Installation guide
for Long Energy photovoltaic module

Purpose of this guide

This guide contains information regarding the installation and safe handling of photovoltaic modules made by Suzhou Shenglong PV-Tech Co., Ltd (hereafter referred to as "modules") Suzhou Shenglong PV-Tech Co., Ltd hereafter is referred to as "Long Energy".

All instructions should be read and understood before installation commences. If there are any questions, please contact our sales department for further assistance.

The installer should conform to all the safety precautions in the guide when installing the module. Local standards should also be followed in such installations.

Before installing a solar photovoltaic system, the installer should become familiar with the mechanical and electrical requirements for such a system. Keep this guide in a safe place for future reference (maintenance) and in case of disposal of the module.

General

◇ Installation of solar photovoltaic systems may require specialized skills and knowledge. Installation should be performed only by qualified persons.

◇ All modules come with a permanently attached junction box. The modules have two 2 PfG 1169 wires terminated in ZJRH 05-1 connectors and the wires which have the TUV certificate use 90cm long and 4 mm² (-40 ºC~90 ºC) wires terminated in ZJRH PV-RH701 junction box. Long Energy can provide customers with fitted cables for easy installation, if desired.

◇ The installer assumes all risk of injury that might occur during installation, including, but not limited to, the risk of electric shock.

◇ One individual module may generate DC voltages greater than 30 volts when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.

◇ When disconnecting wires connected to a photovoltaic module that is exposed to sunlight, an electric arc may result. Such arcs may cause burns, may start fires and may otherwise create problems. Therefore, be extremely careful!

◇ Photovoltaic solar modules change light energy to direct-current electrical energy. They are designed for outdoor use. Modules may be ground mounted, mounted on rooftops, vehicles or boats. Proper design of support structures are the responsibility of the system designer and installer. Use of mounting holes is suggested in a following paragraph, the grounding component must be separately uesd from the mounting parts of the module.

◇ Do not attempt to disassemble the module, and do not remove any attached nameplates or components.

◇ Do not apply paint or adhesive to the top surface of modules.

◇ Do not use mirrors or other magnification device to artificially concentrate sunlight onto the modules.

◇ When installing the system, abide with all local, regional and national statutory regulations. Obtain a building permit where necessary. Abide with any local and national regulations when mounting on vehicles or boats.

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Safety precautions for installation of solar photovoltaic systems

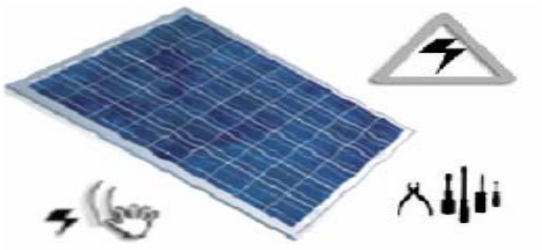
◇ Solar modules produce electrical energy when light shines on their front surface. The DC voltage may exceed 30V. If modules are connected in series, the total voltage is equal to the sum of the individual module voltage. If modules are connected in parallel, the total current is equal to the sum of individual module current.

◇ Keep children well away from the system while transporting and installing mechanical and electrical components.

◇ Completely cover the module with an opaque material during installation to keep electricity from being generated.

◇ Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting photovoltaic systems.

◇ Only use approved insulated tools for electrical installation work.



◇ Abide with the safety regulations for all other components used in the system, including wiring and cables, connectors, charging regulators, inverters, storage batteries and rechargeable batteries, etc.

◇ Use only equipment, connectors, wiring and support frames suitable for use in a solar electric system. Always use the same type of module within a particular photovoltaic system.

◇ Rated electrical characteristics are within ±3 percent of the indicated values of Isc, Voc, and Pmax under standard test conditions (irradiance of 100mW/cm², AM 1.5 spectrums and a cell temperature of 25ºC (77ºF)).

◇For Modules used in Canada, installation shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.

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◇ Under normal outdoor conditions, the module will produce current and voltages that are different than those listed in the data sheet. All values from the datasheet are from standard test conditions. Accordingly, during system design, values of short-circuit current and open-circuit voltage marked on TUV series modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacity, fuse sizes and size of controls connected to the module or system output.

◇ Refer to Section 690-8 of the National Electrical Code (united states) or equivalent for an additional multiplying factor of 125 percent (80 percent derating) which may be applicable.

◇ We advise that artificially concentrated sunlight shall not be directed on the modules or panels.

Mechanical Installation

Selecting the location

◇ Select a suitable location for installation the module.

◇ The module must be facing true south in northern latitudes and true north in southern latitudes.

◇ For detailed information on the best elevation tilt angle for the installation, refer to standard solar photovoltaic installation guides or a reputable solar installer or systems integrator.

◇ The module should not be shaded at any time of the day.

◇ Do not use module near equipment or in locations where flammable gases can be generated or collected.

Selecting the proper support frame

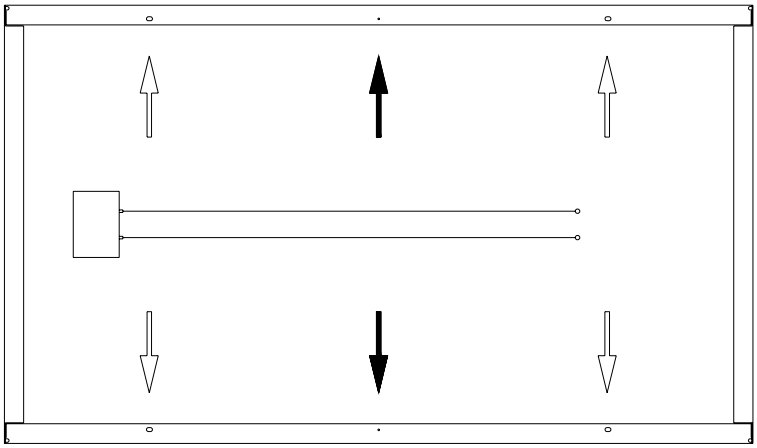
◇ Always observe the instructions and safety precautions included with the support frame to be used with the module.

◇ The moudles have been evaluated by TUV for a maximum positive or negative design loading of 30 lbs/ft2.

◇ The modules have been evaluated by TUV for mounting using the 4 provided mounting holes in the frame. Do not drill additional mounting holes in the glass surface of the module or in the frame of the module. Doing so will void the warranty.

◇ Modules must be installed calmly and straightly on the machine shelving.The clearance between installation surface and ground (or roof) must be 10cm at least ,the space between moudles must be 8 mm at least.

◇ Modules must be securely attached to the mounting structure using four mounting points for normal installation. For details, please see the diagram below. Load calculations shall be done by the system designer or installer.



Mounting holes for normal installation Φ9 for hole size

Mounting holes for grounding installation Φ4 for hole size

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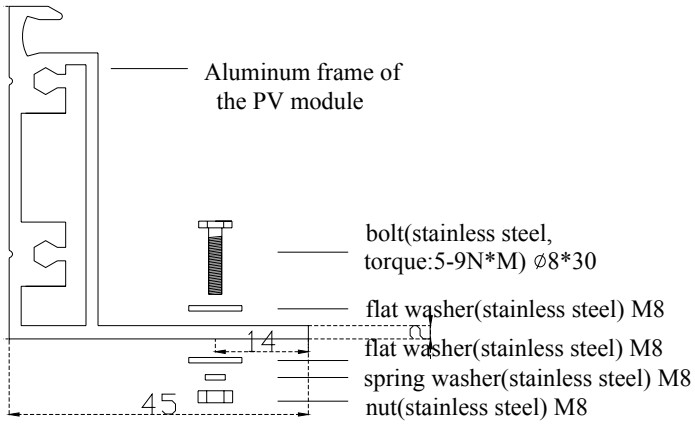
◇ The support module mounting structure must be made of durable, corrosion-resistant , UV-resistant material.

General installation

◇ Module mounting must use the pre-drilled mounting holes in the frame.

◇ The most common mounting is achieved by mounting the module using the four symmetry points close to the inner side on the module frame.



◇ Do not lift the module by grasping the module's junction box or electrical leads.

◇ Do not stand or step on the module.

◇ Do not drop the module or allow objects to fall on the module.

◇ To avoid breakage of module glass, do not place any heavy objects on the module.

◇ Do not set the module down hard on any surface.

◇ Inappropriate transport and installation may break the glass portion of the module.

Electrical Installation

Grounding

◇ The module frame must be properly grounded (refer to NEC clause 250). The grounding wire must be properly connected to the module frame to ensure good electrical contact. Use the recommended type, or an equivalent, connectors for this wire.

◇ For metal support frames, the surface of the frame must be electroplated and have excellent conductivity.

◇ Place the grounding clip onto the frame, making sure that the screw straddles the drilled hole.Thread the hex nut (Φ4) onto the end of the screw,then using a 3/8 –in.wrench,tighten the nut. Recommended torque is between 2.3 and 2.8 Nm[20 and 25 in.-lbs].

◇ Insert the wire into the wire slot. Press down on both ends of the wire (the wire slot will cause the wire to form a slight curve).

◇ Manually, or using channel lock pliers, push the slider over the base until it covers the base. This will terminate the wire.

General installation

◇ Do not use modules of different configurations in the same system.

◇ Several modules are connected in series and then in parallel to form a PV array, especially for application with a high operation voltage. If modules are connected in series, the total voltage is equal to the sum of individual voltages.

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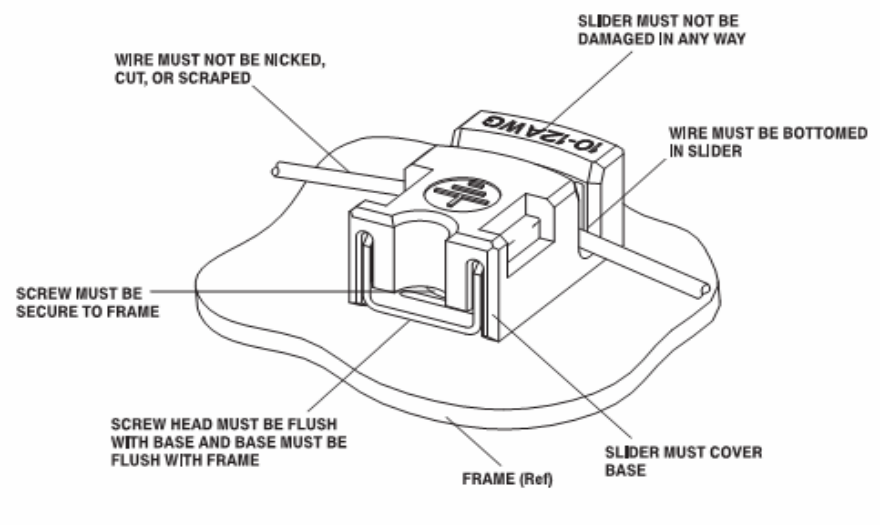
◇ For applications requiring high currents, several photovoltaic modules can be connected in parallel; the total current is equal to the sum of individual currents.



◇ Modules are supplied with connectors ZJRH 05-1 to use for system electrical connections. Use the National Electric Code (united states) or equivalent local wiring regulations to determine system wiring size, type and temperature rating of conductors to be connected to the module's connectors .Wiring connected to the module's should be 4mm ²(minimum) and must be temperature rated connectors at 85ºC (minimum).

◇ The cross sectional area of the cable and the capacity of the connector must be selected to suit the maximum system short circuit current, otherwise the cable and connector will be overheated under large current. Refer to NEC for details.

◇ A DC rated fuse (with maximum capacity 13A) should be used. If there are several moudles which would be installed in a system,get the moudles installed in parallel electrical or in series so that you can get the appropriate energy from moudles. In any case,every moudle or series string of moudles so connected must has a maximum series fuse as specified. Contact with the professional electrical engineer who designed the system for help.

◇ The junction box has a breather port. The breather port must be mounted facing down and must not be exposed to the rain. Therefore, the junction box should be on the higher side of the module when it is mounted.

Maintenance

Long Energy recommends the following maintenance measures in order to ensure optimum performance of the module:

◇ Clean the glass surface of the module when necessary. Always use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt.

◇ Check the electrical and mechanical connections every six months to verify that they are clean, secure and undamaged.

◇ If any problem arises, have them investigated by a competent specialist. In addition, the maintenance instructions for all other components used in the system, such as support frames, charging regulators, inverters, batteries etc. should be followed accordingly.

Disclaimer of liability

Because the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) product are beyond Long Energy's control, Long Energy does not accept responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.

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