



Hangzhou Sunny Energy Science & Technology Co., Ltd

INSTRUCTION MANUAL FOR PV MODULE

6th Nov. 2017



Installation Manual

Please read this manual carefully before installing and using the modules, in order to enable the PV module to be installed correctly and to generate electric power properly.

This Installation Manual applies to:

Poly 72cells series:

ZDNY-300P72, ZDNY-305P72, ZDNY-310P72, ZDNY-315P72, ZDNY-320P72,
ZDNY-325P72, ZDNY-330P72, ZDNY-335P72;

Poly 60cells series:

ZDNY-250P60, ZDNY-255P60, ZDNY-260P60, ZDNY-265P60, ZDNY-270P60 ,
ZDNY-275P60, ZDNY-280P60;

Poly 54cells series:

ZDNY-230P54, ZDNY-235P54, ZDNY-240P54, ZDNY-245P54, ZDNY-225P54;

Poly 48cells series:

ZDNY-200P48, ZDNY-205P48, ZDNY-210P48, ZDNY-215P48, ZDNY-220P48,

ZDNY-225P48,

Electrical parameter

The tolerance of V_{oc} is $\pm 2\%$

The tolerance of I_{sc} is $\pm 4\%$



MODULE TYPE/S	ZDNY-300P72	ZDNY-305P72	ZDNY-310P72	ZDNY-315P72	ZDNY-320P72
V _{oc} (with tolerance) [V]:± 2%	45.48	45.65	45.65	45.70	45.70
I _{sc} (with tolerance) [A]	8.76	8.81	8.85	8.98	9.09
V _{Pmax} [V]	36.36	36.49	36.91	37.01	37.05
I _{Pmax} [A]	8.25	8.36	8.41	8.52	8.64
P _{max} (with tolerance) [W] ±3%	300	305	310	315	320
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-325P72	ZDNY-330P72	ZDNY-335P72	ZDNY-250P60	ZDNY-255P60
V _{oc} (with tolerance) [V]:± 2%	45.74	45.76	45.83	37.76	37.80
I _{sc} (with tolerance) [A]	9.20	9.27	9.34	8.78	8.89
V _{Pmax} [V]	37.09	37.13	37.19	30.54	30.62
I _{Pmax} [A]	8.77	8.89	9.01	8.19	8.33
P _{max} (with tolerance) [W] ±3%	325	330	335	250	255
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-260P60	ZDNY-265P60	ZDNY-270P60	ZDNY-275P60	ZDNY-280P60
V _{oc} (with tolerance) [V]:± 2%	37.90	38.15	38.26	38.37	38.45
I _{sc} (with tolerance) [A]	9.01	9.10	9.22	9.31	9.40
V _{Pmax} [V]	30.73	30.92	31.08	31.22	31.41
I _{Pmax} [A]	8.47	8.58	8.69	8.81	8.92
P _{max} (with tolerance) [W] ±3%	260	265	270	275	280
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15



MODULE TYPE/S	ZDNY-225P54	ZDNY-230P54	ZDNY-235P54	ZDNY-240P54	ZDNY-245P54
V _{oc} (with tolerance) [V]:± 2%	34.09	34.47	34.56	34.60	34.63
I _{sc} (with tolerance) [A] :	8.84	8.96	9.05	9.17	9.26
V _{Pmax} [V] :	27.76	27.84	27.91	28.01	28.18
I _{Pmax} [A] : ± 4%	8.11	8.27	8.43	8.58	8.70
P _{max} (with tolerance) [W] ±3% :	225	230	235	240	245
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-250P54	ZDNY-200P48	ZDNY-205P48	ZDNY-210P48	ZDNY-215P48
V _{oc} (with tolerance) [V]:± 2%	34.67	29.71	29.87	29.95	30.20
I _{sc} (with tolerance) [A] :	9.35	8.78	8.82	8.98	9.25
V _{Pmax} [V] :	28.32	23.80	24.06	24.36	24.43
I _{Pmax} [A] : ± 4%	8.84	8.40	8.52	8.62	8.80
P _{max} (with tolerance) [W] ±3% :	250	200	205	210	215
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-220P48	ZDNY-225P48			
V _{oc} (with tolerance) [V]:± 2%	30.63	30.82			
I _{sc} (with tolerance) [A] :	9.27	9.36			
V _{Pmax} [V] :	24.75	24.89			



MODULE TYPE/S	ZDNY-220P48	ZDNY-225P48			
IPmax [A] : ± 4%	8.89	9.04			
Pmax(with tolerance) [W] ±3% :	220	225			
Maximum system voltage	1500	1500			
Maximum series fusing rating	15	15			

Mono72cells series:

ZDNY-300C72, ZDNY-305C72, ZDNY-310C72, ZDNY-315C72, ZDNY-320C72, ZDNY-325C72, ZDNY-330C72 ,
ZDNY-335C72, ZDNY-340C72, ZDNY-345C72, ZDNY-350C72, ZDNY-355C72;

Mono 60cells series:

ZDNY-250C60, ZDNY-255C60, ZDNY-260C60, ZDNY-265C60, ZDNY-270C60, ZDNY-275C60, ZDNY-280C60 ,
ZDNY-285C60, ZDNY-290C60, ZDNY-295C60, ZDNY-300C60;

Mono 54cells series:

ZDNY-225C54, ZDNY-230C54, ZDNY-235C54, ZDNY-240C54, ZDNY-245C54, ZDNY-250C54, ZDNY-255C54,
ZDNY-260C54, ZDNY-265C54;

Mono 48cells series:

ZDNY-200C48, ZDNY-205C48, ZDNY-210C48, ZDNY-215C48, ZDNY-220C48, ZDNY-225C48;

Electrical parameter

The tolerance of Voc is ±2%

The tolerance of Isc is ±4%



MODULE TYPE/S	ZDNY-300C72	ZDNY-305C72	ZDNY-310C72	ZDNY-315C72	ZDNY-320C72
V _{oc} (with tolerance) [V]:± 2%	45.02	45.29	45.45	45.64	45.96
I _{sc} (with tolerance) [A] :	8.75	8.88	8.96	9.03	9.10
V _{Pmax} [V] :	36.10	36.45	36.68	36.89	37.15
I _{Pmax} [A] : ± 4%	8.31	8.37	8.46	8.55	8.62
P _{max} (with tolerance) [W] ±3% :	300	305	310	315	320
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-325C72	ZDNY-330C72	ZDNY-335C72	ZDNY-340C72	ZDNY-345C72
V _{oc} (with tolerance) [V]:± 2%	46.25	46.45	46.67	46.79	46.90
I _{sc} (with tolerance) [A] :	9.16	9.23	9.29	9.37	9.45
V _{Pmax} [V] :	37.46	37.65	37.88	38.02	38.31
I _{Pmax} [A] : ± 4%	8.68	8.77	8.85	8.95	9.01
P _{max} (with tolerance) [W] ±3% :	325	330	335	340	345
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-350C72	ZDNY-355C72	ZDNY-250C60	ZDNY-255C60	ZDNY-260C60
V _{oc} (with tolerance) [V]:± 2%	47.35	47.59	37.35	37.76	38.04
I _{sc} (with tolerance) [A] :	9.50	9.54	8.99	9.07	9.13
V _{Pmax} [V] :	38.69	38.97	30.22	30.49	30.72
I _{Pmax} [A] : ± 4%	9.05	9.11	8.28	8.37	8.47
P _{max} (with tolerance) [W] ±3% :	350	355	250	255	260
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15



MODULE TYPE/S	ZDNY-265C60	ZDNY-270C60	ZDNY-275C60	ZDNY-280C60	ZDNY-285C60
Voc (with tolerance) [V]:± 2%	38.35	38.66	39.02	39.17	39.33
Isc (with tolerance) [A].....:	9.19	9.24	9.30	9.35	9.41
VPmax [V].....:	30.90	31.11	31.28	31.52	31.85
IPmax [A] : ± 4%	8.58	8.68	8.80	8.89	8.95
Pmax (with tolerance) [W] ±3%.....:	265	270	275	280	285
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-290C60	ZDNY-295C60	ZDNY-300C60		
Voc (with tolerance) [V]:± 2%	39.45	39.72	39.98		
Isc (with tolerance) [A].....:	9.46	9.50	9.53		
VPmax [V].....:	32.23	32.57	32.86		
IPmax [A] : ± 4%	9.01	9.06	9.13		
Pmax (with tolerance) [W] ±3%:	290	295	300		
Maximum system voltage	1500	1500	1500		
Maximum series fusing rating	15	15	15		

MODULE TYPE/S	ZDNY-225C54	ZDNY-230C54	ZDNY-235C54	ZDNY-240C54	ZDNY-245C54
Voc (with tolerance) [V]:± 2%	34.08	34.42	34.78	35.04	35.32
Isc (with tolerance) [A].....:	8.88	8.94	9.02	9.08	9.14
VPmax [V].....:	27.57	27.90	28.14	28.35	28.51
IPmax [A] : ± 4%	8.17	8.26	8.36	8.48	8.61
Pmax (with tolerance) [W] ±3%.....:	225	230	235	240	245
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15



MODULE TYPE/S	ZDNY-250C54	ZDNY-255C54	ZDNY-260C54	ZDNY-265C54	DNY-270C54
V _{oc} (with tolerance) [V]:± 2%	35.59	35.92	36.05	36.20	36.31
I _{sc} (with tolerance) [A]	9.19	9.25	9.30	9.36	9.41
V _{Pmax} [V]	28.70	28.83	29.04	29.33	29.68
I _{Pmax} [A].....: ± 4%	8.73	8.86	8.97	9.04	9.11
P _{max} (with tolerance) [W] ±3%	250	255	260	265	270
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-200C48	ZDNY-205C48	ZDNY-210C48	ZDNY-215C48	ZDNY-220C48
V _{oc} (with tolerance) [V]:± 2%	30.58	30.70	30.82	31.02	31.18
I _{sc} (with tolerance) [A]	8.75	8.92	9.03	9.12	9.22
V _{Pmax} [V]	24.10	24.35	24.59	24.86	25.15
I _{Pmax} [A].....: ± 4%	8.30	8.42	8.54	8.65	8.75
P _{max} (with tolerance) [W] ±3%	200	205	210	215	220
Maximum system voltage	1500	1500	1500	1500	1500
Maximum series fusing rating	15	15	15	15	15

MODULE TYPE/S	ZDNY-225C48	ZDNY-230C48	ZDNY-235C48		
V _{oc} (with tolerance) [V]:± 2%	31.34	31.47	31.65		
I _{sc} (with tolerance) [A].....:	9.35	9.49	9.52		
V _{Pmax} [V].....:	25.31	25.53	25.78		
I _{Pmax} [A]	8.89	9.01	9.11		
P _{max} (with tolerance) [W] ±3%	225	230	235		
Maximum system voltage	1500	1500	1500		

Maximum series fusing rating	15	15	15		
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01 Warning:

1. Artificially concentrated sunlight shall not be directed on the module or panel.
2. 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 value of I_{sc} and V_{oc} marked on this module should be multiplied by of 1.25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.
3. Do not touch live terminals with bare hands, because the nominal open voltage or maximum system voltage of 45 V or more may cause an electric shock .Use insulated tools for electrical connections.
4. To reduce the risk of electrical shock or burns, modules may be covered with an opaque material during installation to avoid shocks or burns.
5. The installation work of the PV array can only be done under the protection of sun-sheltering covers or sunshades and only qualified person can install or perform maintenance work on this module.
6. Follow the battery manufacture's recommendations if batteries are used with modules.
7. The modules have passed TÜV SÜD 5400Pa mechanical load test.
8. All instructions should be read and understood before attempting to install, wire, operate and maintain the module.
9. Do not expose the artificially concentrated sunlight to a module or panel



02. Unpacking

1. After the PV module has been shipped to the installation site all of the parts should be unpacked properly with care.
2. Caution: The condign environment for unpacking the modules and all other apparatus should be proofed against dampness and rainfall.

03. Preparation before Installation:

1. Optical check before installation, to make sure there is no bug in the packing and junction box as well as the surface of module.
2. Check the series number
3. Check the solar cell 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.
4. Tools & Material for Installation
 - ① Bolt driver
 - ② Each mounting hole matches with a set of a bolt, nut and washer, quantity and type are as below:

NO.	description	type	quantity	Material	remark
1	bolt	M8*34mm	8	Stainless steel	
2	Nut	M8	8	Stainless steel	
3	washer	8mm	16	Stainless steel	

- ③ The users should design and build metallic bracket for installing and bearing the weight of the PV modules. The brackets are specially designed for users' installation places such as the open land or the roof of houses.

Caution: To avoid damage from flooding and other unpredictable events, and avoid heavy impact.

To design a gradient angle facing the sun radiation direction in order to insure the full sunshine receives as much as possible.

04. Installations and Operation

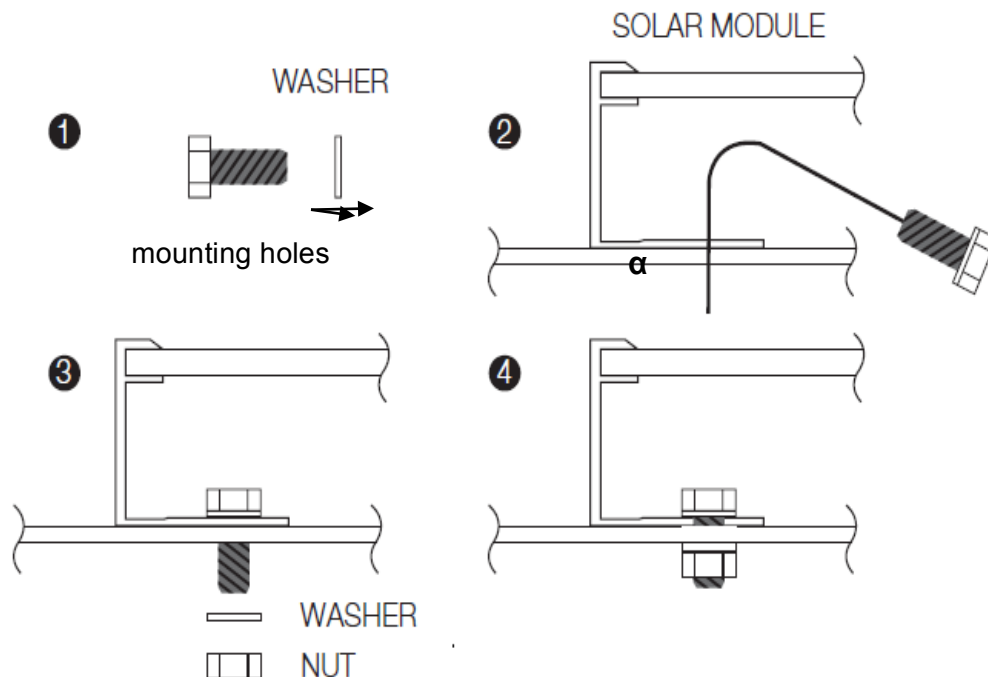
1. Systems should be installed by qualified personnel only and at least two persons. The system involves electricity, and can be dangerous if the personnel are not familiar with the appropriate safety procedures.
2. Do not step on the module.
3. Although modules are quite rugged, the glass can be broken and the module will no longer work properly if it is dropped or hit by tools or other objects.
4. Put the solar cell modules on the frame and put on the bolts and then combine them firmly after put on all the washers. All the nuts should be finished on the frame together firmly. The module frame is made of anodized aluminum, and therefore corrosion can occur if the module is subject to a salt-water environment with contact to a rack of another type of metal.(Electrolysis Corrosion) if required PVC or stainless steel washers can be placed between the solar module frame and support structure to prevent this corrosion.

① **Installation with screws:**

1. The solar module frame must be attached to a support structure using a set of stainless steel bolt, nut and washer of four (4) places symmetrical on the solar module. But in severe cold area, we propose to install with 8 mounting holes. The set of bolt, nut and washer used for securing the module frame should secure with an applied torque of 8Newton-meters (6 foot-pounds).
2. The recommended ambient temperature should be within **-40°C to 40°C**. The temperature limits are defined as the monthly average high and low of the installation site. The limit operating temperature should be **-40°C (-40°F)** and **85°C (185°F)** and the rated operating altitude is not above 2000m.

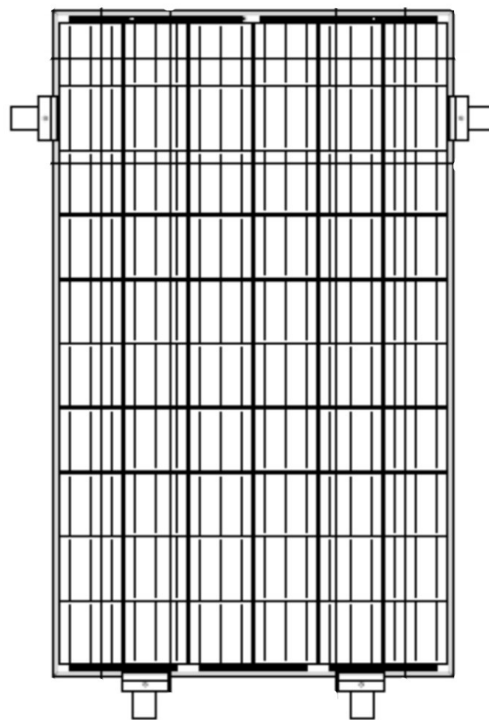
Recommending installing with support structure (with 8 mounting holes, see the graph.), the structure should be around 20cm away from ground, the incline angle α to be adjusted according to local condition. If the modules are installed on the roof, the whole system mounting should be installed around 20cm away from the roof.

Each mounting hole matches with a set of bolt, nut and washer. The bolt should be passed through mounting hole of the frame and washer, and finally to tighten the nut at the time of installator

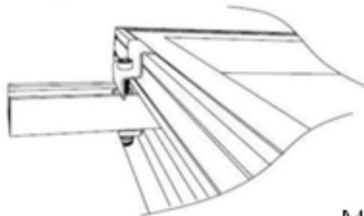


② Installation with clamps:

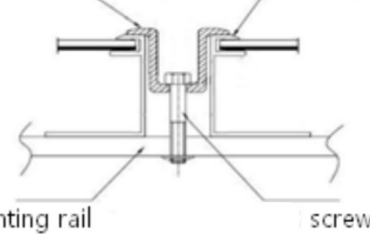
The module clamps should not come into contact with the front glass and must not deform the frame. Be sure to avoid shadowing effects from the module clamps. The module frame is not to be modified under any circumstances. When choosing this type of clamp-mounting method, eight clamps are required for each module, two clamps for each long/short sides of the module. The applied torque value should be big enough to fix the modules steadily (Please consult with the clamp or support's supplier for the specific torque value). Please find detailed mounting information as shown below.



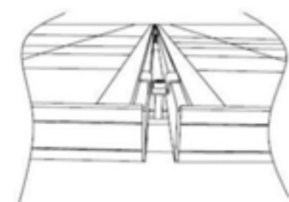
Fringe modules installation



Clamp Frame



Middle modules installation





6. Way of grounding:

All module frames should be grounded for safety. The grounding connections between modules must be approved by a qualified electrician, the grounding itself must be made by a qualified electrician. The grounding clip accepts solid insulated copper wire sizes 10 or 12 AWG. The wire must not be nicked.

Installation process as follows:

① Mounting Grounding Clip to Frame

The grounding clip must be placed onto the frame so that the bolt straddles the pre-drilled hole and stainless steel nut 5-14 should be tightened in the frame. It is recommended that the bolt be tightened to a torque of 3 N*m. The head of the bolt must be flush with the base and the base must be flush with the frame.

② Wire Placement

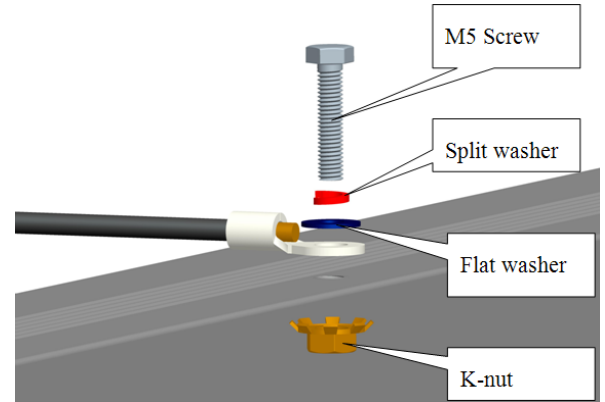
The wire must be bottomed in the wire slot (wire slot will cause the wire form a slight curve).

③ Terminating the Wire

The slider must be engaged (slider covers the base).



The module shall wire in accordance with the standard, the grounding method of the frame of arrays shall comply with IEC 61215. Of course, in accordance with local laws and regulations to carry out electrical installation is the best choice.



7. Module support structures that are to be used to support modules should be wind rated and approved for use by the appropriate local and civil codes prior to installation.

8. When solar modules are used to charge batteries, the batteries must be installed in a manner, which will protect the performance of the system and the safety of its users. Follow the battery manufacturers' guidelines concerning installation, operation and maintenance recommendations. In general, the batteries (or battery bank) should be away from the main flow of people and animal traffic. Select a battery site that is protected from sunlight, rain, snow and debris is well ventilated. Most batteries generate hydrogen gas, which can be explosive when charging. 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.

9. When the modules are installed in electrically parallel, each module (or series string of modules) shall be provided with the maximum series fuse, products of poly72cells family, poly60cells family, family have a fuse rating of 15A.

10. Solar Modules have been certified for a maximum design static load on the back side of 1600 Pa (i.e. wind load) and a maximum design static load on the front side is 3600 Pa (i.e. wind and snow load), depending on the Modules type (designed safety factor r is 1.5)

04 Wiring and Connection:



Before this procedure, please read the operation instructions of the PV control system carefully.

1. Third-party certification body for mounting using 4 or 8 mounting holes in the frame has evaluated the frame of module.
2. Refer to Section 690-8 of the National Electrical Code for an additional multiplying factor of 125 percent (80 percent derating), which may be applicable.
3. For field connections, use minimum 12 AWG copper wires insulated for a minimum of 90°C.

Suggest using QC solar wire cable and QC solar connectors Type: QC4.10-cd(-) female type and Type: QC4.10-cd(+) male type.

4. Make wiring by multi-connecting cables between the PV modules in series or parallel connection, which is determined by the configuration requirement for system power, current and voltage.
5. When the modules are connected in series connection, module's connectors should be linked

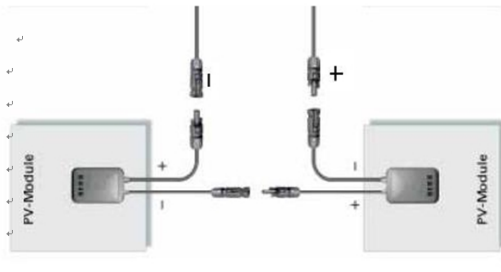
" + " / " - " with another.

When the modules are connected in parallel connection, module's connectors should be linked

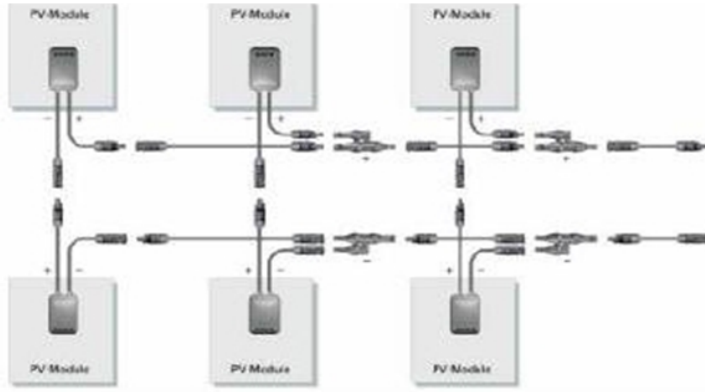
" + " / " + " and " - " / " - " with another.

(1) Serial -connection of modules

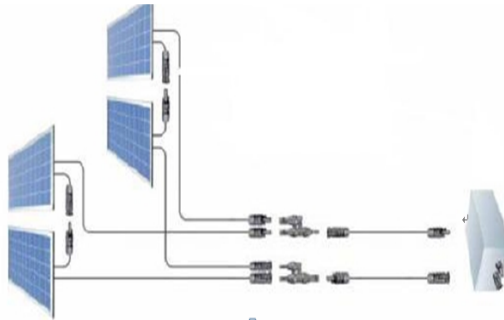
Recommended maximum series: $\lfloor \frac{1500 \text{ V}}{1.25 * V_{oc}} \rfloor$



(2) Parallel- connection of modules



(3) Recommended parallel module configurations: [fuse rating/ $I_{sc}+1$]



6. Open the connection box of the control system and connect the cables from the PV arrays to the connection box in accordance with the installation indication of the PV control systems.

Connect the system of modules to the connection box:

7. Display near the connector or in the installation or instruction manual with the marker 'Do not disconnect during load connection for a removable connector'.
8. All module frames and mounting racks must be properly grounded in accordance with local and national electrical codes.



9. The type of bypass diodes in junction box Type: qc 0816431 are SB3050DY. The nominal current of SB3050DY is 30A, and the peak reverse voltage is 50V.

The modules have been rated Fire Class C. for roof mounting, Installation shall be at an incline of 127 mm per 300 mm; except that built-up roof coverings are to be tested at the maximum incline recommended by the manufacturer, but not more than 127 mm to 300 mm.

05 Maintenance and Care

1. The cumulate dust or dirt on the modules' front face will result in a decreased energy output. Clean the panel(s) preferably once per annum using a soft cloth if possible (depending on site conditions), as necessary.
2. Never use abrasive material under any circumstances.
3. Examine the PV module(s) for signs of deterioration. Check all wiring for possible rodent damage, weathering and that all connections are tight and corrosion free. Check electrical leakage to ground.
4. Check fixing bolts and mounting brackets are tight.
5. It is the great honor to provide you with our PV modules.

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