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Solar Module Installation and User Manual

Thank you for selecting solar panel from CNBM.
In order to use the solar panels properly, please read this Installation Manual carefully and completely before any operating.

Catalogue:

The modules are qualified for application class A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is anticipated (modules qualified for safety through EN IEC 61730-1 and -2 within this application class are considered to meet the requirements for Safety Class II)

About Solar Panel

What is solar panel?

Solar panel is a big semiconductor (PN diode) which can transfer sun energy to electrical energy without any help from mechanical energy and it is a quiet and clean energy generator which can create DC electricity continuously under the sunlight.

Theory

Under the sunlight, the cells in the modules will produce electrons and cavities by photo-emission which is influenced by internal electrical field, the electrons will go towards and assemble at N-silicon and cavities will go towards and assemble at P-silicon. As a result, the electromotive force will occur, if they are connected with exterior load, the DC electricity will be created.

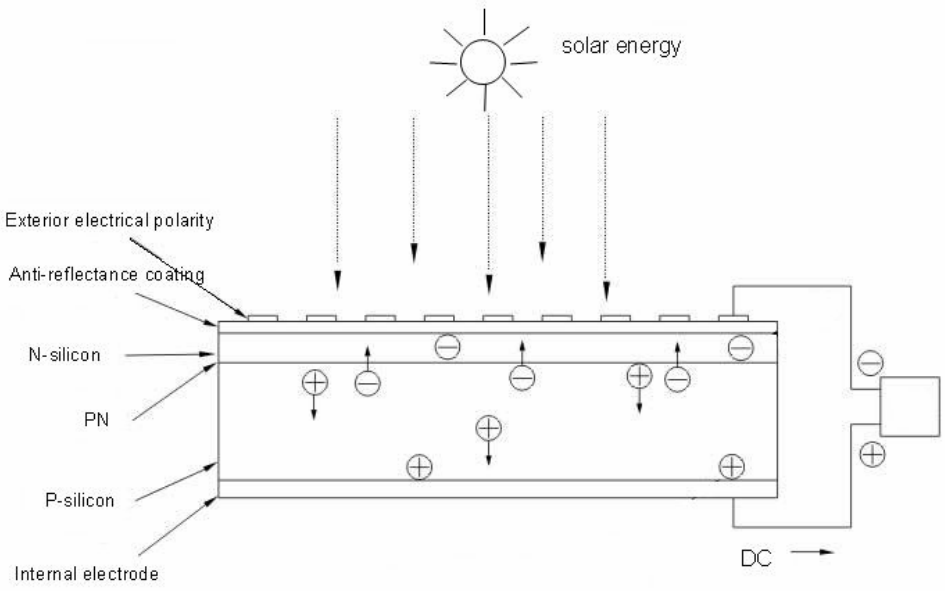


Diagram for Solar Module function

Performance

- The module is high efficient due to adopting high-efficent cell
- The module is high reliable due to adopting high transparent tempered glass
- The structure of module is wind-resistant.

Characteristics

(From CNBM-240P to CNBM-)

Voltage at point of max power Vmpp(V)	Current at point of max power Impp(A)	Open Circuit Voltage Voc（V）	Short Circuit Current Isc(A)	Max System Voltage (V)	**Max Power Pm(W) and Type**	Application class	Maximum series configurations	Maximum parallel configurations	Over-current Protection
35.0±0.5V	6.86±0.5A	42.0±0.5V	7.68±0.5A	1000	240 CNBM-240P	Class A	24	1	15A
35.0±0.5V	7.0±0.5A	42.0±0.5V	7.84±0.5A	1000	245 CNBM-245P	Class A	24	1	15A
35.3±0.5V	7.08±0.5A	42.4±0.5V	7.93±0.5A	1000	250 CNBM-250P	Class A	24	1	15A
35.3±0.5V	7.22±0.5A	42.4±0.5V	8.09±0.5A	1000	255 CNBM-255P	Class A	24	1	15A
35.5±0.5V	7.32±0.5A	42.6±0.5V	8.20±0.5A	1000	260 CNBM-260P	Class A	24	1	15A
35.5±0.5V	7.46±0.5A	42.6±0.5V	8.36±0.5A	1000	265	Class A	24	1	15A

					CNBM-265P				
35.8±0.5V	7.54±0.5A	43.0±0.5V	8.45±0.5A	1000	270 CNBM-270P	Class A	24	1	15A
35.8±0.5V	7.68±0.5A	43.0±0.5V	8.60±0.5A	1000	275 CNBM-275P	Class A	24	1	15A
36.0±0.5V	7.78±0.5A	43.2±0.5V	8.72±0.5A	1000	280 CNBM-280P	Class A	24	1	15A
36.0±0.5V	7.92±0.5A	43.2±0.5V	8.87±0.5A	1000	285 CNBM-285P	Class A	24	1	15A
36.0±0.5V	8.06±0.5A	43.2±0.5V	8.97±0.5A	1000	290 CNBM-290P	Class A	24	1	15A
28.5±0.5V	7.02±0.5A	34.2±0.5V	7.86±0.5A	1000	200 CNBM-200P	Class A	30	1	15A
28.5±0.5V	7.19±0.5A	34.2±0.5V	8.05±0.5A	1000	205 CNBM-205P	Class A	30	1	15A
29.0±0.5V	7.24±0.5A	34.8±0.5V	8.11±0.5A	1000	210 CNBM-210P	Class A	29	1	15A
29.0±0.5V	7.41±0.5A	34.8±0.5V	8.30±0.5A	1000	215 CNBM-215P	Class A	29	1	15A
29.5±0.5V	7.46±0.5A	35.4±0.5V	8.36±0.5A	1000	220 CNBM-220P	Class A	28	1	15A
29.5±0.5V	7.63±0.5A	35.4±0.5V	8.55±0.5A	1000	225 CNBM-225P	Class A	28	1	15A
Voltage at point of max power Vmpp(V)	Current at point of max power Impp(A)	Open Circuit Voltage Voc（V）	Short Circuit Current Isc(A)	Max System Voltage (V)	**Max Power Pm(W) And Type**	Application Class	Maximum series configuratio ns	Maximu m parallel configura tions	Over-curren t Protection
30.0±0.5V	7.67±0.5A	36.0±0.5V	8.59±0.5A	1000	230 CNBM-230P	Class A	28	1	15A

30.0±0.5V	7.83±0.5A	36.0±0.5V	8.77±0.5A	1000	235 CNBM-235P	Class A	28	1	10A
30.0±0.5V	8.00±0.5A	36.0±0.5V	8.96±0.5A	1000	240 CNBM-240P	Class A	28	1	10A

With 72x5 mono c-Si cells:

Voltage at point of max power Vmpp(V)	Current at point of max power Impp(A)	Open Circuit Voltage Voc（V）	Short Circuit Current Isc(A)	Max System Voltage (V)	**Max Power Pm(W) And Type**	Application Class	Maximum series configurations	Maximum parallel configurations	Over-current Protection
35.0±0.5V	4.43±0.5A	42.0±0.5V	4.96±0.5A	1000	155 CNBM-155D	Class A	24	1	15A
35.0±0.5V	4.57±0.5A	42.0±0.5V	5.12±0.5A	1000	160 CNBM-160D	Class A	24	1	15A
35.0±0.5V	4.71±0.5A	42.0±0.5V	5.28±0.5A	1000	165 CNBM-165D	Class A	24	1	15A
35.5±0.5V	4.79±0.5A	42.6±0.5V	5.36±0.5A	1000	170 CNBM-170D	Class A	24	1	15A
35.5±0.5V	4.93±0.5A	42.6±0.5V	5.52±0.5A	1000	175 CNBM-175D	Class A	24	1	15A
36.0±0.5V	5.0±0.5A	43.2±0.5V	5.6±0.5A	1000	180 CNBM-180D	Class A	24	1	15A
36.0±0.5V	5.14±0.5A	43.2±0.5V	5.76±0.5A	1000	185 CNBM-185D	Class A	24	1	15A

Note: Rated electrical characteristics are within ±10 percent of the indicated values of I_{sc}, V_{oc}, P_m under Standard Test Conditions. (Irradiance of 1000W/m^2, Am 1.5 spectrum and a cell temperature of 25°C (77°F)

Safety Warning

In order to use the modules properly, avoiding property losses or injuring the operater or anyone else, warnings and some other caution signs are printed on the solar modules and Manuals.

■ Sign Introduction

Sign	Introduction
 Warning	Means ” Misoperation will cause a risk of lethal or personal serious injury ”
 Caution	Means”Misoperation will cause a risk of injuring or porperty loss ”

■ Graph introduction

Graph	Introduction
	Prohibited (proceeding not permitted) The details will be described in the signs, graphs and texts
	Compulsion (proceeding is compulsory) The details will be described in the signs ,graphs and texts
	Caution (Warning included) The details will be described in the signs or graphs and texts

General Warnings

warning

Solar module installation,maintenance,removal and resetting shall only be done by professionals

Before you attempt to install wire, operate and maintain the PV module, please make sure that you completely understand the information described in this installation manual.

- If there were defects, there is a risk of electrical shock or fire.

When installing,wiring,operating, removing and maintaining modules, pay attention to the risk of electrical shock

- If module is shined by sunlight or other illuminator, the DC electricity will be produced.
- Artificially concentrated sunlight shall not be directed on the module.
- 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.please 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.
- If modules are connected in series or parallel, the voltage and current will increase, the danger will be increased tremendously accordingly.
- When installing, wiring or maintaining modules, in order to prevent producing the DC electricity, please cover the module surface with sufficiently opaque stuff.
- When installing, wiring or maintaining modules, please use protective instruments such as rubber gloves.
- Do not connect the PV modules directly to the loads such as motor since the variation of the output power depending on the solar irradiation cause damage for the connected motor.

  1:In the case of a blushless motor, the lock function becomes active and the hall IC is most likely to be damaged.

  2:In the case of a brush type motor, the coil is most likely to be damaged.

If high reliability is required (the machine is related to personal life), please don't use those modules

- Output is unstable

  Serious accidence such as lethal injure may occur.

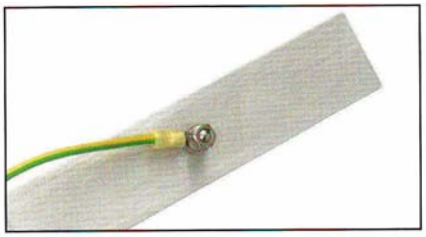
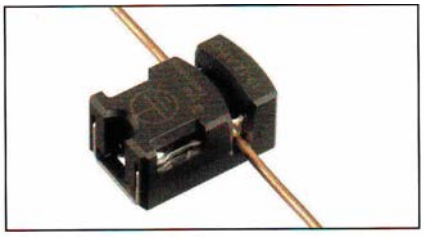
Warning for Installation

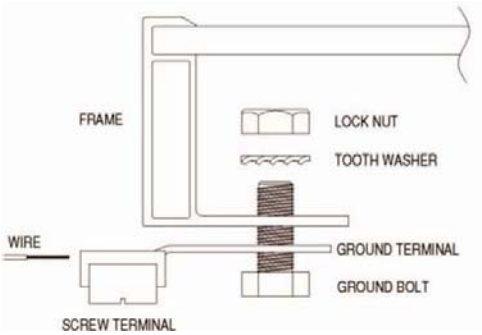
1. Always wear protective head gear, insulating gloves and safety shoes (with rubber soles).
2. Keep the PV module packed in the carton until installation.
3. Completely cover the PV module surface with an opaque material during PV module installation and wiring.
4. Plug in the connector tight and ensure the wiring work.
5. Wear a safety belt if working far above the ground.

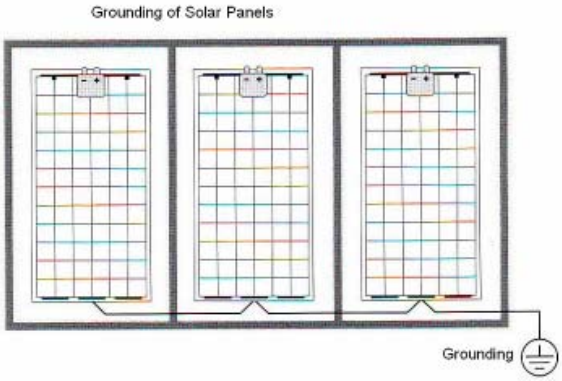
. Bind cables by the insulation locks. Drooping down of cables from the terminal box could possibly cause various problems such as animal biting electricity leakage in puddle.

Warning	
Installing, maintaining, removing and resetting modules shall only be done by professionals.	Don't stand or stamp on the solar modules There is a risk of injury or electric shock if glass is broken and it is slippery which may make injury to someone. 
Do not touch the terminal box and the end of output cable ends (connectors) with bare hands during installation or under sunligh, regardless of whether the PV module is connected to or disconnected from the syste Also do not perform any work if the terminals of PV module are wet. 	Don't wear steel stuff like rings. There is a risk of electrical shock 
Sharp stuff prohibited. It may puncture the back of module ■ There are risks of electrical shock, electricity leakage and solar module's service life may be shortened 	Don't put wires between frame and prop. The wire may be damaged and cause electrical shock and fire 
When connecting modules with ther controlling device please entrust rofessionals	Don't damage or process wiring material. It may cause a risk of electrical shock. 

Warning

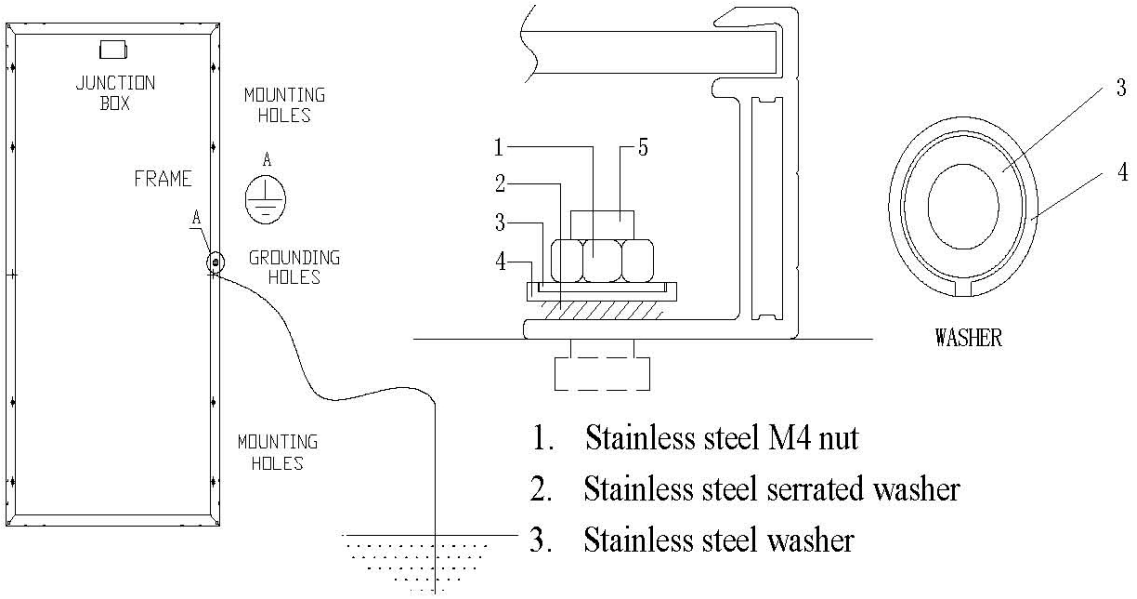
Grounding If not connected properly, it will cause a risk of electric shock. Please don't connect the cable with any other pipes such as gas pipe, water pipe, thunder-avoiding rod etc. Each PV module has a hole on each side with a grounding sign .	Don't install solar modules on movable objects such as doors,vehicles. The glass may be damaged and cause injury due to libration.
An example of ground connection using a bolt, nut, and washer retaining a ground lug is shown in the following figure. The screwing rate for nut is about 1.2 N.M 	Do not touch the PV module unnecessarily during installation. The glass surface and the frames get hot. There is a risk of burn, or you may collapse because of electric shock.
Alternately, the grounding and bonding equipment, type 1954381-1, by Tyco Electronics Corp can be used to provide the grounding connection to the module frame, as illustrated in the following diagram. 	Do not work under rain, snow or windy conditions.





Remarks:

Screw size: M5 screw **Earth cable diameter**: please use a 4mm earth cable.



1. Stainless steel M4 nut
2. Stainless steel serrated washer
3. Stainless steel washer

Warning for Operating

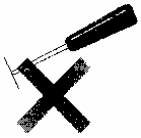
Warning

Do not open cover of junction box, it may result in electric shock.

Don't let children approach modules There is risk of electric shock or injury.

Do not damage or process wiring material, which may cause risk of electric shock.

Do not prick back of solar module with sharp objects otherwise may result in electric shock, electricity leakage or make solar module damaged



Don't stand on or step on the solar modules because the solar module may be damaged and people may be injured if slip down.

Caution
 don’t touch solar modules The module will become high temperature under sunshine, and may cause a risk of scalding

Warning for Maintenance

Warning

Don’t open cover of junction box and clean inside with liquid, it may result in electrical shock.

Don’t immerse the solar modules in liquid, it may result in electrical shock

Do not use damaged, abnormal solar module which may cause risk of an electric shock. If so please contact CNBM.

Don’t deform , mend solar module, it may result in electric shock or be wounded.

Don’t stand or step on solar module. The module may be damaged due to its glass surface and it may make person injured when they slip down.

Don’t touch the cable of the solar module, since DC electricity will be produced when solar module is under sunlight, please pay attention to this to avoid electrical shock.

Installation

Warning
Installing, repairing, removing and resetting solar modules shall only be done by professionals

Caution	● Don't put heavy objects on solar module ● Don't let optical lens and other spotlight objects to shine the modules directly. ● Don't toss or drop the solar modules

Installation shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.

Attention for installation

The modules shall be mounted so that the junction box shall be in the uppermost position to minimize the ingress of water

In case of series connection, the maximum open circuit voltage must not be greater than the specified maximum system voltage. The voltage is proportional to the number of series. In case of parallel connection, please be sure to take proper measure (e.g. fuse for protection of module and cable from over current, and/or blocking diode for prevention of unbalanced strings voltage) to block the reverse current flow. The current may easily flow in a reverse direction.

Site Selection

Please make sure that there is no obstruction in the surroundings of the site of installation. And select the site without shadows from trees or buildings, enabling the module to be shined by sun frequently. Especially in very hot weather, please pay attention the modules can't be shadowed partly. Furthermore, in different season, the dimension of shadow caused by plant or any other objects will be changed and may shadow some portions of solar modules, resulting in power generation reducing. Take proper steps in order to maintain reliability and safety, in case the PV modules are used in areas such as: heavy snow areas/extremely code areas/strong wind areas/installation over, or near, water/areas where installations are prone to salt water damage/small islands or desert areas.

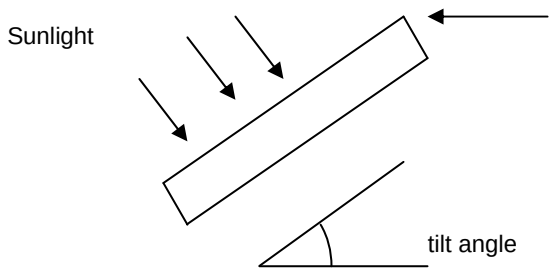
Installation direction: In the Northern Hemisphere, the PV modules should typically face south, and in the Southern Hemisphere, the PV modules should typically face north.

Tilt angle:

The title angle of the PV module is the measured between the PV module and a horizontal ground surface. The PV module generates the maximum output

power when it faces the sun directly.

For the standalone systems with a battery where the PV modules are attached to a permanent structure, the tile angle of the PV modules should be determined to optimize the performance when the sunlight is the scarcest. In general, if the electric power generation is adequate when the sunlight is the scarcest, then the angle chosen should be adequate during the rest of the year. For grid-connected installations where the PV module at the angle equal to the latitude of the installation site so that the power generation from the PV module will be optimum throughout the year.



PV module will get maximum output of power generation when sunlight irradiates on their surfaces vertically. But if operating time and operating purpose are limited, the above-mentioned design may not be optimum.

Support Structure

In order to make PV modules have a long service life outside please pay attention to the following items:

- Adopting strong and safe structure.
- Choosing appropriate materiel for solar modules
- Adopting appropriate method for anticorrosion
- Following all kinds of regulations concerned
- Don’t damage any parts of modules for power generation.
- The site shall be in compliance with ambient and climate.
- Be easy to maintenance
- The foundation shall be done by professional designer or construction company
- The assembly is to be mounted over a fire resistant roof covering rated for the application.

Installation

PV module installation

Caution

Use the long side of module frame as top, bottom side with installation holes to install modules.

If PV modules were blow away, it will be very dangerous.

Applying M6 or M8 stainless steel screws with power about 5~8N.M

In salty area please take appropriate methods to prevent solar modules from corrosion

Wiring and connection

900mmX4mm^2 cable for CNBM-160D---CNBM-180D solar modules, Temperature for interior and exterior of the cable can't exceed 85℃ and 55℃ separately. Diodes were installed in the solar modules.

If solar modules from CNBM were connected with other solar modules, the output of power generation will be deteriorated and may cause bad effect to solar modules. So please avoid this.

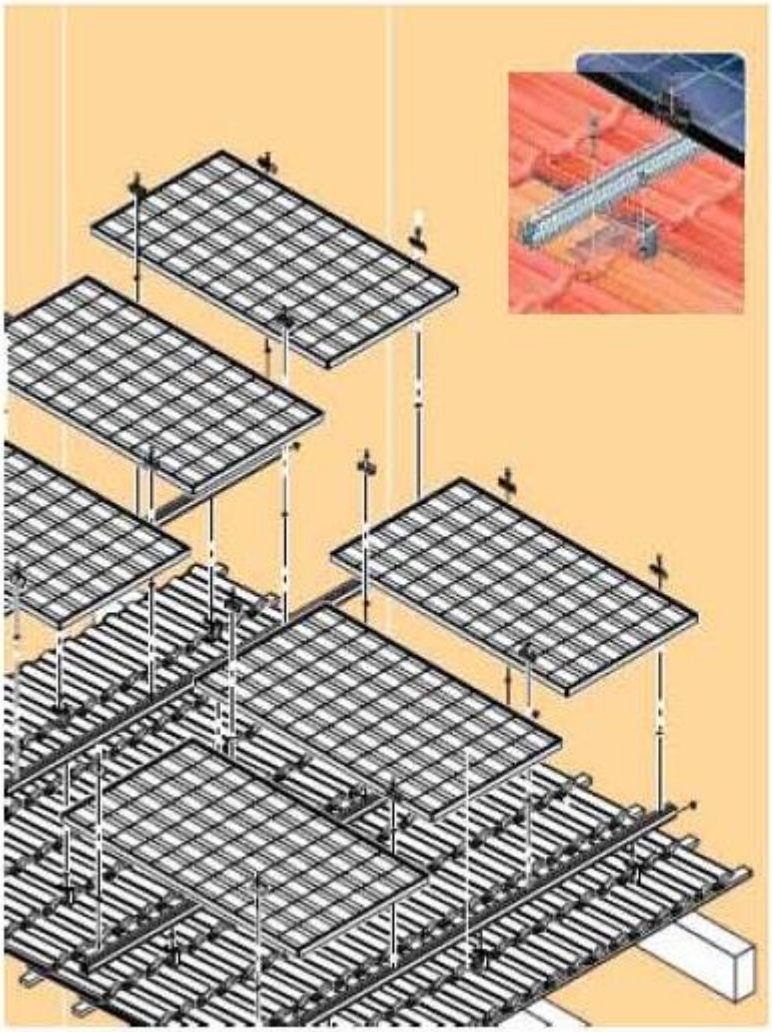
When PV modules are generating DC electricity please use the diodes or other applicable methods to prevent reversed current. Diodes are not subsidiary components of the solar modules

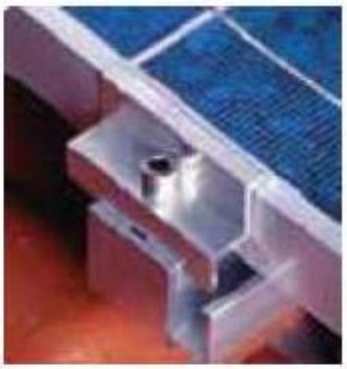
Note: Parallel configuration is not limited in case of taking proper measure (e.g. fuse for protection of module and cable from over current, and/or blocking diode for prevention of unbalanced strings voltage) to block the reverse current flow.

Please make sure that all the information described in the installation manual is

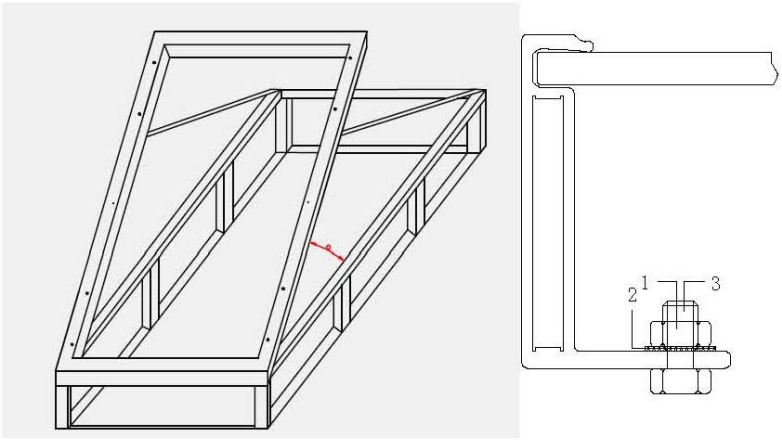
still valid and proper for your installation. The mounting method has been verified by CNBM and NOT CERTIFIED by a third party organization.

The approved way to mount CNBM PV modules to a support structure is using the bolt holes provided as described in the specifications. Although CNBM does not specify or warrant frame clips or clamps, using frame clips (not provided) or clamps module (not provided) is also possible when they are designed for PV modules and with minimum dimensions on the sides of the module in accordance with the instructions and drawings provided. If using frame clips or clamps, the modules should be fixed rigidly and there shall be no damage to the modules by deforming mounting structure against design load. CNBM does not specify or warrant frame clips. The CNBM module warranty may be void if customer-selected frame clips which are improper or inadequate with respect to the module properties (including strength or material) or installation. Note that if metal clips are used, there must be a path to ground from the clips. (for instance, using star washers in the clip hardware set.) Please review the descriptions and drawings carefully; not mounting the modules according to one of these methods may void your warranty. These mounting methods are designed to allow module loading of 2400pa.





sketch map



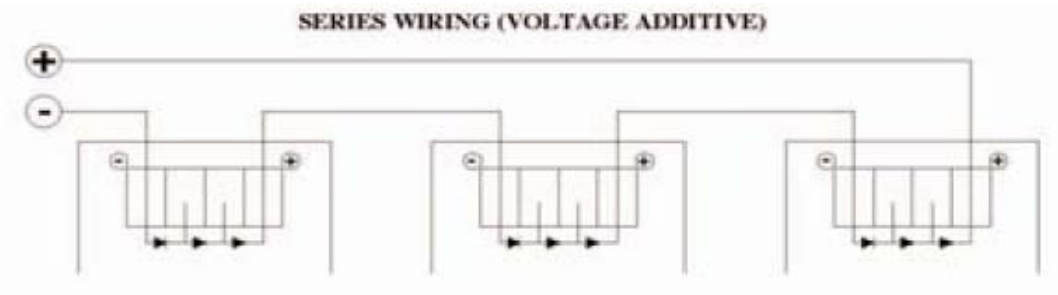
1、 Stainless steel M8 nut
2、 Stainless steel washer
3、Stainless steel M8 t-head bolt

Wiring

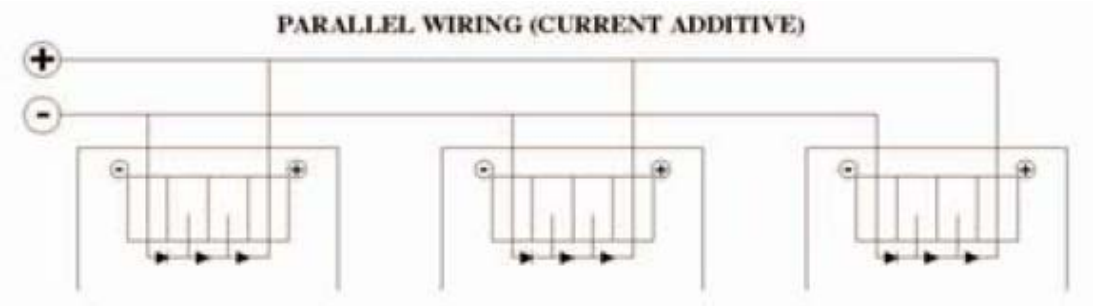
Wiring

Please observe the correct cable connection polarity when installing the modules. If not connected properly, the bypass diode could be destroyed.

PV modules can be wired in series to increase voltage as shown in figure 1.



PV modules can be wired in parallel to increase the current as shown in figure 2.



Removal

Only professionals can disassemble or reinstall the solar modules.

Maintenance & Inspection

Routine Inspection

It is unnecessary to do inspection everyday; our suggestion is one time for one year.

If the dirt were built-up please clean the surface with soft sponge with water.

Inspection for Wind and Rain Hazard or Earthquake

When wind and rain hazard or earthquake happens, please check whether something dropped on the PV modules and made some damages to them.

Inspection for Salt or Snow Hazard

Please make a schedule to inspect whether PV modules were corroded

After heavy snow, please check the condition of solar modules.

CNBM reserve the right to revise the models/contents without notice.

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