INSTALLATION & ASSEMBLY

Please read these instructions before installing and using this panel

Solar Panel
Model CS6C-130P
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1.0 GENERAL INFORMATION
This manual provides important safety information relating to the installation, maintenance and handling of SAM-CS6C-130P solar modules. System users and professional installers should read this manual carefully and strictly follow the instructions. Failure to follow these instructions may result in death, injury or property damage. The installation of solar modules requires specialized skills and should only be performed by licensed professionals.

CS6C-130P is a Polycrystalline Solar Panel rated at power output of 130 Watts.

Design Features
- 10 year product warranty on materials and workmanship
- 25 year linear power output warranty
- Industry leading power tolerance: ± 5W (± 3%)
- Strong framed module, passing mechanical load test of 5400Pa to withstand heavier snow load
- The 1st manufacturer in PV industry certified for ISO:TS16949

(Automotive Quality Management System) in module production since 2003
- ISO17025 qualified, manufacturer owned testing lab, fully complying to IEC, TUV, UL testing standards

Applications
- Residential roof-top systems
- Commercial / industrial building roof-top systems
- Large on-grid and off-grid solar power stations
- Rural area applications
- Other on-grid and off-grid applications
- Automotive, RV and Marine

Quality Certificates
Environmental Certificates

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power (Pmax)</td>
<td>130 W</td>
</tr>
<tr>
<td>Open Circuit Voltage (Voc)</td>
<td>21.9 V</td>
</tr>
<tr>
<td>Short Circuit Current (Isc)</td>
<td>8.07 A</td>
</tr>
<tr>
<td>Operating Voltage (Vpmax)</td>
<td>17.40 V</td>
</tr>
<tr>
<td>Current at Operating Voltage (Ipmax)</td>
<td>7.46 A</td>
</tr>
<tr>
<td>Maximum System Voltage</td>
<td>600 V</td>
</tr>
<tr>
<td>Maximum Series Fuse rating</td>
<td>15 A</td>
</tr>
<tr>
<td>Maximum Temperature</td>
<td>85°C</td>
</tr>
<tr>
<td>Fire Rating</td>
<td>Class C</td>
</tr>
<tr>
<td>Minimum Bypass Diode</td>
<td>10 A</td>
</tr>
<tr>
<td>Cell Type: Polycrystalline</td>
<td></td>
</tr>
<tr>
<td>Cell Arrangement</td>
<td>36 (4 x 9)</td>
</tr>
<tr>
<td>Dimensions (inch): 58.50 x 26.20 x 1.57</td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm): 1485 x 666 x 40</td>
<td></td>
</tr>
<tr>
<td>Weight kg./lbs.</td>
<td>12.0 kg. / 26.5 lbs.</td>
</tr>
<tr>
<td>Front Cover</td>
<td>Tempered glass</td>
</tr>
<tr>
<td>Frame material</td>
<td>Anodized aluminum alloy</td>
</tr>
</tbody>
</table>

CERTIFICATION / SAFETY LISTING
CSA for Canada and USA
Class 5311 10; Class 5311 90
ULC/ORD-C170301; UL1703

**NOTES:**
1. Rated electrical characteristics are within ± 10% of measured values at Standard Test Conditions of 1000W/m² or 100mW/cm² irradiance, AM 1.5 Spectrum and cell temperature of 25°C.
2. Specifications are subject to change without notice.

**1.1 DISCLAIMER OF INSTALLATION MANUAL**
The information contained in this manual is subject to change by Samlex America, Inc. without prior notice. Samlex America, Inc. makes no warranty of any kind whatsoever, either explicitly or implicitly, with respect to the information contained herein.

**1.2 LIMITATION OF LIABILITY**
Samlex America, Inc. shall not be held responsible for damages of any kind, including without limitation bodily harm, injury and property damage, relating to module handling, system installation, or compliance or non-compliance with the instructions set forth in this manual.
SECTION 2 | Safety Precautions

⚠️ WARNING!

All instructions should be read and understood before attempting to install, wire, operate and/or maintain the module. Module interconnects pass direct current (DC) when exposed to sunlight or other light sources. Contact with electrically active parts of the module, such as terminals, can result in injury or death, whether the module is connected or disconnected.

General Safety

- All installations must be performed in compliance with all applicable regional and local codes such as, the latest National Electrical Code (USA) or Canadian Electric Code (Canada) or other national or international electrical standards.
- Wear suitable protection (non-slip gloves, clothes, etc.) to prevent direct contact with 30VDC or greater, and to protect your hands from sharp edges during the installation.
- Use electrical insulated tools to reduce the risk of electric shock.
- Remove all metallic jewellery prior to installation to reduce the chance of accidental exposure to live circuits.
- Cover the front of the modules in the PV array with an opaque material to halt production of electricity when installing or working with a module or wiring.
- Do not install or handle the modules when they are wet or during periods of high wind.
- Do not use or install broken modules.
- If the front glass is broken, or the back sheet is torn, contact with any module surface or the frame can cause electric shock.
- Keep the junction box cover closed at all times.
- Do not attempt to repair any part of the module. There are no serviceable parts within the PV module.
- Do not disassemble a module or remove any module part.
- Do not artificially concentrate sunlight on a module.
- Do not connect or disconnect modules when current from the modules or an external source is present.
3.0 MECHANICAL / ELECTRICAL SPECIFICATIONS

The module electrical ratings are measured under Standard Test Conditions (STC) of 1 kW/m² or 100mW/cm² irradiance with an AM1.5 spectrum, and cell temperature of 25°C. The detailed electrical and mechanical characteristics of PV modules can be found on page 4 of this manual. Main electrical characteristics at STC also appear on each module label. The maximum system voltage for all module series is 600 V.

Under certain conditions, a module may produce more current or voltage than its Standard Test Conditions (STC) rated power. Accordingly, a module's open-circuit voltage and short-circuit current at STC should be multiplied by 1.25 when determining component ratings and capacities. An additional 1.25 multiplier for a short-circuit current (for a total of 1.56), for sizing conductors and fuses may be applicable, as described in Section 690-8 of the National Electrical Code (NEC).

3.1 DIODES

Diodes inside the junction box meet the requirements given in Table 3.1:

Table 3.1: By-pass Diode Specifications

<table>
<thead>
<tr>
<th>Module Series</th>
<th># Bypass Diodes</th>
<th># Cells per Diodes</th>
<th>Diode Ratings</th>
<th>Diode Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAM-CS6C-130P</td>
<td>2</td>
<td>18</td>
<td>≥ 40 V</td>
<td>≥ 10A</td>
</tr>
</tbody>
</table>
SECTION 4 | Unpacking & Storage

PRECAUTIONS & GENERAL SAFETY

- Store modules in a dry and ventilated room.
- Do not allow children and unauthorized persons near the installation site or storage area of modules.
- Do not transport modules in an upright position.
- Unpacking module pallet with care and follow the unpacking steps marked on the pallet. Be careful when unpacking, transporting and storing the modules.
- Do not carry a module by its wires or junction box. Carry a module by its frame with two or more people.
- Do not place modules on top of each other.
- Do not place excessive loads on the module or twist the module frame.
- Do not bow modules under their own weight.
- Do not stand, step, walk and/or jump on the module.
- Do not drop or place objects on the modules (such as tools.)
- Do not mark the modules with sharp instrument.
- Particular attention should be taken to avoid module back-sheet to come in contact with sharp objects, as scratches may directly affect product safety.
- Do not leave a module unsupported or unsecured.
- Do not change the wiring of bypass diodes.
- Keep all electrical contacts clean and dry.
SECTION 5 | Module Installation

5.0 PRECAUTIONS & GENERAL SAFETY

- Before installing modules, contact the appropriate authorities for site, installation and inspection permission and requirement.
- Check applicable building codes to ensure that the construction or structure (roof, facade, support, etc.) can withstand the module system load.
- When installing the modules, please ensure the assembly is mounted over a fire resistant roof covering rated for the application. Samlex America, Inc. modules have been listed as Class C according to UL790 standard.
- DO NOT STAND OR STEP on the modules, as localized high loads may induce severe micro-cracks at the cell level, which in turn may compromise module reliability. Failure to comply with above caution will void Samlex America, Inc. warranty.

Environmental conditions

- The module is intended for use in general open climates, as defined in IEC 60721-2-1: Classification of environmental conditions Part 2-1: Environmental conditions appearing in nature - temperature and humidity.
- Do not install modules near naked flames or flammable materials.
- Do not expose modules to artificially concentrated light sources.
- Do not immerse modules in water or constantly expose modules to water (either fresh or salt) (i.e. from fountains, sea spray). Exposing modules to salt (i.e. marine environments) and sulphur (i.e. sulphur sources, volcanoes) risks module corrosion.

Requirements of installation

- Ensure that the module meets the technical requirements of the system as a whole.
- Ensure that other systems components do not exert damaging mechanical or electrical influences on the modules.
- Modules can be wired in a series to increase voltage or in parallel to increase current. To connect in series, connect cables from the Positive terminal of one module to the Negative terminal of the next module. To connect in parallel, connect cables from the Positive terminal of one module to the Positive terminal on the next module.
- Quantity of bypass diodes provided can vary depending on model series.
- Connect the quantity of modules that match the voltage specifications of the inverters used in the system. Modules must NOT be connected together to create a voltage higher than the permitted maximum system voltage, even under the worst local temperature conditions.
- Similar electrical performance modules should be connected in the same series to avoid or minimize mismatch effects in arrays.
- To minimize risk in the event of an indirect lightning strike, avoid forming loops when designing the system.
- The recommended maximum series fuse rating should not be exceeded.
- Modules should be firmly fixed in place in a manner suitable to withstand all expected loads, including wind and snow loads. A minimum clearance of 6.5 mm (1/4 of an inch) or more between modules is required to allow for thermal expansion of the frames.
SECTION 5 | Module Installation

- Small openings for water draining on the underside of the module should not be blocked after mounting.

Optimum orientation and tilt
Find out the optimum orientation and tilt of the PV modules for your region to achieve the maximum annual yield. Generation of maximum power occurs when sunlight shines perpendicularly onto the PV modules.

Avoid shading
Even the slightest partial shading (e.g., from dirt deposits) will cause a reduction in yield. A module is considered “shadow-free” if it is unobstructed across its entire surface for the whole year. Even on the shortest day of the year, unobstructed sunlight can reach the module.

Reliable ventilation
Sufficient clearance (at least 10 cm) between the module frame and the mounting surface is required to

5.1 MODULE WIRING
Correct wiring scheme
When designing the system, avoid forming loops (to minimize risk in the event of an indirect lighting strike). Make sure that wiring is correct before starting up the system. If the measured open circuit voltage (Voc) and short-circuit current (Isc) differ from the specifications, then there is a wiring fault.

Correct connection of plug connectors
Make sure that the connection is safe and tight. The plug connector should not receive outer stress. The connector should only be used to connect the circuit. It should never be used to turn the circuit on and off.

Use of suitable materials
Use special solar cable and suitable plugs only (wiring should be placed in conduit that is sunlight-resistant or, if exposed, should be sunlight-resistant) in accordance with local fire, building and electrical code. Ensure that they are in perfect electrical and mechanical condition.

The permitted type of solar cable is AWG12 (4 mm²) single conductor cable listed and labelled as USE-2 or PV Wire, 90°C wet rated, with proper insulation to withstand the maximum possible system open-circuit voltage. The conductor material should use copper only. When designing the system select suitable conductor gauges to minimize voltage drop and ensure conductor ampacity complies with local regulations (such as NEC 690.8(D)).

Cable protection
Secure the cables to the mounting system using UV-resistant cable ties. Protect exposed cables from damage with appropriate precautions (e.g. locate them within plastic conduit). Avoid exposure to the direct sunlight.

5.2 GROUNDING
The modules are required to be grounded. Module installation should comply with all local electrical codes and regulations.

The earth grounding connection should be made by a qualified electrician.
Connect module frames to each other using suitable grounding conductor with ring terminals. Holes provided for this purpose are identified with a green earth ground symbol. Use 6-12 AWG (4-14 mm²) copper wire only. The bolts, nuts, flat washers, lock washers or other relevant hardware should be made of stainless steel, unless otherwise specified.

All the junctions on the conductive connection must be tight. Metal used in the conductive connection should be stainless steel or be treated against corrosion by anodizing, spray-painting, or galvanization to prevent rusting and corrosion.

Where required (Grounding Method A and C), a copper terminal ring is recommended (please see dimensional drawing Fig. 5.2.1).

The d2 in the picture is 5.3mm and the size of d1 is determined by the size of the grounding cable. Proper crimping tool and method should be used to crimp the terminal onto the grounding cable. Once crimped, each terminal should be visually checked according to the following points (see Fig. 5.2.2):

1. The insulator jacket is correctly crimped in the first collar
2. The conductor core is correctly crimped in the second collar
3. The conductor core does not run over the functional part of the ring terminal
4. The ring terminal should not be bent or deformed during the crimping operation.

Three grounding methods are recommended, as described below (Grounding hardware is NOT provided):

**Grounding Method A:**

**Tapping + Bolt + Ring Terminal**

When diameter of the grounding holes is 4mm (See Figs. 5.23: Step 1, 2 & 3).

- The grounding hole should be pierced using an adequate tapping tool (M5x0.8mm).
- Secure to the grounding hole the following: the lug with stainless steel hardware including a pan head bolt (M5x14mm), a flat washer, a split washer and an hexagonal nut. Two full threads of the bolt shall engage the metal.
- A torque moment of about 3Nm should be used to fasten the grounding parts to module frame.
**SECTION 5 | Module Installation**

**Grounding Method B:**
Bolt + Nut with Teeth + Cup Washer for Solid Copper Wire
When diameter of the grounding holes is 5mm (See Figs 5.2.4 & 5.2.5).
- A grounding kit with M5 size SS cap bolt, M5 size SS flat washer, M5 size SS cup washer, and M5 size SS nut (with teeth) is used to attach a copper grounding wire to grounding hole pre-drilled on the frame (see picture below).
- Attach the wire between the flat washer and the cup washer. Ensure the cup washer is between the frame and wire with concave side up to prevent corrosion due to dissimilar metal. Tighten the bolt securely using the SS nut with teeth. A wrench may be used in this application. The tightening torque is 1 Nm.

**Grounding Method C: Bolt + K-nut + Ring terminal (copper)**
When diameter of the grounding holes is 5mm (see Fig.: 5.2.6).
- Connect the grounding hardware to the grounding hole on the frame as shown in the picture.
- A K-nut is used to penetrate the frame’s anodizing (protective coating) to create conductive connection.
- A torque moment of about 3Nm should be used to fasten the grounding parts to module frame.

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Fig.: 5.2.3: Step 1, 2 & 3 Grounding Method A

**STEP 1**
Tapping the grounding hole by a tapping tool (M5 x 0.8mm)

**STEP 2**
Pan Head Bolt (M5 x 14)
Wire Connector

**STEP 3**
Flat washer (M5)
Split washer (M5)
Hexagonal nut (M5)
SECTION 5 | Module Installation

Fig.: 5.2.4: Grounding Method B

Attach wire between the flat washer and cup washer. Place cup washer (concave side up) between frame and wire.

Fig.: 5.2.5: Grounding Method B

Tighten the bolt using the nut with teeth.

Fig.: 5.2.6: Grounding Method C
6.0 MOUNTING INSTRUCTIONS
For a clear understanding of mounting and construction of the module, please refer to the illustration at Fig. 6.0.1 & 6.0.2:

Figs. 6.01 & 6.02 Reference Guide:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grounding holes</td>
</tr>
<tr>
<td>2</td>
<td>Junction box</td>
</tr>
<tr>
<td>3</td>
<td>Standard mounting holes (long side)</td>
</tr>
<tr>
<td>4</td>
<td>Additional mounting holes (high wind or snow loads)</td>
</tr>
<tr>
<td>5</td>
<td>Standard mounting holes (short side)</td>
</tr>
<tr>
<td>6</td>
<td>Module frame</td>
</tr>
<tr>
<td>7</td>
<td>Cables and connectors</td>
</tr>
</tbody>
</table>

- The mounting design must be certified by a registered professional engineer. The mounting design and procedures shall comply with local electrical and building codes.
- **Mounting hardware is NOT provided.**
- The modules can be mounted to a support structure by several approved methods using the mounting holes located on the back frame (shown in Fig. 6.0.1) or by means of insertion systems. For other installation hardware, please contact your local representative for further information. Failure to use a recognized installation method will void warranty.
- Only the Bolting Mounting Method shown in Fig. 6.0.3 has been qualified during testing and listing of the modules according to UL1703 standard.
- Use appropriate corrosion-proof fastening materials. All mounting hardware (bolt/spring washer/flat washer/nut) should be made with stainless steel M6 size.

- Use a torque wrench for installation. The above figure shows methods of fastening module to support structure. Tightening torques should respectively be within 4~6 Nm and 10~17 Nm for M6x1 (Example A) and M8x1.5 coarse thread bolts, depending on bolt class. Different recommendations from specific clamping hardware suppliers should prevail.

- The modules can be installed in either landscape or portrait position. Note that further countermeasures such the use of additional support bars should be considered in heavy snow areas (> 2400 Pa), to avoid damage by the snow accumulating in the lowest row of modules.

- When the addition of a support bar is recommended to enhance mechanical stability and module long term performance reliability, material of suitable resistance should be selected. Recommended minimum thickness of the support bar is 50 mm. The support bar centerline should be positioned within 100 mm of the side frame centerline (slight shift may be necessary to access module grounding hole).

6.1 METHOD: BOLTING

- Modules should be bolted to support structures through mounting holes located in the frame’s back flanges only. Do not drill additional holes or modify the module frame. Doing so will void the warranty.

- Each module must be securely fastened at a minimum of 4 points on two opposite sides, using the most inner mounting holes. If additional wind loads are anticipated for this installation, additional mounting points should be used. System designer and installer are responsible for load calculations and for proper support structure design.

- Modules should be bolted at the following hole locations depending on the configuration and load (see Fig. 6.1).
1. Use 4 standard mounting holes (long side)
2. Mounting rails may run perpendicularly or parallel to the long side frame

Fig.: 6.1 Bolting on long side Frame.
Regular maintenance is required to keep modules clear of snow, bird droppings, seeds, pollen, leaves, branches, dirt spots and dust.

If a module has a sufficient tilt (at least 150), it generally is not necessary to clean the modules (rainfall will have a self-cleaning effect). When there is a noticeable buildup of soiling deposits on the module surface, wash the PV array with water and a gentle cleaning implement (a sponge) during the cool part of the day. Dirt must never be scraped or rubbed away when dry, as this will cause micro-scratches.

If snow is present, a brush with soft bristles can be used to clean the surface of the module.

Periodically inspect the system to make sure all wiring and supports stay intact.

If you need electrical or mechanical inspection or maintenance, it is recommended to have a licensed, authorized professional carry out the job to avoid hazards of electric shock or injury.

Do not change the PV components (diode, junction box, plug connectors).
SECTION 8 | Warranty

10 YEAR product warranty on materials and workmanship and 25 YEAR linear power output warranty.

The SAM-CS6C-130P Solar Panel manufactured by Samlex America, Inc. (the “Warrantor”) is warranted for 10 years on materials & workmanship and for 25 years for linear power output.

- For a warranty claim, the Purchaser should contact the place of purchase to obtain a Return Authorization Number.

- The defective part or unit should be returned at the Purchaser’s expense to the authorized location.

- A written statement describing the nature of the defect, the date of purchase, the place of purchase, and the Purchaser’s name, address and telephone number should also be included.

- If upon the Warrantor’s examination, the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor’s option without charge, and returned to the Purchaser at the Warrantor’s expense.

- No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so.

- Warranty service shall be performed only by the Warrantor. Any attempt to remedy the defect by anyone other than the Warrantor shall render this warranty void.

- There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion.

- No other express warranty is hereby given and there are no warranties which extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.

- There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any persons, or damage to person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof.

- The Warrantor assumes no liability for incidental or consequential damages of any kind.

Samlex America, Inc. (the “Warrantor”)
Telephone: (604) 525-3836
www.samlexamerica.com
OUR MISSION

To develop enduring relationships with our customers by providing innovative power conversion products supported by the best customer service in the industry.

OVERVIEW

- Samlex America, Inc was incorporated in 1991.
- Manufactures and distributes power conversion products to customers around the globe.
- Synonymous with providing quality products at competitive prices & supported by the best customer service in the industry.
- OEM, custom design & private label services offered as well as specialized component manufacturing factories & assembly facilities located in Europe, Asia and North America.
- Major markets of communications, electronics & alternative energy supported by extensive distributor network.
Contact Information

Toll Free Numbers
Ph: 1.800.561.5885
Fax: 1.888.814.5210

Local Numbers
Ph: 604.525.3836
Fax: 604.525.5221

Website
www.samlexamerica.com

USA Shipping Warehouse
Kent WA

Canadian Shipping Warehouse
Delta BC

Email purchase orders to
orders@samlexamerica.com