



INSTALLATION MANUAL

For Monocrystalline Modules

“According with IEC61215 edition 2 & IEC61730 standards”

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Overview

Thank you very much for using FEIYA Energy PV modules. In order to enable the PV modules to be installed correctly and to generate electric power properly, please read the following operation instructions carefully before installing and using the modules.

Please remember that you are operating a product that generates electricity, and therefore certain safety measures need to be implemented in order to avoid accidents.

1. Instruction

Jiaying FEIYA New Energy Co.,Ltd is one of the leading Producer of integrative photovoltaic products. apply ourself to Resarch, produce, sell photovoltaic products. Also we can supply complete solutions of photovoltaic application system. Now we have established this distribution pattern of mainly solar module, Solar street light and Solar home system. We have established perfect quality management system, our products passed ISO9001:2000, UL, CE, TUV, ROHS and other international quality certification. We have complete manufacturing capabilities and new product development ability, strict management system, advanced production technology and comprehensive after-sales service system for our products.

2. Power MODULES

FEIYA Energy MODULES consist of a series of electrically interconnected crystalline silicon solar cells, which are permanently encapsulated between a tempered glass cover, an EVA potted with TPT back sheet. The entire laminate is secured within an anodized aluminum frame for structural strength; ease of installation, and to protect the cells from the most severe environmental conditions. The MODULES which are listed below table applicable for this Manual, the data are tested at STC. The MODULES power tolerance is +/-3%

Modules	Pmpp (W)	Impp (A)	Vmpp(V)	Isc (A)	Voc (V)	FF%	Application class	Max system voltage
FY-185S-M	185	5.11	36.2	5.5	45.0	74.7	A	1000V
FY-190S-M	190	5.19	36.6	5.57	45.1	75.6	A	1000V
FY-195S-M	195	5.3	36.8	5.6	45.3	76.8	A	1000V
FY-200S-M	200	5.4	37.0	5.72	45.4	77.0	A	1000V
FY-220S-M	220	4.58	48.0	4.82	59.5	76.6	A	1000V
FY-230S-M	230	4.77	48.2	5.06	59.8	76.0	A	1000V
FY-240S-M	240	4.95	48.4	5.26	60	76.0	A	1000V
FY-250S-M	250	5.15	48.6	5.45	60.3	76.2	A	1000V
FY-260S-M	260	5.33	48.8	5.66	60.5	76.0	A	1000V

Modules	maximum over current protection ratings	Recommended maximum series	parallel module configuration	Fire resistance class
FY-185S-M	10A	22	2	Class C
FY-190S-M	10A	22	2	Class C

FY-195S-M	10A	22	2	Class C
FY-200S-M	10A	22	2	Class C
FY-220S-M	10A	16	2	Class C
FY-230S-M	10A	16	2	Class C
FY-240S-M	10A	16	2	Class C
FY-250S-M	10A	16	2	Class C
FY-260S-M	10A	16	2	Class C

Table 1: Parameters of the FEIYA Energy MODULES

Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at STC. Accordingly, the values of Isc and Voc marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.

3. Applications

FEIYA Energy MODULES are a highly reliable, virtually maintenance free power supply, designed to operate efficiently in sunlight, these solar modules are ideal for charging storage batteries used to power remote homes, recreational vehicles, boats, telecommunications systems and other electric generation application.

4. Climate Condition

Install the FEIYA ENERGY Crystalline series MODULES in the following conditions:

- Ambient temperature: -40°C to +40°C
- Operating temperature: -40°C to +85°C
- Operating Storage temperature: -20°C to +40°C
- Humidity: below 85RH%
- Mechanical Load Pressure: below 112.78lb/ft² (5400Pa)*.

*Note: the mechanical load bearing (including wind and snow loads) of the MODULES is based on the mounting methods. The professional system installer must be responsible for mechanical load calculation according to the system design.

5. Mounting Site Selection

The MODULES should be mounted in a location where they will receive maximum sunlight through the year and also to be mounted over a fire resistant roof covering rated for the application. In the Northern Hemisphere, the MODULES should face south, and in the Southern Hemisphere, the MODULES should face north. MODULES facing 30degrees away from true South (or north) will lose approximately 10 to 15 percent of their power output. If the MODULES face 60 degrees away from true South (or North), the power loss will be 20 to 30 percent.

When choosing a site, avoid trees, buildings or obstructions which could cast shadows on the solar modules especially during the winter months when the arc of the sun is lowest over the horizon. Shading causes loss of output, even though the factory fitted bypass diodes of the MODULES will minimize any

such loss.

Do not install the MODULES close to naked flame or flammable materials.

Do not install the MODULES in a location where it would be immersed in water or continually exposed to water from a sprinkler or fountain etc.

Do not install the MODULES in a marine environment and/or area where salty wind hit directly.

Do not install the MODULES in corrosive environment, such as corrosive salt area or sulfurous area, etc.

Do not install the MODULE to substitute, even partially a roof or wall of a habitable structure.

6. MODULE Tilt Angle

FEIYA ENERGY MODULES connected in series should be installed at same orientation and angle. Different orientation or angle may cause loss of output power due to difference of amount of sunlight exposed to the MODULES.

FEIYA ENERGY MODULES produce the most power when they are pointed directly at the sun. For installations where the MODULES are attached to a permanent structure, the MODULES should be tilted for optimum winter performance. As a rule, if the system power production is adequate in winter, it will be satisfactory during the rest of the year. The MODULESE tilt angle is measured between the solar MODULES and the ground (Figure 1). Optimal tilting of MODULES is almost the same as the latitude of installation location.

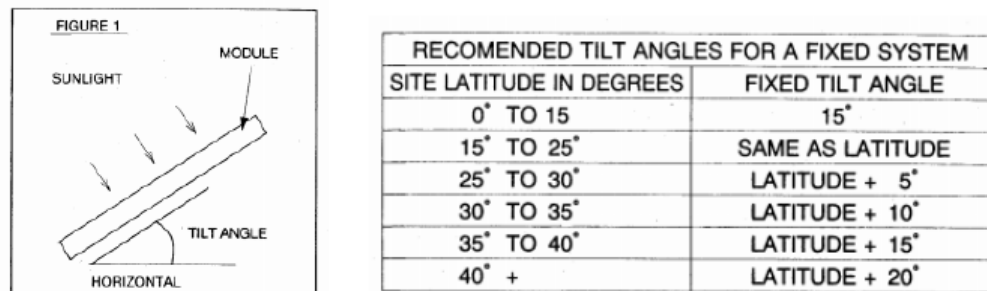


Figure 1 MODULES Tilt Angle

7. Mounting the MODULE

The frame of each MODULE has eight 9mm diameter mounting holes (Figure 2 and Figure 3). These are used to secure the MODULES to the support structure. For installation safety, we recommend that minimum torque of screw between 5-8Newton-meters. The mounting method is as Figure 4 below.

The four holes close to the corners of the MODULE are most often used for mounting. Clearance between the MODULES frame and the mounting surface may be required to prevent the junction box from touching the surface, and to circulate cooling air around the back of the MODULE. In case the MODULES will be mounted on the roof or wall of a building, the standoff method or the rack method are recommended.

Standoff: The MODULES are supported parallel to the surface of the building wall or roof. Clearance between the MOUDLES frames and surface of the wall or roof is required to prevent wiring damage and

to allow air to circulate behind the MODULE. The recommended standoff height is Class Ratings.

Rack: The supporting frame is used to mount modules at correct tilt angle. The MODULES are not designed for integral mounting as part of a roof or wall. The mounting design may have an impact on the fire resistance.

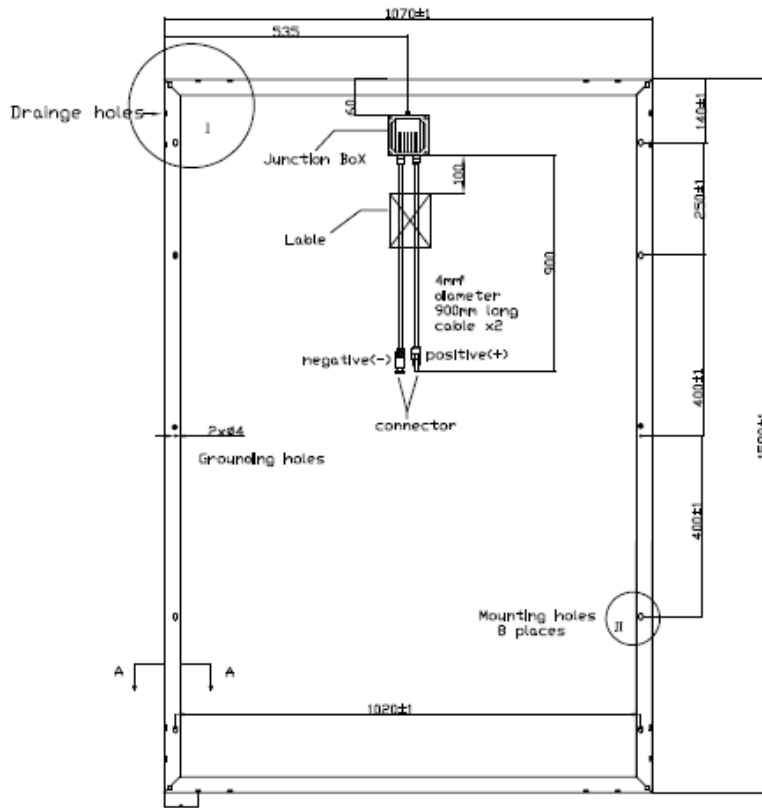


Figure 2: Aluminum frame: 1580X1070X50X35(mm)

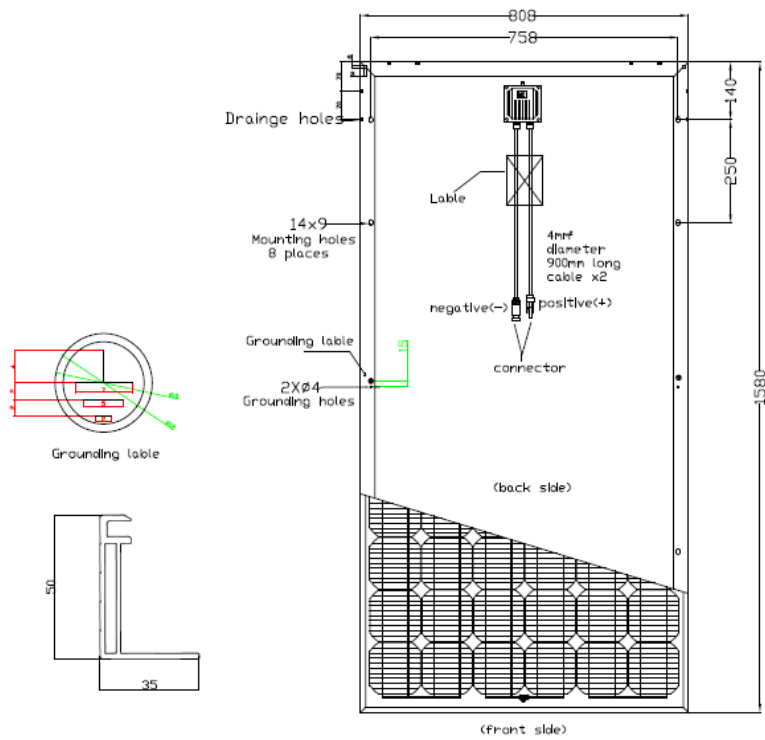


Figure 3: Aluminum frame: 1580X808X50X35(mm)

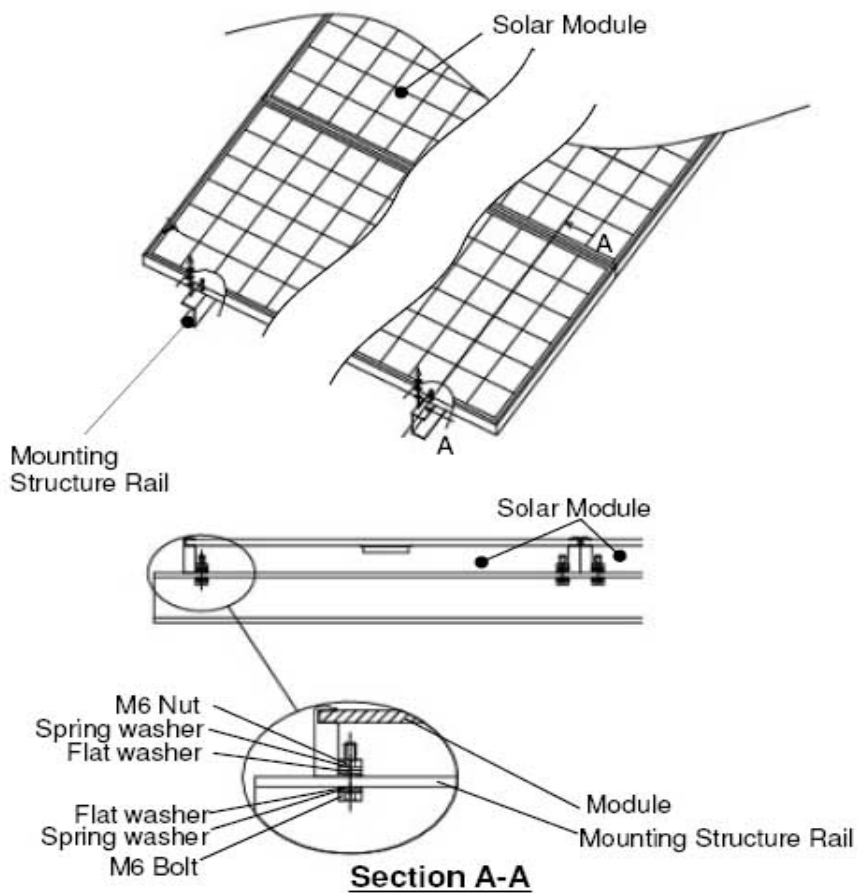


Figure 4: Mounting Method

8. Wiring

For MODULES wiring, when your PV system includes other components (batteries, charge controllers, inverters, etc.), be sure to follow the safety recommendations of their manufacturers.

These MODULES contain factory installed bypass diodes. If these MODULES are incorrectly connected to each other, the by-pass diodes or cable or junction box may be damaged.

For array wiring, the terms “array” is used to describe the assembly of several MODULES on a support structure with associated wiring. Use copper wire that is sunlight resistant and is insulated to withstand the maximum possible

system open circuit voltage. Check your local codes for requirements.



9. Grounding

For grounding, there is a grounding label and two holes at the panel, of whose position refer to the Figure 1. Size and earth the equipment grounding conductor in accordance with local requirements or the IEC. Attach the equipment grounding conductor to the module frame using the hole and hardware provided. Note that a stainless steel washer is used between the ground wire and the module frame (see Figure 5). The diameter of hole on module is 4mm. The diameter of nut is 5mm. According to GB/T 97.1, d1 is 5.3mm, d2 is 10mm, h is 1mm. These washers are used to avoid corrosion due to dissimilar metals. Tighten the screw that the minimum of torque screw between 0.5 and 1.0 Newton meters. We recommend you attach all module frames to an earth ground. Attach a separate ground wire to one of the extra mounting holes on the module frame with a self-tapping screw. The racks must also be grounded unless they are mechanically connected by nuts and bolts to the grounded modules. Grounding is achieved by securing the array frame for both roof and field mounted applications. Please note all washers and nuts are stainless steel.

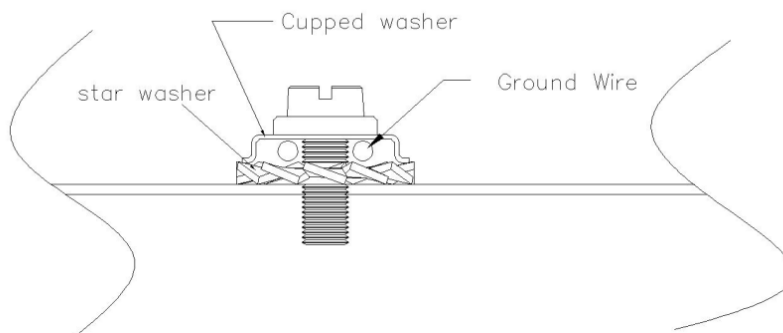


Figure 5: Grounding method

10. Junction Box



Modules	Junction Box Type	Connector type	Connector temperature ratings	Wire size and type	Cable ambient temperature	Bypass diodes type
FY-185S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-190S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-195S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-200S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-220S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-230S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-240S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-250S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050
FY-260S-M	PV-ZH008	PV-ZH202	-40 to 85°C	2PFG 1169 1*4.0mm 2*900MM	40 to 90°C	10SQ050

Partial shading of an individual MODULE can cause a reverse voltage across the shaded MODULE.

Current is then forced to go through the shaded area by the other MODULE. By having a bypass diode, the forced current will bypass the shaded module in a series circuit, thereby minimizing module heating and array current losses. For 12-volt systems and higher: Each solar module junction box has a diagram illustrating the proper direction for the by-pass diode to be installed between two of the terminal screws. When the solar MODULES are connected as individual series strings first, and then these strings are connected in parallel, bypass diodes should be used in each junction box, this is the simplest wiring arrangement for most installations. At a minimum the bypass diodes must have the following electrical characteristics:

- Rated Average Forward Current above maximum system current at the highest MODULES operating temperature.
- Rated Repetitive Peak Reverse Voltage above maximum system voltage at the lowest MODULE operating temperature.

11. Preparation before Installation

Unpacking

Once the PV MODULES have been shipped to the installation site all of the parts should be unpacked properly with care.

Caution: The environment for unpacking the MODULES and all other apparatus should be proofed against dampness and rainfall.

- a) Visual check before installation, to make sure there is no bug in the packing and junction
- b) Check the serial number.
- c) Check the PV MODULES with irradiance of more than $600\text{W}/\text{m}^2$ and get the voltage. In case the voltage is ZERO, it should not be installed and please contact the supplier.
- d) All the washers, nut, and bolt must be stainless steel.

12. Safety Precautions

- a) Make sure the MODULES are arranged so that the current and voltage characteristics of the array are within the tolerance of the device to which the array will connect. MODULES sold in Europe rate up to 1000V DC.
- b) For rooftop installations, this MODULE has Class C Fire Rating and must be installed over a roof of appropriate fire resistance. Consult your local building department to determine approved roofing materials.
- c) The shock hazard increases as modules are connected in parallel producing higher current. The shock hazard increases as modules are connected in series producing higher voltages. To avoid the hazard of electric shock, work only under dry conditions, with dry module and tools.

13. Warnings

MODULES are live electrical power source when exposed to light. Array of many MODULES can cause lethal shock and burn hazards. Although single module produces only a low voltage and current, shocks and burns are still a potential hazard. MODULES should be covered with an opaque material during installation to avoid shocks or burns. Do not touch the live parts of cables and connectors. Using appropriate safety equipment (insulated tools, insulating gloves, etc) when handling MODULES.

14. Permit

Before installing your system, contact local authorities to determine the necessary permitting, installation and inspection requirements.

15. Installation and Operation

- Systems should be installed by qualified professionals only. The process involves electricity and can be dangerous if the installing personnel are not familiar with the appropriate safety procedures.
 - Do not step on the module.
 - Artificially Sunlight shall not be concentrated on the module.
 - Although the modules are quite rugged, the glass can be broken (and the module will no longer work properly) if it is dropped or hit by tools or other objects.
 - Solar modules have a protective front glass. Broken solar module glass is an electrical safety hazard (electric shock and fire). These modules cannot be repaired and should be replaced immediately.
- d) Do not damage the back sheet of a MODULE, to avoid the hazard of electric shocks and fire. Children and unauthorized persons should not be allowed close to the installation of the PV MODULES.
- e) Do not remove any part installed by FEIYA Energy or disassemble the MODULES.
- f) Protect plug against soiling, do not make any plug connections using soiled plug contacts.
- g) MODULES must be carried more than two persons by the frame and wear non-slip gloves.
- h) Do not use MODULES of different configurations in the same systems.
- i) Do not drill additional mounting holes in the MODULES frames, as it will void the warranty.
- j) All instructions should be read and understood before attempting to install, wire, operate and maintain the MODULE.

16. Battery

When solar modules are used to charge batteries, follow the battery manufacture's recommendations if batteries are used with MODULES. The battery must be installed in a manner which will protect the performance of the system and the safety of its users. The battery should be away from the main flow of people and animal traffic. Select a battery site that is protected from sunlight, rain, snow, debris, and is well ventilated. Most batteries generate hydrogen gas when charging, which is explosive. Do not light matches or create sparks near the battery bank. When a battery is installed outdoors, it should be placed in an insulated and ventilated battery case specifically designed for the purpose.

17. Inspection

- Follow the requirements of applicable National and local electrical safety Codes.

18. Maintenance

Solar modules require very little maintenance. It is not un-common for a remote site to be checked but once per year. Under most conditions, normal rainfall is sufficient to keep MODULE glass clean. If dirt build-up becomes excessive, clean the glass with a soft cloth using mild detergent and water. Do not clean the MODULES with cold water during the warmer hours of the day in order to avoid creating any thermal shock that maybe damage the MODULE. Modules that are mounted flat should be cleaned more often, as they will not "self clean" as effective as modules mounted at 15 degree or greater angle. Once a

year, check the tightness of terminal screws and the general condition of the wiring. Also, check to be sure that mounting hardware is tight. Loose connections will result in damage for MODULES or array.

Changed MODULES must be same type.

Cover the front surface of MODULES by an opaque or other material when repairing. When MODULES exposed to sunlight, it generate high voltage and are dangerous.

Warnings: For any electrical maintenance, the PV system must first be shut down. Improper maintenance can cause lethal electric shock and/burns.

19. Disclaimer of Liability

The installation, handling and use of FEIYA Energy Crystalline series modules are beyond company control. Accordingly, FEIYA Energy does not assume responsibility for loss, damage, injury or expense resulting from improper installation, handling, use or maintenance. FEIYA Energy assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of the modules. No license is granted by implication or under any patent or patent rights. FEIYA Energy reserves the right to update the product, specifications or this installation Manual without prior notice.

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