HT-SAAE HT60-166M-370 370W Mono HC PV Module Instruction Manual

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Table 1: This installation manual applies to component product models, and mechanical and electrical performance ratings under standard test conditions.

PV Modle	Pmax W	Voc V	Isc A	Vmp V	Imp A	Maximum sys tem
HT60-166M-370	370	41.5	11.72	34.1	10.86	1500
HT66-166M-415	415	45.8	11.93	38.2	10.88	1500
HT54-18X-415	415	37.48	14.06	31.60	13.14	1500
HT60-18X-440	440	41.03	13.76	34.48	12.77	1500
HT60-18X-450	450	41.33	13.90	34.78	12.95	1500
HT60-18X-460	460	41.63	14.04	35.08	13.13	1500
HT60-18X-465	465	41.78	14.11	35.23	13.22	1500
HT72-18X-550	550	49.80	14.00	41.95	13.12	1500

Thermal Coefficient

Type	M
Pm	-0.39%
Voc	-0.29%
Isc	0.049%

Contents

Preface Introduction

Thanks for purchasing PV modules of **Shanghai Aerospace Automobile Electromechanical Co., Ltd**. .This manual refers to PV modules manufactured or sold by our company.

This manual contains the information of installation and safe handling of HT's PV modules (hereafter is referred to as "module").

All instructions shall be carefully read before installation. Please contact our sales department for further information if have any question.

The installer shall be familiar with the mechanical and electrical requirement of PV system. The installer shall comply with safety precautions listed in this manual and local law regulations when installing the modules.

Our company does not take the responsibility for the loss, damage, or expense arising that caused by any violation of this manual.

This manual shall be properly kept for future reference (care and maintenance) and in case of sale or disposal of the module at the end of its useful life.

Our company reserves the right of final interpretation of this installation manual.

Warnings

1. It requires specialized skills and knowledge for installation of solar photovoltaic systems. It shall be performed

by qualified licensed professional installation personnel.

2. 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.
3. Apply modules to such as ground, roofs etc. outdoor environment. Appropriate rack structure shall be designed by system designer or installer.
4. Do not disconnect the cables of modules when modules are on operation.
5. Do not disassemble modules or move nameplate or any adhesion parts of modules.
6. Do not place the modules where it is easy to produce or gather combustible gases.
7. Artificially concentrated sunlight shall not be directed on the module.
8. Any dropping or covering on module sis not allowed. Do not tread,stand or walk on modules.

9. Do not pull or drag the modules by cables or connectors.
10. Keep children away from modules during transportation and installation.
11. Do not touch live terminals with bare hands. Use insulated tools for electrical connections.

12. Do not wear metal rings, bracelet, earrings, nose rings, lip rings or other metal accessories during transportation and installation.
13. Do not drill on the glass surface of module which will void its warranty.
14. Do not destroy the modules edge seal which will void its warranty.
15. Make sure the connection between the rack and PV module is firmly and without loosen.
16. It may affect fire resistance of the house if roof-mounted; fire rating of the modules is rated as Class C according to IEC61730: 2016, which shall be installed on the roof fire-rated above Class C. The system fire rating should always be evaluated along with the roof cover and mounting system. The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.

Product Identification

1. **Each module has a label on the back containing following information:**
   Product type, weight, size, fuse current, the system max voltage, rated power measured under standard test conditions, ated current, rated voltage, open circuit voltage, short circuit current.
2. Bar code (serial number): each module is registered with a unique serial number. It is permanently fixed in the module, which can be seen in front of module.

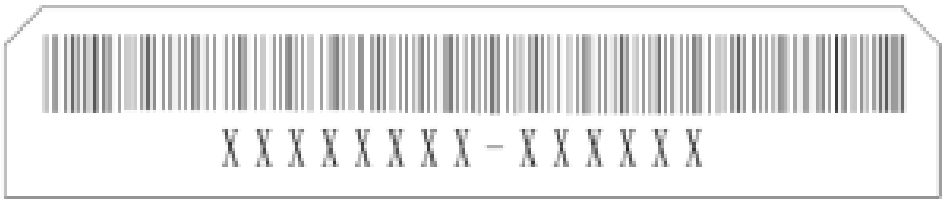


Figure 1 Bar Code

Tools & Materials for Installation

1. Screwdriver
2. Wrench
3. Mounting bracket
4. Stainless steel screws, nuts, washers, clips and other accessories.

System design

Please use the the equipments, connectors, wires and rack which match with solar power system. In a particular system, be sure to apply the same type of modules. Please refer to the short-circuit current (Isc) nd open circuit voltage (Voc) showing on modules' label as proper value to install and design when determining settling parameters such as rated voltage, the wire capacity, fuse, the controller capacity and module output power of relevant parts of PV system.

In normal outdoor conditions, the generated current and voltage maybe different from the parameters listed in Table. Parameter table is measured under standard test conditions (STC), so concerning settling parameters of other parts of photovoltaic power generation system, such as rated voltage, the wire capacity, fuse, the controller capacity and module power output, it shall refer to the short-circuit current (Isc) and open circuit voltage (Voc) noted on modules' label, with the redundancy value of 125% for design and installation.

Make sure the array of modules installed within the Maximum permitted system voltage and the rating current and voltage of the sub-equipments such as regulators and inverters. The maximum permitted system voltage (DC) of the modules sold in Europe is 1500V.

The connection of modules: in accordance with system design, requirements of output voltage and current, modules can be series or parallel connected by their connecting wires; the maximum number of modules in series (N) is equal to the maximum system voltage Vmax divided by the open circuit voltage Voc of one single module; the number of modules in parallel is related to the selection of electrical equipment (inverters, controllers) under standard test conditions.

$$N \leq \frac{Vmax}{Voc * [1 + Tc(voc) * (Tmin - 25)]}$$

- **N:** Number of modules in series.
- **Vmax:** Maximum system voltage
- **Voc:** Open circuit voltage of each module(refer to product label or data sheet).
- **Tc(voc):** Thermal coefficient of open circuit voltage for the module(refer to data sheet).
- **Tmin:** The lowest ambient temperature

Location Selection

1. The module should be installed at an ambient temperature of –40 °C to +40 °C. The module's limit working ambient temperature range is from –40 °C to +85 °C.
2. 2 The maximum altitude for HT PV module is 2000m.
3. Under standard test conditions (1000W / m² irradiance, AM 1.5 spectrum, 25 ° C (77 ° F) ambient temperature), the electrical performance parameters of modules, such as Isc, Voc, and Pmax. Tolerance of rating Pmax is±3%,Voc and Isc is±5%.
4. A suitable installation location shall be carefully selected for modules.
5. In the northern hemisphere, modules had better be installed facing south direction; in the southern hemisphere, modules had better be installed facing north.
6. The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface (as shows in Figure 1). The PV module generates maximum output power when it faces the sun vertical. If you want the specific information of best install tilt angle, please consult the local authoritative solar system construction company.

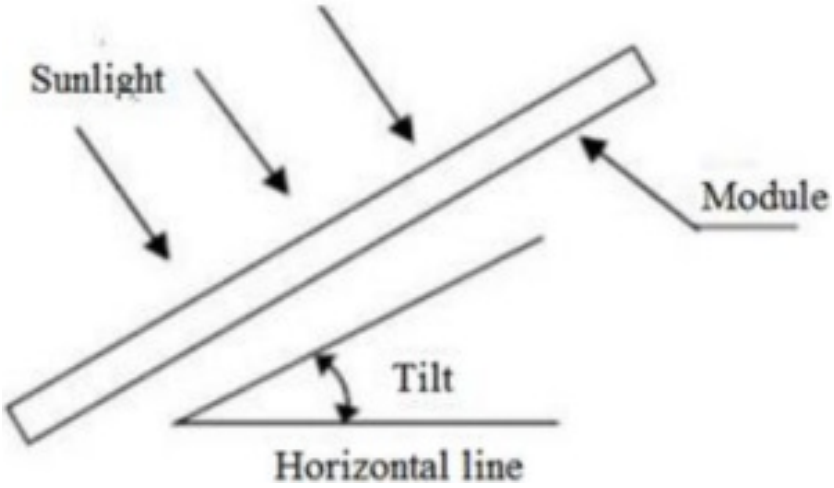


Figure 2 PV module tilt angle

7. Modules shall be installed in the position of full sun exposure and not be obscured at any time.
8. The modules have a guarantee of 25 years of useful life when installed 3 km away from the sea; if the installation site is within 500m to 3000m from the sea, the modules may require additional protection such as an increase to the oxide film of the alloy frame. This only applies to particular regions, please check certification documents for your region.

Choosing the appropriate inverter

It need take the output power, open-circuit voltage, short-circuit current of PV modules array into consideration when choose inverter type. And the minimum voltage of the module array should be higher than the threshold voltage of inverters to guarantee the inverters proper functioning.

Choose the appropriate rack

The load calculation should be charged by system designers and installers to make sure all modules could bear predetermined load conditions. The choosing rack should pass all the inspection and test by third party test institution which possessing static mechanics analysis ability.

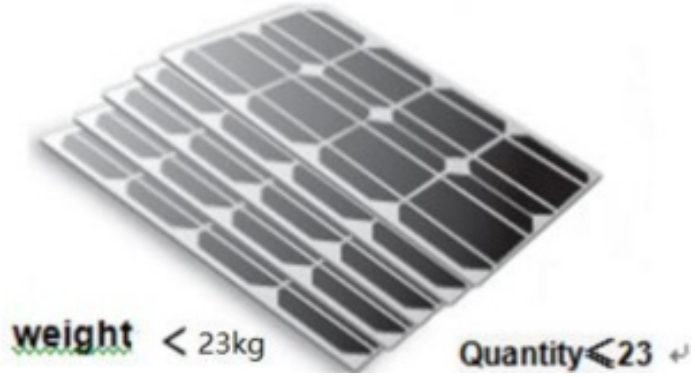
Modules Installation

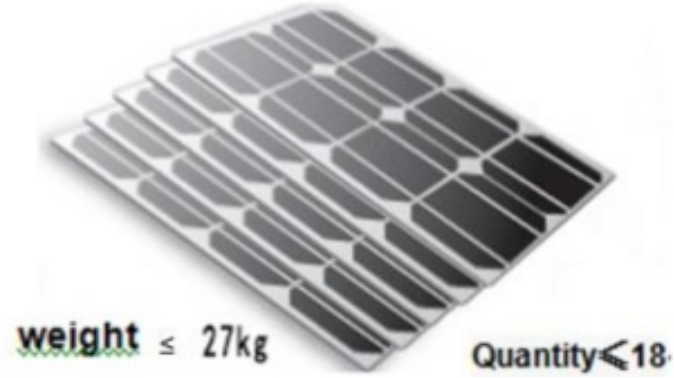
Modules unpacking

1. When the modules are shipped to installation place, do not unpack modules in humid and rainy weather.
2. After being unpacked, the modules shall be placed horizontally; the tilt, heap pressure, leaning stack way are prohibited.

Figure 3 Modules stack illustration

3. After unpacking the modules, do not remove the cover, and modules shall be loaded on roughness surface or table.
4. Distance shall be kept between two batches of modules, no more than 23pcs modules shall be piled up together (it is recommended that no more than 23pcs modules whose weight is less than 27kg shall be piled up, and no more than 18pcs modules whose weight is no less than 27 kg shall be piled up).

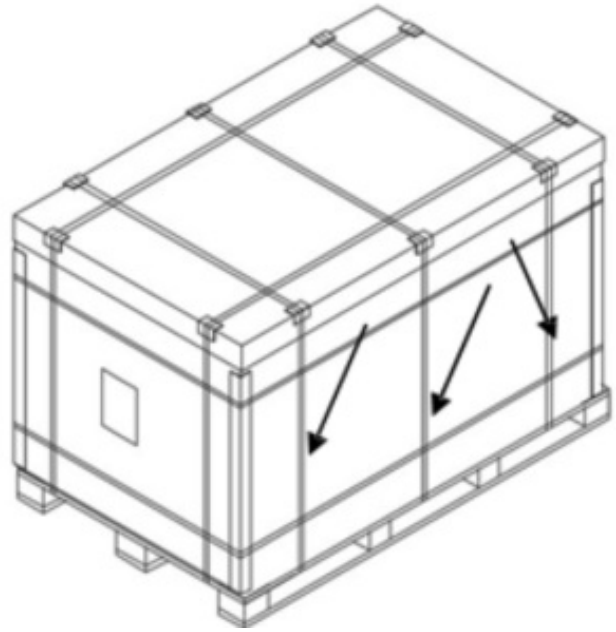




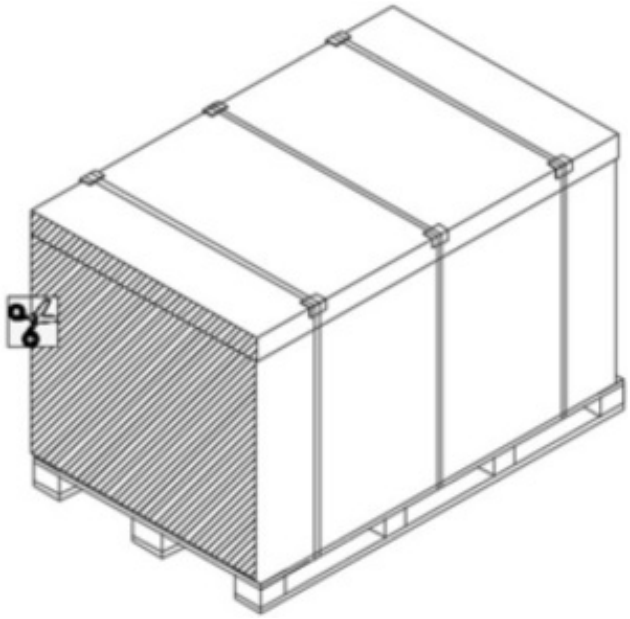
5. Unpacking the package should refer to the following instructions as Figure 3, Any rude operation or use crowbar clench into the boxes are prohibited. Pay attention to personal safety and modules safety when using tools.

Unpacking paper boxes process

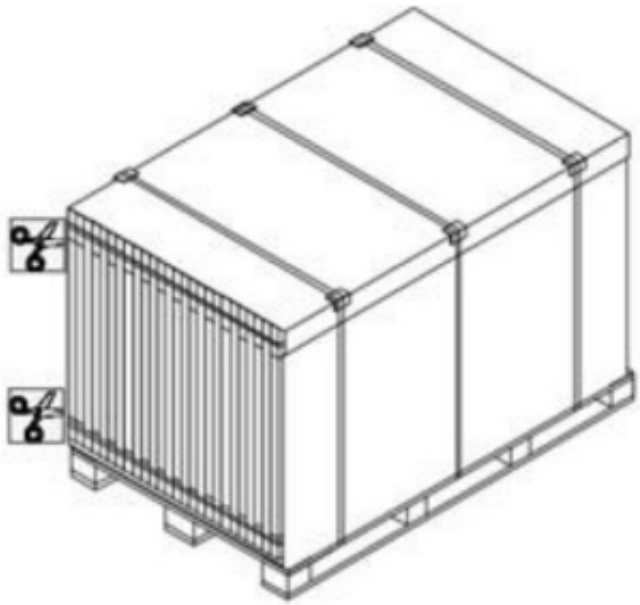
1. Do not remove the 3 packing belts indicated by the arrow, and remove the other packing belts of the package.



2. Remove one side of the package (shaded part).



3. Cut the 2 horizontal packing belts in the carton.



4. Disassembly modules from side. According actual surrounding, avoid tipping over or sliding of unpacking modules.

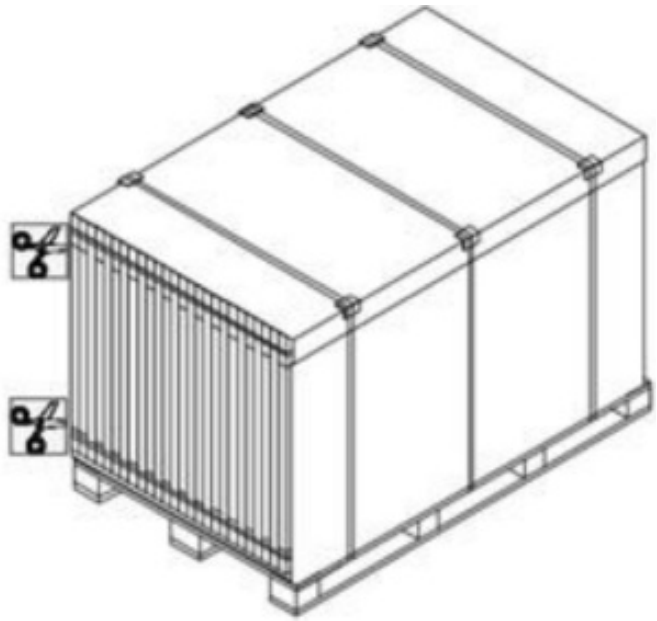


Figure 4 Upacking process

Mounting with Clamps

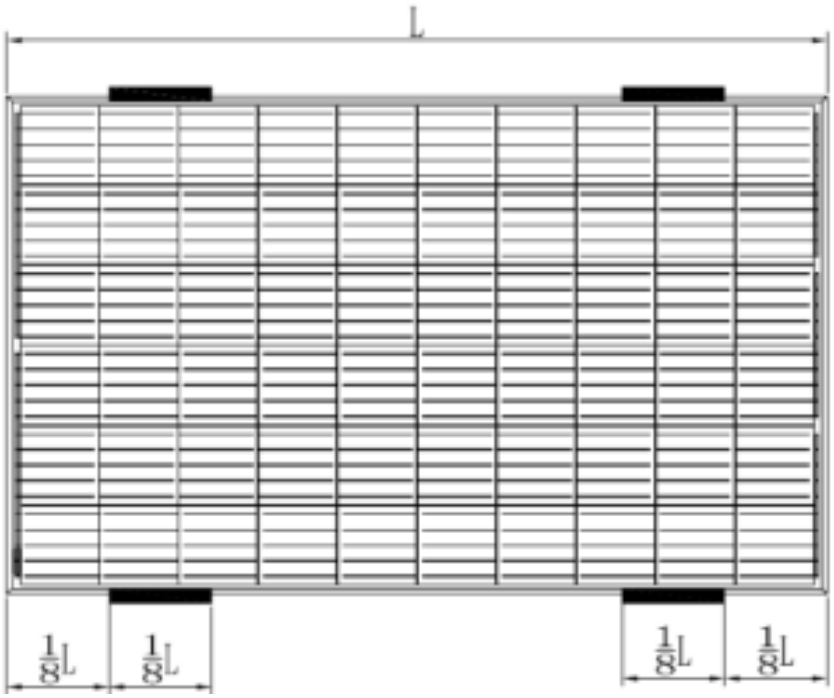
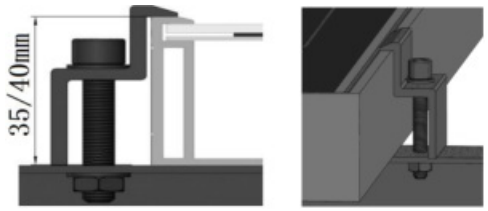
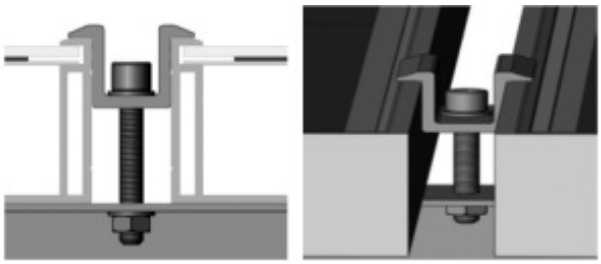
We have tested its modules with a number of clamps from different manufacturers and recommends the use of clamps which have an EPDM or similar insulating washer, fixing use M8. The clamp must overlap the module frame by at least 0.28 in but no more than 0.39 in. All the installation methods described here are for reference only. We are not responsible for the design and installation of relevant modules and photovoltaic systems. Mechanical load and safety of components must be performed by a professional system installer or someone with relevant qualifications.

- Use at minimum 4 clamps to fix modules on the mounting rails.
- Modules 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, use at least four clamps on each module, two clamps should be attached on each long sides of the module (for portrait orientation) and each short sides of the

module (for landscape orientation). Depending on local wind and snow loads, additional clamps may be required to ensure that Unpacking paper boxes process modules can bear the load.

- Applied torque should refer to mechanical design standard according to the bolt customer is using,
- M6 —- 70 lbf*in
- M8 —- 140 lbf*in

The modules negative design loading 2400Pa, with 1.5 times safety factor(wind load/snow load).

<table>
<tr><td colspan="3">mounting with clamps at longside of module- Load≤3600Pa(Using 4 clamps)</td></tr>
<tr><td rowspan="5"> 
</td><td>NO.</td><td>L*W(mm)</td></tr>
<tr><td>1</td><td>1924*1038</td></tr>
<tr><td>2</td><td>1724*1134</td></tr>
<tr><td>3</td><td>1909*1134</td></tr>
<tr><td>4</td><td>2279*1134</td></tr>
<tr><td colspan="3">Notes: L is the length of PV module, W is the wide of module ,and the black shaded part is the installation rang e.</td></tr>
<tr><td>End Clamp installation(35mm/40mmoptional)</td><td colspan="2">Middle Clamp installation</td></tr>
<tr><td> 
</td><td colspan="2">  </td></tr>
<tr><td colspan="3">SPV module installed with clamp fitting method.</td></tr>
</table>

Mounting with Bolts

The frame of each module has 14 x 9mm mounting holes, ideally placed to optimize the load handling capability,

to secure the modules to supporting structure.

- To maximize mounting longevity, our Solar strongly recommends using corrosion proof (stainless steel) fixings.
- Secure the module in each fixing location with an M8 bolt and a flat washer, spring washer and nut as shown in Figure 5 and tighten to a torque of 140 lbf*in.

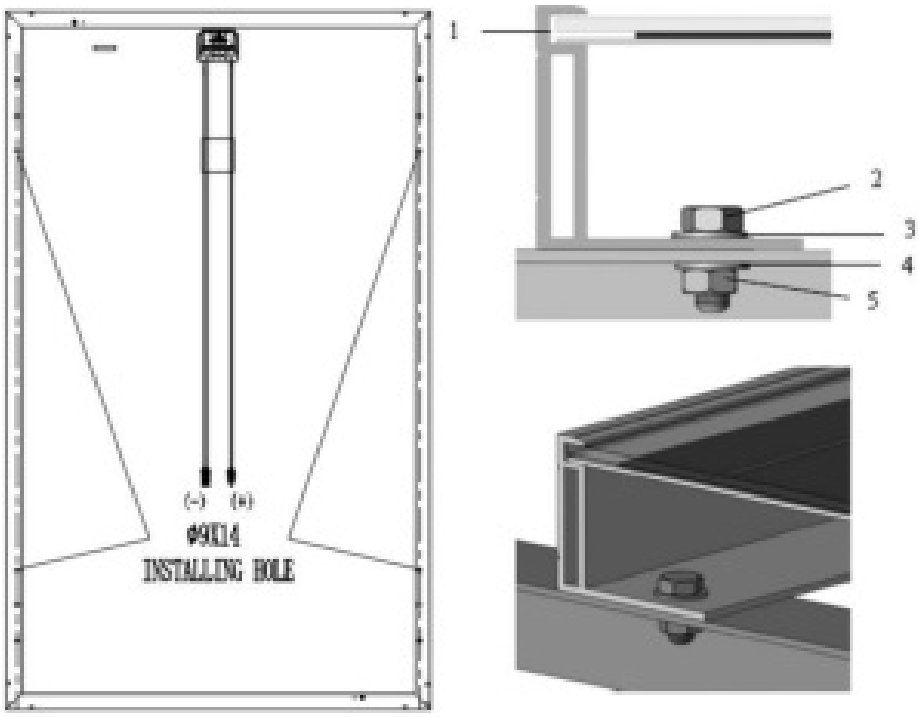


Figure 5. SPV module installed with Bolt fitting method

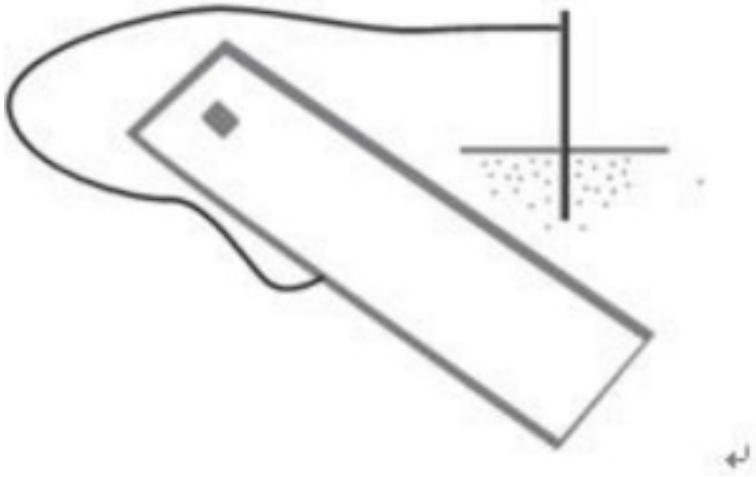
1. Aluminum Frame
2. M8 Stainless bolt
3. Flat Stainless Washer 4 Spring Stainless Washer
4. HEX Stainless Nut

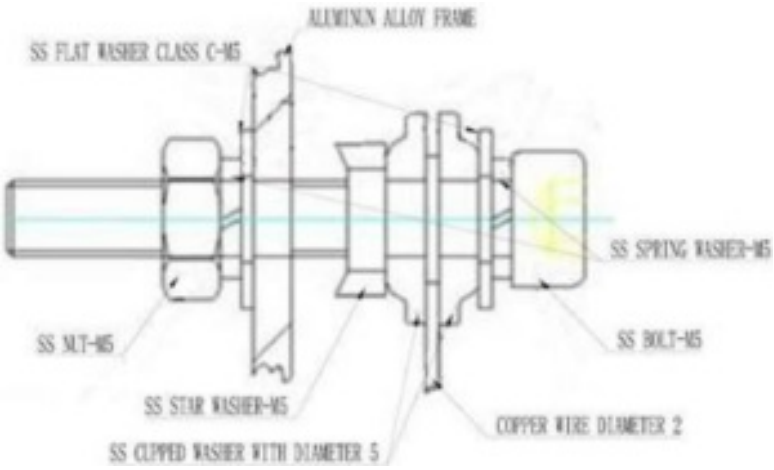
Mounting with Bolts			
NO.	L*W(mm)	Load≤3600Pa	Load≤3600Pa
		Using 4 installation holes with S or P holes	Using 4 installation holes with S holes
1	1924*1038		
2	1724*1134		
3	1909*1134		
4	2279*1134		

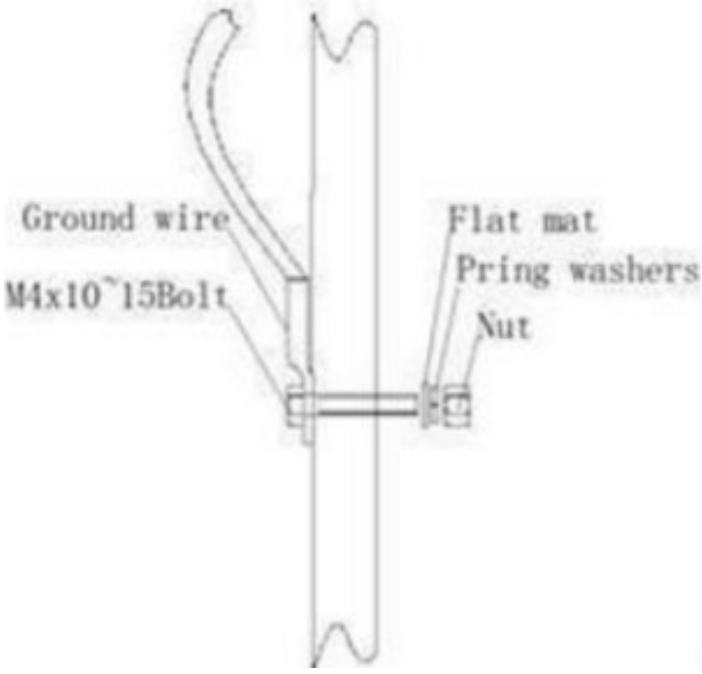
Electrical connection

1. Please read the electrical wiring drawings carefully before wiring, when the modules followed the IEC standard,the maximum system voltage is 1500V DC.
2. The connection of module and junction box is as following. The modules are connected with junction connectors, such as PV-JK03M-2, PV-CO02, PV-HT002-1, PV-HT03, PV-KST4-EVO 2/ xy_UR (male) and PV-KBT4-EVO 2/XY UR(female). Meanwhile, the diode UKTH0345-12, UKTH0345-13, GFMK6045C and GFMK6045 are used in the junction box. The cross-sectional area of cable and the connector capacity must be satisfied the system's short circuit current the cable's cross-sectional area for a single module is recommended to be 4mm 2 , The outer diameter of the cable could be selected 5-7mm. The fuse current and the rated current of the connector should be higher than 2 0 A(In 18X series module situation, both fuse current of cable and rated current of connect should be ≥ 25A.). Otherwise, the cables and connectors will overheat due to high current. Please note that the highest temperature of cable is 90 ℃, and the highest temperature of connector is 125 ℃.
3. Aluminum frame and brackets of modules must be grounded with four ground holes of each module, which is marked on frames (it is recommended that each series/parallel of modules should be grounded once). The specific location of the grounding holes can be seen as the figure below. The ground wire and frame will be reliable grounding through the reserve grounding holes,by the installation bolts M4X10 ~ 15 matching plain washers, spring washers and nuts. Modules and ground cables shall be connected perfectly by wiring nose. Negative grounded inverters can be installed to prevent PID phenomenon.
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.

5. 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.







6. The electrical connection shall conform to local electrical laws and regulations, “Y” type electrical connection mode is not allowed in module system electrical connection.
7. Modules are equipped with bypass diodes rated voltage 45V, rated current 20A ; improper installation may damage diodes, cables or wiring box.
8. Please wrap the connectors after taking out the modules without immediate installation so as to prevent damage caused by wind or rain. Use of lubricant for connectors is prohibited, because it leads fracture of

connectors.

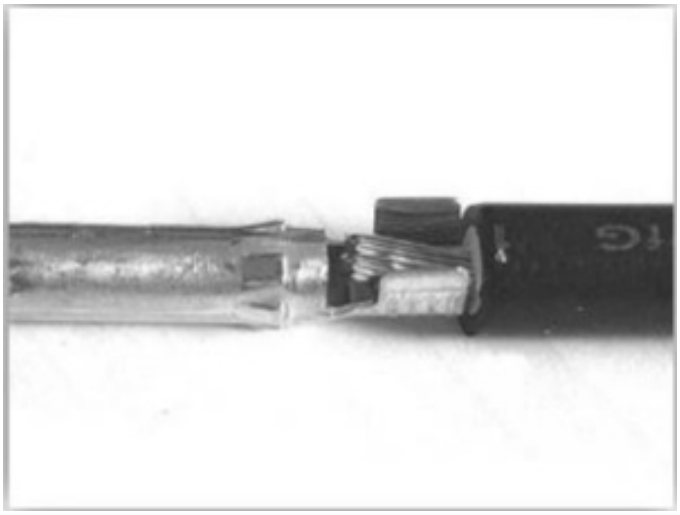
9. Do not remove the waterproof rubber rings out of the junction box or connectors.
10. Use of diesel oil for heating is strictly prohibited at installation site, which may lead to connector failure because the gas after combustion of diesel and other petroleum products.
11. Connector Installation Process.
    1. **Cutting and Stripping Cable Process:**

       Use the Wire Cutter to cut out the required length of the cable. The cable is placed in a suitable position, using Strip Clamp to strip cable, the striped cable should be controlled within 7±0.1mm.

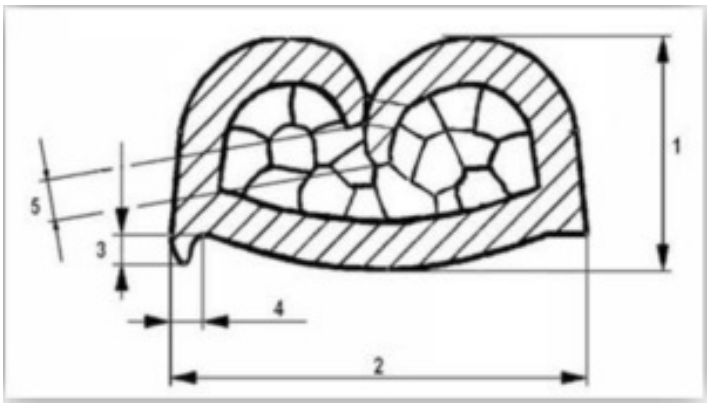
    2. **Crimping Process:**

       Insert striped cable into contact barrel and insure all conductor strands are captured in the contact barrel. Inset the cable cores until the insulation comes up against the crimp insert. Completely close the crimping pliers.

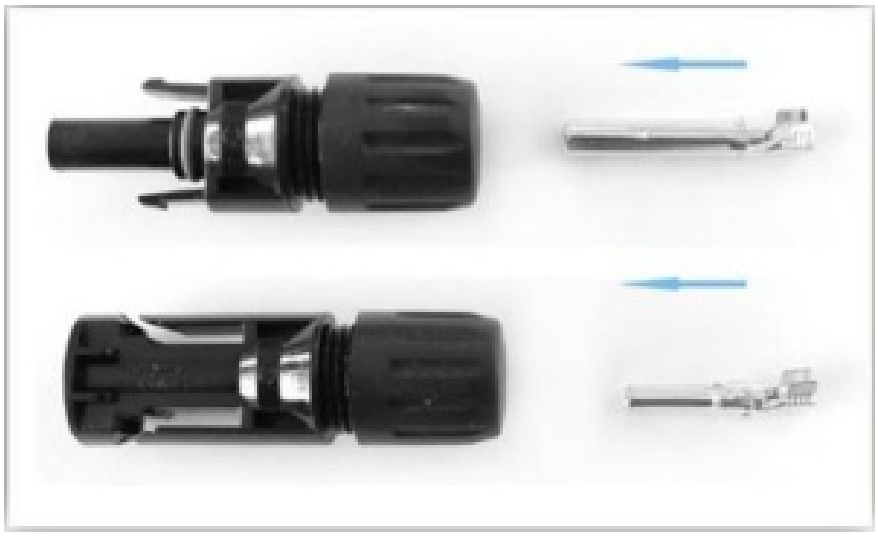
3. **Crimping and No Soldering:**

   Using specified Crimping Blade to crimping cable and Pin\Contact, the pull force between cable and metal parts should be more than 310N after crimping.



4. Crimping and Soldering: The pull force between cable and metal parts should be more than 150N after crimping. Tin liquor need to melt into the crimping opening, not only melt on the surface. The pull force between cable and metal parts should be more than 310N after soldering.

5. Insert crimping socket and pin into back of male and female connector. A “click” should be heard or felt when the contact cable assembly is seated in correct position



6. When installing the back cap, need to pre-tighten by hand, then tighten the back cap with the lock too.

Maintenance

1. Check all electrical connectionsto ensure that there is no open circuit and well connected.
2. Check the open circuit voltage of each module:
3. Covered the modules completelyby non-transparent material.
4. Disconnect the wire terminals.
5. Remove the non-transparent material off the modules; check and measure the terminal open circuit voltage.
6. If the measured voltage is reduced by 1/4, it supposed to be bypass diode damaged. Please test the bypass diode performance.
7. It’s recommend that adopt the following maintenance to ensure the modules maintain the best performance:
8. If necessary, Please clean the glass surface of modules by soft sponge or wiping cloth with water. Amild without abrasive cleaning agent can be used to remove stubborn dirt.
9. Mechanical and electrical checks are required every six months to ensure the modules’ connectors clean and reliable connected.
10. It need ask qualified person to check the modules if have any doubt on the modules.
11. Please note that all maintenance instructions, such as brackets, charging rectifier, inverters and batteries,shall be complied.

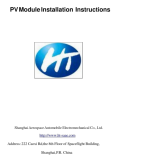
Appendix A
Importer information

1. **Company:** ASC Energy Pty Ltd
2. **ABN:** 99156499133
3. **Web:** www.ascenergy.com.au
4. **Email: info@ascenergy.com.au**
5. **Tel:** 1300 309 008

Appendix B

Standard test conditions:A=1000W/m²,AM=1.5,Tc=25°C.Tolerance of rating Pmax is ±3%,Voc is ±5% ,Isc is ±5%.The electrical properties of Isc, Voc and Pmax are subject to change without notice.

Documents / Resources

	HT-SAAE HT60-166M-370 370W Mono HC PV Module [pdf] Instruction Manual HT60-166M-370, 370W Mono HC PV Module, HT60-166M-370 70W Mono HC PV Module, HT66-166M-415, HT54-18X-415, HT60-18X-440, HT60-18X-450, HT60-18X-460, HT60-18X-465, HT72-18X-550