage to the module and personal injury may be caused.
- 接线时请务必连接地线，否则有触电，火灾的危险。
- During wiring, please connect GND wire, or electric shock and fire may occur.
- 请有相应操作资格的电工专业人员完成配线接线工作，否则会有触电火灾的危险。
- Please arrange professional electrical personnel with required qualifications to conduct wiring, or electric shock and fire may occur.

2-3关于运行和维护

2-3 About Operation and Maintenance



- 光伏发电系统的运行和维护需要专业的技能和知识，必须由专业的工程师来完成。
- The operation and maintenance of PV power generating system requires professional skills and knowledge and must be completed by professional engineers.
- 穿戴好防护用品，做好安全防护措施，如安全帽，安全鞋，安全带等必要的安全防护用具。
- Take safety protection measures and wear such necessary protective equipment as helmet, safety shoes and safety belt.
- 在有光照的情况下严禁用手或身体其他部位触碰到接线部位的任何金属附件，或有触电的危险。
- With light, do not touch any metal accessory at any connection by hand or other part of the body to prevent possible electric shock.
- 定期清理组件表面的污染物，否则影响系统的发电量。
- Remove contaminants from module surface regularly, or generating capacity of the system may be influenced.



- 在有光照的情况下严禁断开组件连接头，否则会有触电危险。
- With light, do not disconnect any module connector, or electric shock may occur.



2-4 安全标示

2-4 Safety Signs

2-4 安全说明与警告

2-4 Safety Instructions and Warnings

	<p>严禁踩踏组件</p> <p>Do not step on a module</p>
	<p>严禁徒手触碰组件或接线端</p> <p>Do not touch a module or terminal with bare hand</p>
	<p>远离危险物品</p> <p>Keep away from dangerous items</p>
	<p>远离儿童</p> <p>Keep away from children</p>
	<p>严禁拆卸组件</p> <p>Do not disassemble a module</p>
	<p>严禁聚光照射组件</p> <p>No module exposure to concentrated light</p>

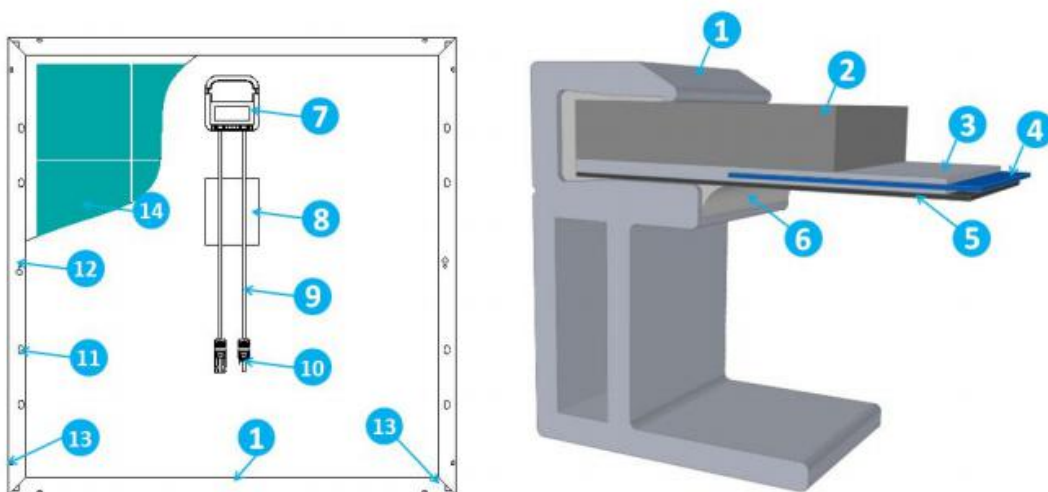
	<p>严禁锐器触碰组件</p> <p>Do not touch a module with a sharp device</p>
	<p>轻拿轻放</p> <p>Handle gently</p>

第 3 部分 产品外观及各部分说明

Part 3 Product Appearance and Description of Each Part

3-1 组件的外观示意图

3-1 Outline



1、铝合金边框 1. Aluminum alloy frame	2、钢化玻璃 2. Tempered glass	3、EVA 3. EVA	4、电池片 4. Cell	5、背板 5. Backboard
6、硅胶	7、接线盒	8、铭牌	9、电缆线	10、接头

6. Silica gel	7. Junction box	8. Nameplate	9. Cable	10. Connector
11、安装孔 11. Mounting hole	12、接地孔 12. Grounding hole	13、漏水孔 13. Drain hole	14、电池片 14. Cell	

3-2 组件的铭牌及条形码

3-2 Nameplate and Bar Code

条形码：每块组件都有唯一的一个序列号，该序列号由 15 位组成（双玻组件是 16 位）；

Bar code: Each module has a unique serial number which contains 15 digits (16 digits for a double-glazed module);

第 1 位为生产车间代码；

Digit 1: workshop code;

第 2 位为字母代码（P 代表多晶，M 代表单晶，PB 代表双玻）；

Digit 2: letter code (P for polycrystal, M for monocrystal, and PB for double-glazed);

第 3 位代表电池片型号；

Digit 3: cell model;

第 4、5 位为电池片数量（如“72”代表该块组件有 72 片电池片），

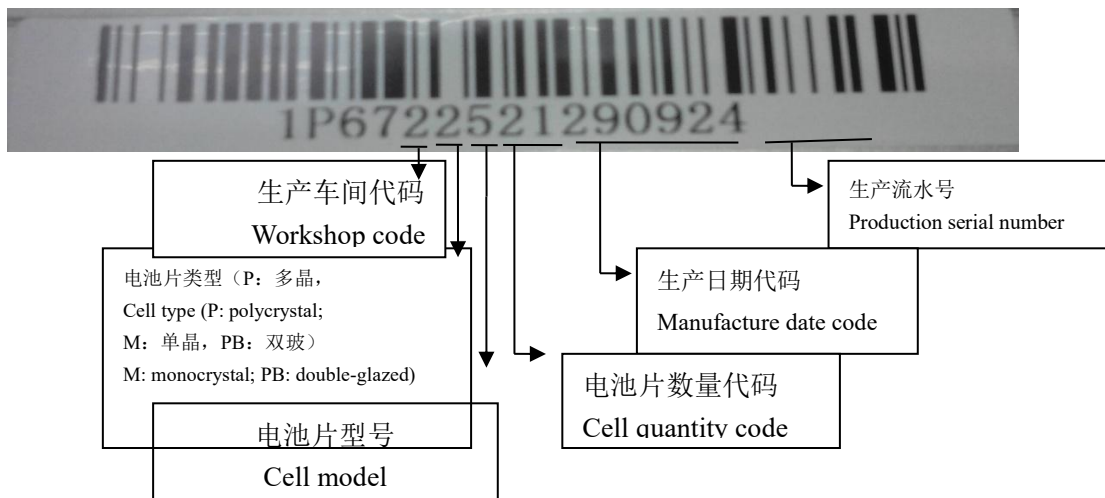
Digits 4 and 5: quantity of cell (such as "72" means the module contains 72 cells);

第 6-11 位平均分三组分别表示生产年月日代码，其计算方法为在代码的基础上分别减去 11,13,15 即为生产年月日（如“252129”表示 2014 年 08 月 14 日生产）；

Digits 6-11: averagely divided into three groups - codes of year, month and date of manufacturing. These three codes minus 11, 13 and 15 respectively are the year, month and date of manufacture (e.g. "252129" means manufacturing on August 14, 2014);

第 12-15 位为组件的当日生产流水号。

Digits 12-15: serial number of the module on the date of manufacture.



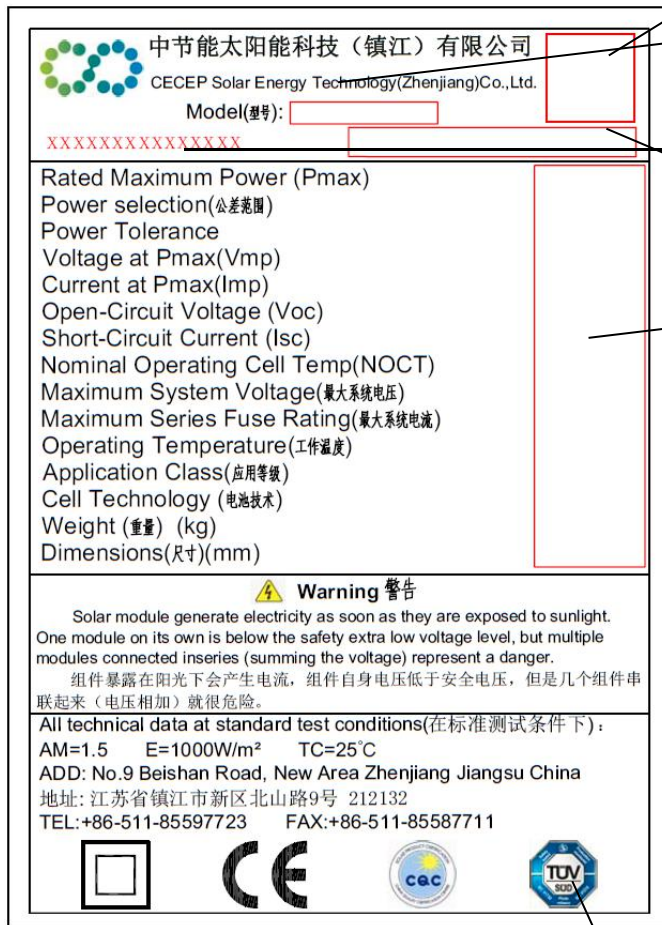
条形码举例

Example of Bar Code

铭牌：描述产品型号，包括额定功率、额定电流、额定电压、开路电压、短路电流等所有标准条件下测得的值，以及重量、尺寸、最大保险丝容量和系统最高电压。

Nameplate: describe product model, including measured values of rated power, rated current, rated voltage, open-circuit voltage, short-circuit current, etc. under all standard conditions, as well as weight, dimension, maximum fuse capacity and maximum system

voltage.



- 组件二维码
QR code
- 组件型号
Module model
- 组件序列号
Module S/N
- 组件条形码
Module bar code
- 最大功率
Maximum power
- 公差范围
Tolerance range
- 工作电压
Operating voltage
- 工作电流
Operating current
- 开路电压
Open-circuit voltage
- 短路电流
Short-circuit current
- 标称工作温度
Nominal operating temperature
- 最大系统电压
Maximum system voltage
- 最大系统电流
Maximum system current
- 工作温度
Operating temperature
- 应用等级
Application class
- 电池技术
Cell technology
- 重量
Wight
- 尺寸

第 4 部分 产品安装

Part 4 Product Installation

认证标示
Certification

4-1 产品的安装条件

4-1 Installation Conditions

为了确保组件产品在安装完成后能安全、稳定、高效运行，CECEP 建议组件的安装需满足下列条件。

To ensure safe, stable and efficient operation of installed module

products, the following conditions are suggested by CECEP to be met for installation.

4-1.1 产品安装的朝向和倾角

4-1.1 Orientation and Inclination

组件安装时正面（玻璃面）朝阳，在北半球朝南安装，在南半球朝北安装，冬至日 9:00-15:00 组件上无任何阴影，确保光照充分。组件安装的角度依照纬度进行调整，可依照下表进行选择：

A module shall be installed with its front face (glass face) facing the sun, i.e. facing south in the Northern Hemisphere and north in the Southern Hemisphere, and with no shadow on it during 9:00-15:00 on the winter solstice to ensure sufficient light. The installation angle shall be adjusted based on the latitude, as listed in the table below:

建议安装倾斜角度	
Recommended Installation Inclination Angle	
纬度 Latitude	安装角度 Angle of Installation
0°-15°	15°
15°-25°	与纬度一致 Same as the latitude
25°-30°	纬度+5° Latitude + 5°
30°-35°	纬度+10° Latitude + 10°
35°-40°	纬度+15°

	Latitude + 15°
40°	纬度+20° Latitude + 20°

组件的安装倾角也可根据当地的气象部门提供的日照辐射数据，计算多年的不同角度倾斜面上各月日的平太阳总辐射量，进行比较后得出最佳倾角。

Also, the optimum installation inclination angle can be obtained through comparison of total mean sun radiation of each month and day on inclined plane of different angles over years calculated based on solar radiation data provided by the local meteorological department.

4-1.2 产品安装的支架要求

4-1.2 Bracket Requirements

确保组件安装方式和支架系统符合设计要求，支架足够坚固，能够承受所有预定的载荷条件，这是支架安装商所必须要提供的保证。安装的支架系统必须经过有静态力学分析能力的第三方测试机构进行检验和测试，采用当地国家或国际标准。

The bracket installer must guarantee that the module installation method and the bracket system comply with the design requirement, and the bracket is firm enough to withstand all the predetermined

loading conditions. The installed bracket system must pass inspection and test of a third-party test institution capable of conducting static mechanical analysis and comply with local national or international standard.

组件的安装支架必须使用耐用、耐腐蚀、防紫外线的材料，并具备足够的强度，例如铝合金，不锈钢,镀锌钢等材料。

The mounting bracket for module must be strong enough and made of durable, corrosion-resistant, anti-ultraviolet material, such as aluminum alloy, stainless steel and galvanized steel.

在冬天有较大积雪的地区，选择较高的的安装支架，避免组件最低点被积雪覆盖，此外，因确保了安装后的组件最低点足够高，可以避免组件被植物和树木遮挡，或受到飞沙走石损坏。

In places with heavy snow in winter, higher mounting bracket shall be selected to prevent the lowest point of the module from being covered by snow. As the lowest point of the module is guaranteed to be high enough after installation, the module can be prevented from plant and tree blocking or being damaged by sand and stones.

4-1.3 其他

4-1.3 Others

在屋顶安装组件之前，请确保建筑是符合必要的安装条件。此外，屋顶的任何固定点都必须进行密封，以防止渗漏。当组件安装在

平行于屋顶或者墙面的支架上时。组件边框与屋顶或者墙面的最小间隙为 10cm，需要让空气流通，防止组件的线路损坏。

Before rooftop installation of modules, please make sure that the building meets necessary installation conditions. In addition, any fixing point on the roof must be sealed to prevent seepage. When a module is installed on a bracket parallel to the roof or on the wall, the minimum clearance between its frame and the roof or the wall shall be 10cm to facilitate ventilation and prevent damage to wires of the module.

组件边框会有热胀冷缩效应，建议两块组件之间的距离最小为 1cm。

Two modules are suggested to be installed with an interval of at least 1cm in consideration of expansion and contraction of module frame.

4-2 产品的安装流程

4-2 Installation Procedure

成箱组件产品运输至项目现场进行安装的流程分为：卸货和验收、搬运和暂存、开箱和检查、铺设和固定四个环节。为保证组件的安全，各个环节都需参照相应的操作要求。

Installation procedures of boxes of module products transported to the project site: unloading and acceptance inspection, handling and temporary storage, unpacking and inspection, and laying and fixing.

For the sake of module safety, corresponding operating requirements must be referred to for each link.

4-2.1 卸货和验收

4-2.1 Unloading and Acceptance Inspection

组件产品运输至项目安装现场时，应注意组件和人员的安全问题，正确使用叉车进行卸货和转移工作，若现场场地不适合叉车作业，请采用吊车卸货并采用有效的防护措施，严禁采用任何对组件或人员造成伤害的搬运方式，或者进行无任何有效防护措施的卸货。

When module products are transported to the installation site, pay attention to the safety of modules and personnel. Correctly use a forklift to unload and transfer products. If forklift operation is not suitable due to the site condition, please use a hoist for unloading and take effective protective measures. Do not adopt any handling method that may hurt modules or person, or unload modules without any effective protective measure.





为方便购买方进行验货，组件卸货完毕后，CECEP 安排专业人员配合购买方对组件进行抽样检测，验货。

For the convenience of inspection by the buyer, CECEP will arrange professional personnel to coordinate with the buyer on sampling test and inspection of modules after unloading.

4-2.2 搬运和暂存

4-2.2 Handling and Temporary Storage

组件应在平整的地面存放，避免组件箱体相互挤压，或叉车运输时因地面不平损坏托盘从而导致组件损坏的风险。组件暂存时，拆封的组件做好防雨措施，加盖遮雨布等，防止组件背面积水。

Modules shall be stored on even ground to prevent squeezing of module boxes against each other or module damage due to pallet damage during forklift transportation on uneven ground. During temporary storage, rain-prevention measures (such as coverage with waterproof cloth) shall be taken for unpacked boxes to prevent water accumulation on the backside of modules.



4-2.3 开箱和检查

4-2.3 Unpacking and Inspection

开箱钱请准备好必要工具，如：剪刀、卷尺、木托盘等，并配备两名人员，协助抬板检查。

Before unpacking, please prepare necessary tools such as scissors, flexible rule and wood pallet, and arrange two persons to help to raise the plate for inspection.

组件开箱时确保开口向上，用剪刀将打包带剪开，纸箱打开后将组件一块一块抬出并平放在木托盘上进行检查。开箱检查项目有：玻璃有无破碎，背板有无损坏，边框是否变形，组件尺寸是否符合设计要求，组件的电流档位和外包装箱的电流档位是否一致。对于有异常的组件需单独放置，最后统一处理。

During module unpacking, make sure that the carton is placed with the open side up, cut the packing belt with scissors, take out modules from the carton one by one and place them on the wood pallet flatly for inspection. Unpacking inspection items include the following: glass breakage, backboard damage, frame deformation, compliance of

module dimensions with design requirement, consistent of module current range with the current range indicated on the packaging carbon. Modules with abnormality shall be placed separately and handled in a centralized manner at the end.

CECEP 建议根据安装进度进行拆箱，即：安装多少箱拆多少箱。如果安装过程中出现零星组件时，注意组件的玻璃面朝下平整放置在垫有纸板的木托盘上，否则可能会造成组件玻璃划伤或损坏。同时组件的接线头和电缆不可压在边框之间或外露，以免压伤电缆和接线头。

Unpacking based on the installation schedule, i.e. unpacking the number of carton as required by installation, is suggested by CECEP. In case of scattered modules during installation, put such modules flatly on a wood pallet with paperboard pad with the glass face down, to prevent possible scratch of or damage to module glass. Module connectors and cables cannot be pressed between frames or exposed to prevent cable and connector damage.

开箱后的组件应及时安装，零散的组件上方需使用防水材料盖住，防止遭受雨雪，避免组件接线头进水导致漏电或遭受腐蚀。

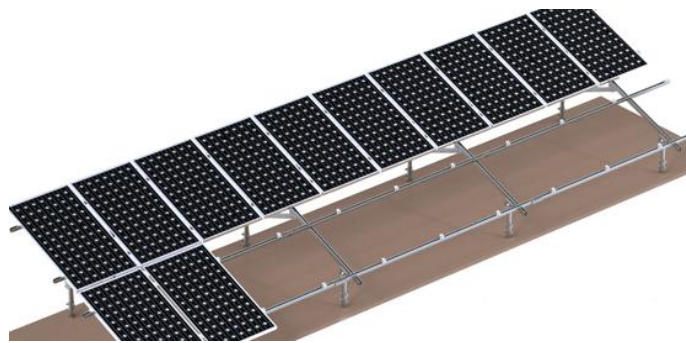
Modules shall be installed immediately after unpacking. Scattered modules shall be covered with waterproof materials to prevent rain and snow and also prevent electric leakage or corrosion of module connector due to water.

4-2.4 组件的铺设

4-2.4 Module Laying

组件验收合格后，依照设计图纸对组件进行铺设。安装人员抓住组件铝边框进行搬运和铺设，严禁触碰组件除铝边框之外的任何部位。

Modules shall be laid as per the design drawing after acceptance inspection. Installation personnel shall handle and lay modules by grasping the aluminum frame and touching any part of a module except the aluminum frame is not allowed.



同一阵列的组件必须功率一致，电流档位一致，否则会对系统的发电量产生影响。若无法满足以上要求时，可将电流大的相邻档位组件与该电流档位组件安装在同一个方阵内。如：一个方阵需要 20 块组件，现在只有 17 块 $I\beta$ 电流档的组件，可选取 3 块 $I\gamma$ 档位的组件与 17 块组件一起装在同一方阵内。下表为 CECEP

产品电流分档情况说明：

Modules in the same array shall have the same power and current range, or the generating capacity of the system may be influenced. In the event that this requirement cannot be met, module within a certain current range and with that with a higher current within the adjacent range can be installed in an array. For example, if an array requires 20 modules but there are only seventeen $I\beta$ modules, then three $I\gamma$ modules and these 17 ones can be installed in an array. The table below lists current ranges of CECEP products:

分类 Category	型号 Model	第一档 Range I	第二档 Range II	第三档 Range III	第四档 Range IV	第五档 Range V	第六档 Range VI	第七档 Range VII	第八档 Range VIII
单晶 125 Monocrystal 125	CEC5-XX-XXXM	$I\alpha < 4.9$	$4.9 \leq I\beta < 5.0$	$5.0 \leq I\gamma < 5.1$	$5.1 \leq I\beta < 5.2$	$5.2 \leq I\delta$	无 N/A	无 N/A	无 N/A
多晶 156 Polycrystal 156	CEC6-XX-XXXP	无 N/A	无 N/A	无 N/A	$I\delta < 8.2$	$8.2 \leq I\epsilon < 8.3$	$8.3 \leq I\zeta < 8.4$	$8.4 \leq I\eta < 8.5$	$8.5 \leq I\theta$
单晶 156 Monocrystal 156	CEC6-XX-XXXM	$I\alpha < 4.9$	$7.9 \leq I\beta < 8.0$	$8.0 \leq I\gamma < 8.1$	$8.1 \leq I\gamma < 8.2$	$8.2 \leq I\delta$	无 N/A	无 N/A	无 N/A

4-2.5 组件的固定

4-2.5 Module Fixing

组件的固定方式一般有两种，一种是利用组件边框的预留安装孔

进行固定，第二种是利用压件对组件进行固定。

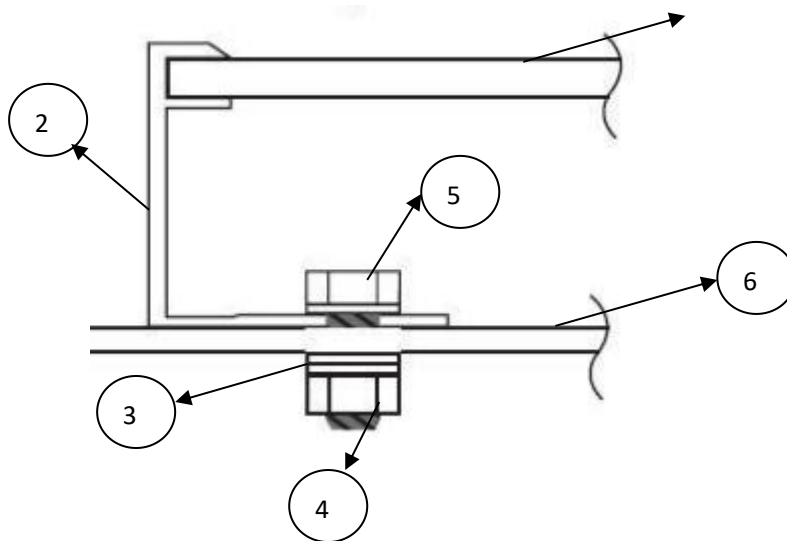
There are generally two module fixing methods: one is to use the mounting holes reserved along the frame, and the other is to use pressing pieces.

1. 利用组件边框预留安装孔进行安装

1. Use mounting holes reserved along the module frame for installation

通过组件边框预留孔，使用螺栓把组件固定在支架上，如下图所示：

Fix a module onto the bracket with bolts through the reserved holes along the frame as shown in the figure below:



1、组件 1. Module	2、组件铝边框 2. Aluminum frame	3、平垫，弹垫 3. Flat gasket, spring shim
4、螺母 4. Nut	5、螺栓 5. Bolt	6、支架 6. Bracket

推荐使用配件如下：

The following accessories are recommended:

名称 Name	材质 Material	规格 Specification
螺栓 Bolt	不锈钢或热镀锌钢 Stainless steel or hot-dip galvanized steel	M8 (M6) *16mm M8 (M6)*16mm
螺母 Nut	不锈钢或热镀锌钢 Stainless steel or hot-dip galvanized steel	M8 (M6) M8 (M6)

螺丝拧紧的扭力矩范围为：14Nm-20 Nm。

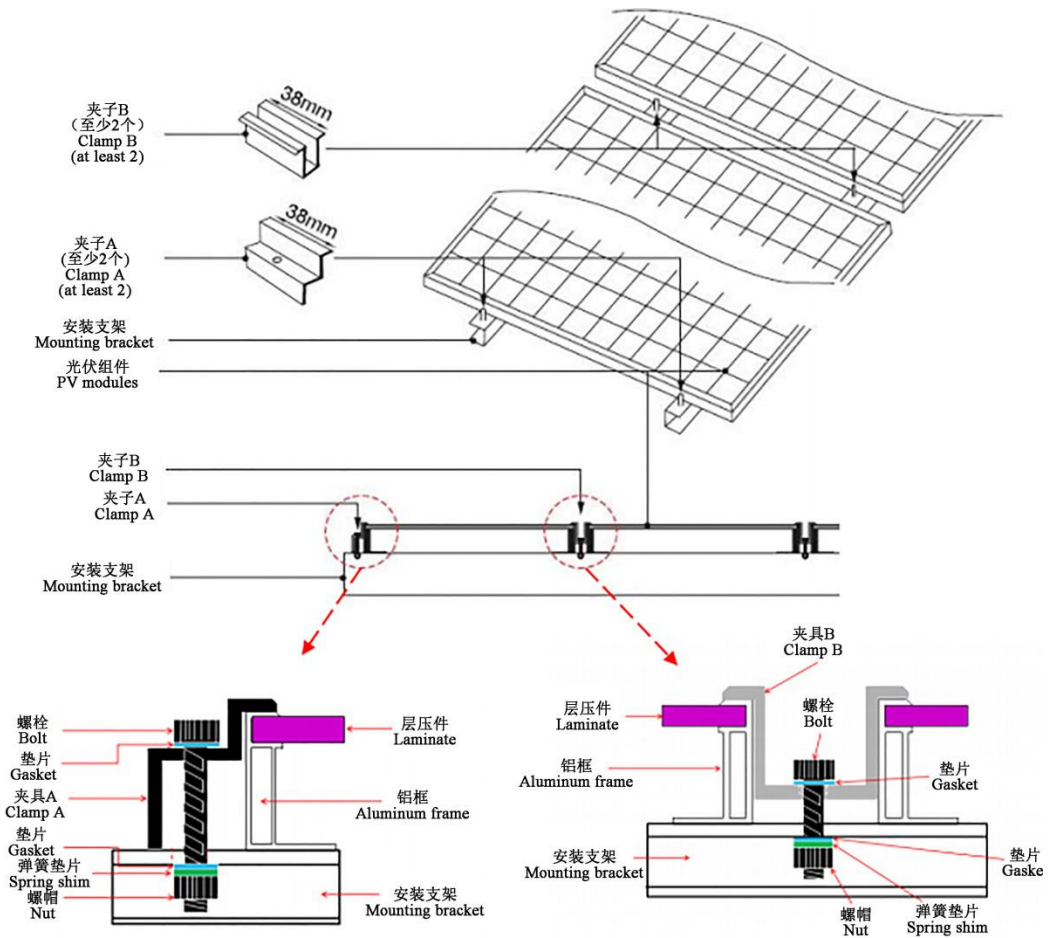
Range of tightening torque of bolt: 14Nm-20 Nm.

2. 利用压块（夹具）进行安装

2. Use pressing pieces (fixtures) for installation

可以使用专业的压块进行安装，排列在中间的组件利用中压块进行连接，在边沿的组件利用边压块进行固定连接，如下图所示：

Dedicated pressing pieces can be used for installation. A module in the middle can be connected with an intermediate pressing piece and a side module can be fixed and connected with a side pressing piece, as shown in the figure below:



边压块及中压块采用铝合金材质，螺栓采用 M8 的不锈钢螺栓，螺栓的拧紧扭力矩范围为：14Nm-20 Nm。

Side and intermediate pressing pieces can be made of aluminum alloy. M8 stainless steel bolts with a range of tightening torque of 14Nm-20 Nm.

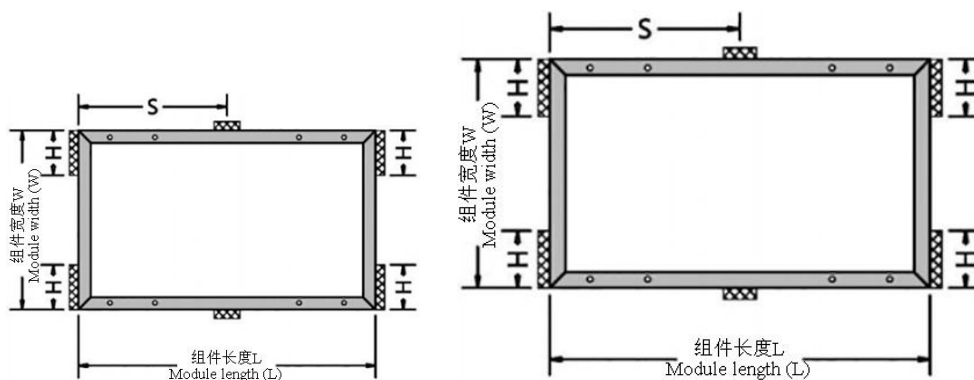
压块正面不能超过边框压倒玻璃上，或者使边框发生变形，同时不能影响到组件的使用，如排水孔，接地孔不能被堵塞遮挡。

A pressing piece shall not have its front face go beyond the frame and stay on the glass, or cause frame deformation, or influence module

application. For example, drain hole and grounding hole shall not be blocked.

压块的放置位置尺寸可参考下图：

Refer to the following figures for location of a pressing piece:



在长边上的固定

在短边上的固定

On the Longer Side

On the Shorter Side

$$(1/4L-50) < S < (1/4L+50)$$

$$(1/2L-50) < S < (1/2L+50)$$

$$(1/4L-50) < S < (1/4L+50)$$

$$(1/2L-50) < S < (1/2L+50)$$

$$0 < H < 1/4W$$

4-3 产品之间的电气连接

4-3 Electrical Connection between Products

4-3.1 产品之间连接方式

4-3.1 Connection Method

组件之间的连接方式分为串联连接和并联连接。

Modules can be connected in series or in parallel.

1. 组件之间的串联连接

1. Connection in Series

组件之间的串联连接即为组件的“+”极连接头连接另外一块组件的“-”极连接头。一定数量相同电性能的组件串联在一起组成一串。

If modules are connected in series, the "+" connector of a module is connected to the "-" connector of another one. A module string consists of a certain amount of modules having the same electrical performance and connected in series.



一串组件的最终电压为各单块组件电压之和，最终电流为各单块组件电流。一串组件最大可以串联组件的数量必须依据相关要求计算，其最终电压的最大值不能超过组件的最大系统电压。

The final voltage of a module string is the sum of voltage of each single module, while the final current is that of a single module. The maximum number of modules in series that form a module string must be calculated as per related requirements, and the maximum final voltage of the string shall not exceed the maximum system voltage of the module.

2. 组件之间的并联连接

2. Connection in Parallel

组件并联连接时，组件的“+”极接头连接另外一块组件的“+”极接头；组件的“-”极接头连接另外一块组件的“-”极接头。

If modules are connected in parallel, the "+" connector of a module is connected to the "+" connector of another one, and the "-" connector of a module to the "-" connector of another one.



4-3.2 连接线和连接器

4-3.2 Connecting Wire and Connector

现场用的组件连接线必须满足最大短路电流，光伏系统中只采用符合光伏直流要求的光照的电缆线，线径不小于 4mm^2 。连接线之间的连接必须用专用的光伏连接器进行连接，且牢固可靠。连接线固定在支架上时应避免机械损伤，同时避免阳光直射或者被水浸泡。

The connecting wires used for modules at the site must meet the maximum short-circuit current requirement. A PV system only uses

light-resistant cables meeting PV direct current requirement. The wire diameter shall not exceed 4mm². Connecting wires must be connected with a dedicated PV connector firmly and reliably. When installed on a bracket, connecting wires must be prevented from mechanical damage, direct sunlight or water soaking.

连接器之间必须正确连接，错误连接可能会产生电弧或电击。连接器要保持干燥和清洁，避免阳光直射或被水浸泡。

Connectors must be correctly connected. Incorrect connection may cause electric arc or shock. Connectors must be kept dry and clean and prevented from direct sunlight or water soaking.

4-4 产品的接地保护

4-4 Grounding Protection

组件的边框为铝合金材质，为了使用安全，避免雷击或静电伤害，铝边框必须有可靠的接地。在组件的边框上已预留并标记了接地安装孔，这些空洞只能用来连接接地线，不可作为组件安装孔使用。

Since the module frame is made of aluminum alloy, for the purpose of safety use and avoiding lightning stroke or static electricity, the aluminum frame must be reliably grounded. Grounding and mounting holes are reserved and marked in the frame. But these holes can only be used for connection of grounding wire but not for module

installation.

组件有多种接地方式，但无论那种接地方式，其接地必须安全可靠，接地装置符合国家有关要求。

Although there are many grounding methods of modules, for no matter which method, the grounding must be safe and reliable and the grounding device must meet related national requirements.

第 5 部分 产品的维护

Part 5 Product Maintenance

为了确保组件产品能安全、稳定、高效运行，组件安装完成后必须定期进行检查和维护，尤其在质保期内，这是用户应承担的责任。组件及其所组成的方阵日常维护主要是针系统中的配件设施和外围设施的维护。

To ensure safe, stable, efficient module operation, modules must be regularly checked and maintained after installation, especially during the warranty period. This is a responsibility that shall be borne by the user. The main focus of daily maintenance of modules and the array formed by the modules is maintenance of system accessories and peripheral facilities.

5-1 组件方阵维护

5-1 Maintenance of Module Array

1. 对组件表面清洁处理：
 1. Cleaning of module surface:
 - a. 日常维护：对组件表面鸟粪、灰尘进行清理；
a. Daily maintenance: remove bird droppings and dusts from module surface;
 - b. 特殊维护：若当地有雨雪季节，并且经常出现长时间大雪覆盖的状况，影世纪对组件上的积雪进行清扫；
b. Special maintenance: in the event of frequent long-time snow coverage in local rainy and snowy season, clean off snow on modules if necessary;
 - c. 应在辐照度低于 $200\text{W}/\text{m}^2$ 的情况下清洁组件，不宜使用与组件温差较大的液体清洗组件；
c. Clean modules when the irradiance is lower than $200\text{W}/\text{m}^2$. Do not clean modules with liquid having great temperature difference with modules;
2. 对组件接头处进行漏电检查及处理，防止漏电。
2. Check module connectors for electric leakage and perform corresponding handling to prevent electric leakage.
3. 对支架稳固性的维护：如果风力较大，支架的螺栓可能出现松动，

应该经常注意检查支架的稳定性，及时对支架螺栓螺母紧固。

3. Maintenance of stability of bracket: as the bracket bolts may get loose in case of relatively high wind, pay attention to check the bracket stability regularly and timely tighten bracket bolts and nuts.
4. 防腐处理：定期对支架进行防生锈防腐蚀处理。
4. Anti-corrosion treatment: regularly perform anti-rust and anti-corrosion treatment for bracket.
5. 组件应定期检查，若发现下列问题应立即调整或更换组件：
5. Modules shall be regularly checked, and immediately adjusted and replaced in any of the following cases:
 - a. 组件存在玻璃破碎、背板灼焦、明显的颜色变化；
 - a. Broken glass, scorched backboard and obvious color change;
 - b. 组件中存在气泡；
 - b. Bubbles in modules;
 - c. 组件接线盒变形、开裂、脱胶、烧毁、接线端子无法良好连接。
 - c. Deformation, cracking, degumming, or burn-down of junction box, and connection failure of terminals.
6. 组件的铝合金边框和支架应结合良好，两者之间接触电阻应不大于 4Ω ，边框必须可靠接地。
6. The aluminum alloy frame and bracket of a module shall be well combined, the contact resistance between them should not be greater than 4Ω , and the frame must be reliably grounded.

7. 在无阴影遮挡条件下工作时，太阳辐照度为 $500\text{W}/\text{m}^2$ 以上，风速不大于 $2\text{m}/\text{s}$ 的条件下，同一组件正面（玻璃面）温度差异应小于 20°C 。
7. When a module works in a no-shade condition with a solar irradiance of greater than $500\text{W}/\text{m}^2$ and a wind speed of not higher than $2\text{m}/\text{s}$, the temperature difference of its front face (glass face) shall be less than 20°C .
8. 使用直流钳型电流表在太阳辐射强度基本一致的条件下测量接入同一个直流汇流箱的各组件串的输入电流，其偏差应不超过 5%。
8. The deviation of the input current of module strings connected to the same DC combiner box measured with a DC clamp ampere meter under basically the same solar radiation intensity shall not exceed 5%.

5-2 组件方阵外围设施维护

5-2 Maintenance of Peripheral Facilities of Module Array

1. 人为活动破坏的维护：组件方阵及其配套外围设施维护须安装围栏，防止牲畜和人为破坏。
1. Maintenance against man-made sabotage: a module array and its peripheral facilities shall be provided with fences to prevent livestock and man-made sabotage.
2. 自然灾害方面的维护：
2. Maintenance in terms of natural disaster:

-
- a. 基础保护：在组建方阵外围采取必要的保护措施，避免方阵基础和外围设施在雨季受水流的冲蚀；
 - a. Foundation protection: take necessary protective measures in the periphery of a module array to protect the array foundation and peripheral facilities from water corrosion in the rainy season;
 - b. 雷电高发区，必须配备有效避雷措施，预防雷击。
 - b. In areas with high incidence of lightning, provide effective lightning measures to prevent lightning stroke.

5-3 Troubleshooting

If the photovoltaic system cannot work normally after installation, please inform the installer immediately. It is recommended to carry out preventive inspection every 6 months. Do not replace the components without authorization. it is necessary to check and maintain the electrical or mechanical properties, it is necessary to let qualified and professionally trained professionals operate to avoid electric shock or casualties.

附件：

Attachment:

中节能 KA 系列支架系统

CECEP KA Series Bracket System

专利号：201520149632.4

Patent No.: 201520149632.4

目前大型地面电站光伏组件安装方式复杂，安装效率很低，同时在安装过程中易对组件造成隐裂等伤害，影响电站的发电量和运行安全。针对此问题，CECEP 根据组件产品特性及多年的安装经

验，研发出组件快速安装系统。该系统在原支架基础上进行了改善，改变原支架上的横担结构和组件的紧固方式，使得组件的安装更快速、安全，同时材料费用基本不增加。具体效果如下。

The generating capacity and operation of utility-scale PV stations may be influenced due to complex installation of PV modules, quite low installation efficiency, and quite possible damage (such as cracking) to modules during installation. To solve this problem, CECEP has developed a quick module installation system based on the characteristics of modules and years of installation experience. This system is an improvement of the original bracket by changing the fastening method of crossarm and module on the original bracket, to realize quicker and safer module installation, basically with no increase of material expense. The specific benefits are described as follows:

1. 节约人工安装成本；改善支架后，10KWp 组件由 2 人操作 2.5H 内完成安装，安装效率可提高 50%以上。
1. Saving of installation labor cost: after bracket improvement, the installation of a 10KWp module can be completed by 2 persons within 2.5H. The installation efficiency can be improved by over 50%.
2. 提高发电量，增加收益；此种安装方式大大降低了组件安装过程中造成隐裂的风险，能提高电站的发电量，保障了电站投资人的

收益。

2. Increase of generating capacity and revenue: this installation method can significant reduce the risk of module cracking during installation, increase the generating capacity of stations, and guarantee the revenue of station investors.

若对该种组件安装方式感兴趣，欢迎来电垂询。

If you are interested in this module installation method, please call us.