

JINZHOU YANGGUANG ENERGY CO., LTD.

INSTALLATION MANUAL

– Crystalline Photovoltaic Module –

In order to guarantee safe operation and safe use,
be sure to comply with the following content

#	Model Number
1	JMPV-HM6HBM1/72-440(R)
2	JMPV-HM6HBM1/72-445(R)
3	JMPV-HM6HBM1/72-450(R)
4	JMPV-HM6HBM1/60-365(R)
5	JMPV-HM6HBM1/60-370(R)
6	JMPV-HM6HBM1/60-375(R)
7	JMPV-X1/72-540(R)
8	JMPV-X1/72-545(R)
9	JMPV-X1/72-550(R)
10	JMPV-X1/54-405(R)
11	JMPV-X1/54-410(R)
12	JMPV-X1/54-415(R)
13	JMPV-T1/66-650(R)
14	JMPV-T1/66-655(R)
15	JMPV-T1/66-660(R)
16	JMPV-T1/60-590(R)
17	JMPV-T1/60-595(R)
18	JMPV-T1/60-600(R)
19	JMPV-HM6BM1/72-400(R)
20	JMPV-HM6BM1/72-405(R)

IMPORTANT SAFETY INSTRUCTIONS

3 Please read this manual carefully before installing and using the modules. If any abnormal conditions are found during the installation process, please stop the construction immediately and contact the dealer or our company.

4 Please do not decompose or modify the solar module, and do not loosen or remove the screws.

5 Please operate in strict accordance with the installation manual. Our company is not

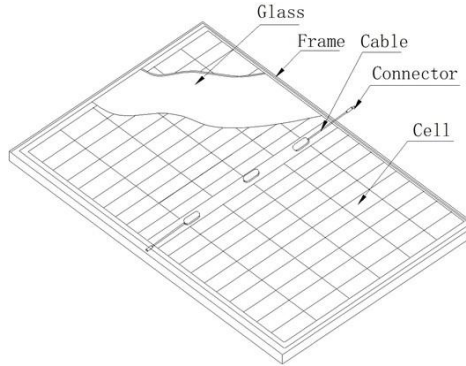
responsible for any defective modules caused by operation problems.

6 For the operation of electrical connection, please carry out according to the provisions of relevant laws and regulations. In addition, electrical connection operations should be performed by personnel with relevant electrical qualifications.

7 If the system voltage is set to $\geq 600\text{V}$, please follow the safety regulations of electrical appliances.

8 If you have any questions about this product, please contact our sales department.

9 Without notice, our company has the right to modify the specifications of the modules and the contents of the installation manual. Please understand.



WARNING

2 Solar modules are heavy objects. Please ask 2 or more workers to carry them.

3 Solar modules generate electricity by receiving sunlight or artificial light. When generating electricity, please do not connect the positive and negative poles of the module to cause short circuit, which will produce electric arc or spark, there is a risk of electricity leakage and fire.

- 4 Please do not remove the wiring terminals when the solar modules are powered or generated.
- 5 High voltage and large current will be generated in the process of solar module power generation. If mishandled, injuries can be life-threatening.
- 6 The surface of the solar module is covered with smooth glass. Compared with ordinary roof materials (tiles, etc.), the snow will slide off more easily. Depending on local weather conditions and the slope of the roof, the difficult degree and extent of snow fall can vary. If the location of snow cover is the range of personnel activities (residential, parking, etc.), it is very vulnerable to injury, therefore, please set up appropriate snow prevention measures.

NOTICES

- (1) In the height of more than two meters of work, in order to prevent the occurrence of danger, during the construction, please strictly comply with the labor safety and health regulations.
- (2) Please install solar cell modules on the roof with fire resistance.
- (3) Please do not install solar modules where the modules are blocked. Different installation locations can affect the generation and quality of modules.
- (4) Please do not install solar modules in areas or places where there is bathing. In this case, fog will form on the surface of the modules, affecting the generation of the modules.
- (5) Please do not place solar panels horizontally.
- (6) Please do not block the outlet hole of the frame according to the principle of heat expansion and cold contraction; there is a deformation of the frame.
- (7) Please do not use ophthalmic lens or crystals to artificially collect sunlight and shine it on the solar cell module, which will lead to faults or accidents.
- (8) Please turn off the power regulator immediately when any abnormality occurs.
- (9) When connecting solar cell modules in series, please do not exceed the maximum input voltage of the power regulator.
- (10) When it rains, please do not put it outside or in a wet place while packing. This can cause module damage and corrosion inside the connector, leading to module failure.
- (11) When the solar cell module is placed on the roof, according to the position and angle of the sun, the light reflected by the adjacent modules will produce a strong sense of vertigo (the vertigo will vary according to individual conditions). Modules should be installed taking into account such factors as position, angle and direction of light reflection. Note in particular that when installing modules do not face north.

SAFE OPERATIONS

1. Please do not place objects on the solar module, which is easy to cause glass breakage and other accidents.
2. The back sheet of the module is easy to be damaged, and it is easy to be damaged when contacting with hard objects, which can easily lead to accidents.
3. Please do not touch the junction box or pull the cable, which may lead to failure.
4. When the sunlight shines on the solar cell module, please do not touch the junction box, cable or terminal of the junction box by hand. To prevent electric shock, please wear insulating gloves to operate.
5. Please do not stretch or bend the cable vigorously. Damaged cable may cause electricity leakage and electric shock.
6. In addition to connecting the ground wire, please do not destroy the surface insulation oxide film of the frame, which will damage the frame, affecting the safety and quality of the modules.
7. The edge of the solar module is very sharp, and it is easy to get hurt during installation, so please do not touch it with your bare hands.
8. When transporting solar modules, placing frames with the same size together and placing one module alone may cause the frame to bend.

9. When installing the solar cell module, the connection and disassembly method of the module cable should be inserted or withdrawn through the terminal of the junction box. In addition, the length of the cable should be considered when connecting the terminals, please don't pull on purpose. Excessive load at the junction of the terminal and cable may result in failure.

10. Please do not paste adhesive tape on the connection of the terminal, so that the connection of the lock can be easily removed.

TYPE	(Pmax)	(Vm _{pp})	(Imp _p)	(Voc)	(Isc)
JMPV-HM6HBM1/72-440(R)	440	41.09	10.71	48.75	11.49
JMPV-HM6HBM1/72-445(R)	445	41.32	10.77	49.04	11.55
JMPV-HM6HBM1/72-450(R)	450	41.56	10.83	49.35	11.61
JMPV-HM6HBM1/60-365(R)	365	34.18	10.68	40.56	11.46
JMPV-HM6HBM1/60-370(R)	370	34.42	10.75	40.81	11.54
JMPV-HM6HBM1/60-375(R)	375	34.63	10.83	41.08	11.62
JMPV-X1/72-540(R)	540	41.64	12.97	50.34	13.66
JMPV-X1/72-545(R)	545	41.83	13.03	50.54	13.73
JMPV-X1/72-550(R)	550	42.02	13.09	50.70	13.81
JMPV-X1/54-405(R)	405	31.11	13.02	37.55	13.73
JMPV-X1/54-410(R)	410	31.30	13.10	37.79	13.81
JMPV-X1/54-415(R)	415	31.49	13.18	38.08	13.87
JMPV-T1/66-650(R)	650	37.53	17.32	45.05	18.39
JMPV-T1/66-655(R)	655	37.69	17.38	45.25	18.45
JMPV-T1/66-660(R)	660	37.83	17.45	45.42	18.52
JMPV-T1/60-590(R)	590	34.11	17.30	40.95	18.37
JMPV-T1/60-595(R)	595	34.24	17.38	41.11	18.45
JMPV-T1/60-600(R)	600	34.39	17.45	41.29	18.52
JMPV-HM6BM1/72-400(R)	400	41.37	9.67	49.79	10.40
JMPV-HM6BM1/72-405(R)	405	41.21	9.83	48.94	10.54

SECURITY SETTINGS

- * Under normal circumstances, please wear safety helmet, insulating gloves and safety shoes (rubber soles).
- * Please place the solar cell modules in the packaging box before installation.
- * In order for the solar cell module to generate electricity after irradiating the solar energy, please completely cover the module with light-proof cloth and other materials during the installation and wiring.
- * During installation, please do not touch the glass surface of the solar cell module, because its high temperature can cause burns.
- * Please insert the terminal of junction box into the bottom of another terminal completely.
- * In order to prevent the danger of electric shock when the solar cell module is wet, please do not install the module before it is dry.
- * Because metal jewelry is easy to conduct electricity, please do not wear it on your body during installation.
- * Do not install in rainy or windy weather due to wet feet or residual snow.
- * Please use insulated tools when installing.
- * Please do not use damp tools.
- * Please do not drop the tool on the solar cell module when installing at a high place.
- * Please make sure that there is no gas or other inflammable substances near the installation site.
- * Please do not trample on the solar module.
- * Do not work alone when installing modules. Please work together with two or more people.
- * When the installation work on high place, please do adequate security countermeasures.
- * Do not damage the film of the back sheet while the solar module is being installed.
- * When wiring, the cable may be bent greatly, because of the wind and other factors, the cable and terminal may shake. After wiring, the cable shall be fixed on the support with a rope (belt). In addition, do not stretch the cable of the junction box when securing the cable with a rope.

WIRING CONFIGURATION

The solar module is connected to the power regulator in series. (Figure 1)

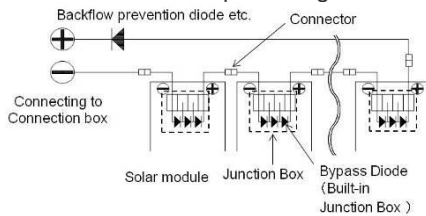


Figure1. SERIES for more voltage

When connected in series, the positive terminal of the previous module is connected to the negative terminal of the next module. In addition, electrical wiring, in order to prevent the flow of electricity to the direction of the solar cell modules against the reverse flow, the line needs to prevent the reverse flow processing. In order to prevent countercurrent, during the connection of the solar modules, the cables (connected to the solar modules), the interior of the junction box (with a bypass diode to prevent countercurrent), the connection box or the power regulator (anti-countercurrent function) shall be provided with a counter-current diode. When wiring, please pay attention to the terminal and cable connections and the junction box and cable connections do not overload. The connection between terminals and cables and the connection between junction boxes and cables shall not bend the cables to more than 45 degrees. The place where the bending begins shall be at least 50mm above.

1. SETTING

1-1 Matters need attention

Please do not tread on the solar module. In addition, the glass surface attached to the fall of dirty things, please wash with water. Do not use hard objects such as brushes.

1-2 Setting method

Please read the instruction, specification and drawings (specification enclosed drawings), according to the following method for installation.

Do not install in any way other than the following.

1.To prevent electrical corrosion during installation in severe areas, use electrical corrosion resistant materials between frames and supports.

The installation method by using mounting hole(Bolt)

As shown in Figure 3 and Figure 4, the bracket is connected and fixed with the mounting holes C on the long frame.

(1) Installation situation of the long side frames of module vertical to fixed bracket as shown in figure 3-a

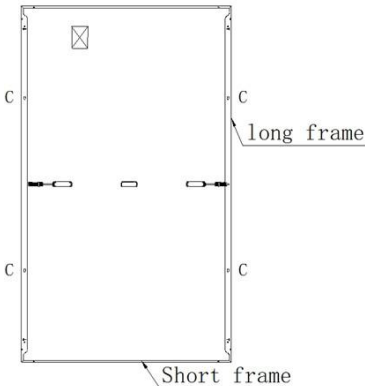


Figure 3 Back of module

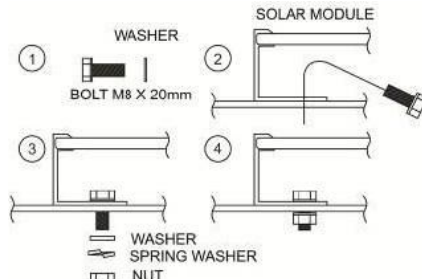


Figure 4 Installation details

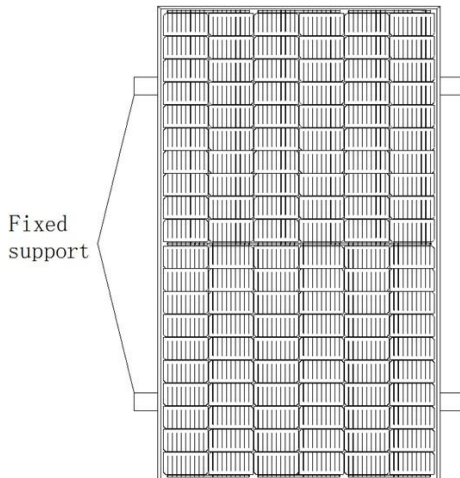


Figure 3-a Support is vertical to the long frame (front of module)

2. Please carefully confirm the location of the mounting hole in the specification before installation.

The following installation screws are recommended. (Recommended fixture mounting torque: 16N.m)

1. Bolt and nut

Material: 304 Stainless steel, bolt M8×20mm, nut M8

2. Washer

Material: 304 Stainless steel, M8 (inner diameter 8.5/ outer diameter 15.5mm), thickness: 1.6 mm

3. Spring washer

Material: 304 Stainless steel, M8 (inner diameter 8.5/ outer diameter 15.5mm), thickness: 1.6 mm

3. For installation in severe areas, use electrical corrosion resistant materials between aluminium frames and supports to prevent electrical corrosion.

The method of fixing by means of a fixture

The method of fixing the long side frame of a module with a fixture is shown in figure 5-a.

The specifications of the fixture are as follows:

Material: more than 3.3 mm thickness of aluminium alloy products.

Fixture width: ≥ 60 mm

Press width: ≥ 12 mm

Fixed method: it is recommended to use the M8 bolts to fixed

4. Please do not allow the fixture to contact the glass. In addition, the fixture strength used must meet the module load performance.

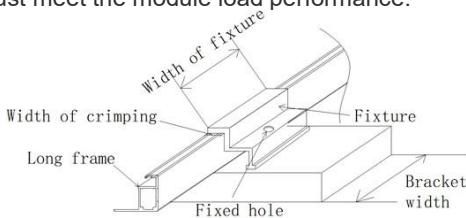


Figure 5-a Support is vertical to the longside frame

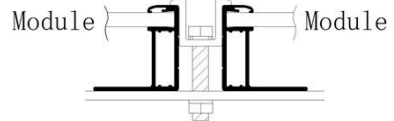


Figure 5-b Intermediate fixture

1. The installation of the long side frame of the module vertical to the support is shown in Figure 5-a, the fixed position of the module fixture is shown in Figure 5-a-1, each place is provided with one fixed point, four fixed points in total. (Recommended fixture mounting torque: 16N.m - use M8 bolts)

2. The installation of intermediate fixture is shown in Figure 5-b. (Recommended fixture mounting torque: 16N.m - use M8 bolts)

3. The mounting method is designed to allow module positive loading of 3600 Pa and negative loading of 1600Pa, safety factor is 1.5.

The method of fixing by means of Bolt and Fixture (vertical installation)

Installation Method of Single-Glass Modules (72-half-piece-158.75)						
No.	Method		Installation Location	Design Load	Test Load	
1	Bolt	4		S=1300mm	3600/1600	5400/2400
2	Fixture	4		S1=300-400mm	3600/1600	5400/2400

Installation Method of Single-Glass Modules (60-half-piece-166)						
No.	Method		Installation Location	Design Load	Test Load	
1	Bolt	4		S=1000mm	3600/1600	5400/2400
2	Fixture	4		S1=300-400mm	3600/1600	5400/2400

Installation Method of Single-Glass Modules (72-half-piece-166)						
No.	Method		Installation Location	Design Load	Test Load	
1	Bolt	6		S=1400mm S1=130mm	3600/1600	5400/2400

2	Fixture	6		S1=300-400mm S2=130mm	3600/1600	5400/2400
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Installation Method of Single-Glass Modules (54-half-piece-182)

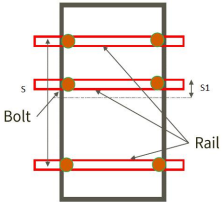
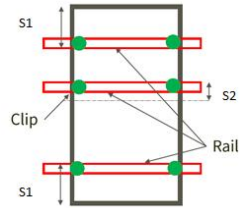
No.	Method		Installation Location		Design Load	Test Load
1	Bolt	4		S=1118mm	3600/1600	5400/2400
2	Fixture	4		S1=300-400mm	3600/1600	5400/2400

Installation Method of Single-Glass Modules (72-half-piece-182)

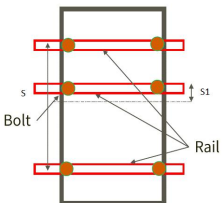
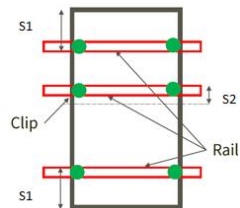
No.	Method		Installation Location		Design Load	Test Load
1	Bolt	6		S=1600mm S1=150mm	3600/1600	5400/2400
2	Fixture	6		S1=315-415mm S2=150mm	3600/1600	5400/2400

Installation Method of Single-Glass Modules (60-half-piece-210)

No.	Method		Installation Location		Design Load	Test Load
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1	Bolt	6		S=1500mm S1=150mm	3600/1600	5400/2400
2	Fixture	6		S1=310-410mm S2=150mm	3600/1600	5400/2400

Installation Method of Single-Glass Modules (66-half-piece-210)

No.	Method		Installation Location	Design Load	Test Load	
1	Bolt	6		S=1600mm S1=150mm	3600/1600	5400/2400
2	Fixture	6		S1=350-450mm S2=150mm	3600/1600	5400/2400

1-3 The method of grounding

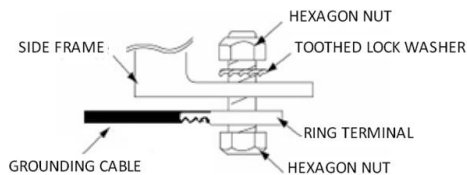
The grounding wire is required for a solar cell module.

- ① For the operation method of grounding, please operate according to the national standard - electrical code.
- ② In addition to this module, please ensure that maintenance work of other modules?grounding wires.
- ③ Grounding measures should be performed as follows.

【Aluminium frame grounding】

The ground connection is shown in the figure 7.

The ground hole at the long frame of the solar cell module, the ground wire is pressed with



bolts and crimp terminals and installed with M4 nuts. In addition, the grounding wire installation part of the module frame may enter water, it is recommended to use a high grounding hole for grounding wires. (grounding hole of module ϕ 5.1)

Figure 7 Schematic diagram

2. ELECTRICAL CONNECTION

- **Cable specifications**

The modules used in cable specifications are as follows:

Suitable specification: 62930 IEC 131 1*4.0 mm²/ (EN 50618 : 2014) H1Z2Z2-K 1*4.0 mm²
5.Extension cable is longer, because the conductor cross section area is smaller and the reason for the lead resistance, there will be a serious power loss (power generation decline). Please take this into full consideration by selecting the appropriate conductor section area for the cable.

6.The above conclusions are based on the correct installation of the "o-ring gasket" of the terminals.

7.The serial quantity is the reference value, and the specific quantity depends on the geographical environment conditions of the installation site.

Recommended maximum number of parallel: 1 column (please don't in parallel connection)

The premise to carry on the design of the module is in series connection, and please don't put the module in series and parallel connection.

- **Notes for electrical wiring**

Solar cell modules are subject to changes due to environmental factors such as the amount of light and temperature, which will affect the rated output current and voltage. Therefore, when determining the parameters associated with the rated voltage, wire capacity, fuse capacity and module power output, the corresponding short circuit current and open circuit voltage should be amplified by 1.25 times. The maximum open circuit voltage of the system must be greater than the maximum system voltage of the module.

3. APPLICATION and FIRE RATING

- **Application Class**

This module is rated as "Application class A" according to IEC61730.

8.class A applies to dangerous voltages and dangerous powers under normal conditions.

Modules rated for use in this application class may be used in systems operating at greater than 50 V DC or 240 W, where general contact access is anticipated. Modules qualified as application class A in IEC 61730 are considered to meet the requirements for safety class II.

- **Fire rating**

This module is rated as "Fire safety class C" according to IEC61730.

4.MAINTENANCE

SOLARGIGA ENERGY PV modules are designed for long life and require very little maintenance. If the angle of the PV module is 5 degrees or more, normal rainfall is sufficient to keep the module glass surface clean under most weather conditions. If dirt build-up becomes excessive, clean the glass surface only with a soft cloth using water. If cleaning the back of the module is required, take utmost care not to damage the back side materials. In order to ensure the operation of the system, please check all wiring connections and the condition of the wire insulation periodically.

<In case GROUNDING to Array >

This method is applicable for method of construction.

The example for grounding is shown as Figure 2-(b).The grounding cable with ring terminal should be fastened by the hardware (M6 bolt, washer, M6 nut) in the grounding hole of the rail. The module frame and the frame can be grounded via clip.

