安装说明书
Installation Instructions

(适用于TCL双玻叠瓦系列光伏组件)

(Suitable for TCL Double Glass Shingled Series Photovoltaic Modules)

USER MANUAL 用户手册

1 INTRODUCTION FOR USER MANUAL用户手册介绍

This Manual applies to the installation, maintenance and use of the dual glass series solar modules manufactured by TCL Photovoltaic Technology (Shenzhen) Co., Ltd (hereinafter referred to as “TCL PV Tech”). Failure to follow these safety instructions could result in personal injury or property damage.

本手册适用于TCL光伏科技（深圳）有限公司 （以下简称TCL光伏科技）生产的双玻系列太阳能组件的安装、维护和使用。如果不遵守这些安全指南，将可能导致人员伤亡或财产损失。

Installation and operation of solar modules require specialized skills, and only professional personnel can engage in the work. Please read the “Safety and Installation Instructions” carefully before using and operating the modules. The installer must inform the end customer (or consumer) of the above matters accordingly.

安装和操作太阳能组件需要专业的技能，只有专业人员才可以从事该项工作。请在使用和操作组件之前仔细阅读安全和安装说明。安装商必须相应地把上述事项告知终端客户（或消费者）。

The term “Module” or “PV Module” in this Manual refers to one or more dual glass series solar modules. Please keep this Manual for future reference.

本手册中的“组件”或“PV组件”指的是一个或多个双玻系列太阳能组件。请保留此说明书以供将来参考。

1.1 DISCLAIMER 免责申明

TCL PV Tech reserves the rights to change this User Manual without prior notice. Failure of the customer to follow the requirements outlined in this Manual during the installation of the module will result in the invalidity of product's limited warranty.

TCL光伏科技保留在没有预先通知的情况下变更本安装手册的权利。客户在安装组件过程中未按照本手册中所列出的要求操作，会导致提供给客户的产品有限质保失效。

1.2 LIMITATION OF LIABILITY 责任范围

TCL PV Tech is not responsible for any form of damage, including but not limited to module operation and system installation error, and personnel injury, hurt, and property loss resulted from failure to follow the instructions in this Manual.

TCL光伏科技不为任何形式的伤害负责，包括但不限于组件操作、系统安装失误以及未按照本手册的指示产生的身体伤害、受伤和财产损失负责。

2 SAFETY PRECAUTIONS 安全措施

2.1 WARNING 警告

Before installing, wiring, operating, or maintaining modules, you should read and understand all safety precautions. Direct current (DC) is generated when the battery surface of the module is exposed to direct sunlight or other light sources, and direct contact with the live parts of the module, such as terminals, may result in death of personnel whether connected to the module or not .

对组件进行安装、接线、操作或维护前，应阅读并理解所有安全细则。当组件电池面直接暴露在阳光或其他光源下时，会产生直流电(DC)，无论是否连接组件，直接接触组件的带电部分，例如接线端子等，将可能导致人员伤亡。

2.2 GENERAL SAFETY 通用安全

- All installation work must comply with the local codes and the relevant international electrical standards.

  所有的安装工作必须完全遵守当地法规和相应的国际电气标准。

- TCL PV Tech recommends that PV module installation is conducted by personnel with experience in PV system installation. Operation by personnel who are not familiar with the relevant safety procedures will be very dangerous.

TCL光伏科技建议由具备光伏系统安装经验的人员进行安装。如果由不熟悉相应安全程序的人员操作将会非常危险。

- Do NOT allow unauthorized persons to access the installation area or module storage area.

  不允许未经授权的人员接近安装区域或者组件仓储区域。

- Do NOT install modules with damaged glass or damaged backsheet .

  请不要安装玻璃已损坏或背板损坏的组件。

- Do NOT disassemble or move any part of the module.

  不要拆解或移动组件中的任何部分。

- Do NOT artificially focus the light on the module.

  不要人为在组件上聚光。

- Do NOT connect or disconnect the module when it is energized or connected with the external power supply

  当组件有电流或外部电流出现时，不得连接或断开组件。

- Meaning of crossed –out wheeled dustbin on label: 标签上划线轮垃圾箱的含义:

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities.

切勿将电器作为未分类的都市废物弃置，应使用单独的收集设施。
Contact your local government for information regarding the collection systems available.

与当地政府联系，了解有关收集系统的信息。
If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.

如果电器被填埋或倾倒，有害物质会渗入地下水，进入食物链，损害你的健康和幸福。

2.3 HANDLING SAFETY 操作安全

- Do NOT stand, walk on or step on the module directly.

  禁止直接在包装或组件上站立、踩踏、行走或跳跃。

- Do NOT damage or scratch the front or backside surfaces of the module.

  请不要损坏或划伤组件的上下玻璃面。

- Do NOT scratch the output cable or bend it with force. The insulation of output cable can break and may result in electricity leakage or shock.

  请不要拉扯、划伤或用力弯折输出线缆，否则线缆的绝缘部分会被损坏导致电流泄露或触电。

- Do NOT use water to extinguish fires of an electrical origin.

  请不要在电源未断开的情况下，使用水来灭火。

- Do NOT install or handle modules when they are wet or during periods of high wind. At the installation site, take care to keep modules and in particular their electrical contacts, clean and dry before installation. If connector cables are left in damp conditions then the contacts may corrode. Any module with corroded contacts should not be used.

  请不要在潮湿或者大风期间安装或处理组件。在安装现场，请保持组件电器元件的清洁与干燥。如果线缆插头在潮湿条件下互相接触，会被腐蚀。任何被腐蚀的组件都不能被使用。

- Please do NOT loosen or unscrew the PV module bolts, which may lead to the module loading drop or even fall down.

  请不要松动或拧下光伏组件的螺丝，有可能导致组件载荷下降，甚至掉落。

- Do NOT drop PV modules or allow objects to fall down on the PV modules.

  请不要让物体直击组件或物体直接掉落在组件上。

- Do NOT touch the terminal box or the ends of the output cables (connectors) with bare hands under sunlight, regardless of whether the PV module is connected to or disconnected from the system.

  在阳光下，请不要在没有任何保护的情况下用手直接触摸组件的接线盒、连接器、线缆等带电体，无论光伏组件是否与系统连接。

3 UNLOAD/TRANSPROTATION/STORAGE 卸货、运输和存储

Precautions and general safety rules:

预防措施和通用安全细则：

- The modules should be stored in the original package before installation. Protect the package from damage. Unpack the modules as per the recommended unpacking procedures. The whole process of unpacking, transport and storing should be handled with care.

  组件在安装前应存储在原包装箱内，请保护好包装不要使其受损。按照建议的拆包步骤打开组件包装。打开、运输和存储过程需小心操作。

- Do NOT stand, climb, walk or jump on unpacked pallets of modules.

  禁止在未拆包的包装箱上及组件上站立、攀爬、行走或跳跃。

- Before installation, ensure that all modules and electrical contacts are clean and dry.

  安装前，确保所有组件和电气接触都是干净和干燥的.

- If the modules are required to be stored temporarily, they should be stored under dry and ventilated conditions.

  如果需要暂时存放组件，则应将组件存储在干燥通风的环境中。

- Unpacking must be carried out by two or more persons at the same time. It is forbidden to pull the wires or junction boxes of the modules to carry the modules. Handling the modules requires two or more people with non-slip gloves; do NOT handle the modules in an overhead way or stack the modules.

  拆包时，必须由2个或2个以上人员同时操作，禁止拉扯组件的导线或接线盒来搬运组件，搬运组件时应由2个人以上带防滑手套同时手持组件搬运；禁止头顶组件搬运；禁止堆叠组件搬运。

- Do NOT put the modules in a place that is not supported or fixed.

  禁止将组件置于无可靠支撑或未固定的环境下。

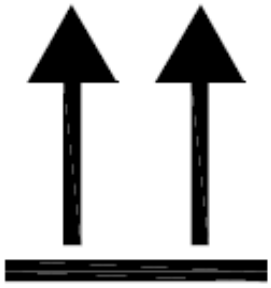
- Do NOT allow the modules to come in contact with sharp-pointed objectives to prevent them from scratches, avoiding a direct impact on the safety of modules.

  禁止组件与尖锐物接触，划痕，以免直接影响组件的安全性。

3.1 MAKERS ON OUTER PACKAGING 包装标示说明

3.1.1 Modules shall be kept dry, not exposing to the rain or moisture. 禁止组件淋雨或者受潮。 	3.1.2 Modules in carton are fragile, which shall be handled with care. 纸箱中的组件为易碎物品，搬运时应小心轻放。 

3.1.3 The packaging shall be transported upright.
包装在运输时应竖直向上。



3.1.4 Do NOT step on the package and module.
禁止在包装箱和组件上面踩踏。

3.1.5 The carton can be recycled.
纸箱可循环再利用。

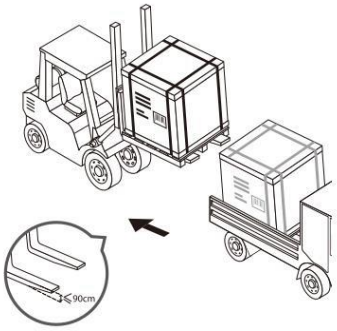
3.1.6 Modules shall be stacked as required, not exceeding the maximum number of layers printed on the outer packaging (n = 2 means no more than two layers and n = 3 means no more than three layers).
堆叠组件时请勿超过外包装箱上印刷标志的最高层数限制（n=2时，最多堆码2层； n =3时，最多堆码3层）。

3.1.7 One module shall be handled by two persons together.
一块组件需由2个人同时搬运。

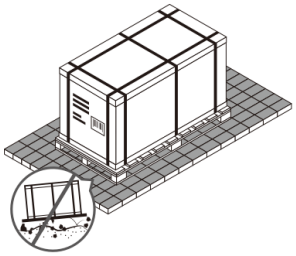
3.2 UNLOADING WARNNING 卸货注意事项

3.2.1 Use the correct (as picture) lifting fixture to handle, no more than 2 pallets for one time lifting. Before lifting, please confirm whether the tray and the carton are damaged and the hoisting rope is firm and solid or not. Before lifting touchdown, two persons shall support at two sides of the righting carton gently to put it on a relatively flat place.
使用合理的吊装治具，吊装一次性最多允许2托组件。吊装前应确认托盘和纸箱是否有破损及吊装的绳索是否结实、牢固。吊装快着地时，两人一人一边扶正纸箱轻轻放在项目地相对平坦的位置上。

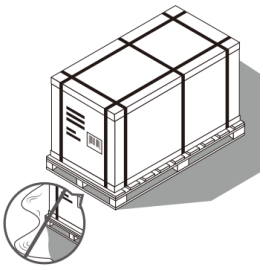
3.2.2 If the condition permits, use a fork lift to remove the module from the truck.
请使用叉车将组件从货车上卸下来；



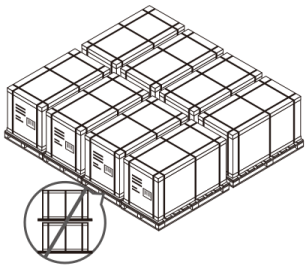
Put the module on the level ground.
将组件放置于水平地面上。



3.2.3 Store the module in a dry and ventilated place.
将组件放置在通风干燥处。



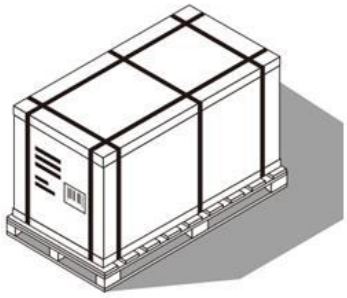
3.2.4 No stacking the modules at the project site.
禁止在项目地将组件堆码。



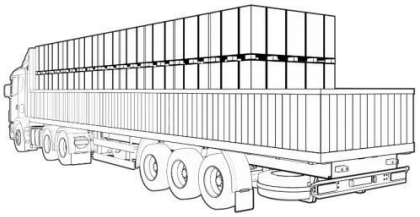
3.2.5
Cover the module with waterproof cloth to prevent it from moisture.
使用遮雨布盖住组件，防止组件受潮。

3.3 SECONDARY TRANSPORT AND WARNNING 二次运输及注意事项

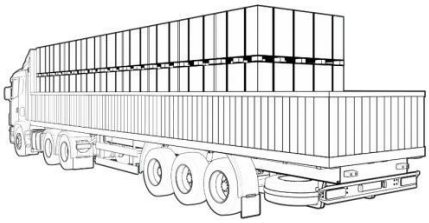
3.3.1 Do NOT remove the original packaging if the modules require long-distance transport or long-term storage.
如果组件需要长途运输或长期存储，请不要拆除原包装。



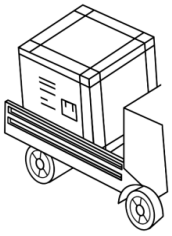
3.3.2 The finished package can be transported by land, sea or air. During transport, make sure that the package is fixed to the shipping platform without moving.
包装的成品可以通过陆运、海运、或空运进行运输。在运输过程中：请将包装箱固定在运输平台上，确保包装不会翻滚。（以陆运为例）。



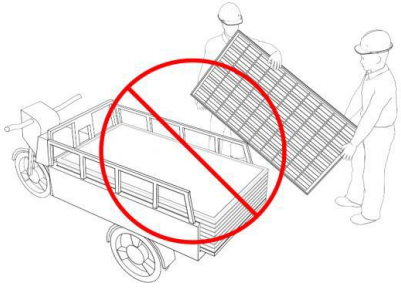
3.3.3 Transport: stacking no more than two layers by truck normally.
运输：正常卡车运输时，最多2层叠加后运输。



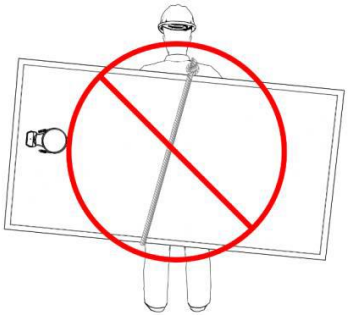
3.3.4 One layer stacking for transport is only allowed at project site.
项目现场托运，只允许1层运输。



3.3.5 No transport or handling by pedi-cab as below.
禁止三轮车转运。



3.3.6 No handling the module with rope.
禁止用绳子背组件。



3.3.7
No carrying the modules on the back of one person;
禁止单人背组件；

3.4 STORAGE 存储

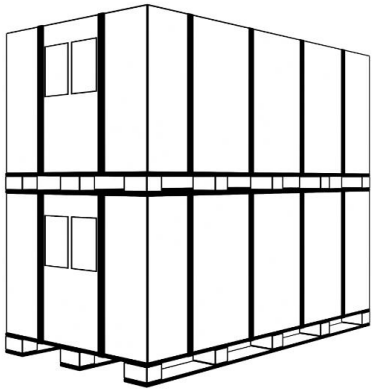
- Do NOT expose the modules to rain or moisture. Store the finished product in a ventilated, waterproof and dry place.

  禁止淋雨或者受潮，请将包装的成品置于通风、防雨和干燥的地方。

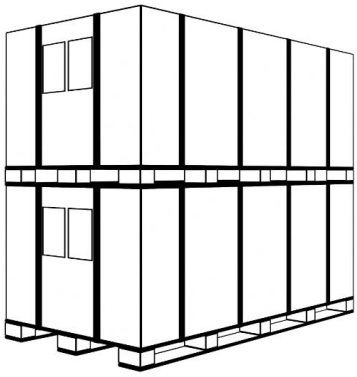
- Do not remove the original packaging if the module requires long-distance transport or long-term storage.

  如果组件需要长途运输或长期存储，请不要拆除它。

3.4.1 Storage in project site warehouse (moisture＜85%, temperature in the range from -20°C to + 50 °C): Be stacked separately in two groups.
项目地仓库存储（湿度＜85%；温度：-20°C ~+50°C）：组件静态堆码堆放2托。



3.4.2 Normal warehouse storage (moisture＜85% and temperature in the range from -20°C to + 50 °C): Be stacked no more than two layers.
正常仓库的存储（湿度＜85%；温度：-20° C ~+50° C）：组件最多堆码2层。



4 UNPACKING INTRODUCTION 拆包说明

4.1 UNPACKING SAFETY 拆包安全：

- As for outdoors unpacking, it is prohibited to operate in rainy conditions. Because the carton will become soft and damaged after it gets wet in the rain. The PV modules (hereinafter referred to as "modules") inside the pallet will release, which may cause damage or injury to personnel.

  在户外拆箱时，禁止在下雨的条件下作业。因为纸箱淋雨后会变软散开，里面的光伏组件（下文简称“组件”）会脱出造成损坏或者砸伤人员。

- If there is wind at site, it is necessary to pay special attention to safety; especially in high wind conditions, it is NOT recommended to transport the modules, and the unpacked modules shall be fixed properly.

  如果现场有风，需要特别注意安全，尤其是大风的情况下，建议不要搬运组件，并且妥善固定好已拆开包装的组件。

- The work surface is required to be level to ensure that the package can be placed stably, avoiding dumping.

  作业地面需要保证包装箱能够水平稳定的放置，避免倾倒。

- Wear protective gloves during unpacking to avoid hand injury and fingerprints on the glass surface.

  拆箱过程中请佩戴保护手套，避免伤手和在玻璃面留下指印。

- Module information and unpacking instructions can be found on the outer package. Please read the instructions before unpacking.

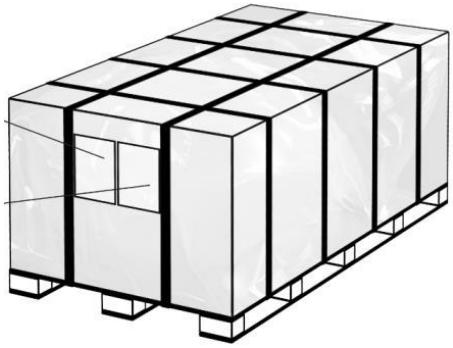
  外包装可查询组件信息和拆包作业指导，请在拆包前详细阅读拆包说明。

- Each module shall be handled by two persons. It is forbidden to pull the wires or junction boxes of the modules to carry the module. No pulling the long side frame to take out the module.

  每块组件需要2个人抬，抬组件时，禁止拉扯接线盒；禁止抓住长边取出组件。

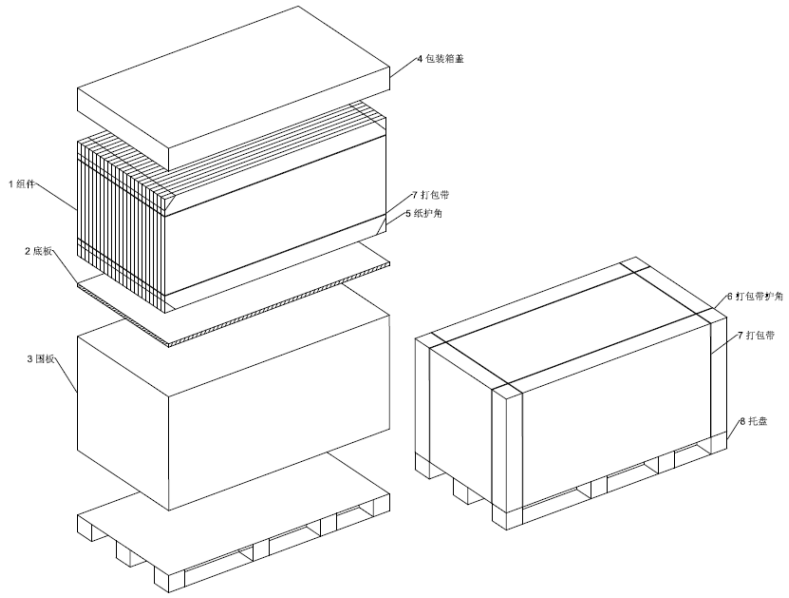
4.2 UNPACKING STEP 拆包步骤

4.2.1 Before unpacking, please check the product name, serial number and related suggestions on the A4 paper. Please read the unpacking instructions carefully and the customized unpacking method is no allowed.
拆包前，请核对外箱A4纸上的产品名、序列号及相关建议,并请仔细阅读拆包指导，禁止自定义式的拆包方式。



4.2.2 The packing box structure consists of modules (no. 1), baseplate (no. 2), coaming (no. 3), packing cover (no. 4), paper corner (no. 5), packing belt corner (no. 6), packing tape (no. 7), and pallet (no. 8).

包装箱结构由组件（序号1）、底板（序号2）、围板（序号3）、包装箱盖（序号4）、纸护角（序号5）、打包带护角（序号6）、打包带（序号7）、托盘（序号8）组成。



4.2.3 Use an art cutter or other hard object to break out the protective film outside the box. Be careful not to damage the carton and remove the protective film around the box.用美工刀或者其他坚硬物品划开包装箱外的保护膜。注意不要损坏纸箱，然后拆除包装箱四周的保护膜。

4.2.4 Cut the outer packing belt of the packing box with an art cutter or scissors, and remove the paper corner and packing tape.

用美工刀或剪刀剪断包装箱外打包带，并拆除打包带护角和打包带。

4.2.5 One person stands at each end of the box, slowly open the box cover.

在箱子两端各站一人，将包装箱盖慢慢打开。

4.2.6 One person stand at each end of the short side of the box, lift the carton coaming slowly from the bottom. After the carton casing board is separated from the modules, the casing board is removed and then placed between the box and the support to protect the modules from the scratch of the support.

在箱子的短边两端各站一人，从下往上慢慢提起纸箱围板。在纸箱围板脱离组件后，把围板拆平整后放置于箱子与支撑物之间，保护组件不受支撑物的刮伤。

4.2.7 One person at each end of the short side of the box to hold the assembly. At the same time, remove the fixed packing tape on the module and slowly tilt the support when removing the packing tape.

在箱子的短边两端各站一人，扶住组件。与此同时，拆掉组件上固定的打包带，拆卸打包带时，使组件慢慢倾斜倚靠支撑物。

4.2.8 Two people hold the short edge of the module and lift it to the designated location for installation. (protective gloves must be worn during unpacking to avoid scratches. Please grab the inner side of the border and move the modules. Do not touch the glass surface with your fingers.

两人拿住组件的短边，把组件抬到指定地点进行安装。（拆箱过程中必须佩戴保护手套，避免划伤收。请抓住边框内侧搬动组件，严禁手指接触玻璃面，避免在玻璃面留下指印。）

4.2.9 If the module is not installed immediately after disassembly, it needs to be moved from vertical to horizontal. Please place a box bottom plate on the tray and stack the glass face down on the tray, but the maximum number of pieces is not more than one box. Note: modules must be aligned after stacking, otherwise they will fall off in transit.

如果组件拆开后没有立即安装，需从立式转变为平放。请在托盘上放一个包装箱底板，然后把依次玻璃面朝下堆叠上去，但最高堆码片数不超过一箱组件的数量。注意：堆叠后组件必须要对齐，否则组件在运输过程中会发生倾斜掉落。

4.2.10 Do NOT lean the module on the mounting posts.

禁止将组件斜靠在安装柱子上。

5 SITE SELECTION 场地选择

- Solar modules are recommended to be installed at an optimized tilt angle to maximize the energy output. It is roughly equal to the latitude of the project site as a rule of thumb, facing toward the equator. Optimized system designs incorporate other local requirements.

  建议通过优化的倾斜角安装太阳能组件以达到能量输出最大化。一般来说它大致等同于项目所在地的纬度，面向赤道方向。但在实际的设计中还是按照当地具体情况设计并找出最佳倾斜角。

- When installing solar modules on a roof, the roof must be covered with a layer of fireproof material applicable to this class, and adequate ventilation must be ensured between the back sheet and the installation surface. A safe working area also must be left between the edge of the roof and the external edge of the solar array.

  当在屋顶上安装太阳能组件时,屋顶上必须要覆盖有一层适用于该等级的防火材料，并且保证背板和安装面之间充分的通风，要在屋顶边缘和太阳能阵列的外边缘之间留出安全的工作区域。

- In the case of residential installations on the ground, modules shall be installed following local regulations, e.g. using fence.

  如果住宅设施在地面上，组件的安装应按照当地法规进行，例如安装中需要用到围栏。

- Position the modules to minimize the chances of shading at any time of the day.

  对组件进行定位以尽量减少其在一天中任何时间段遮光的可能性。

- TCL PV Tech recommends that the module should be installed at an ambient temperature of -40℃ ~40℃. The module's operating temperature range is from -40℃ to 85℃.

  TCL光伏科技推荐组件安装在温度为-40℃~40℃的环境下，组件的工作温度范围为-40℃~85℃。

- Try to install modules in a location where there is rare shading throughout the year.

  尽量将组件安装在一年中罕有遮阳的位置。

- If you are planning to use the PV modules where the water damage (Humidity: ＞ 85RH%) may be possible, please consult with TCL PV Tech technical support first to determine an appropriate installation method , or to determine whether the installation is possible.

  如果您计划在可能出现水渍侵害的地方（湿度：> 85RH％）使用光伏组件，请先向TCL光伏科技的技术支持团队咨询以确定合适的安装方法，或确定是否可以安装。

- If the module is installed in an area with frequent lightning and thunder, the module must be protected against lightning strikes.

  如果组件安装在有频繁雷电活动的地方是，必须要对组件进行防雷击保护

- Make sure flammable gases are NOT generated near the installation site.

  请勿安装在可燃气体附近。

- According to salt mist corrosion testing of photovoltaic (PV) in IEC 61701, TCL PV Tech modules can be installed in corrosive salt areas within proximity of the ocean or sulfurous areas. The module must not be soaked in the water or in the environment (i.e., fountain, spindrift, etc.) where the module would touch water (pure water or brine) for a long term. If the modules are placed in an environment of salt fog (i.e., marine environment) or sulfur (i.e., sulfur sources, volcanoes, etc.), there is a risk of corrosion.

  按照IEC 61701要求开展的光伏（PV）组件盐雾腐蚀试验结果表明，TCL光伏科技的太阳能组件可以安装在近海或亚硫酸盐区域附近的腐蚀性盐碱地区。组件不得浸泡在水中或长期沾水(纯水或盐水)的环境中（例如喷泉、浪花等）。如果组件置于盐雾（即海洋性环境）或者含硫（即含硫源、火山等）的环境中，会有腐蚀的风险。

- In locations that are 50m ~ 500m from the ocean, stainless steel or aluminum materials must be used to contact the PV modules, and the installation position must be processed with anti-corrosion treatment.

  在离海边50m~500m的地方，必须采用不锈钢或者铝材料来与光伏组件接触，并且对安装部位做好防锈蚀的处理。

- Modules should be installed in locations where the altitude is less than 2000m.

  组件应安装在海拔低于2000米的地方。

6 TILT ANGLE 倾角选择

- The tilt angle measurement of the PV module refers to measuring the angle between the module and the horizontal ground surface. For different projects there are different mounting angles. TCL PV Tech recommends that the mounting tilt angle should be NOT less than 10°, or in accordance with local regulations or follow the recommendations of experienced PV module installers.

  光伏组件的倾角测量指组件与水平地面的角度。针对不同的项目有不同的安装倾角，TCL光伏科技推荐的组件安装夹角不小于10°，或依据当地法规指南或有经验的光伏组件安装商的建议。

- The tilt angle of the PV module is measured between the PV module and a horizontal ground surface.

  通过测量PV组件和水平地面之间的夹角来得出PV组件的倾斜角测量值。

- In the Northern Hemisphere, the PV modules should typically face south, and in the Southern Hemisphere, the PV modules should typically face north.

  在北半球安装，组件最好朝南，在南半球安装，组件最好朝北。

- A clearance of at least 115mm (4.5in) (recommended) is provided between modules frame and the surface of the wall or roof. If other mounting means are employed this may affect the UL Listing or the fire class ratings.

  应在组件边框和墙面或屋顶表面之间留有至少115mm（4.5英寸）（建议）的间隙。如果采用其他安装方式，则有可能会影响UL认证或防火等级。

7 INSTALLATION 安装

- TCL PV Tech modules may be installed in the following conditions for more than 30 years.

  TCL光伏科技组件按照以下条件安装可以使用30年以上。

7.1 INSTALLATION SAFETY 安装安全

- TCL PV Tech Modules can be mounted in landscape or portrait orientation however the impact of dirt and marginal dirty shading the solar cells can be minimized by orienting the product in landscape.

  TCL光伏科技的太阳能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和边缘脏污对太阳能电池板的遮光影响最小化。

- Always wear dry insulation protection equipment: insulated tools, head gear, insulated gloves, safety belt and safety shoes (with rubber soles).

  请使用干燥的绝缘防护措施：如绝缘工具、安全帽、绝缘手套、安全带和安全鞋（橡胶底）。

- Do NOT wear metallic jewelry which can cause electric shock during installation.

  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 install modules under rain, snow or windy conditions.

  请勿在下雨、下雪或大风的情况下安装组件。

- Please keep the connector dry and clean during installation to avoid the risk of electric shock. It is recommended to install it immediately after unpacking.

  安装时请保持连接器干燥清洁，以免触电风险，建议开箱后立即安装。

- Due to the risk of electrical shock, do NOT perform any work if the terminals of PV module are wet. Please install immediately after you unpacking.

  如果PV组件的端子潮湿则不能进行任何工作，以免触电。请在开箱后立即安装。

- The safety class of TCL PV Tech module is Class Ⅱ, which can be used in systems operating at greater than 50 V DC or 260 W, where general contact access is anticipated.

  TCL光伏科技组件的安全等级为Ⅱ类，可用于＞直流50V或260W以上的系统。

- Keep the PV module packed in the carton until installation.

在安装之前，将PV组件保留在纸箱中。

- Please use an opaque material to completely cover the PV module surface during PV module installation and wiring.

  在PV组件安装和布线期间，请使用绝缘材料将PV组件表面完全覆盖住。

- Do NOT unplug the connector if the system circuit is connected to a load.

  如果系统电路与负载接通，请不要拔下连接插头。

- Do NOT stand on the module glass while installing. There is a risk of injury or electric shock if glass is broken.

  工作时不要站在玻璃上，以免玻璃破碎造成伤害或引发触电危险。

- Do NOT work alone (always work as a team of 2 or more people).

  不要单独工作（一直保持由2个或更多的人组成团队工作）

- Do NOT damage the back sheet of PV modules when fastening the PV modules to a support with bolts.

  在通过螺栓将PV组件紧固到支架上时，不要损坏PV组件的背板。

- Do NOT damage the surrounding PV modules or mounting structure when replacing a PV module.

  更换PV组件时，不要损坏周围的PV组件或安装结构。

- Cables shall be located and secured so that they will not be exposed to direct sunlight after installation to prevent degradation of cables. Low drooping of cables from the terminal box must be avoided. Low hanging cables could cause various problems such as animal biting, electricity leakage in water, and fire.

  电缆应固定起来或绑好，这样在安装后不会暴露在阳光直射下，可以防止电缆老化。从接线盒下引出电缆可能会引起各种问题，例如积水处漏电和火灾。

7.2 INSTALLATION METHOD 安装方法

7.2.1 MECHINICAL INSTALLATION AND WARNING 机械安装及注意事项

The connection of the module to the racking system can be created through the mounting holes, with clamps, or an embedded system on the frame. The modules must be installed according to the following examples and recommendations. If a different installation method is desired, please contact TCL PV Tech customer service or technical support team for consultation. Improperly mounted modules maybe damaged. If alternative mounting method is used and not approved by TCL PV Tech, the modules will not continue to have a valid warranty.

组件和支架系统的连接可以使用边框上的安装孔、夹具或者嵌入式系统来安装。安装组件必须依照下面示例和建议进行，如果安装方式与TCL光伏科技公示不同，请咨询TCL光伏科技当地技术支持或售后，并取得TCL光伏科技同意，否则会损坏组件并导致质保失效。

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

  两个组件之间的最小间距为10mm（0.4英寸）。

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

  组件不能承受超过最大许可载荷的暴风雪冲击，也不能承受因支撑结构的热膨胀而引起的过大的力。

- The module frame drain holes cannot be blocked in any situation during installation or use.

  安装或使用过程中，排水孔在任何情况下都不能堵塞。

- To maximize mounting longevity, TCL PV Tech strongly recommends the use of corrosion proof (stainless steel) attachment hardware.

  为了最大限度地延长安装寿命，TCL光伏科技强烈建议使用抗腐蚀（不锈钢）固定件。

- Secure the module in each mounting location with a bolt , flat washer, spring washer and nut and tighten to a torque of 16~20N.m(140-180lbf.in.).

  The tightening step is as follows :

  a. Use torque wrench to tighten nut to target torque: 16~20N.m;

  b. Nut loosen 90~180 degrees;

  c. Finally tighten the nut to the target torque and reduce the torque attenuation.

  使用螺栓、平垫圈、弹簧垫圈和螺母在每个固定位置固定组件，并拧紧至16～20 N.m（140-180lbf.in）的扭矩。拧紧步骤如下：

  a. 使用扭矩扳手拧紧螺母至目标扭矩：16~20N·m；

  b. 螺母反松90~180°；

  c. 最终拧紧螺母至目标扭矩，降低扭矩衰减。

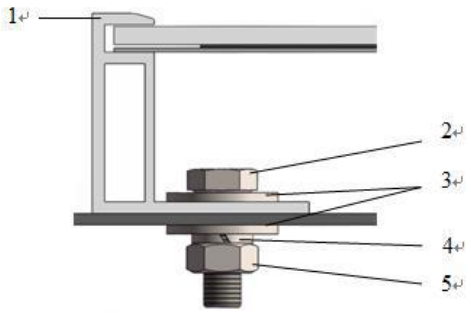
- It is recommended that flat stainless steel washers with a thickness of 1.6mm and an outside diameter of 16mm (0.63 inch) be used at all parts in contact with the modules.

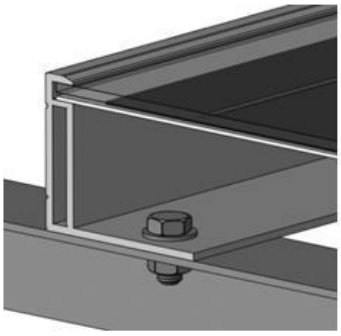
  组件连接的所有部位推荐采用厚度为1.6mm且外径为16mm（0.63英寸）的扁平不锈钢垫圈。

A. Mounting with mounting holes 安装孔安装

- Modules can be attached through the mounting holes on the back frame of the module, by fixing the module to the support rails with bolts. The mounting details are shown in the following figures.

  通过组件背面边框上的安装孔，使用螺栓把组件固定在支架上，安装细节下图所示。

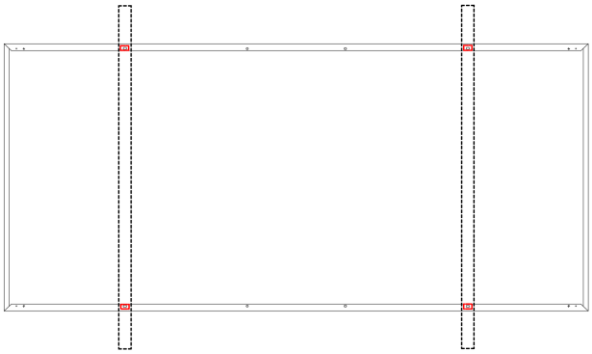
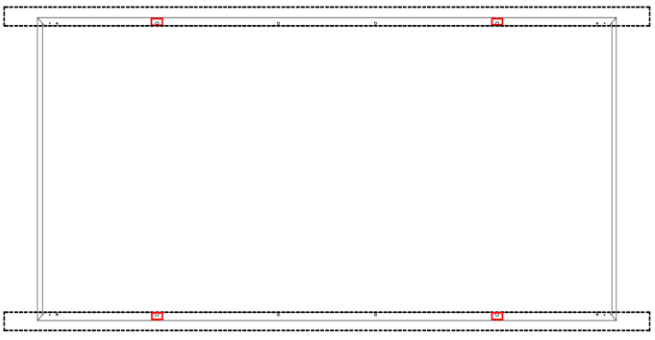




1、 Frame 铝边框；2、M8 stainless steel bolt M8不锈钢螺栓；3、Flat stainless steel washer扁平不锈钢垫圈；4、Spring stainless steel washer弹簧不锈钢垫圈；5、HEX Stainless Nut 六角不锈钢螺母

- The frame of each module has mounting holes compatible with M8 bolt, ideally placed to optimize the load handling capability, to secure the modules to supporting structure.

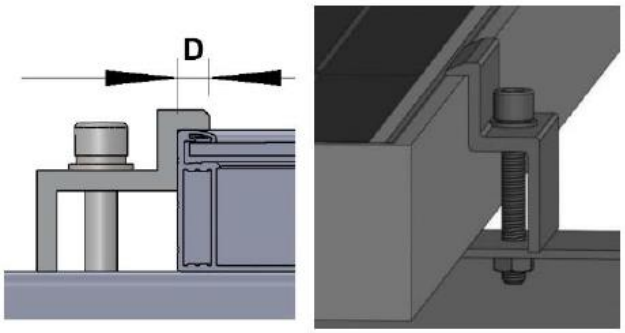
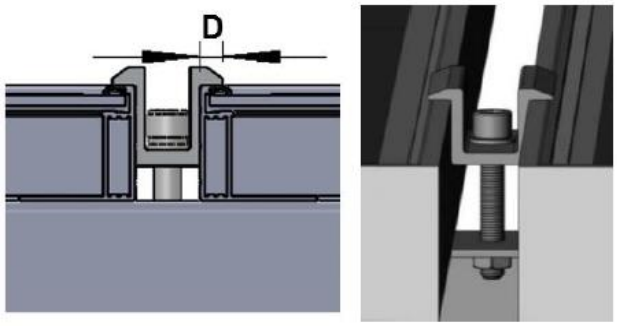
  每个组件的边框上都有配套M8螺栓的安装孔，通过这些安装孔可以很好地将组件固定到支撑结构上以优化其负载承受能力。

Module 组件	Mechanical Load Pressure 载荷	Mounting Direction 安装图示
Bifacial Dual Glass Frame Module 双面双玻边框组件	Front load ≤ 5400pa Reverse load ≤ 2400pa 正面载荷≤5400pa 反面载荷≤2400pa	Use four outer mounting holes and the guide rail is installed vertically with the long frame. 使用外侧4个安装孔，安装导轨与长边框垂直安装。 
	Front load ≤ 5400pa Reverse load ≤ 2400pa 正面载荷≤5400pa 反面载荷≤2400pa 适用于宽度小于1.2m的组件 Suitable for modules with a width of less than 1.2m	Use four outer mounting holes and the guide rail is installed parallelly with the long frame. 使用外侧4个安装孔，安装导轨与长边框平行安装。 
	Front load ≤ 3600pa Reverse load ≤ 2400pa 正面载荷≤3600pa 反面载荷≤2400pa 适用于宽度大于1.2m的组件 Suitable for modules with a width of more than 1.2m	

B. Mounting with Clamps 夹具安装

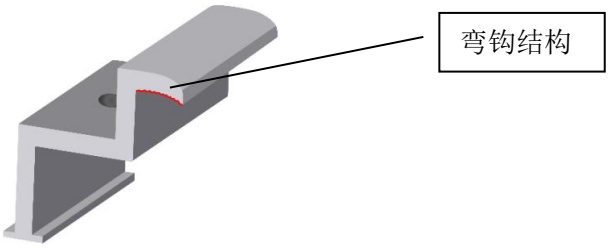
- TCL PV Tech has tested its modules with different clamps from several manufacturers and recommends to use clamps that can hold M8 bolt at least . The clamps shall meet the following requirements:

  TCL光伏科技在用多家制造商的不同夹具测试过其组件后，建议使用至少可以固定M8螺栓的夹具。夹具需要满足如下要求：

Clamp 夹具	
End Clamp installation 边夹具	**Middle Clamp installation 中夹具安装**
	
Clamp specification: Length≥50mm, Thickness≥4mm, Material：6005-T6，Rp0.2≥225Mpa，Rm≥265 MPa 夹具规格：长度≥50mm,厚度≥4mm，材质6005-T6，Rp0.2≥225 MPa，Rm≥265 MPa	
Parts部件:M8 bolts, nuts, spring washers, flat washers M8螺栓、螺母、弹簧垫片、平垫片	

- The "A surface Matching Clamp" has a bent hook structure where contacts with the frame to increase the friction, it can better fix the module, so it is recommended to install modules with a width more than 1.2m.

  “A面匹配压块”与组件边框接触处增加弯钩结构，增大摩檫力，能够更好的固定住组件，建议宽度＞1.2m的组件选用安装。



- Use at least 4 clamps to attach modules to the mounting rails.

  使用至少4个夹具将组件固定在安装导轨上。

- Be sure to avoid shadowing effects from the module clamps. At the same time, ensure that the contact distance between one clamp and the A side of the module frame is 8mm≤ D ≤10mm

  请务必避免组件夹具的遮光效应,同时确保夹具与组件边框A面接触8mm≤ D ≤10mm

- When choosing this type of clamp-mounting method, use at least four clamps on each module, two clamps should be attached on each long sides of the module. Depending on local wind and snow loads, additional clamps may be required to ensure that modules can bear the load.

  当选择夹具安装方法时，每个组件上至少需要使用四个夹具，在组件的每个长边上各安装两个夹具。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。

<table>
<tr><th>Module
组件</th><th>Mechanical Load Pressure
载荷</th><th>Mounting Direction
安装图示</th></tr>
<tr><td rowspan="3">Bifacial Dual Glass Frame Module
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正面载荷≤5400pa
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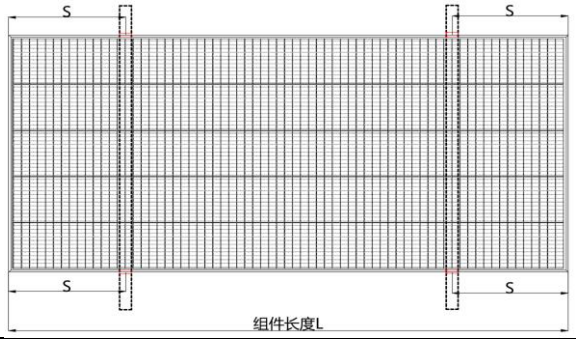
组件长边使用4个夹具，安装导轨与组件长边垂直安装。
S=1/5*L
  </td></tr>
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适用于宽度小于1.2m的组件
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 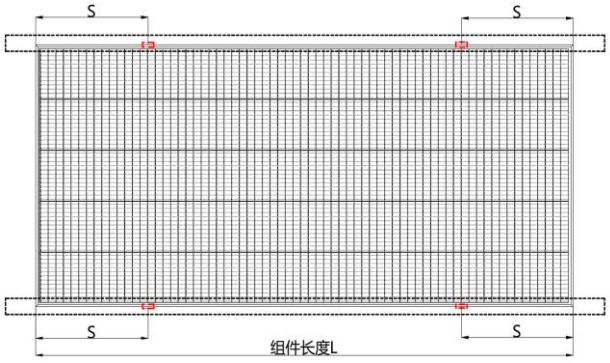 </td></tr>
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适用于宽度大于1.2m的组件
Suitable for modules with a width of more than 1.2m</td></tr>
</table>

7.2.2 GROUNDING 接地

- Frameless module do not need grounding because there will be no leakage current between cell and encapsulation material due to non-frame structure
  无边框组件不会形成电池和封装材料间的漏电流，因此无需接地处理。

- All module frames and mounting racks must be properly grounded in accordance with appropriate respective National Electrical Code.

  所有组件边框和安装架必须按照相应的《国家电气规程》正确接地。

- Proper grounding is achieved by bonding the module frame(s) and all metallic structural members together continuously using a suitable grounding conductor. The grounding conductor or strap may be copper, copper alloy, or any other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.

  通过使用合适的接地导体将组件边框和所有金属结构件连续连接在一起以实现正确接地。接地导体或接地线可以是铜、铜合金或任何其他符合相应的《国家电气规程》要求的用作电导体的材料。接地导体必须通过合适的接地电极连接到大地。

- TCL PV Tech modules can be installed with the use of third party listed grounding devices for grounding the metallic frames of PV modules. The devices have to be installed in accordance with the grounding device manufacturer's specified instructions.

  TCL光伏科技的太阳能组件可以使用第三方列出的接地装置对PV组件的金属边框进行接地安装。设备必须按照接地设备制造商的指定说明进行安装。

7.2.3 ELECTRICAL INSTALLATION 电气安装

- All wiring should be performed, by qualified installers, in accordance with the local codes and regulations.

  所有接线应由合格的安装人员按照当地法规和程序进行。

- Modules can be connected in series to increase the operating voltage by plugging the positive plug of one module into the negative socket of the next. Before connecting modules always ensure that the contacts are corrosion free, clean and dry.

  组件可以串联，通过将一个组件的正极端子插入下一个组件的负极端子来提高工作电压。在连接组件之前，始终确保触点无腐蚀、清洁并且干燥。

- Product can be irreparably damaged if an array string is connected in reverse polarity to another. Always verify the voltage and polarity of each individual string before making a parallel connection. If you measure a reversed polarity or a difference of more than 10V between strings then check the string configuration before making the connection.

  如果一组阵列以相反极性连接到另一个，则会对产品造成无法修复的损坏。在进行并联之前，请务必确认各列的电压和极性。如果测量发现各列之间的极性相反或电压差值大于10V，则在进行连接之前检查其结构配置。

- TCL PV Tech modules are provided with stranded copper cables with a cross sectional area of 4mm²(0.006in²) which are rated for 1500V DC, 90°C and are UV resistant. TCL PV Tech recommends that all cables are run in appropriate conduits and sited away from areas prone to water collection.

TCL光伏科技的太阳能组件采用适合额定参数1500V直流及温度90°C 的截面积为4mm²（0.006in²）且防紫外线的绞合铜电缆。TCL光伏科技建议所有电缆应布设在适当的管道中且远离易积水的地方。

- The maximum voltage of the system must be less than the maximum certified voltage 1500V typically and the maximum input voltage of the inverter and of the other electrical devices installed in the system. To ensure that this is the case, the open circuit voltage of the array string needs to be calculated at the lowest expected ambient temperature for the location. This can be done using the following formula.

  系统的最高电压必须低于1500V的最高认证电压以及安装中系统中的变频器及其他电气设备的最高输入电压。为了确保这种情况，阵列的开路电压需要在该位置的最低预期环境温度下计算。可以使用以下公式进行计算：

  Max System voltage ≥ N * 1.25*Voc * [1 + TCvoc x (Tmin-25)]

  最大系统电压≥N*1.25 *Voc * [1 + TCvoc×（Tmin-25）]

  Where 其中

  N ： Number of modules in series 表示太阳能光伏组件串联数量

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

  表示各组件的开路电压（参考产品标签或数据表）

  TCvoc： Thermal coefficient of open circuit voltage for the module (refer to data sheet)

  表示组件开路电压的温度系数（参见数据表）

  Tmin ： The lowest expected ambient temperature

  表示最低环境温度

- Each module has two standards 90°C sunlight resistant output cables each terminated with plug & play connectors. The wire type and gauge of the output cables are 1500V rated PV Wire cable and are 12AWG in size. This cable is suitable for applications where wiring is exposed to the direct sunlight. We require that all wiring and electrical connections comply with the appropriate National Electrical Code.

  每个组件都有两条标准的90°C遮光输出电缆且在每个端子上接有即插即用的连接器。输出电缆的类型和规格为1500V的额定PV导线电缆，其尺寸为12AWG。该电缆适用于接线直接暴露在阳光下的情况。我司要求所有接线和电气连接符合相应的《国家电气规程》要求。

- The minimum and maximum outer diameters of the cable are 5 to 7mm (0.20 to 0.28in).
- 电缆的外径范围为5到7mm（0.20～0.28in）。
- For field connections, use at least 4mm^2 copper wires insulated for a minimum of 90°C and sunlight resistance with insulation designated as PV Wire.

  现场接线应使用最低90°C耐温、耐光且横截面不低于为4mm^{2}的铜线作为PV连接线。

- The minimum bending radius cables should be 43mm (1.69in).

  电缆的最小弯曲半径应为43mm（1.69in）。

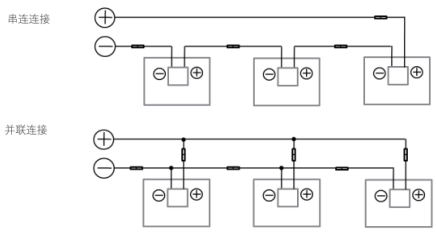
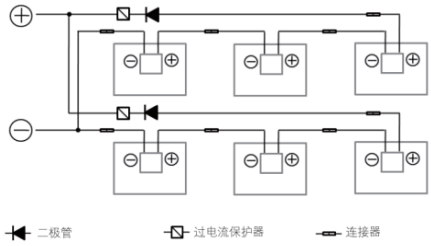
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of Isc and Voc marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.

  在正常使用条件下，光伏组件有可能产生比标准测试条件下更大的电流和/或电压。因此，应将组件标示的Isc和Voc乘上1.25，再决定部件的电压标定值、导线的电流标定值、保险丝规格和连接光伏输出的控制设备的规格。

7.2.3.1 WIRING 接线

- To ensure proper system operation the correct cable connection polarity (Figures 1 & 2) should be observed when connecting the modules to each other or to a load, such as inverter, a battery etc. If modules were not connected correctly, the bypass diode could be destroyed. PV modules can be wired in series to increase voltage. A series connection is made when the wire from the positive terminal of one module is connected to the negative terminal of the next module. Figure 1 shows modules connected in series. PV modules can be connected in parallel to increase current (Figure 2). A parallel connection is made when the wire from the positive terminal of one module is connected to the positive terminal on the next module.

  为了确保系统正常运行，在连接组件或连接负载（如变频器、电池等）时，应观察确保电缆的极性连接正确（图1和图2所示）。如果组件连接不正确，旁路二极管可能会损坏。PV组件可以串联接线以增加电压。串联连接是将接线从一个组件的正极端子连接到下一个组件的负极端子上。图1显示了组件的串联连接方式。PV组件可以并联连接以增加电流（图2所示）。并联连接是将接线从一个组件的正极端子连接到下一个组件的正极端子上。

Connecting in series 串联链接	Connecting in parallel after connected in series 串联后并联
 Figure 1 （图1）	 Figure 2 （图2）

- The number of modules in series and in parallel shall be designed reasonably according to the system configuration.

  组件串联并联数量，需根据系统配置合理设计。

- All instructions above have to be obeyed to maintain TCL PV Tech's limited warranty.

  必须遵守上述所有说明以满足TCL光伏科技保修条件。

7.2.3.2 FUSING 熔丝

- When fuses are fitted they should be rated for the maximum DC voltage and connected in each, non-grounded pole of the array (i.e. if the system is not grounded then fuses should be connected in both the positive and negative poles).

  在安装熔丝时应将其额定为最大直流电压并连接到阵列的每个非接地极上（换言之，如果系统没有接地则应将熔丝连接到正负极上）。

- The maximum rating of a fuse connected in series with an array string is typically 25A but the actual module specific rating can be found on the product label and in the product datasheet.

  与阵列串联连接的熔丝的最大额定值通常为25A，但实际的组件特定额定值可在产品标签和产品数据表中获得。

- This fuse rating value also corresponds to the maximum reverse current that a module can withstand (when one string is shaded then the other parallel strings of modules will be loaded by the shaded string and current will flow) and therefore impacts the number of strings in parallel.

  该熔丝的额定值也对应于组件可承受的最大反向电流值（当一个阵列被遮蔽时，该阵列会加载到其他并联的组件阵列生成电流），因此会对并列连接阵列的数量产生影响。

- Do NOT share a fuse in a Combiner Box with two or more strings in parallel connection.

  禁止两串或多串并联后再接熔丝。

8 INVERTER SELECTION AND COMPATIBILITY 逆变器的选择及其兼容性

- When installed in systems governed by IEC regulations, TCL PV Tech modules normally do not need to be electronically connected to earth and therefore can be operated together with either galvanically isolated (with transformer) and transformerless inverters.

  当安装在符合IEC规定的系统中时，TCL光伏科技的组件通常不需要接地，因此可以与电隔离式的逆变器（带变压器）或无变压器式的逆变器一起工作。

- Choose inverters with isolation transformers in hot and wet areas (such as shores, wetlands), to ensure proper module function under positive voltage.

  在炎热和潮湿的地区（如海岸、湿地）选择带有隔离变压器的逆变器以确保组件在正电压下的正常工作。

9 MODULE MAINTENANCE FOR PV MODULE PV 组件的维护

9.1 PANEL VISUAL INSPECTION AND REPLACEMENT 组件外观检查和替换

The modules in a PV array should be regularly checked for damage. Factors such as glass breakage, cable breakage, and junction box damage may lead to function and safety problems. In the case of a damaged module, replace it with the same type of module. Refer to the *Product Installation Manual* for installation and dis-assembly of module.

应定期检查光伏方阵中组件是否有坏，例如玻璃破裂、线缆破损、接线盒损坏等因素导致组件发生功能性和安全性故障，须更换相同型号组件。

- It is recommended to perform a preventive inspection every six months without changing the components of the module. If electrical or mechanical properties are required for inspection or maintenance, qualified professionals should be advised to avoid any electric shock or loss of life.

  建议每6个月执行一次预防性检查，不要擅自更换组件的元部件。如果需要进行电性能或机械性能的检查或维护，建议让具有资质的专业人员进行操作，以免发生触电或人员伤亡。

- Trim any vegetation which may shade the solar array, thus impacting performance.

  除去一切可能遮蔽太阳能阵列从而影响其性能的植被。

- Check that mounting hardware is properly tightened.

  检查安装的硬件是否紧固到位。

- Check that all string fuses in each non/earthed pole are operating.

  检查每个非接地极中的所有阵列熔丝是否正常工作。

- Replacement modules must be of same type. Do NOT touch live parts of cables and connectors. Use appropriate safety equipment (insulated tools, insulating gloves, etc.) when handling modules.

  组件必须用相同类型的更换。不许触碰电缆和连接器的带电部位。搬运组件时应使用适当的安全防护装置（绝缘工具、绝缘手套等）。

- Cover the front surface of modules by an opaque material when repairing. Modules when exposed to sunlight generate high voltage and are dangerous.

  修复时用不透明材料覆于组件的前侧表面上。暴露在阳光下的组件会产生高电压，极其危险。

- TCL PV Tech PV modules are equipped with bypass diodes in the junction box. This minimizes module heating and current losses. The diode type is UKTH3045-12/ FMK5040D/3045S/35SQ045/40SQ045/MD3045S/30ST045C /40ST045C (The junction box type: UKT PV-JB12x / ZJRH FT50xy / Zerun Z8 / Huanxin PV-JB2101/ Huanxin PV-JB2203).

  TCL光伏科技的光伏组件接线盒中配有旁路二极管，会使组件加热和电流的损耗最小化。二极管的型号如UKTH3045-12/ FMK5040D/3045S/35SQ045/40SQ045/MD3045S /30ST045C /40ST045C（接线盒型号:同泰PV-JB12x/人和FT50xy/泽润Z8 /环鑫PV-JB2101/环鑫PV-JB2203）。

  - Do NOT open the junction box to change the diodes even if they malfunction.

    不许尝试打开接线盒更换二极管，即使它们发生故障。

  - In a system using a battery, blocking diodes are typically placed between the battery and the PV module output to prevent battery discharge at night.

    在使用电池的系统中，阻塞二极管通常放置在电池和PV组件输出装置之间以防止夜间电池放电。

- In the event that a module is damaged (broken glass or a scratch on back sheet) and needs to be replaced.

  如果组件损坏（玻璃破碎或背板上有划痕），则需要对其进行更换。

  - Observe the safety precautions listed earlier in the Manual.

    请注意本手册前面列出的安全注意事项。

  - Wear cut resistant gloves and other personal protective equipment required for the particular installation.

    进行特殊安装时需要穿戴防切割手套和其他个人防护装备。

  - Isolate the impacted array string to prevent current flow before attempting to remove the module.

在尝试移除组件之前，一定要将受影响的阵列隔离以防止电流产生。

- ○ Disconnect the connectors of the affected module using the related disconnect tool provided by suppliers.

  用供应商提供的相关断开工具去断开受影响组件的连接器。

- ○ Replace the damaged module with a new module of the same type.

  使用相同类型的新组件更换损坏的组件。

- ○ Check the open circuit voltage of the array string and verify that this is within 10V of the other strings to be connected in parallel.

  检查阵列的开路电压并验证与其并联连接的其他阵列的开路电压是否在10V以内。

- ○ Turn the breaker back on.

  重新合上断路器。

9.2 CONNECTOR AND CABLE INSPECTION连接器和线缆检查

- Inspect all cables to verify that connections are tight; the cables are protected from direct sunlight and sited away from areas of water collection.

  检查所有电缆以验证其连接是否牢固；避免电缆受阳光直射且使其远离积水区域。

- It is recommended to check the torque of terminal bolts and the general condition of wiring at least once a year. Also, check that mounting hardware is properly torqued. Loose connections will result in damage to the array.

  建议至少每年检查一次端子螺栓的扭矩和接线的各方面情况。此外，检查安装的硬件是否紧固到位。连接松动会导致阵列损坏。

9.3 CLEANNING 清洗

The amount of electricity generated by a solar module is proportional to the amount of light falling on it. A module with shaded cells will produce less energy and therefore it is important to keep modules clean.

太阳能组件产生的电量与落在其上的光照成比例。电池被遮挡的组件产生的能量相对较少，因此保持组件的清洁十分重要。

- Clean PV modules when the irradiance is below 200W/m2; liquid with a large temperature difference from the modules shall not be used for cleaning the modules.

  应在辐照度低于200W/m^2的情况下清洁光伏组件，不宜使用与组件温差较大的液体清洗组件。

- It is forbidden to clean PV modules under the weather conditions of wind more than 4 grades, heavy rain or heavy snow.

  严禁在风力大于4级、大雨或大雪的气象条件下清洗光伏组件。

- When cleaning with pressurized water, the water pressure on the glass surface of the module shall not exceed 700 Kpa (14619.80psf); the module is prohibited to bear the extra force.

压力水流清洗时，组件玻璃表面的水压不得超过700Kpa(14619.80psf)，组件严禁承受额外的外力。

- When cleaning PV modules, do NOT step on the modules; do NOT spay water on the backside of the module or the cables; do NOT clean the backside of the modules; keep the connectors clean and dry; prevent fire and electrical shock from occurring; do NOT use as steam cleaner.

  光伏组件清洁工作中，严禁踩踏组件、严禁流水溅射至组件背面和电缆，严禁清洁组件背面，要保证连接头的清洁和干燥，防止电击和火灾危险；严禁使用蒸汽清洁器。

- Periodically trim any vegetation which may shade the solar array thus impacting performance.

  应定期削减植被，避免植被遮挡光伏组件。

- When cleaning the modules, use a soft cloth together with a mild detergent and clean water. Take care to avoid severe thermal shocks which might damage the module by cleaning modules with water which has a similar temperature to the modules being cleaned.

  清洁组件时，应使用软布和温和的清洁剂以及清水。注意避免出现严重的可能损坏组件的热冲击。清洁组件时应保证水与组件之间的温差不大。

- Use dry or wet soft clean cloth to clean the PV modules; non-corrosive solvents or hard objects are strictly prohibited.

  应使用干燥或潮湿的柔软洁净的布料擦拭光伏组件，严禁使用腐蚀性溶剂或用硬物擦拭光伏组件。

- If there are greasy dirt and other substances on the surface of the PV module which are difficult to clean, conventional household glass cleaning agents can be used; Do NOT use the alkaline and strong acid solvents.

  光伏组件表面有油污等难清洁物质，可使用常规家用玻璃清洗剂；注意不能使用碱性及强酸性溶剂。

- When cleaning the back surface of the module, take care to avoid penetrating the substrate material. Modules that are mounted flat (0° tilt angle) should be cleaned more often, as they will NOT "self-clean" as effectively as modules mounted at a 10° tilt or greater.

  清洁组件的背面时，注意避免清洗液渗到材料底层。应稍微频繁地清洁水平安装的组件（0°倾斜角），因为这些组件不会像以10°倾斜角或更大倾斜角安装的组件那样具有“自清洁”功能。

- If you are unsure whether the array or section there of needs to be cleaned, then first select an array string that is particularly soiled.

  如果不确定是否需要清除阵列或截面，则首先选择一列特别脏的阵列开始。

- Measure & record the inverter feed in current from that string.

  测量并记录来自变频器对该列电流的反馈。

  - Clean all modules in the string.

    清洗该列的所有组件。

  - Measure the inverter feed in current again and calculate the % improvement from cleaning.

    重新测量变频器的反馈电流并计算清洁后的改进百分比。

- The back surface of the module normally does not need to be cleaned but, in the event this is deemed necessary, avoid the use of any sharp projects that might damage the penetrating the substrate material.

  组件的后表面通常不需要清洁；但在认为确实有必要对其进行清洗时，应避免使用可能引起损坏或穿透基底材料的一切尖锐物体。

9.3.1 REQUIREMENTS FOR WATER QUALITY 水质要求

- PH: 5 ~7
- Chloride and Salinity 氯化物或盐分含量：0 - 3,000 mg/L
- Turbidity 浑浊度：0-30 NTU
- Conductivity 电导率：1500~3000 μs/cm
- Total dissolved solids (TDS)总溶解固体：≤1000 mg/L
- Water Hardness—calcium and magnesium ions 水硬度：0-40 mg/L
- Non-alkaline water must be used; demineralized water shall be used if the condition permits.

  必须采用非碱性水，具备条件时应使用软化水。

9.3.2 MODULE INSPECTION AFTER CLEANING 清洗后组件检查

- Ensure that the module under visual inspection is clean, bright and free of stains.

  目视组件整体外观清洁、明亮，无污渍。

- Spot check to verify whether there is soot deposit on the module surface.

  抽样检查组件表面是否有积灰存在。

- Check to see that there are no visible scratches on the surface of the module.

  组件表面无明显的刮伤痕迹。

- Check to see that no man-made cracks are on the module surface.

  组件表面无人为造成的破裂现象。

- Check to see that whether the module support structure is leaning or bent after cleaning.

  清洗后组件支架有无倾斜、弯曲现象。

- Check to see that whether the wiring terminals of the module are detached.

  组件接线端子是否有脱落的现象等。

- After cleaning PV modules, fill out the PV module cleaning record.

  光伏组件清洗完后，完成光伏组件清洗文字记录。

9.3.3 TROUBLESHOOTING 故障排查

- If your installation does not work properly, please inform your installer immediately. It is recommended to perform a preventive inspection every six months without changing the components of the modules. If electrical or mechanical properties are required for inspection or maintenance, qualified professionals should be advised to avoid any electric shock or loss of life.

  如果安装后无法正常工作，请立即通知安装商。建议每6个月执行一次预防性检查，不要擅自更换组件的元部件。如果需要进行电性能或机械性能的检查或维护，建议让具有资质的专业人员进行操作，以免发生触电或人员伤亡。

- Contact your installer.

  请联系安装商。

- Contact TCL PV Tech after sales service team.

  请联系TCL光伏科技的售后服务团队。