Carefully read through these installation instructions before installing, operating or servicing PV system. Failure to follow these instructions may result in bodily injury or damage to property. Keep these instructions!

Working on a PV system (installation, setup, maintenance, repairs) must be carried out by qualified and authorized persons.

This installation instruction is for mono and poly modules:

Maximun Power

The tolerance of Maximun Power is 0~+5W under standard conditions (irradiance of 1000mW/cm^2, AM 1.5 spectrum, and cell temperature of 25℃ (77℉)).

Warning:

Danger of death from electric shock!

• Solar modules generate electricity as soon as they are exposed to light. One module on its own is below the safety extra low volt level, but multiple modules connected in series (summing the voltage) or in parallel (summing the current) represent a danger. The following points must be observed when handling the solar modules to avoid the risk of fire, sparking and fatal electric shock.

• Do not insert electrically conducting parts into the plugs or sockets! Fit solar modules and wiring with wet plugs and sockets!

•Exercise utmost caution when carrying out work on wiring and safety equipment (use insulated tools, insulated gloves, ect.)!

• Do not use damaged modules! Do not dismantle modules! Do not mark on the rear of the module using sharp objects!

• Exercise utmost caution when working on wiring and the inverter. Be sure carefully to follow manufacture’s installation instructions!

Artificially concentrated sunlight shall not be directed on the module or panel.



Danger of death from arcing

Modules generate direct current when light shines on them. An arc may be produced when connections are separated. We therefore recommended covering modules with a lightproof cloth during installation. When breaking a connected string of modules (e.g. when disconnecting the DC line from the inverter under load), a lethally strong arc can occur:

- Never disconnect the solar generator from the inverter while the inverter is connected to the mains grid—remove the fuse from the AC side on the inverter first!
- Ensure cable connections in perfect condition (no splitting, soiling or other contamination)!

Unpacking the modules and storage

The utmost care is required when handling the modules. Be careful when unpacking, transporting, and storing the modules:

- Transport modules in an upright position.
- Carry modules with both hands. Do not use the connection socket as a handle.
- Ensure modules do not bow under their own weight.
- Do not place modules on top of each other.
- Do not subject to load, do not stand on them.
- Do not mark using sharp implements.
- Do not stand on the panel.
- Keep all electrical contacts clean and dry.

If it is necessary to store the modules temporarily, a dry, ventilated room should be used.

General safety information

Ensure that the module is used only in applications for which it is suitable (see “Installing the modules”). All work on a PV system (installation, setup, maintenance, repairs) must be carried out only by appropriately qualified and authorized persons.

The appropriate DIN standards, construction rules and safety instructions are to be followed for installation.

Installing the modules

When installing the modules, please pay attention to: the assembly is to be mounted over a fire resistant roof covering rated for the application.

- **Keeping within the maximum permitted load**

The mechanical load on the module tested is 5400pa.To avoid exceeding the maximum mechanical load, site-specific live loads such as wind and snow should be taken into account.

- **Environmental conditions**

The module is intended for use in temperate climatic conditions. The module is "non-explosion-protected equipment". Hence it must not be installed in the proximity of highly inflammable gases and vapors (e.g. filling stations, gas containers, paint equipment).

The module must not be installed near to naked flames or flammable materials. Do not expose modules to concentrated light sources.

It must not be immersed in water or constantly exposed to water (e.g. from fountains). If there is exposure to salt (it is recommended that modules are installed at least 500m from the sea) and sulfur (sulfur sources, volcanoes), there is a risk of corrosion.

Suggests modules are installed in ambient temperature of -20℃~46℃ and humidity less than RH85% environment The ambient temperature refers to the lowest and highest monthly average temperature of installation site. Long-term exposure beyond the ambient temperature limit of -40℃~85℃, damage and power loss may occur earlier.

Modules are suitable for terrestrial installation, which can not be used in outer pace. The maximum altitude that the PV module is designed for is up to 2000 m.

- **Requirements of installation**

Make sure the modules' electrical performances in a system are the same. When connected in series, modules must all have the same amperage. When connected in parallel, the modules must all have the same voltage. Connect the quantity of modules that match the voltage specifications of the devices used in the system. The modules must not be connected together to create a voltage higher than the permitted system voltage.

To minimize risk in the event of an indirect lightning strike avoid forming loops when designing the system. Artificially concentrated sunlight shall not be directed on the module or panel.

Modules must not be fitted as overhead glazing. Ensure that the mounting system can also withstand the anticipated wind and snow loads.

Precipitation can run off through small openings on the back side of the module. Make sure that these openings are not masked after mounting.

- **Optimum orientation and tilt**

To achieve the maximum annual yield figure out what the optimum orientation and tilt of the PV modules is. If sunlight shines vertical onto the PV modules you have the best conditions to generate maximum power.

- **Avoid overshadowing**

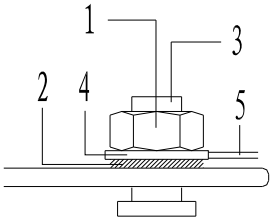
Even the slightest partial shading (e.g. from dirt deposits) will cause a reduction in yield. A module is considered "shadow-free" if it is unobscured across its entire surface for the whole year and even on the shortest day of the year unobstructed sunlight can reach the module.

- **Reliable ventilation**

Functioning ventilation prevents the build-up of heat, which would reduce performance.

- **Earthing**

Although the modules are certified to safety class Ⅱ, we still recommend earthing them. The earth connection must be made by a qualified electrician. Connect module frames to each other using cables with cable lugs. Use the hole (φ4.5mm) attached with a green label that are provided for this purpose. To create the conductive connection (frame is anodized), use a serrated washer or a self-tapping screw (φ5mm). The earth connection should be made by a qualified electrician.



1 Stainless steel M4 nut
2 Stainless steel serrated washer
3 Stainless steel bolt
4 Stainless steel connection head
5 Grounding lead

All the junctions on the conductive connection must be fixed. The fastness does not depend on soldering.

The metal containing iron in the conductive connection should be handled by some way, such as anodization, spray-painting, galvanization. Stainless steel does not need to be handled.

- **Maximum number of modules in parallel and in series**

When designing the system, we recommend that the maximum number of modules in parallel should be no more than four while the maximum number of modules in series no more than twelve.

Recommended maximum series/parallel module configurations: [Vsys/(1.25Voc)]/2

Bypass diodes

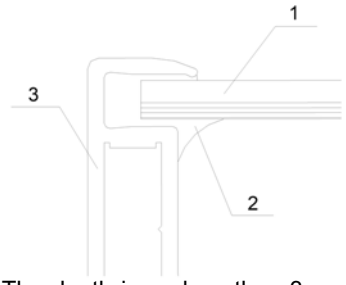
Check the following pages.

Roof Installing

- Use fasteners to fasten the modules to the mounting support structure. Modules should be bolted to support structures through mounting holes located in the frame's back flanges only. Stainless-steel bolts, with nuts, washers, and locks washers, are recommended for module mounting. Creation of additional holes for mounting is not recommended and will invalidate the warranty. Modules should not be mounted by supports at the ends.
- Mounting support structure should withstand forces from wind and snowfall pressure etc. Mounting support structure should use proper materials and corrosive treatment.
- Installation the modules on the roof should has proper ventilation. A clearance of 4.5 inches (about 115mm) or more behind the modules is recommended to permit air circulation and cooler module operation. Elevated temperatures lower operating voltage and power, and shorten module lifetime. Clearance of 1/4 inch (6.35mm) or more between modules is required to allow for thermal expansion of the frames.
- The mounting support structure should be fire-proof..
- The modules' fire safety is class C.
- The tilt angle should be no less than 5 in/ft (127 mm/300 mm) when the modules are mounted on the roof.

Mounting

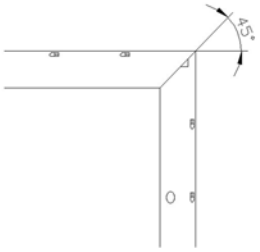
● Installation of Frame and Module



1 Module
2 Silica
3 Aluminum Frame

The depth is no less than 3mm when installing the module into the frame.

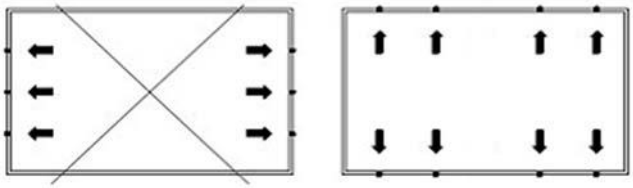
● Connection between frames



Aluminum Frame

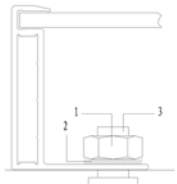
● Installation Requirements

Each module must be securely fastened at a minimum of 4 points. The frame has been stress tested for mounting on the long sides. The module must not be secured by its short sides.

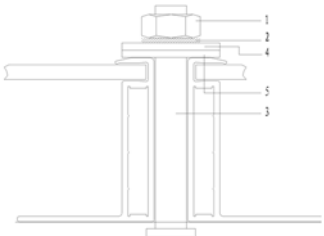


Example for mounting the PV modules to the substructure:

Example A:
Bolting



Example B:
Clamping on



1 Stainless steel M8 nut
2 Stainless steel spring washer
3 Stainless steel M8 t-head bolt
4 Aluminum clamping plate
5 EPDM washer 2mm

We recommend using a torque wrench for installation. In example B, the tightening torque (using stainless steel M8 bolts) should be around 15-20Nm. Use the existing holes for securing the module and do not drill additional holes (doing so would void the warranty). Use appropriate corrosion-proof fastening materials.

Wiring

For the wiring, pay attention to:

- **Correct wiring scheme**
  When designing the system, avoid forming loops (to minimize risk in the event of an indirect lighting strike). Check that wiring is correct before starting up the generator. If the measured open circuit voltage (Voc) and short-circuit current (Isc) differ from the specifications, then there is a wiring fault.
- **Correct connection of connectors**
  The connector check the following page. The area of the cable mating with the connector recommended to be 4~6 mm^2.The plug connector has its own polarity. Make sure that the connection is safe and tight. The plug connector should not receive outer stress. The connector should only be used to connect the circuit, but never be used to turn the circuit on and off..
- **Use of suitable materials**
  Use cable extensions and plugs that are designed for outdoor applications. Ensure that they are in perfect electrical and mechanical condition. Use only cables having one conductor. Select the appropriate cable diameter to minimize voltage drop (to calculate the minimum cable diameter, the fuse, and to calculate controls, multiply the Isc and Uoc by a factor of 1.25). Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. 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 ampacities, fuse sizes, and size of controls connected to the PV output.

Maintenance and cleaning

Do not change the PV components optionally (diode, junction box, plug connectors).
Given a sufficient tilt (at least 15°), it is not generally necessary to clean the modules (rainfall will have a self-cleaning effect). In case of heavy soiling (which will result in output reductions), we recommend cleaning the modules using plenty of water (from a hose) without cleaning agents and using a gentle cleaning implement (a sponge). Dirt must never be scraped or rubbed away when dry, as this will cause micro-scratched. We recommend the system is inspected at regular intervals.

Checklists:

- All fastenings are tight and secure and free of corrosion.
- All cable connections are secure, tight, clean and free of corrosion.
- Cables are not damaged in any way.
- Checking the earthing resistivity of metals.

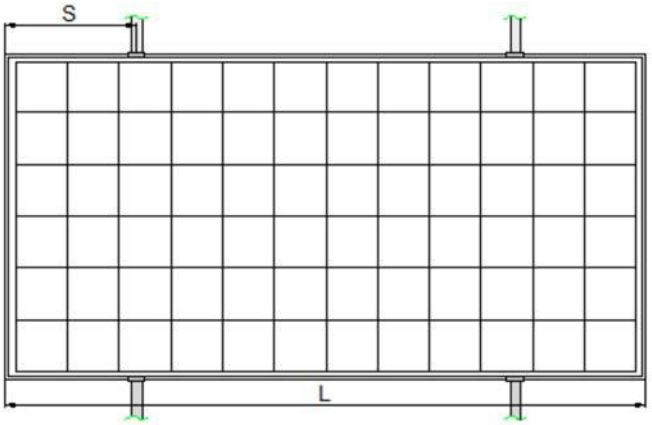
“Modules rated for use in this application class may be used in systems operating at greater than 50V DC or 240W, where general contact access is anticipated. Modules qualified for safety through IEC 61730-1 and this part of IEC 61730 within this application class are considered to meet the requirements for safety class II.”

“external or otherwise artificially concentrated sunlight shall not be directed onto the front or back face of the PV module”

Installation method and location

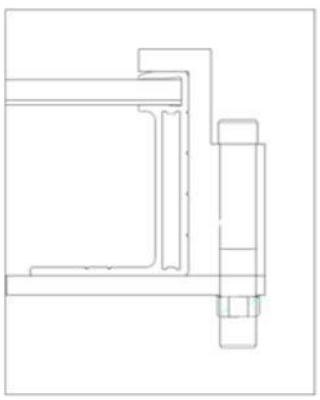
1/5L-50≤S≤1/5L+50 (mm)

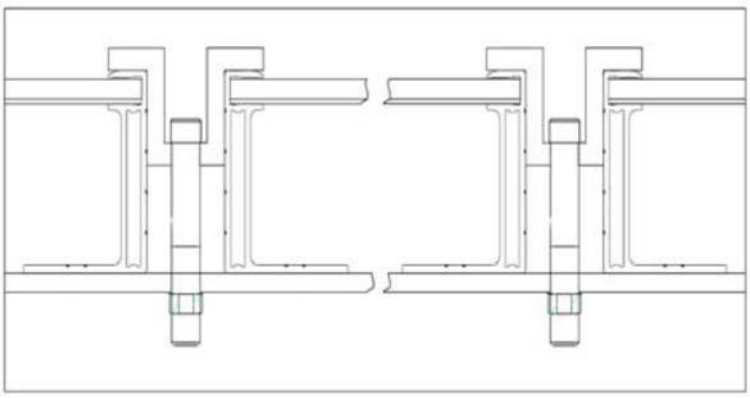
Clamp width: 40mm



Mounting details

1. Clamping mounting





Junciton Box and Bypass diodes:

Junction box set 1				
Junction box	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd.	JM18-1 JM18-2 JM18-3	Rated voltage = 1500VDC Rated current = 15A Reverse current = 30A Number of diodes: 3	Tested with PV modules Certificate no. R 50385231
Adhesive (junction box)	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color: white or black	-
Potting material	Shanghai Huitian New Material Co.,Ltd.	5299W-S	Color: white or black	-
Bypass diodes	Hangzhou Lion Microelectronics Co., Ltd.	THY2550	Tj max = 200°C If = 25A	-
Cable	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd.	H1Z2Z2-K 1x4.0 mm^2	Rated voltage = 1500VDC	Certificate no. R 50334928
Connectors	Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd.	PV-JM608	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R 50374980
Junction box set 2				
Junction box	SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	JB06x (x = A)	Rated voltage = 1500VDC Rated current = 15A Reverse current = 25A Number of diodes: 3	Tested with PV modules Certificate no. R 50337524
Adhesive (junction box)	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color: white or black	-
Potting material	Shanghai Huitian New Chemical Material Co., Ltd.	5299W-S	Color: white or black	-
Bypass diodes	SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	UKTD3045-06	Tjmax = 200°C If=30A	-
Cable	Wuxi Xinhongye Wire & Cable Co., Ltd.	H1Z2Z2-K 1×4.0mm^2	Rated voltage = 1500VDC	Certificate no. R 50311889
Connectors	SUZHOU UKT NEW ENERGY TECHNOLOGY CO.,LTD	PV-CO02-xy (x=1, y=A)	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R 50390097
Junction box set 3				
Junction box	SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	PV-JB12x (x=A or C or E or H or A-1 or T or A-25)	Rated voltage = 1500VDC Rated current = 25A (x = A-25) / 18A (x = A or C or E or T) / 15A (x = A-1) Reverse current = 25A Number of diodes: 3	Certificate no. R 50377301
Adhesive (junction box)	Shanghai Huitian New Material Co., Ltd.	HT906Z	Color: white or black	-
Potting material	Shanghai Huitian New Chemical Material Co., Ltd.	5299W-S	Color: white or black	-
Bypass diodes	SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	UKTH3045-12	Tjmax = 200°C If=30A	-
Cable	Wuxi Xinhongye Wire & Cable Co., Ltd.	H1Z2Z2-K 1×4.0mm^2	Rated voltage = 1500VDC	Certificate no. R 50311889
Connectors	SUZHOU UKT NEW ENERGY TECHNOLOGY CO.,LTD	PV-CO02-xy (x=1, y=A)	Rated voltage = 1500VDC Rated current = 30A	Certificate no. R 50390097

Accessory:

Module Type	Pmax (W)	Tolerance of Pmax	Voc (V)	Tolerance of Voc	Isc (A)	Tolerance of Isc	Vsys	Fuse rating	Application Class
SLB144M8-395	395	0 ~ +5W	49.04	±3%	10.16	±3%	1500V	20A	Class Ⅱ
SLB144M8-400	400		49.31		10.23				
SLB144M8-405	405		49.58		10.3				
SLB144M8-410	410		49.85		10.37				
SLB144M8-415	415		50.12		10.44				
SLB144M8-420	420		50.39		10.51				
SLB144M8-425	425		50.66		10.58				
SLB144M8-430	430		47.98		11.1				
SLB144M8-435	435		48.25		11.17				
SLB144M8-440	440		48.52		11.24				
SLB144M8-445	445		48.79		11.31				
SLB144M8-450	450		49.06		11.38				
SLB144M8-455	455		49.33		11.45				
SLB144M8-460	460		49.6		11.52				
SLB144M8-465	465		49.87		11.59				
SLB120M8-330	330		41.27		10.15				
SLB120M8-335	335		41.55		10.23				
SLB120M8-340	340		41.83		10.31				
SLB120M8-345	345		42.11		10.39				
SLB120M8-350	350		42.39		10.47				
SLB120M8-355	355		42.67		10.55				
SLB120M8-360	360		40.15		11.2				
SLB120M8-365	365		40.45		11.27				
SLB120M8-370	370		40.75		11.34				
SLB120M8-375	375		41.05		11.41				
SLB120M8-380	380		41.35		11.48				
SLB120M8-385	385		41.65		11.55				
SLB72M6-385	385		48.1		10.16				

Module Type	Pmax (W)	Tolerance of Pmax	Voc (V)	Tolerance of Voc	Isc (A)	Tolerance of Isc	Vsys	Fuse rating	Application Class
SLB72M6-390	390	0 ~ +5W	48.3	±3%	10.22	±3%	1500V	20A	Class Ⅱ
SLB72M6-395	395		48.5		10.28				
SLB72M6-400	400		48.7		10.34				
SLB72M6-405	405		48.9		10.4				
SLB60M6-320	320		40.93		10.15				
SLB60M6-325	325		41.14		10.2				
SLB60M6-330	330		41.35		10.31				
SLB60M6-335	335		41.56		10.36				
SLB48M6-250	250		32.06		9.78				
SLB48M6-255	255		32.21		9.86				
SLB48M6-260	260		32.36		9.94				
SLB72M6-375(HV)	375	0 ~ +5W	47.35	±3%	9.95	±3%	1000V 1500V	15A 20A	Class Ⅱ
SLB72M6-380(HV)	380		47.48		10.02				
SLB72M6-385(HV)	385		47.61		10.09				
SLB72M6-390(HV)	390		47.74		10.16				
SLB60M6-315(HV)	315		40.08		9.91				
SLB60M6-320(HV)	320		40.26		9.99				
SLB60M6-325(HV)	325		40.44		10.07				
SLB72P6-320(HV)	320		45.82		9.14				
SLB72P6-325(HV)	325		45.97		9.23				
SLB72P6-330(HV)	330		46.12		9.32				
SLB72P6-335(HV)	335		46.27		9.41				
SLB72P6-340(HV)	340		46.42		9.5				
SLB72P6-345(HV)	345		46.57		9.59				
SLB60P6-265(HV)	265		38.14		9.1				
SLB60P6-270(HV)	270		38.3		9.16				
SLB60P6-275(HV)	275		38.46		9.22				
SLB60P6-280(HV)	280		38.62		9.28				
SLB60P6-285(HV)	285		38.78		9.34				

Module temperature coefficient:

Module Type	α [%/°C]	β [%/°C]	δ [%/°C]
SLB144M8-xxx (xxx = 395-465 , in increment of 5)	0.041	-0.2641	-0.3369
SLB120M8-xxx (xxx = 330-385 , in increment of 5)	0.041	-0.2641	-0.3369
SLB72M6-xxx(HV) (xxx = 375-405 , in increment of 5)	0.0425	-0.2653	-0.3474
SLB60M6-xxx(HV) (xxx = 315-335 , in increment of 5)	0.0425	-0.2653	-0.3474
SLB72M6-xxx (xxx = 375-390 , in increment of 5)	0.0609	-0.3697	-0.4954
SLB60M6-xxx (xxx = 315-325 , in increment of 5)	0.0609	-0.3697	-0.4954
SLB72P6-xxx (xxx = 320-345 , in increment of 5)	0.0618	-0.3525	-0.4664
SLB60P6-xxx (xxx = 265-285 , in increment of 5)	0.0618	-0.3525	-0.4664
SLB48M6-xxx(HV) (xxx = 250-260 , in increment of 5)	0.0425	-0.2653	-0.3474
α - Current temperature coefficient			
β - Voltage temperature coefficient			
δ - Power temperature coefficient			

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