

# Installation Guide

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

HSL72P6-PC-1-xxx(W/B)

HSL60P6-PC-1-xxxE

HSL72P6-PC-1-xxxE

HSL60P6-PC-3-xxx(W/B)

HSL72P6-PC-3-xxx(W/B)

HSL60P6-PC-3-xxxE

HSL72P6-PC-3-xxxE

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Note: 1. "xxx" indicates nominal power output  
2. "B" denotes black diamond module  
3. "W" denotes white back sheet and black frame  
4. "E" denotes anti-salted property

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## 1. GENERATION INFORMATION

Hanwha SolarOne 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 SolarOne modules:

### IEC 1000V

HSL60P6-PC-1-xxx (W/B); HSL72P6-PC-1-xxx (W/B); HSL60P6-PC-1-xxxE; HSL72P6-PC-1-xxxE

### UL 1000V

HSL60P6-PC-3-xxx (W/B); HSL72P6-PC-3-xxx (W/B); HSL60P6-PC-3-xxxE; HSL72P6-PC-3-xxxE

### 1-1. Purpose Of This Guide

This guide contains important information regarding the installation, safe handling and maintenance of photovoltaic modules made by Hanwha SolarOne. 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.

SolarOne provides technical support worldwide. Visit [www.hanwha-solarone.com](http://www.hanwha-solarone.com) for contact information.

### 1-2. Disclaimer Of Liability

The installation techniques, handling and use of the product are beyond company control. Therefore, Hanwha SolarOne 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 “Installing Module”). All work on a PV system (installation, setup, maintenance) must be carried out only by appropriately qualified and authorized engineers. The appropriate DIN standards, construction rules and safety instructions must be followed during installation.

### 1-3. IEC/EN61730 Information

Hanwha SolarOne 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).

### 1-4. UL1703 Information

1. Rated electrical characteristics are within 10% of measured values at Standard Test Conditions of: 1000W/m<sup>2</sup>, 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 4.0 in. If other mounting means are employed, this may affect the UL Listing.
3. The modules have been evaluated for a maximum positive or negative design loading by UL1703.
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).

### 1-5. Safety Instruction

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.



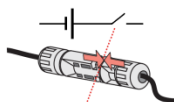
Do not insert any electrically conducting materials into the plugs or sockets.



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



Make sure to use proper safety equipments (insulated tools, insulated gloves, etc.) when wiring.



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



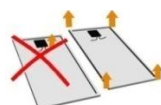
To avoid the generation of an electric arc, ensure the connectors are clean and have not been contaminated, and that the electrical connection and mechanical joint are good.

### 1-6. Unpacking and storing module

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



Do not strike or physically damage the module.



Carry modules with both hands. Do not use the connection socket as a handle; Avoid cutting and damaging the frame during handling and installation.



Do not stand on the module.



Do not twist the module.



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

Additionally, unpacking module carton box with care and follow below instructions:

1. Cut the packaging with care avoid hurting people;
2. Carry module out of carton box with two or more people;
3. Carry modules with proper method in case of module breakage;
4. Place the module with proper support, do not place one on top of each other.

## 2. SYSTEM DESIGN, MOUNTING AND INSTALLATION

### 2-1. System Design

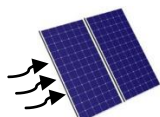
Before installing your solar system, contact local authorities to determine the necessary permit, installation and inspection requirements that must be followed.

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.

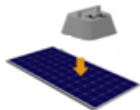
PV modules should be mounted in a location where they will receive maximum sunlight throughout the year. Specially, in the Northern Hemisphere, the modules should face South. And in the Southern Hemisphere, the modules should face North.



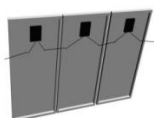
In order to achieve maximum annual yield, optimum orientation and tilt of PV module is necessary. Sunlight shining vertically and completely onto PV module is the best condition to generate maximum power. Artificially concentrated sunlight shall not be directed on the module.



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 5400Pa.



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 keep electricity from being generated. The products should be installed in locations that are not accessible to contact under working conditions.

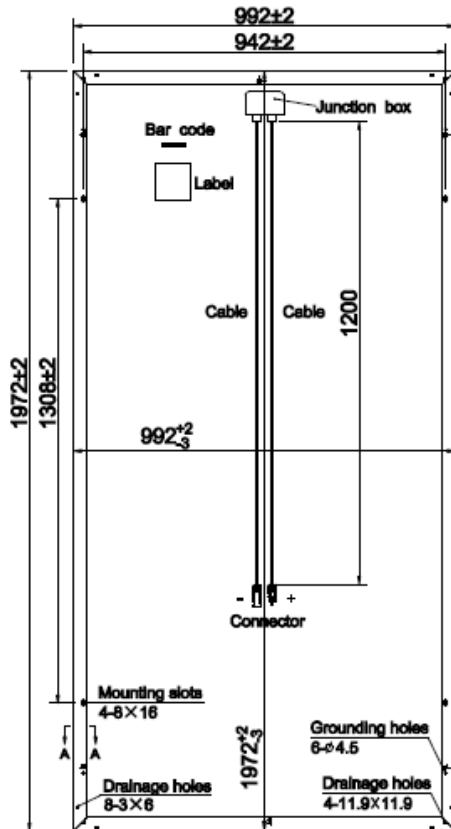
### 2-2. Mechanical Mounting

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.

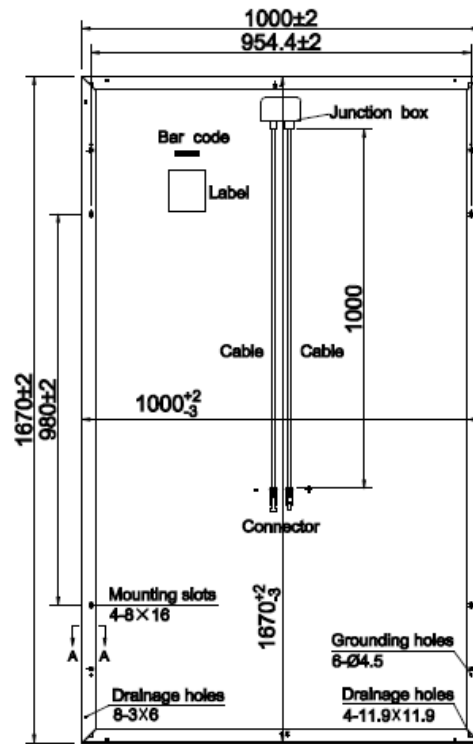
To prevent bending, vibration, mechanical stress or warpage, mount the module onto a flat contact surface.

Secure the module along the long edges with the correct number of clamps. Use all the mounting points provided and avoid direct contact between glass and metal (e.g. mounting rails).

### 2-3. Module Specification



HSL72 Series

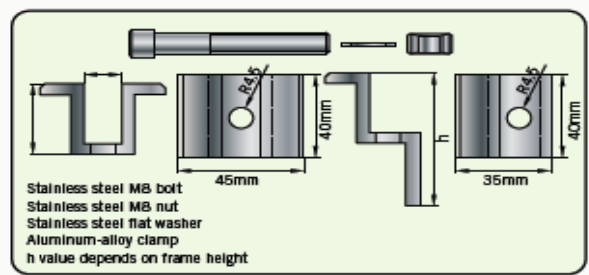
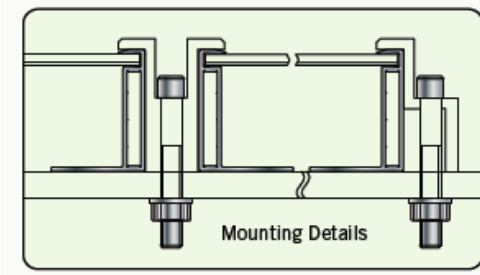


HSL60 Series

### 2-4. Mounting Methods For Hanwha SolarOne Modules

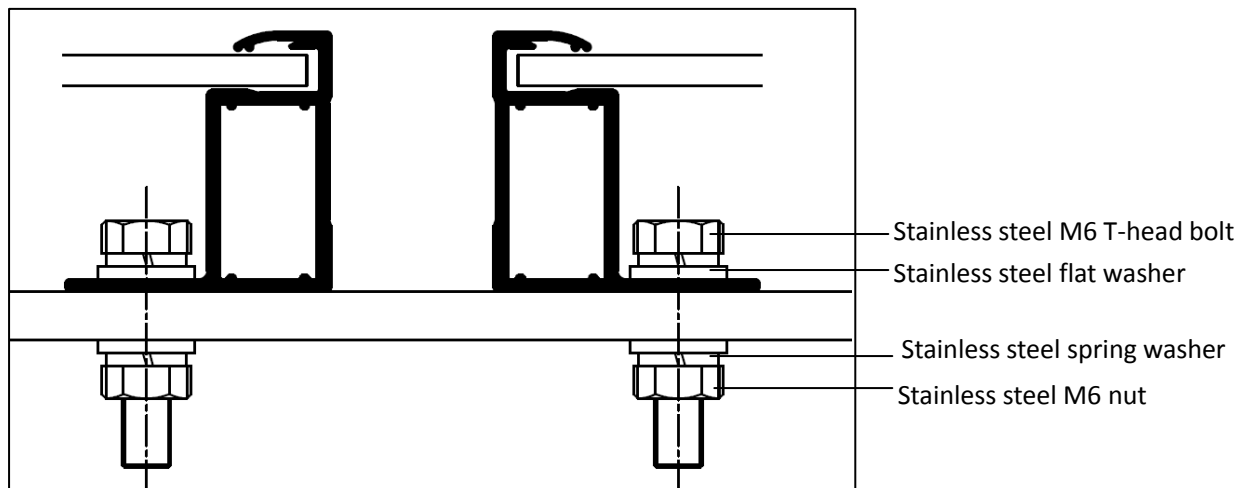
Option A: Clamping mounting	Option B: Bolting mounting
<p>The module may be clamped only in the permitted clamping areas as indicated on following drawings. And the module clamps must not overlap the glass or shade the module surface. Recommended tightening torque: 5Nm.</p>	<p>Use the existing installation holes instead of drilling additional holes for installation (Drilling holes shall against the reliability and warranty of the module). The installation and attachment materials (nuts, bolts, etc.) must be corrosion-resistant. Recommended tightening torque: 5Nm.</p>

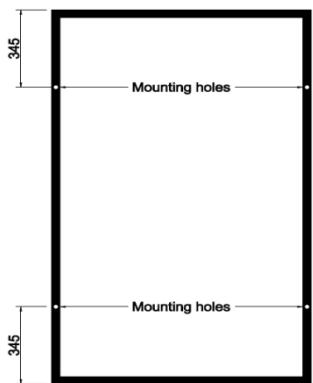
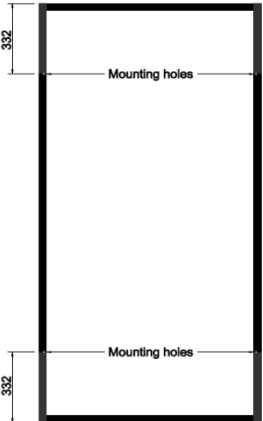
#### Option A: Clamping drawing



Installation Method	Snow/Wind Pressure 5400/4000 Pa		Snow/Wind Pressure 5400/2400 Pa
	HSL60	HSL72	HSL60 & HSL72
Clamping long frame			
Clamping short frame			

Option B: Bolting drawing



Installation Method	Snow/Wind Pressure 5400/4000 Pa	Snow/Wind Pressure 5400/4000 Pa
	HSL60	HSL72
Bolting Mounting		

### 3. ELECTRICAL INSTALLATION-WIRING

#### 3-1. Correct wiring scheme

To minimize the risk of 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 (Voc) and short-circuit current (Isc) differ from the specifications, there may be a wiring fault.

#### 3-2. Solar module plug connectors

All solar modules are equipped with solar cables with 4-6mm<sup>2</sup> serving a temperature range from -40°C to 90°C. Furthermore, customer also can specify the cable length. 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.

#### 3-3. 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 Isc and Voc 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: 15A for modules with 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.

#### 3-4. 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 SolarOne modules are equipped with factory installed bypass diodes. The factory installed diodes provide proper circuit protection for the system.



### 3-5. 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.

## 4. GROUNDING:

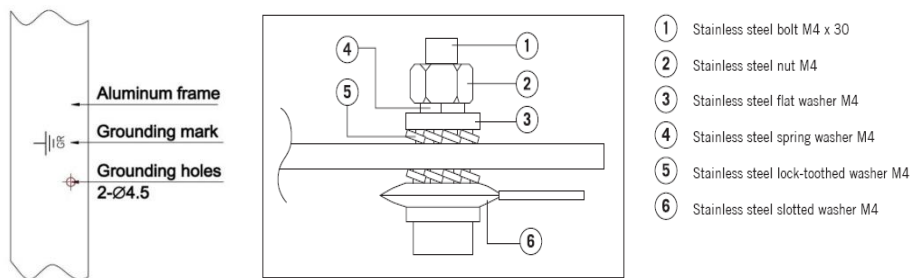
To avoid the risk of electrical shock or fire, the module frame should be grounded before the electrical connection of the modules is operated.

The frame shall be grounded in accordance with local electrical requirements. A good connection between 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 ground, the grounding hardware should penetrate the anodized layer.






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.

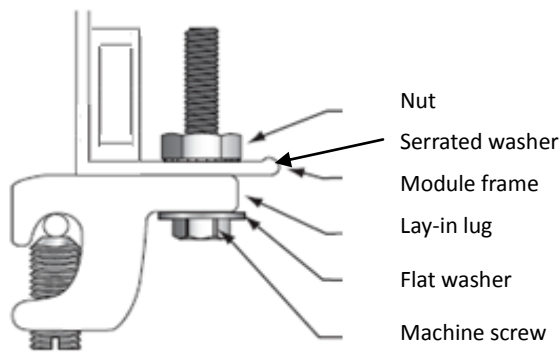
Hanwha SolarOne recommends using the follow components or equivalents.

#### Option A: bolting ground



#### Option B: Grounding lug with machine screw at frame hole

Component	Example for manufacturer	Example for manufacturer part number	Example for picture
Lay-in lug	IlSCO	GBL-4DBT	
Machine screw	Fastenal	0170682	
Nut	McMaster	91841A007	
Flat washer	McMaster	92141A007	
Serrated washer	McMaster	91120A140	



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.

## 5. LIMITED ENVIRONMENTAL CONDITIONS

Hanwha SolarOne's Limited Warranty for module is based upon modules being mounted in accordance with following conditions.

### 5-1. Operating conditions

The operating temperature of Hanwha SolarOne 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 (Sulfur sources such as volcanoes), can also lead to performance degradation and should be avoided.

### 5-2. Location conditions

The following locations should be avoided when installing a module:

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

## 6. MAINTENANCE AND CARE

Dirt on the surface of solar module may decrease the power generation. Hanwha SolarOne modules have a self-cleaning function under rainfall weather condition. Module with a mounted tilt angle more than 15° is more effective than other mounting angle. If heavy soiling build-up is excessive on module glass, use a soft cloth and water for cleaning. **CAUTION: DON'T 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.

Visit [www.hanwha-solarone.com](http://www.hanwha-solarone.com) for more information.

Hanwha SolarOne provides detailed technical support, worldwide.

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