



MINGYANG

PV Module Installation manual

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1. Basic Information

1.1 Summary

Firstly, thanks for choosing Mingyang Solar PV modules. In order to ensure the PV modules are installed correctly and have power output stability, please read the following operation instructions carefully before installing and using. Please remember that you are using an electricity generating product, in order to avoid any accident, safety and security measures should be undertaken.

Secondly, make sure that the current and voltage values which are generated after the commissioning of the module are within the ratings of the current and voltage values of the other devices connected to the PV array. The maximum permitted system voltage (DC) of the modules is 1500V DC. If installed on the rooftop, modules must be installed on fireproof materials. Please consult your local building regulations to determine the roofing material to be used.

PV module application Class is A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: Higher than 120V), hazardous power (higher than 240W), according to EN IEC61730-1 & -2 standards, the quality of PV modules can meet the safety requirements and safety level II.

1.2 Products application

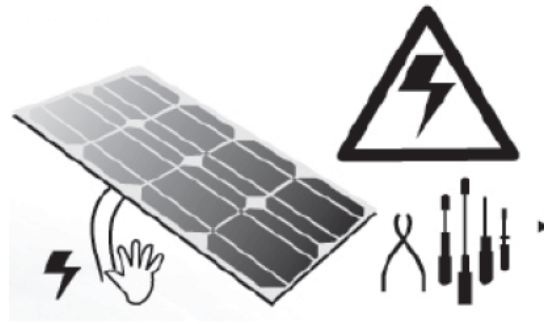
This document is applicable to the series of Mingyang solar modules as listed below: MYMH-72HD-XXX、MYMH-60HD-XXX, MYMH-54HD-XXX, MYMP-72HD-XX、MYMP-60HD-XXX, MYMP-54HD-XXX, MYMP-72HS-XXX, MYMP-60HS-XXX and MYMP-54HS-XXX where XXX is maximum power rating defining the model type.

1.3 Warning

- 1) When Module exposed to sunshine or other lights, it can produce DC, in this case it may cause electric shock hazard to physical touch
- 2) Focus sunlight on to PV module via mirror or lenses is prohibited.



- 3) Front glass and backsheets have a protective effect. Broken PV modules create electrical hazards (electric shock and burning), they should be replaced immediately and not be fixed or repaired.
- 4) Under nominal outdoor conditions, the current and voltage produced by a module are different to the datasheet. The parameters in the datasheet are tested under STC (standard test conditions) conditions, therefore when determining other components rated voltage, wire capacity, fuse rating, controller capacity and parameters relevant to PV module power output, please refer to the short circuit current and open circuit voltage of the PV module which use 125% values to design and install the system.
- 5) To mitigate risks of electric shock or fire ignition, it is recommended to cover the PV modules with opaque material when installing.
- 6) PV array installation should be undertaken by isolating sunlight from panels and maintenance also shall be done by trained professionals.
- 7) If a power battery bank is connected to the PV system, it should comply with the battery supplier's requirements.
- 8) PV modules shall not be a substitute for rooftop or wall materials in any circumstances.
- 9) Don't install PV modules in the area where combustible gases may exist.
- 10) Insulating gloves should be used when connecting PV module electrical connections. Insulated tools should be used when working on the electrical parts of a PV module.



Use tools that meet the insulation requirements of power installation

- 11) Don't dismantle any components of Mingyang Solar PV module without MINGYANG's approval.
- 12) Please read and comprehend all the installation instructions before installation, testing, commissioning and maintenance.
- 13) Don't lift modules by junction box or connecting cables.
- 14) The PV module system should be effectively earthed in accordance with relevant local wiring rules, for Australia AS/NZ 5033 and AS 3000. If no local wiring rules then in accordance with International Electrical Standards or other relevant International Standards. An earth conductor connection to the PV module shall be made using an approved penetrating washer system (e.g. stainless steel star washer) to a mounting hole or via the clamp. The penetrating washer system is used to avoid corrosion between dissimilar metals and ensure good contact.
- 15) After modules delivered to the installation site, all the components should be unpacked carefully.
- 16) Please do not stand, sit, or lie on modules, as it may damage the modules and may cause injury to workers.



- 17) Only identical size and specification modules can be connected together.
- 18) During the delivery procedure, please make sure transport handling methods ensure the modules are not subjected to severe vibration since vibrations may cause module damage such as the development of microcracks within the solar cells.
- 19) During all delivery phases, do not allow modules to fall from lifting equipment, from house roofs, or any elevated position or when handling as this can damage the modules or solar cell units inside.
- 20) Do not wipe the module with corrosive chemicals.
- 21) Please do not disconnect the modules in working status, please follow the correct isolation procedures and cover any panel in sunlight with an opaque cover.

2. Installation

2.1 Installation Safety:-

- Please wear protective helmet, insulated gloves, and rubber shoes during installation work.
- Keep the PV module packed until installation begins. This will avoid any unnecessary physical touching of the PV module during installation. Exposed modules may overheat causing risk of burning and potential electric shock from loose leads.
- Do not install in raining, snowing or windy weather conditions.
- Due to the risk of electric shock, please do not proceed with installation work if junction boxes are wet.
- Use insulated and dry tools, do not use wet tools.
- Do not throw any objects during installation (such as PV module or tools).
- Make sure that combustible gasses are not generated or present near the installation site.
- Correctly connect the male and female connectors as per the manufacturer's instructions, inspect the wiring for damage and all the cables must not be separated from the PV module.
- Do not touch junction box and the end of the connectors (male and female) with

bare hands during installation or under sunlight, regardless of whether the PV module is connected or disconnected to the PV system.

- Do not expose the PV module to excessive loads on the surface of the PV module.
- Do not strike or put excessive loads on the glass or back sheet, this may break the cells or cause micro crack.
- Do not use sharp tools to wipe the glass of PV module. It would leave scratches on the module.
- Do not drill holes on the frame of PV module.
- For BIPV (building integrated photovoltaic) or rooftop mounting structure installation, please try to follow the “from top to bottom” and/or “from left to right” principle, and do not step on the module that will damage the module and would be dangerous for personal safety.

2.2 Installation Condition

1) Climatic Condition

a. Recommended installation ambient temperature is between -40 °C to 85 °C (-4 °F to 185 °F).

b. Do not install PV modules in an area where it may flood

Note: The PV module’s resultant mechanical load (including the wind and snow pressure) is based on the installation method and the installation site conditions. The calculation of mechanical load must be done by a trained professional installer in accordance with the required overall system design.

2) Installation Site Selection

In general, the PV modules should be installed in the place with the maximum sun radiation throughout the year. In the northern hemisphere, modules should be placed facing south as the first choice, while in the southern hemisphere, it should be placed facing north. If the angle of the modules deviates 30deg. angle away from the South (or North) direction, the power output would lose about 10% to 15%; if a module’s angle of deviation is 60deg., loss rate is about 20% to 30% of power output. The installation

site should avoid shadows of tree, building and other obstacles. The PV Module manufacturer has already installed a bypass diode to minimize the loss, but the shadow will still reduce the output.

When the PV system is equipped with batteries, it must be installed correctly to ensure protection of the system operation and the safety of user during their use; Please follow the recommendations of the battery manufacturer regarding installation instructions, operation and maintenance.

To ensure that the battery will work properly, the battery installation should avoid direct sunlight, rain and snow exposure, be well ventilated;

Battery recharging can release hydrogen in which an explosion could easily take place. Do not set fire or make sparks around the batteries.

If the battery is installed outdoors, it must be placed in a specially designated area with weatherproofing insulation, adequate ventilation and appropriate safety signage.

Do not install the PV modules where there is fire or flammable material.

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

3) Angle Selection

The angle of the PV modules refers to the angle between module surface and the ground (Figure 1), the output power will be maximized when modules are facing the sun in vertical.

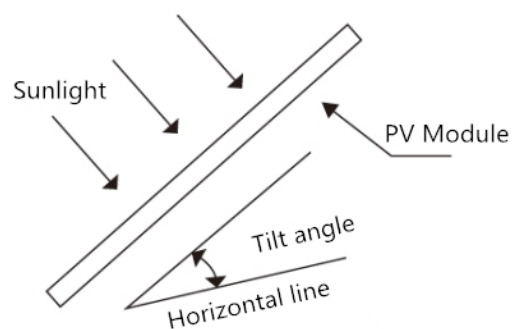


Figure 1: the installation angle of PV Module

If connected to a standalone (not grid connected) PV system, a module's tilt angle should be based on the seasons and local sunshine conditions to obtain the maximum

power output. Normally, if module's power output could be satisfied during the lowest sunshine intensity of a year, then this installation angle can meet the demands of the whole year.

For grid-connected PV system, the installation angle selection of the modules should be based on maximum of annual power output.

2.3 Installation Instructions

PV modules can be mounted to the substructure using either corrosion-proof M8 bolts placed through the mounting via holes on the rear of the module or specially designed module clamps. Regardless of the fixing method the final installation of the modules must ensure that:

- 1) A clearance of minimum 120 mm (recommended) is provided between modules frame and the surface of the wall or roof. If other mounting means are employed this may affect the UL Listing or the fire class ratings.
- 2) The minimum distance between two modules is 10 mm (0.4 in).
- 3) The mounting method does not block the module drainage holes.
- 4) Panels are not subjected to wind or snow loads exceeding the permissible maximum loads and are not subject to excessive forces due to the thermal expansion of the support structures.

◆ Screws installation method

- 1) The frame of each module has 8- $\phi 9 \times 14$ mm and 4- $\phi 7 \times 10$ mm mounting holes (for MYMH-72HD、MYMP-72HD、MYMP-72HS) or has 8- $\phi 9 \times 14$ mm mounting holes (for MYMH-60HD、MYMH-54HD、MYMP-60HD、MYMP-54HD、MYMP-60HS、MYMP-54HS) ideally placed to optimize the load handling capability and to secure supporting structure of the modules
- 2) Secure the module in each fixing location with an M8 bolt and a flat washer, spring washer and nut as shown in Figure 1 and tighten to a torque of 16~20 N.m (140-180 lbf.in.).
- 3) All parts in contact with the frame should use flat stainless-steel washers of minimum 1.8 mm thickness with an outer diameter of 20-24 mm (0.79-0.94 in).

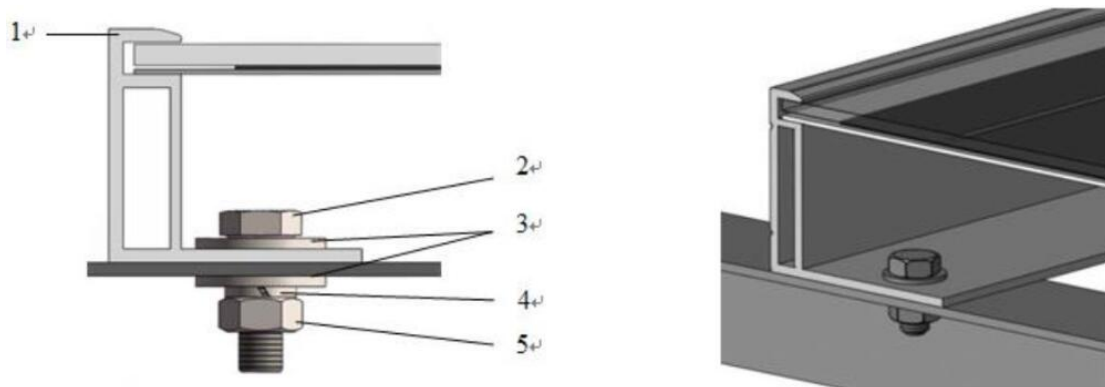


Figure 1. PV module installed with Bolt fitting method

- 1) Aluminum Frame
- 2) M8 Stainless Bolt
- 3) Flat Stainless Washer
- 4) Spring Stainless Washer
- 5) HEX Stainless Nut

Applicable Modules

PV Module Series	Power (W) {XXX}	Rated Power (W)	Dimension (mm)	Module thickness (mm)	Installation hole pitch (mm)
MYMH-72HD-XXX	565	565-570	2278*1134*30	30	400; 1100; 1400
	570	570-575			
	575	575-580			
	580	580-585			
	585	585-590			
MYMH-60HD-XXX	470	470-475	1903*1134*30	30	990, 1400
	475	475-480			
	480	480-485			
	485	485-490			

MYMH-54HD-XXX	420	420-425	1722*1134*30	30	990, 1400
	425	425-430			
	430	430-435			
	435	435-440			
	440	445			
MYMP-72HD-			2278*1134*30	30	400; 1100; 1400
	535	535-540			
	540	540-545			
	545	545-550			
	550	550-555			
	555	555-560			
MYMP-60HD	445	445-450	1903*1134*30	30	990, 1400
	450	450-455			
	455	455-460			
	460	460-465			
MYMP-54HD	400	400-405	1722*1134*30	30	990, 1400
	405	405-410			
	410	410-415			
	415	415-420			
MYMP-72HS	535	535-540	2278*1134*35	35	400;1100;1400
	540	540-545			
	545	545-550			
	550	550-555			
	555	555-560			
MYMP-60HS	440	440-445	1903*1134*35	35	990;1400
	445	445-450			
	450	450-455			
	455	455-460			
	460	460-465			

MYMP-54HS	405	405-410	1722*1134*35	35	990; 1400
	410	410-415			
	415	415-420			

◆ Clamps Mounting Methods

- 1) The clamp must overlap the module frame by at least 7 mm but no more than 11 mm.
- 2) Use a minimum of 4 clamps to fix modules onto the mounting rails.
- 3) Modules clamps should not come into contact with the front glass and must not deform the frame.
- 4) Be sure to avoid shadowing effects from the module clamps.
- 5) The module frame is not to be modified under any circumstances.
- 6) When choosing this type of clamp-mounting method, use at least four clamps on each module and two clamps should be attached on each long sides of the module (for portrait orientation) or each short sides of the module (for landscape orientation). Depending on local wind and snow loads, additional clamps may be required to ensure that modules can bear the load. the distance from the four clamps on the long side of the 72P PV module to the short frame is not less than 340 mm.
- 7) Applied torque should refer to mechanical design standard according to the bolt customer is using, ex: M8-16~20N.m (140-180 lbf.in)

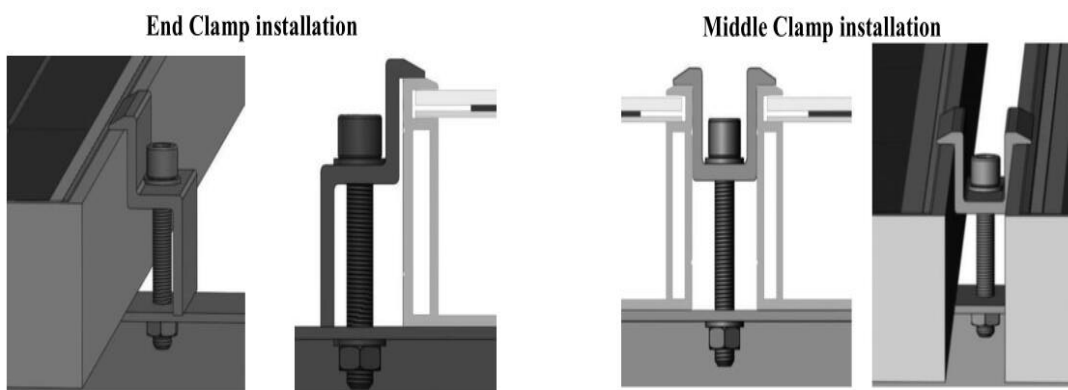


Figure 2. PV module installed with clamp fitting method

Notes:

- 1) All mentioned clamp mounting methods here are only for reference, Mingyang

Solar will not be responsible for the system design and installation. The mechanical loads and installation safety requirements must be designed and installation completed by a professional accredited solar system installer and experienced installation team.

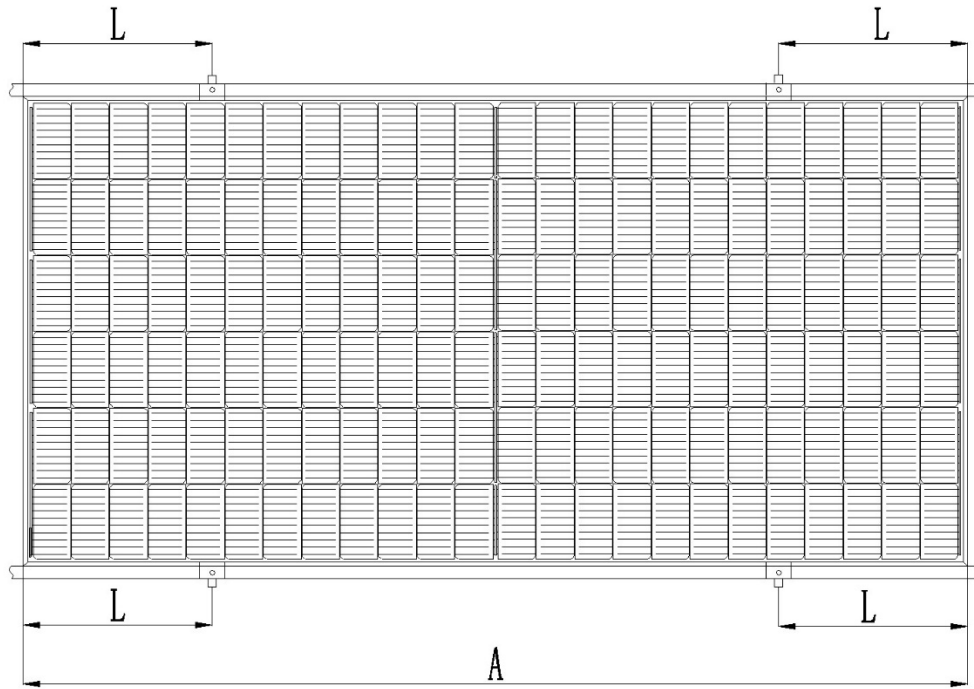


Figure 3. Diagram of Mounting Zones for clamps

Table of Mounting Zones for clamps.

Module Type	Module Dimensios	Clamp installation on long side (+5400Pa,-2400Pa) L in Fig.3
MYMH-72HD MYMP-72HD	2278mm*1134mm*30mm	$A/5 \sim A/4$ mm
MYMH-60HD MYMP-60HD	1903mm*1134mm*30mm	$A/5 \pm 50$ mm
MYMH-54HD	1722mm*1134mm*30mm	$A/5 \pm 50$ mm

MYMP-54HD		
MYMP-72HS	2278mm*1134mm*35mm	$A/5 \pm 50\text{mm}$
MYMP-60HS	1903mm*1134mm*35mm	$A/5 \pm 50\text{mm}$
MYMP-54HS	1722mm*1134mm*35mm	$A/5 \pm 50\text{mm}$
Note	A is the length of the long side of the module. For details, please refer to Datasheet.	

2) Please ensure the following points before the clamps mounting:

- a. Before the mounting, please check the integrity of the junction box.
- b. Any objects such as insects or others on the surface of solar panels must be removed
- c. Please check and ensure the PV modules serial number is correct.

2) Snow/wind load for Mingyang Solar PV module (only refers to the model involved in this specification): front side 5400 Pa, back sheet load 2400 Pa and safety factor 1.5 times. If modules are installed in a snowy and strong wind environment, then special additional weather protection methods should be used to meet the installation requirements.

3. Wiring and Connection

3.1 Before the installation, please carefully read the operation instructions of PV system.

Using multi-connecting cables to make the PV modules in series or parallel connection, which is determined by the customers' requirements on the solar system power, current and voltage etc.

3.2 Please connect similar current level modules for series connection, and output voltage should not be higher than permitted system maximum voltage. Module number of each series depends on the system design, inverter type and the installation environment.

3.3 The maximum rated fuse current of each series is marked on the label of each module and also in the specification sheet. The rated fuse current refers to the highest reverse current that each module can bear. Based on the maximum fuse current and

installation requirements of the local electrical performance, please match and choose the suitable fuse to protect the PV modules in series or parallel connection.

3.4 Isolate the control system or inverter and connect the cables from the PV arrays to the isolator in accordance with the installation instructions of the PV control systems or inverter. The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of PV system (For single module, we recommend 4 mm² cross-sectional cable, and the rated current of connectors more than 10A). Otherwise, the connecting cables and connectors will overheat. Please pay attention that the temperature limit of the cables is 85°C.

3.5 The electrical connections must comply with local and national electrical rules. Please note the earthing/grounding requirements in Clause 1.2 above “Products Application –(14). For bolted connections, as per diagram below.

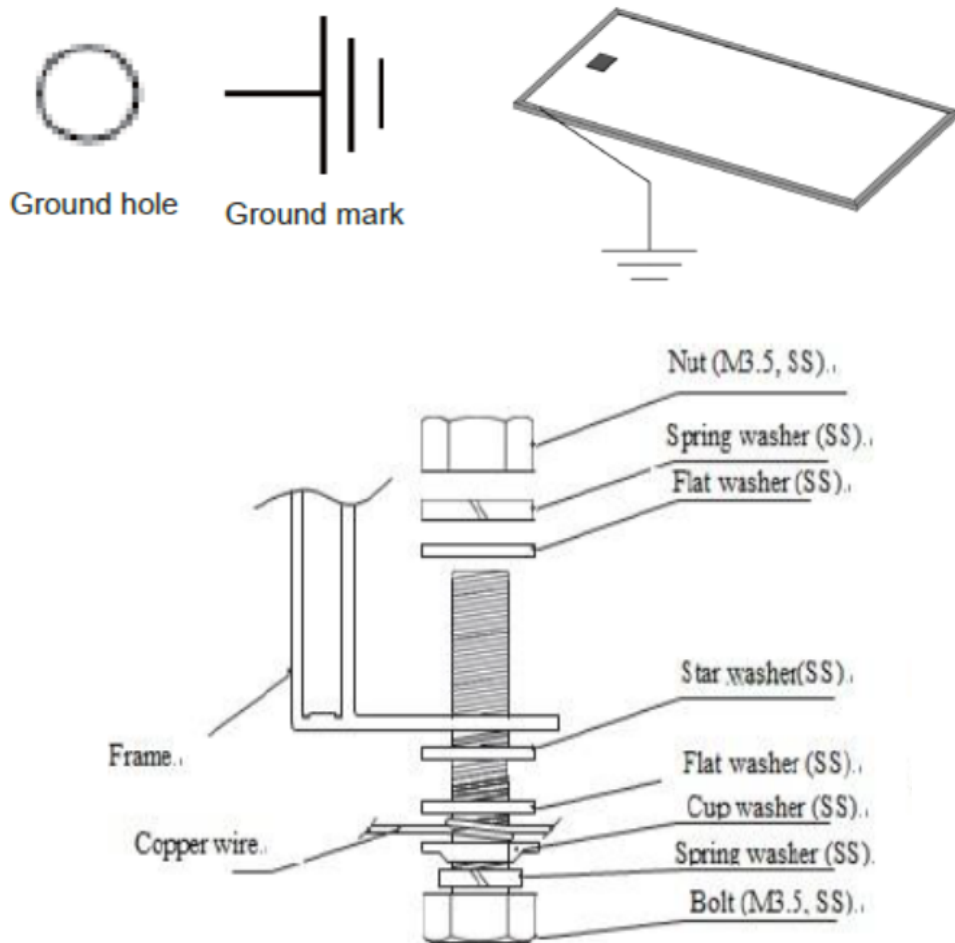


Figure 4. Ground connection of PV modules

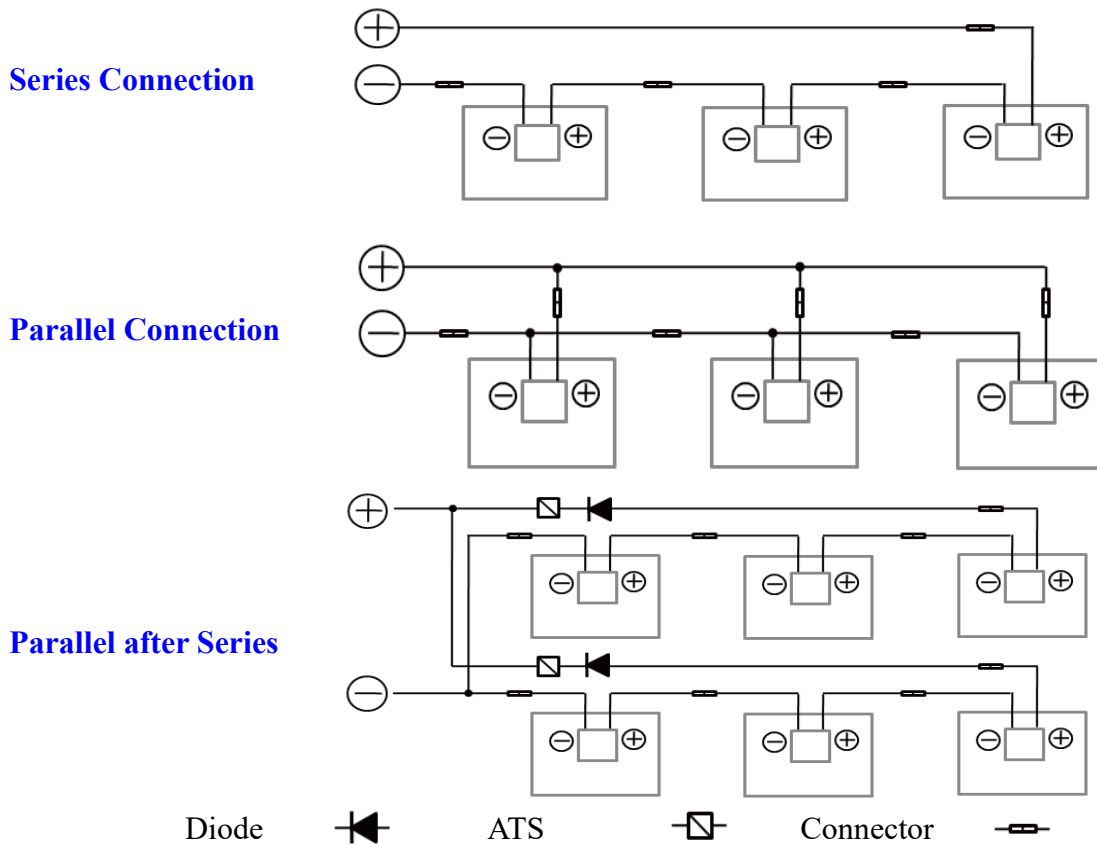
3.6 All PV modules are equipped with the bypass diodes. Please notice that the diodes, cables, and junction boxes maybe damaged by the incorrect installation.

4. *Electrical Installation*

Electrical performance parameters of module, such as nominal value of I_{sc} 、 V_{oc} and P_{mas} has $\pm 3\%$ random error compared with value of STC. The standard Testing Environment of module is :Irradiance 1000/m²、 Cell temperature 25°C and Spectrum AM 1.5.

Normally the current and voltage of the module, will be a little higher compared with the value under STC, so when checking each parameter of solar system outputs , such as rated voltage, cable capacity, fuse capacity and module power, the corresponding short circuit current and open circuit voltage should be amplified by 1.25 times.

Series, parallel circuit electrical diagram



The maximum number of modules per series string must be calculated according to design requirements. The value of the Voc in the local expected minimum temperature cannot exceed the maximum system voltage value specified of the module (According to IEC61730 safety test, the maximum system voltage of Mingyang Solar Module is DC1500V).

DC electrical output values can be corrected as follows.

The Voc correction factor can be calculated according to the following formula: $C_{Voc}=1-\beta_{Voc}\times(25-T)$, T is The minimum ambient temperature expected for the installation of the system and β (% /°C) is the temperature coefficient of the selected module Voc (According to the corresponding Module Data sheet).

If the reverse current can exceed the maximum fuse current of the module, the modules must be protected by an equivalent current protection device. If the number of parallel strings is more than or equal to 2 , they must be equipped with an over current protection device on each series of modules.

5. Maintenance

PV modules need to be inspected and maintained regularly, especially during the warranty period. In order to make sure modules maintain required performance, Mingyang Solar adopts following maintenance measures:

5.1 Appearance Inspection

Please kindly check the PV modules carefully, ensure the modules are without appearance defects and particularly pay attention to following points:

- 1) Module glass was damaged or not.
- 2) Whether sharp-pointed objects in touch with panels surface.
- 3) Whether solar panel is blocked by obstacle and other objects .
- 4) Whether corrosion appeared near fingers of the solar cell. This is caused by steam penetrated into the module resulted from the damage of laminates surface during installation or transportation.
- 5) Check whether the screws were loose or damaged between modules and mounting

structures. If so, adjust it or repair it in time.

5.2 Cleaning

- 1) Dust or dirt on the modules glass will decrease power output. Clean modules preferably once per year if possible (depend on site conditions). Use a soft cloth dry or wet are workable. Mineral water is not recommended for cleaning.
- 2) Never use abrasive material to clean the modules under any circumstances.
- 3) In order to reduce or avoid potential electric shock or burning risks, Mingyang Solar suggests that the cleaning is done early morning or at dusk with lower temperature, especially in the high temperature areas.
- 4) Do not try to clean the panel which has broken glass or uncovered wires. This may lead to electric shock.

5.3 Connector & Wires Inspection

It is recommended that the following preventive maintenance be carried out every six months:

- 1) Inspect the sealant gel to make sure there is no flaw or chink.
- 2) Inspect for aging signs of modules, including possible breakage by the bites of rodent, climate aging, and all the connectors are connected tight and have correct appearance. Inspect the grounding/earthing connection status.

6. Disclaimer

The conditions of installation, operation, using and maintenance of the modules shown in this manual are beyond the controlling range of Mingyang Solar. Any personal injury or property lost during the installation, operation, using and maintenance, and any disputes caused by defect of non Mingyang Solar product, Mingyang Solar shall not be held accountable for any legal consequences.

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