Hanwha Solar

Installation Guide

HSL Poly Series

Hanwha Solar

CONTENT

DISCLAIMER OF LIABILITY

The installation techniques, handling and use of the product are beyond company control. Therefore, Hanwha Solar assumes no responsibility for loss, damage or expense resulting from improper installation, handling or misuse. Ensure that the module is used only in applications for which it is suitable (see "Mounting Instructions"). All work on a PV system (installation, setup, maintenance) must be carried out only by appropriately qualified and authorized engineers. The appropriate local standards, construction rules and safety instructions must be followed during installation.

INTRODUCTION

Hanwha Solar is a leading manufacturer of silicon ingots, wafers, PV cells and modules, delivering reliable products at competitive pricing on a global scale. We provide world-class PV technology, efficient manufacturing, and local customer support. We are committed to providing technical and installation support for our customers worldwide. This Installation Guide covers installation of the following Hanwha Solar modules:

IEC Products

HSL60P6-PB-1-xxx (W/B)
HSL72P6-PB-1-xxx (W/B)

KEMCO Products

HSL60P6-PB-5-xxx (W/B)
HSL72P6-PB-5-xxx (W/B)

UL Products

HSL60P6-PB-0-xxxT (W/B)
HSL60P6-PB-2-xxxQ (W/B)
HSL60P6-PB-3-xxxQ (W/B)
HSL60P6-PB-4-xxxQ (W/B)
HSL60P6-PB-4-xxxT (W/B)
HSL72P6-PB-0-xxxT (W/B)
HSL72P6-PB-2-xxxQ (W/B)
HSL72P6-PB-3-xxxQ (W/B)
HSL72P6-PB-4-xxxQ (W/B)
HSL72P6-PB-4-xxxT (W/B)

*xxx represents the power class

PURPOSE OF THIS GUIDE

This guide contains important information regarding the installation, safe handling and maintenance of photovoltaic modules made by Hanwha Solar. The word "module" as used in this guide refers to one or more PV modules. All instructions should be read and understood prior to installing the modules. The installer should conform to all the safety precautions in this guide when installing the modules. Local standards and regulations should also be followed during installation. Before installing a photovoltaic system, the installer must be familiar with the mechanical and electrical requirements for such a PV system. Keep this guide in a safe place for future reference. Hanwha Solar provides technical support worldwide. Visit www.hanwha-solarone.com for contact information.

SYSTEM DESIGN

Before installing your solar system, contact local authorities to determine the necessary permit, installation and inspection requirements that must be followed. System should be installed by qualified personnel only. The system involves electricity, and can be dangerous if the personnel are not familiar with the appropriate safety procedures. PV modules should be mounted in a location where they will receive maximum sunlight throughout the year. Specially, in the northern hemisphere, the modules should face south. And in the southern hemisphere, the modules should face north.

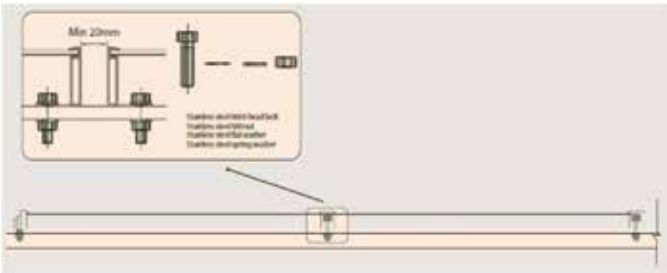
- In order to achieve maximum annual yield, optimum orientation and tilt of PV module is necessary. Sunlight shining vertically and completely onto PV module is the best condition to generate maximum power.
- Artificially concentrated sunlight shall not be directed on the module. Very hot module(s) can reduce power output performance. Ensure the module has good ventilation conditions to prevent overheating.
- Site-specific environment loads such as wind and snow should be taken into account to avoid exceeding the maximum load.
- When designing the system, please pay attention to the total voltage (if connected in series) and current (if connected in parallel).
- You must not install more than three (3) modules in parallel without additional string fuses or string diodes. While in series, the open circuit voltage of the string must not exceed the allowed maximum system voltage (e.g. 1000Vdc for IEC certified systems), even under cold climate conditions.
- The module must not be installed close to fire or flammable materials. Completely cover the module with an opaque material during installation to prevent electricity from being generated.
- If system grounding is required by system configuration or local authorities, Hanwha SolarOne recommends negative system grounding which could have positive effect on system performance.
- For optimal PV system array performance in a hot, humid climate, grounding of negative pole is strongly recommended. Failure to comply with such requirement may reduce the performance of the system. Under no circumstances positive grounding should be applied as this may reduce power generation.

MOUNTING INSTRUCTIONS

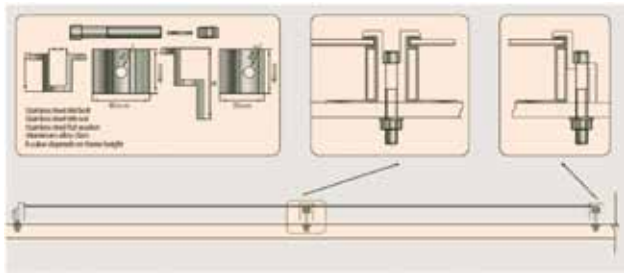
The basis for durable and safe mounting is an assembly frame which corresponds to the appropriate structural requirements, which is securely anchored to the ground, to the roof, or to a facade, and whose long-term stability is guaranteed. The mounting structure and the module attachments must be designed in accordance with the local wind and snow loads. Ensure that the modules are mounted over a fire resistant roof covering rated for the application. To prevent bending, vibration, mechanical stress or warpage, mount the module onto a flat contact surface.

- Always secure the module with the correct number of clamps or screws or use appropriate mounting rails
- The distance between modules should be selected carefully respecting thermal expansions. In no way modules should touch each other at any operating temperature to avoid unfavorable forces. Keep in mind, different modules, mounting systems, and building materials do have different thermal expansion coefficients. Hanwha Solar recommends a minimum distance of 20 mm between modules
- Avoid direct contact between glass and metal (e.g. mounting rails)
- Modules can be installed in both landscape and portrait modes. Reduced snow loads may apply, depending on mounting method
- Recommended tightening torque: 10Nm for bolt mounting and clamp mounting unless otherwise specified by mounting system provider
- Do not drill additional holes for installation (drilling holes shall void product warranty)
- Module clamps must not overlap the glass or shade the module surface
- The installation and attachment materials (nuts, bolts, etc.) must be corrosion-resistant

Bolt Mounting Details



Clamp Mounting Details



MOUNTING INSTRUCTIONS

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HSL60P6-PB-1-xxx (W/B)

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UL Products

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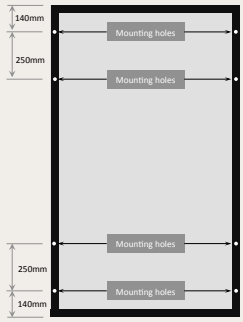
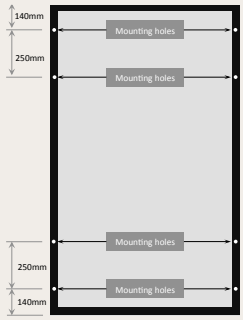
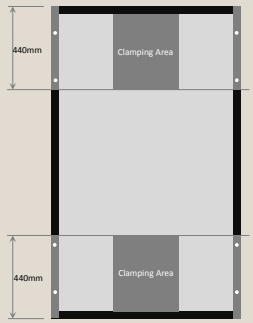
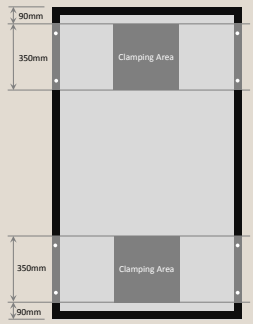
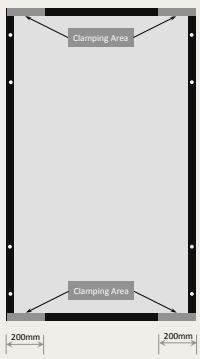
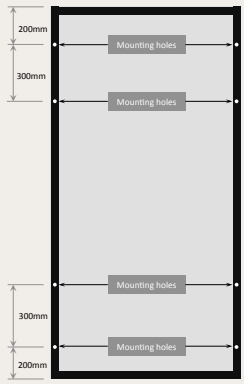
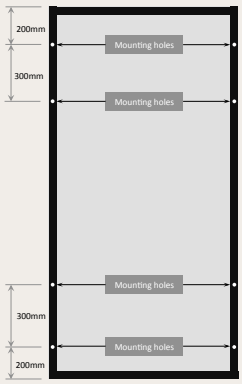
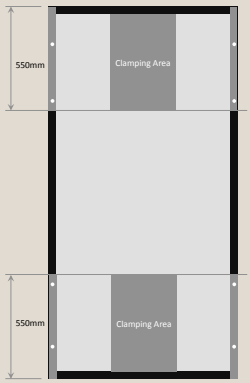
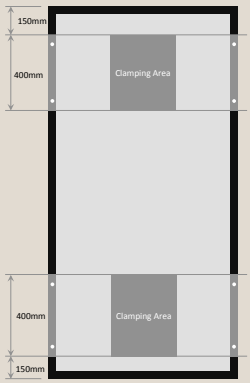
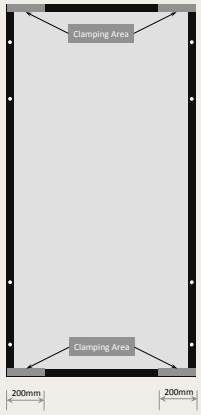
HSL60P6-PB-4-xxxQ (W/B)
HSL60P6-PB-4-xxxT (W/B)

	Maximum Load/Pressure 4000 Pa	Extended Maximum Static Load 7000 Pa
Bolt Mounting		
Clamping at the long module sides		
Clamping at the short module sides		

Maximum Load/Pressure 4000 Pa	Extended Maximum Static Load 7000 Pa	
		Bolt Mounting
		Clamping at the long module sides
		Clamping at the short module sides

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ELECTRICAL INSTALLATION

CORRECT WIRING SCHEME

To minimize the risk of an indirect lightning strike, avoid forming closed loops when designing the system. Check that wiring is correct before starting the generator. If the measured open circuit voltage (V_{oc}) and short-circuit current (I_{sc}) differ from the specifications, there may be a wiring fault.

SOLAR MODULE PLUG CONNECTORS

All solar modules are equipped with solar cables with 4-6mm^2 serving a temperature range from -40°C to 90°C. The connectors have specified polarities; they are marked with ´+´ and ´-´ signs. Make sure that the connection is safe and tight. Connectors should only be used to connect the circuit, but never used to turn the circuit on or off. Connectors must not be exposed to direct rain or laid in water drains.

USE OF PROPER COMPONENTS

Use cable extensions and plugs that are designed for outdoor applications. Ensure that they are in good electrical and mechanical condition. Only cables with one conductor are to be used. Ensure that all materials meet the requirements of the systems` maximum voltage, current, moisture, and temperature when they are exposed to sunlight. Under normal conditions, a photovoltaic module is likely to produce more current and/or voltage than that reported under Standard Test Conditions. Accordingly, the values of I_{sc} and V_{oc} marked on the module should be multiplied by a factor of 1.25 when selecting electrical components voltage ratings, conductor capacities, fuse type, and type of control components connected to the PV output.

The maximum series fuse rating is:

- 10A for modules with Hanwha Solar 125x125mm cells
- 15A for modules with Hanwha Solar 156x156mm cells

The maximum reverse current is known as series fuse rating multiplied by a factor of 1.35. Each module (or series string of modules so connected) shall be provided with the maximum series fuse as specified.
For USA:
Refer to Section 690-8 of the U.S. National Electrical Code for an additional multiplying factor of 1.25 which may be applicable.

BYPASS DIODES

When modules in series are partially shaded, it may cause reverse voltage across cells or modules, this may cause undesirable heating to occur. The use of a diode to bypass the shaded area can minimize both heating and array current reduction. All Hanwha Solar modules are equipped with factory installed bypass diodes. The factory installed diodes provide proper circuit protection for the system.

OTHERS

During installation, be sure to tie the cable from the junction box to the mounting substructure with nylon line, etc. to avoid direct contact of the cable with the back surface of the module.

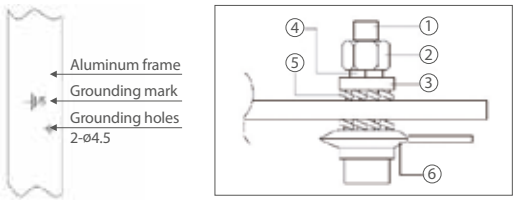
GROUNDING

The frame shall be grounded in accordance with local electrical requirements*. If grounding of the modules is required, a good connection between modules and the grounding hardware is essential for an effective ground. The anodization on a module frame provides a coating to minimize the corrosion due to weather and it acts as a barrier that reduces the effectiveness of the grounding connection. For an adequate electrical connection, the grounding hardware should penetrate the anodized layer.

* For UL Products: Only UL listed equipment should be used for bonding to ground. For USA: National electrical code (NEC) Article 250; for Canada: CEC

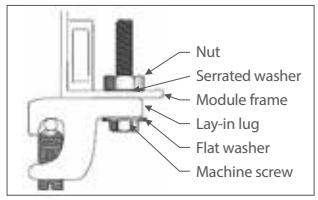
In case grounding is required, Hanwha Solar recommends using the follow components or equivalents.

Option 1: Bolting ground



①Stainless steel bolt M4 × 30 ②Stainless steel nut M4 ③Stainless steel flat washer M4
④Stainless steel spring washer M4 ⑤Stainless steel lock-toothed washer M4 ⑥Stainless steel slotted washer M4

Option 2: Grounding lug with machine screw at frame hole



Select a grounding lug listed for direct burial and outdoor use (tin-plated, solid copper lay-in lug with a stainless-steel set screw) capable of accepting a 4-14 AWG copper conductor. Secure the lug to module grounding hole with a stainless steel machine screw, flat washer, serrated washer and nut. Tighten the nut to approximately 2.26 N-m (20 in-lbs). Tighten the lug set screw to the copper wire at the torque specified by lug manufacturer.

IEC/EN61730 INFORMATION

Hanwha Solar module is designed to fulfill the criteria of Application Class A requirements according to IEC/EN61730-part1. The modules are qualified for application class A: Hazardous voltage (IEC61730: higher than 50V DC; EN61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is anticipated (Modules qualified for safety through EN IEC61730-1 and EN IEC61730-2 within this application class are considered to meet the requirements for Safety Class II.

UL LISTING INFORMATION

1. Rated electrical characteristics are within 10% of measured values at Standard Test Conditions of: 1000W/ m^2, 25°C cell temperature and solar spectral irradiance per ASTM E892 or irradiance of AM 1.5 spectrum.
2. The standoff height should be at least 7.9 in. If other mounting means are employed, this may affect the UL Listing.
3. The modules have been evaluated by UL for a maximum positive or negative design loading of 4000 Pa and snow loading of 7000 Pa.
4. Wiring methods should be in accordance with the NEC.
5. For installations in Canada, the installation shall also be in accordance with CSA C22.1, safety Standards for Electrical Installations, Canadian Electrical Code, Part 1.
6. The use of the following hardware is required in order to provide a reliable grounding connection to the module frame: a combination of the following stainless steel hardware: Serrated washer, Spring washer, flat washer, a size M4 nut, and bolt M4x30mm -- (see illustration grounding for details).

ADDITIONAL INFORMATION

WARNING!

PV modules generate electricity as soon as they are exposed to sunlight. One module generates a safe, extra-low voltage level, but multiple modules connected in series (summing the voltage) or in parallel (summing the current), represent a danger. The following points must be noted when handling the solar modules to avoid the risk of fire, sparking, and fatal electric shock.

Do not insert any electrically conductive materials into the plugs or sockets.

Do not fit PV modules and wiring with wet plugs and sockets.

Make sure to use proper safety equipment (insulating tools and gloves, etc.) when wiring.

Make sure that the connection is made when the circuit is cut off.
Do not disconnect under load.

To avoid the generation of an electric arc, ensure the connectors are clean and have not been contaminated,and that the electrical connection and mechanical joint are good.

UNPACKING AND STORING MODULES

Utmost attention is required when handling module(s). The following guidelines should be followed with caution while unpacking, transporting, and storing the modules:

Open the packaging with care, especially when handling sharp blades. Lift the modules out of carton box with two or more persons.

Do not strike or physically damage the module.

Carry modules with proper method in order to avoid module breakage. Using both hands is recommended. Do not use the junction box or the cables as a handle.

Place the module with proper support. Do not place modules on top of each other. Do not twist the module.

Do not stand on the module.

Do not mark the rear of the module using sharp objects.

NORMAL OPERATING CONDITIONS FOR HANWHA SOLAR MODULES

Operating conditions

- The operating temperature of PV module should be within -40°C to 85°C (-40°F to 185°F).
- Ensure adequate ventilation behind the module, especially in hot environments.
- Modules must not be exposed to direct contact with salt water/spray. Any installation in areas subject to high salt mist concentration must be avoided.
- Other sources of corrosion, including sulfur (from sulfur sources such as volcanoes), can also lead to performance degradation and should be avoided.

Location conditions

The following location conditions should be avoided when installing a module:

- Location with potential for extreme sand and dust damage.
- Location with extreme air pollution, chemical vapors, acid rain, and/or soot, etc.
- Location with extreme hail and/or snow.
- Location with potential extreme salt damage.

MAINTENANCE AND CARE

Dirt on the surface of the solar module may decrease power generation. Keep module surface free from any dirt which potentially shades the cells. An at least 10 degree inclination supports the self-cleaning function of the glass. If you still need to clean the module or if soiling on the module glass becomes excessive, use a soft cloth and water for cleaning.

CAUTION: DO NOT USE ABRASIVE DETERGENTS

Please consult with system designer to decide the cleaning frequency according to local environmental conditions. Once a year, check the electrical and mechanical devices to ensure every connection is tight. The system must be periodically inspected.

These symbols on the products, packaging, and /or accompanying documents mean that end of life photovoltaic modules should not be mixed with general household waste.
For proper treatment, recovery and recycling of end of life photovoltaic modules, please take them to applicable collection points in accordance with your national legislation.
These symbols are only valid in the European Union. For countries outside the European Union: If you wish to discard end of life photovoltaic modules, please contact your local authorities or dealer and ask for the correct method of disposal.

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