GAIN SOLAR

Installation Manual

1. Introduction

This manual provides essential information for the safe handling, installation, and maintenance of Baoding Jiasheng Photovoltaic (PV) Modules.

Note: This manual does not serve as a warranty document. It outlines important safety guidelines and handling procedures. Please read thoroughly before transporting, installing, or maintaining PV modules. For additional assistance, contact us directly.

All personnel involved in the installation must be familiar with the mechanical and electrical requirements described herein and comply with the National Construction Code and all relevant local regulations.

2. Safety Precautions

- PV modules generate potentially lethal DC voltages when exposed to light. Avoid contact with live parts and isolate electrical circuits before making or breaking connections.
- Only authorized and trained personnel should perform work on PV modules or systems.
- Remove all metallic jewelry, use insulated tools, and wear appropriate PPE to reduce the risk of electric shock.
- Do not step on, scratch, or place heavy objects on PV module surfaces.
- Do not use or handle PV modules with broken glass or torn substrate. These cannot be repaired and pose shock hazards.
- Do not disassemble modules or alter components.
- Protect electrical connectors from corrosion and dirt. Ensure they are clean before connection.
- Avoid handling modules when wet or during high winds.
- Ensure tight and gap-free electrical connections to prevent arcing and fire hazards.
- Ensure module polarity is correctly aligned with the system before connecting.
- Do not artificially concentrate sunlight onto modules.
- PV modules are certified for class II installations ≤ at 1500VDC. Consider voltage increases at temperatures below 25°C in system design.
- Do not use water to extinguish electrical fires.
- PV modules may produce higher current/voltage than rated. Multiply Isc by 1.25 when determining conductor and fuse ratings.
- The installation position of modules should be consistent with the requirements of various kinds of electrical and fire codes. Fire rating of this module is class A (UL790). When modules are installed on the roof, the roof needs to be fire-resistant, therefore, the design of the housing structure, the selection of raw materials for the roof as well as the local relevant laws and regulations need to be taken into consideration.

3. Unpacking and Storage

- Upon delivery, verify the product matches the order. Model and serial numbers are listed on each box.
- Keep PV modules in original packaging until installation.
- Store in a dry, clean environment with <85% RH, between -20°C to 40°C.
- Do not stack pallets beyond allowed limits.
- At the site, keep PV modules and connectors clean and dry.
- If stored outdoors temporarily, cover pallets and do not stack more than one high.
- Use two people to unpack. Always handle with both hands.
- Use wire cutters, not knives, to remove zip ties.
- Do not place PV modules directly on top of each other.

3.1 Product Identification

Every PV module is assigned a unique serial number, laminated behind the front glass, with a corresponding copy permanently affixed to the back-sheet. Ensure all serial numbers are documented at the time of installation for future reference and records.

3.2 Applicable Models

JS290CB-80

JS290CB-80-BIPV

JS375CB-102

JS375CB-102-BIPV

3.3 TRANSPORT AND HANDLING

Gain Solar green building materials must be transported in the supplied packaging only, and kept in the packaging until they are ready to be installed. Protect pallets against movement and exposure to damage during transportation. Do not exceed the maximum allowable height of pallets to be stacked, as indicated on the pallet packaging. Secure pallets from falling over. If pallets are stored temporarily outside please place a protective covering over the pallet to protect it from direct weathering and do not stack pallets.It is recommended that you choose A frame for domestic transportation for transportation (safe and low price), wooden box transportation is selected internationally, see Figure 2 and Figure 3 for details.

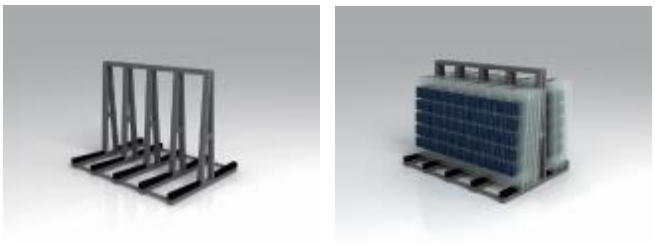


Figure 2:A Frame Packaging

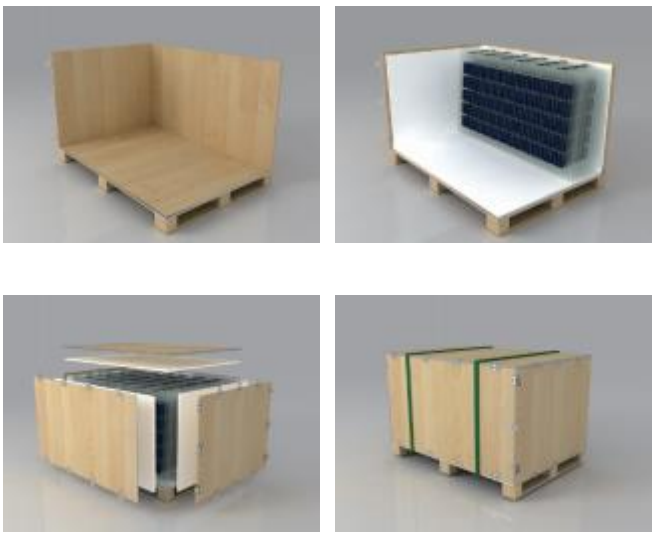


Figure 3: wooden box Packaging

Gain Solar green building materials products are heavy and should be handled carefully with both hands. It is forbidden to grab the junction box or wire to pick up the entire green building material product under any circumstances and stand or walk on the module, also forbidden to drop a green building material product on another on the outer piece, in order to avoid glass damage, do not put any heavy objects on the green building materials. When placing green building materials on the surface of the product, be careful to prevent it from falling. The green building materials with broken glass can not be used. Broken or damaged green building. materials must be handled carefully and treated specially.

When taking out the green building materials products from the packaging provided by Gain Solar , firstly remove the box Cover (after removing the flxing strap), take it out one piece at a time (figure 4), When taking out the green building materials products from the packaging box, you should pay attention to the leftovers in the box. The remaining green building materials products prevent them from dumping to one side.

Figure 4: Cutting cardboard and pull out green building materials

Check green building materials for damage due to transportation before installation. Do not install damaged green building materials. Please contact the company you have purchased the Gain Solar green building materials for information or complaints.green building materials Surfaces are susceptible to damage that could affect the performance or safety of the module. Do not damage or scratch the green building materials surfaces, and do not apply paint or adhesive to any of the surfaces, including the frame. For your safety, do not disassemble or modify the green building materials in any way. Doing so may degrade performance or cause irreparable damage and will void any applicable warranties.

If it is necessary to store green building materials prior to installation, the green building materials should remain inside the packaging and protected from exposure that could compromise the durability of the packaging.

4. Environmental Considerations

We recommend installing the PV modules in environments with ambient temperatures ranging from -40°C to 40°C. The anticipated 98th percentile operating temperature of the modules is expected to remain below 70°C.

Baoding Jiasheng PV Modules are designed and manufactured in accordance with the international standards: IEC 61215-1:2021, IEC 61215-1-1:2021, IEC 61215-2:2021, and IEC 61730-1/2:2023. The PV modules are qualified for Protection Class II.

Operating temperature range: -40°C to +70°C

Storage temperature range: -20°C to +50°C

Relative humidity: <85% RH

Mechanical load pressure: Design load, + 3600 Pa (front) / - 1600 Pa (back); Safety factor, 1.5

Note: The mechanical load-bearing capacity of the PV modules depends on the mounting method used. Failure to follow the instructions in this manual may compromise the PV modules' ability to withstand snow and wind loads. It is the responsibility of the system installer to ensure that the chosen installation method complies with the requirements outlined in this manual, as well as all applicable local codes and regulati

5. Site Selection

- PV modules can be installed in both landscape and portrait orientations. However, to minimize the impact of dirt-related shading on the solar cells, portrait orientation is recommended.
- For optimal energy production, PV modules should generally face the equator and be mounted at an angle equal to the latitude of the installation site. Mounting PV modules at a different tilt or orientation may negatively affect annual energy output.
- Position the modules to avoid shading at any time of day. As a general rule, shading can be minimized by placing the solar array at a distance greater than three times the height of any nearby obstruction.
- For specific installation angles, which vary by location, consult recommendations from experienced PV module installation professionals.
- Avoid using mounting methods that block the drainage holes in the PV module frame.
- When PV modules are installed in the same plane and orientation, they will exhibit similar performance characteristics and can be connected to the same inverter input.
- If PV modules are installed at different angles or orientations within the same system, energy output can typically be optimized by connecting each orientation to a separate inverter or to different Maximum Power Point Trackers (MPPTs) if the inverter supports multiple MPPTs. Refer to the inverter manufacturer's guidelines for detailed instructions.
- Do not install PV modules in locations where they may be submerged or continuously exposed to water.
- Application altitude for Baoding Jiasheng PV Modules: < 2000 meters.

6. Mounting Instructions

Please make sure that the installation is under the guidance of all the information in the manual. Please review the descriptions and drawings carefully, failure to follow the manual may void your warranty. The PV modules and mounting instruction are engineered and passed the test as following: Maximum static test load of the front side is 5400pa (design 3600Pa, safety factor 1.5) and back side is 2400pa (design 1600Pa, safety factor 1.5) .

- Before installation, ensure full compliance with local regulations and consult the manufacturer's technical team to address any site-specific questions or concerns.
- It is recommended to install the PV modules at least 30cm above the ground to allow for adequate ventilation.
- Select an appropriate mounting structure that can support the required mechanical loads.
- PV modules should be installed at a minimum tilt angle of 8.3° to facilitate self-cleaning by rain and reduce dust accumulation.
- PV modules must be mounted in accordance with their specified mechanical load requirements.
- For optimal performance, choose a location with abundant sunlight. In the Northern Hemisphere, modules should generally face south; in the Southern Hemisphere, they should

face north. The optimal tilt angle depends on the geographic latitude. Please consult a qualified expert to determine the ideal installation orientation and tilt.

- Avoid installing PV modules in locations where trees, buildings, or other structures may cast shadows on the surface. Shading can lead to hot spots and reduced power output.

6.1 Structural sealant Installation

- The PV modules are also suitable to be glazed with structural sealant to the metal structure under the guidance of the structural sealant manufacturer. In this case the clamp is not required.

- To bond PV glass to aluminum extrusions using structural sealant, follow a precise process while ensuring compliance with technical standards:

- Surface Preparation: First, thoroughly clean and dry all bonding surfaces (glass and aluminum) to remove contaminants such as dust, oil, or oxidation. If required by the sealant manufacturer, apply a compatible primer to enhance adhesion.

- Sealant Application: Using a calibrated dispenser, apply a continuous and uniform bead of structural sealant to the extrusion frame. Ensure proper bead size and shape to achieve full contact with the glass.

- Glass Placement: Carefully position the PV glass onto the sealant-coated frame while ensuring proper alignment. Avoid excessive movement once contact is made to prevent air entrapment or sealant deformation.

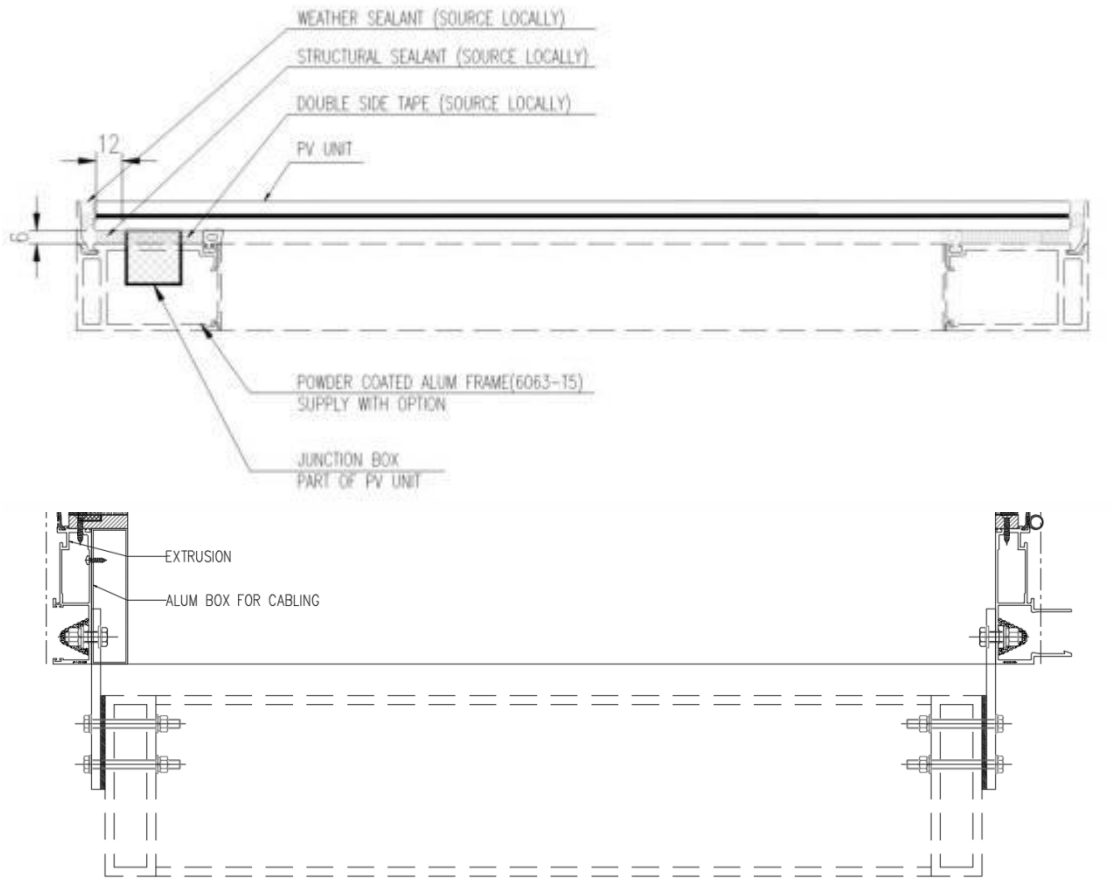
- Curing Conditions: Maintain curing temperatures between 20–30°C and relative humidity at 40–70% for optimal bonding strength. The sealant typically achieves initial load-bearing capacity in 24–48 hours, with final mechanical properties developing over 7–14 days. Protect the assembly from moisture, dust, and mechanical stress during curing.

- Performance Requirements: The cured sealant must meet minimum adhesion strength of 2.0 MPa (ASTM C1135) and exhibit at least 50% elongation to accommodate structural movements. Additionally, it should maintain stability under prolonged UV exposure and weathering.

- After the PV glass and aluminum frame are fully bonded and cured, they form a modular panel unit. These units are then installed onto the main steel structure using curtain wall brackets.

- PV panels are mounted vertically on the tower crown façade, directly fixed to the steel structure. The support system must be designed to handle both the weight of the panels (~20-35 kg/m^2) and high wind loads ($\geq$3.5 kN/m^2, calculated per wind pressure report).

- Since waterproofing and thermal/fire protection are not required, the design focuses solely on structural strength. The steel brackets should be corrosion-resistant (stainless steel or hot-dip galvanized) and securely welded or bolted to the main supporting steel frame. Deflection must be limited to L/250 or stricter to avoid stress on glass panels.



Section of structural sealant attachment (Unit: mm)

7. Electrical Installation

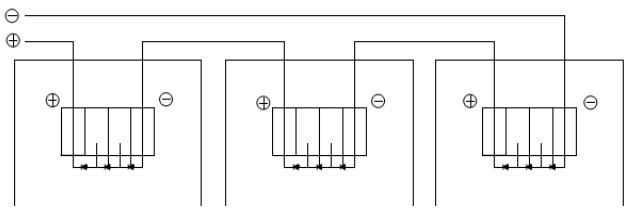
7.1 Electrical Configuration

Under normal conditions, the module is likely to experience conditions that produces more current and/or voltage than reported at Standard Test Conditions (Irradiance: 1000 W/m2, 25° C cell temperature and AM 1.5). The short-circuit current (ISC) should be multiplied by a factor of 1.25 based on the highest ambient temperature recorded, and the open-circuit voltage (VOC) should be multiplied by a factor of up to 1.25 based on the lowest ambient temperature recorded for the installation location when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output. This maximum voltage should not be exceeded at any time and, as the voltage of the module increases, above datasheet

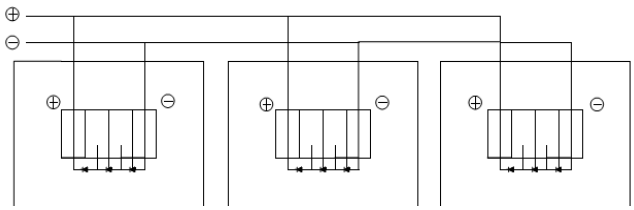
values, at operating temperatures below 25°C, then these need to be taken into account when designing a PV system. When modules are connected in series, the voltages add up, and the module currents accumulate.

The maximum voltage of the system must be less than the maximum certified voltage and the maximum input voltage of the inverter and 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.

The maximum quantity of PV modules in series and in parallel must be calculated based on the related regulations. The open-circuit voltage (Voc) under the expected lowest local temperature and the highest irradiation should not exceed DC1500V, the regulated maximum system voltage. Reference formula for quantity of PV modules in series: 1500V / (1.25*Voc); Reference formula for quantity of modules in parallel: Max. Series Fuse(A)/Isc +1.



in series to increase



in parallel to increase current

An appropriately rated overcurrent protection device must be used when the reverse current could exceed the value of the maximum fuse rating of the module. An overcurrent protection device is required for each series string if more than two series strings are connected in parallel.

7.2 Cables and Wiring

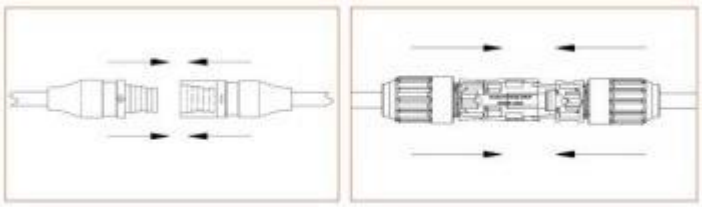
The PV modules are provided with two (2) stranded, sunlight resistant output cables that are terminated with PV connectors ready for most installations. The positive (+) terminal has a female connector while the negative (-) terminal has a male connector. The PV module wiring is intended for series connections [i.e. female (+) to male (-) interconnections, but can also be used to connect suitable third-party electrical devices that may have alternative wiring configurations so long as the manufacture's instructions are followed. For example, inverters, distribution cabinets, etc.

Use field wiring with suitable cross-sectional areas that are approved for use at the maximum short-circuit current of the modules. Recommends to use only sunlight Resistant waterproof cables qualified for direct current (DC) wiring in PV systems. The minimum wire size should be 4 mm2.wire Rated temperature: -40 ~ 90 ℃

Cables should be fixed to the mounting structure in such a way that mechanical damage of the cable and/or the PV module is avoided. Do not apply stress to the cables, the minimum cable being radius should be 40 mm. For fixing ,use appropriate means, such as sunlight resistant cable ties and/ or wire management clips specifically designed to attach to the mounting structure. While the cables are sunlight resistant and waterproof, where possible, avoid direct sunlight exposure and water.

7.3 Connectors

Keep connectors dry and clean, and ensure that connector caps are hand tight before connecting the PV modules. Do not attempt making an electrical connection with wet, soiled or otherwise faulty connectors. Avoid sunlight exposure and water immersion of the connectors. Avoid connectors resting on the ground or roof surface. Faulty connection can result in arcs and electrical shock. Check that all electrical connections are securely fastened. Make sure that all locking connectors are fully engaged and locked. PV modules must not be interconnected using connectors from different manufacturers and/or of different types. If PV modules having such different connectors need to be interconnected, a qualified professional may replace connectors according to the manufactures' specified instructions such that an interconnection can be made with connectors from the same manufacturer and the same type.



Manufacturer	Type	System Voltage (V DC)	Rated Current (A)	Temperature Range
Baoding Yitong PV Science & Technology Co., Ltd.	18-01	1500	41A	-40°C to 85°C

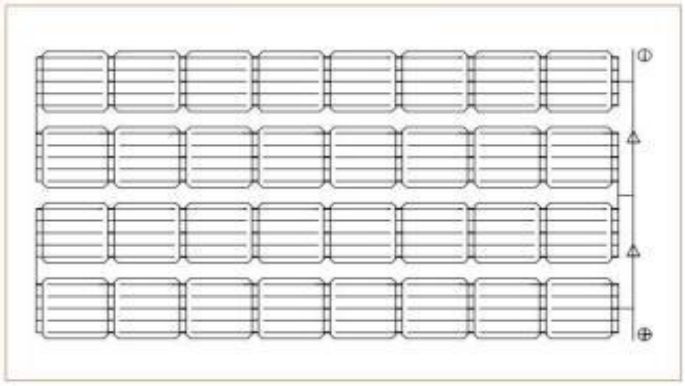
Staubli Electrical Connectors AG	Model: PV-KST4-EVO2A/xy; PV-KBT4-EVO2A/xy Model: PV-KST4-EVO 2/xy_UR (male); PV-KBT4-EVO 2/xy_UR (female)	1500	60A	-40°C to 85°C

7.4 Bypass Diodes

The junction boxes used with PV modules contain bypass diodes wired in parallel with the PV cell strings. In the case of partial shading, the diodes bypass the current generated by the non-shaded cells, thereby limiting module heating and performance losses. Bypass diodes are not overcurrent protection devices.

Bypass diodes divert current from the cell strings in the event of partial shading. See Figure for a diagram showing how the cell strings are electrically connected with the diodes.

In the event of a known or suspected diode failure, installers or maintenance providers should contact the company which the modules were purchased from. Never attempts to open the junction box of PV modules yourself.



7.5 Equipment Grounding and Lighting Protection

The PV module frame or supporting structure should be reliably grounded. The frame and supporting structure should be well combined, and the contact resistance between should not be greater than 4Ω . The connection between the photovoltaic grounding system and the building grounding device should be reliable. The connection of PV modules, supporting structures, cable metal armor and roof metal grounding grid should be reliable. The grounding resistance value of the grounding device shared by the module square array and the lightning protection system should be within the range specified in the design. The function of overvoltage protection device between the monitoring, control system, power conditioning equipment grounding wire and lightning protection system of the square array of PV modules should be effective and the grounding resistance should be within the range specified in the design. The PV module phalanx lightning protection device should be effective and should be inspected in time before the arrival of the thunderstorm and after the thunderstorm.

8. Maintenance and Care

The PV modules are designed for long-term durability. However, regular inspection and maintenance are essential, particularly during the warranty period, and are the responsibility of the system owner.

If a PV module is damaged, notify the supplier within two weeks of discovery.

When the installation angle is 8.3° or greater, normal rainfall is typically sufficient to keep the glass surface clean in most environments.

In the event of excessive dirt accumulation, clean the glass surface using only a soft cloth and clean water. Do not use acidic or alkaline cleaning agents.

To ensure optimal system performance, clean the PV modules regularly. Do not walk on the PV modules during cleaning, and always follow appropriate safety procedures.

Ensure that no obstructions block the front side of the PV modules.

Periodically inspect wiring connections and check the condition of cable jackets for signs of wear or damage.

Do not use chemical cleaners on the PV module surface. Also, avoid standing water on the glass surface, as this may lead to white efflorescence, a common issue that can degrade energy output over time.

In snowy conditions, be aware that snow may accumulate beneath tilted modules, increasing mechanical load. Take appropriate measures to prevent PV module damage due to snow accumulation.

Recommends that PV systems be periodically inspected by the installer or other qualified person. The purpose of the PV system inspection is to ensure that all system components are functioning properly. At a minimum, this inspection should confirm the following; all cables and connector attachments are undamaged and properly secured; no sharp objects are in contact with the module surfaces; PV modules are not shaded by unwanted obstacles and/or foreign material; mounting and grounding components are tightly secured with no corrosion Defects should be addressed immediately.

9. Warnings

These PV modules do not contain any user-serviceable parts. If you suspect that your solar installation is not functioning properly, contact your installer immediately.

WARNING: Before performing any electrical maintenance, the PV system must be completely shut down.

For the Australian Market, Building Integrated PV Module installations must comply with the requirements of the National Construction Code and AS/NZS 5033

10. Contact Information

Manufacturer

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