Installation Manual for OSDA Solar PV Modules

欧达太阳能光伏组件安装手册

Regular Modules

常规组件

Safety Notes 安全须知

- *This manual elaborates on installation and safety use information for PV power generating modules (hereinafter referred to as module) of Ningbo Osda Solar Co.,Ltd. (hereinafter referred to as OSDA). Please abide by all safety precautions in this guide and local regulations.*
- 本手册详细介绍了宁波欧达光电有限公司（以下简称“欧达”）生产的光伏发电组件(以下简称“组件”)的安装及安全使用信息。请遵守本指南中的所有安全注意事项和当地法规。

- *Installation of modules requires professional skills and knowledge and is to be carried out by qualified personnel. Please read this manual carefully before installing and using this module. Installation personnel shall get familiar with mechanical and electrical requirements of this system. Please keep this manual properly as reference for future maintenance or upkeep or for sales and treatment of modules.*
- 组件的安装需要专业的技能和知识，必须由有资质的人员进行安装。在安装和使用此组件之前，请仔细阅读本手册。安装人员应熟悉本系统的机电要求。请妥善保管本手册，以便日后维修或销售、处理组件时参考。

- *If you have any doubts, please contact OSDA global quality and customer service department for further interpretation.*

如有任何疑问，请联系欧达全球质量与客户服务部进行进一步解释。

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1 Introduction

简介

First thank you very much for choosing OSDA PV modules!

首先非常感谢您选择欧达的光伏组件！

This installation manual covers key electric and mechanical installation information, so please understand such information before installing OSDA modules. In addition, this manual also covers some safety information that you shall get familiar with. All contents in this manual are intellectual properties of OSDA which originates from long term of technical exploration and experience accumulation of OSDA.

本安装手册包含了关键的电气和机械安装信息，请在安装欧达组件之前了解这些信息。此外，本手册还包括一些您应该熟悉的安全信息。本手册的所有内容均为欧达的知识产权，来源于欧达长期的技术探索和经验积累。

This installation manual does not entail any explicit or implicit quality warranty and does not stipulate on compensation schemes for losses, module damages or other costs caused by or related to module installation, operation, utilization and maintenance process. If patent rights or the third party rights are infringed by use of modules, OSDA will not take any responsibility. OSDA reserves the rights for modifying product manual or installation manual without notice in advance.

本安装手册不作任何明示或暗示的质量保证，也不规定因组件安装、操作、使用和维护过程中造成的或与之相关的损失、组件损坏或其他费用的赔偿方案。如因使用组件而侵犯专利权或第三方权利，欧达不承担任何责任。欧达保留修改产品手册或安装手册的权利，恕不另行通知。

If customers fail to install modules as per requirements set forth in this manual, the quality warranty provided for customers during sales will become invalid. In addition, suggestions in this manual are to improve safety of module installation, which are tested and proved by practices. Please provide this manual to PV system users for reference to and advise them of safety, operation and maintenance requirements and suggestions.

如果客户没有按照本手册的要求安装组件，销售过程中为客户提供的质量保证将失效。此外，本手册中的建议是为了提高组件安装的安全性，并经过实践的检验和证明。请将本手册提供给光伏系统用户参考，并向他们提供安全、操作和维护要求和建议。

2 Laws and regulations

法律法规

Mechanical and electrical installation of PV modules shall follow proper regulations such as electric law, building law and electric connecting requirements. These regulations differ with different installation sites, such as building roofing installation, vehicle-mounted application. Requirements may also differ with installation system voltage, DC or AC. See specific clauses in local authorities.

光伏组件的机械和电气安装应遵循适当的法规，如电气法、建筑法并满足电气连接要求。这些规定因安装地点的不同而不同，如建筑屋顶安装、车载应用等。安装系统电压(直流或交流)不同，要求也可能不同。请参阅当地权威机构的具体条款。

3 General information

基本信息

3.1 Module identification 组件识别

Each module is pasted with 3 labels providing information below：

每个组件会贴上 3 个标签，包含以下信息：

1.Nameplate: It describes product type, standard rated power, rated current, rated voltage, open circuit voltage, short circuit current under testing conditions, certification indicator, maximum system voltage, etc.

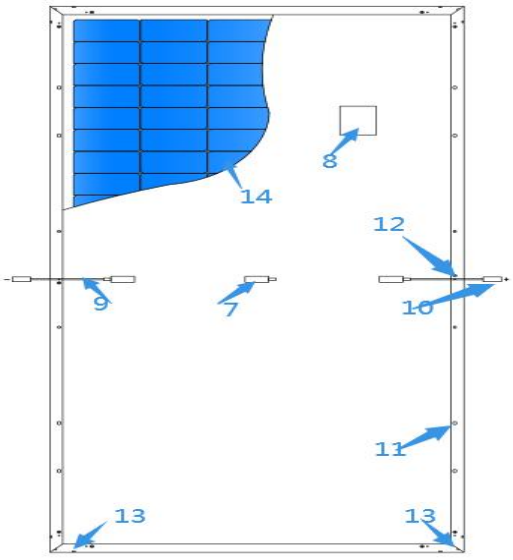
铭牌：说明产品型号、标准额定功率、额定电流、额定电压、开路电压、试验条件下短路电流、认证指标、系统最大电压等。

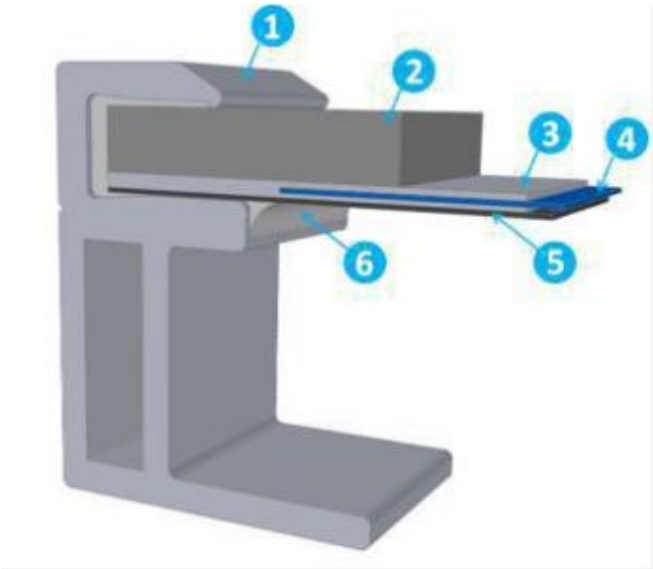
2. Current level label: Divide modules as per their optimal working current and there are values:H, M or L (H means the highest current level). The best practice is to install modules with the same current level (such as H) in one strand in the process of installation.

电流等级标签：按组件的最佳工作电流划分组件，分为 H、M 或 L (H 表示最高电流水平)。最佳做法是在安装过程中将具有相同电流电平(如同为 H)的组件安装在同一串。

3.Serial No.: Each module has a unique serial number which is solidified inside the module permanently and it can be seen from front top of the module. Each serial number is put in before laminating of the module.

序列号：每个组件都有一个唯一的序列号，该序列号永久固化在组件内部，从组件正面顶部可以看到。每个序列号都是在组件层压前放进去的。





1	Aluminum alloy frame 铝合金边框	2	PV tempered glass 光伏钢化玻璃	3	EVA Film EVA 胶膜	4	Cells 电池片

5	Back plate or glass 背板或玻璃	6	Silica gel 硅胶	7	Connecting box 接线盒	8	Nameplate 铭牌
9	Cables 线缆	10	Connector 连接器	11	Mounting hole 安装孔	12	Grounding hole 接地孔
13	Leakage hole 漏电孔	14	Cell 电池				

Figure 1 Module Section Structure and Components

图 1 组件截面结构及部件

3.2 Regular safety 常规安全

OSDA module is considered to be in compliance with IEC61215 and IEC61730 only when the module is mounted in the manner specified by the mounting instructions below.

只有当欧达组件按照以下安装说明规定的方式安装时，才被认为符合 IEC61215 和 IEC61730。

When the module is installed on roof, it is necessary to take the overall fire rating of the finished structure as well as later overall maintenance into account. The roofing PV system shall be installed after assessment by construction experts or engineers and with official analysis results for the entire structure. It shall be proved capable of supporting extra system bracket pressure, including PV module weight.

当组件安装在屋顶上时，需要考虑成品结构的整体防火等级以及后期的整体维护。屋顶光伏系统应在施工专家或工程师评估并获得整个结构的官方分析结果后安装。它应被证明能够承受额外的系统支架压力，包括光伏组件重量。

For your safety, please do not work on the roof without safety protective measures which include but not limited to fall protection, ladder or stair and personal protective articles.

为了您的安全，请不要在没有安全防护措施的屋顶上工作，这些安全防护措施包括但不限于防摔装置、梯子或楼梯以及个人防护用品。

For your safety, please do not install or handle modules in unfavorable conditions including but not limited to strong wind or gust, damp or sandy roofs.

为了您的安全，请不要在不利条件下安装或操作组件，包括但不限于强风或阵风、潮湿或沙质屋顶。

3.3 Electric performance safety 电气性能安全

PV products will produce DC in the sunlight, so there may be electric shock or burning when touching module connecting line metals. 30V DC voltage or higher voltage can be fatal.

光伏产品在阳光下会产生直流电，接触组件连接线金属时可能会触电或灼伤。30V 直流电压或更高电压可致命。

In case of no connected load or external circuits, modules can also produce voltage. Please use insulation tools and wear rubber gloves when operating modules in the sunlight.

在没有连接负载或外部电路的情况下，组件也可以产生电压。在阳光下操作组件时，请使用绝缘工具并佩戴橡胶手套。

PV modules doe not have switch. PV modules can only stop work when they are kept from sunlight or covered by cloth, hard board or light-proof materials or when front side of modules are placed on smooth and flat surfaces.

光伏组件没有开关。光伏组件只有在远离阳光照射或被布、硬板或防光材料覆盖或组件正面放置在光滑平坦的表面时才能停止工作。

To avoid electric arc or electric shock hazards, please do not break down electric connection in loaded conditions. Wrong connections will also lead to electric arc or shock. Keep connectors dry and clean and make sure that they are in good working condition. Do not insert other metals into the connectors or carry out electric connection by whatever means.

为避免电弧或触电危险，请不要在有负载的情况下断开电气连接。错误的连接也会导致电弧或触电。保持连接器干燥、清洁，并确保其处于良好的工作状态。禁止在连接器中插入其他金属或以任何方式进行电连接。

Snow and water in surrounding environments will intensify light reflection and lead to increase of current and output power. And module voltage and power will increase under low temperature.

周围环境中的雪和水会加剧光的反射，导致电流和输出功率的增加。在低温下，模块电压和功率会增大。

If module glass or packaging materials are damaged, please wear personal protective articles and isolate modules from the circuit.

如果组件玻璃或封装材料损坏，请穿戴个人防护用品，并将模块与电路隔离。

Working is only allowed in dry conditions by means of dry tools. Do not operate when modules are wet unless you wear the proper electric shock protection device. Please operate following the cleaning requirements in this manual when cleaning modules.

作业只允许在干燥条件下使用干工具进行。禁止在组件潮湿的情况下操作，除非佩戴合适的电击防护装置。清洗组件时，请按照本手册的清洗要求操作。

3.4 Operation safety 操作安全

Do not open OSDA Package in transportation and storage process unless the modules arrive at the installation site.

在运输和储存过程中，不允许打开欧达的组件包装，除非组件到达安装现场。

Do not damage the package and do not make packaged modules on pallet fall directly.

请勿损坏包装，请勿使包装好的组件直接掉落在托盘上。

Do not exceed the highest layer limit indicated on the packaging carton when piling modules up.

堆叠组件时，请勿超过包装纸盒上标示的最高层限。

Put packaging carton in the ventilated, rain-proof and dry places before unpacking of modules. Open OSDA's packaging carton following unpacking instructions

组件开箱前，请将包装箱置于通风、防雨、干燥的地方。按照开箱说明打开哦欧达的包装纸盒。

Do not hold the connecting box or wires to lift the entire module in any cases.
在任何情况下，都不要握住接线盒或连接线将整个组件抬起。

Do not stand or walk on modules.
请勿在组件上站立或行走。

Do not pile one module onto another.
不要将一个组件堆叠到另一个组件上。

To avoid glass damage, do not put heavy objects on module glass.
请勿将重物放在组件玻璃上，以免损坏玻璃。

Be careful when placing modules on a surface and at corners in particular.
在平面上放置组件时要小心，尤其是在角落。

Do not try to unpack the module or remove nameplate or parts of modules.
请勿打开包装或者撕下组件铭牌或其他部件。

Do not paint surface of modules or apply any other glues.
请勿在组件表面涂漆或使用其他胶水。

Do not damage, grad or scratch back film of modules.
请勿损坏、撕裂或刮伤组件背板。

Do not drill frame of modules, which may reduce frame loading capacity or lead to frame corrosion
禁止在组件的边框上钻孔，以免降低边框的承载能力或导致边框腐蚀。

Do not scratch anodic coating of aluminum alloy frame except for grounding connection. Scratch may lead to frame corrosion and reduce frame loading capacity
除接地连接外，禁止划伤铝合金边框的阳极涂层。划痕可能导致边框腐蚀，降低边框承载能力。

Do not repair glass or modules whose back film is damaged on your own.
请勿自行修理背面膜损坏的玻璃或组件。

3.5 Fire safety 消防安全

Please consult local laws and regulations before installing modules and abide by requirements on building fire protection. Fire rating of OSDA modules is TypeC according to IEC61730.
安装组件前请参考当地法律法规，并遵守建筑防火要求。欧达组件的防火等级为 IEC61730 的 C 级。

The roof shall be coated with a layer of fireproof materials of such rating for roofing installation and make sure that the back plate and the mounting surface are fully ventilated.

屋顶应涂刷一层该等级的屋面安装防火材料，并保证背板和安装面充分通风。

Difference of roofing structures and installation modes will affect fireproof performance of buildings. Improper installation may lead to fire disasters.
屋面结构和安装方式的不同会影响建筑物的防火性能。安装不当可能导致火灾。

To guarantee roof fire rating, the module frame shall be at least 10cm from the roof surface.
为保证屋顶防火等级，组件边框距屋顶表面至少 10cm。

Adopt proper module accessories such as fuse, circuit breaker and grounding connector according to local regulations.
根据当地法规选用合适的组件配件，如保险丝、断路器、接地接头等。

The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
本组件的防火等级仅在按照机械安装说明中规定的方式安装时有效。

Please do not use modules if there are exposed inflammable gases nearby.
如果附近有易燃性气体，请不要使用组件。

4 Installation conditions

安装条件

4.1 Installation site and working environments 安装位置和工作环境

The modules can only be used on earth but not in outer space.
这些组件只能在地球上使用，不能在外太空使用。

Do not focalize sunlight with mirrors or magnifying glass artificially onto modules.
不要用镜子或放大镜将太阳光人为地聚焦到组件上。

OSDA modules shall be installed on proper buildings or other appropriate places (such as ground, garage, building outer wall, roof, PV tracking system) but shall not be installed on any mobile vehicles.
欧达组件应安装在适当的建筑物或其他适当的地方(如地面、车库、建筑物外墙、屋顶、光伏跟踪系统)，但不得安装在任何移动车辆上。

Do not install modules at such places as that are possible to be submersed.
不要将组件安装在可能被淹没的地方。

OSDA suggests that modules be installed in the working environment with the temperature of -20 to 46 which is the monthly average highest and lowest temperature of the installation places.The extreme working environment temperature for modules is -40 to 85.
欧达建议将模块安装在温度为-20～46℃的工作环境中，这是安装地点月平均最高和最低温度。组件的极端工作环境温度为-40～85℃。

Make sure that installed modules do not suffer wind or snow pressure that exceeds the permissible maximum load.

确保安装的组件不承受超过允许最大负载的风或雪压力。

Modules shall be installed in places free from shades throughout the year. Make sure there are no light-blocking obstacles in the installation places.

组件应安装在全年无阴影的地方。确保安装处没有遮挡光线的障碍物。

Carry out lightning protection for modules installed in places with frequent lightning and thunder.

安装在雷电频繁场所的模块应做好防雷工作。

Do not install modules in places with possible inflammable gases.

请勿将组件安装在可能存在易燃气体的地方。

Modules can not be used in environments with too much hails, snows, flue gas, air pollution and soot or in places with strong corrosive substances such as salt, salt mist, saline, active chemical steam, acid rain, or other substances corroding modules, affecting module safety or performance.

组件不能在冰雹、雪、烟气、空气污染、烟尘过多的环境中使用，也不能在有盐、盐雾、盐水、活性化学蒸汽、酸雨等腐蚀性强的物质或其他物质腐蚀模块的场所使用，影响组件的安全或性能。

Please take protective measures to ensure reliable and safe installation of modules in severe environments such as heavy snow, cold and strong wind or islands close to water and salt mist or deserts.

在大雪、严寒、强风、靠近水、盐雾的海岛、沙漠等恶劣环境下，请采取防护措施，确保组件安装可靠、安全。

4.2 Selection of tilt angles 倾斜角度的选择

Tilt angle of modules: Included angle between module surface and horizontal surface; the module will obtain the maximum power output in direct facing of sunlight.

组件倾斜角度：组件表面与水平面夹角；组件将在阳光直射下获得最大的功率输出。

Modules are preferred to be south-facing in the north hemisphere and north-facing in the south hemisphere.

组件在北半球最好朝南，在南半球最好朝北。

A specific installation angle shall be determined according to installation guide for standard modules or suggestions from PV module installer.

具体安装角度根据标准组件安装指南或光伏组件安装人员的建议确定。

OSDA suggests that module installation tilt angle be no less than 10° so module surface dust can be washed away easily by rainfall and times of cleaning can be reduced. And it is easy for ponding to flow away and avoid water print on the glass due to long time of water ponding which may further affect module appearance and performance.

欧达建议组件安装倾斜角度不小于 10°，这样可以使组件表面的灰尘容易被雨水冲走，减少清洗次数。而且容易使积水流走，避免长时间积水在玻璃上留下水印，影响组件的外观和性能。

5 Mechanical installation

机械安装

5.1 Regular requirements 常规要求

Make sure that module installation mode and bracket system are solid enough to bear the expected load, which is requisite assurance that the bracket installer must provide. Installation bracket system shall be tested and inspected by the third party testing institution with static mechanical analysis capacity in accordance with local national or international standards.

确保组件安装方式和支架系统足够坚固，能够承受预期的荷载，这是支架安装人员必须提供的必要保证。安装支架系统应由具有静力分析能力的第三方检测机构按照当地国家或国际标准进行测试和检验。

Module bracket shall be made from durable, corrosion resistant, ultraviolet proof materials.

组件支架应采用耐用、耐腐蚀、防紫外线的材料制成。

Modules shall be fixed on the bracket solidly.

组件应牢固地固定在支架上。

Use higher brackets in places with heavy snow accumulation so the lowest point of modules will not be covered by snow for a long time. In addition, make the lowest point high enough so as to avoid sheltering of vegetations and woods or damage of flying sands and stones.

在积雪较重的地方使用较高的托架，这样组件的最低点就不会长期被积雪覆盖。此外，最低点要高一些，以免遮挡植被和树木，也避免飞沙和飞石的破坏。

If modules are installed on brackets parallel to the roof or wall, the minimum gap between the module frame and the roof/wall shall be 10cm for air ventilation so as to prevent module line damage.

如果组件安装在与屋顶或墙壁平行的支架上，则组件边框与屋顶/墙壁之间的最小间隙应为 10cm，以便通风，防止损坏组件线路。

Do not make holes on glass or frame of modules.

请勿在组件的玻璃和边框上打孔。

Make sure the building is suitable for installation before installing modules on roof. Moreover, seal permeable parts properly to prevent leakage.

在屋顶安装组件前，请确保建筑物适合安装。此外，适当密封透水部位，防止漏电。

The module frame has thermal expansion and cold contraction so the frame interval between two adjoining modules shall be less than 10mm.

组件边框会热胀冷缩，相邻组件之间的边框间距应小于 10mm。

Make sure that back plate of modules will not contact bracket into the module or building structures, especially when the module surface is imposed by pressure.

确保组件背板不会接触到连接组件或建筑的支架，特别是当组件表面受压力作用时。

OSDA Solar Modules have been certified for a maximum design static load on the back of the Modules of up to 1600Pa*1.5 (i.e. wind load) and a maximum design static load on the front of the Modules of up to 3600Pa*1.5 (i.e. wind and snow load), depending on the clamp mounting (please refer to follow installing data for this information). And this is printed on the label of modules.

欧达的太阳能组件已通过认证，组件背面的最大设计静荷载可达 1600Pa*1.5(即风载荷)，组件前部的最大设计静载荷可达 3600Pa*1.5(即风和雪载荷)，具体取决于夹具安装(请参阅以下安装数据以获取此信息)。这是打印在组件标签上的。

Module installation methods can not lead to electrochemical corrosion between module aluminum frame and different metals. Electrochemical potential difference of contacting metals shall not exceed 0.6V as is recommended in IEC61730 Appendix Flat Plate Photovoltaic Modules and Panels.

组件安装方式不能导致组件铝边框与不同金属之间发生电化学腐蚀。根据 IEC61730 附录平板光伏组件和面板的建议，接触金属的电化学电位差不得超过 0.6V。

Modules can be installed horizontally or vertically.

组件支持水平安装和垂直安装。

5.2 Way of installation 安装方式

Module and bracket system connection can be realized by clamp or embedded systems. Installation shall follow the demonstration and suggestions below. If installation mode is different, please consult OSDA and obtain approval. Otherwise, modules may be damaged and quality warranty will become invalid.

组件与支架系统的连接可通过夹具或嵌入式系统实现。安装应遵循以下演示和建议。如果安装方式不同，请咨询欧达并获得批准。否则可能导致组件损坏，质量保证失效。

5.2.1 Use clamps to install modules 使用夹钳安装组件

Use the special clamp to install modules. See Figure 3.

使用专用夹具安装组件。参见图 3。

A. Fix modules on the bracket by metal clamp. The following clamps or those clamps recognized by module system installer are recommended.

A.用金属夹将组件固定在支架上。建议使用以下夹钳或组件系统安装人员认可的夹钳。

Width: no less than 40mm；

Thickness: no less than 3mm；

Material: aluminum alloy；

Bolt: M8.

宽度:不小于 40mm；

厚度:不小于 3mm；

材质:铝合金；

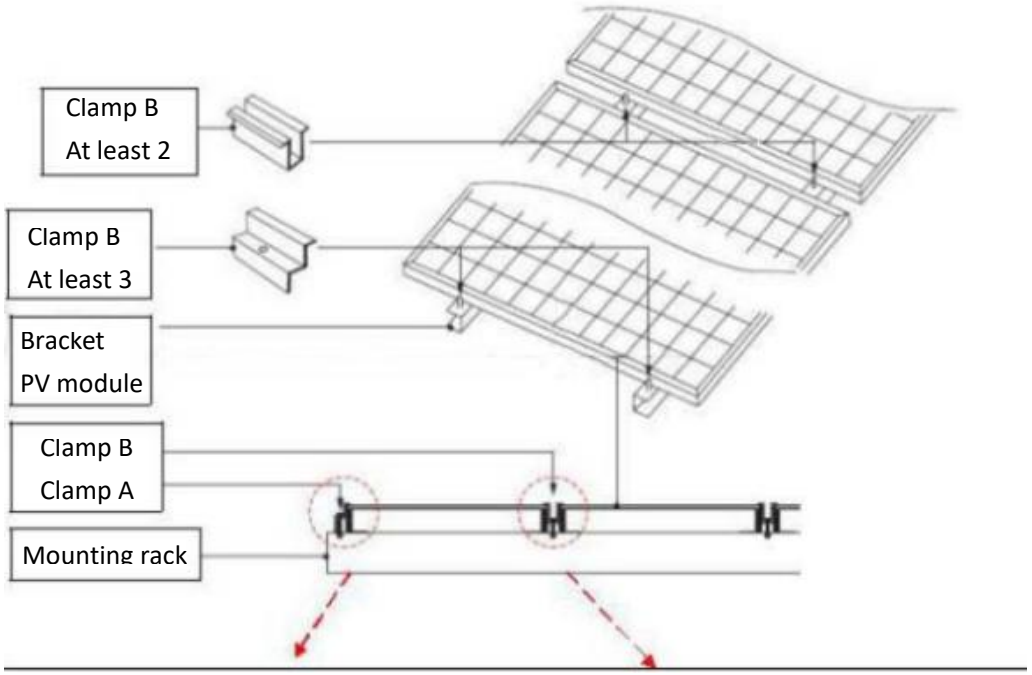
螺栓:M8。

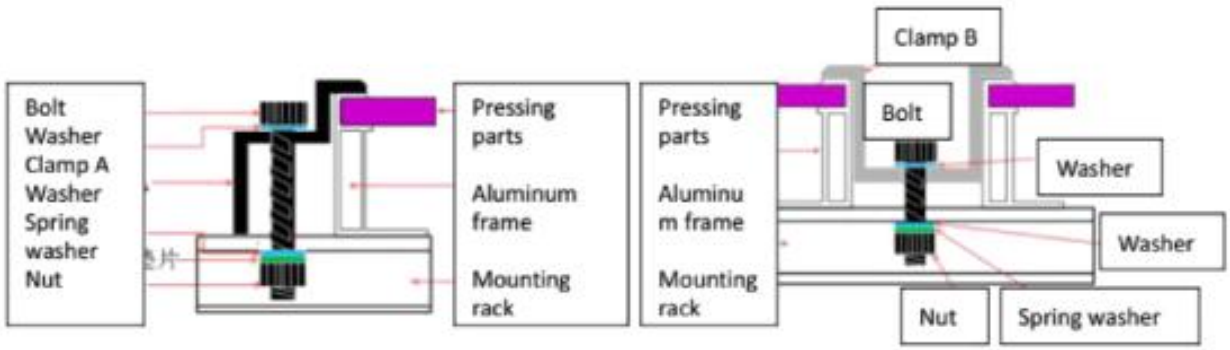
B. Torque range for bolt fastening: 18N•m to 24N•m.

B．螺栓紧固扭矩范围:18N•m ~ 24N•m。

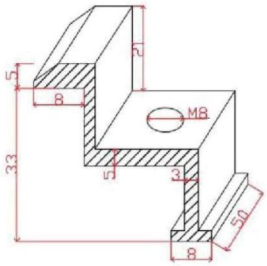
C. The clamp shall not contact glass or make module frame deformed in any case. The contacting surface of the clamp and frame front side shall be neat and smooth. Otherwise, frame and module may be damaged. Make sure that the clamp will not produce shading effect. Drain holes can not be sheltered by the clamp.

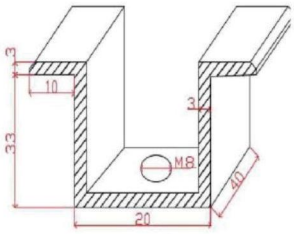
C.夹头在任何情况下不得接触玻璃或使组件变形。夹具与边框正面的接触面应整洁光滑，否则可能损坏边框和组件。确保夹紧不会产生遮光效果。排水孔不能被夹住。



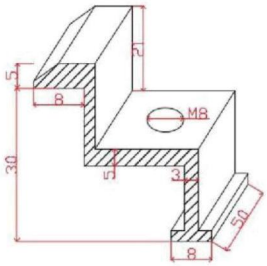


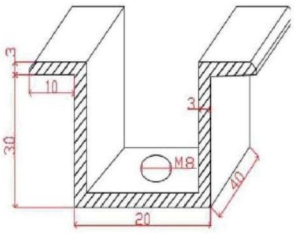
Applicable to B side 35mm frame 适用于 B 面 35mm 边框





Applicable to B side 33mm frame 适用于 B 面 33mm 边框





Applicable to B side 30mm frame 适用于 B 面 30mm 边框

Clamp A for tail end module edge
夹具 A 用于组件尾端边缘

Clamp B for middle modules
夹具 B 用于组件中段

Figure 3 Clamp Illustration (unit: mm)
图 3 夹具示意图(单位:mm)

5.2.2 Position of installation connecting points 安装连接点位置

Low/normal load working condition applies to most environments: the maximum static load for backside is 1600Pa*1.5 (equal to wind pressure) and the maximum static pressure for the front side is 1600Pa*1.5 (for 4 clamps installation) (equal to wind pressure and snow pressure).

低/正常负载工作情况适用于大多数环境:背面最大静负载为 1600Pa*1.5(等于风压)，正面最大静压力为 1600Pa*1.5(安装 4 个夹具)(等于风压和雪压)。

Higher load applies to severe environments (such as wind storm, heavy snow): the maximum static load for backside is 1600*1.5Pa (equal to wind pressure) and the maximum static pressure for the front side is 3600Pa*1.5 (for 6 clamps installation) (equal to wind pressure and snow pressure).

更高的载荷适用于恶劣环境(如狂风暴雨、大雪) 后侧最大静载荷为 1600*1.5 pa(等于风压)，前侧最大静压为 3600Pa*1.5(安装 6 个夹具)(等于风压和雪压)。

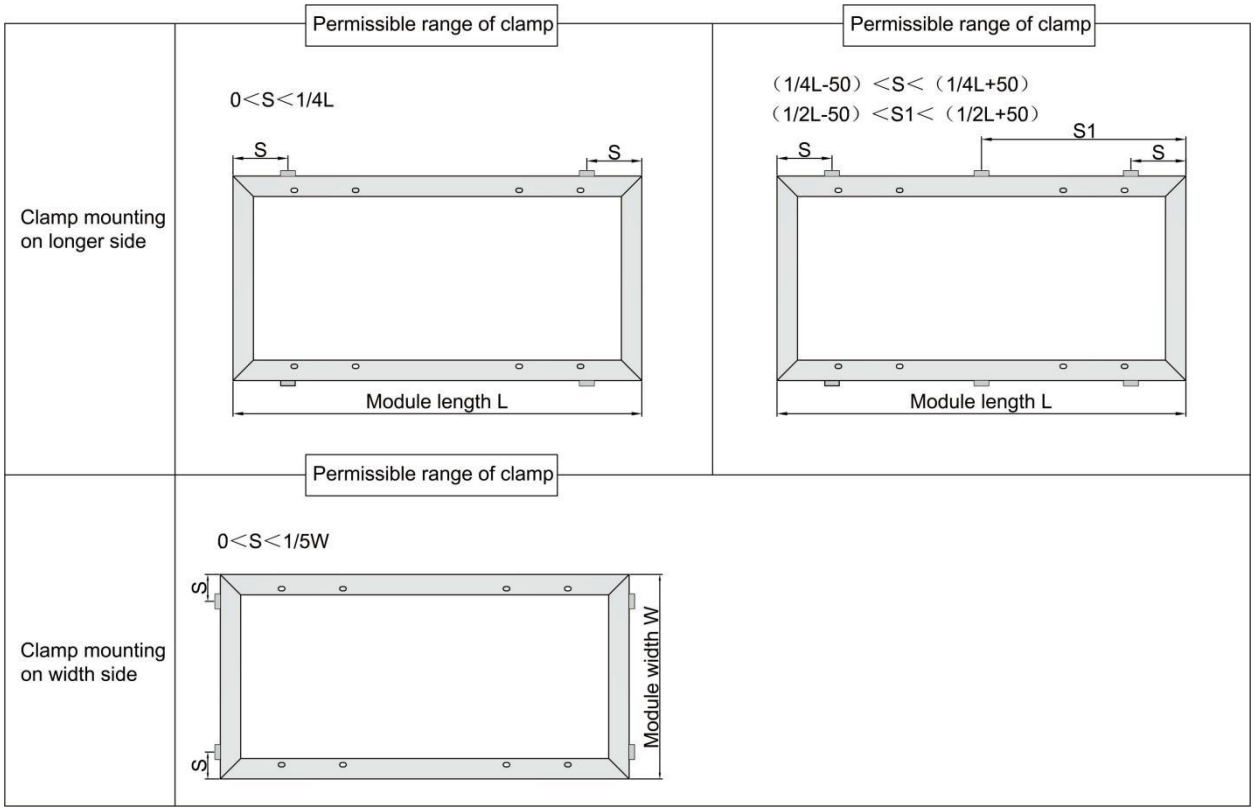


Figure 4 Position requirements of connecting points

图 4 连接点位置要求

6 Electric installation

电气安装

6.1 Electric performance 电气性能

Module electric performance parameters such as Isc, Voc and Pmax nominal values have ±3% error with those under standard testing conditions of: irradiance of 1000 W/m^2, cell temperature of 25℃ and air mass of AM1.5.

组件电性能参数 Isc、Voc、Pmax 标称值与辐照度 1000w /m2、电池温度 25℃、空气质量 AM1.5 的标准测试条件下误差±3%。

Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations not under the requirements of the NEC, the values of Isc and Voc marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.

在正常条件下，光伏组件可能会产生比标准测试条件下报告的更大的电流和/或电压。应遵循国家电气规范(NEC)第 690 条的要求来解决这些增加的输出。在不符合 NEC 要求的安装中，在确定组件电压额定值、导体容量、过流器件额定值和连接到 PV 输出的控制器尺寸时，应将此组件上标记的 Isc 和 Voc 值乘以 1.25。

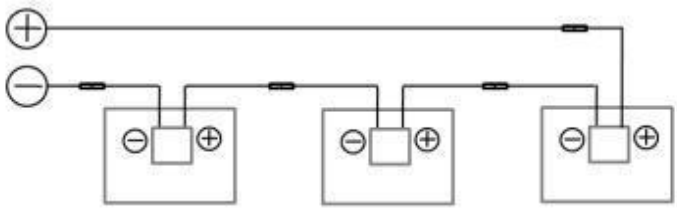
When modules are in series connection, the final voltage is sum of that of the single module. When modules are in parallel connection, the final current is sum of the single module. See Figure 5

当组件串联时，最终电压为单个组件电压之和。当组件并联时，最终电流为单个组件之和。参见图 5

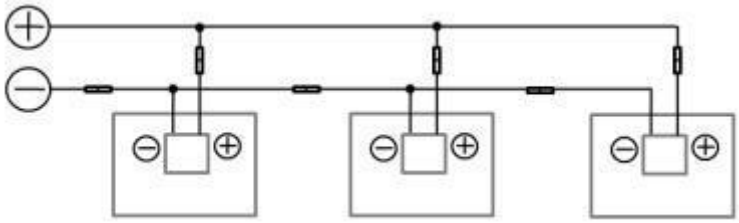
Modules with different electric performance models can not be connected in one series.

不同电性能型号的组件不能串联在一起。

Serial connection 串联



Parallel connection 并联



Parallel connection after series connection 串联后并联

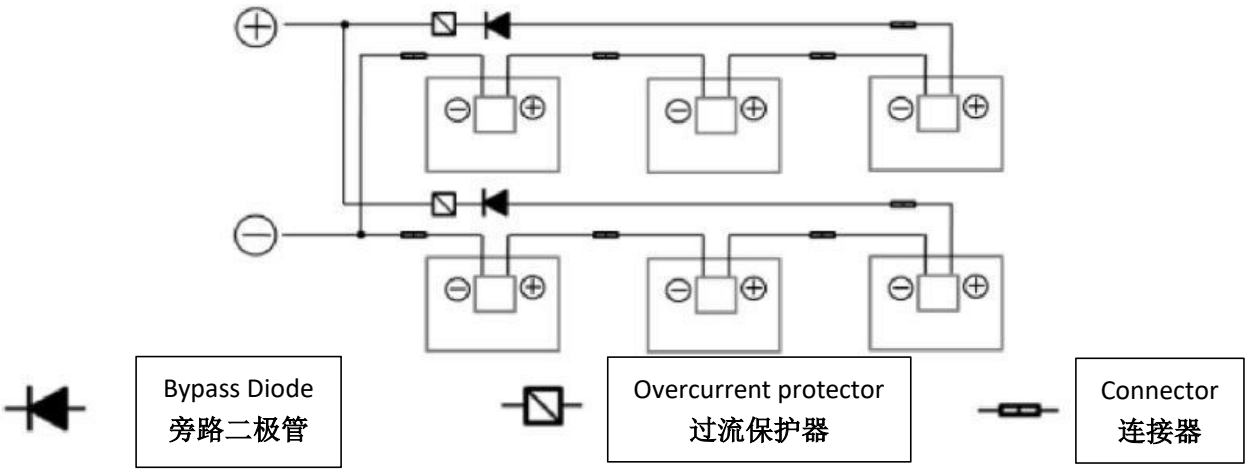


Figure 5: Series connection and parallel connection circuit diagram

图 5: 串并联电路图

The number of modules in series connection in each strand shall be calculated as per requirements. The open circuit voltage value under the expected lowest temperature shall not exceed the maximum system voltage value stipulated for modules (OSDA module maximum system voltage is DC1500V according to IEC61730) and other values required by DC electric parts.

每条线串联连接的组件数量应按要求计算。预期最低温度下的开路电压值不得超过组件规定的最大系统电压值(欧达组件最大系统电压根据 IEC61730 为 DC1500V)和直流电气部件要求的其他值。

If modules are connected in series, the total voltage is equal to the sum of individual voltages. The recommended system voltage is as below：

System voltage ≥ N*Voc[1+TCVoc* (Tmin-25)]

如果组件串联，则总电压等于单个电压之和。推荐的系统电压如下:

系统电压≥N*Voc[1+TCVoc* (Tmin-25)]

If the modules are connected in parallel, the recommended number of modules in parallel is: maximum series fuse rating/Isc+1

如果组件并联，建议并联的模块数为:

最大系列保险丝额定值/Isc+1

Where/注释

N：module numbers in series

N：串联的组件数量

Voc：Open circuit voltage (refer to product label or data sheet)

Voc ：开路电压(参考产品标签或说明书)

TCVoc：Temperature coefficient of open circuit voltage (refer to product label or data sheet)

TCVoc：开路电压温度系数(参考产品标签或说明书)

Tmin：Minimum ambient temperature

Tmin：最小环境温度

Maximum series overcurrent protective device, where required.

在需要的地方安装最大串联过流保护装置。

If there is reverse current exceeding the maximum fuse current flowing through the module, use overcurrent protection device with the same specifications to protect the module; if parallel connection strands are more than 2, there shall be an overcurrent protection device on each strand of module. See Figure 5.

如果有反向电流超过通过组件的最大熔断器电流，则使用相同规格的过流保护装置对组件进行保护;如果并联股数大于 2 股，组件的每一股上都应有过流保护装置。参见图 5。

6.2 Cables and connecting lines 线缆和连接线路

In module design, adopt enclosed connecting boxes with the protective level of IP68 for on-site connection to provide environmental influence protection for wires and connections and contacting protection for non-insulating electric parts. The connecting box has well connected cables and connectors with the protective level of IP68. These designs facilitate parallel connection of modules. Each module has two independent wires connecting the connecting box, one is negative pole and the other is positive pole. Two modules can be in parallel connection by inserting the positive pole at one end of wire of one module into the negative pole of the adjoining module.

在组件设计中，就地连接采用防护等级为 IP68 的封闭式接线盒，对导线及连接处进行环境影响保护，对非绝缘电气部件进行接触保护。连接盒内有已连接的电缆和防护等级为 IP68 连接器。

这些设计便于组件并联。每个组件有两根独立的导线连接接线盒，一根是负极，一根是正极。通过将一个组件导线一端的正极插入相邻模块的负极，可以实现两个组件并联。

Cables connecting modules shall satisfy the module maximum short circuit current. Adopt the special PV system sunlight resistant cables.

组件连接线缆应满足组件最大短路电流需求，采用专用光伏系统耐光线缆。

The minimum standards of cables connecting modules are:

组件间线缆连接的最低标准为:

Testing standards 测试标准	Wire diameter 线径	Temperature range 温度范围	Voltage 电压
IEC62930	4mm²	-40ºC to +85ºC	1500V

When cables are fixed on the bracket, avoid mechanical damage to cables or modules. Do not press cables by force. Adopt special designed light resistant wires and clamps to fix cables on the bracket. Though cables are light resistant and water proof, it is still necessary to prevent cables from direct sun radiation and water immersion.

电缆固定在支架上时，应避免对电缆或组件造成机械损伤。请勿强行压电缆。采用特殊设计的耐光导线和夹具将电缆固定在支架上。虽然电缆是耐光和防水的，但仍有必要防止电缆直接受到太阳辐射和水浸泡。

6.3 Connector 连接器

Please keep connectors clean and dry. Make sure connector nuts are fastened before connection. Do not connect connectors that are damp or dirty or under other status. Protect connectors from direct sun radiation and water immersion or fall onto ground or roof.

请保持连接器的清洁和干燥。连接前请确保连接螺母已拧紧。禁止连接潮湿、肮脏或其他状态的连接器。保护连接器免受太阳直射和水浸泡，或掉落在地面或屋顶上。

Wrong connection may lead to electric arc and electric shock. Please make sure that all electric connection is reliable. Make sure all connectors with lock are fully locked.

错误的连接可能导致电弧和触电。请确保所有的电气连接是可靠的。确保所有带锁的连接器都完全锁住。

6.4 Bypass diode 旁路二极管

OSDA solar module connecting box contains bypass diode which is in parallel connection with the cell strands. If heat spot occurs locally with the module, the diode will come into operation to stop the main current from flowing through the heat spot cells with the view to restrain module heating and performance loss. But bypass diode is not the overcurrent protection device.

欧达的太阳能组件连接盒包含与电池链并联的旁路二极管。如果组件局部出现热斑，二极管将开始工作以阻止主电流流过热斑单元，从而抑制组件加热和性能损失。但旁路二极管不是过流保护装置。

If the diode is found or doubted to get out of order, the installer or system maintenance supplier shall contact OSDA. Please do not try to open the module connecting box on your own.

如果发现或怀疑二极管出现故障，安装人员或系统维护供应商应与欧达联系。请勿尝试自行打开组件接线盒。

7 Grounding

接地

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

在组件设计中，采用阳极氧化耐腐蚀铝合金边框用于刚性支撑。为了安全使用和保护组件免受雷击和静电损坏，组件边框必须接地。

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

接地装置应与铝合金内侧充分接触，并穿透边框表面氧化膜。

Do not drill additional grounding holes on module frame.

请勿在组件边框上额外打孔。

To get the optimal power output, OSDA suggests that DC negative pole of the module array shall be grounded in installation of modules. Otherwise, the system power output will be reduced.

为了获得最佳的功率输出，欧达建议在安装组件时对组件阵列直流负极进行接地。否则会降低系统输出功率。

Module installation methods can not lead to electrochemical corrosion between module aluminum frame and different metals. Electrochemical potential difference of contacting metals shall not exceed 0.6V as is recommended in IEC61730 Appendix Flat Plate Photovoltaic Modules and Panels.

组件安装方式不能导致组件边框与不同金属之间发生电化学腐蚀。根据 IEC61730 附录平板光伏组件和面板的建议，接触金属的电化学电位差不得超过 0.6V。

Holes on the frame shall be drilled in advance and grounding signs shall be indicated. These holes are only used for grounding but not for installation of modules.

边框上的孔应提前打孔，并有接地标志。这些孔只用于接地，不用于安装组件。

A module with exposed conductive parts is considered to be in compliance with IEC61730 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.

具有暴露的导电部件的组件只有在按照以下说明和国家电气规范的要求进行电气接地时才被认为符合 IEC61730。

Where common grounding hardware (nuts, bolts, star washers, spilt-ring lock washers, flat washers and the like) is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions.

如果使用常见的接地五金件(螺母、螺栓、星形垫圈、溢环锁紧垫圈、平垫圈等)来连接列出的接地/连接装置，则必须按照接地装置制造商的说明进行连接。

OSDA recommends must thoroughly detail the attachment means in the module installation instructions.

欧达建议必须在组件安装说明中详细说明附件的方法。

Common hardware items such as nuts, bolts, star washers, lock washers and the like have not been evaluated for electrical conductivity or for use as grounding devices and should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirements in IEC61730, may be used for grounding connections in accordance with the instructions provided with the module.

常用的五金产品，如螺母、螺栓、星形垫圈、锁紧垫圈等，没有经过导电性评估，也没有作为接地装置使用，只能用于保持机械连接，并将电气接地装置固定在适当的导电性位置。这些设备，如果与组件一起提供并通过符合 IEC61730 要求的评估，可以根据组件提供的说明用于接地连接。

Grounding methods below are permissible:

以下接地方法是允许的:

7.1 Grounding by grounding clamp 接地夹具接地

There is a grounding hole with the diameter of Ø4.2mm at the edge of the module back frame. The central line of the grounding sign and that of the hole overlaps and is consistent with the frame length direction.

组件后框边缘有一个直径为Ø4.2mm 的接地孔。接地标志的中心线与孔的中心线重叠，且与边框长边方向一致。

Grounding between modules shall be confirmed by qualified electricians and grounding devices shall be manufactured by qualified electric manufacturer. The torque is recommended to be 2.3N•m.12 AWG copper core wire is used for the grounding clamp. And copper wires can not be pressed damaged in installation.

组件之间的接地由有资质的电工确认，接地装置由有资质的电器厂家制造。推荐力矩为 2.3N•m.12 且含有 AWG 铜芯线接地夹，并且铜线在安装过程中不会被压坏。

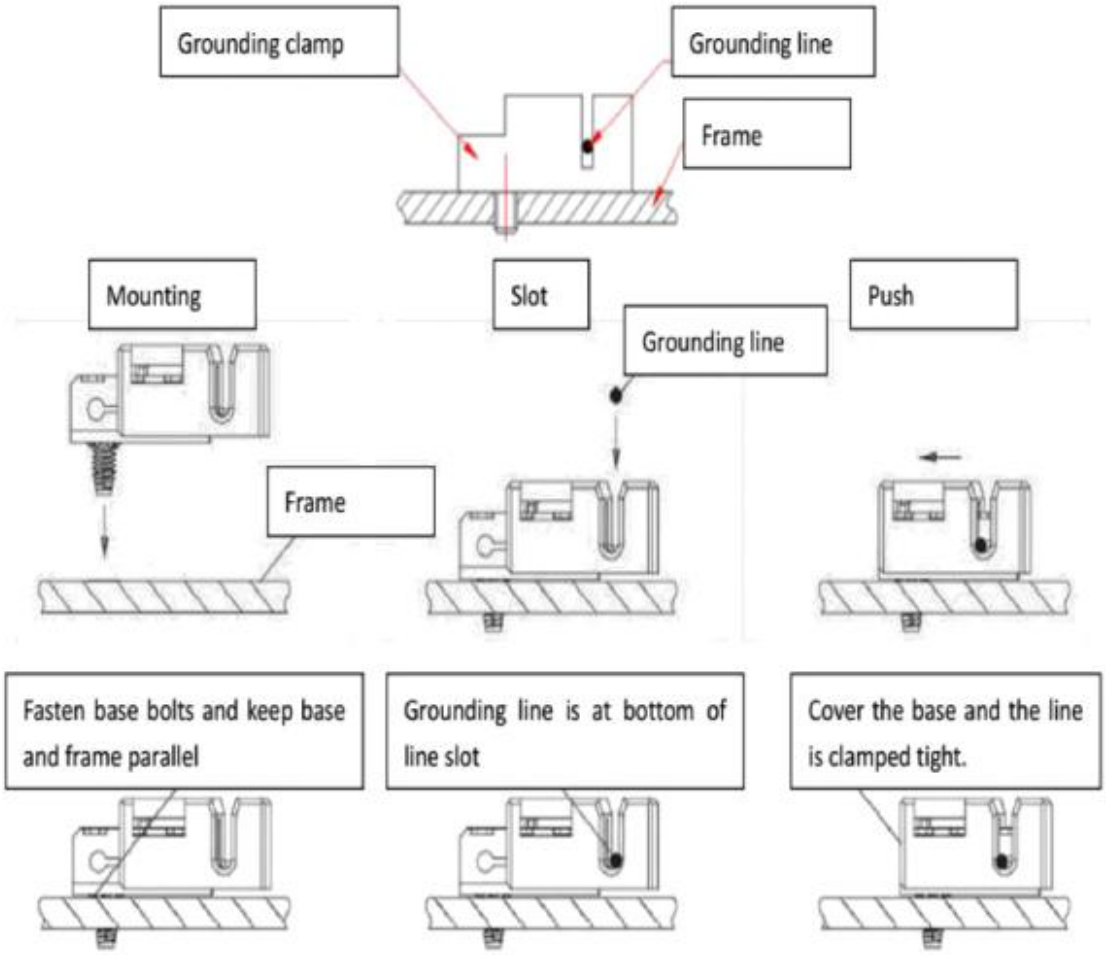


Figure 6 Grounding Clamp Installation

Note: TYCO. 1954381-1 (recommended) is used in figures above.

图 6 接地夹安装

注意: TYCO. 1954381-1 (推荐)在上图中使用。

7.2 Grounding by unoccupied mounting holes 未占用的安装孔接地

Mounting holes on modules that are not occupied can be used for installing grounding devices.

未占用的组件安装孔位可用于安装接地设备。

1.Align grounding clamp to the frame mounting hole. Use grounding bolt to go through the grounding clamp and frame.

接地钳对准边框安装孔，使用接地螺栓穿过接地夹和边框。

2.Put the tooth side of the washer on the other side and fasten the nuts. The recommended torque for nut fastening is 2.0Nm to 2.2Nm.

把垫圈的齿面放在另一侧，拧紧螺母。螺母紧固力矩推荐为 2.0Nm ~ 2.2Nm。

3.Put grounding lines through the grounding clamp and grounding wire material and dimension shall meet requirements in local national and regional law and regulations.

接地线穿过接地夹，接地线的材料和尺寸应符合当地国家和地区法律法规的要求。

4.Fasten bolts of grounding lines and installation ends.
紧固接地线和安装端螺栓。

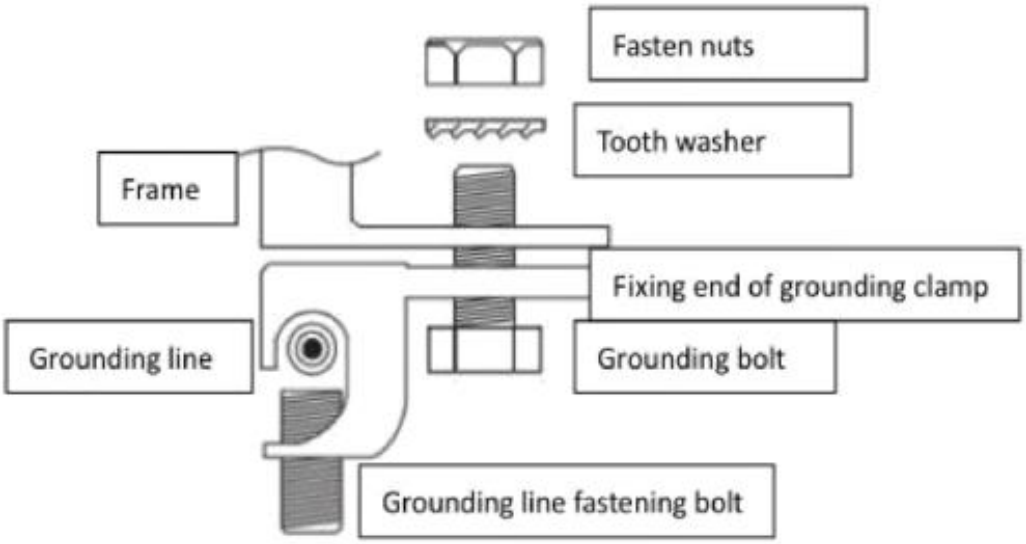


Figure 7 Way of Installation
图 7 安装方法

7.3 The third party grounding devices 第三方接地设备

The third party grounding device can be used for grounding of OSDA modules but such grounding shall be proved to be reliable. Grounding device shall be operated in line with stipulations of the manufacturer.

欧达组件的接地可以采用第三方接地装置，但必须保证可靠。接地装置的操作应符合制造厂的规定。

8 Operation and maintenance

操作和维护

Carry out regular inspection and maintenance for modules and this is the user' responsibility within the quality warranty period in particular; and, inform the supplier within two weeks when modules are found to be damaged.

对组件进行定期检查和维护，特别是在质保期内，这是用户的责任；当发现组件损坏时，应在两周内通知供应商。

8.1 Cleaning 清洁

Accumulated dust on module surface glass will reduce the power output and lead to local heat spot, such as industrial waste water and birds droppings. The degree of influence is determined by transparency of wastes. Small amounts of dust will affect sunlight strength and evenness but are not dangerous and power will not be reduced remarkably in general.

组件表面玻璃上积聚的灰尘会降低功率输出，导致局部热斑，如工业废水和鸟粪。影响的程度是由废物的透明度决定的。少量的灰尘会影响阳光的强度和均匀度，但并不危险，电力一般不会显著降低。

During operation of modules, there shall be no environmental factors projecting shades or shelter partial or the entire module, including other modules, module system bracket, birds, dust, soil or plants. These will reduce output power. OSDA suggests that the module surface should not be sheltered in any case.

在组件运行过程中，不允许有环境因素投射阴影或遮挡部分或整个组件，包括其他组件、组件系统支架、鸟类、灰尘、土壤或植物。这会降低输出功率。欧达建议在任何情况下组件表面都不应该被遮蔽。

Frequency of cleaning depends on dirt accumulation speed. In normal situations, rainwater will clean the module surface and the cleaning frequency is reduced therefore. It is suggested to use damp clean water sponge or soft cloth to wipe the glass surface. Do not use acid and alkaline detergents to clean modules.

清洁的频率取决于污垢积聚的速度。正常情况下，雨水会清洗组件表面，减少清洗频率。建议使用潮湿的清洁海绵或软布擦拭玻璃表面，禁止使用酸性和碱性洗涤剂清洁组件。

8.2 Module appearance inspection 组件外观检查

Check module appearance defects visually, especially:
目检组件外观缺陷，特别是:

1. Module glass cracks.
组件玻璃裂纹。

2. Corrosion at welding parts of the cell main grid: it is caused by moisture into the module due to damage of surface packaging materials during installation or transportation.
电池主栅极焊接部位的腐蚀:安装或运输过程中，由于表面包装材料损坏，水汽进入组件造成。

3. Check whether there is burning traces on the module back plate.
检查组件背板是否有烧损痕迹。

8.3 Inspection of connectors and cables 连接器和线缆检查

It is suggested to carry out a preventive inspection once every 6 month:
建议每 6 个月进行一次预防性检查:

1. Check connector sealing and cable connection solidness.
检查接头密封和电缆连接的牢固程度。

2. Check whether sealant of the terminal box is cracking with gap.
检查接线盒密封胶是否有裂缝。

9 The list of the modification

修改列表

Date 日期	Version 版本	Contents 内容	Remark 备注
2021.01.30	1.0	1st edition 第一版	Updated parameters table 更新参数表
2022.11.05	2.0	2st edition 第二版	Updated parameters table 更新参数表
2025.05.05	3.0	3st edition 第三版	Updated parameters table 更新参数表

10 Suited Module Types

适用组件

PV Modules with Half-cut 210mm Mono-crystalline Silicon Solar Cells:
210 单晶硅半片光伏组件
ODAxxx-33V-MH/ODAxxx-33V-MHD
ODAxxx-30V-MH/ODAxxx-30V-MHD
ODAxxx-28V-MH/ODAxxx-28V-MHD
ODAxxx-25V-MH/ODAxxx-25V-MHD
PV Modules with Half-cut 182mm Mono-crystalline Silicon Solar Cells:
182 单晶硅半片光伏组件
ODAxxx-39V-MH/ODAxxx-39V-MHD
ODAxxx-36V-MH/ODAxxx-36V-MHD
ODAxxx-33V-MH/ODAxxx-33V-MHD
ODAxxx-30V-MH/ODAxxx-30V-MHD
ODAxxx-27V-MH/ODAxxx-27V-MHD
PV Modules with Half-cut 182*210mm Mono-crystalline Silicon Solar Cells:
210R 单晶硅半片光伏组件
ODAxxx-33V-MHRz/ODAxxx-33V-MHDRz
ODAxxx-30V-MHRz/ODAxxx-30V-MHDRz
ODAxxx-27V-MHRz/ODAxxx-27V-MHDRz
ODAxxx-24V-MHRz/ODAxxx-24V-MHDRz

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