



REDSOLAR

光伏组件用户使用手册

PV Module User Manual

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一、目的 Goal

本手册提供了湖南红太阳新能源科技有限公司（以下简称为“湖南红太阳公司”）所生产的光伏组件（以下简称为“组件”）安装和安全使用的信息。

This manual provides information on the installation and safe use of photovoltaic modules (hereinafter referred to as "modules") produced by Hunan Red Solar New Energy Science and Technology Co., Ltd. (hereinafter referred to as "Red Solar").

为了正确的安装和获得稳定的电力输出，安装前必须阅读和理解本手册。如有任何疑问，请联系我们的销售部门或者售后工程师，请他们做进一步的解释。安装组件时，安装者应遵守本手册的所有安全防范措施和当地法规。

In order to install it correctly and obtain stable power output, this manual must be read and understood before installation. If you have any questions, please contact our sales department or after-sales engineer and ask them for further explanation. When installing modules, the installer should follow all safety precautions in this manual and local regulations.

安装光伏系统需要有专业技能和知识，并且只能由具备相关资质的人员进行安装。在安装和使用组件之前，安装人员应熟悉此系统的机械和电气要求。本手册请妥善保管，以备将来维护与保养或组件需出售或处理时参考。

Installing photovoltaic systems requires specialized skills and knowledge and can only be performed by qualified personnel. The installer should become familiar with the mechanical and electrical requirements of this system before installing and using modules. Please keep this manual in a safe place for future reference for maintenance and repair or when the modules need to be sold or disposed of.

本手册中的建议项是为了提高组件在安装维护过程中的安全性，是经过测试和实践检验的，请把手册提供给光伏系统的用户作为他们的参考，并告知他们所有相关安全、操作、维护的要求及建议。

The recommended items in this manual are designed to improve the safety of the module during installation and maintenance and are tested and proven. Please provide the manual to the user of the PV system as their reference and inform them of all relevant safety, operation and maintenance requirements and recommendations.

二、免责声明 Disclaimer

由于本手册的使用及组件安装、操作、使用和维护的条件或方法超出了我司的控制范围，我司不对任何与客户装卸、安装、操作、使用或维护相关的操作所引起的损失、破坏或费用负责。

Since the use of this manual and the conditions or methods of installation, operation, use and maintenance of the modules are beyond the control of our company, our company shall not be liable for any loss, damage, or expense arising from any operation related to customer loading, unloading, installation, operation, use or maintenance.

我司不对由于不当存储转运、安装、使用或维护组件造成的损失承担责任，其中包括但不限于因为不遵守本手册说明造成的、其他厂商产品造成的或与其他厂家产品相连接造成的伤害、损失和费用。

Our company shall not be liable for damages resulting from improper storage transit, installation, use or maintenance of the modules, including, but not limited to, injuries, damages and expenses resulting from failure to comply with the instructions in this manual, caused by other manufacturer's products, or resulting from connection to other manufacturer's products.

由于使用光伏组件可能导致的侵犯第三方专利或其它权利，不属于我司的责任范围。客户并不因使用我司的产品获得任何专利或者专利权利的使用授权，无论明示的或隐含的。

Infringement of third party patents or other rights that may result from the use of PV modules is not the responsibility of our company. The customer is not authorised to use any patents or patent rights, express or implied, as a result of the use of our company's products.

本手册的信息基于我司的长期技术探索和宝贵经验积累，但是包括产品规格的这些信息和相关建议并不构成任何保证条款，无论明示或隐含的。我司保留修改手册、组件产品信息权利，无需提前通知。

本手册不具备任何质保书的意义。

The information in this manual is based on our long-term technical exploration and valuable experience, but the information and related recommendations including product specifications do not constitute any warranty, whether express or implied. Our company reserves the right to modify the manual, component product information without prior notice. This manual does not have any warranty meaning.

三、安装条件 Installation conditions

3.1 气候条件

3.1 Climatic conditions

推荐工作环境温度：-20℃ ~ 46℃ （该工作环境温度为安装地点月平均最高温度和最低温度）。

Recommended operating ambient temperature: -20℃ ~ 46℃ (the operating ambient temperature is the monthly average maximum and minimum temperature of the installation site) .

组件极限运行环境温度：-40℃ ~ 85℃ 。

Module limit operating ambient temperature: -40℃ ~ 85℃

相对湿度：≤85RH% 。

Relative humidity: ≤85RH% 。

组件表面最大静负荷：背面2400Pa静态机械载荷（风压），正面5400Pa静态机械载荷（雪压），这取决于组件的安装类型。

Maximum static load on the surface of the module: 2400 Pa static mechanical load (wind pressure) on the back side and 5400 Pa static mechanical load (snow pressure) on the front side, depending on the type of installation of the module .

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，机械载荷或者其他安装条件必须符合具备相关资质设计单位的设计要求。

Note: Module mechanical loads (including wind and snow pressure) are based on the method of installation and the location of installation. Mechanical loads or other installation conditions must comply with the design requirements of the design unit with the relevant qualifications.

3.2 选择位置

3.2 Selection of location

在北半球，组件最好朝南，而在南半球最好朝北。

In the northern hemisphere, modules should ideally face south, while in the southern hemisphere they should ideally face north.

组件应安装在太阳光可以充分照射的位置，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。

Modules should be mounted where the sun's rays can reach them adequately, avoiding shadowing of the modules by trees, buildings or other obstacles. Although the manufacturer has installed appropriate bypass diodes to minimise this loss, shadows can still cause a reduction in output power.

不要将组件放置、安装在明火或可燃物体附近。

Do not place or install modules near open flames or combustible objects.

不要将组件放置、安装在有可能被水淹没的地方，以及长期沾水的（纯水或盐水）的环境中（例如喷泉、浪花等）。

Do not place or install the modules in a place where there is a risk of flooding, or in an environment that is permanently exposed to water (pure water or salt water) (e.g. , fountains, waves, etc.) .

不要将组件放置、安装在强酸碱环境中（比如石灰厂、热镀锌厂旁）。

Do not place or install the modules in strong acidic and alkaline environments (e.g. next to lime plants, hot-dip galvanising plants)

3.3 倾斜角的选择

3.3 Selection of tilt angle

组件的倾斜角指的是组件表面与地平面之间的夹角（如图3.3-1），组件正对着太阳的时候功率输出最大。

The tilt angle of the module refers to the angle between the surface of the module and the ground plane (e.g., Figure 3.3-1), and the power output is greatest when the module is facing the sun.

组件表面积聚的灰尘可能会破坏组件性能。为使组件达到较好的自清洁能力，建议安装倾角不小于 15° ，安装倾角过小，雨水在组件下端边缘处形成积水区并夹杂积尘、各种矿物质等经过长时间沉积形成斑痕，将破坏组件性能。

Dust accumulated on the surface of the module may damage the performance of the module. In order to make the module achieve better self-cleaning ability, it is recommended that the installation inclination angle is not less than 15° . If the installation inclination angle is too small, the rainwater will form a water accumulation area at the lower edge of the module, and mixed with the accumulated dust, various minerals, etc. after a long period of time to form a mark, which will damage the performance of the module.

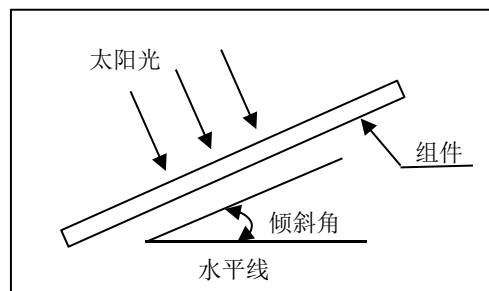


图 3.3-1 组件安装的角度

四、安全通则 Safety regulations

所有组件的安装、维护都应遵守本手册的所有安全防范措施和地方、地区和国家的相关法规及国家现行相关标准、规程、规范。

All modules should be installed and maintained in compliance with all safety precautions in this manual and relevant local, regional and national regulations and relevant national standards, protocols and norms.

4.1 防火安全

4.1 Fire safety

安装组件前请咨询当地的法律法规，遵守其中关于建筑防火性的要求。根据IEC61730-2标准，我司所生产的单玻组件防火等级为C级，双玻组件防火等级为A级。

Before installing the modules, please consult the local laws and regulations and comply with their requirements on building fire resistance. According to IEC61730-2 standard, the single-glazed modules produced by our company are fireproof grade C, and the double-glazed modules are fireproof grade A.

屋顶结构和安装方式的不同会影响建筑的防火安全性能，如果安装不恰当，可能会酿成火灾。为了保证屋顶的防火等级，组件边框与安装表面的最小间距为10厘米，并保证组件背面和安装面之间充分的通风。

Differences in roof construction and mounting methods can affect the fire safety performance of a building, and may result in a fire if not properly installed. To ensure the fire rating of the roof, the minimum distance between the module edge and the mounting surface is 10cm and adequate ventilation is ensured between the back of the module and the mounting surface.

请根据当地的法规要求使用恰当的组件配件，如保险丝、断路器、接地连接器。

Use appropriate module accessories such as fuses, circuit breakers, and grounding connectors as required by local regulations.

如果组件安装附近出现暴露的可燃性液体、气体或者危险物品，请勿安装组件。

Do not install the module if exposed flammable liquids, gases, or hazardous materials are present in the vicinity of the module installation.

当光伏系统起火后，请立即断开电源，并在确保人员安全的情况下进行灭火。

When the PV system catches fire, immediately disconnect the power supply and extinguish the fire while ensuring the safety of personnel.

4.2 使用安全

4.2 Safety of use

每个组件在太阳光直射下可产生30V以上的直流电压，接触电压达到30V或更高对人体具有危害。

Each module can generate more than 30V DC voltage under direct sunlight, and contact voltage of 30V or higher is hazardous to human body.

严禁触摸组件串的金属带电部位。无论是否连接组件，直接接触组件的带电部分，例如接线端子插芯，将可能导致人员伤亡。

Do not touch the live metal parts of the module string. Direct contact with live parts of the assembly, such as terminal inserts, whether the assembly is connected or not, will likely result in injury or death.

使用符合电力安装工作绝缘要求的工具和劳动保护用品。

Use tools and labour protections that meet the insulation requirements for electrical installation work

安装时请不要佩戴金属饰物，以免戳穿组件，引起触电危险。

Do not wear metal jewellery during installation as it may poke through the modules and cause an electric shock hazard.

在运输和安装组件时以及组件发电过程中，应使儿童远离组件。

Children should be kept away from the module when transporting and installing the module and during the generation of electricity from the module.

为了您的安全，请不要在没有安全防护措施的情况下在屋顶上工作，防护措施包括但不限于摔落保护、梯子或楼梯及个人保护装备。

For your safety, do not work on a roof without safety precautions that include, but are not limited to, fall protection, ladders or stairs, and personal protective equipment.

为了您的安全，不要在不利的环境下安装或处理组件，包括但不限于强风或阵风、潮湿的或带沙的屋顶，禁止在雨中进行组件接线、测试调试工作。

For your safety, do not install or handle the modules in unfavourable conditions, including but not limited to strong winds or gusts, wet or sandy roofs, and it is prohibited to carry out module wiring, testing and commissioning work in the rain.

遵守适用于所有部件安装的安全规则，如电线和电缆、连接线、充电控制器、逆变器、蓄电池等。

Observe the safety rules that apply to the installation of all modules, such as wires and cables, connection cables, charge controllers, inverters, batteries, etc.

刮大风时不要在屋顶或建筑物上安装组件，以防意外。

Do not install modules on roofs or buildings during high winds to prevent accidents.

安装光伏系统要求专业的技能和知识，必须由经过培训且具备资质的人员来完成。

Installing a photovoltaic system requires specialised skills and knowledge and must be carried out by trained and qualified personnel.

安装人员应该预先了解安装过程中可能会发生伤害的风险，避免不必要的触摸组件，组件的表面和边框可能很热，这会有烧伤或电击的危险。

Installers should be forewarned of the risk of injury that may occur during installation and avoid touching the module unnecessarily; the surface and bezel of the module may be hot, which can pose a risk of burns or electric shock.

为了防止电击，工作环境、组件以及安装工具应该保持干燥状态。

To prevent electric shock, the working environment, modules and installation tools should be kept in a dry condition.

在组件安装或布线过程中，如果断路器和过流保护断路器不能打开，或逆变器无法关闭，则使用不透明材料覆盖在阵列组件上，来停止电力输出。

During module installation or wiring, if the circuit breakers and overcurrent protection circuit breakers fail to open, or the inverter fails to shut down, an opaque material is used to cover the array modules to stop the power output.

接线盒的盖子应一直保持密闭状态。

The cover of the junction box shall remain closed at all times.

不要拆开组件或者移动组件的任何部分。

Do not disassemble the assembly or move any part of the assembly.

当组件有电流或外部电流出现时，不得连接或断开组件。

Do not connect or disconnect the assembly when there is current in the assembly or when external current is present.

禁止清洗已经出现玻璃爆裂，线缆破损的组件，破损的组件具有电危险性（电击和着火），不能修复或维修，应立即更换。

It is prohibited to clean modules that have burst glass and broken cables. Broken modules are electrically hazardous (electric shock and fire), cannot be repaired or serviced, and should be replaced immediately.

五、产品标识 Product marking

每个组件的背面都有两个标签，提供了以下信息：

There are two labels on the back of each module that provide the following information:

铭牌：描述产品类型，在标准测试条件下（1000w/m² 的辐照度，AM1.5光谱，以及25℃的组件电池温度）的额定功率、额定电流、额定电压、开路电压、短路电流；认证标识、重量、尺寸、最大的保险丝容量以及系统最高电压等信息。

Nameplate: describes the product type, rated power, rated current, rated voltage, open-circuit voltage, short-circuit current under standard test conditions (1000w/m² irradiance, AM1.5 spectral, and module cell temperature of 25°C); information on certification mark, weight, dimensions, maximum fuse capacity, and maximum system voltage.

条形码：每个组件都有一个唯一的序列号，组件正面和背面各有一个条形码。正面的条形码被永久的固定在组件内部，从组件的正面顶部可以清楚的看到。

Barcode: Each module has a unique serial number, with a barcode on the front and one on the back of the module. The barcode on the front is permanently attached to the inside of the module and is clearly visible from the top of the front of the module.

注意：保留组件的产品标识，以作为产品厂家质保的依据。

Note: Retain the product identification of the module for the product manufacturer's warranty.

六、运输存储 Transport storage

6.1 运输及转运

6.1 Transport and transhipment

组件包装箱外面有一层缠绕膜，可以对组件起到常规的防水防尘。如果组件需要长途运输或存储，请不要拆除它。包装的成品可以通过陆运，海运或者空运进行运输。在运输过程中：请保证包装箱固定在运输平台上；组件为易碎品，包装的成品不能从高处跌落；避免包装的成品受到激烈的震动和颠簸。

There is a layer of winding film on the outside of the module packing box, which can provide regular waterproof and dustproof to the module. Please do not remove it if the module is to be transported or stored over long distances. The finished product can be transported by land, sea or air. During transport: please make sure the packing box is fixed on the transport platform; the modules are fragile, the packaged products can not be dropped from a high place; avoid the packaged products being subjected to fierce vibration and bumps.

包装箱不能完全防潮，受潮后包装箱的结构强度将变小，可能会发生危险。包装的成品在运输与存储过程中，禁止淋雨或受潮，请将已包装的成品向上并置于通风、防雨和干燥的地方。

The packing box cannot be completely protected against moisture, the structural strength of the box will become less after moisture, which may be dangerous. It is prohibited for the packaged finished products to get wet or damp during transport and storage, please place the packaged finished products upwards and in a ventilated, rain-proof and dry place.

包装的成品可以叠放在一起运输或存储，总高度不能超过2层。

Packaged finished products may be stacked for transport or storage with a total height of no more than 2 layers.

禁止在包装箱和组件上面踩踏（图6.1-1-3）。

It is prohibited to step on top of boxes and modules (Figure 6.1- 1-3) .



图 6.1-1

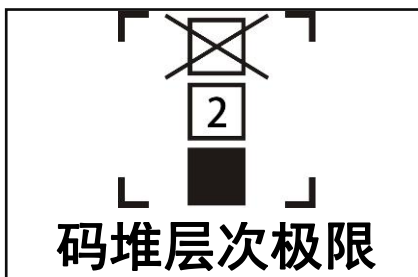


图 6.1-2



图 6.1-3

禁止将包装的成品与腐蚀性的化学药品或气体存放在一起，注意防火。

It is prohibited to store the packaged finished product with corrosive chemicals or gases, and pay attention to fire prevention.

一旦发现包装箱受潮，请小心的拆开外包装箱，将其中的组件抬出，放置在通风的地方，避免组件发霉。拆开后的组件平放叠放不要超过13件。

Once the box is found to be damp, please carefully unpack the outer box, lift out the modules therein and place them in a ventilated area to avoid mouldy modules. Do not stack more than 13 modules flat after unpacking.

在搬运单块组件的过程中，请务必两个人同时操作。

Be sure to have two people working at the same time during the handling of a single module.

6.2 卸货后存储注意事项

6.2 Precautions for storage after unloading

卸货要求请按照《七、卸货及异常反馈》，存储场地要求坚实、平整、宽阔、没有火灾隐患，避免在坑洼积水、积雪地面及冰面、软质地及斜坡上堆放组件（图6.2-1,6.2-2），防止组件受力不平衡造成组件隐裂或倾倒。

For unloading requirements, please follow "VII. Unloading and Abnormal Feedback". The storage site should be solid, level, wide and free from fire hazards, and avoid stacking the modules on potholes and puddles of water, snowy and icy ground, soft texture and slopes (Fig.6.2-1, 6.2-2), so as to prevent the imbalance in the force of the modules from causing them to be hidden and cracked or tilted over.

6.3 卸货后防雨防潮要求

6.3 Requirements for protection against rain and moisture after unloading

若需要在户外长时间堆放，请做好防雨、防潮措施（图6.3-1,6.3-2）。

If the product is to be stored outdoors for a long period of time, please take measures to protect it from rain and moisture (Figure 6.3-1, 6.3-2).

6.4 项目地组件转运注意事项

6.4 Considerations for the transshipment of modules at the project site

请使用合适的运输工具转运（如小型平板车或叉车），转运工具应做好防震措施。禁止使用推土机、挖掘机转运，运输过程中应保持平稳，项目现场托运，只允许1层运输（图6.4-1,6.4-2），安装剩余的尾数如需转运请使用两个托盘叠放，组件平放于托盘之上，叠放数量不超过13块，且使用打包带固定，防止运输过程倾倒。

Please use suitable means of transport for transshipment (e.g. small flatbed truck or forklift), and the means of transshipment should be well protected against vibration prohibit the use of bulldozers, excavators for transit, the transport process should be kept smooth, the project site consignment, only allowed to transport 1 layer (Figure 6.4-1, 6.4-2), installation of the remaining end of the need for transit, please use two pallets stacked on top of each other, the modules are placed flat on top of the pallet, the number of stacked not more than 13 pieces, and the use of packing tape fixed to prevent the transport process tipped over.



图 6.2-1



图 6.2-2



图 6.3-1



图 6.3-2



图 6.4-1



图 6.4-2

6.5 组件存储及搬运

6.5 Module storage and handling

打开包装箱，请按照《八、开箱说明》操作。

To open the box, follow the VIII. Unpacking Instructions.

不能在组件的表面刷油漆或其他粘胶剂。

Paint or other adhesives cannot be applied to the surface of the module.

组件在存储和运输过程中，除非到达安装地点，否则不能随意打开包装；组件到达项目指定地，存储堆放注意通风、防雨、干燥，禁止沙土覆盖或污染组件。

During the storage and transport of the modules, the packaging cannot be opened at will unless it arrives at the installation site; when the modules arrive at the designated place of the project, the storage and stacking should pay attention to ventilation, rain protection and dryness, and it is forbidden to cover the modules with sand or soil or contaminate them.

周转搬运组件过程中轻拿轻放，周转搬运工具要充分考虑到组件的防护（如减震，防撞击），组件平起堆放时需保持底部平整，组件的玻璃面朝下摆放（玻璃与地面接触时需隔开），底部最下一块组件玻璃面朝上摆放，边框四周对齐，并且防止水进入组件从而损坏组件的连接器，上块组件禁止压在下块组件背板上，堆放不超过13件，如需要转运的，底层托盘需要叠放2个，且做好固定工作，防止转运过程组件倾斜掉落。

Turnaround handling modules in the process of light take lightly, turnaround handling tools should give full consideration to the protection of the modules (such as shock absorption, impact prevention), modules stacked flat need to keep the bottom flat, the glass side of the modules face down (glass contact with the ground needs to be separated), The bottommost piece of the module is placed with the glass side facing up, the bezel around the alignment, and to prevent water from entering the modules so as to prevent damage to the modules of the connector, the upper module is prohibited from pressing the lower piece of the module on the back plate, stacked no more than 13 pieces, such as the need to transit, the bottom of the tray needs to be stacked on the 2, and to do a good job fixing the work, to prevent the process of transit modules tilted to fall off.

人工搬运或移动组件时应由两人进行抬放。

Manual handling or moving of modules should be performed by two persons for lifting and lowering.

不要划伤铝合金边框表面的阳极氧化层，划伤可能会导致边框腐蚀，影响边框载荷能力。

Do not scratch the anodic oxide layer on the surface of the aluminium alloy bezel. Scratches may cause the bezel to corrode and affect the bezel loading capacity.

禁止拉拽组件的接线盒或电缆头来搬移组件。

Stop pulling on the junction box or cable head of the assembly to move the assembly.

禁止踩踏组件正面或背面，本公司组件通过IEC61215机械载荷实验，背面最大可承受2400Pa静态载荷（风压），正面最大可承受5400Pa静态载荷（雪压）。此载荷与人力踩压存在本质上的区别：机械载荷实验压力是静态均匀分布，人力踩压是动态不均匀且具有冲击力的（图6.5-1）。

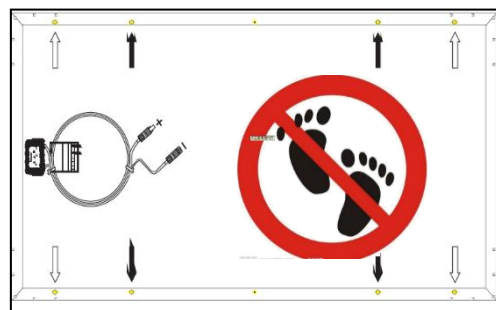


图 6.5-1

It is forbidden to step on the front or back of the modules. Our modules have passed the IEC61215 mechanical load test, and can withstand a maximum static load of 2400Pa (wind pressure) on the back, and a maximum static load of 5400Pa (snow pressure) on the front. There is a fundamental difference between this load and human pressure: the mechanical load test pressure is static and uniformly distributed, while human pressure is dynamic and uneven and has an impact force (Figure 6.5-1).

禁止让包装好成托的组件直接掉落或重摔组件。

It is prohibited to drop or drop the packaged modules directly on the pallet.

禁止在组件上放置重物或让物体落在组件上。


Do not place heavy objects on the modules or allow objects to fall on them.

不正确的运输或安装可能会损坏组件，运输时应使组件边框均匀受力，避免组件玻璃面和背板受冲击或重压，所有因存储、运输、安装等外力造成的背板划伤会导致在销售时提供给客户的产品有限质保的失效。

Incorrect transport or installation may damage the module. The module should be transported in such a way that the module bezel is evenly stressed and the module glass surface and back panel are not subjected to impact or heavy pressure. All scratches on the back panel due to external forces such as storage, transport, installation, etc., will result in the expiration of the product's limited warranty that was provided to the customer at the time of the sale.

在搬运或者安装组件的时候，不要靠背板支撑组件。

Do not lean on the back plate to support the assembly when handling or installing the assembly.

 禁止在组件上施加过度的载荷或扭曲组件的边框。

It is prohibited to apply excessive loads to the module or to distort the edges of the module.

安装或维护光伏系统时，不要穿戴金属戒指、手表、耳环或其它的金属配饰，禁止利器与组件玻璃、背板接触（图 6.5-2）。

Do not wear metal rings, watches, earrings, or other metal accessories when installing or maintaining the PV system, and prohibit sharp objects from coming into contact with the module glass and backsheet (Figure 6.5-2).

禁止拆解组件，不要移除组件的铭牌或组件上的部件（图 6.5-3）。

Disassembly of the module is prohibited and do not remove the nameplate of the assembly or parts from the module (Figure 6.5-3).

禁止用镜子或透镜聚焦太阳光照射到组件上（图 6.5-4），禁止将组件背面直接暴露在太阳光下。

It is prohibited to use mirrors or lenses to focus sunlight onto the module (Figure 6.5-4), and it is prohibited to expose the back of the module to direct sunlight.

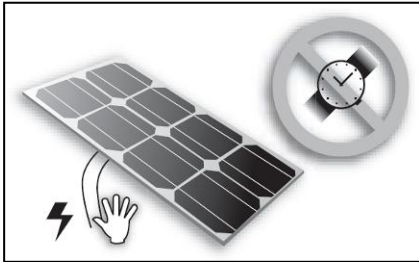


图 6.5-2

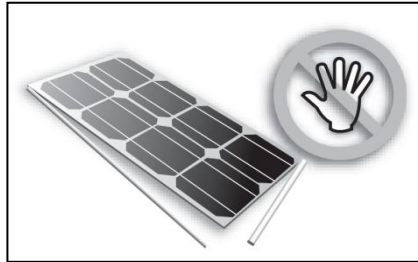


图 6.5-3



图 6.5-4

七、卸货及异常反馈 Unloading & Abnormal feedback

7.1 卸货前检查

7.1 Pre-unloading inspection

卸货前根据随车发货清单核对包装箱外粘贴的装箱单上的数量、型号，并检查外包装有无破损、倾倒。如有破损倾倒，请第一时间联系我司人员，并在发货清单上备注。

Before unloading, check the quantity and model on the packing list attached outside the box according to the delivery list, and check whether the outer package is damaged or dumped. If there is any damage or dumping, please contact our staff at the first time and make a note on the delivery list.



核对出厂检验报告、合格证、光伏组件用户使用手册（根据项目发适当数量）是否齐全。

Verify whether the factory inspection report, certificate of conformity, PV module user manual (according to the project to send the appropriate number) is complete.

7.2 组件异常反馈信息提交要求

7.2 Module exception feedback submission requirements

请在组件卸货前安排检查，如发现包装箱破损或组件损坏（特别是玻璃破裂、边框变形和背板破损），此托组件严禁继续作业并保留现场原貌，第一时间拍照记录，并向我司进行反馈，我司根据实际反馈信息决定是否前往查看，未按要求进行反馈的任何组件损坏视为由安装过程中损坏的，我司将不予认可、处理、赔付（安装，搬运过程中损坏会导致有限质保的失效）。

Please arrange to check the modules before unloading, if you find that the packing box is damaged or the modules are damaged (especially the glass is cracked, the frame is deformed and the back plate is broken), the modules of this consignment are strictly prohibited to continue the operation and retain the original appearance of the scene, the first time to take pictures and records, and to give feedback to our company, our company based on the actual feedback to decide whether or not to go to view, not according to the requirements of the feedback of any damage to the modules is regarded as damaged by the process of installation, our company will not be recognised, processed, compensation (installation, handling process damage will lead to the lapse of the Limited Warranty).

基本拍照图片要求有以下：

The basic photographic image requirements are the following:

1)组件完整的条码信息（图 7.2-1）；

module complete barcode information (Figure 7.2-1)

2)组件完整的正面照（图 7.2-2）；

A complete front view of the module (Figure 7.2-2);

3)组件完整的背面照（图 7.2-3）；

A complete backside photo of the module (Figure 7.2-3);

4)异常点特写一张（图 7.2-6）；

One close-up of the anomaly (Figure 7.2-6);

5)组件破裂时如玻璃面存在以某点为中心的扩散纹路需拍近照一张（图 7.2-4）；

When the module breaks, if there is a spreading pattern on the glass surface centred on a certain point, take a close-up photo (Figure 7.2-4);

6)如还未卸货即已发现异常，需拍摄异常组件所在的托（托号及整托照片）及其在装车位置中的照片和对应的收货单、装箱单；

If the abnormality is found before unloading, it is necessary to take photos of the consignment where the abnormal module is located (consignment number and photo of the whole consignment) and its photo in the loading position and the corresponding consignment note and packing list;

7)异常组件在本托中的位置；

The location of the anomalous module in this pallet;

8)根据实际异常情况我司会要求提供其它更详细资料及图片信息。

According to the actual abnormal situation, our company will ask for other more detailed information and picture information.

注意：所拍照片请确保清晰、便于技术分析。

Note: Please ensure that the photos taken are clear and easy to analyse technically.



图 7.2-1 条码信息
Barcode



图 7.2-2 组件正面照
Front view of the module

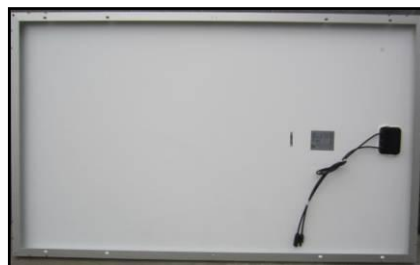


图 7.2-3 组件背面照
Back view of the module

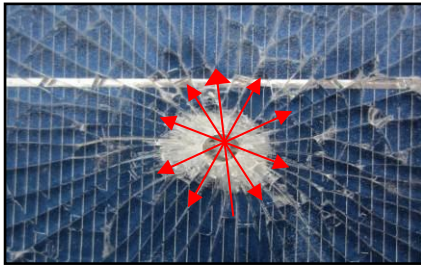


图 7.2-4 组件破裂
Cracked module

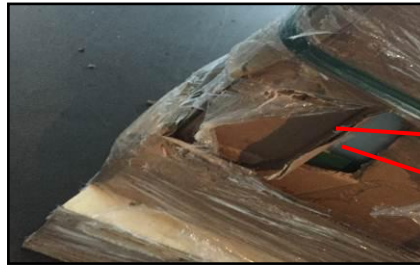


图 7.2-5 包装箱破损
Broken packaging box

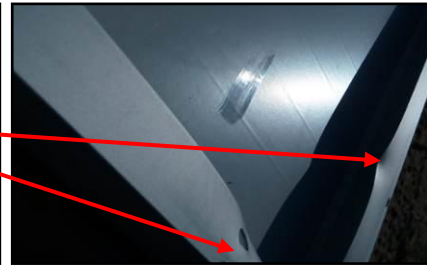


图 7.2-6 异常点特写
Close-up of abnormal point

7.3 卸货要求

7.3 Unloading requirements

卸货请使用叉车或吊车，注意叉吊车的承载能力(包装箱有具体重量标识)，卸货过程请保持轻拿轻放原则。

Unloading please use a forklift or crane, pay attention to the forklift's carrying capacity (the box has a specific weight marking), the unloading process, please keep the principle of light take light put.

1) 吊车卸货建议一次吊装一箱或者一托（上下叠拖的两箱），不建议同时吊运多箱。如确需要请使用合理的吊装治具。注意吊带固定好再起吊，禁止碰撞、快速下放等野蛮作业行为，不能在下雨、下雪或大风等恶劣天气下作业，堆码层数不得超过两箱且上下托对齐，存储过程中请保持包装箱及缠绕膜完好。

1) Crane unloading is recommended to lift one box or one pallet (two boxes stacked on top and bottom) at a time, and it is not recommended to lift more than one box at the same time. If necessary, please use reasonable lifting tackle. Pay attention to the sling fixed before lifting, prohibit collision, fast lowering and other barbaric operation behaviour, can not be in the rain, snow or wind and other bad weather operations, stacking layers shall not exceed two boxes and the upper and lower trays are aligned, please keep the packing box and the winding film intact during the storage process.

2) 叉车卸货注意叉车的竖臂或者横臂之一需要长于组件（防止叉车卸货转运时顶住组件背板导致爆裂），叉车叉臂不能太短，长度应 > 1.8m，避免运输过程中托盘向后倾倒，最好从托盘的短边进入；因作业区域条件限制无法达到足够水平的应做好防倾斜措施。如两托组件并排放置时注意叉子的长度，以防叉伤并排的另一箱组件。

2) Forklift unloading pay attention to the forklift's vertical arm or one of the horizontal arm needs to be longer than the module (to prevent the forklift unloading transfer top module back plate lead to burst), forklift arm can not be too short, the length of the forklift should be > 1.8m, to avoid transporting the pallet backward dumping, it is best to enter from the short side of the pallet; due to the operating conditions of the area can not be reached enough level should be done to prevent tilting measures. If two pallet modules are placed side by side, pay attention to the length of the fork to prevent the fork from hurting the other box module side by side.

3) 卸货作业时注意安全，划定作业区域，无关人员不得随意进入作业区域，叉吊车指挥人员在起吊或者叉运的时候应保持安全距离，防止组件意外掉落或倾倒砸伤作业人员。

3) Pay attention to safety when unloading operations, demarcate the operating area, unrelated personnel shall not enter the operating area at will, forklift truck commanders in the lifting or forklift should be kept at a safe distance, to prevent the modules accidentally fall or fall over and injure the operating personnel.

八、开箱说明 Unpacking instructions

8.1 开箱准备

8.1 Unpacking preparation

设备和工具：刀具，手套，防倒A字架。

Equipment and tools: knives, gloves, anti-reverse A-frame.

人员：最少3人。

Personnel: Minimum 3 persons.

注意事项：

Caveats:

- 1) 如果现场有风，需要特别注意安全，尤其是在大风的情况下，建议不要搬运组件，并且妥善固定好已拆开包装的组件。作业地面需要保证包装箱能够水平稳定的放置，避免倾倒。

1) If the site is windy, special attention to safety is required, especially in windy conditions, it is recommended not to move the modules, and properly fix the unpacked modules. The working ground should ensure that the packing box can be placed horizontally and stably to avoid tipping.

2) 拆箱过程中请佩戴保护手套，避免划伤和在玻璃面留下指印。

2) Please wear protective gloves during unpacking to avoid scratches and fingerprints on the glass surface.

3) 开箱仅允许单包作业，禁止在两托叠放的情况下开箱。

3) Only single-package operation is permitted for unpacking, and unpacking with two pallets stacked on top of each other is prohibited.

4) 以下开箱方案适用于大部分地形区域，如地形特殊（如较陡的山地、船上等）开箱方案需结合现场实际情况。开箱的原则是受力点需均匀分布在边框上。

4) The following open box programme is applicable to most terrain areas, such as special terrain (such as steeper mountains, ships, etc.) open box programme needs to be combined with the actual situation on site. The principle of unboxing is that the stress points should be evenly distributed on the frame.

5) 无框双玻组件不允许堆叠。

5) Stacking of frameless double-glazed modules is not allowed.

8.2 常规边框组件开箱步骤

8.2 Conventional Bezel Assembly Unboxing Procedure

1) 防倒A字架的制作。

1) Fabrication of anti-fall A-frame.

使用圆钢或者结实的木料制作一个简易防倒A字架（如图），A字架的高度及宽度必须超过组件的高度或长度（保证受力点均在组件边框）。防倒面与地面的夹角呈60°-70°左右。

Use round steel or sturdy wood to make a simple anti-fall A-frame (as shown in the picture), the height and width of the A-frame must exceed the height or length of the module (to ensure that the stress points are all in the module frame). The angle between the anti-fall surface and the ground is about 60° -70°.

2) 检查包装箱是否完整，外箱标识的组件功率及电流等其他信息，将待拆包组件移动至拆包位置且离A字架约20CM。

2) Check whether the packing box is complete, the power and current of the modules marked on the outer box and other information, move the modules to be unpacked to the unpacking position and about 20cm away from the A-frame.

3) 拆除缠绕膜。

3) Remove the winding film.

用刀具或者其他坚硬物品划开包装箱外的缠绕膜，注意不要损坏包装箱，然后拆除包装箱四周的缠绕膜。

Use a knife or other hard objects to cut the winding film outside the box, be careful not to damage the box, and then remove the winding film around the box.

4) 拆开外包装的所有塑钢打包带。

4) Unpack all plastic packing straps from the outer packaging.

如打包带是气压黏合的，请找到打包带的结合部位，分别用双手拽住接头的两端，相反方向用力，可以使之分开。如打包带是钢制打包扣紧固的，请用刀具在接头附近部位切断打包带。

If the strapping is pneumatically bonded, please find the bonding part of the strapping and separate it by tugging both ends of the joint with both hands and exerting force in opposite directions. If the strapping is fastened with steel buckles, use a knife to cut the strapping near the joint.

5) 拆除外包装。

5) Remove the outer packaging.

移除纸箱上盖，并上提纸箱移除围卡箱体。

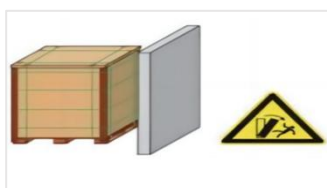
Remove the top cover of the carton and lift the carton up to remove the enclosure.

6) 两人扶住组件，另一人剪断内包装的所有打包带，扶组件的人轻推组件使其缓慢斜靠A字架，待完全支撑后从外侧开始依次搬运组件。

6) Two people hold the module, the other person cut all the packing tape of the inner packaging, the person holding the module gently push the module to make it slowly lean against the A-frame, and then start to carry the module sequentially from the outside after it is fully supported.

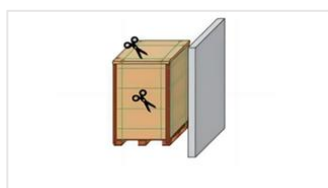


7) 开箱步骤 (图示)



检查包装箱是否完整, 将拆包组件移动至拆包位置且离A字架约20CM

Check whether the packaging box is complete, move the unpacking modules to the unpacking position and about 20cm away from the A-frame



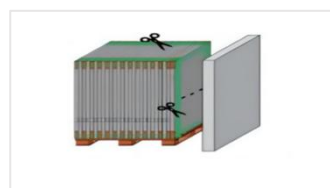
拆除包装箱四周的缠绕膜, 塑钢打包带

Remove the wrapping film and plastic-steel strapping around the packaging box.



移除纸箱上盖, 并上提纸箱移除围卡箱体

Remove the top cover of the carton and lift up the carton to remove the cardboard box



两人扶住组件, 另一人剪断内包装的所有打包带

Two people hold the module, and another person cuts all the strapping tapes of the inner packaging



扶组件的人轻推组件使其缓慢斜靠A字架, 待完全支撑

The person holding the assembly gently pushes the assembly to slowly lean against the A-frame until it is fully supported.



两人从外侧开始依次搬运组件

Two people carry the modules one by one starting from the outside



简易防倒A字架, 高度及宽度必须超过组件的高度或长度

Simple anti-fall A-shaped frame, the height and width must exceed the height or length of the module



防侧面与地面的夹角呈60° -70°左右

The angle between the anti-reverse surface and the ground is about 60°-70°

8) 开箱检验。

8)Unpacking and inspection.

请检查组件是否有玻璃爆裂、边框变形、电池片碎片、背板划伤异常情况, 如有异常请按7.2组件异常反馈信息提交要求进行反馈。

Please check whether the module has any glass burst, frame deformation, cell debris, back plate scratch abnormalities, if abnormal, please follow 7.2 Module Abnormal Feedback Information Submission Requirements to provide feedback.

9) 搬运组件。

9)Handling modules.

两个人拿住组件的两个短边, 同时用力, 把组件抬到指定地点。拆箱搬运组件过程中佩戴保护手套, 避免划伤手, 严禁裸手触摸玻璃面, 避免在玻璃面留下手印, 然后两人逐步移动所有组件。

Two people hold the two short sides of the modules and exert force at the same time to lift the modules to the designated place. Wear protective gloves during the process of unpacking and carrying the modules to avoid scratching your hands, and it is strictly prohibited to touch the glass surface with bare hands to avoid leaving handprints on the glass surface, and then two people gradually move all the modules.

10) 如果组件拆开后没有立即安装, 需从立式转变为平放, 组件玻璃面朝下堆叠在托盘上, 最下一块组件玻璃面朝上摆放 (如下雨最上一块组件玻璃面朝上摆放, 并立即停止操作, 固定好组件, 盖好防雨布), 最高堆码片数不超过13块。

10)If the modules are not installed immediately after dismantling, they need to be transformed from vertical to flat, with the glass side of the modules stacked face down on the pallet, and the lowest piece of module glass face up (if it rains, the uppermost piece of module glass will be placed face up, and the operation will be stopped immediately, the modules will be fixed, and the rain-proof cloth will be covered), and the maximum number of stacked pieces will not be more than 13 pieces.

8.3 非常规无框组件开箱步骤

8.3 Unconventional frameless assembly unpacking procedure

联系我司售后人员指导。
Contact our after-sales staff for guidance.

8.4 拆箱堆放不当图示

8.4 Unpacking and Stacking Improperly Illustrated



图 8.4-1
拆箱错误组件倾倒
Wrong way of unpacking causes modules to fall over



图 8.4-2
组件倚靠方式错误
Wrong way of leaning modules



图 8.4-3
组件拆箱后堆放不整齐
Modules are not stacked neatly after being unpacked



图 8.4-4
组件堆放方式错误
Wrong module stacking method

九、机械安装 Mechanical Installation

9.1 选择合适的支架

9.1 Selection of a suitable support

必须遵守支架所附的说明书指导和安全守则。
Instructional guidance and safety codes accompanying the holder must be observed.

禁止在组件玻璃的表面钻孔，以防对组件造成破坏，从而使产品有限质保失效。

It is prohibited to drill holes in the surface of the module glass to prevent damage to the module, which could void the Limited Product Warranty.

禁止在组件的边框上钻附加的安装孔。

It is prohibited to drill additional mounting holes in the bezel of the assembly.

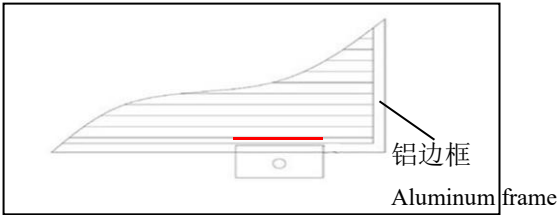


图 9.1-1

组件采用压块固定安装方式时：组件正面压块宽度不宜超出组件铝边框（如图9.1-1红线标识处），每个组件上至少需要使用四/八个夹块固定在长边框上。视当地的风雪气象情况确定是否需要额外的夹具以确保组件能承受负载。压块安装使用的螺栓建议采用 M8规格（长度根据压块设计高度定）并配备相应的垫片、弹簧垫片和螺母，采用扭力扳手拧紧，扭力范围18N.m到24N.m。

When the module adopts the block fixing installation method: the width of the block on the front side of the module should not exceed the aluminium frame of the module (as marked by the red line in Fig. 9.1-1), and at least four/eight clamps should be used on each module to fix it on the long frame. Depending on local wind and snow conditions, additional clamps may be required to ensure that the module can withstand the load. The bolts used for mounting the blocks are recommended to be M8 size (length depending on the design height of the block) with appropriate spacers, spring washers and nuts, tightened with a torque spanner with a torque range of 18 N.m to 24N.m.

组件采用螺栓安装孔安装时：使用边框内侧的四个对称的安装孔将组件固定在支架上。在有强风或大雪的地区，同时使用外侧对称的安装孔来加强固定。细节请参见图9.1-2。机械载荷必须符合具备相关资质设计单位的设计要求。螺栓孔安装使用的螺栓建议采用M8规格（长度根据压块设计高度定）并配备相应的垫片、弹簧垫片和螺母，采用扭力扳手拧紧，扭力范围14N.m到20N.m。

When the module is mounted using bolt mounting holes: use the four symmetrical mounting holes on the inside of the frame to secure the module to the bracket. In areas with strong winds or heavy snowfall also use the symmetrical mounting holes on the outside to reinforce the fixing. For details see Fig. 9.1-2. Mechanical loads must be in accordance with the design requirements of a qualified designer. The bolts used for mounting the bolt holes are recommended to be of M8 size (length according to the designed height of the block) and equipped with appropriate spacers, spring washers and nuts, tightened with a torque spanner with a torque range of 14N.m to 20 N.m .

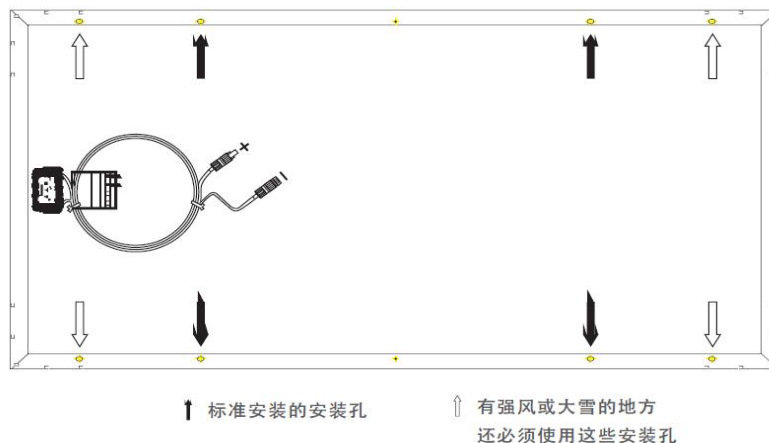


图 9.1-2

支撑结构必须由耐用、防腐蚀、抗紫外线的材料制成。请使用经检测和认证批准的支撑结构。Support structures must be made of durable, corrosion and UV resistant materials. Please use support structures that have been tested and certified for approval.

太阳能电池方阵的支架，可以固定安装，也可按季节的变化调整电池方阵与地面的夹角，以便太阳能电池组件更充分地接受太阳光。通常的调整角度是（以北半球为例）：①春分以后的接收角是当地的纬度-11048,；②秋分以后的接收角是当地的纬度+11048,；③全年平均的接收角是当地纬度的+50。

The bracket of the solar cell array can be fixedly installed, or the angle between the array and the ground can be adjusted according to seasonal changes, so that the solar cell module can receive sunlight more fully. The usual adjustment angles are (in the northern hemisphere, for example): ① the reception angle after the vernal equinox is the local latitude - 11048, ; ②the reception angle after the autumnal equinox is the local latitude +11048, and; ③ the reception angle for the average of the whole year is the local latitude of +50 .

9.2 地面安装

9.2 Ground Installation

选择合适的光伏系统安装高度，防止冬天下雪时组件的底部长时间被积雪覆盖。此外，还要确保组件的安装高度距离地面的最低部分足够高，以防被植物或树遮挡或被风吹来的沙石损坏。

Choose a suitable mounting height for your PV system to prevent the underside of the modules from being covered by snow for long periods of time in the winter when it snows. Also make sure that the mounting height of the modules is high enough from the lowest part of the ground to prevent them from being shaded by plants or trees or from being damaged by wind-blown sand and gravel.

9.3 屋顶安装

9.3 Roof Installation

组件安装在屋顶或建筑物上时，要确保它被安全的固定并且不会因为强风或大雪而破坏。

When the module is mounted on a roof or building, make sure it is securely fastened and will not be damaged by strong winds or heavy snow.

组件背面要确保通风顺畅以便组件的冷却（组件和安装表面的最小间距为10cm，以确保组件运行环境-40℃~85℃）。

Ensure that the back of the module is well ventilated to allow cooling of the module (minimum distance between the module and the mounting surface is 10cm to ensure that the module operates in an ambient environment of -40°C to 85°C) .

在屋顶安装组件时，要保证屋顶结构合适。此外，安装固定组件时所需要穿透的屋顶必须适当密封，以防渗漏。

When installing modules on the roof, ensure that the roof structure is suitable. In addition, roof penetrations required for the installation of fixed modules must be properly sealed to prevent leakage.

在屋顶安装组件可能会影响房屋的防火性。单玻组件防火等级为C级，适合安装防火等级A级以上的屋顶。

Installing modules on the roof may affect the fire resistance of the house. Single-glazed modules have a fire rating of C and are suitable for installation on roofs with a fire rating of A or higher.

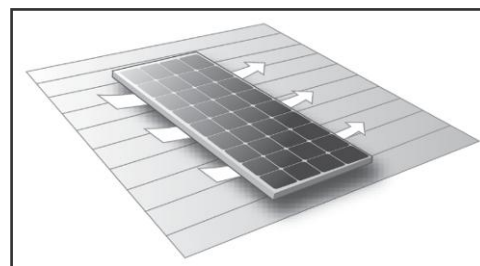


图 9.3-1

双玻组件防火等级为A级。

The double-glazed modules have a Class A fire rating.

刮大风时不要在屋顶或建筑物上安装组件，以防意外。

Do not install modules on roofs or buildings during high winds to prevent accidents .

在某些情况下，可能需要使用特殊支架。

In some cases, special brackets may be required.

在屋顶安装组件时需留出足够检修通道，方便后续维护清洁。

When installing modules on the roof, it is necessary to leave sufficient access for subsequent maintenance and cleaning.

9.4 支柱安装

9.4 Installation of pillars

当在支柱上安装组件时，请选择能够承受当地预期风力的支柱和组件安装结构。

When mounting a module on a strut, select a strut and module mounting structure that can withstand the expected local winds.



图 9.4-1 屋顶安装
Roof installation



图 9.4-2 地面安装
Ground installation



图 9.4-3 支柱安装
Pillar installation

9.5 机械安装通则

9.5 General rules for the installation of machinery

安装支架必须确保连接紧固。

The mounting bracket must ensure a tight connection.

标准情况下，使用组件边框上内侧的4个对称安装孔来安装组件。

As standard, use the 4 symmetrical mounting holes on the inside of the module bezel to mount the module.

如果当地有强风或大雪，同时使用外侧的4个对称的安装孔。

If there are strong winds or heavy snowfalls in the area, use the 4 symmetrical mounting holes on the outside at the same time.

不要利用组件的接线盒或电缆头来移动组件。

Do not use the module's junction box or cable head to move the module.

不要站在或踩在组件上。不要使组件掉落或让物体落在组件上。

Do not stand or step on the assembly. Do not drop the module or allow objects to fall on the module.

为了避免组件玻璃破碎，不要在组件上放置重物。

To avoid breaking the module glass, do not place heavy objects on the module.

不可重摔组件。

Do not drop the module.

不正确的运输或安装可能会损坏组件，运输时应使组件边框均匀受力，避免组件玻璃面和背板受冲击或重压。

Incorrect transport or installation may damage the module. The module should be transported in such a way that the module frame is evenly stressed and the module glass surface and back panel are not subjected to impact or heavy pressure.

组件可以横向或纵向安装，但是采用横向安装的方式可以使灰尘对组件的遮光影响最小化。

Modules can be mounted horizontally or vertically, but the use of horizontal mounting minimises the effect of dust on the shading of the module.

9.6 安装与防护

9.6 Installation and protection

安装光伏系统要求专业的技能和知识，必须由经过培训且具备资质的人员来完成。

Installing a photovoltaic system requires specialised skills and knowledge and must be carried out by trained and qualified personnel.

安装人员应该预先了解安装过程中可能会发生伤害的风险，避免不必要的触摸组件，组件的表面和边框可能很热，这会有烧伤或电击的危险。

Installers should be forewarned of the risk of injury that may occur during installation and avoid touching the module unnecessarily; the surface and bezel of the module may be hot, which can pose a risk of burns or electric shock.

为了防止电击，工作环境、组件以及安装工具应该保持干燥状态。

To prevent electric shock, the working environment, modules and installation tools should be kept in a dry condition .

安装时，禁止在组件上堆放任何重物，禁止挤压或敲击组件任何部位，禁止站立、坐卧、倚靠在组件上。

During installation, it is prohibited to stack any heavy objects on the module , to squeeze or knock any part of the module , and to stand, sit or lean on the module .



图 9.6-1



图 9.6-2



图 9.6-3

每个组件在太阳光直射下可产生30V以上的直流电压，接触电压达到30V或更高是很危险的。

Each module can generate a DC voltage of 30V or more under direct sunlight , and contact voltage of 30V or more is dangerous.

严禁触摸组件串的金属带电部位。

It is strictly prohibited to touch the electrically charged metal parts of the module string.

请确保安装地点附近，不会有或者不会产生可燃性气体。

Please make sure that near the installation location , there will be no or no flammable gas generated.

不要擅自在组件的边框上进行钻孔。

Do not drill holes in the bezel of the module without permission .

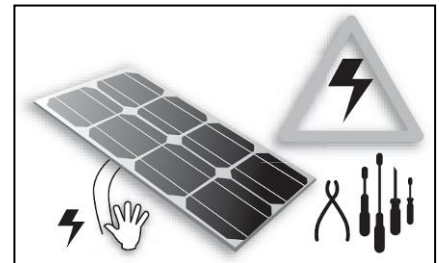


图 9.6-4

安装组件时，请尽量遵循“从上到下”或“从左到右”的安全原则，请不要站到组件上面去，不仅会损坏组件，也会对人身安全造成危险。

When installing modules, please try to follow the safety principle of "top to bottom" or "left to right", please do not stand on top of the modules, as it will not only damage the modules, but also pose a danger to personal safety.

组件上的排水孔不能被堵塞。

The drain holes in the assembly must not be blocked.

两个组件间的距离建议最少为2厘米，防止热膨胀产生的损坏。

A minimum distance of 2 cm is recommended between the two modules to prevent damage from thermal expansion .

当拆除暴露在太阳光下的组件连接缆线时，可能产生电弧，电弧会导致燃烧，起火或其他安全问题。拆除连接组件的连接缆线时，须佩戴符合电力安装工作绝缘要求的劳动保护用品，以防触电。

When removing module connecting cables that are exposed to sunlight, electrical arcing may occur, which can cause burning, fire, or other safety concerns. When removing connecting cables from connected modules, wear labour protective equipment that meets the insulation requirements for electrical installation work to prevent electric shock.

组件必须安装在适合的建筑上，或者其他适合组件安装的地方（如地面，车库，建筑物外墙，屋顶，光伏追踪系统），组件不能安装在可移动的任何类型车辆上。

The module must be mounted on a suitable building or other suitable place for the module to be mounted (e.g. ground, garage, building façade, roof, PV tracking system) and the module must not be mounted on a moveable vehicle of any type.

组件不能安装在有强烈腐蚀性物质以及影响组件安全或者性能的地方。

The module must not be installed in places where there are strong corrosive substances and where the safety or performance of the module is affected.

使用符合电力安装工作绝缘要求的工具和劳动保护用品。

Use tools and labour protections that meet the insulation requirements for electrical installation work.

如果组件串联，总电压等于单个组件电压总和；如果组件并联，则总电流等于单个组件电流总和。

If the modules are connected in series, the total voltage is equal to the sum of the individual module voltages; if the modules are connected in parallel, the total current is equal to the sum of the individual module currents.

在运输和安装组件时以及组件发电过程中，应使儿童远离组件。

Children should be kept away from the modules during transport and installation and during the generation of electricity from the modules.

为了您的安全，请不要在没有安全防护措施的情况下在屋顶上工作，防护措施包括但不限于摔落保护、梯子或楼梯及个人保护装备。

For your safety, do not work on a roof without safety precautions that include, but are not limited to, fall protection, ladders or stairs, and personal protective equipment.

为了您的安全，不要在不利的环境下安装或处理组件，包括但不限于强风或阵风、潮湿的或带沙的屋顶，禁止在雨中进行组件接线、测试调试工作。

For your safety, do not install or handle the modules in unfavourable conditions, including but not limited to strong winds or gusts, wet or sandy roofs, and it is prohibited to carry out module wiring, testing and commissioning work in the rain.

遵守适用于所有部件安装的安全规则，如电线和电缆、连接线、充电控制器、逆变器、蓄电池等。

Observe the safety rules that apply to the installation of all modules, such as wires and cables, connection cables, charge controllers, inverters, batteries, etc.

只使用与光伏系统相匹配的设备、连接线、电线和支架。在特定系统中，尽可能使用相同类型的组件。

Use only equipment, connections, wires and mounts that are compatible with the PV system. Whenever possible, use the same type of modules in a given system.

组件安装后不能被任何物体遮挡太阳光，以防组件局部或整体阴影（如纸护角等异物），经常性的被遮挡导致的EVA老化以及二极管的长期不间断发热会影响组件的使用寿命。

After the installation of the module can not be any object to block the sunlight, in order to prevent the module local or overall shadow (such as paper corner protector and other foreign objects), frequent blocking caused by the EVA aging and diode long-term uninterrupted heat will affect the service life of the module.

组件安装过程或完工后不能被任何外力撞击，防止组件爆裂。

The module must not be hit by any external force during installation or after completion to prevent the module from bursting.

现场卸载或转运组件时，避免野蛮操作或不规范操作，防止组件产生质量隐患。

When unloading or transferring modules on site, avoid barbaric or irregular operation to prevent the modules from generating quality hazards.

十、电气安装 Electrical Installation

10.1 并网电气系统

10.1 Grid-connected electrical systems

光伏系统产生的直流电可以转换为交流电并连接到公共电网上。关于连接可再生能源系统到公共电网的政策，各地区有所不同，设计本系统时请向资深的系统设计工程师咨询相关信息。通常情况下，安装并网光伏系统需要得到公共事业部门的认可、验收及正式批准。

The DC power generated by a PV system can be converted to AC power and connected to the public grid. Policies on connecting renewable energy systems to the utility grid vary from region to region, so please consult an experienced system design engineer for information when designing this system. Typically, the installation of a grid-connected PV system requires approval, acceptance and official sanction from the utility.

10.2 接地

10.2 Grounding

所有的组件边框和安装支架都必须合理的接地。使用推荐的连接端子将接地电缆良好的连接并固定到组

件边框上。

All module bezels and mounting brackets must be properly grounded. Connect and secure the ground cable to the module frame using the recommended connection terminals.

组件边框表层为抗腐蚀的绝缘材质，因此要求每块组件边框都要可靠接地。

The module bezel surface is a corrosion-resistant insulating material, so each module bezel is required to be reliably grounded.

请使用边框上的接地孔连接接地（将接地装置与铝合金充分接触，穿透边框表面的氧化膜，接地装置需与边框内壁形成导通）。

Please use the grounding hole on the bezel to connect the grounding (the grounding device will be in full contact with the aluminium alloy to penetrate the oxide film on the surface of the bezel, and the grounding device needs to form a conduction with the inner wall of the bezel).

不要在组件边框任何位置钻孔用于接地。

Do not drill holes for grounding anywhere on the module bezel.

用一适当的接地导体，将该组件框架和支撑构件连接，可做到合适的接地效果。

Suitable grounding can be achieved by connecting the module frame to the support member with a suitable grounding conductor.

为了获得最佳的功率输出，建议组件在安装时，需要将组件阵列的直流负极接地。如果未按照这条要求操作，系统的功率输出可能会降低。

For optimum power output, it is recommended that the modules need to be installed with the DC negative terminal of the module array grounded. If this requirement is not followed, the power output of the system may be reduced.

使用经过电镀处理的支撑框架，以保证电路导通良好。

Use plated support frames to ensure good circuit conduction.

接地导体必须通过一个适当的地面电极连接到地面，推荐使用接地线配件（接线鼻）连接接地电缆，若没有通过螺栓和螺母连接机械地到已接地的光伏组件上，支架也必须接地。

The grounding conductor must be connected to ground via a suitable ground electrode, it is recommended that the ground cable be connected using a grounding wire fitting (lug nose), and the mount must also be grounded if it is not mechanically grounded via a bolt and nut connection to the grounded PV module.

对于高温高湿环境下的项目，项目系统设计强烈推荐采用逆变器负极接地或者负直流支路正确接地。组件的接地应与避雷系统的接地分开，否则会增加组件被雷击的概率。

For projects in high temperature and high humidity environments, the project system design strongly recommends the use of negative inverter grounding or correct grounding of the negative DC branch. The grounding of the module should be separated from the grounding of the lightning protection system, otherwise it will increase the probability of the module being struck by lightning.

我司不提供接地零部件。

Our company does not provide grounding parts.

10.3 电气安装通则

10.3 General rules for electrical installations

在同一个光伏发电系统上尽量使用相同配置的组件。

Try to use the same configuration of modules on the same PV power system.

确保组件满足整体的系统技术要求。

Ensure that the modules meet the overall system technical requirements.

若有汇流箱，汇流箱选配防反二极管，防止组串极性接反和相邻组串不平衡电流涌入。

If there is a convergence box, the convergence box is equipped with anti-reverse diodes to prevent the polarity of the string from being reversed and unbalanced currents from neighboring strings.

组件产品产生的电流和电压值，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。

Module products produce current and voltage values that can be high relative to those obtained under standard test conditions for the module. Therefore, when determining photovoltaic power generation system accessories. When determining PV power system accessories, such as rated voltage, conductor capacity, fuse capacity and parameters related to the power output of the module, the corresponding short-circuit current and open-circuit voltage should be enlarged by a factor of 1.25 before application.

几个组件串联，然后并联形成光伏阵列，这特别适用于电压较高的情况下。组件串联的最大串联数量 $(N) = V_{\text{max系统}} / [V_{\text{oc}}(at T)]$ ，T为实际使用环境温度，单个组串组件开路电压之后应在组件设计系统电压之内。

Several modules are connected in series and then in parallel to form a PV array, which is particularly suitable for higher voltages. The maximum number of modules connected in series $(N) = V_{\text{max system}} / [V_{\text{oc}}(at T)]$, T is the actual ambient temperature of use, and the open-circuit voltage of a single string module should be within the design system voltage of the module afterwards.

需要使用高电流的情况下，可以将几个组件并联，总电流等于各个组件电流的总和。

Where high currents are required, several modules can be connected in parallel with the total current equal to the sum of the individual module currents.

系统电气连接器，推荐使用多触点MC4。强烈建议使用正品连接器。电缆线尺寸、类型和温度等参数的选择请参考相关的规定，连接器只能用于连接线路，不得用于开启和关闭电路。

system electrical connectors, recommended to use multi-contact MC4. The use of genuine connectors is strongly recommended. Please refer to the relevant regulations for the selection of cable size, type and temperature. Please refer to the relevant regulations for the selection of cable size, type and temperature. The connectors should only be used for connecting wiring and should not be used to open or close circuits.

为了确保可靠的电气连接并防止进入潮气，当两个MC4连接器对接时，必须锁住直到听见咔哒声。

To ensure a reliable electrical connection and to prevent the ingress of moisture, when two MC4 connectors are mated, they must be locked until a click is heard.

长期暴露于潮湿环境中可能导致连接器连接性变差，导致漏电和较差的传导性，这将会使有限质保的失效。Prolonged exposure to moisture may result in poor connector connectivity, leading to leakage and poor conductivity, which will void the limited warranty.

组串并联前必须检查连接器和接线极性，如有错误会导致一组或多组产生不可修复的损坏或者电气事故。

如发现接线错误需测量组串中所有组件开路电压，确认是否正常（参照本手册11.2处理）。

Connectors and wiring polarity must be checked before stringing and paralleling groups, as any errors could result in irreparable damage or electrical accidents in one or more groups. If wiring errors are found, measure the open circuit voltage of all modules in the string to confirm the normal (refer to 11.2 of this manual for processing).

请遵守电缆线厂商推荐的弯曲半径（最小弯曲半径60mm），包含连接器后的电缆半径。我司建议所有电缆应布设在适当的管道中且远离积水的地方。

Please observe the bending radius recommended by the cable line manufacturer (minimum bending radius 60 mm), including the cable radius after the connector. Our company recommends All cables should be laid in proper conduits and away from waterlogged areas.

在组件阵列中最大的额定电流值标识在产品铭牌上，额定电流值也对应一块组件所能承受的最大反向电流。

例如：当有一串被阴影遮挡时，另外两串会形成负载导致电流回路。依据组件的最大额定电流以及相关电气安装标准，出于电路保护原则对组件并连串的连接需要配有合适的熔丝。

The maximum current rating in a module array is identified on the product nameplate, and the current rating also corresponds to the maximum reverse current that a module can withstand. For example, if one string is shaded, the other two strings will form a load resulting in a current loop. Depending on the maximum current rating of the module and the relevant electrical installation standards, the connection of parallel strings of modules needs to be equipped with suitable fuses for circuit protection purposes.

组件方阵内，对插的MC4 插接头应选用同一厂家同一规格型号的，禁止不同规格型号插接头对插，以免因不同插接头内铜芯接触位置不一，长时间不当使用导致事故的发生。安装插接头时，为确保安装到位，需听到或感觉到“咔嗒”的声音，安装后不能拔出。

Use the MC4 connectors of the same manufacturer and the same specifications in the array. It is forbidden to plug in the connector of different specifications and models. Otherwise, improper use may cause accidents due to the different contact positions of copper cores in different connectors. When installing the connectors, A “click” should be heard or felt when the contact cable assembly is seated in correct position. Contacts cannot be removed once seated.

十一、调试和维护 Commissioning and Maintenance

11.1 阻塞二极管和旁路二极管

11.1 Blocking and Bypass Diodes

在阻塞二极管能够在组件没有电流生成时阻止电流从其他来源流向组件。如果没有使用充电控制器，则推荐使用阻塞二极管。关于充电控制器请咨询专业经销商。

In blocking diodes are able to stop current from flowing to the module from other sources when the module is not generating current. If a charge controller is not used, the use of a blocking diode is recommended. Please consult a specialized dealer for charge controllers.

在由两个以上组件串联的系统中，当组件的一部分被遮挡而其它部分暴露在阳光下时，过高的反向电流会流经局部或完全被遮挡的电池，导致电池过热甚至会损坏组件。在组件中使用旁路二极管可以保护组件不受这种过高的反向电流影响。所有额定功率大于55瓦的组件都已在接线盒中集成了旁路二极管。二极管不容易坏。

In systems consisting of more than two modules connected in series, when one part of the module is shaded and the other part is exposed to sunlight, excessive reverse currents can flow through the partially or completely shaded cell, causing the cell to overheat or even damage the module. The use of a bypass diode in the module protects the module from this excessive reverse current. All modules rated greater than 55 watts already have bypass diodes integrated in the junction box. The diode is not easily broken.

11.2 调试

11.2 Commissioning

使用之前测试系统的所有电气和电子部件，并遵守随部件和设备提供的说明指导书。

Test all electrical and electronic modules of the system before use and follow the instruction guide provided with the modules and equipment.

串联组件连接到系统前的测试：

Testing of series modules before connecting them to the system:

使用数字万用表检查串联组件的开路电压，测量值应等于单个组件开路电压的总和，您将在所用类型组件的技术说明书中找到额定电压。如果测量发现各串之间的极性相反或电压差值大于10V，则在连接之前检查其结构配置，并按照下文中的“低电压故障排除”中的说明进行处理。

Use a digital multimeter to check the open-circuit voltage of the modules connected in series. The measured value should be equal to the sum of the open-circuit voltages of the individual modules, which you will find rated in the technical specifications of the type of module used. If the measurement reveals that the polarity between the strings is reversed or that the voltage difference is greater than 10V, check the structural configuration before connecting and follow the instructions in "Low Voltage Troubleshooting" below.

检查每个串联电路的短路电流

Check the short-circuit current of each series circuit

可以通过将数字万用表连接到串联组件的两端直接测量，或使用PV灯等负载进行粗测。注意，电流表的额定刻度或负载的额定电流应该大于串联组件额定短路电流的1.25倍。您可在所用型号组件的技术说明书中找到额定电流。测量值随着气候条件、时刻和组件的遮光情况发生显著变化。

This can be measured directly by connecting a digital multimeter to the ends of the series module or roughly by using a load such as a PV lamp. Note that the rated scale of the ammeter or the rated current of the load should be greater than 1.25 times the rated short-circuit current of the series module. You can find the current rating in the technical data sheet of the module type used. Measurements vary significantly with climatic conditions, time of day and shading of the module.

低电压故障排除：鉴别正常的低电压和故障低电压。正常低电压是指组件开路电压的降低，它是由太阳能电池温度升高或辐照度降低造成的。故障低电压通常是由于终端连接不正确或旁路二极管损坏引起的。

Low voltage troubleshooting: Identify normal low voltage and faulty low voltage. Normal low voltage is a reduction in the open-circuit voltage of a module, which is caused by an increase in solar cell temperature or a decrease in irradiance. Faulty low voltage is usually caused by incorrect terminal connections or damaged bypass diodes.

1)首先，检查所有的电线连接，确保没有开路，连接良好。

1)First, check all wire connections to make sure there are no open circuits and good connections.

2)检查每个组件的开路电压：用一块不透明的材料完全覆盖整串组件，断开组件两端的导线，取掉组件上的不透明材料，检查并测量组件的开路电压。如果测量的电压是额定值的一半，说明旁路二极管已坏，如有损坏禁止继续使用，否则会导致一组或多组产生不可修复的损坏或者电气事故。

2)Check the open-circuit voltage of each module: completely cover the whole string of modules with a piece of opaque material, disconnect the wires at both ends of the modules, remove the opaque material from the modules, check and measure the open-circuit voltage of the modules. If the measured voltage is half of the rated value, it means that the bypass diode is bad, and if it is damaged, it is forbidden to continue to use it, otherwise it will lead to one or more groups to produce irreparable damage or electrical accidents.

3)在辐照度不足（很低）的情况下，如果终端的电压与额定值相差5%以上，说明组件连接不好。

3)In case of insufficient(very low)irradiance, if the voltage at the terminals differs from the rated value by more than 5%, it means that the modules are not well connected.

组件的接线盒中包含了旁路二极管并并联在组件内的电池串上。当组件局部发生热斑现象，二极管将工作，让主电流不再从热斑电池片上流过，从而限制组件发热和性能损失。注意旁路二极管不是过电流保护装置。禁止私自打开组件的接线盒。

The junction box of the module contains bypass diodes and is connected in parallel to the cell strings within the module. When hot spotting occurs locally in the module, the diode will operate to keep the main current from flowing through the hot spot cells, thus limiting module heat generation and performance loss. Note that the bypass diode is not an overcurrent protection device. It is not permitted to open the junction box of the module privately.

当知道或怀疑二极管发生故障时，请安装商或系统维护商第一时间联络我司。

When a diode failure is known or suspected, ask the installer or system maintainer to contact our company in the first instance.

注意：在调试或维修光伏系统时要保护自己免遭电击。

CAUTION: Protect yourself from electric shock when commissioning or servicing your PV system.

11.3 维护

11.3 Maintenance

组件清洁：

module cleaning:

1)应保持光伏方阵采光面的清洁，组件玻璃的清洗工作应选择在清晨、傍晚、夜间或阴天进行，同时在早上或晚上清洗的时候，建议在辐照度低于200W/m²时，先用清水冲洗，水压控制在690KPa以下，注意清洗水温与组件温差不能太大，使用柔软的清洁工具（如海绵）来清洗组件阵列。不得在干燥的情况下刮擦组件表面灰尘，否则会导致划痕。

1)Should keep the PV square array lighting surface clean, module glass cleaning work should be selected in the early morning, evening, night or cloudy days, at the same time in the morning or evening cleaning, it is recommended that the irradiance is lower than 200W/m², the first rinse with water, water pressure control in the 690KPa below, pay attention to the cleaning of the water temperature and the module temperature difference can not be too large, the use of soft cleaning tools (such as sponges) to clean the module Array. Do not scrape the module surface dust in dry condition, otherwise it will lead to scratches.

2)组件玻璃的表面涂有一层减反射膜，利于增强功率的输出，为防止组件的破坏，请不要使用电动清洁机或是压力清洁机，建议使用商业玻璃清洗剂或者酒精辅助清洗，请不要使用蒸汽或有腐蚀性的酸、碱以及研磨粉、汽油等溶剂进行清洗或用硬物擦拭。

2)The surface of the module glass is coated with a layer of reflection-reducing film, which is conducive to the enhancement of power output, in order to prevent the destruction of the modules, please do not use electric cleaning machine or pressure cleaning machine, it is recommended to use a commercial glass cleaner or alcohol-assisted cleaning, please do not use steam, or corrosive acids, alkalis, and solvents such as abrasive powder, gasoline and so on, for cleaning or rubbing with hard objects.

3)清洗时严禁在组件上站立行走。

3)It is strictly prohibited to stand and walk on the modules during cleaning.

4)禁止清洗已经出现玻璃爆裂，线缆破损的组件，以防触电。

4)It is prohibited to clean the modules that already have burst glass and broken cables to prevent electric shock.

5)严禁在风力大于4级、大雨或大雪的气象条件下清洗组件。

5)It is strictly prohibited to clean the modules under meteorological conditions of wind greater than level 4, heavy rain or heavy snow.

6)遇风沙或积雪后，请使用毛刷轻柔清扫。

6)In case of sand or snow, please use a brush to sweep gently.

7)不要尝试清除组件表面上冻住的雪或冰。

7)Do not attempt to remove frozen snow or ice from the surface of the assembly.

8)应采取适当的维护措施以保持组件没有积雪、鸟粪、种子、花粉、树叶、灰尘、污点等脏污。

8)Appropriate maintenance measures shall be taken to keep modules free of snow, bird droppings, seeds, pollen, leaves, dust, stains, and other soiling.

9)一般每天检查，根据组件积尘及脏污情况进行定期清洁。

9)General daily inspection and periodic cleaning based on module dust accumulation and soiling.

10)建议每月至少清扫一次，如组件表面积尘严重以及安装倾角较小时，需加大清洗的频率。

10)It is recommended to clean at least once a month, such as module surface dust accumulation is serious as well as the installation inclination is small, need to increase the frequency of cleaning.

11)不受控制的污染及未及时清洁组件都将会使有限质保的失效。

11)Uncontrolled contamination and failure to clean modules in a timely manner will void the Limited Warranty.

12)组件使用减反射膜技术，若在不同角度下观察组件发现存在颜色差异，这属于正常现象。

12)The module uses a reflection-reducing film technology, and it is a normal phenomenon to find color differences when observing the module from different angles.

13)组件清洗完后，完成光伏组件清洗文字记录。

13)After the module is cleaned, complete the PV module cleaning text record.

水质要求：

Water Quality Requirements:

1)PH:5 ~ 7;

1)PH:5 to 7;

2) 氯化物或盐分含量：0 ~ 3000mg/L;

2)Chloride or salt content:0 to 3000 mg/L;

3) 浑浊度：0 ~ 30NTU;

3) Turbidity: 0~30 NTU;

4) 电导率: 1500~3000 μ S/cm;

4) Conductivity: 1500~3000 μ S/cm;

5) 总溶解固体: ≤ 1000 mg/L;

5) Total dissolved solids: ≤ 1000 mg/L;

6) 水硬度: 0~40mg/L;

6) Water hardness: 0~40mg/L;

必须采用非碱性水, 具备条件时应使用软化水。

Non-alkaline water must be used, and softened water should be used when available .

组件元器件检查:

module assembly inspection:

定期对光伏阵列中组件进行检查, 若发现以下情况, 立即断开异常组件所在的组串, 然后调整或更换组件:

Periodically inspect the modules in the PV array and immediately disconnect the string in which the abnormal module is located and then adjust or replace the module if any of the following conditions are found:

1) 组件存在玻璃破碎。

1) There is glass breakage in the module.

2) 背板灼焦。

2) The backplane is scorched.

3) 组件接线盒变形、扭曲、开裂或烧毁, 接线端子无法良好连接。

3) The module terminal box is deformed, twisted, cracked or burnt, and the terminals cannot be well connected.

值班人员应注意光伏方阵周围有没有新生长的树木、新立的电杆等遮挡太阳光的物体, 以免影响组件充分的接受太阳光, 一经发现, 要报告电站负责人, 及时加以处理。

Duty personnel should pay attention to the photovoltaic square array around there is no new growth of trees, newly erected poles and other objects blocking the sunlight, so as not to affect the module to fully receive the sunlight, once found, to report to the person in charge of the power station, and deal with it in a timely manner.

带有向日跟踪装置的光伏方阵, 应定期检查跟踪装置的机械和电性能是否正常。

PV arrays with sunward tracking devices should be periodically checked for proper mechanical and electrical performance of the tracking device .

要定期检查光伏方阵的金属支架有无腐蚀, 并根据当地具体条件定期对支架进行油漆。

The metal brackets of the PV arrays should be inspected regularly for corrosion and the brackets should be painted regularly according to the specific local conditions.

检查方阵支架应良好接地, 接地装置有无腐蚀, 如有异常及时加以处理。

Check that the square bracket should be well grounded and that the grounding device is not corroded, and deal with any abnormality promptly.

不要擅自更换组件的元部件 (二极管、接线盒、插头等)。

Do not replace the module's meta-modules (diodes, junction boxes, plug connectors, etc .) without authorization .

应每月检查1次各太阳能电池方阵封装及接线接头, 如果发现有封装开胶进水、电池变色及接头松动、脱线、腐蚀等, 应及时进行处理。不能处理的, 应及时向电站负责人报告。

Each solar cell square array encapsulation and wiring connector should be inspected once a month, and if encapsulation is found to be open and water ingress, battery discoloration and connector looseness, wire removal, corrosion, etc., it should be dealt with in a timely manner. If it cannot be handled, it should be reported to the person in charge of the power station in time.

电站系统要能对太阳能电池方阵的光电参数包括其输出功率进行自动检测分析, 出现异常, 如组件出现热斑效应保护后系统能自动报警, 这样能第一时间排除故障, 保证方阵不间断地正常供电。

The power station system should be able to automatically detect and analyze the photovoltaic parameters of the solar cell array, including its output power, and the system can automatically alarm after the emergence of anomalies, such as the protection of modules appearing hot spot effect, so that it can be the first time to solve the problem, to ensure that the array of uninterrupted normal power supply.

十二、发货说明 Shipping Instructions

12.1 包装

12.1 Packaging

我司通常采用纸箱+托盘包装方案。

We usually use carton + pallet packing solution.

常规包装每箱组件数量约30块左右，我司将根据实际发货数量和运输车辆情况适时调整包装方式。调整后包装方式以不影响组件的运输安全为准则，包装外观可能有所改变。

Conventional packaging is about 30 pieces of modules per box, we will adjust the packaging according to the actual number of shipments and transport vehicles at the right time. The adjusted packaging method will not affect the safety of module transport as a guideline, and the appearance of packaging may be changed.

12.2 分档

12.2 Staging

我司组件具有电流分档，通常通过最佳工作点电流大小分为3档，表示方式有：

Our modules have a current rating, usually through the best working point current size is divided into 3 grades, expressed in the following way:

英文字母：L（低电流档），M（中间电流档）和H（高电流档）

English letters: L (low current), M (middle current) and H (high current).

字母加数字：I1（低电流档），I2（中间电流档）和I3（高电流档）

Letters and numbers: I1 (low current), I2 (intermediate current) and I3 (high current).

希腊字母：α（低电流档），β（中间电流档）和γ（高电流档）

Greek letters: α (low current band), β (intermediate current band) and γ (high current band).

字母仅代表组件电流档位，不代表组件产品等级

The letters only represent the current level of the module, not the product level of the module.

批量发货时：我司保证常规情况下每箱组件为同一电流档位。

Bulk shipments: We guarantee that each box of modules will be of the same current rating under normal circumstances.

临售/尾数发货时：功率满足需求前提下，不同电流档位组件可能混包为一个包装以便于运输。

Pro-sale/tail shipment: under the premise of power to meet the demand, the modules of different current grades may be mixed into one package to facilitate the shipment.

使用建议：

Recommendations for use:

同一组串尽量使用同一档位组件；

Try to use the same gear module for the same set of strings;

如果同一档位组件不足，尽量采用相邻档位组件组串；

If there are insufficient modules of the same gear, try to use adjacent gear modules to form a string;

如果相邻档位不足，尽量使用少量高电流档位组件补充低电流档位组件串。这样组件受到影响数量最小。

If the neighbouring gear is insufficient, try to use a small number of high-current gear modules to supplement the low-current gear modules string. This will minimise the number of modules affected.

12.3 单玻封装胶膜

12.3 Single-glass encapsulated films

我司单玻组件产品有透明胶膜封装和不透明胶膜封装两种封装方案。

Our single-glass module products are available in two types of encapsulation solutions: transparent film encapsulation and opaque film encapsulation.

两种封装方案均通过第三方测试，组件产品质量均满足组件产品使用质量要求。

Both packaging solutions have passed third-party testing, and the quality of the module products meets the quality requirements for the use of the module products.

两种封装方案组件外观正面一致，背面稍有区别。

The appearance of the modules of the two packaging solutions is the same on the front side and slightly different on the back side.

当太阳照射到组件正面，从背面观察时：

When the sun shines on the front side of the module, when viewed from the back side:

透明胶膜封装方案：电池间隙透光量较多相对电池部分位置较明亮，看上去有较明亮的网格在背面

Transparent film encapsulation solution: more light transmission through the cell gap relative to the cell part of the location of the brighter, looks like a brighter grid on the backside

不透明胶膜封装方案：电池间隙透光量和电池部分一样，背面无网格/轻微网格在背面

Opaque film encapsulation solution: the amount of light transmission between the cell gaps is the same as that of the cell part, and there is no grid/slight grid on the back.

发货安排：
Shipping Arrangements:

无具体要求发货：发货允许两种封装方案同时发货。批量发货时优先保证整车一致（17.5/13米平板车），零售/尾数发货时，可能会有混装；

No specific requirements to ship: shipments allow both packaging options to be shipped at the same time. Priority is given to ensuring consistent whole trucks (17.5/13m flatbed trucks) for bulk shipments, and there may be mixing of packages for retail/tailgate shipments;

有具体要求发货：按具体要求备货。
Shipment with specific requirements: stocked according to specific requirements .

使用建议：
Recommendations for use:

不同封装胶膜方案只是组件背面外观有轻微不同，对组件实际性能无影响。客户可在同一项目安装两种封装方案组件。如客户对外观要求较高，可以采取分区域方式安装两种组件（我司组件在外装箱单上均有标注）。

Different encapsulation film solutions only have slight differences in the appearance of the back of the module, and have no effect on the actual performance of the module . Customers can install two kinds of encapsulation programmes in the same project. If customers have higher requirements on appearance, they can install two kinds of modules in a sub-regional way (our modules are marked on the packing list) .

如顾客对此外观有特别要求，请在合同签订时明确要求。
If the customer has special requirements for this appearance, please specify the requirements when signing the contract.

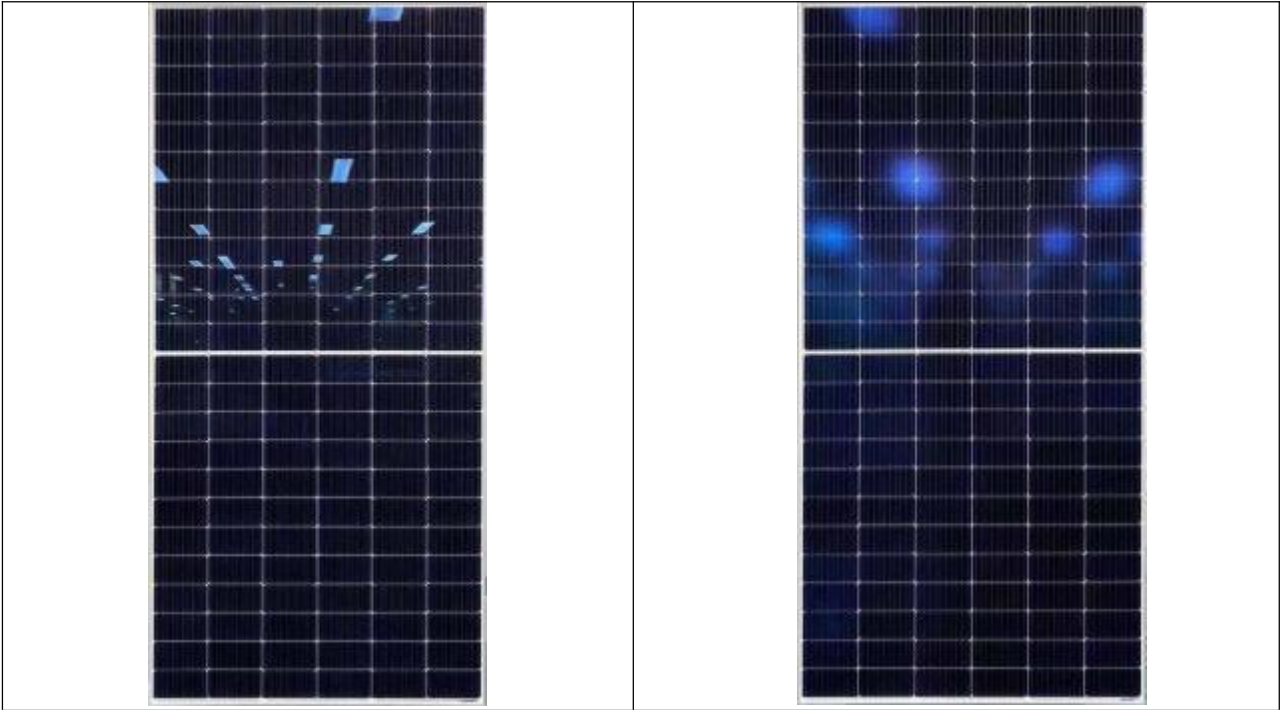
12.4 玻璃



12.4 Glass

因材料供货时间/规格不同，我司组件有采用浮法玻璃或压花玻璃。
Due to different material delivery times/specifications, our modules are available in float glass or embossed glass.

两种玻璃均通过第三方测试，组件产品质量均满足组件产品使用质量要求。
Both types of glass have passed third-party testing, and the quality of the module products meets the quality requirements for the use of module products .

两种玻璃外观上区别如下图：
The difference in appearance between the two types of glass is shown below:



浮法玻璃（室内）Float glass (indoor)	压花玻璃（室内）Embossed glass (interior)
	
浮法玻璃（室外）Float glass (outdoor)	压花玻璃（室外）Embossed glass (outdoor)

发货安排：
Shipping arrangements:

无具体要求发货：大批量发货时确保整车一致（17.5/13米平板车），零售/尾数发货允许两种方案混装；
Shipments without specific requirements: large volume shipments to ensure that the entire vehicle is consistent(17.5/13m flatbed) , retail/tail shipments allow for a mix of both options;

有具体要求发货：按具体要求备货。
Shipment with specific requirements: stocked according to specific requirements.

使用建议：
Suggestions for Use:

浮法玻璃和压花玻璃在室内时外观有轻微差异，在户外正面观看外观差异不明显，一定天气角度下轻微不同。
Float glass and embossed glass have a slight difference in appearance when they are indoors, and the difference in appearance is not obvious when viewed from the front outdoors, and is slightly different under certain weather angles.

同一个项目用户完全可以同时使用两种组件，当用户对外观要求较高时，可以采取分区域安装方式使用。
Users of the same project can use the two modules at the same time, when the user has higher requirements for the appearance of the user, you can take the installation of the use of sub-area .

如顾客对此外观有特别要求，请在合同签订时明确要求。
If the customer has special requirements for this appearance, please specify the requirements when signing the contract.

十三、组件规格 Module specifications

	类型 / model	规格尺寸 (mm) Size(mm)	功率档位 (W)Power(w)	备注 note
	210 单 晶 132 片 G12 module(132)	2383*1302*40/35	640-660	

单晶系列 Monocrystalline Series	210 单 晶 120 片 G12 module(120)	2171*1301*40/35	585-605	系统电压 1000&1500v 可选 System voltage 1000& 1500v available
	182 单 晶 144 片 M10 module(144)	2278*1133*35/30	530-550	
	182 单 晶 108 片 M10 module(108)	1722*1133*35/30/6	400-420	
	叠瓦组件 Shingled high efficiency module	1646*1130*30/6	390-400	
多晶系列 Polycrystalline Series	M6多晶144 M6 module(144)	2094*1038*35/30	375-410	

表 13-1

注：规格尺寸以合同签订要求为准，如有更新不再另行通知。
Note: Specifications and dimensions are subject to contract signing requirements and will not be notified if there are any updates .