

# Installation Manual for Solar PV Modules

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Applicable Module Type			Certification Status	Module Structure
	MG2K-30	MG2K-36	IEC、UL	Single glass



## Safety Note

- This manual elaborates on installation and safety use information for PV power generating modules (hereinafter referred to as module) of BYD (Shangluo) Industrial Co., LTD (hereinafter referred to as BYD). Please abide by all safety precautions in this guide and local regulations.
- Installation of modules requires professional skills and knowledge and is to be carried out by qualified personnel. Please read this manual carefully before installing and using this module. Installation personnel shall get familiar with mechanical and electrical requirements of this system. Please keep this manual properly as reference for future maintenance or upkeep or for sales and treatment of modules.
- If you have any doubts, please contact BYD global quality and customer service department for further interpretation.

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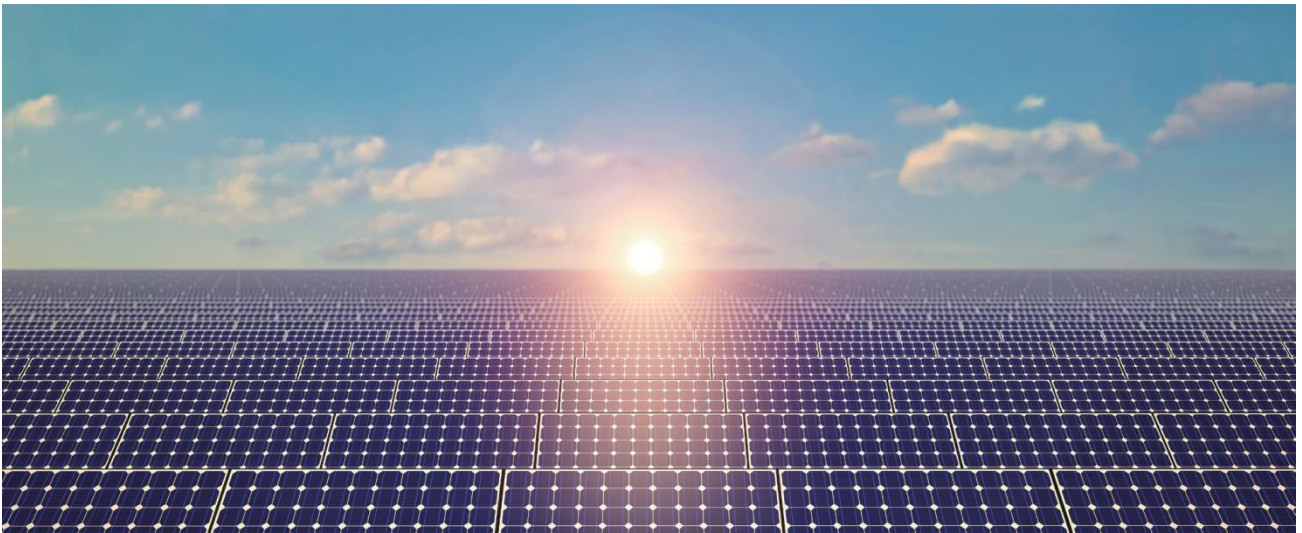
## 1 Introduction

**Firstly thank you very much for choosing BYD PV modules!**

This installation manual covers key electrical and mechanical installation information, so please be fully aware of the information before installing BYD modules. In addition, this manual also covers some safety information that you shall get familiar with. All contents in this manual are intellectual properties of BYD which originates from long term of technical exploration and experience accumulation of BYD.

This installation manual does not entail any explicit or implicit quality warranty and does not stipulate on compensation schemes for losses, module damages or other costs caused by or related to module installation, operation, utilization and maintenance process. If patent rights or the third party rights are infringed by use of modules, BYD will not take any responsibility. BYD reserves the rights for modifying product manual or installation manual without notice in advance.

If customers fail to install modules as per requirements set forth in this manual, the quality warranty provided for customers during sales will become invalid. In addition, suggestions in this manual are to improve safety of module installation, which are tested and proved by practices. Please provide this manual to PV system users for reference and advise them of safety, operation and maintenance requirements and suggestions.



## 2 Laws and Regulation

**Mechanical and electrical installation of PV modules shall follow proper regulations such as electric law, building law and electric connecting requirements. These regulations vary with different installation sites, such as building roofing installation, vehicle-mounted application and etc. Requirements may also vary with DC or AC system, difference installation system voltage. Please contact local authorities for specific clauses.**

## 3 General Information

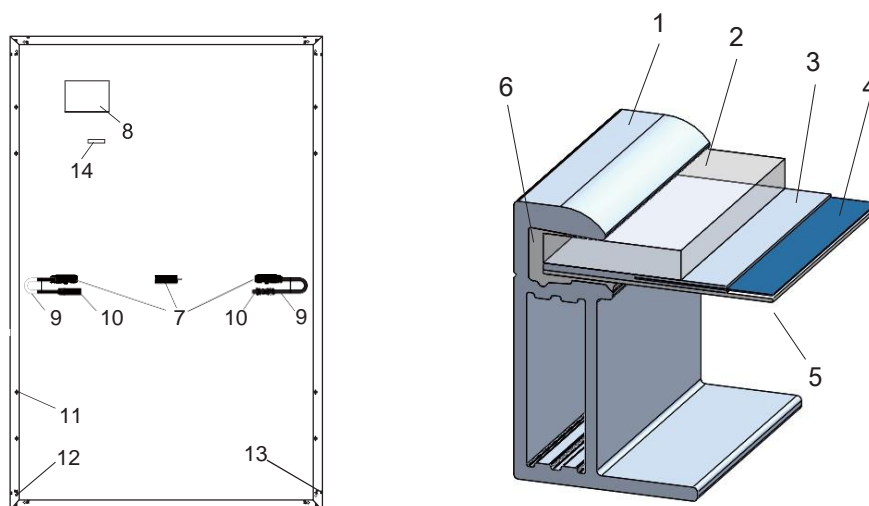
### 3.1 Modules identification

Each module is pasted with 3 labels providing information below:

**Nameplate:** It describes product type, standard rated power, rated current, rated voltage, open circuit voltage, short circuit current under testing conditions, certification indicator, maximum system voltage, etc.

**Current level label:** It describes modules according to their optimal working current.

**Serial No.:** Each module has a unique serial number which is solidified inside the module permanently and it can be seen from front top of the module. Each serial number is put in before laminating of the module. In addition, you can find the same serial number on the module nameplate.



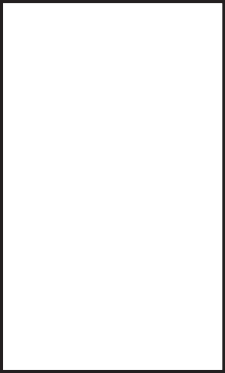
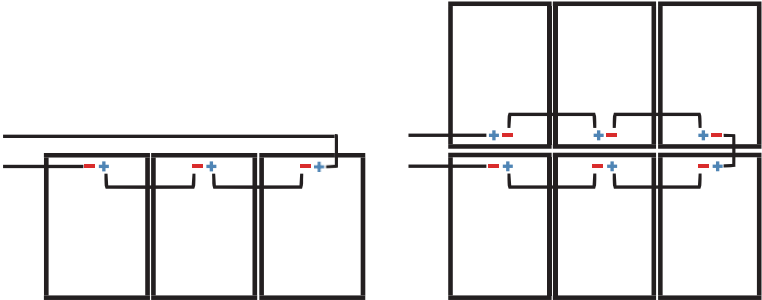
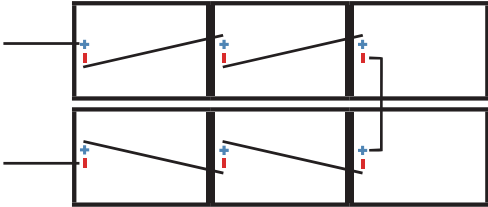
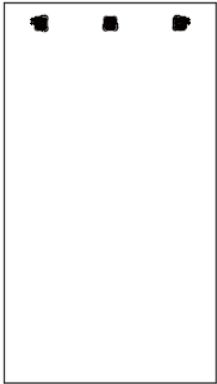
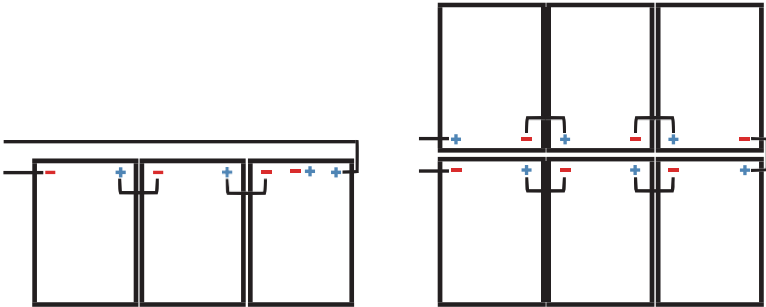
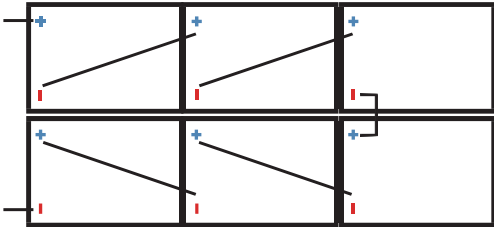
1 Frame	2 Glass	3 EVA	4 Solar Cell
5 Backsheet	6 Silica Gel	7 Junction Box	8 Name Plate
9 Cable	10 Connector	11 Mounting Hole	12 Grounding Hole
13 Drain Hole	14 Bar Code		

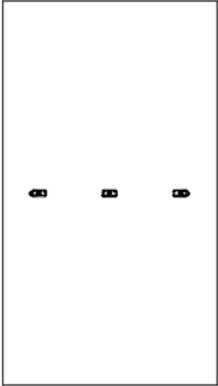
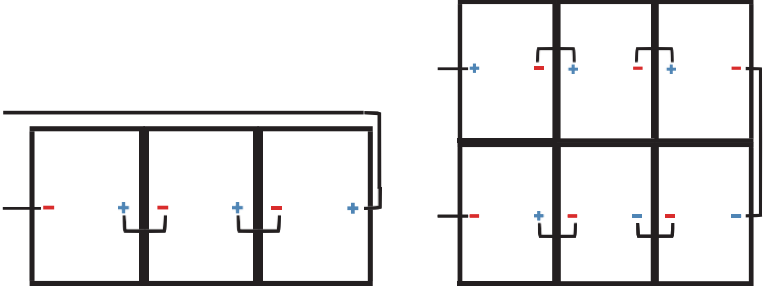
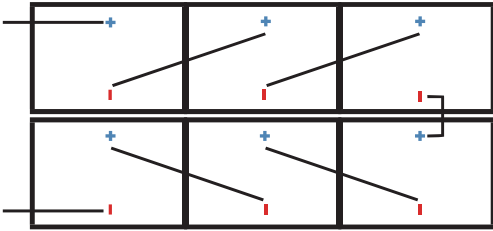
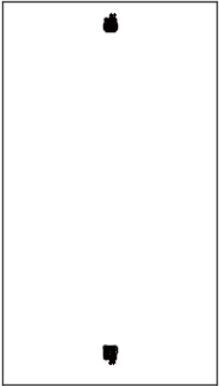
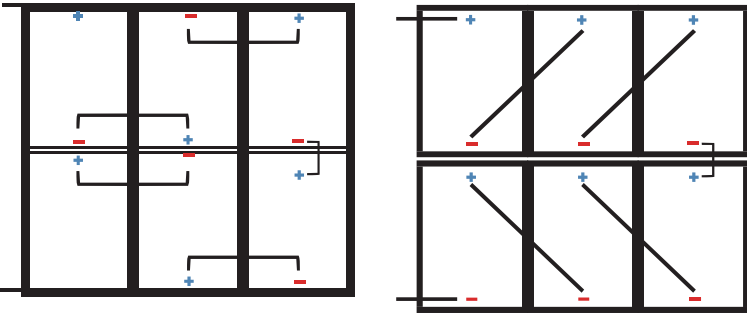
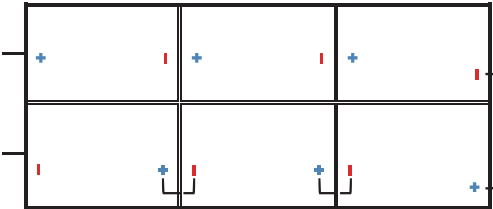
Figure 1 Regular modules Mechanical drawing

(Please refer to section 3.2 for the location of the junction box. The specific version is subject to the corresponding specification.



3.2 Junction box style and wiring method

Junction Box Location Icon	Recommended Wiring Method
<div></div> <div>Standard line length: 60 PV module: 1m 72 PV module: 1.2m</div>	<div><p>Vertical Installation: Standard line length (Note : One end of the single row needs to be extended.)</p><div></div></div> <div><p>Horizontal Installation: Standard line length</p><div></div></div>
<div></div> <div>Standard line length: 60 single glass PV module : 1m 72 single glass PV module : 1.2m</div>	<div><p>Vertical Installation: Standard line length (Note: One end of the single row needs to be extended.)</p><div></div></div> <div><p>Horizontal Installation : 60 type PV module line length <math>\geq 1.2\text{m}</math>, 72 type PV module line length <math>\geq 1.4\text{m}</math></p><div></div></div>

Junction Box Location Icon	Recommended Wiring Method
 <p>Standard line length: 0.3m</p>	<p>Vertical Installation: Standard line length : (Note: An extension cord is required at the rotor head of the double row assembly and at the end of the single row.)</p>  <p>Horizontal Installation: 60 type PV module line length <math>\geq 1.2\text{m}</math>, 72 type PV module line length <math>\geq 1.4\text{m}</math>, 78 type PV module line length <math>\geq 1.5\text{m}</math></p> 
 <p>Standard line length: Positive electrode 0.8m Negative electrode 0.4m</p>	<p>Vertical Installation: Method 1: Standard line length      Method 2: Single component line length <math>\geq 1.2\text{m}</math></p>  <p>Horizontal Installation : Standard line length</p> 

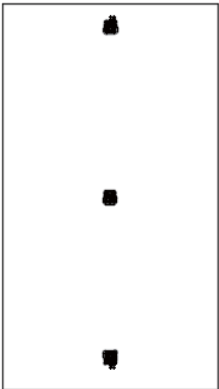
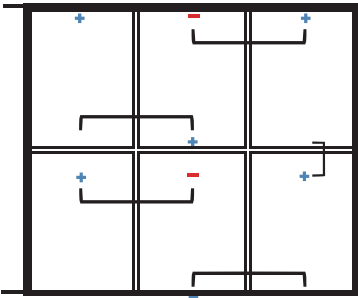
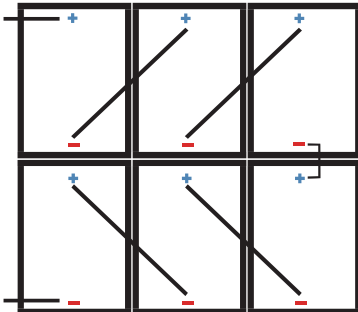
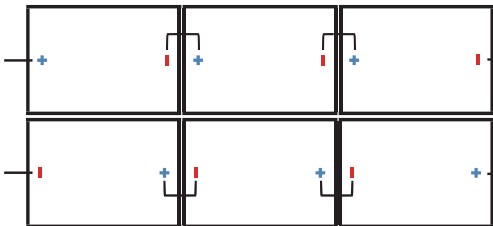
Junction Box Location Icon	Recommended Wiring Method
 <p>Standard line length: Positive electrode 0.8m Negative electrode 0.4m</p>	<p>Vertical installation:</p> <p>Method 1: Standard line length</p>  <p>Method 2: Single component line length <math>\geq 1.4\text{m}</math></p>  <hr/> <p>Horizontal Installation: Standard line length</p> 

Figure 3 Junction Box Style and Wiring Method



### 3.3 Regular Safety

The application level of BYD Solar module is Class II, which can be used in systems operating at  $> 50\text{ V DC}$  or  $>240\text{ W}$ , where general contact access is anticipated;

When the module is installed on roof, it is necessary to take the overall fire rating of the finished structure as well as later overall maintenance into account. The roofing PV system shall be installed after assessment by construction experts or engineers and with official analysis results for the entire structure. It shall be proved capable of supporting extra system bracket pressure, including PV module weight.

For your safety, please do not work on the roof without safety protective measures which include but not limited to fall



protection, ladder or stair and personal protective articles.

For your safety, please do not install or handle modules in unfavorable conditions including but not limited to strong wind or gust, damp or sandy roofs.



### 3.4 Electrical Performance Safety

PV modules can produce DC current under illumination, any contact of the exposed metal of the modules connection wires may result in electrical shock or burn. Any contact of 30V or larger DC Voltage can be fatal.

In case of no connected load or external circuits, modules can still produce voltage. Please use insulation tools and wear rubber gloves when operating modules in the sunlight.

PV modules does not have switch. PV modules can only stop operating when they are kept from sunlight or covered by cloth, hard board or light-proof materials or when front side of modules are placed on smooth and flat surfaces.

To avoid electric arc or electric shock hazards, please do not break down electric connection in loaded conditions. Wrong connections will also lead to electric arc or shock. Keep connectors dry and clean and make sure that they are in good operating condition. Do not insert other metals into the connectors or carry out electric connection by whatever means.

Snow and water in surrounding environments will intensify light reflection and lead to increase of output current and power. And module voltage and power will increase under low temperature condition.

If module glass or packaging materials are damaged, please wear personal protective articles and then isolate modules from the circuit.

Any modules related works are only allowed in dry conditions by means of dry tools. Do not operate when modules are wet unless you wear the proper electric shock protection articles. Please follow the cleaning requirements in this manual when cleaning modules.



### 3.5 Operation Safety



- Do not open BYD Package in transportation and storage process unless the modules arrive at the installation site.
- Do not damage the package and do not fall packaged modules.
- Do not exceed the highest layer limit indicated on the packaging carton when piling modules up.
- Put packaging carton in the ventilated, rain-proof and dry places before unpacking of modules.
- Open BYD's packaging carton following unpacking instructions.
- Do not lift the module by holding the junction box or wires in any cases.
- Do not stand or walk on modules.
- Do not drop one module onto another.
- To avoid glass damage, do not put heavy objects on module glass.
- Be careful when placing modules on a surface and at corners in particular.
- Do not try to unpack the module or remove nameplate or parts of modules.
- Do not paint surface of modules or apply any other glues.
- Do not damage, grad or scratch back film of modules.
- Do not drill frame of modules, which may reduce frame loading capacity or lead to frame corrosion.
- Do not scratch anodic coating of aluminum alloy frame except for grounding connection. Scratch may lead to frame corrosion and reduce frame loading capacity.
- Do not repair glass or modules whose back film is damaged on your own.



### 3.6 Fire Safety

Please consult local laws and regulations before installing modules and abide by requirements on building fire protection. According to the corresponding certification standards, the fire rating of the components of BYD is Class C.

The roof should be coated by a layer of fireproof materials with suitable fire protection rating for roofing installation and make sure that the back plate and the mounting surface are fully ventilated.

Difference roofing structures and installation modes will affect fireproof performance of buildings. Improper installation may lead to the risk of fire.

To guarantee roof fire rating, the distance between module frame and roof surface must be  $\geq 10\text{cm}$ . (4in)


Adopt proper module accessories such as fuse, circuit breaker and grounding connector according to local regulations.

Please do not use modules if there are exposed inflammable gases nearby.

## 4 Installation Conditions

### 4.1 Installation Site and Working Environment

- The modules can only be used on earth but not in outer space.
- Do not manually focus sunlight with mirrors or magnifying glass onto modules.
- BYD modules shall be installed on proper buildings or other appropriate places (such as ground, garage, building outer wall, roof, PV tracking system) but shall not be installed on any vehicles.
- Do not install modules at places that are possible to be flooded.
- BYD suggests that modules be installed in the working environment with the temperature of  $-20^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  which is the monthly average highest and lowest temperature of the installation sites. The extreme working environment temperature for modules is  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .
- Make sure that installed modules do not suffer wind or snow pressure that exceeds the permissible maximum load limit.
- Modules shall be installed in places free from shadows throughout the year. Make sure there are no light-blocking obstacles in the installation sites.
- Carry out lightning protection for modules installed in places with frequent lightning and thunder.
- Do not install modules in places with possible inflammable gases.
- Modules cannot be used in environments with too much hails, snows, flue gas, air pollution and soot or in places with strong corrosive substances such as salt, salt mist, saline, active chemical steam, acid rain, or other substances corroding modules, affecting module safety or performance.
- Please take protective measures to ensure reliable and safe installation of modules in severe environments such as heavy snow, cold and strong wind or islands close to water and salt mist or deserts.

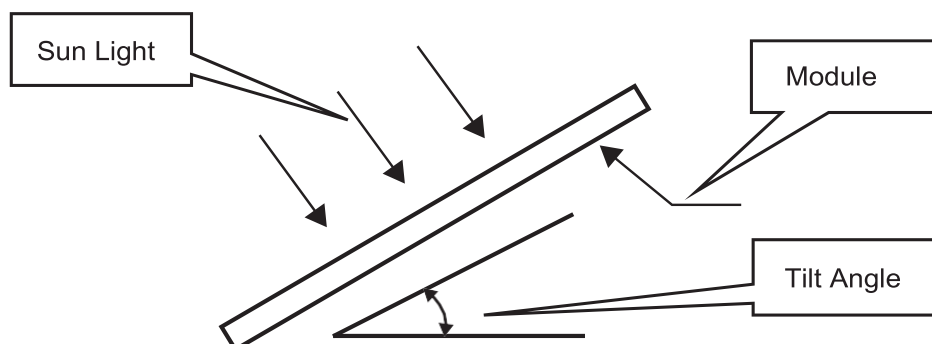


BYD modules have passed the IEC61701 salt spray corrosion test, but the corrosion may still occur on where the modules frame is connected to the bracket or where the grounding is connected. BYD modules can be installed 50m –500m away from the ocean side, but stainless steel or aluminum material are needed to be used in where contacting PV modules and apply anti-corrosion measurement on the connection point. Please refer to the BYD Seaside Installation Manual for further detail.



## 4.2 Selection of Tilt Angles

Tilt angle of modules: Included angle between module surface and horizontal surface; the module will obtain the maximum power output in direct facing of sunlight.



Modules are preferred to be south-facing in the north hemisphere and north-facing in the south hemisphere. Please refer to standard modules installation guideline or suggestions from experienced PV module installer, for the specific installation angle.

BYD suggests that module installation tilt angle be no less than  $10^{\circ}$  so module surface dust can be washed away easily by rainfall and times of cleaning can be reduced. And it is easy for ponding to flow away and avoid water print on the glass due to long time of water ponding which may further affect module appearance and performance.

The BYD modules connected in series should be installed with the same orientation and tilt angle. Difference orientation and tilt angle may result in differ received solar irradiation and result in output power loss.

If the BYD modules are used in Stand-alone System, the tilt angle should be calculated based on seasons and irradiation to maximize the output power. If the modules output power meets the acquired load under the period of the worst irradiation in the year, the modules should be able to meet the load of entire year. If the BYD modules are used in Grid-connected System, the tilt angle should be calculated based on the principle to maximize the yearly output power.



## 5 Mechanical Installation

### 5.1 Regular Requirements

- Make sure that module installation mode and bracket system can meet the expected load, which is requisite assurance that the bracket installer must provide. Installation bracket system shall be tested and inspected by the third party testing institution with static mechanical analysis capacity in accordance with local national standards or international standards.
- Module bracket shall be made from durable, corrosion resistant, ultraviolet proof materials.
- Modules shall be fixed on the bracket solidly.
- Use higher brackets in places with heavy snow accumulation so the lowest point of modules will not be covered by snow for a long time. In addition, make the lowest point of modules high enough so as to avoid shading of vegetation and woods or damage of sands and stones.
- If modules are installed on brackets parallel to the roof or wall, the minimum gap between the module frame and the roof/wall shall be 10cm for air ventilation so as to prevent module wire damage.
- It is forbidden to drill holes in the glass and frame of the component without the permission of BYD.
- Make sure the building is suitable for installation before installing modules on roof. Moreover, seal permeable parts properly to prevent leakage.
- The module frames can appear thermal expansion and cold contraction so the frame interval between two adjoining modules shall be  $\geq 10\text{mm}$ .
- Make sure that back plate of modules will not in contact with bracket or building structures that can pierce into the inside of the modules, especially when the module surface is imposed by pressure.
- Maximum static load of the PV module by: front 5400pa and back 2400pa, these values can vary depending on installation method of the modules (please refer to the following installation guidance), the described load in this manual is for the test load. Note: on the basis of IEC61215 - 2016 installation requirements, when computing the corresponding maximum design load, need to consider the safety factor of 1.5 times.
- Modules can be installed horizontally or vertically. When installing the components, be careful not to block the drain hole of the frame.

### 5.2 Monofacial assembly mechanical installation

Module and bracket system connection can be realized by mounting holes, clamps or embedded systems. Installation shall follow the demonstration and suggestions below. If installation mode is different, please consult BYD and obtain approval. Otherwise, modules may be damaged and quality warranty will become invalid.



## 5.2.1 Install Modules by Mounting Holes

Make use of bolts to fix modules on the bracket through mounting holes on the back frame. See details in Figure 4.



Figure 4 Installation Mode

Recommended accessories as below :

Accessories	Model	Material	Note
Bolt	M8	Q235B/SUS304	Accessories material selection should base on local environment.
Washer	2*8	Q235B/SUS304	
Spring Washer	8	Q235B/SUS304	
Nut	M8	Q235B/SUS304	

Accessories	Model	Material	Note
Bolt	M6	Q235B/SUS304	Accessories material selection should base on local environment.
Washer	2*6 ( 6.4*18-1.6 ISO 7093 )	Q235B/SUS304	
Spring Washer	6	Q235B/SUS304	
Nut	M6	Q235B/SUS304	

Suggest : (1) M8 bolt tightening torque range: 14N•m-18N•m; M6 bolt tightening torque range: 5N•m-12N•m;

(2) When using BYD 30mm (30H) height frame assembly, it is recommended to select  $L \leq 20\text{mm}$  length fasteners. (If you have a special model, you can consult BYD customer service)

## 5.2.2 Use clamps to install modules

The assembly can be mounted using a dedicated fixture, as shown in Figure 5.

Under no circumstances should the fixture touch the glass or deform the frame of the component. The surface of the fixture that is in contact with the front of the frame must be smooth and flat, otherwise the frame will be damaged and the component will be damaged.

Be sure to avoid the shadow blocking effect of the fixture. The drain hole cannot be blocked by the fixture. For a framed module, the fixture must maintain an overlap of at least 8mm but no more than 11mm with the frame of the module (you can change the cross section of the fixture if the module is securely installed). For a frameless module, the fixture must maintain an overlap of no more than 15mm with the module.

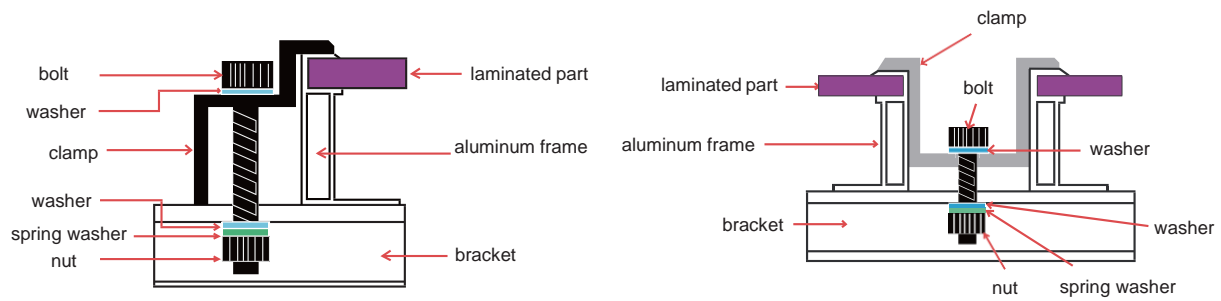


Figure 5 Clamp installation guideline

### 5.2.3 Monofacial component installation diagram and corresponding load

Screw mounting or clamp mounting: The static load on the largest back of the module is 2400pa (equivalent to wind pressure), and the maximum static pressure on the front is 5400pa (equivalent to wind pressure and snow pressure). Adopting 400 pitch hole installation method, the mechanical load of the component is tested according to the corresponding certification standard. The maximum value of the front is 2400pa (snow pressure) and the maximum value of the back is 2400pa (wind pressure).

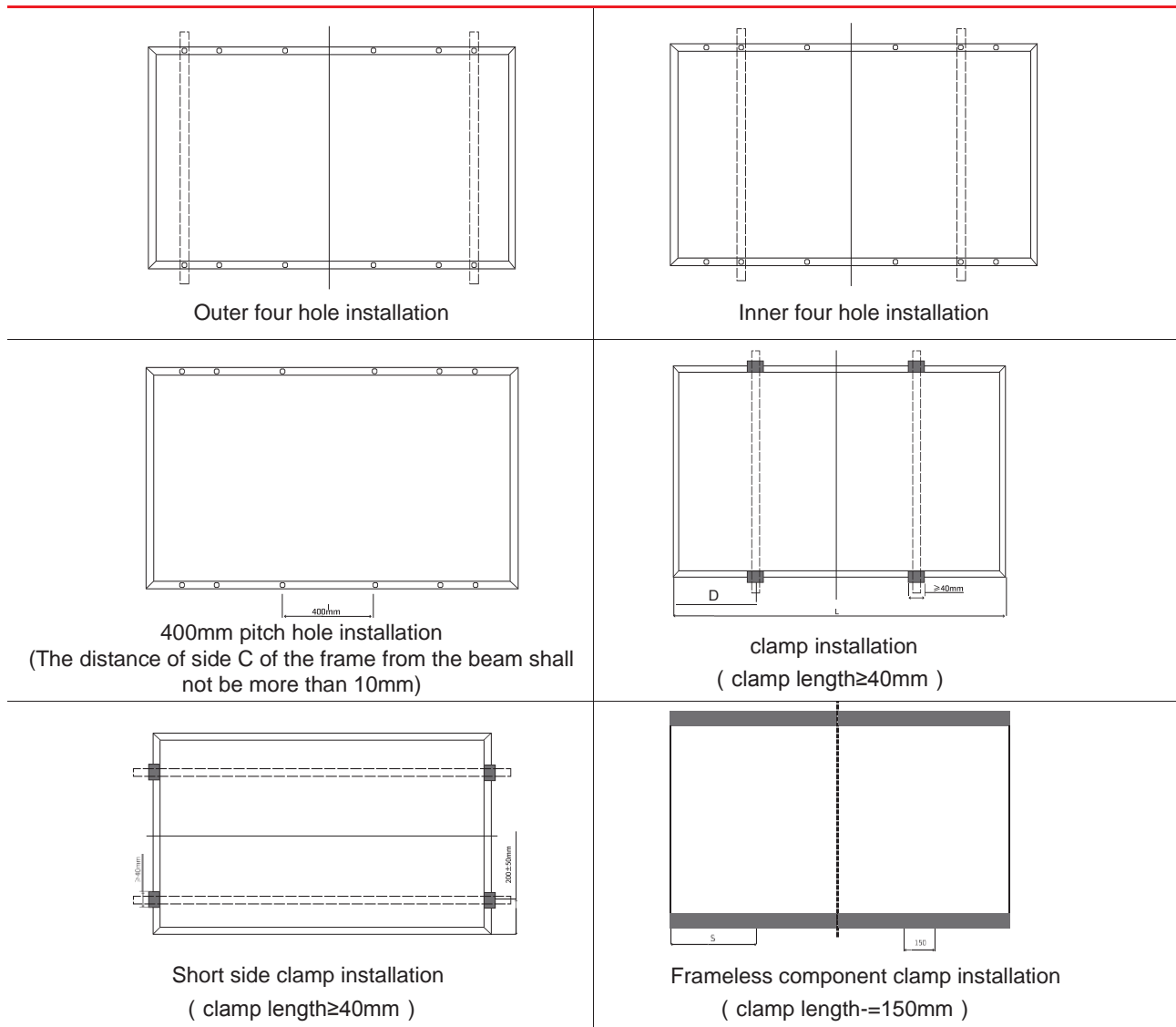


Figure 6 Monofacial component installation icon

Monofacial module	Installation method		Inner four holes	Outer four holes	Clamp D=1/4L±50	Clamp 300mm ±50	Short side clamp	400mm pitch hole	300mm≤S ≤400mm	400mm≤S ≤500mm
	Module Type									
Framed PV module	MG2K-30		+ 5400, - 2400	±2400	+ 5400, - 2400	/	±2400	/	/	/
	MG2K-36		±2400	+ 5400, -2400	+ 5400, - 2400	/	/	±2400	/	/

## 6 Electrical installation

### 6.1 Electrical Performance

Module electric performance parameters such as  $I_{sc}$ ,  $V_{oc}$  and  $P_{max}$  nominal values have  $\pm 3\%$  error with those under standard testing conditions of: irradiance of  $1000 \text{ W/m}^2$ , cell temperature of  $25^\circ\text{C}$  and air mass of AM1.5.

When modules are in series connection, the final voltage is sum of that of the single module. When modules are in parallel connection, the final current is sum of the single module as below Figure 10 shows. Modules with different electric performance models cannot be connected in series.

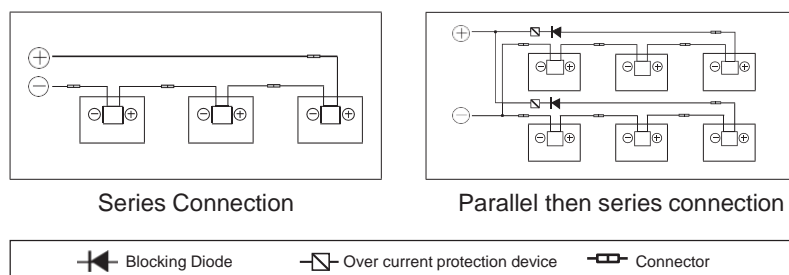


Figure 10 Series connection and parallel connection circuit diagram



The number of modules in series connection in each strand shall be calculated according to relative regulations. The open circuit voltage value under the expected lowest temperature shall not exceed the maximum system voltage value stipulated for modules and other values required by DC electric parts. (BYD modules maximum system voltage is DC1000V/DC1500V---actually system voltage is designed based on the used modules model and inverter.)

The VOC factor can be calculated with the following formula.  $C_{Voc}=1-\beta_{Voc}\times(25-T)$

T: The expected lowest temperature of the installation site.

$\beta$ :VOC temperature coefficient (% /°C) (Refer to modules manual for further detail)

If there is reverse current exceeding the maximum fuse current flowing through the module, use overcurrent protection device with the same specifications to protect the module; if parallel connection strands are more than 2, there shall be an overcurrent protection device on each strand of module. See Figure 5.



## 6.2 Cables and Connecting Lines

In module design, adopt enclosed junction boxes with the protective level of IP67 for on-site connection to provide environmental influence protection for wires and connections and contacting protection for non-insulating electric parts. The junction box has well connected cables and connectors with the protective level of IP67. These designs facilitate parallel connection of modules. Each module has two independent wires connecting the junction box, one is negative pole and the other is positive pole. Two modules can be in series connection by inserting the positive pole at one end of wire of one module into the negative pole of the adjoining module.

According to local fire protection, building and electrical regulation, apply proper cable and connector; ensure the electrical and mechanical property of the cables (the cables should be coated in a catheter with anti-UV aging properties, and if is exposed to air, the cable itself should have anti-UV aging properties).

The installer can only use one-way cable, 2.5-16mm<sup>2</sup>(5-14 AWG), 90 °C grade, with proper insulation capability to withstand the maximum open circuit voltage (such as EN50618 approval). Need to select appropriate wire specifications to reduce voltage drop.

BYD requires that all wiring and electrical connections comply with the appropriate National Electrical Code.

When cables are fixed on the bracket, avoid mechanical damage to cables or modules. Do not press cables by force.

Adopt light resistant cable ties and clamps to fix cables on the bracket. Though cables are light resistant and water proof, it is still necessary to prevent cables from direct sun light and water immersion.

The minimum bending radius cables should be 43mm. (1.69in)

## 6.3 Connector

Please keep connectors clean and dry. Make sure connector nuts are fastened before connection. Do not connect connectors that are damp or dirty or under any other improper conditions. Avoid connectors from direct sun light and water immersion or falling onto ground or roof.

Wrong connection may lead to electric arc and electric shock. Please make sure that all electric connection is reliable. Make sure all connectors with lock are fully locked.

Only connectors matching those installed on module, i.e. from the same vendor and model, shall be used;(If you need to use different types of connectors, please consult the BYD solar ).

## 6.4 Bypass diode

BYD solar module junction box contains bypass diode which is in parallel connection with the cell strands. If heat spot occurs locally with the module, the diode will come into operation to stop the main current from flowing through the heat spot cells in order to restrain module heating and performance loss. Notice, bypass diode is not the overcurrent protection device.

If the diode is found or doubted to be out of order, the installer or system maintenance supplier shall contact BYD. Please do not try to open the module junction box on your own.



## 6.5 PID Protection and Inverter Compatibility

① PV modules may appear Potential Induced Degradation (PID) under high humidity, high temperature and high voltage condition. Modules may appear Potential Induced Degradation (PID) under the conditions below:

- ◇ PV modules install under hot and humid weather condition.
- ◇ PV modules installation site is under long term humid condition such as floating PV system.

② To reduce the risk of PID, on the modules DC connection site, it is recommended to connect the negative to ground.

The PID protection measures on system level are recommended as follow

- ◇ For isolated PV inverter, the negative of the PV modules DC connection side can be directly grounded.
- ◇ For non-isolated PV inverter, isolated transformer is needed to be installed before applying virtual grounding (grounding method guidance from the inverter manufactures are usually needed)

## 7 Grounding

In design of modules, the anodized corrosion resistant aluminum alloy frame is used for rigidity support. For safety utilization and to protect modules from lightning and static-electricity damage, the module frame shall be grounded. The grounding device shall be in full contact with inner side of the aluminum alloy and penetrate the frame surface oxide film. Do not drill additional grounding holes on module frame.

The grounding conductor or strap may be copper, copper alloy, or any other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.

Holes marked with a grounding mark on the frame can only be used for grounding and not for component mounting.



### Grounding methods below are permissible

#### 1 Grounding by grounding clamp

There is a grounding hole with the diameter of  $\varnothing 4.2$  mm at the edge of the module back frame. The central line of the grounding sign also located on the edge of the module back frame overlaps with that of the grounding hole.

Grounding between modules shall be confirmed by qualified electricians and grounding devices shall be manufactured by qualified electric manufacturer. The torque is recommended to be  $2.3\text{N}\cdot\text{m}$ . 12 AWG copper core wire is used for the grounding clamp. And copper wires cannot be pressed damaged during installation.

#### 2 Grounding by unoccupied mounting holes

Mounting holes on modules that are not occupied can be used for installing grounding devices.

- ◆ Align grounding clamp to the frame mounting hole. Use grounding bolt to go through the grounding clamp and frame.
- ◆ Put the tooth side of the washer on the other side and fasten the nuts.
- ◆ Put grounding wires through the grounding clamp and grounding wire material and dimension shall meet requirements in local national and regional law and regulations.
- ◆ Fasten bolts of grounding lines and installation ends.



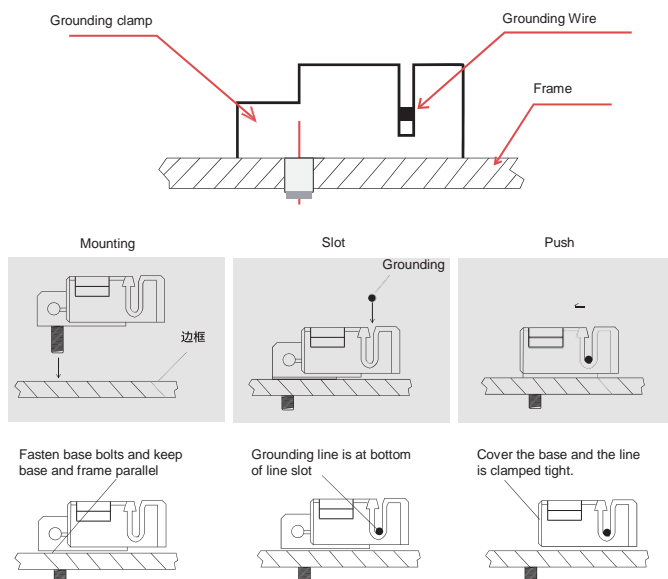


Figure 11 Grounding Clamp Installation

Note: TYCO. 1954381-1 (recommended) is used in figures above.

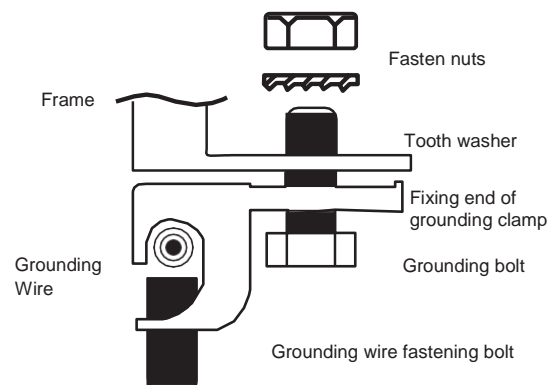


Figure 12 Install Method

### 3 The third party grounding devices

The third party grounding device can be used for grounding of BYD modules but such grounding shall be proved to be reliable. Grounding device shall be operated in line with stipulations of the manufacturer.

## 8 Operation and maintenanc

It is the users' responsibility to carry out regular inspection and maintenance for modules in particular during the quality warranty period; and, inform the supplier within two weeks when modules are found to be damaged.

### 8.1 Cleaning

Accumulated contaminants on module surface glass will reduce the power output and lead to local heat spot, such as dust, industrial waste water and birds' droppings. The degree of influence is determined by transparency of wastes. Small amounts of dust will affect the intensity of solar irradiation and evenness that modules received but are not dangerous and power will not be reduced remarkably in general.



During operation of modules, there shall be no environmental factors projecting shades that shelter partial or the entire module. These environment factors including other modules, module system bracket, birds, dust, soil or plants. These will significantly reduce output power. BYD suggests that the module surface should not be sheltered in any case. Frequency of cleaning depends on dirt accumulation speed. In normal situations, rainwater will clean the module surface and reduce the cleaning frequency. It is suggested to use damp clean water sponge or soft cloth to wipe the glass surface. Do not use acid and alkaline detergents to clean modules. Do not use tool with rough surface to clean in any case. In order to avoid potential risk of electrical shock or burn, BYD suggests cleaning the modules during early morning and evening with less solar irradiation and lower modules temperature especially area with high average temperature. In order to avoid potential risk of electrical shock, do not try to clean the modules with glass damage or expose wires.



## 8.2 Module Appearance Inspection

Check module appearance defects visually, especially:

- Module glass cracks.
- Corrosion at welding parts of the cell main grid: it is caused by moisture into the module due to damage of surface packaging materials during installation or transportation.
- Check whether there are traces of burning on the module back plate.
- Check PV modules for signs of aging including rodent damage, weather damage, connection tightness, corrosion and grounding condition.
- Check for any shape objects in contact with PV modules' surface
- Check for any obstacles shielding the PV modules
- Check for any loose or damage screws between the modules and bracket. If so, adjust and fix on time.

## 8.3 Inspection of connectors and cables

It is suggested to carry out the following preventive inspection once every 6 month:

- Check connector sealing and cable connection.
- Look for gap on the sealant of the terminal box and confirm whether it is cracking



Product Electrical Rating at STC						
Module	BYD425WMG2K-36	BYD430WMG2K-36	BYD435WMG2K-36	BYD440WMG2K-36	BYD445WMG2K-36	BYD450WMG2K-36
Open-circuit voltage (tolerance $\pm 3\%$ ) [V]:	48.3	48.5	48.7	48.9	49.1	49.3
Short-circuit current (tolerance $\pm 3\%$ ) [A]:	11.23	11.31	11.39	11.46	11.53	11.60
Voltage at max. power [V]:	40.5	40.7	40.9	41.1	41.3	41.5
Current at max. power [A]:	10.50	10.57	10.64	10.71	10.78	10.85
Max. power (tolerance $\pm 3\%$ ) [W]:	425	430	435	440	445	450
Maximum system voltage [V]	1500	1500	1500	1500	1500	1500
Series Fuse Rating [A]	20	20	20	20	20	20
Module	BYD455WMG2K-36	BYD350WMG2K-30	BYD355WMG2K-30	BYD360WMG2K-30	BYD365WMG2K-30	BYD370WMG2K-30
Open-circuit voltage (tolerance $\pm 3\%$ ) [V]:	49.5	40.1	40.3	40.5	40.7	40.9
Short-circuit current (tolerance $\pm 3\%$ ) [A]:	11.66	11.15	11.25	11.35	11.43	11.52
Voltage at max. power [V]:	41.7	33.6	33.8	34.0	34.2	34.4
Current at max. power [A]:	10.92	10.42	10.51	10.59	10.68	10.76
Max. power (tolerance $\pm 3\%$ ) [W]:	455	350	355	360	365	370
Maximum system voltage [V]	1500	1500	1500	1500	1500	1500
Series Fuse Rating [A]	20	20	20	20	20	20
Module	BYD375WMG2K-30					
Open-circuit voltage (tolerance $\pm 3\%$ ) [V]:	41.1					
Short-circuit current (tolerance $\pm 3\%$ ) [A]:	11.60					

[A]:						
Voltage at max. power [V]:	34.6					
Current at max. power [A]:	10.84					
Max. power (tolerance $\pm 3\%$ ) [W]:	375					
Maximum system voltage [V]	1500					
Series Fuse Rating [A]	20					



# Limited Warranty for Solar Modules

## (High Efficiency Single Glass Series)

This Limited Warranty is suitable for the following BYD Modules model	
BYDxxxMG2K-30	BYDxxxMG2K-36

Supplier is committed to the following quality performance warranty for solar modules (hereinafter referred to as “modules”). The Product Warranty Term starts as of the delivery date as per INCOTERMS 2010 or 6 months after the modules are shipped out of the production plant, which the earlier date shall be effective (hereinafter short as the “Warranty Effective Date”).

The name of the project between BYD and Original Buyer is Achievers Energy Group Pty Ltd, address is 4/29 Bellrick St, Acacia Ridge 4110 QLD , email is [purchase@achieversenergy.com.au](mailto:purchase@achieversenergy.com.au), phone is 61424113442, Website (Doc Link) is <http://achieversenergy.com.au/Categorylist/Detail/44>.

### 1. Limited Product Warranty-Repair or Replacement within 12 years

Supplier assures that under the conditions for regular application, installation, use and service, the integral module (including attached DC connectors, cables) can meet the demand of regular application, use and installation and have no defect caused by material and process within 144 months as of the Warranty Effective Date. If the modules get out of order or fail to operate due to material or process defects within 144 months as of the Warranty Effective Date, Supplier provides remedy, only repairing and replacing the failed modules after verification and confirmation by an independent testing institution agreed by Supplier and the customer in advance. The remedy of repair or replacement is the exclusive measure within this “Limited Product Warranty”, which does not involve assurance for the module power output. The power output assurance is to be specially elaborated in the Section 2 “Limited Warranty for Peak Power” below.





## 2. Limited Warranty for Peak Power - Limited Compensation

Supplier provides power output loss assurance within 25 years as of the Warranty Effective Date. Power output loss is calculated by comparing the minimum “module nominal power under standard testing conditions” (short as nominal power) marked on the nameplate with the actual power output under standard testing conditions.

The annual attenuation is less than 2% within the 1<sup>st</sup> year from the Warranty Effective Date and is less than 0.55% from the 2<sup>nd</sup> year to the 25<sup>th</sup> year within the peak power warranty period. The output power can reach 84.8% in the last year of the 25-year peak power warranty period.

Supplier assures that any qualified module sold out can meet the power guarantee value mentioned above within 25 years of power warranty period from the Warranty Effective Date. If any power loss exceeds the guaranteed value verified by Supplier, and Supplier attributes such power loss to its material or process defects, or such power loss is further (required by customers) verified by the third party testing institution (agreed by both the customer and Supplier), Supplier will make judgment at its discretion and take either remedial measures as (1) provide extra modules to make up for power loss as above; or (2) repair or replace the defected modules and provide the shipment free of charge to the initial delivery location.

The above-mentioned compensations in “Limited Warranty for Peak Power” are the sole and exclusive remedy measures.

Note: If any customer finds that the defective modules need to be returned before the treatment, the freight shall be borne on the customer. If the third party testing institution confirms that it is the responsibility within the scope of Supplier quality warranty, the shipping cost can be compensated as per the freight or related invoice provided by the customer.

## 3. Exceptions and Restrictions

(a) All quality warranty claims shall be submitted to Supplier or Supplier authorized distributors in written form within but not beyond the warranty period in any cases.

(b) “Limited Product Warranty” and “ Limited Warranty for Peak Power” do not apply to modules in situations below:



- Improper use, misuse, negligence, intentional damage or accidents;
- Fabrication without permission, improper installation or application;
- The customers move the installed module or change the location of the module installed without any prior written consent or authorization by the supplier.
- Fail to follow the repair and recovery instructed by the producer;
- Fail to follow the Supplier maintenance instructions;
- Power failure, power surge, lightning, fire and flood, accidental damage or force majeure.

(c) “Limited Product Warranty” and “Limited Warranty for Peak Power” do not compensate costs as, any costs related to module installation, demounting and re-installation (except for those stated in the last part of Section 5) or custom clearance costs and other costs related to return and replacement of modules.

(d) Claims will be rejected if the module model and serial number labels are falsified, removed or blurred without written authorization by Supplier.

#### **4. Quality Warranty Scope**

Unless Supplier agrees on and signs and recognizes other obligations and liabilities in written form, the warranty clauses in this quality warranty will replace and exclude other explicit or implied assurances including but not limited to the merchantability assurance, or assurance for special purposes or applications, and other obligations and liabilities undertaken by Supplier. Supplier shall not be responsible for human injury or property losses nor for other losses or injuries caused by modules or module-related problems (including but not limited to any module defect or any defect caused by use and installation). Supplier shall not compensate any collateral damages, derived damages or special damages by any cause. Losses such as profit loss, production loss or revenue loss caused by product faults are excluded hereby. If Supplier makes compensation for customers, the accumulated compensation amount shall not exceed the invoicing price for a single module paid



by the customer.

## **5. Quality Warranty Performance**

If any customer proposes legitimate quality warranty requirements in accordance with the “Limited Product Warranty”, they shall send a written notice by registered letter to Supplier at the address below or send email to Supplier email address. The customer shall attach proof of quality warranty herewith, corresponding module serial number and purchasing date and provide the invoice marked with clear purchasing date, price, module model and Supplier seal or signature.

If modules need to be shipped to Supplier for testing, repair or replacement, Supplier shall provide the return merchandise authorization (RMA) to the customer. Supplier will not accept returned modules without RMA. With approval of the customer service department, the reasonable, normal and proved shipping cost (including return cost and re-shipping cost of repaired and replaced modules) of modules related to “Limited Product Warranty” and “Limited Warranty for Peak Power” will be compensated by Supplier to customers.

## **6. Transferability**

The clauses of this “Quality Warranty” will cover end users and can be transferred to any successive owners if the module’s installation position is unchanged and the inheritance or transferring relations can be sufficiently proved.

## **7. Severability of Clauses**

Should a part or a clause of the “Quality Warranty” is considered invalid or ineffective or not executable, or this part or clause to some people or some conditions is deemed invalid or ineffective or not executable, this situation shall not affect effectiveness of other parts or clauses of the “Quality Warranty”. In this case, the other parts or clauses in this “Quality Warranty” or the applicability of this “Quality Warranty” are considered independently effective.

## **8. Dispute Resolution**

If any dispute occurs with quality warranty claims, one of the domestic first-class testing



institutions such as TÜV SUD, Intertek, UL, CQC and CGC shall be invited for verdict of the final claim. All the cost shall be borne by the losing party unless otherwise stipulated in the verdict. Supplier reserves the right for the final interpretation.

Further dispute resolutions shall be executed by the applicable legal jurisdiction agreed upon in the sales contract signed by both parties.

## **9. Alteration**

The repair, replacement or the provision of extra modules does not mean that the warranty period is renewed and the original warranty period shall not extend. Any replaced modules are possessed by Supplier and shall be treated or disposed of at its own discretion. In case Supplier has stopped producing the same model as the defective modules which the claim is made against, Supplier shall keep the right to provide the modules of other models (different sizes, color, shape or power), either new brand or original brand.

## **10. Force Majeure**

If Supplier fails to perform or postpone performing sales articles or this “Quality Warranty” in the event of fire, flood, storm, typhoon, lightning, natural disaster, change of public policies, terrorism, war, riot, strike, or unavailability of proper and sufficient labor and materials or due to any other reasons or situations out of control of Supplier, Supplier shall not take any responsibilities for customers or any third party. In this case, Supplier shall not take any responsibilities for end users or any third party in any form.

Note: “Peak power” is the maximum power of solar module under the standard testing conditions (STC). Standard testing conditions refer to as:

- (a) Spectrum amplitude AM1.5
- (b) 1000W/m<sup>2</sup> irradiance
- (c) Irradiance at the correct angle and the cell temperature is 25°C.

Testing is done at the terminal of the junction box according to IEC61215 (equivalent to GB/T 9535). Supplier’s calibration and testing standard are effective on the manufacturing date of the



solar modules. Supplier's calibration standards are consistent with the approved standards by international institutions. During the period of 'Limited Warranty for Peak Power', measurement uncertainty shall be counted when determining module's output power, according to standard IEC 60904.

#### 11. Note

In the event that Customer claims any warranty service which is covered by this Warranty, customer shall immediately notify BYD in writing through below contact information:

Tel: +86-21-5777-8888-32252

E-mail: gavin.tong@byd.com

Manufacturer: BYD (Shangluo) Industrial Co.,Ltd.

Website: <http://www.byd.com.cn>

Address: No.999 Xiangjing Road, Songjiang District, Shanghai. 201611, P. R. China

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.



## Limited Warranty Letter for BYD Crystalline Photovoltaic Module

**BYD (Shangluo) Industrial Co., LTD** ("BYD") hereby provides this Limited Warranty set forth herein to the original buyer ("Original Buyer") and its permitted successors and assigns (hereinafter collectively as "Customer"), with respect to its A grade photovoltaic modules sold by BYD, subject to the terms and conditions herein ("Limited Warranty"). BYD and Customer may hereinafter be referred to each as a "Party" and collectively as the "Parties".

### 1. WARRANTY PRODUCTS

- 1.1. The standard Photovoltaic Modules covered under this Limited Warranty are - \_\_\_\_\_ ("Product") (specific models type please refer to Annex 1) which belong to \_\_\_\_\_ module products.
- 1.2. The Product will be placed and installed at \_\_\_\_\_.
- 1.3. The name of the project between BYD and Original Buyer is Achievers Energy Group Pty Ltd, address is 4/29 Bellrick St, Acacia Ridge 4110 QLD, email is [purchase@achieversenergy.com.au](mailto:purchase@achieversenergy.com.au), phone is 61 424 113 442, Website (Doc Link) is <http://achieversenergy.com.au/Categorylist/Detail/44>.

### 2. LIMITED WARRANTY

#### 2.1. Warranty Start Date

The Warranty Start Date is the date of delivery the Product to the Original Buyer according to the delivery term in the contract between them or six months following the Product manufacture date (as indicated by the serial number (digit no. 3-8 (YYMMDD), starting from the left side of the serial number.), whichever date is earlier.



(sample)

## 2.2. Limited Product Warranty

BYD warrants that the Product will be free from defects in material or workmanship that materially impede their functioning under normal conditions of use, installation, and maintenance, for a period of one hundred and forty-four (144) months commencing on Warranty Start Date. Material defects shall not include any deterioration in appearance of the Product (including without limitation of any scratches, stains, mechanical wear, rust or mold) or any other changes to the Product which occur after delivery to the Original Buyer.

## 2.3. Limited Power Output Warranty

The output power of the Limited Warranty which is based on the labeled power from BYD shall be in accordance with the followings:

For Standard Polycrystalline Module Products:

- Within a period of one (1) year from the Warranty Start Date, the average output of the modules will be at least 97.5% of the rated power output specified in the original product label.
- During the next twenty-four (24) years, the average output of the modules will degrade no more than 0.73% per year of the rated power output specified in the original product label. Therefore, at the end of the warranty period, the guaranteed module power output will be at least 80% of the rated power output specified in the original product label.

For Standard Monocrystalline Module Products:

- Within a period of one (1) year from the Warranty Start Date, the average output of the modules will be at least 97% of the rated power output specified in the original



product label.

- During the next twenty-four (24) years, the average output of the modules will degrade no more than 0.7% per year of the rated power output specified in the original product label. Therefore, at the end of the warranty period, the guaranteed module power output will be at least 80.2% of the rated power output specified in the original product label.

For Standard Double Glass Polycrystalline Module Products:

- Within a period of one (1) year from the Warranty Start Date, the average output of the modules will be at least 97.5% of the rated power output specified in the original product label.
- During the next twenty-Nine (29) years, the average output of the modules will degrade no more than 0.5% per year of the rated power output specified in the original product label. Therefore, at the end of the warranty period, the guaranteed module power output will be at least 83% of the rated power output specified in the original product label.

For Standard Double Glass Monocrystalline Module Products:

- Within a period of one (1) year from the Warranty Start Date, the average output of the modules will be at least 97% of the rated power output specified in the original product label.
- During the next twenty-Nine (29) years, the average output of the modules will degrade no more than 0.5% per year of the rated power output specified in the original product label. Therefore, at the end of the warranty period, the guaranteed module power output will be at least 82.5% of the rated power output specified in the original product label.





2.3.1 For purposes of determining Product power output, measurements shall be determined for verification using Standard Testing Conditions ( STC: irradiation 1000w/m<sup>2</sup>, temperature 25°C, AM1.5 ) and the sample size will be confirmed by both parties or follow the ISO 2859-1. The actual power output measurement is either carried out by a BYD facility or by BYD recognized third-party testing institute. Testing equipment uncertainty will be applied to all actual power output measurements.

### 3. EXCLUSIONS AND LIMITATIONS

3.1 THE WARRANTIES STATED HEREIN ARE IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IN NO EVENT SHALL ANY IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT, EXTEND BEYOND THE APPLICABLE WARRANTY PERIOD IDENTIFIED IN ARTICLE 2 ABOVE. NO SELLER OF THE PV MODULES NOR ANY OTHER PERSON IS AUTHORIZED TO MAKE ANY WARRANTIES OTHER THAN THOSE SET FORTH HEREIN, OR TO EXTEND THE DURATION OF THE WARRANTIES BEYOND THE PERIODS SET FORTH ABOVE, ON BEHALF OF BYD.

3.2 In any event, all warranty claims must be received by BYD within the applicable warranty period for this Warranty to be effective and BYD reserve the right to determine whether the Warranty will apply to such claims for defective Product.

3.3 The Warranty does not apply to any Product which has been subjected to:

- ( 1 ) No training record(See Annex 3) feedback to BYD side within 10 workdays from the begin of construction. The Original buyer and/or Customer should train Installation Manual and User Manual for BYD Photovoltaic Modules and The Standard instruction of Unpacking(See Annex 2) at the beginning of construction;
- ( 2 ) Misuse, abuse, neglect or accident in storage, transportation, handling, installation,



application, use or service;

- ( 3 ) Modification, alteration, repair or replacement, without the expressed, prior written consent of BYD or its authorization maintainer;
- ( 4 ) Non-observance of BYD's installation and maintenance instructions;
- ( 5 ) Alteration, removal, and illegible of the type or serial number of the Product;
- ( 6 ) Used in an abnormal environmental condition not conforming to the Installation and User Manual;
- ( 7 ) War, riots, strikes, unavailability of suitable and sufficient labor, material or capacity, technical or yield failures and any unforeseen event beyond BYD's control;
- ( 8 ) Use of the Product in such a manner as to infringe BYD's or any third party's intellectual property rights;
- ( 9 ) The Product's installation in a mobile device or marine environment;
- ( 10 ) Cosmetic blemishes associated with installation, or the normal wear and tear of PV Modules.
- ( 11 ) If BYD have not received all or any part due payment of the Project from the Original Buyer ("Non-payment"), we have the right to inform the Original Buyer and/or Customer the Non-payment and reject Warranty accordingly. The Original Buyer and/or Customer may pay for the outstanding amount in order to get Warranty support.

#### **4. Repair, Replacement or Refund Remedy**

- 4.1 In the event that any Product is found and confirmed by BYD to be defective, BYD will, at its discretion, (i) repair or replace such defective Product at no charge to the Customer for replacement modules or parts; or (ii) refund the difference between the



actual power output of the Product and the power according to article 2.3, based on the current market price of the Product defined by BYD at the time of the Customer's claim. The above (i) and (ii) remedy shall be the sole and exclusive remedies provided by BYD under the Warranty.

- 4.2 In the event that BYD elects to repair or replace such defective Product, BYD will assume all insurance and transportation fees (except air freight), customs clearance, logistics and labor costs for removing and installing the Product.
- 4.3 In the event of any replacement, BYD shall be entitled to deliver another type of Product or any portion of it with difference size, form, color or output that is no less than the actual due output according to article 2 at the time of the Customer's claim, which is compatible to the Customer's PV system, if the type of the claimed Product or parts is no longer produced by BYD at the time of claim. The ownership of the replaced modules shall belong to BYD upon completing the replacement work.
- 4.4 The warranty period as defined in article 2 shall not extend or renew upon the repair or replacement of a defective Product by BYD. The warranty period for replaced or repaired Product is the remainder of the warranty on the original new Product.

## **5. LIMITATION OF LIABILITY**

- 5.1 THE WARRANTIES SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE WARRANTIES PROVIDED BY BYD, AND SHALL BE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE TO THE CUSTOMER FOR ANY BREACH OF WARRANTY, EXPRESS OR IMPLIED. PROVISION OF REMEDIES, IN THE MANNER AND FOR THE PERIODS DESCRIBED HEREIN, SHALL CONSTITUTE COMPLETE FULFILLMENT OF ALL LIABILITIES AND RESPONSIBILITIES OF BYD TO THE CUSTOMER WITH RESPECT TO THE PRODUCT.
- 5.2 IN NO EVENT WILL BYD BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL OR PUNITIVE DAMAGES (INCLUDING WITHOUT LIMITATION OF LOSS OF PROFITS, HARM TO GOODWILL OR BUSINESS REPUTATION, OR DELAY DAMAGES) ARISING FROM OR OUT OF THE PRODUCT OR THEIR



INSTALLATION, USE, PERFORMANCE OR NON-PERFORMANCE, OR ANY DEFECT OR BREACH OF WARRANTY, WHETHER BASED ON CONTRACT, WARRANTY, NEGLIGENCE, STRICT LIABILITY, OR ANY OTHER THEORY. BYD'S AGGREGATE LIABILITIES, IF ANY, IN DAMAGES OR OTHERWISE, SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE CUSTOMER FOR THE PARTICULAR PRODUCT INVOLVED.

## 6. PERFORMANCE OF WARRANTY SERVICE

6.1 In the event that Customer claims any warranty service which is covered by this Warranty, customer shall immediately notify BYD in writing through below contact information:

Tel: +86-21-5777-8888-32252

E-mail: [gavin.tong@byd.com](mailto:gavin.tong@byd.com)

Manufacturer : BYD ( Shangluo ) Industrial Co.,Ltd.

Website: <http://www.byd.com.cn>

Address: No.999 Xiangjing Road, Songjiang District, Shanghai. 201611, P. R. China

6.2 Together with the notification, the customer shall submit the following information:

- (1) Detailed description of the defective modules and related evidence, including photographs and data;
- (2) Relevant serial number;
- (3) Invoice with clear indication of the purchase data chopped or signed by BYD; and
- (4) Any other materials requested by BYD

6.3 Any dispute on technical facts relating to claims brought under this Warranty for defects of Product shall be determined by expert determination. BYD will, at its option and upon informing Customer in writing, appoint as independent expert and appraiser a reputable researcher from a first class test-institute such as TÜV SÜD in China,



CPVT, PI China and other institutes with the same qualification ("Technical Expert"). Neither party may reject or delay the appraisal issue above without justified reasons. The determination by such Technical Expert shall be final, conclusive, binding and enforceable in any proceeding brought hereunder. All fees and expenses shall be borne by the losing party.

6.4 Any claim for breach of this Limited Warranty must be brought within one (1) month after discovery of the breach.

6.5 The return of any defective Product will not be accepted unless prior written authorization has been given by BYD.

## **7. MISCELLANEOUS**

7.1 In the event that customer requests after-sale service, such as repair or replacement, after warranty period, BYD will charge fees.

7.2 This entire Limited Warranty may be assigned in whole but not in part to any persons or entity provided that BYD receive full and final payment for the Product, which shall stay at the same place since the completion of installation and BYD confirm the assigned notice in writing.

7.3 If any part or provision of this Warranty, or the application thereof to any person or circumstance, is held invalid, void or unenforceable, such holding shall not affect any other parts, provisions or applications of this Warranty, which shall remain in full force.

7.4 Any dispute related to or arising out of this Warranty, including without limitation any question regarding its existence, validity, breach, or termination, shall be referred to and finally resolved pursuant to the governing law clauses and dispute resolution procedures under the Purchase Agreement between the original buyer and BYD.

## **8. Note**

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the



failure does not amount to a major failure

## Annex 1: Module Type

**a) Standard Polycrystalline Module Products:**

**BYDxxxP6C-18/P6K-18, BYDxxxP6C-24/P6K-24, BYDxxxP6C-27/P6K-27,  
BYDxxxP6C-30/P6K-30, BYDxxxP6C-36/P6K-36, BYDxxxPHC-30/PHK-30,  
BYDxxxPHC-36/PHK-36**

**b) Standard Monocrystalline Module Products:**

**BYDxxxM6C-18/M6K-18, BYDxxxM6C-30/M6K-30, BYDxxxM6C-36/M6K-36,  
BYDxxxMHC-30/MHK-30, BYDxxxMHC-36/MHK-36, BYDxxxMIK-30,  
BYDxxxMIK-33, BYDxxxMIK-36, BYDxxxMIK-39**

**c) Standard Double Glass Polycrystalline Module Products:**

**BYDxxxP6D-30, BYDxxxP6D-36**

**d) Standard Double Glass Monocrystalline Module Products:**

**BYDxxxM6D-30, BYDxxxM6D-36, BYDxxxMIB-36**



## **Annex 2: The Standard Instruction of Unpacking**



## Solar Division



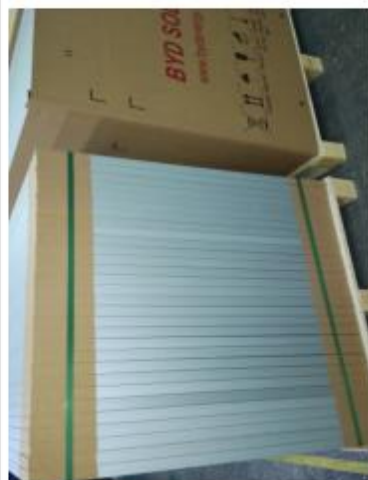
BYD (Shangluo) Industrial Co., LTD

## The standard Instruction of Unpacking



## 1.Place box :

Select a flat ground and make sure the two boxes are close together. Then open the lid.



## 2.Remove straps :

Use a cutting tool to cut straps,and pay high attention for safety issue.



## 3.Taking out modules:

After removing straps and making modules lean on racks or other supports. Grab the short frames with hands,and handle them to the mounting rack and install. After that, collect all packing materials for environment.

## Caution:

1.pay attention to the cutting edge to avoid personee;

2.pay attention to avoid sharp objects, to prevent scratching the back.

Drafting:	Yonghua mao	File No:		Work tool		Parts	Quantity	Tools	Personal protective equipment		Helmet	Cotton gloves
Date:	2018/7/24	Version NO:	1.0			Component packaging	Pending	Diagonal pliers/Blade				
Review:	Wallace Li	Department:	Tech. Dep.									
Date:	2018/7/24											
Approve:	Henry Tao	BYD Solar Division										
Date:	2018/7/24											





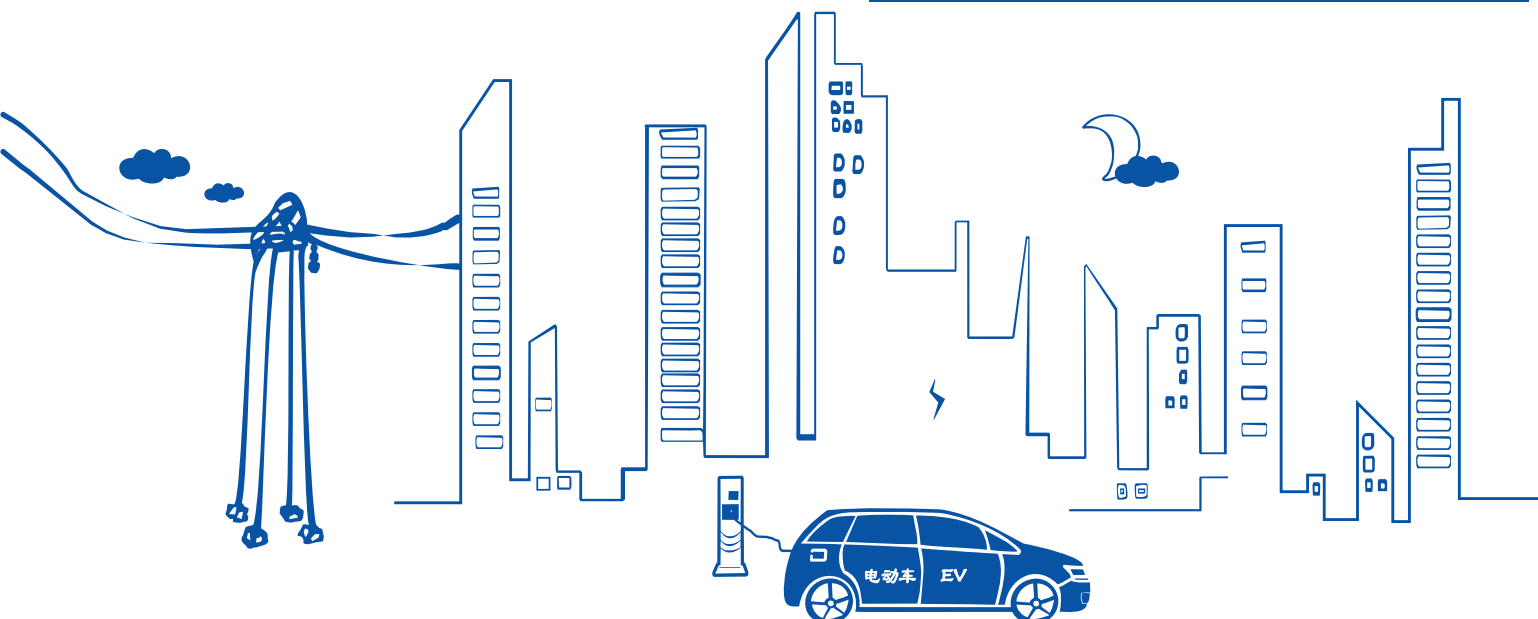
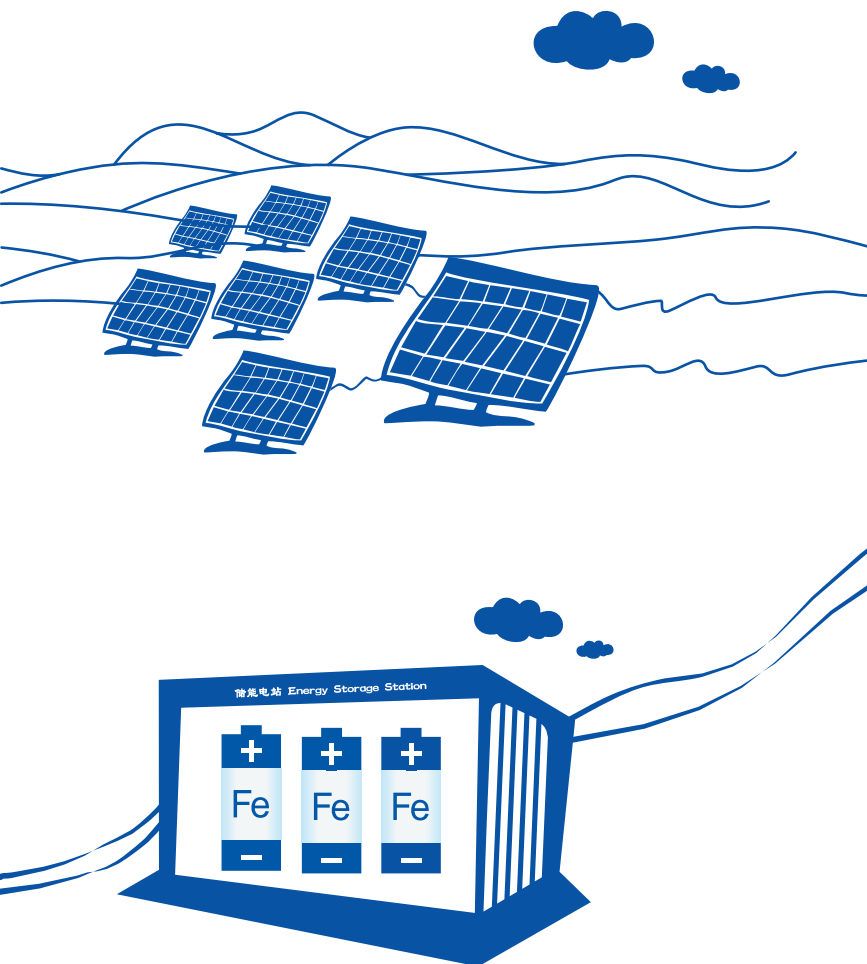
## Annex 3: The Training Record of Unpack And Installation of BYD Solar Modules



### The Training Record of Unpack And Installation of BYD Solar Modules

Subject				NO.			
Location				MM/DD/YY			
Period				Attendance Quantity			
Attendance							
The Training Content							
No.	Name	Surname	Signature	No.	Name	Surname	Signature
1				21			
2				22			
3				23			
4				24			
5				25			
6				26			
7				27			
8				28			
9				29			
10				30			
11				31			
12				32			
13				33			
14				34			
15				35			
16				36			
17				37			
18				38			
19				39			
20				40			
Supervisor :				Signature:			

FM-MSP-20-A41-006-01A



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Average cell efficiency up to **22.2%**  
Excellent optical performance



Power tolerance 0-5W  
Power Measurement Tolerance  $\pm 3\%$   
Reliability for output performance



12 years for product  
25 years linear warranty



Residential roof top systems  
On/Off-grid commercial systems  
On/Off-grid utility systems



Design loads: 3600 Pa for positive  
(downward) and 1600 Pa for  
negative (upward) Safety factors  $\gamma_m$ : 1.5

Corresponding to maximum snow and ice  
load 5400Pa, maximum wind load 2400Pa

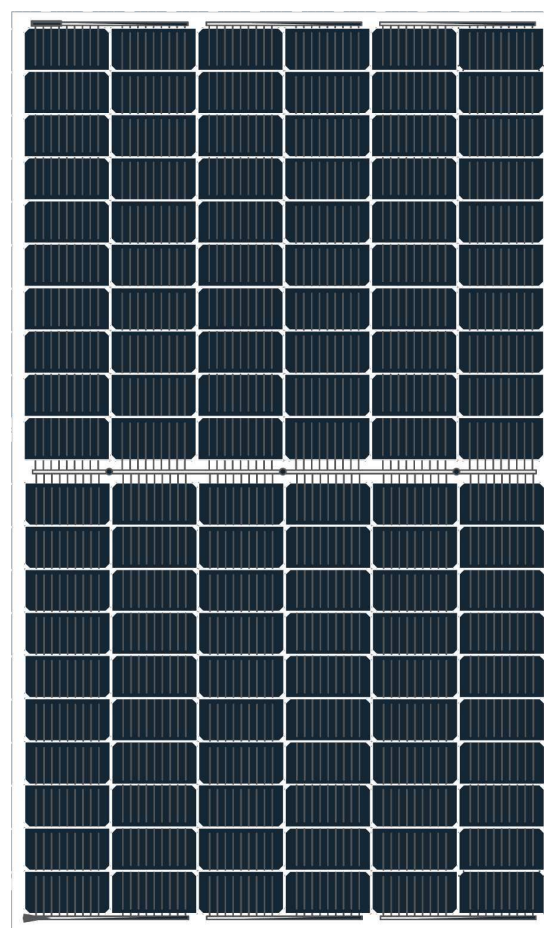


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IEC61215-1-1(ed.1)  
IEC61215-2(ed.1)  
IEC61730-1(ed.2)  
IEC61730-2(ed.2)

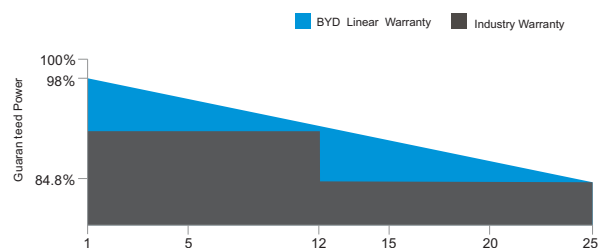
# BYD

## Mono Half Cell Module

### BYD MG2K30-166M 350W-380W



PV Module 25 Years Linear Performance Warranty





# BYD MG2K-30-166M 350W-380W

## Mechanical Properties

Cell Type	166*83mm
Number of Cells	120
Dimension of Module	1755*1038*35mm
Weight	19.5KG
Front Glass	3.2mm tempered glass with AR Coating
Frame	Anodized aluminum alloy
Junction Box	IP68
Cable Length	+300mm , -300mm(4.0mm <sup>2</sup> )
Connector	Genuine MC4 EVO2

## Temperature Coefficient

Peak Power Temperature Coefficient	-0.350%/°C
Open-Circuit Voltage Temperature Coefficient	-0.270%/°C
Short-Circuit Current Temperature Coefficient	0.048%/°C

## Packing Information

Packing Type	40'HQ
Piece/Pallet	30
Pallet/Container	13+13
Piece/Container	780

## Electrical Data (STC\*)

Module Type	BYD350MG2K-30	BYD355MG2K-30	BYD360MG2K-30	BYD365MG2K-30	BYD370MG2K-30	BYD375MG2K-30	BYD380MG2K-30
Rate Maximum Power P <sub>max</sub> (W)	350Wp	355Wp	360Wp	365Wp	370Wp	375Wp	380Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	40.1V	40.3V	40.5V	40.7V	40.9V	41.1V	41.3V
Short Circuit Current (I <sub>sc</sub> ) (A)	11.15A	11.25A	11.35A	11.43A	11.52A	11.60A	11.69A
Maximum Power Voltage (V <sub>mp</sub> )(V)	33.6V	33.8V	34.0V	34.2V	34.4V	34.6V	34.8V
Maximum Power Current (I <sub>mp</sub> ) (A)	10.42A	10.51A	10.59A	10.68A	10.76A	10.84A	10.92A
Module Efficiency (%)	19.2%	19.5%	19.8%	20.0%	20.3%	20.6%	20.9%

\* Standard Test Conditions (STC) : irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

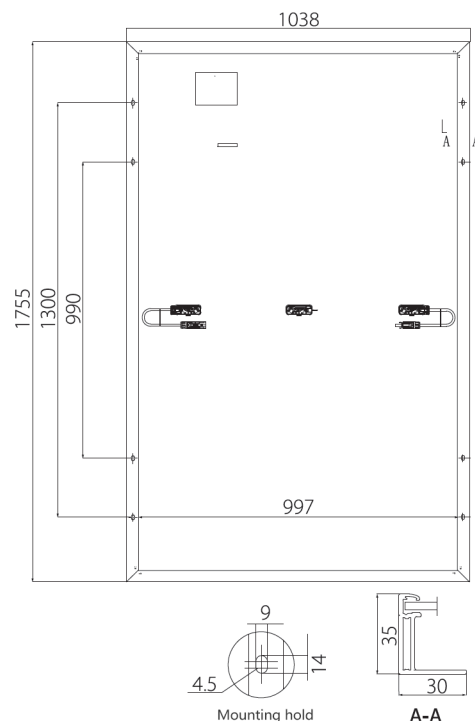
## Electrical Data (NMOT\*)

Module Type	BYD350MG2K-30	BYD355MG2K-30	BYD360MG2K-30	BYD365MG2K-30	BYD370MG2K-30	BYD375MG2K-30	BYD380MG2K-30
Rate Maximum Power P <sub>max</sub> (W)	261.4Wp	265.1Wp	268.8Wp	272.6Wp	276.3Wp	280.0Wp	283.8Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	37.6V	37.8V	38.0V	38.2V	38.3V	38.5V	38.7V
Short Circuit Current (I <sub>sc</sub> ) (A)	9.02A	9.10A	9.17A	9.25A	9.32A	9.38A	9.45A
Maximum Power Voltage (V <sub>mp</sub> )(V)	31.3V	31.5V	31.7V	31.8V	32.0V	32.2V	32.4V
Maximum Power Current (I <sub>mp</sub> ) (A)	8.35A	8.43A	8.49A	8.56A	8.63A	8.69A	8.76A

Nominal Module Operating Temperature (NMOT) : irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## Operational Parameter

Operating Temperature (°C)	-40°C~+85°C
NMOT(Nominal Module operating temperature)	45°C±2°C
Maximum System Voltage (V)	1500 (VDC)
Maximun Fuse Current Rating (A)	20A
Fire Safety	Class C
Power Tolerance	0-5W
Power Measurement Tolerance	±3%



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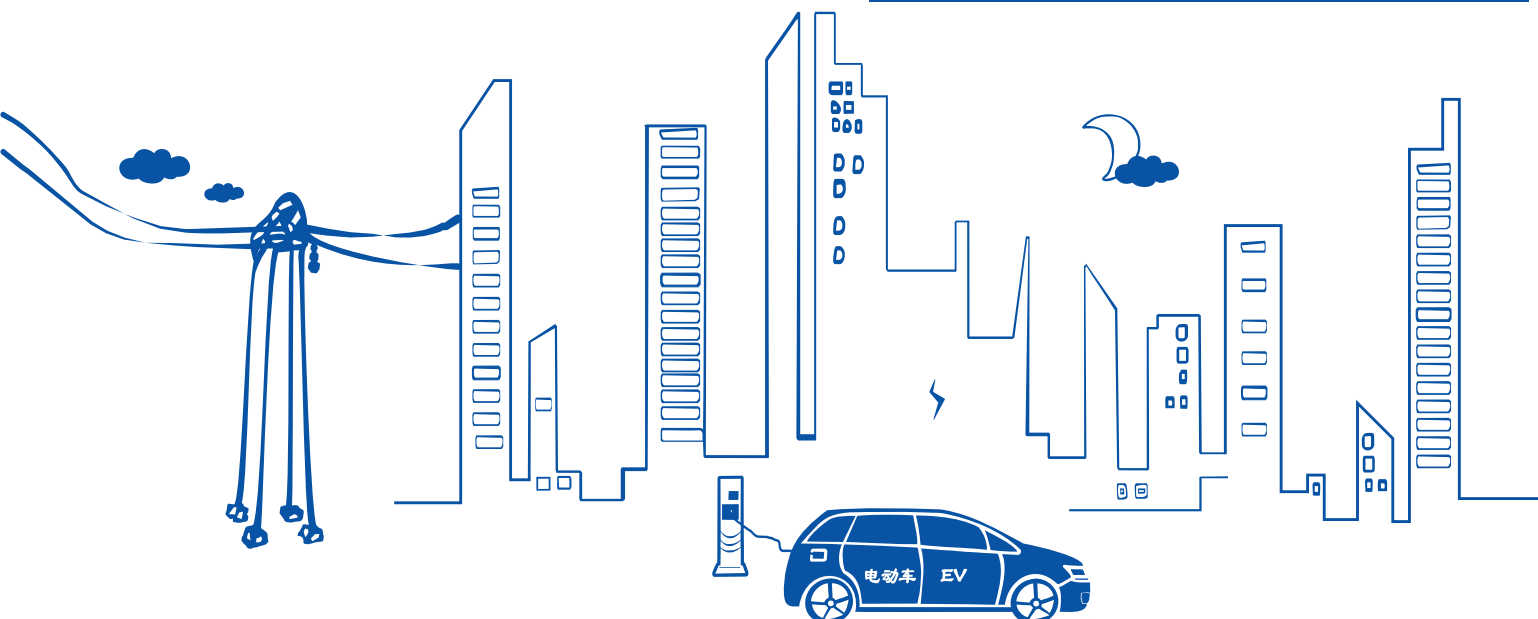
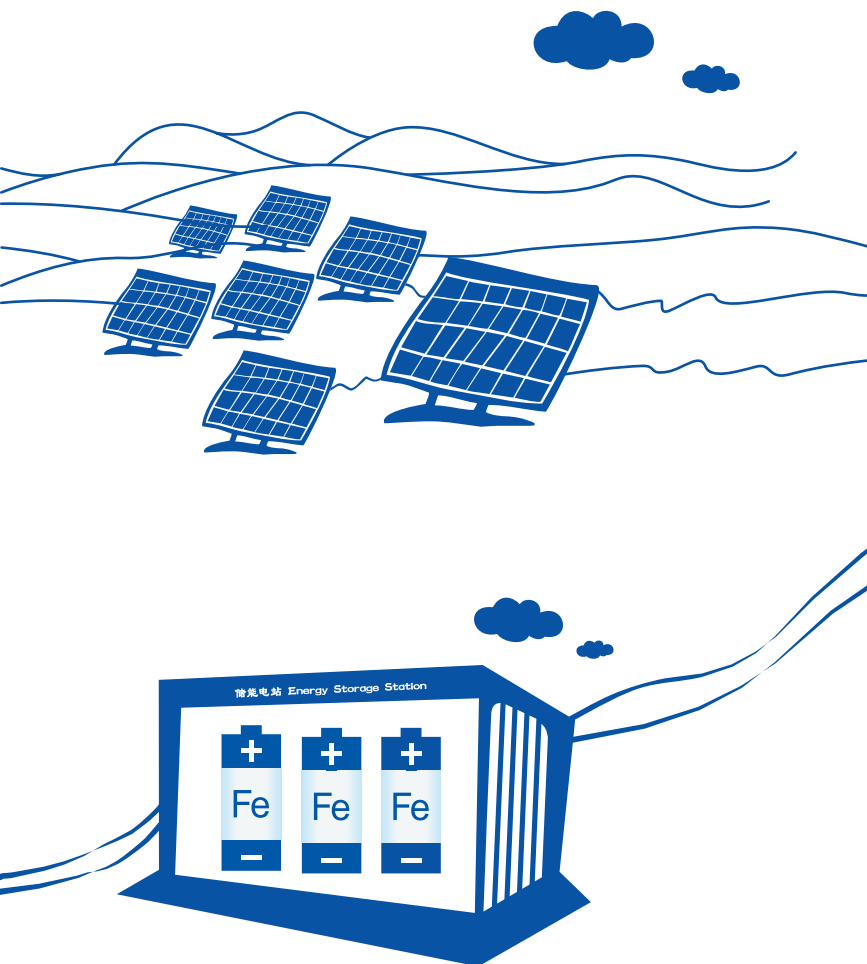
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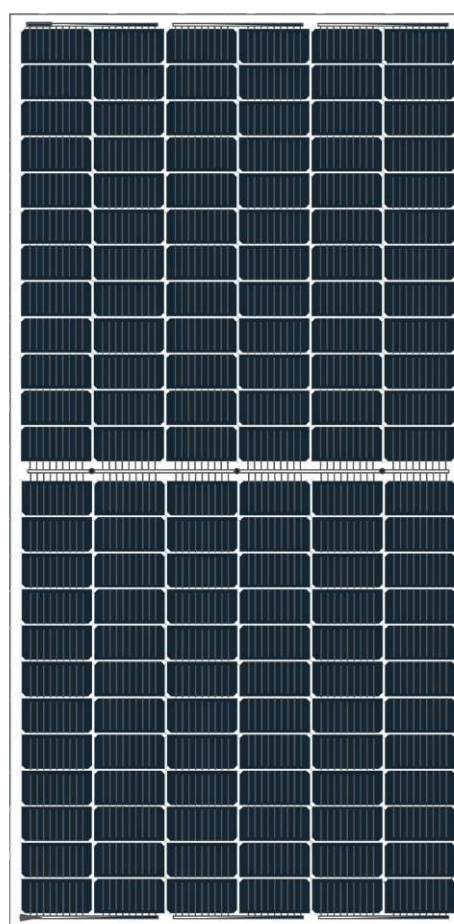


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IEC61215-2(ed.1)  
IEC61730-1(ed.2)  
IEC61730-2(ed.2)

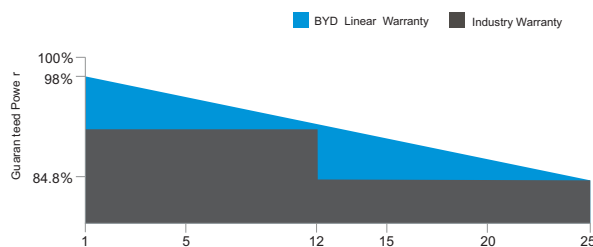
# BYD

## Mono Half Cell Module

**BYD MG2K36-166M 425W-455W**



PV Module 25 Years Linear Performance Warranty



# BYD MG2K-36-166M 425W-455W

## Mechanical Properties

Cell Type	166*83mm
Number of Cells	144
Dimension of Module	2094*1038*35mm
Weight	23.5KG
Front Glass	3.2mm tempered glass with AR Coating
Frame	Anodized aluminum alloy
Junction Box	IP68
Cable Length	+300mm , -300mm(4.0mm <sup>2</sup> )
Connector	Genuine MC4 EVO2

## Temperature Coefficient

Peak Power Temperature Coefficient	-0.350%/°C
Open-Circuit Voltage Temperature Coefficient	-0.270%/°C
Short-Circuit Current Temperature Coefficient	0.048%/°C

## Packing Information

Packing Type	40'HQ
Piece/Pallet	30
Pallet/Container	11+11
Piece/Container	660

## Electrical Data (STC\*)

Module Type	BYD425MG2K-36	BYD430MG2K-36	BYD435MG2K-36	BYD440MG2K-36	BYD445MG2K-36	BYD450MG2K-36	BYD455MG2K-36
Rate Maximum Power P <sub>max</sub> (W)	425Wp	430Wp	435Wp	440Wp	445Wp	450Wp	455Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	48.3V	48.5V	48.7V	48.9V	49.1V	49.3V	49.5V
Short Circuit Current (I <sub>sc</sub> ) (A)	11.23A	11.31A	11.39A	11.46A	11.53A	11.60A	11.66A
Maximum Power Voltage (V <sub>mp</sub> ) (V)	40.5V	40.7V	40.9V	41.1V	41.3V	41.5V	41.7V
Maximum Power Current (I <sub>mp</sub> ) (A)	10.50A	10.57A	10.64A	10.71A	10.78A	10.85A	10.92A
Module Efficiency (%)	19.6%	19.8%	20.0%	20.2%	20.5%	20.7%	20.9%

\* Standard Test Conditions (STC) : irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

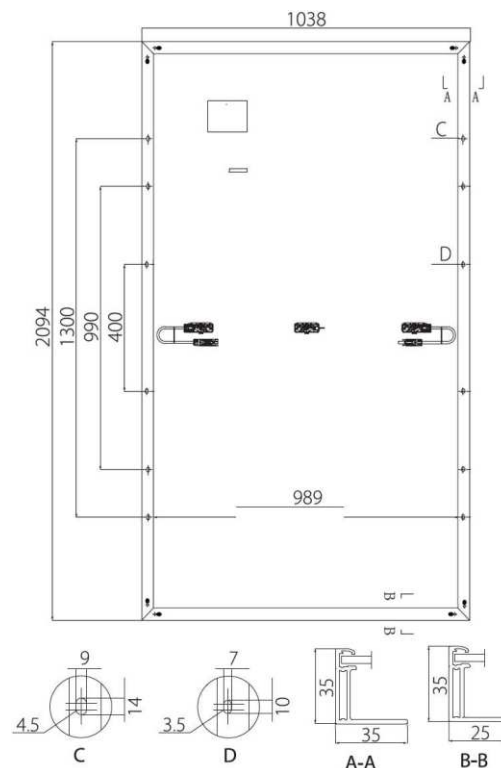
## Electrical Data (NMOT\*)

Module Type	BYD425MG2K-36	BYD430MG2K-36	BYD435MG2K-36	BYD440MG2K-36	BYD445MG2K-36	BYD450MG2K-36	BYD455MG2K-36
Rate Maximum Power P <sub>max</sub> (W)	317.4Wp	321.1Wp	324.9Wp	328.6Wp	332.3Wp	336.1Wp	339.8Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	45.3V	45.5V	45.7V	45.8V	46.0V	46.2V	46.4V
Short Circuit Current (I <sub>sc</sub> ) (A)	9.08A	9.15A	9.21A	9.27A	9.33A	9.38A	9.43A
Maximum Power Voltage (V <sub>mp</sub> ) (V)	37.7V	37.9V	38.1V	38.3V	38.5V	38.6V	38.8A
Maximum Power Current (I <sub>mp</sub> ) (A)	8.42A	8.47A	8.53A	8.59A	8.64A	8.70A	8.75A

Nominal Module Operating Temperature (NMOT) : irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## Operational Parameter

Operating Temperature (°C)	-40°C~+85°C
NMOT(Nominal Module operating temperature)	45°C±2°C
Maximum System Voltage (V)	1500 (VDC)
Maximum Fuse Current Rating (A)	20A
Fire Safety	Class C
Power Tolerance	0-5W
Power Measurement Tolerance	±3%



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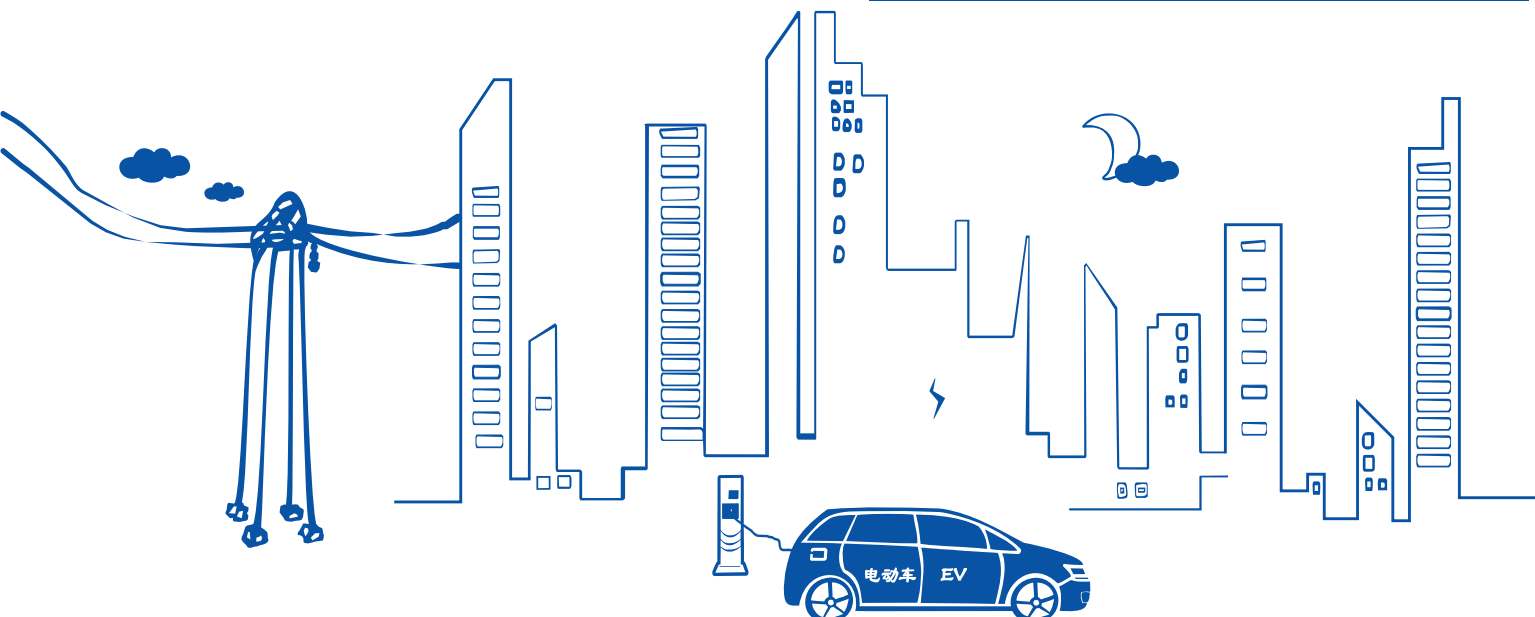
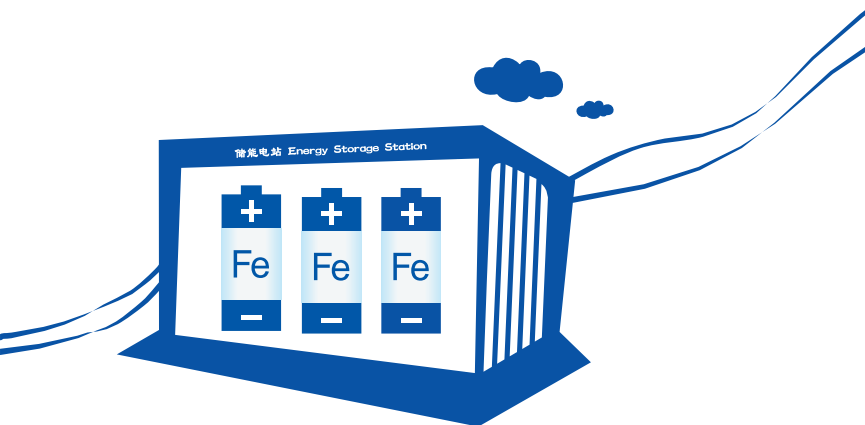
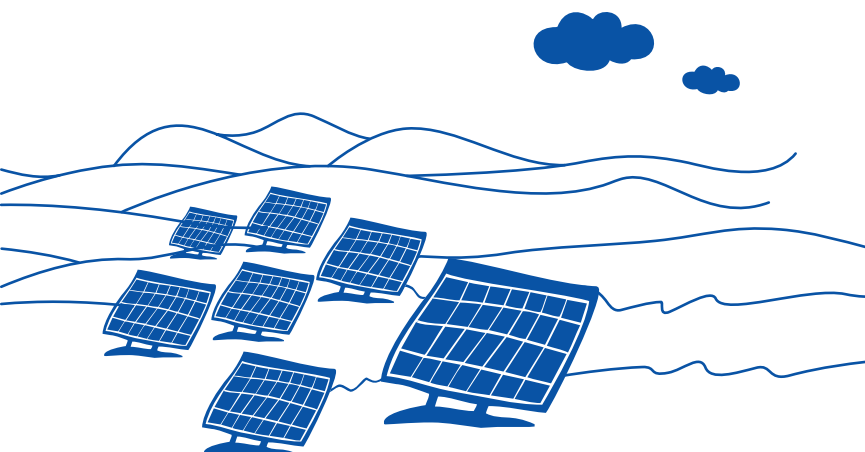
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**e** pv.byd.com

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Power Measurement Tolerance  $\pm 5\%$   
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Residential roof top systems  
On/Off-grid commercial systems  
On/Off-grid utility systems



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negative (upward) Safety factors  $Y_m$ : 1.5

Corresponding to maximum snow and ice  
load 5400Pa, maximum wind load 2400Pa

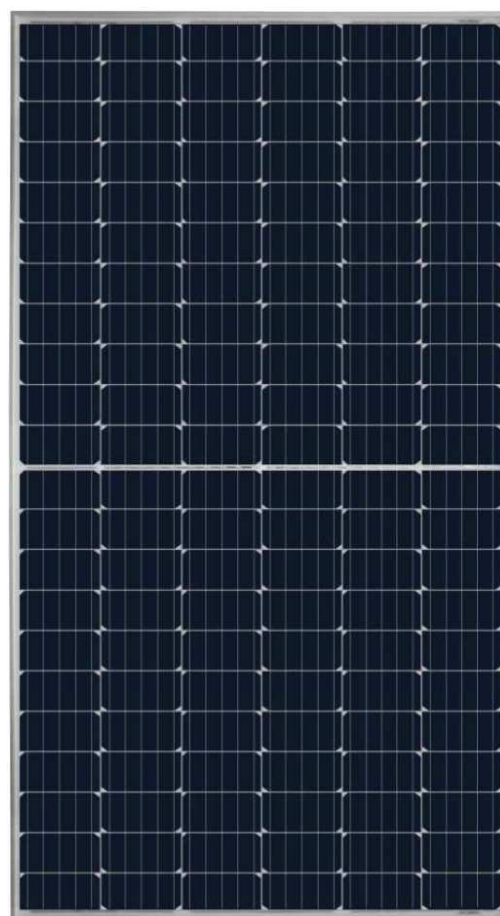


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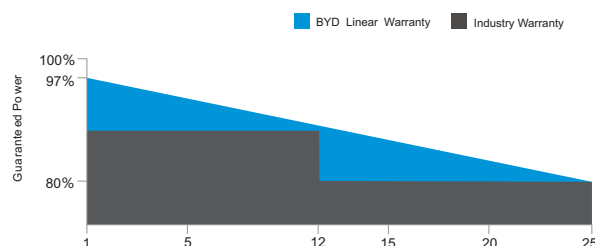
# BYD

## Mono Half Cell Module

### BYD MIK-33-SERIES-5BB 355W-370W



PV Module 25 Years Linear Performance Warranty





# BYD MIK-33-SERIES-5BB 355W-370W

## Mechanical Properties

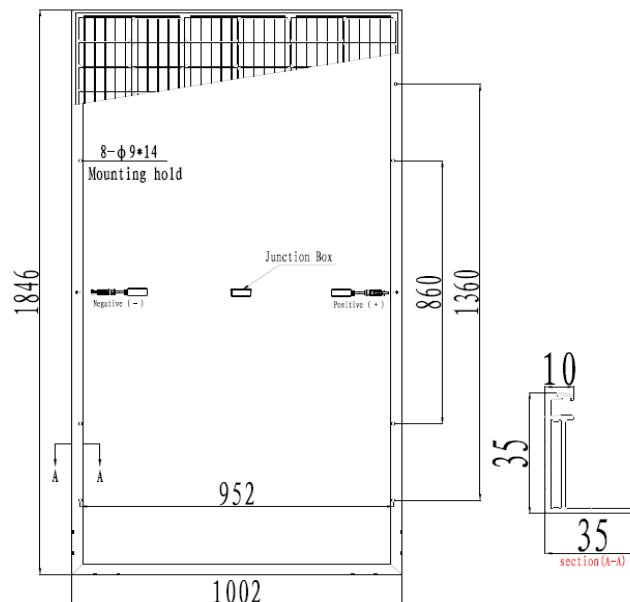
Cell Type	158.75mm*79.375mm
Number of Cells	132
Dimension of Module	1846*1002*35mm
Weight	20.2kg ±5%
Front Glass	3.2mm tempered glass with AR Coating
Frame	Anodized aluminum alloy
Junction Box	IP67(3 Diodes)
Cable Length	+320mm, -260mm(4.0mm <sup>2</sup> )
Connector	Genuine MC4 EVO2

## Temperature Coefficient

Peak Power Temperature Coefficient	-0.328%/°C
Open-Circuit Voltage Temperature Coefficient	-0.254%/°C
Short-Circuit Current Temperature Coefficient	0.041%/°C

## Packing Information

Packing Type	40' HQ
Piece/Pallet	30+35
Pallet/Container	12+12
Piece/Container	780



## Electrical Data (STC\*)

Module Type	BYD355MIK-33	BYD360MIK-33	BYD365MIK-33	BYD370MIK-33
Rate Maximum Power P <sub>max</sub> (W)	355Wp	360Wp	365Wp	370Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	49.38V	49.69V	50.00V	50.31V
Short Circuit Current (I <sub>sc</sub> ) (A)	9.20A	9.29A	9.38A	9.47A
Maximum Power Voltage (V <sub>mp</sub> )(V)	41.14V	41.47V	41.80V	42.13V
Maximum Power Current (I <sub>mp</sub> ) (A)	8.64A	8.69A	8.74A	8.79A
Module Efficiency (%)	19.19%	19.46%	19.73%	20.00%

\* Standard Test Conditions (STC) : irradiance of 1000 W/m<sup>2</sup> , spectrum AM 1.5 and cell temperature of 25°C.

## Electrical Data (NMOT\*)

Module Type	BYD355MIK-33	BYD360MIK-33	BYD365MIK-33	BYD370MIK-33
Rate Maximum Power P <sub>max</sub> (W)	264.0Wp	267.6Wp	271.2Wp	274.8Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	46.50V	46.80V	47.10V	47.40V
Short Circuit Current (I <sub>sc</sub> ) (A)	7.42A	7.49A	7.56A	7.63A
Maximum Power Voltage (V <sub>mp</sub> )(V)	38.40V	38.50V	38.70V	38.80V
Maximum Power Current (I <sub>mp</sub> ) (A)	6.88A	6.94A	7.00A	7.06A

Nominal Module Operating Temperature (NMOT) : irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## Operational Parameter

Operating Temperature (°C)	-40°C~+85°C
NMOT(Nominal Module operating temperature)	45°C±2°C
Maximum System Voltage (V)	1500 (VDC)
Maximun Fuse Current Rating (A)	20A
Fire Safety	Class C
Power Tolerance	0-5W
Power Measurement Tolerance	±5%

## BYD COMPANY LIMITED

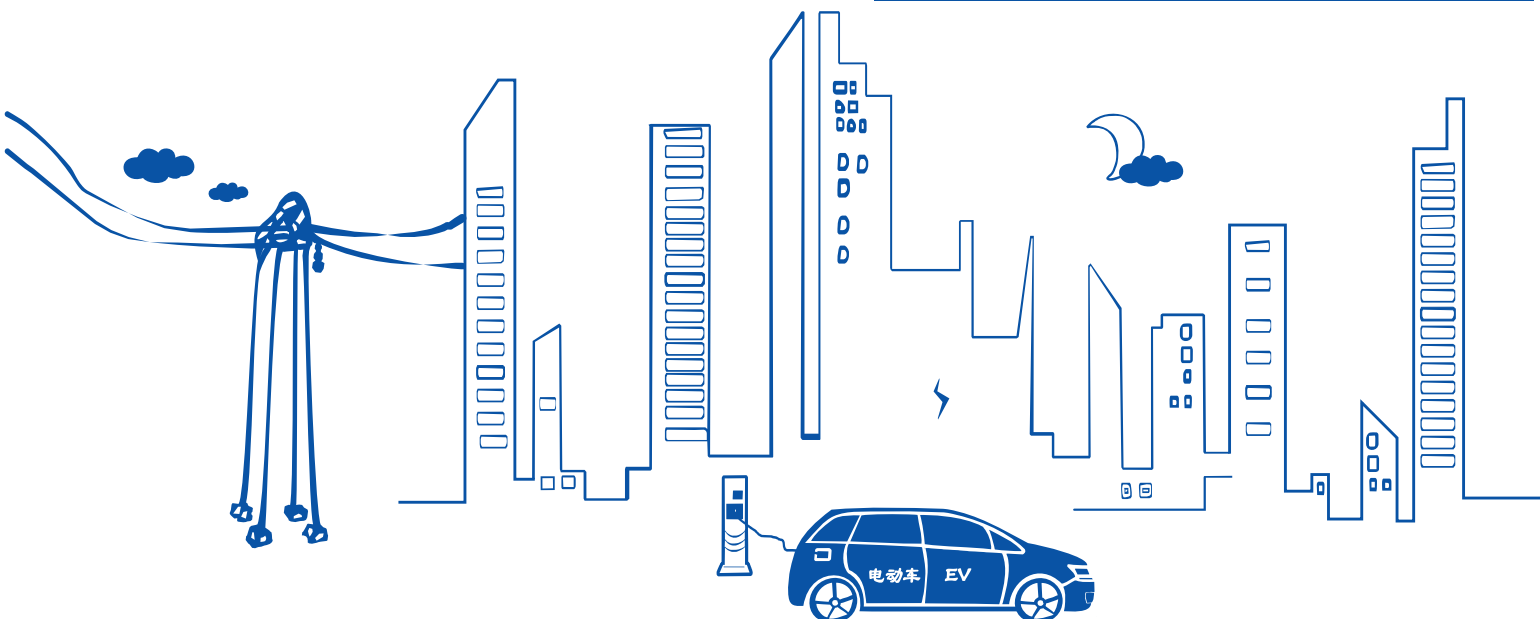
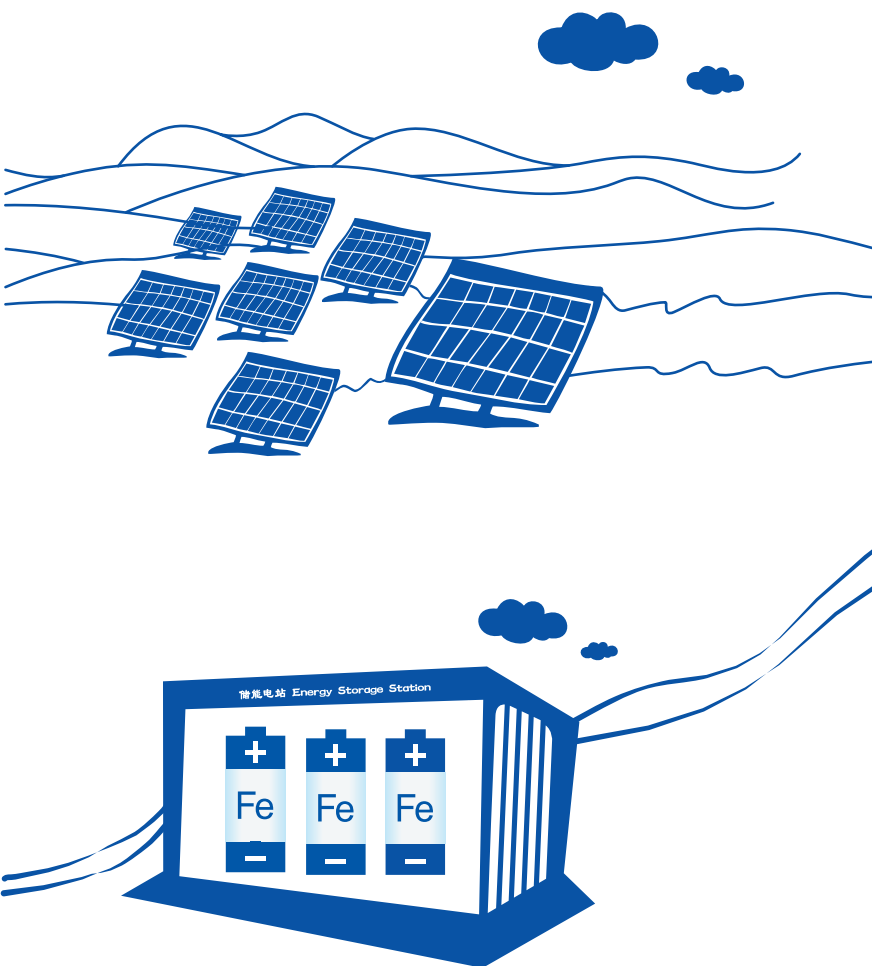
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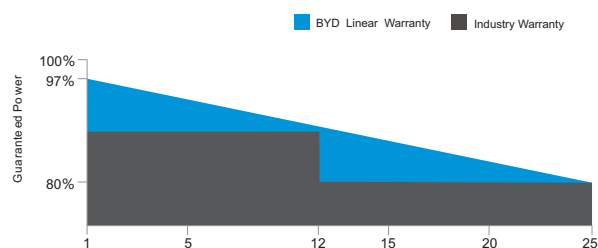
# BYD

## Mono Half Cell Module

**BYD MIK-39-SERIES-5BB 420W-445W**



PV Module 25 Years Linear Performance Warranty





# BYD MIK-39-SERIES-5BB 420W-445W

## Mechanical Properties

Cell Type	158.75mm*79.375mm
Number of Cells	156
Dimension of Module	2166*998*35mm
Weight	23.44kg ±5%
Front Glass	3.2mm tempered glass with AR Coating
Frame	Anodized aluminum alloy
Junction Box	IP67(3 Diodes)
Cable Length	+320mm , -260mm(4.0mm²)
Connector	Genuine MC4 EVO2

## Temperature Coefficient

Peak Power Temperature Coefficient	-0.328%/°C
Open-Circuit Voltage Temperature Coefficient	-0.254%/°C
Short-Circuit Current Temperature Coefficient	0.041%/°C

## Packing Information

Packing Type	40'HQ
Piece/Pallet	30+35
Pallet/Container	10+10
Piece/Container	650

## Electrical Data (STC\*)

Module Type	BYD420MIK-39	BYD425MIK-39	BYD430MIK-39	BYD435MIK-39	BYD440MIK-39	BYD445MIK-39
Rate Maximum Power P <sub>max</sub> (W)	420Wp	425Wp	430Wp	435Wp	440Wp	445Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	51.82V	51.94V	52.06V	52.18V	52.30V	52.42V
Short Circuit Current (I <sub>sc</sub> ) (A)	10.27A	10.36A	10.45A	10.54A	10.63A	10.72A
Maximum Power Voltage (V <sub>mp</sub> )(V)	43.48V	43.59V	43.70V	43.81V	43.92V	44.03V
Maximum Power Current (I <sub>mp</sub> ) (A)	9.66A	9.75A	9.84A	9.93A	10.02A	10.11A
Module Efficiency (%)	19.4%	19.7%	19.9%	20.1%	20.4%	20.6%

\* Standard Test Conditions (STC) : irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

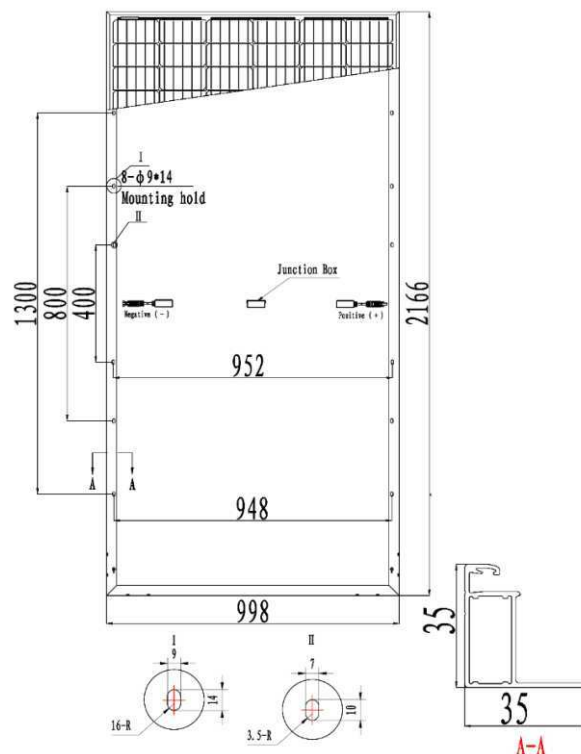
## Electrical Data (NMOT\*)

Module Type	BYD420MIK-39	BYD425MIK-39	BYD430MIK-39	BYD435MIK-39	BYD440MIK-36	BYD445MIK-39
Rate Maximum Power P <sub>max</sub> (W)	317.7Wp	322.3Wp	326.1Wp	330.0Wp	333.9Wp	336.3Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	49.0V	49.1V	49.3V	49.4V	49.5V	49.5V
Short Circuit Current (I <sub>sc</sub> ) (A)	8.27A	8.34A	8.42A	8.49A	8.56A	8.64A
Maximum Power Voltage (V <sub>mp</sub> )(V)	40.50V	40.70V	40.80V	40.90V	41.00V	41.00V
Maximum Power Current (I <sub>mp</sub> ) (A)	7.84A	7.92A	8.00A	8.07A	8.14A	8.21A

Nominal Module Operating Temperature (NMOT) : irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## Operational Parameter

Operating Temperature (°C)	-40°C~+85°C
NMOT(Nominal Module operating temperature)	45°C±2°C
Maximum System Voltage (V)	1500 (VDC)
Maximun Fuse Current Rating (A)	20A
Fire Safety	Class C
Power Tolerance	0-5W
Power Measurement Tolerance	±5%



## BYD COMPANY LIMITED

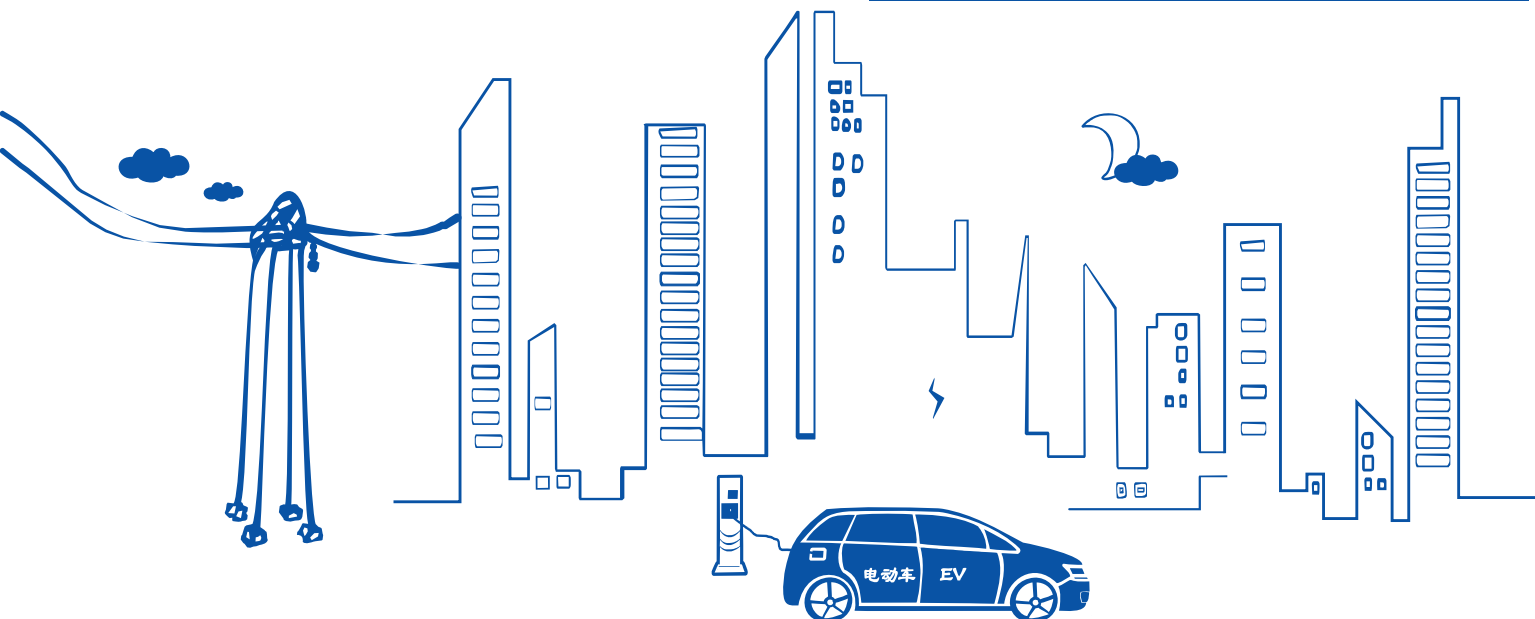
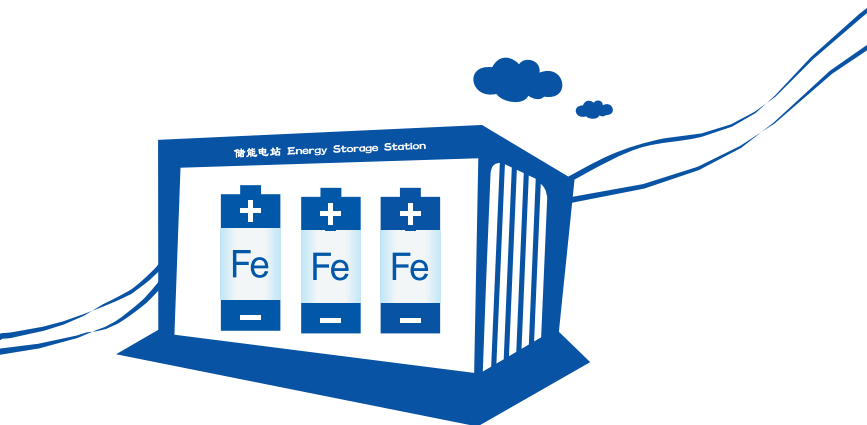
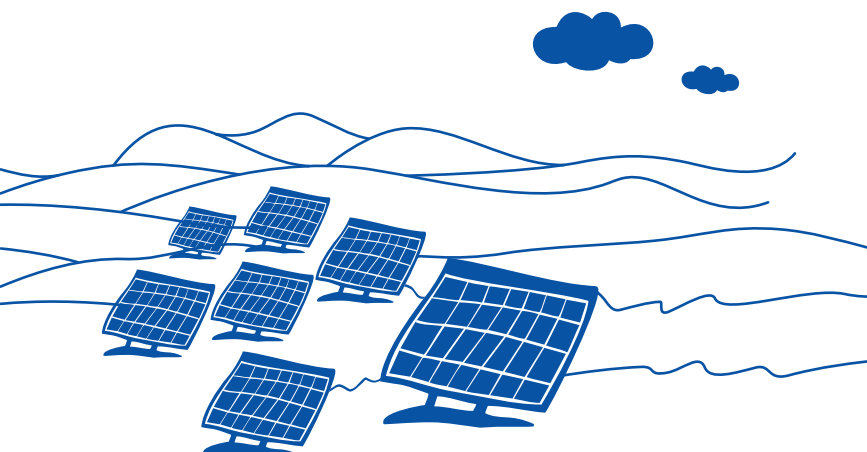
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Made in China,Vietnam,Cambodia



## BYD's Dream All Human Hope

Changing human dependence on non-renewable energy as the starting point, with three green dreams of electric vehicle, energy storage station and solar farm, BYD looks forward to helping more countries and people to get rid of fossil energy over consumption crisis and environmental pollution, and strive to leave offspring a beautiful and clean world to live in.

“

In the daytime, solar panels capture solar energy like plants. At night, energy storage station transports the stored energy, like solar energy, wind energy, tidal energy, to thousands of families smoothly.

The electric vehicle, shuttling on the streets and lanes, is of zero emission, zero pollution.

Is this a dream?

This is the green dream of BYD and even all human beings.

Is this a dream?

No. We are already seeing it approaching us.

”





Average cell efficiency up to **19.0%**  
Excellent optical performance



Power tolerance 0-5W  
Power Measurement Tolerance  $\pm 5\%$   
Reliability for output performance



12 years for product  
25 years linear warranty



Residential roof top systems  
On/Off-grid commercial systems  
On/Off-grid utility systems



Design loads: 3600 Pa for positive  
(downward) and 1600 Pa for  
negative (upward) Safety factors  $Y_m$ : 1.5

Corresponding to maximum snow and ice  
load 5400Pa, maximum wind load 2400Pa

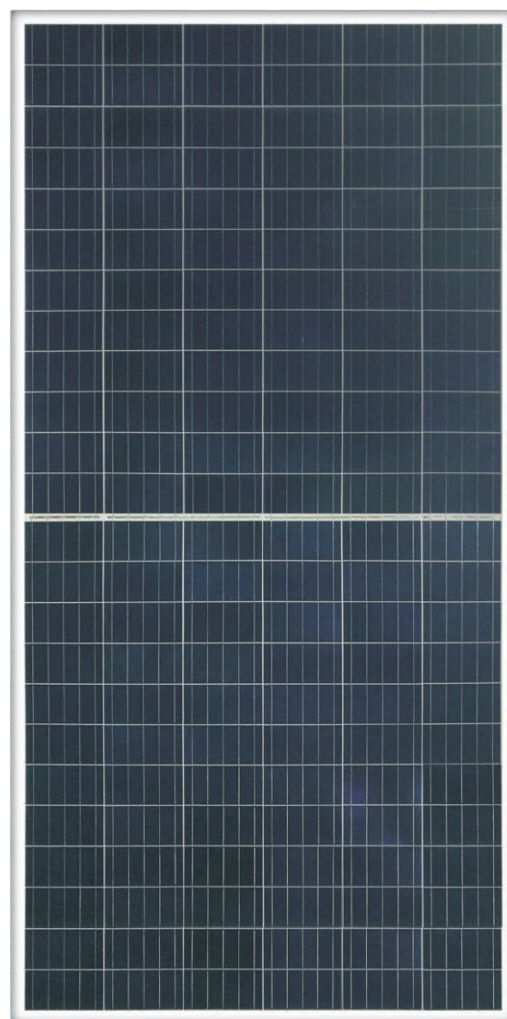


IEC61215-1(ed.1)  
IEC61215-1-1(ed.1)  
IEC61215-2(ed.1)  
IEC61730-1(ed.2)  
IEC61730-2(ed.2)

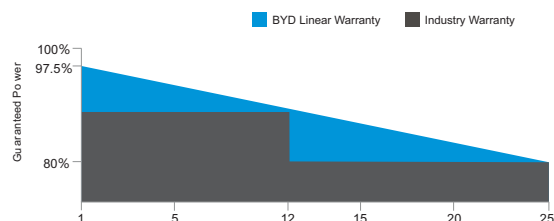
# BYD

## Poly Half Cell Module

**BYD PHK-36-SERIES-5BB 325-345W**



BYD PV Module 25 Years Linear Performance Warranty



# BYD PHK-36-SERIES-5BB 325-345W

## Mechanical Properties

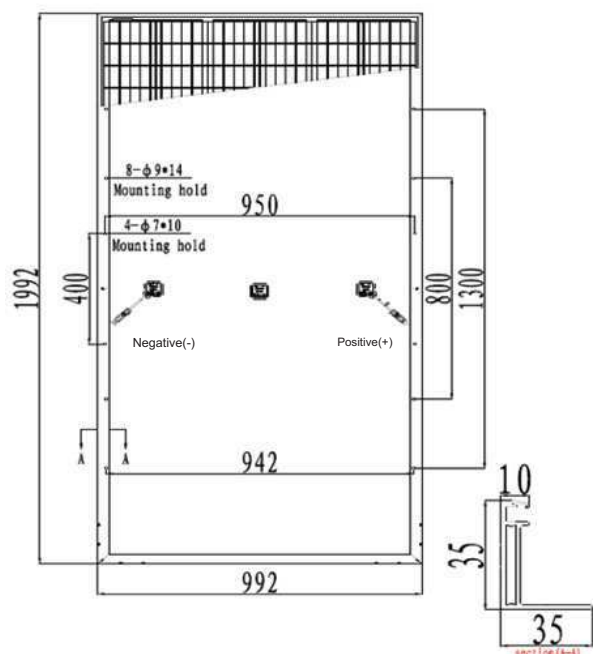
Cell Type	156.75×78.375mm
Number of Cells	144
Dimension of Module	1992 mm×992 mm×35 mm
Weight	22.3 kg ±5%
Front Glass	3.2mm tempered glass with AR Coating
Frame	Anodized aluminum alloy
Junction Box	IP67(3 Diodes)
Cable Length	+320mm,-260mm(4.0mm²)
Connector	Genuine MC4 EVO2

## Temperature Coefficient

Peak Power Temperature Coefficient	-0.349%/°C
Open-Circuit Voltage Temperature Coefficient	-0.285%/°C
Short-Circuit Current Temperature Coefficient	0.057%/°C

## Packing Information

Packing Type	40' HQ
Piece/Pallet	30+35
Pallet/Container	11+11
Piece/Container	715



## Electrical Data (STC\*)

Module Type	BYD325PHK-36	BYD330PHK-36	BYD335PHK-36	BYD340PHK-36	BYD345PHK-36
Rate Maximum Power P <sub>max</sub> (W)	325Wp	330Wp	335Wp	340Wp	345Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	44.94 V	45.19 V	45.44 V	45.69 V	45.94 V
Short Circuit Current (I <sub>sc</sub> ) (A)	9.140 A	9.196 A	9.252 A	9.308 A	9.364 A
Maximum Power Voltage (V <sub>mp</sub> )(V)	37.57 V	37.83 V	38.10 V	38.36 V	38.62 V
Maximum Power Current (I <sub>mp</sub> ) (A)	8.654A	8.724 A	8.794A	8.864 A	8.934 A
Module Efficiency % )	16.45%	16.70%	16.95%	17.21%	17.46%

Standard Test Conditions (STC) : irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

## Electrical Data (NMOT\*)

Module Type	BYD325PHK-36	BYD330PHK-36	BYD335PHK-36	BYD340PHK-36	BYD345PHK-36
Rate Maximum Power P <sub>max</sub> (W)	245.4Wp	248.9Wp	252.5Wp	256.0Wp	259.7Wp
Open Circuit Voltage (V <sub>oc</sub> ) (V)	42.3V	42.5V	42.7V	43.0V	43.2V
Short Circuit Current (I <sub>sc</sub> ) (A)	7.38A	7.43A	7.47A	7.52A	7.56A
Maximum Power Voltage (V <sub>mp</sub> )(V)	35.0V	35.3V	35.6V	35.8V	36.2V
Maximum Power Current (I <sub>mp</sub> ) (A)	7.01A	7.06A	7.10A	7.14A	7.18A

Nominal Module Operating Temperature (NMOT): irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## Operational Parameter

Operating Temperature (°C)	-40°C~85°C
NMOT(Nominal Module operating temperature)	45°C±2°C
Maximum System Voltage (V)	1500(VDC)
Maximum Fuse Current Rating (A)	20A
Fire Safety	Class C
Power Tolerance	0~5W
Power Measurement Tolerance	±5%

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## Document Issue or Modification Record

Edition	Date	ECN code	Modification content	Writed or modified
1	2013-02-05	/	/	Mingguang Wang, Yingying Xu, Qin Cang
2	2013-08-08	/	Add Shangluo Factory	Xu Yingying
3	2013-09-27	/	Modify manufacturer name and address	Xu Yingying
4	2014-5-16	/	a,Modify the explain of bar code; b,Modify the installation picture c,Add the Parameter of Modules d, Canceled information of manufacturer	Fang Shuili, Han Peng
5	2014-9-5	/	Add manufacturer location	Fang Shuili
6	2015-3-5	/	Add Vietnam Factory	Han Peng
7	2015-8-28	/	Add Insertion system on the short side of the frame	HanPeng, BaoWei
8	2016-06-01	/	Increasing the power level of the model	HanPeng
9	2016-06-15	/	Modify naming PV modules	HanPeng
10	2016-09-29	/	Add new frame of the P6-18	HanPeng
11	2016-11-03	/	Add information of 1500V system Voltage of module and delete some low power modules	ZhaoBishuai
12	2016-2-10	/	Add information of 1100V system Voltage of module	ZhaoBishuai
13	2017-4-5	/	a. Add Runda factory; b. Modify module cleaning.	Li Chao, Yuan Shuyun, Cheng Yaru



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14	2017-11-29	/	a. Add half-cell module b. Modify cleaning pressure c. Add installation height of module	Zhao bishuai Mao yonghua
15	2017-12-20	/	Add an equation for calculating the voltage of sting	Li Shangkun
16	2018-5-23	/	a. Modify power for P6K module b. Add PHK-30 module's power c. Add MHC-36 module's power d. Add MHK-36 module's power e. Add Santaicheng factory f. Add IEC 61215 new standard for load	Zhao bishuai
17	2019-10-25	/	a. Add 158.75cell module	Yonghua.Mao
18	2020-7-17	/	a. Add BYDxxxMGTK-36 b. Add BYDxxxMIC/K-39	Yonghua.Mao



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## Installation Manual and User Manual for BYD Photovoltaic Modules

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## Foreword

This manual describes the transportation, installation and maintenance of PV modules (hereafter referred to as “module”). Please read this manual carefully before installing and using the modules. Please get in touch with the provider if you have any questions.

This manual applies to all the standard modules of BYD Company Limited.

Keep this guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.



**NOTE:** All statements in this manual refer to our 4 or 5bus-bar polycrystalline cell PV modules .The illustrations in this manual, which show 2 or 3 bus-bar cell PV modules, are only used for reference purposes.

## 1. Product identification

### 1.1 Label

The label shows the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current, weight, dimensions etc.;

### 1.2 Barcode

Each module has only one bar code as shown below:



FIG.1 Bar code

SH 130701 P630 ASEC 001

SH——Manufacturer location, SH:Shanghai; SA:South Africa

SL:Shangluo; TS:Tangshan Haitai; VN:Vietnam; RX:Ruixin; BR:Brazil;

RD:Runda; GL:Guolong (Dingxinsheng) ;ST:Santaicheng; CA:

Cambodia ENALEX CB: Cambodia Shenglong

130701——Date (YYMMDD) ;

P——P for Poly -Si, M for Mono-Si; L for Mono-like

6——6 for the cell dimension of 156\*156, 5 for the cell dimension of 125\*125mm, 7 for the cell dimension of 156.75\*156.75; H for the cell dimension of 156.75\*78.375mm; 8 for the cell dimension of 158.75\*158.75mm; I for the cell dimension of 158.75\*79.375mm;G for the cell dimension of 166\*83mm;





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30——the voltage of the modules;

ASEC- ——Engineering Code ,for different shifts, materials etc;

001——Number of product components,3 digit sequence 0 to 999  
for sequential production starting on each new day of production at 001.

## 2. Transportation and storage manual

Please observe the following criteria after packing:

(1) Don't tilt the packing boxes for more than 15° during handing.

(2)Please follow the instruction labels “up” and “down” during placing the packing boxes and avoid placing them upside down during transit.

(3)Be careful while handing the boxes during transit, and avoid heavy pressure or jolting of the boxes.

(4)The packing boxes should be protected from rain.

(5)Transportation conditions should conform to the requirements of the packing boxes and of the modules regarding their environmental conditions.

## 3. Installation

### 3.1 Warning

(1) Do not use mirrors or other magnifiers to artificially concentrate sunlight on the module.

(2) Do not touch the connectors with bare hands and use insulated tools during electrical work.

(3) Although the glass surface of the modules is rather durable and able to withstand pressure, the glass might break (and the module will no longer work properly), if it is dropped or hit by tools or other heavy objects.

(4) Under certain conditions, the module might produce a higher electric current and/or voltage than measured under standard test conditions. Accordingly, the values of  $I_{sc}$  and  $V_{oc}$  marked on this module should be multiplied by 1.25 when determining the component voltage ratings, conductor current ratings, fuse sizes and size of controls relating to the PV output.

(5) The installation work of the PV array can only be done under the protection of sun-sheltering covers or sunshades, and only qualified persons should install modules or perform maintenance work.

(6) Systems should be installed by qualified personnel only and at least by two persons. The system involves electricity and can be dangerous if the personnel are not familiar with the appropriate safety procedures.

(7) Follow the recommendations of the battery manufacturer if batteries are used with the modules. Please observe national and local laws and regulations when installing modules. If required, an architecture license should be obtained before carrying out this work.

(8) Please unpack carefully.

(9) A visual inspection should be carried out before installation, in



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order to make sure that there is no defect in the packing, the junction box or on the surface of module.

(10) The user should design and select a metallic bracket for installing that is suitable to bear the weight of the PV modules. The brackets should be selected by the user according to their destined places of installation, such as open land or a rooftop. For safety reasons, all brackets should be grounded. In order to insure good conductivity, electroplated brackets should be used.

(11) As a general rule, PV modules should be installed in a location where they will receive maximum sunlight throughout the year. In the Northern Hemisphere, the modules should typically face south, and in the Southern Hemisphere, the modules should typically face north. When choosing a site, avoid trees, buildings or other obstructions, which might block the sunrays. When selecting a clamping or insertion system, appropriate anticorrosive brackets should be selected according to the specification of the module.

(12) Put the modules on the frame and tighten the screws after putting on the underlying washers. Don't cover the drain holes with other components when installing the modules. The junction box should be placed at the top of the module in order to facilitate correct positioning of ventilation holes.

(13) Don't grasp the junction box or cables during the installation process.

(14) In case of installing the module on a roof top, the roof top should be made fire-resistant first. Do not use modules near equipment

or in places where flammable gases may be generated.

(15) In case of roof top installation, the PV array should fulfill the requirements regarding fire resistance of the norm IEC 61730-2.

(16) The ambient temperature range at the location of installation should not exceed  $-40^{\circ}\text{C}$  ~  $+85^{\circ}\text{C}$ .

(17) Do not connect/disconnect modules during load connection.

(18) If the modules are installed on the roof, the whole system mounting should be installed around 20CM away from the roof. The recommended standoff height is 20 cm. The PV array installation slope should more than 5in/ft (127mm/305 mm) when modules are installed in rooftop. The module is in a minimum fire resistance rating of Class C, and the fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.

(19) If the component is installed on the roof, the structure must have a high bearing capacity, common roof structure such as color steel roofs, cement flat roofs, the glazed tile roof, etc.

(20) If the modules have the area of the salt crystals which exceed 5% of the modules on façade then should clean it up. We advice that the modules should cleanly at every turn.

(21) We suggested that the height of the module from the ground is not less than 60cm, in order to prevent the hot –spot caused by the weeds.

(22) Modules should be stored in a dry and ventilated environment to avoid direct sunlight and moisture. If modules are stored in an uncontrolled environment, the storage time should be less than 3



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months and extra precautions should be taken to prevent connectors from being exposed to moisture or sunlight, like using connector endcaps.



**DANGER:** One single module may generate more than 30V DC when its front is exposed to direct sunlight. If modules are connected in series, the total voltage is equal to the sum of the partial voltages of each module. A nominal open voltage or maximum system voltage of 45 V or more may cause an electric shock, exist in the conspicuous position of a module connection part. Therefore direct contact should be avoided after installing a greater number of modules in series or parallel, in order to avoid electric shocks.



**CAUTION:** Please unpack the module in an appropriate environment, and use special tools. The modules need to be kept water-proof and damp-proof.

**NOTE:** BYD does not limit the materials of the installation as long as they can be used outdoors for at least 25 years

## 3.2 Mechanical installation

### 3.2.1 Mounting system

Use screws put through the mounting holes according to the following

figure for fixing the module, If all mounting holes are used, 2400 Pa wind load and 5400 Pa snow (IEC61215 2005); a load of 3600Pa for frontal, a load of 1600Pa for back (IEC61215 2016 safety factor 1.5).

Description of the mounting holes:

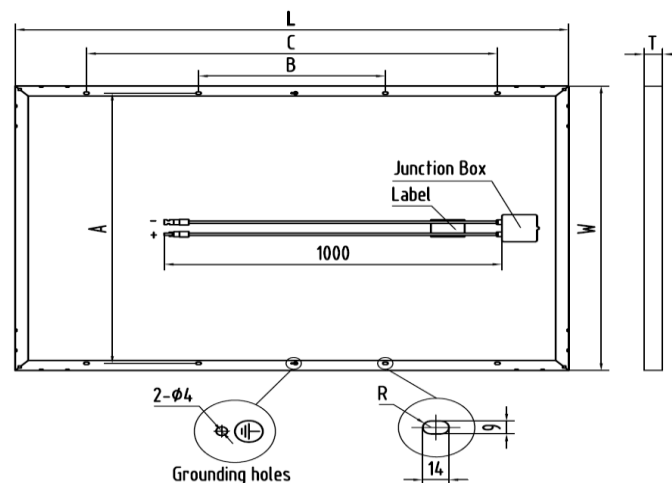


FIG.2 P6K series models

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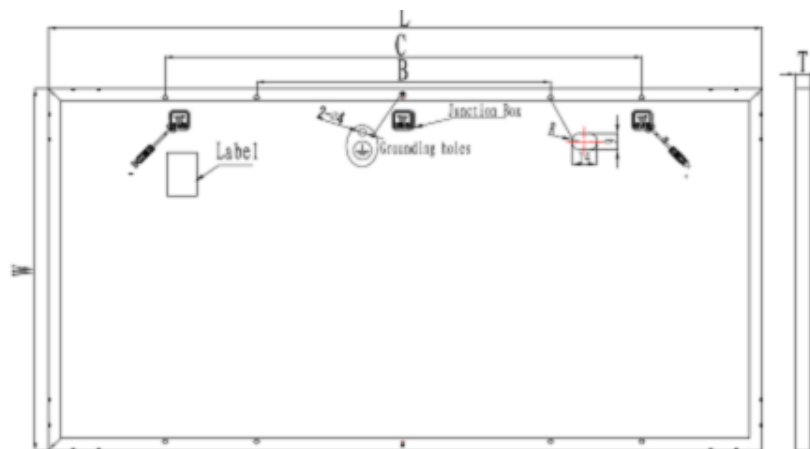


FIG.3 PHL series models

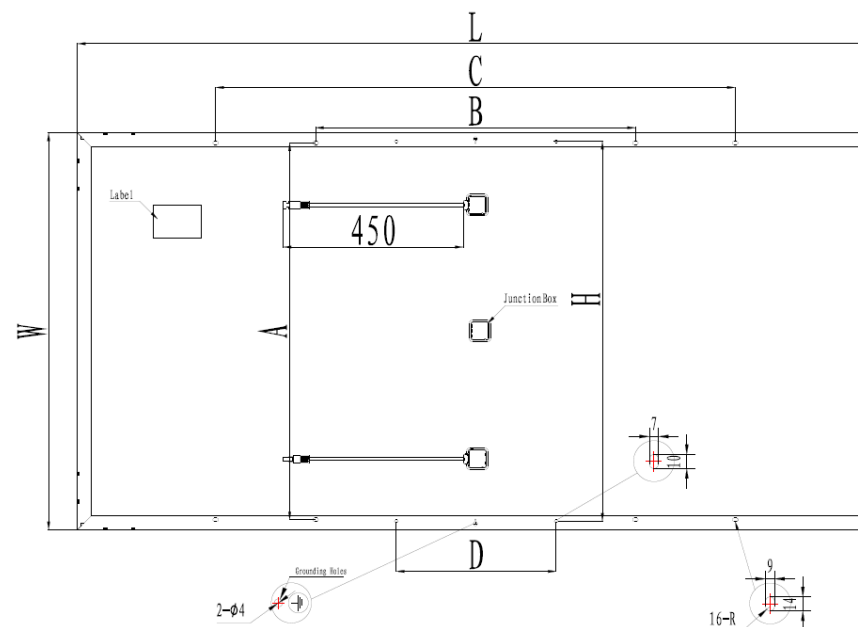


FIG.4 PHK series models

5

TAB.1 The size of each code

measure Model	L	W	T	A	B	C
BYDxxxP6C/K-18	1482	676	50/40/35	626/628	802/482	566
BYDxxxM6C/K-18						
BYDxxxP6C/K-24	1325	992	50/40/35	942	476	1076
BYDxxxP6C/K-27	1482	992	50/40/35	942	500	1100
BYDxxxP6C/K-30	1640	992	50/40/35	942	860	1360
BYDxxxM6C/K-30						



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BYDxxxP6C/K-30	1645	992	45/40/35	942	860	1360
BYDxxxM6C/K-30						
BYDxxxPHC/K-30	1658	992	40/35	942	860	1360
BYDxxxMHC/K-30						
BYDxxxPHC/K-30	1669	992	50/40/35	942	860	1360
BYDxxxMHC/K-30						
BYDxxxP6C/K-36	1956	992	50/40/35	942	800	1300
BYDxxxM6C/K-36						
BYDxxxP6C/K-36	1962	992	45/40/35	942	800	1300
BYDxxxM6C/K-36						
BYDxxxPHC/K-36	1992	992	50/40/35	942	800	1300
BYDxxxMHC/K-36						
BYDxxxPIC/K-30	1684	1002	50/40/35	952	860	1360
BYDxxxMIC/K-30						
BYDxxxMIC/K-33	1846	1002	40/35	952	860	1360
BYDxxxPHC/K-36	1978	992	40/35	942	800	1300
BYDxxxMHC/K-36						
BYDxxxMIC/K-36	2008	1002	40/35	952	800	1300
BYDxxxMGTK-36	2118	1046	40/35	996	800	1300
BYDxxxMIC/K-39	2166	998	40/35	948	800	1300

**Remark:** “K” denotes 1500V system Voltage of module, “L” denotes 1500V system Voltage of half-cell transverse module.

**TAB.2 The size of each code**

measure	D	H		
---------	---	---	--	--

Model			Mechanical load test (Front)	Mechanical load test (Back)
BYDxxxP6C/K-36	400	950	2400Pa	2400Pa
BYDxxxM6C/K-36				
BYDxxxPHC/K-36	400	950	2400Pa	2400Pa
BYDxxxMHC/K-36				

**Remark:** A load of 1600Pa for frontal, a load of 1600Pa for back(IEC61215 2016 safety factor 1.5).

During installation of the modules it should be made sure, that all mounting holes are used for fixation, the number of mounting holes for each module series is indicated in the table below:

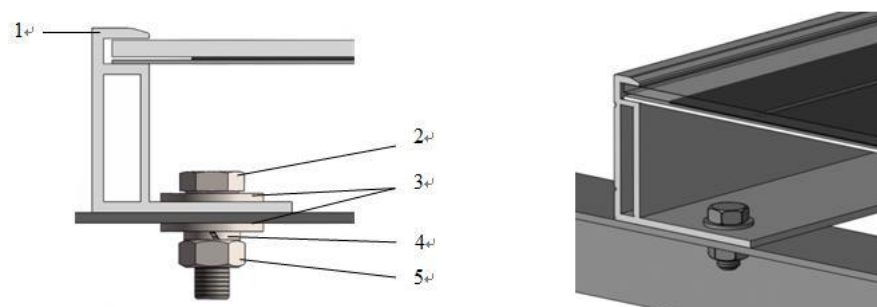
**TAB.3 Number of mounting holes for each series of components**

Model	n	Model	n
measure		measure	
BYDxxxP6C/K-18	4	BYDxxxMIC/K-33	8
BYDxxxM6C/K-18		BYDxxxP6C/K-36	
BYDxxxP6C/K-24	8	BYDxxxM6C/K-36	
BYDxxxP6C/K-27		BYDxxxPHC/K-36	
BYDxxxP6C/K-30		BYDxxxMHC/K-36	
BYDxxxM6C/K-30		BYDxxxMIC/K-36	
BYDxxxPHC/K-30		BYDxxxPIC/K-39	
BYDxxxMHC/K-30		BYDxxxMIC/K-39	
BYDxxxPIC/K-30		BYDxxxMGTK-36	

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BYDxxxMIC/K-30

Installation details:



**FIG.5 Diagram of pressure installation under 3600Pa(IEC61215 2016 safety factor 1.5)**

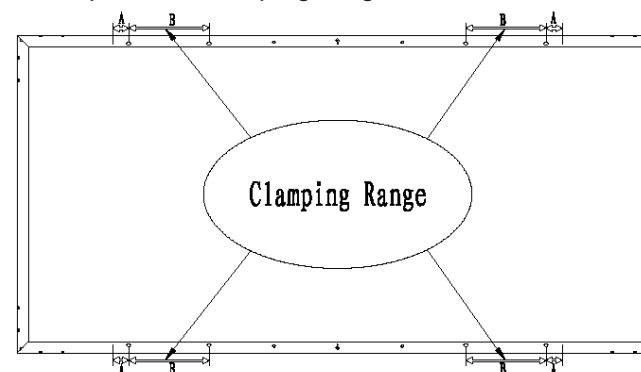
- 1) Aluminum Frame
- 2) M8 Stainless Bolt M8
- 3) Flat Stainless Washer
- 4) Spring Stainless Washer
- 5) HEX Stainless Nut

### 3.2.2 Clamping

For clamping of the modules, clamps can be used as in the figure below, while the clamps must be strong enough to fasten the modules (the use of stainless steel is recommended), and their structure must not cover the cells. A load of 3600Pa for frontal, a load of 1600Pa for back(IEC61215 2016 safety factor 1.5); 2400 Pa wind load

and 5400 Pa snow (IEC61215 2005);

If a module is installed with clamps on a long side of the frame, “A” “B” denotes the possible clamping range:



**FIG. 6 Installation diagram of four fixtures under pressure of a load of 3600Pa for frontal, a load of 1600Pa for back(IEC61215 2016 safety factor 1.5).**

**TAB.4 The dimensions corresponding to fixture installation**

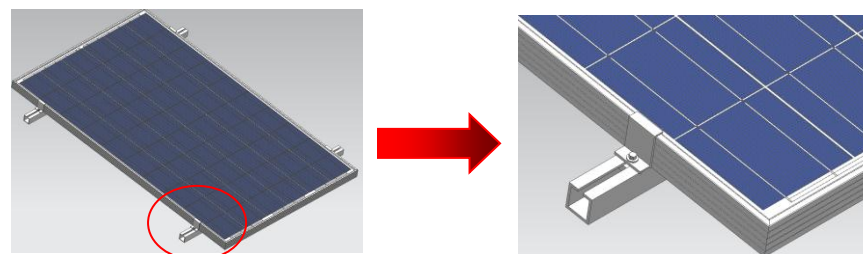
Model	Measure A	Measure B
BYDxxxP6K-18	50	250
BYDxxxM6K-18		
BYDxxxP6K-24	50	250
BYDxxxP6K-27	50	250
BYDxxxP6C/K-30 (L=1640)	50	250
BYDxxxM6C/K-30 (L=1640)		
BYDxxxP6C/K-30 (L=1650)	50	250
BYDxxxM6C/K-30 (L=1645)	50	250

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BYDxxxP6C/K-30 (L=1645)		
BYDxxxPHC/K-30 (L=1669)	50	250
BYDxxxMHC/K-30 (L=1669)		
BYDxxxPHC/K-30(L=1658)	50	250
BYDxxxMHC/K-30(L=1658)		
BYDxxxPIC/K-30 (1684)	50	250
BYDxxxMIC/K-30 (1684)	50	250
BYDxxxMIC/K-33 (1846)	50	250
BYDxxxP6C/K-36(L=1956)	50	250
BYDxxxM6C/K-36(L=1956)		
BYDxxxP6C/K-36(L=1962)	50	250
BYDxxxM6C/K-36(L=1962)		
BYDxxxPHC/K-36(L=1992)	50	250
BYDxxxMHC/K-36(L=1992)		
BYDxxxPHC/K-36(L=1978)	50	250
BYDxxxMHC/K-36(L=1978)		
BYDxxxPIC/K-36 (2008)	50	250
BYDxxxMIC/K-36 (2008)	50	250
BYDxxxPIC/K-39(L=2166)	50	250
BYDxxxMIC/K-39(L=2166)	50	250
BYDxxxMGTK-36 (L=2118)	50	250

**Remark:** “A” “B” denotes the possible clamping range.

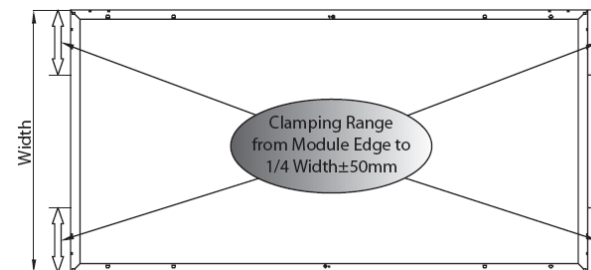
Installation method:



**FIG. 7 Schematic diagram of long side pressing block**

We advise users to use an installation method as shown in the two pictures above, as this method renders modules connection rather fast.

Installation method with clamping on the short side of the frame as below:

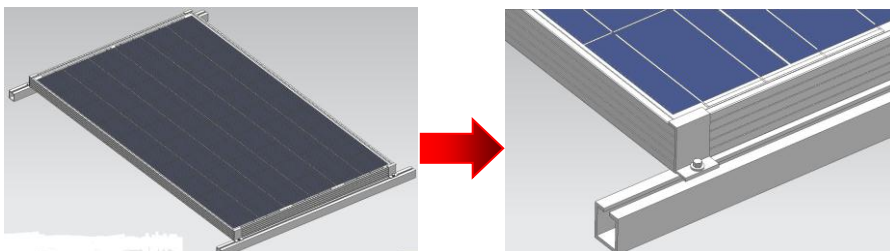


**FIG. 8 Schematic diagram of four clamps under pressure of 2400Pa(IEC61215 2005 )**

Installation method:



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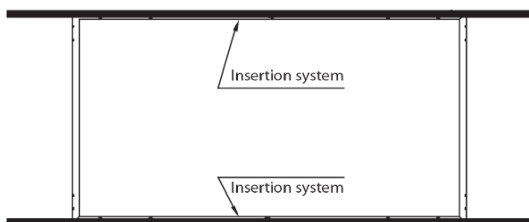
**FIG. 9 Schematic diagram of short side pressing block (IEC61215 2005)**



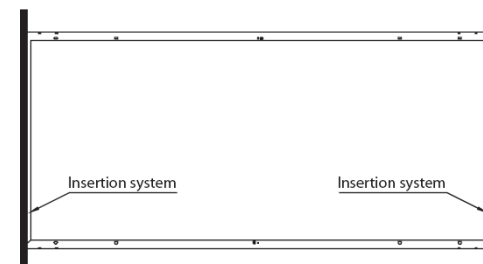
**Notice:** If customer choose Installation method with clamping on the short side of the frame, you should customize the length of the electric cable for us.

### 3.2.3 Insertion system

For the modules to follow an insertion system as depicted below can be used for installation. The insertion system must have enough strength to fix modules, and can be made of materials such as stainless steel and other appropriate metals for solid support of the PV modules.

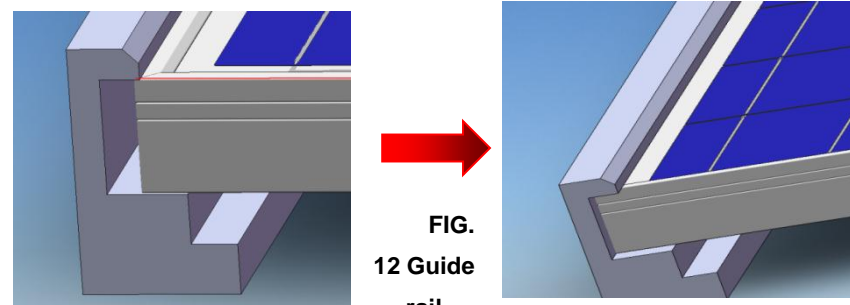


**FIG. 10 Installation diagram of long side guide rail under pressure of 2400Pa(IEC61215 2005 )**



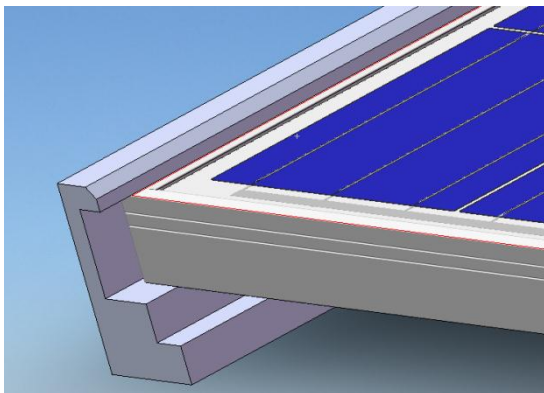
**FIG. 11 Guide rail installation diagram**

During the installation on the long side of the frame you need to take care that the cells on the front side and that the grounding holes on the back side don't get covered. Please refer to the detailed illustration below for installation on the long side of the frame:

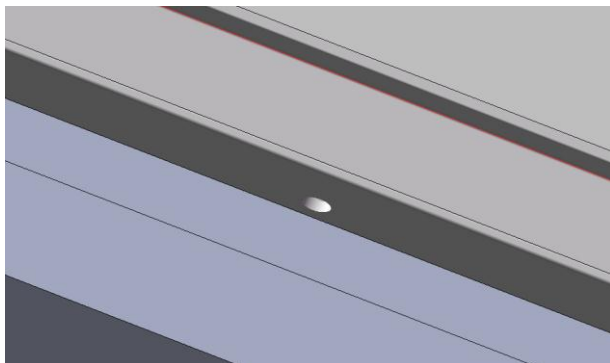


**FIG. 12 Guide rail**

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installation diagram



**FIG. 13 The front cannot block the PV plate and the back cannot block the grounding hole**

The installation mode of the half-cell intermediate outgoing module is recommended the long edge to be parallel the ground; The installation mode of the half-cell long edge outgoing module is recommended the short edge to be parallel the ground.

All the mounting ways above are suitable to roof mounting. And the module is considered to be in compliance with IEC61215 when the module is mounted in the manner specified by the mounting instruction above.

minimum gap between modules :  $\geq 10\text{mm}$

Tab 6. List of mounting modes with border thickness

Thickness Installation	50mm	45mm	40mm	35mm	30mm	Refer
Long side bolt	✓	✓	✓	✓	✓	FIG.2 FIG.3 FIG.4 FIG.5
Long side press	✓	✓	✓	✓	✓	FIG.6 FIG.7
Long side rail	✓	✓	✓	✓	✓	FIG.10 FIG.12 FIG.13

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Short side press	✓	✓	✓	×	×	FIG.8 FIG.9
Short side rail	✓	✓	✓	×	×	FIG.11 FIG.12 FIG.13

Note: ✓ : Indicates compliance with load bearing installation requirements; X: indicates that the load bearing installation requirements are not met

### 3.3 Electric installation

#### 3.3.1 Grounding

(1) Grounding: For safety reason, all module frames should be prepared for grounding. It is not recommended to use modules with different configurations (grounding, wiring) in the same system. The connecting areas between the materials of the frame and the grounding should not cause galvanic corrosion.

(2) Regarding grounding and bonding requirements, please refer to regional and national safety and electricity standards. If grounding is required, use a recommended connector type, or an equivalent, for the grounding wire. The grounding wire must be properly fastened to the

module frame to assure adequate electrical connection.

(3) There are many possible methods for grounding. The main point is to ensure the resulting safety. We recommend one method as sketched below:

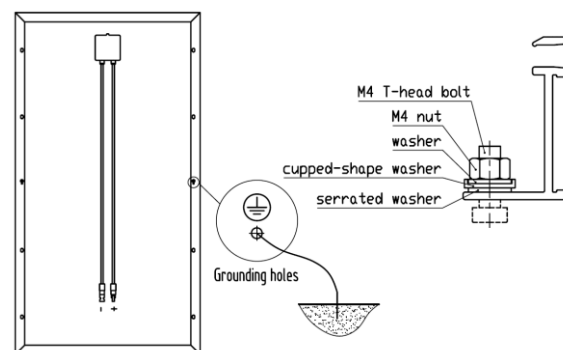


FIG. 14 Ground diagram

(4) All module frames should be grounded for safety. All materials for grounding connections between modules must be approved by a qualified electrician and also, the grounding itself must be done by a qualified electrician. The ground wire should have at least the same size as the electrical conductors (10-12 AWG exposed copper wire with a minimum of 90°C is recommended).

(5) In order to avoid potential induced degradation (PID), BYD insists that the negative electrode of the inverter should be grounded.



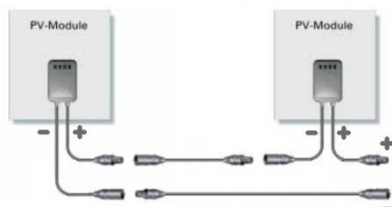
**CAUTION:** BYD modules provide the mounting holes, drain holes and grounding holes. That has passed the safety testing. Installers can't drill and block drain holes at random.

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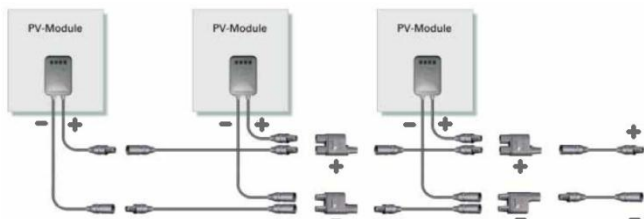
### 3.3.2 General Installation

(1)The module was rated for use in the A application class which follows the items referred in IEC 61730-1.When the modules in a PV system are connected in series or parallel generally, we recommend simple methods of connecting them in series or parallel as shown below:

Series connection of modules:



Parallel connection of modules:

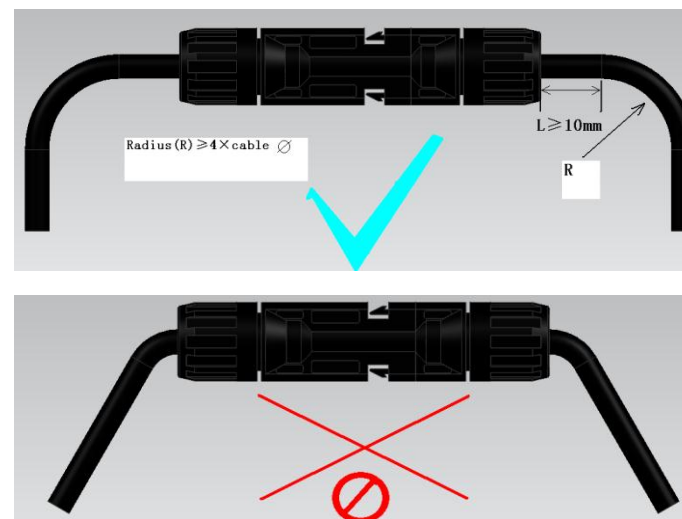


(2) The bypass diode should have a Rated Average Forward Current at least 10A, and a Rated Repetitive Peak Reverse Voltage of

at least 40V.The diode types are as below:

Type	Maximum DC Blocking Voltage	Maximum Average Forward Current
<b>20SQ045</b>	45V	20A
<b>10SQ050</b>	50V	10A
<b>GF2045MG</b>	45V	20A
<b>SDA2040</b>	40V	20A

(3) The cable must not be bent or crushed on the direct exit of the cable screw joint include connector and box. A minimum bending radius  $R \geq 4 \times \text{cable diameter}$  must be maintained. The cable must be routed in a way that tensile stress on the conductor or connections is prevented. The pictures are as below:





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According to the system voltage (1500V) of the IEC standard. Under normal conditions, a PV module is likely to experience conditions that produce more current/voltage than reported at STC. Accordingly,  $I_{sc}$  and  $V_{oc}$  must be multiplied by 1.25 (for C-Si or non-C-Si) we recommend the maximum number of series connected modules for each module series as stated below:

Type	The maximum number of modules in series
BYDxxxP6C-18/P6K-18	$\leq 51$
BYDxxxP6C-24/P6K-24	$\leq 39$
BYDxxxP6C-27/P6K-27	$\leq 34$
BYDxxxP6C-30/P6K-30	$\leq 31$
BYDxxxM6C-30/M6K-30	$\leq 30$
BYDxxxP6C-36/P6K-36	$\leq 26$
BYDxxxM6C-36/M6K-36	$\leq 24$
BYDxxxPIC-30/PIK-30	$\leq 25$
BYDxxxMIC-30/MIK-30	$\leq 22$
BYDxxxMIC-33/MIK-33	$\leq 19$
BYDxxxPHC-30/PHK-30	$\leq 31$

BYDxxxPHC-36/PHK-36	$\leq 26$
BYDxxxMHC-30/MHK-30	$\leq 30$
BYDxxxMHC-36/MHK-36	$\leq 25$
BYDxxxMIC-36/MIK-36	$\leq 20$
BYDxxxMIC-39/MIK-39	$\leq 19$
BYDxxxPIC-36/PIK-39	$\leq 21$
BYDxxxMGTK-36	$\leq 21$

And the electrical characteristics are within +/- 10% of the indicated values of  $I_{sc}$ ,  $V_{oc}$ ,  $P_{max}$  under STC.

Additionally, there is an equation for calculating the modules amount in one string. It also depends on the system voltage and the lowest temperature in latest 40 years. The equation is below,

$$N \times \left[ V_{oc} \left[ 1 + \beta \times (T - 25) \right] \right] \leq V_{system}$$

Here: N---means the module's amount;

$V_{oc}$ ---means the module's voltage under STC;

$\beta$  ---means the voltage temperature coefficient;

T---means the lowest environment temperature in latest 40 years;

$V_{system}$ ---means the system voltage of the module.

(4) For parallel connection, the current will be added up and the



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used connectors will be limited by the number of parallel connection.

We recommended the maximum number of modules is 3. The fuse protection needs to be determined as well.

(5) To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current. Please note that the upper limit temperature of cable is 90°C and that of the connector is as follows:

Connector Type	The upper limit temperature
PV-TS02 (1500V)	100°C
PV-ZH202B (1500V)	100°C

(6) There is no general limitation on the number of parallel connected modules but the number of modules is determined by system design parameters such as current or power output. Every PV array in parallel should install a protection circuit.

(7) Please refer to local laws and regulations to determine the system wires size, type and temperature. To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current (the recommended cable cross section is 4mm<sup>2</sup> for a single module or a rated current of the connectors of more than 10A). Our module's maximum fuse rating current is 15A.



**NOTE:** Please note that the upper temperature limit is 90°C for cable and 100°C for the connectors. We demand the connection must be matching BYD's, otherwise BYD don't responsible for anything about performance problem caused by your action.

## 4. Maintenance and Care

### 4.1 General Maintenance

The following inspections of the modules should be carried out in regular intervals:

(1) Regularly check the mechanical installation of the module. Check the support equipment for fastness and symptoms of corrosion or other damages. Check bolts and nuts for loosening, especially the places with exposure to hard winds or at times of jolting. Ensure that the fixing is fast and fasten immediately in places with some looseness. If conditions permit the metal fittings that fasten or support the modules, such as the bolts and nuts, should be protected from corrosion. A first inspection should be carried out 12 months after installation and inspections every 10 years thereafter.

(2) Regularly check the electric wiring of the modules for reliable connection to the components of the equipment and the grounding system. Check regularly, if the value of the grounding resistance is still



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reaching the designated requirement, If connections are not fast, fasten them by soldering. After a thunderstorm or before the start of the stormy season check the convergence box and the lightning protection systems installed inside the equipment for loss of function and change them immediately if necessary.

(3) Check cables, connectors and joints for current leakages and deal with it, in order to prevent leakage currents caused by rainy or snowy weather when checking the wiring, people must take insulation equipment (such as tools and gloves etc.) with them and avoid touching the bare parts of connectors or joints with bare hand, Check the system for loosen parts of the connectors and fasten where necessary to ensure good contact. Wipe the dust from the equipment regularly to keep it clean.

(4) If the module appears in need of repair, the surface of the module should be covered with fabric or other material. There is a danger of high voltage, if the sun ray directly hit the module.

(5) Under any condition, PV modules should not be discarded at will. They should be dealt with by a qualified recycling agency or consulted with BYD customer service department.



**CAUTION:** *If you come across loose connectors, please contact Supplier or Maintenance and let them carry out maintenance and care.*

## 4.2 Module Cleaning

Excess dirt and dust accumulating on the glass surface of the module can reduce its power output. Therefore BYD recommends periodic cleaning of PV modules especially during times when the modules do not have the expected power output. The cleaning process must be implemented after the PV modules are disconnected and cooled, and after cleaning PV modules must ensure dry, next it are connected. Non-professional authorized personnel are not allowed to clean modules, and make sure they have appropriate safety equipment for aerial work and the risk consciousness of high altitude work. Please check the glass surface of the module for cracks and damages before cleaning. If there are already cracks on the module, please do not clean but inform the installer or maintenance service provider. Do not wear metal accessories like a watch or jewelry during cleaning PV modules, avoid the broken of modules.

### 4.2.1 Module Cleaning Condition

The cleaning works of PV module should be carried out at morning, evening, overcast sky or irradiance less than  $200\text{W}/\text{m}^2$ . The use of cold water to clean a PV module heated up sunshine might cause cracks in the glass cover of the module, so strictly forbidden proceed cleaning work during the noon or a strong period of sunlight.





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#### 4.2.2 Module Cleaning Method

Module cleaning method divided into general clean and washing clean.

##### 1. General Clean

(1) To the attachment which can easy to clean like dry dust, leaves on the PV module surface, cleaner can use dry and professional mop or soft cloth to clean.

(2) To the attachment which are not easy to clean like mud, birds droppings, sticky stuff on the PV module surface, cleaner can use scraper or gauze to wipe, but avoid using hard material, to prevent destroy glass surface. Use cleaning effect to judge whether clean or not.

##### 2. Washing Clean

(1) To the inorganic compound like wet dust which are not easy to clean on the PV modules surface, cleaner can carry out general clean (2) first, then use clean water which pressure less than 500KPa to washing, finally, use clean gauze wipe the waterlogging. To avoid cell micro crack or module broken, cleaner must attention the water pressure should not too large.

(2) To the organic like animal corpse (such as mosquitoes and flies), dung or plant sap which are closely attach to the glass surface, cleaner can carry out general clean (2) first, then use clean water which pressure less than 5MPa to washing meanwhile match up professional cleaner like soft soap water or neutral disinfectant (such like alcohol,

glass cleaner and so on) to clean this part alone, pay attention to avoid use strong chemical or grinding cleaner and disinfectant (like laundry detergent, alkaline detergent, cleanser essence, etc.). When it is necessary to use the soft sponge or cotton but can't wipe the components or apply gravity on the component.

##### 3. Matters Attention

(1) It is forbidden to use bareness fingers or hand without gloves touch or deal with modules glass surface. Use clean gloves can avoid fingerprint or other dirt stay on the glass.

(2) It is forbidden to use metal tools like knife, blade, cleaning wire or other grind material.

(3) It is forbidden to use grind powder, grind detergent, polished machine, sodium hydroxide, benzene, nitro diluent, acid, alkali and other chemical material.

(4) It is not suggested to use water which contain much mineral substance, for the mineral substance will deposit on the glass surface when the water evaporate.

(5) If it is necessary to clean the snow to improve the power output, please use brush clean the snow gently. But don't try to clean the freeze snow or ice.

#### 4.2.3 Security Management

1. Before module cleaning, staff should check whether there are records of abnormal output in the monitoring recording, analysis



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whether caused by leakage current or not, and check whether exist damage or sticky on the modules' connection and related electrical components. There should use test pencil to check modules' frame, support, tempering glass surface, to eliminate leakage potential, ensure personal safety.

2. There are many sharp corner on modules frame and support, cleaner should wear appropriate protective clothing and wear helmets to avoid causing injury. It is necessary to prohibit the emergence of hook, belt, threads, and other components that are easy to cause obstruction in clothing or tools.

3. It is forbidden to tread PV modules, guide rail support, cable tray or any other PV system equipment or any way force on modules and support.

4. It is forbidden to use hard and sharp tools or corrode solvent or organic solvent wipe module, it is forbidden to spray the cleaning water to the module junction box, cable tray, combiner box and so on. To avoid module micro crack, cleaner must attention the cleaning equipment's pressure which should be controlled in a range.

5. It is forbidden to clean modules in windy, heavy rain, thunderstorms, heavy snow. Avoid rinse in winter, to prevent freeze in low temperature cause dirty accumulate; at the same time, don't use cold water rinse when module surface hot.

6. When cleaning, staff are forbidden stand at distance less than 1 meter from the roof edge. Tools and sundries are not allowed to be thrown down, bring back after work.

## 5. Claim

As the adherence to this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) products are beyond BYD's control. BYD does not accept responsibility and expressly disclaims liability for any loss, damage, or expense arising out of or in any way connected with incorrect installation, operation, use or maintenance.

The information in this manual is based on BYD's knowledge and experience and is believed to be reliable. This manual provides reference only, and consumers are free to choose an appropriate way of installation according to place and environment.

BYD reserves the right to change the manuals, PV products, specifications and product information sheets without prior notice.



**NOTE:** A note provides information about installation, operation, or maintenance of the module that is important to know, but it is not necessarily hazardous.



**CAUTION:** A caution message indicates a potential threat to minor injury, or alerts against behavior that can lead to property damage.



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**DANGER:** A danger message indicates a hazard in the immediate area which, if not avoided, can result in death or serious injury.