

Cinco Solar
Photovoltaic Module



Installation Manual

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1. General Information

1.1 Overview

Thanks for choosing Cinco Solar PV modules. In order to ensure the PV modules to be installed correctly, please read the following operation instructions carefully before modules installed and used.

Please remember that the products would generate electricity and certain safety measures need to be taken to avoid danger.

1.2 Applicable Products

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

Poly crystalline Solar Panel

36Cell 156*156 Non-standard series:

CNCC30W;CNCC50W;CNCC100W

36Cell 156*156 series:

CNCC155W

60Cell 156*156 series:

CNCC250W;CNCC255W;CNCC260W;CNCC265W

72Cell 156*156 series:

CNCC305W;CNCC310W;CNCC315W;CNCC320W

Mono crystalline Solar Panel

36Cell 125*125 Non-standard series:

CNCB50W

36Cell 125*125 series:

CNCB100W;CNCB200W

36Cell 156*156 series:

CNCB165W

60Cell 156*156 series:

CNCB265W;CNCB270W;CNCB275W;CNCB280W

72Cell 156*156 series:

CNCB320W;CNCB325W;CNCB330W;CNCB335W

1.3 Warnings



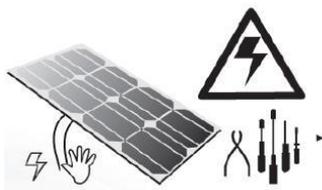
- PV modules generate DC electrical energy when exposed to sunlight or other light sources. Active parts of module such as terminals can result in burns, sparks, and lethal shock.
- Artificially concentrated sunlight shall not be directed on the module or panel.



- Front protective glass is utilized on module. Broken solar module glass is an electrical safety hazard (may cause electric shock and fire). These modules cannot be repaired and should be replaced immediately.

 Warning	Electric Shock and Burn Hazard This photovoltaic module produces Electricity when exposed to the sun
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- To reduce the risk of electrical shocks or burns, modules may be covered with an opaque material during installation to avoid shocks or burns.
- The installation work of the PV array can only be done under the protection of sun-sheltering covers or sunshades and only qualified person can install or perform maintenance work on this module.
- Follow the battery manufacture's recommendations if batteries are used with module.
- Do not use this module to replace or partly replace roofs and walls of living buildings.
- Do not install modules where flammable gas may be present.
- Do not touch live terminals with bare hands. Use insulated tools for electrical connections.



Use insulated tools for electrical connection

- Do not remove any part installed by Cinco Solar or disassemble the module.
- All instructions should be read and understood before attempting to install, wire, operate and maintain the module.
- Please don't lift up PV modules using the attached cables or the junction box.
- All PV systems must be earthed. If there is no special regulation, please follow the National Electrical Code or other national code.
- 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 value of I_{sc} and V_{oc} marked on this module should be multiplied by 1.25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.
- Once the PV module has been shipped to the installation site, all of the parts should be unpacked properly with care.
- Do not stand or step on the PV module like below pictures show, this is prohibited and there can be risks of micro-crack which may cause a sharp decline of module's power performance; what's more, it may threaten your safety.



- Only PV modules with the same cell size should be connected in series.
- During all transportation situations, please make sure no huge shock for the vehicle or the modules, as this may damage the module or lead the cell to be crack.
- During all transportation situation, never let the module fall down from the vehicle, house or hands. This will break the cells of the modules.
- Do not clean the glass with chemicals.
- Do not disconnect any of the modules when it is under load.

- Corner protection of DV module is used to protect the module during transportation, and the customer can remove or leave it on modules.

2. Installation

2.1 Installation safety

- Always wear protective head gear, insulating gloves and safety shoes (with rubber soles).
- Keep the PV module packed in the carton until installation.
- Do not touch the PV module unnecessarily during installation. The glass surface may be hot. There is a risk of burns and electric shock.
- Do not work in rain, snow or windy conditions.
- Due to the risk of electrical shock, do not perform any work if the terminals of the PV module are wet.
- Use insulated tools and do not use wet tools.
- When installing PV modules, do not drop any objects (e.g., PV modules or tools).
- Make sure flammable gasses are not generated or present near the installation site.
- Insert interconnect connectors fully and correctly.
- Do not touch the terminal box and the end of the interconnect cables (connectors) with bare hands during installation or under sunlight, regardless of whether the PV module is connected to or disconnect from the system.
- Do not expose the PV module to excessive loads on the surface of the PV module.
- Do not hit or put excessive load on the glass, this may break the cells or cause micro crack.
- During the operation, don't use sharp tools to wipe glass. It would leave scratch on the module.
- For BIPV mounting structure, when install the modules, please try to follow the "from top to bottom" and/or "from left to right" principle, and don't step on the module, that will damage the module and would be dangerous for personal safety.

2.2 Installation Condition

2.2.1 Climate condition

Please install the modules in the following conditions:

- 1) The environment temperature: within $-40^{\circ}\text{C}(-4^{\circ}\text{F})$ to $85^{\circ}\text{C}(185^{\circ}\text{F})$.
- 2) Do not install modules in a place where there may be water immersion.

* Note: The mechanical load bearing (include wind and snow loads) of the module is based on the mounting methods. The professional system installer must be responsible for mechanical load calculation according to the system design.

2.2.2 Site selection

In most applications, Cinco solar PV modules should be installed in a location where they will receive maximum sunlight throughout the year. In the Northern Hemisphere, the module should typically face south, and in the Southern Hemisphere, the modules should typically face north. Modules facing 30 degrees away from true South (or North) will lose approximately 10 to 15 percent of their power output. If the module faces 60 degrees away from true South (or North), the power loss will be 20 to 30 percent. When choosing a site, avoid trees, buildings or obstructions, which could cast shadows on the solar photovoltaic modules especially during the winter months when the arc of the sun is lowest over the horizon. Shading causes loss of output, even though the factory fitted bypass diodes of the PV module will minimize any such loss.

Do not install the PV module near naked flame or flammable materials.

When solar modules are used to charge batteries, the battery must be installed in a manner, which will protect the performance of the system and the safety of its users. Follow the battery manufacturer's guidelines concerning installation, operation and maintenance recommendations. In general, the battery (or battery bank) should be away from the main flow of people and animal traffic. Select a battery site that is protected from sunlight, rain, snow, debris, and is well ventilated. Most batteries generate hydrogen gas when charging, which can be explosive. Do not light matches or create sparks near the battery bank. When a battery is installed outdoors, it should be placed in an insulated and ventilated battery case specifically designed for the purpose.

Do not install the PV module in a location where it would be immersed in water or continually exposed to water from a sprinkler or fountain etc.

2.2.3 Tilt angle selection

The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface (Figure 1). The PV module generates maximum output power when it faces the sun directly.

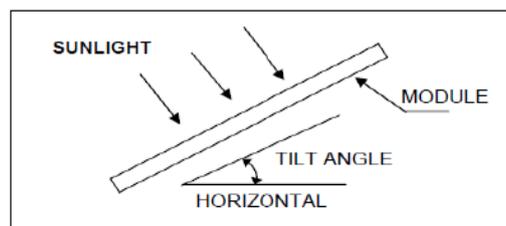


Figure1: PV module title angle

For standalone systems with batteries where the PV modules are attached to a permanent structure, the tilt angle of the PV modules should be selected to optimize the performance based on seasonal load and sunlight. In general, if the PV output is adequate when irradiance is low (e.g., winter), then the angle chosen should be adequate during the rest of the year. For grid-connected installations where the PV modules are attached to a permanent structure, PV modules should be tilted so that the energy production from the PV modules will be maximized on an annual basis.

2.3 Mechanical Installation introduction

Cinco Solar modules usually can be mounted by the clamps.

(1) All installation methods herein are only for reference, and Cinco Solar will not provide related mounting components, the system installer or trained professional personnel must be responsible for the PV system's design, installation, and mechanical load calculation and security of the system.

(2) Before installing, you should confirm below important things:

1) Visual check before installation, to make sure there is no bug in the packing and junction box as well as the surface of module, If have , remove and clean it .

2) Check the series number is right or not.

3) The minimum distance between modules should be more than 10mm for all installation methods.

(3) Cinco modules are designed to meet a maximum positive (or downward) pressure of 3600Pa and negative (or upward) pressure of 1600Pa. When mounting modules in snow-prone or high-wind environments, Special care should be taken to mount the modules in a manner that provides sufficient design strength while meeting local code requirements.

(4) Where common grounding hardware (nuts, bolts, star washers, spilt-ring lock washers, flat washers

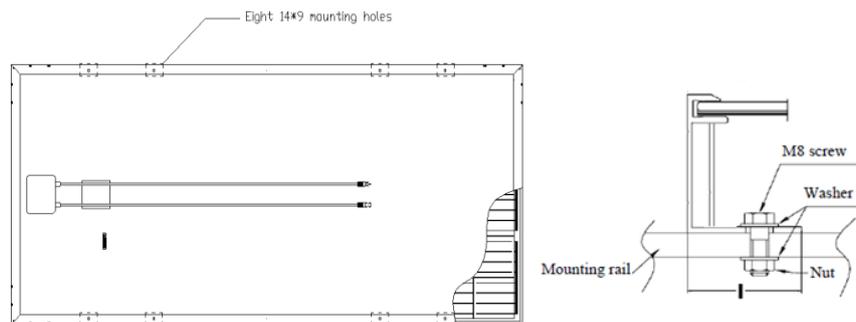
and the like) is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions.

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.

2.3.1 Fixation with screws

The frame of each module has 8 mounting holes used to secure the modules to support structure. You can use the four symmetry holes close to the inner side on module frame. If excessive wind or snow load are expected, you must use all the eight mounting holes. The module frame must be attached to a mounting rail using M8 corrosion-proof screws together with spring washers and flat washers in eight symmetrical locations on the PV module. The applied torque value should be big enough to fix the modules steadily. The reference value for M8 screw is 16~20N*m. As to special support system or special installation requirement, please reconfirm with the support's supplier for the torque value. Please find detailed mounting information in the below illustration.

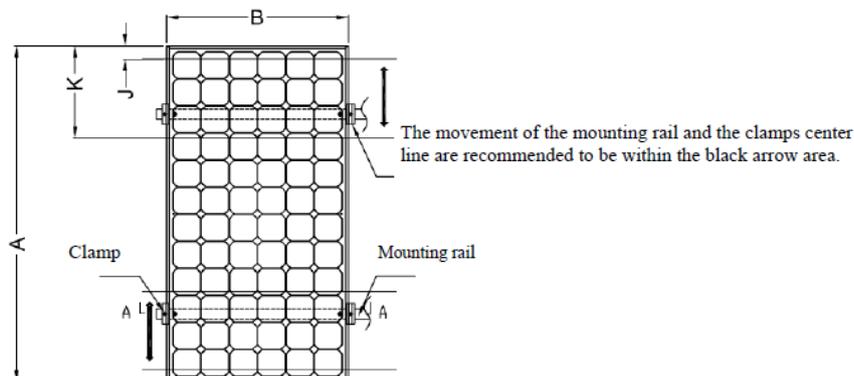
The following is M8 stainless steel mounting hardware.

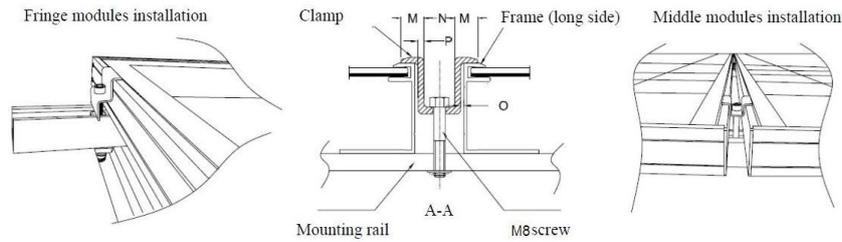


2.3.2 Fixation with clamps

The applicable products only allow using clamps at long side of frames.

The module clamps should not come into contact with the front glass and must not deform the frame. Be sure to avoid shadowing effects from the module clamps. The module frame is not to be modified under any circumstances. When choosing this type of clamp-mounting method, please be sure to use at least four clamps on each module, two clamps should be attached on each long side of the module. The applied torque value should be big enough to fix the modules steadily. Please find detailed mounting information in the below illustration, the mounting place distance is suggested bigger than J and less than K, as showed below.



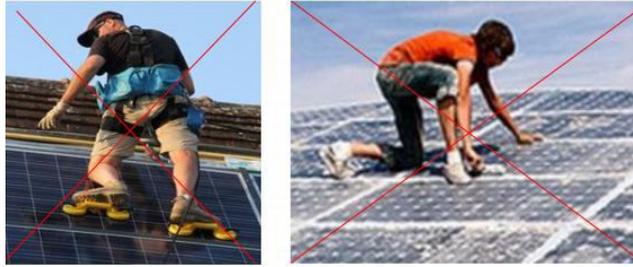


3. Wiring and connection

- a) Before this procedure, please read the operation instructions of the PV system carefully. Make wiring by Multi-connecting cables between the PV modules in series or parallel connection, which is determined by user's configuration requirement for system power, current and voltage.
- b) PV module connected in series should have similar current. Modules must not be connected together to create a voltage higher than the permitted system voltage (1500VDC). The maximum number of modules in series depends on system design, the type of inverter used and environmental conditions.
- c) The maximum fuse rating value in an array string can be found on the product label or in the product datasheet. The fuse rating value is also corresponding to the maximum reverse current that a module can withstand. Thus based on the maximum series fuse rating of module and local electrical installation criteria, make sure the modules strings in parallel for connection need to be assembled with appropriate string fuse for circuit protection.
- d) Open the connection box of the control system and connect the cabled from the PV arrays to the connection box in accordance with the installation indication of the PV control systems. The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of PV system (For a single component, were commended the cross-sectional area of cables is 4mm² and the rated current of connectors is more than 10A), otherwise cables and connectors will become over heating for large current. Please pay attention: the temperature limit of cables is 85 °C .
- e) Follow the requirements of applicable local and national electrical codes.
- f) These modules contain factory installed bypass diode .if these modules are in correctly connected to each other, the bypass diodes, cable or junction box may be damaged.

4. Maintenance and care

- a) A built up of dust or dirt on the module(s) front glass will result in a decreased energy output. Clean the module(s) preferably once annually if possible (depend on site conditions) using a soft cloth dry or damp, as necessary.
- b) Never use abrasive material under any circumstances.
- c) Examine the PV module(s) for signs of deterioration. Check all wiring for possible rodent damage, weathering and that all connections are tight and corrosion free. Check electrical leakage to ground.
- d) Check fixing screws and mounting brackets are tight, adjust and tighten as necessary.
- e) Check the junction box and diodes are well. If you have any diodes problem, please contact Cinco Solar.
- f) When cleaning the modules, it is not allowed to stand on the module. See below pictures shown, this is prohibited.



5. Electrical specification

The module electrical rating are measured under Standard Test Conditions, which are 1000W/m², irradiance with AM 1.5 spectrum and 25 deg (77°F) ambient temperature. The module might produce more or less voltage or current than rating value in uncertainty condition. 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.

6. Disclaimer of Liability

Because the use of the manual and the conditions or methods of installation operation, use and maintenance of photovoltaic (PV) product and beyond Cinco control, Cinco does not accept any legal responsibility and expressly disclaims liability for any person and property damage arising from the failure to follow the installation, operation, use, maintenance provided in the manual, and for any disputes caused by no-quality reasons.

Intellectual Property Right: No responsibility is assumed by Cinco for any infringement of intellectual property or other rights of third parties, which may result from use of the PV product. No license is granted by implication or otherwise under any intellectual property right or related use authorization.

Cinco reserve the right to change the manual, the PV produce, the specifications or product information. Any information may be changed due to business needs, technical level or other objective environment, which is not representative of the negation for the original information.

The information in this manual is based on Cinco knowledge and experience and is believed to be reliable, but such information and suggestions (without limitations), which is not the only and proprietary approach, do not constitute security and quality assurance, expresses or implied.

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