SHAWLLAR

SHAWLLAR ENERGY TECHNOLOGY CO., LTD.

6TH BUILDING, NO.50 XINGLONG STREET, JIANYE DISTRICT, NANJING, CHINA

SHAWLLAR

INSTALLATION MANUAL

SHAWLLAR

6TH BUILDING, NO.50 XINGLONG STREET, JIANYE DISTRICT, NANJING, CHINA

M10 SUNCAKE PRODUCT

BMW-K1/054A (200W) / BMW-K1/084A (310W) / BMW-K1/108A (400W)

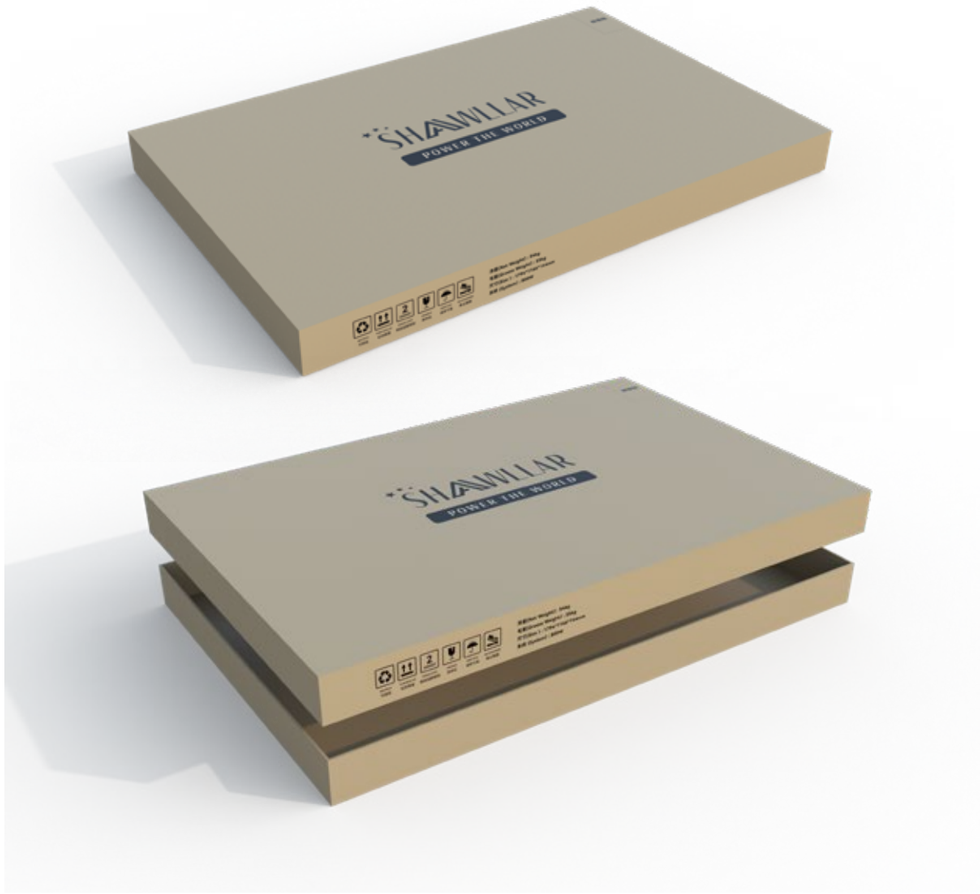
SHAWLLAR ENERGY TECHNOLOGY CO., LTD.

CONTENT

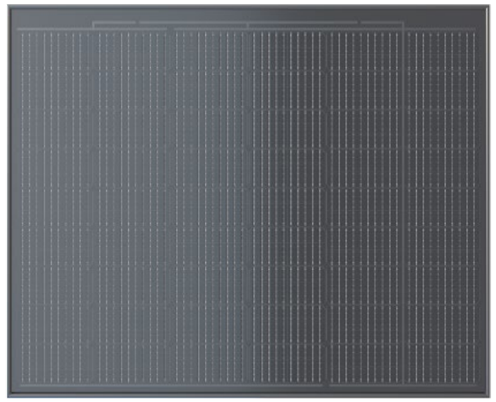
1 PRODUCT KIT OF SUNCAKE PRODUCT

1.1 ILLUSTRATION OF SUNCAKE PRODUCT KIT

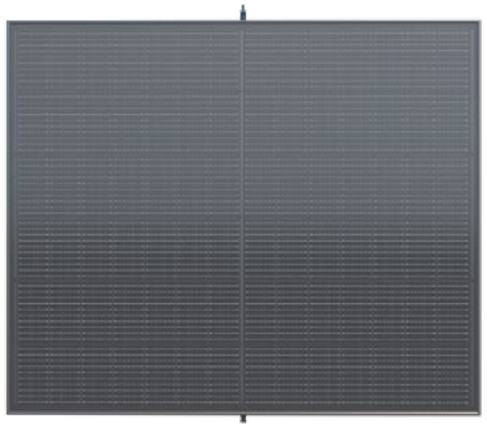
When the product arrives, it should be handled with the label facing upwards. After unpacking and removing the packaging tape, start by opening the cover on the label, take out the accessory package, and then proceed to install the components.



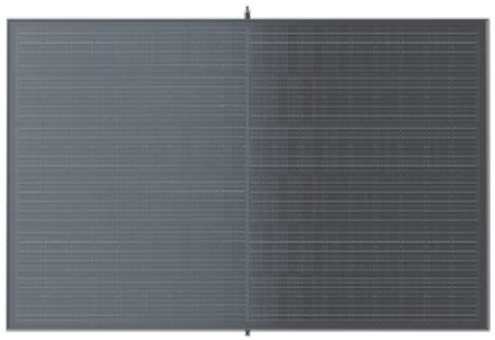
1.2 MAIN STRUCTURE OF SUNCAKE PRODUCT



BMW-K1/054A (200W)



BMW-K1/084A (310W)



BMW-K1/108A (400W)

Installation Altitude<2000m

Fire protection level:

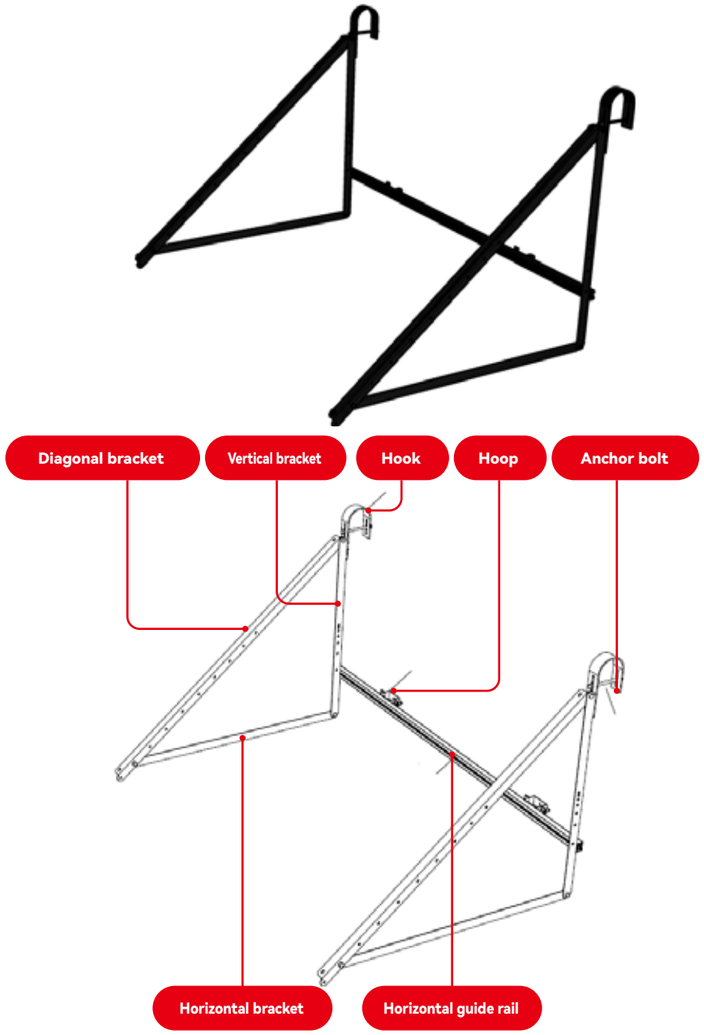
According to the corresponding certification standard (IEC61730-2-MST23), the fire protection level of external balcony photovoltaic products is CLASS C.

Protection level: Level II

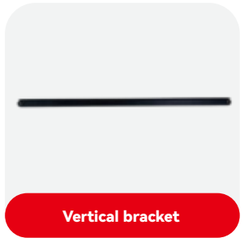
Mechanical load: Maximum load 2400Pa;

2 INSTALLATION ACCESSORY LIST

2.1 DIAGRAM OF INSTALLATION ACCESSORIES ASSEMBLY



2.2 INSTALLATION ACCESSORY LIST



Vertical bracket

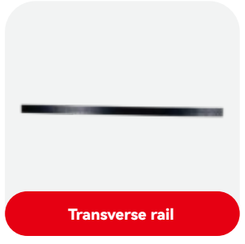
Size	Quantity	
vertical bracket	300w and 400W version	200W version
702mm	4pcs	8pcs

Horizontal bracket

Size	Quantity	
Horizontal bracket	300w and 400W version	200W version
833.5mm	4pcs	8pcs

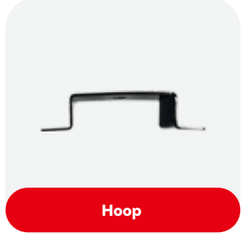
Diagonal bracket

Size	Quantity	
Diagonal bracket	300w and 400W version	200W version
1148mm	4pcs	8pcs



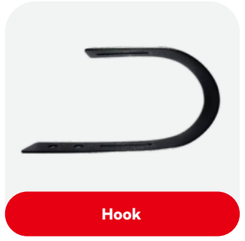
Transverse rail

Size	Quantity	
Transverse rail	300w and 400W version	200W version
600/1000/1380mm	2pcs	4pcs



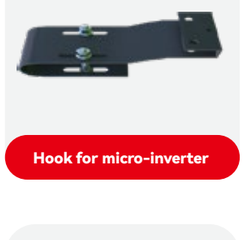
Hoop

Size	Quantity	
Hoop	300w and 400W version	200W version
30*80mm	4sets	8sets



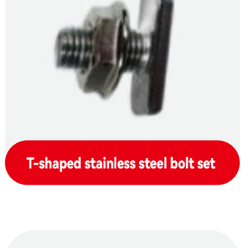
Hook

Size	Quantity	
Hook	300w and 400W version	200W version
40*179.5*92mm	4sets	8sets



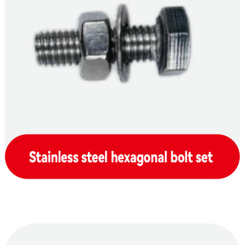
Hook for micro-inverter

Size	Quantity	
Hook for micro-inverter	300w and 400W version	200W version
50*200*67mm	1set	1set



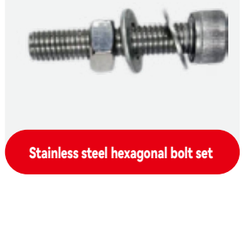
T-shaped stainless steel bolt set

Size	Quantity	
T-shaped stainless steel bolt set	300w and 400W version	200W version
M8*20	8sets	18sets



Stainless steel hexagonal bolt set

Size	Quantity	
Stainless steel hexagonal bolt set	300w and 400W version	200W version
M8*25	20sets	40sets



Stainless steel hexagonal bolt set

Size	Quantity	
Stainless steel hexagonal bolt set	300w and 400W version	200W version
M8*40	8sets	16sets

Stainless steel hexagonal bolt set

Size	Quantity	
Stainless steel hexagonal bolt set	300w and 400W version	200W version
M8*90	2sets	2sets

Stainless steel hexagonal bolt set

Size	Quantity	
Stainless steel hexagonal bolt set	300w and 400W version	200W version
M8*120	4sets	8sets

3 INSTALLATION TOOLS LIST

3.1 RECOMMENDED LIST OF TOOLS FOR CONSTRUCTION

Steel tape

Electric Impact Wrench

Wrench

Socket Wrench

Safety Rope

Note: This list only specifies the primary tools required for the installation of Suncake Product structural systems.

4 PRE-INSTALLATION INSPECTION OF SUNCAKE PRODUCT

WARNING

- Please use insulated tools to reduce the risk of electric shock.
- Use appropriate protective measures (non-slip gloves, work attire, etc.) to prevent direct contact between personnel and 30V DC or higher voltages. During installation, avoid direct contact with sharp edges to protect the installer's hands.
- DO NOT install the product in rainy weather or strong wind.
- DO NOT allow children or unauthorized personnel to approach the installation area or the storage area of the Suncake product.
- DO NOT use or install Suncake products that are damaged.
- If the product is damaged or worn, direct contact with the product surface may result in electric shock.
- DO NOT attempt to repair any part of the product.

● The cover of the junction box should always remain closed.
● DO NOT disassemble, modify, or move any part of the Suncake product.
● DO NOT artificially concentrate light on Suncake Products.
● It is important to note that only one piece of product can be moved in a single operation when installing the Suncake Products.

BE CAREFUL

● Before installing Suncake Products, the relevant authorities should be contacted to obtain information about the installation site and construction permits, and the requirements for installation and inspection should be observed.
● Check the applicable building codes to ensure that the balcony in which Suncake products are to be installed have adequate load-bearing capacity.
● Suncake Products are compliant with Safety Class II. These Suncake Products can be used in systems where the public is likely to be exposed to voltages greater than 50V or power greater than 240W.
● Suncake Products must not be installed near flames or combustible objects
● There is a risk of corrosion if Suncake Products are placed in salt spray (i.e., marine environments) or environments containing sulfur (i.e., sulfur-containing sources, volcanoes, etc.).
● Ensure that Suncake Products meet the overall technical requirements of the system.
● Ensure that other system components DO NOT cause damaging mechanical or electrical performance effects on Suncake Products.
● It is allowed to connect Suncake Products in series to increase the voltage or in parallel to increase the current. When connected in parallel, the positive terminal of the Suncake Product is connected to the positive terminal of the next Suncake Product.
● To reduce the risk of indirect lightning strikes, the system should be designed to avoid the creation of loops.
● Suncake Products should be securely fastened so that they can withstand all possible loads, including wind and snow loads.
● When installing Suncake Products, it is strictly prohibited to step on, twist or collide with them.
● Please ensure that the installation location of Suncake Products is free from shading all year round, as shadows can cause a decrease in the power generation of Suncake Products. Hot spots and long-term heat generation from diodes caused by frequent shading of Suncake Products can affect the service life of Suncake Products.

5 INSTALLATION WORK OF SUNCAKE PRODUCT

5.1 INSTALLATION REQUIREMENT

Requirements for balcony railing bearing capacity
Balcony horizontal bearing capacity: not less than 1500N.
Vertical bearing capacity of balcony: not less than 1500N.

5.2 UNPACKING AND STACKING (STORAGE AND UNPACKING)

● To ensure the safety of Suncake Products during transportation, it is better to open the packaging box of Suncake Products after reaching the installation site.
● Check whether the box is damaged before unpacking.
● It is advised that unpackers wear non-slip gloves in advance.
● Suncake Products should be stored in a dry and ventilated environment.
● Suncake Products must be shipped in the boxes provided by SHAWLLAR and should be stored in the original boxes before installation. Please protect the packaging from damage. Follow the recommended unpacking procedure to open Suncake Product packaging. Careful handling is required during unpacking, transportation and storage.
● DO NOT apply excessive loads or twist Suncake Products.
● DO NOT use wires or junction boxes to carry Suncake Products.
● DO NOT stand, climb, walk or jump on Suncake Products.
● DO NOT allow Suncake Products to come in contact with sharp objects; scratches can directly affect the safety of Suncake Products.
● DO NOT place Suncake Products in an environment that is not reliably supported or not fixed.
● DO NOT change the wiring of bypass diode.
● It is important to keep all electrical connectors clean and dry.

5.3 CHECKING

● Please check whether the surface of Suncake Products is damaged, if there is damage or wear on the surface of the products, please DO NOT use the product.
● Please check whether the junction box, connectors and cables are damaged. Please DO NOT use the product if there is damage.
● DO NOT apply adhesives, paint, label or any other product on the surface of Suncake Products.

5.4 INSTALLATION

● Before installation, first check all accessories according to the list
● Installation of the angle adjustment bracket: Use M8*25 stainless steel hex bolts to connect the vertical bracket and the horizontal bracket (as shown in Figure 1)

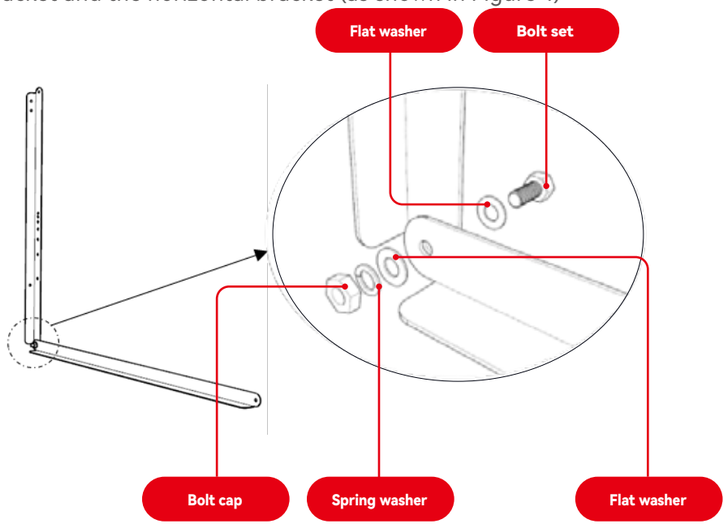


FIGURE 1

● **Installation of the diagonal bracket:**

Use M8*25 stainless steel hex bolts to connect it to the vertical and horizontal brackets. The tripod assembly is complete (as shown in Figure 2).

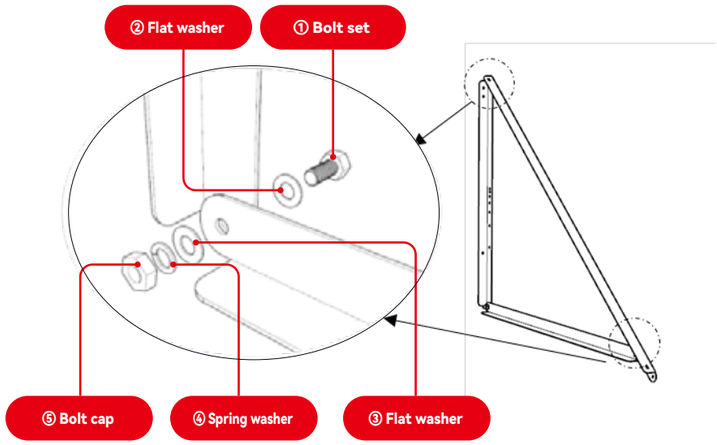


FIGURE 2

● **Installation of hook:**

Use M8*25 stainless steel hex bolts to connect the hook to the tripod. Complete as shown in Figure 3. Follow the same procedure to install another tripod (Figure 4)

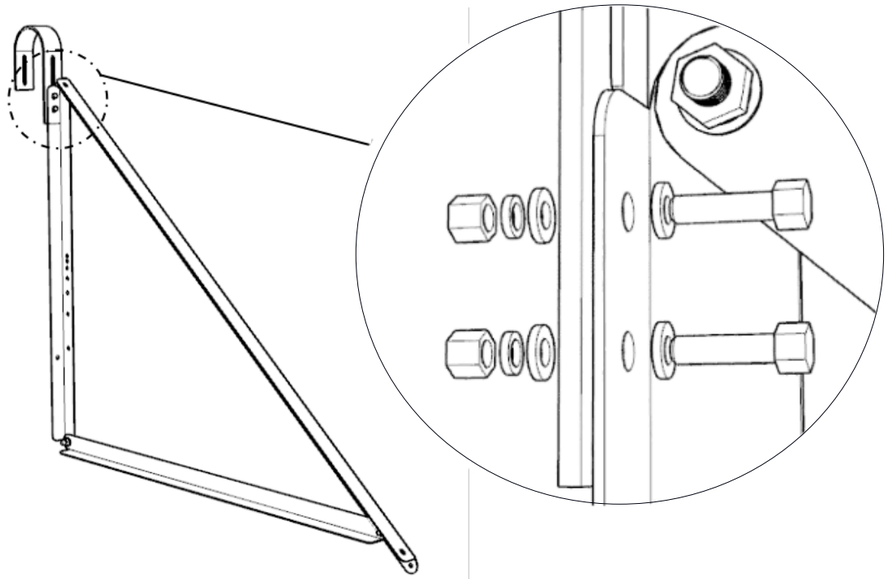


FIGURE 3

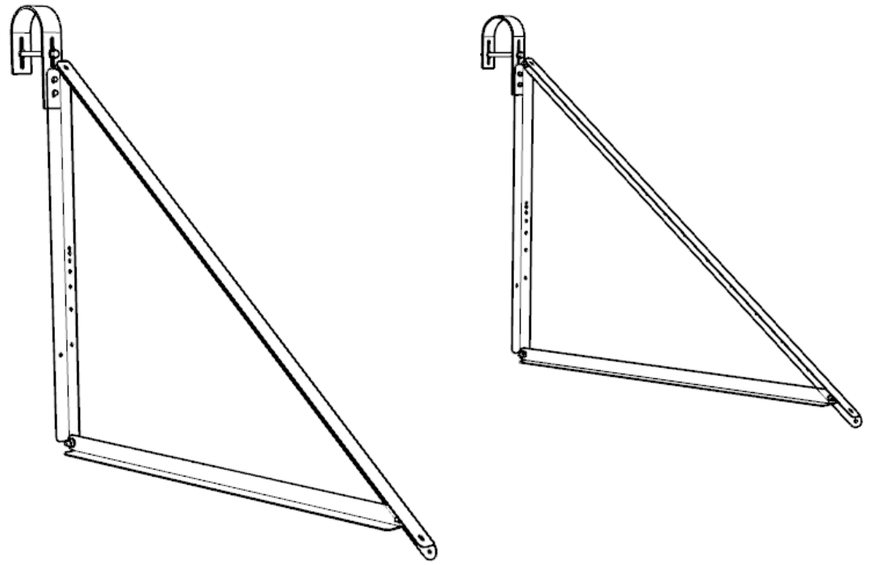


FIGURE 4

● **Installation of Suncake product with tripod:**

Use M8*25 stainless steel hex bolts to connect Suncake with tripod. Complete as shown in Figure 5.

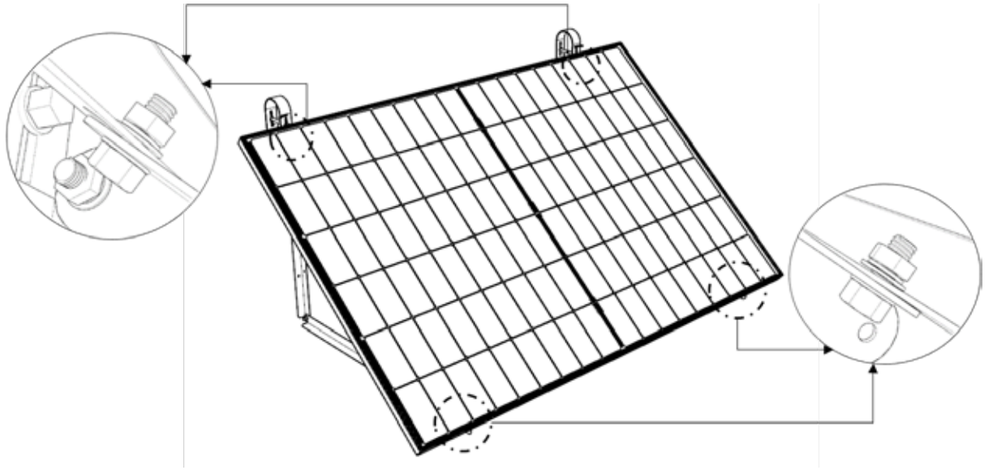


FIGURE 5

● **Installation of the bottom horizontal guide rail:**

Use M8*20 stainless steel T-bolts to connect it to the two tripods (as shown in Figure 6)

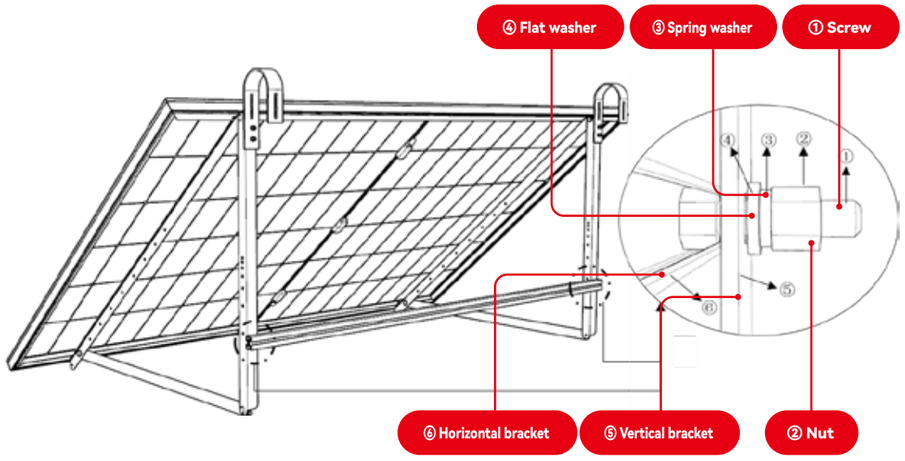


FIGURE 6

● **Installation of the bottom hoop:**

Use M8*20T stainless steel T-bolts to secure the 30*80mm hoop onto the bottom horizontal guide rail (as shown in Figure 7).

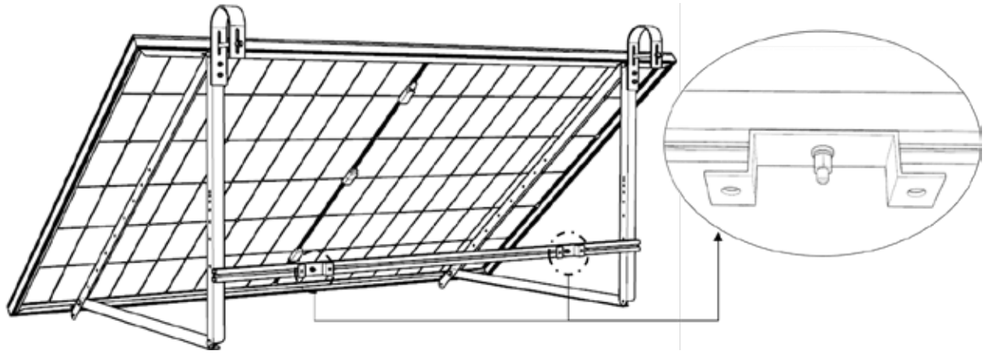


FIGURE 7

● **Installation of the Suncake product with the balcony rail:**

Before installation, hang one end of the safety rope on the railing and secure the other end to the Suncake product or bracket. Then, hang the Suncake product on the railing (as shown in Figure 8), and use M8*120 stainless steel bolts to securely fasten the hook to the railing. Connect the bottom horizontal guide rail to the vertical railing using custom-made clamps (Figure 9).

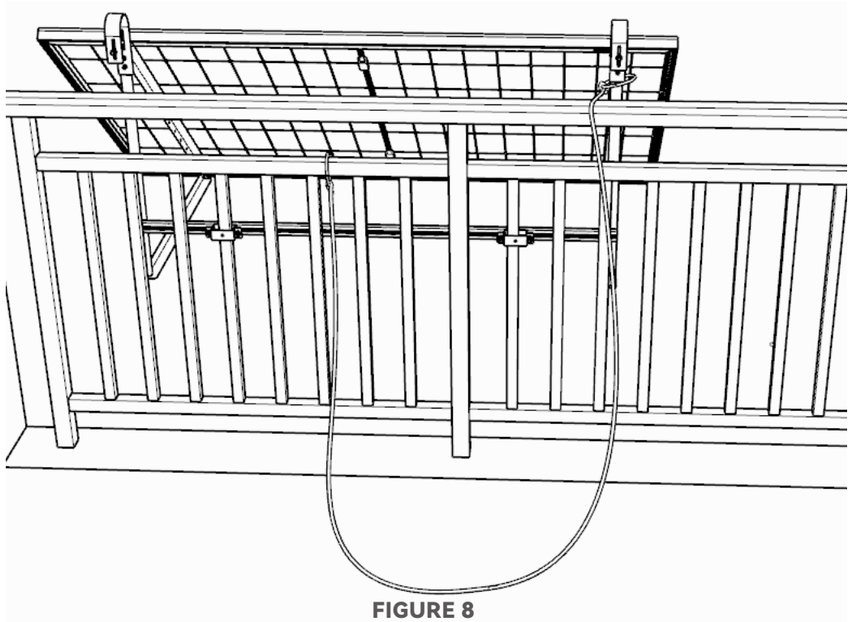


FIGURE 8

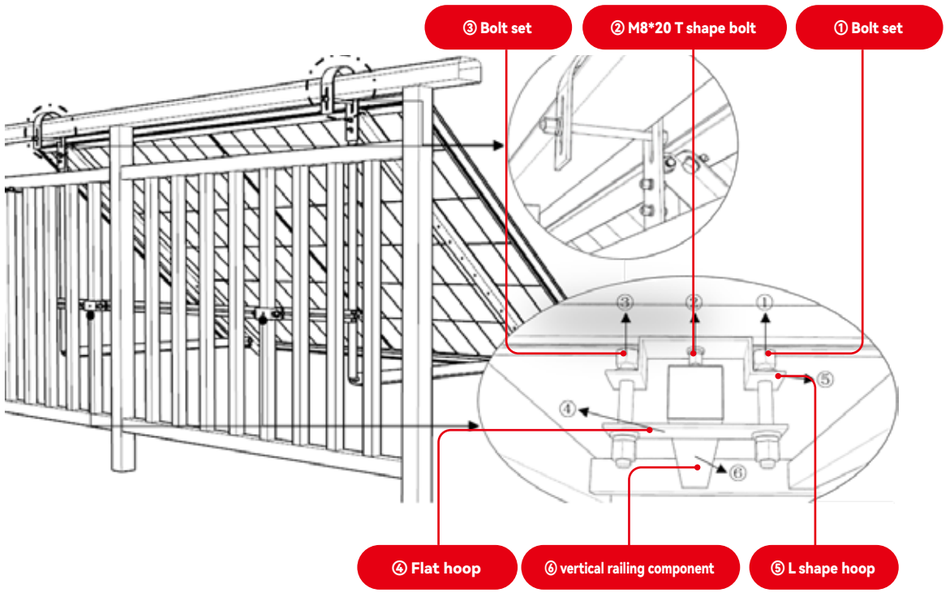
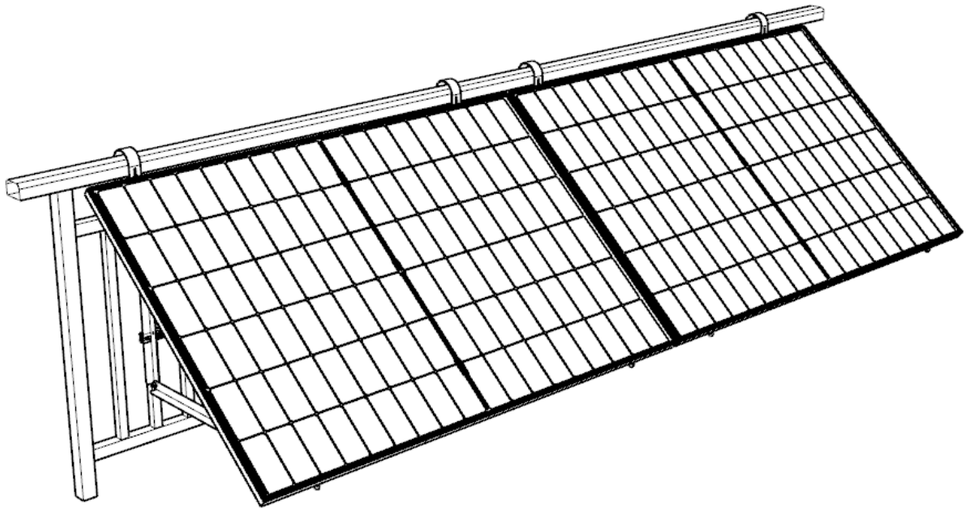


FIGURE 9

● Installation of the other Suncake product with the same method.(Figure 10)



● Installation of micro-inverter:

Use special hooks to install micro-inverter.(Figure 11)

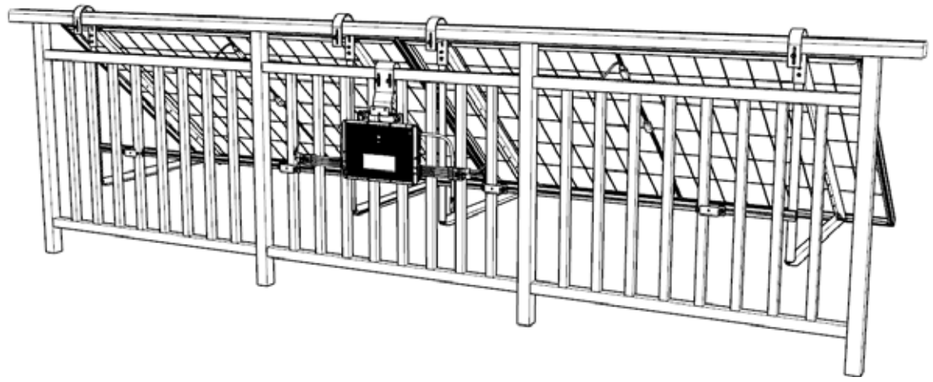


FIGURE 11

● Complete the whole installation of the Suncake product.

5.5 ANGLE ADJUSTMENT INSTRUCTIONS

● Vertical bracket and diagonal bracket hole positions illustrated (Figure 1)

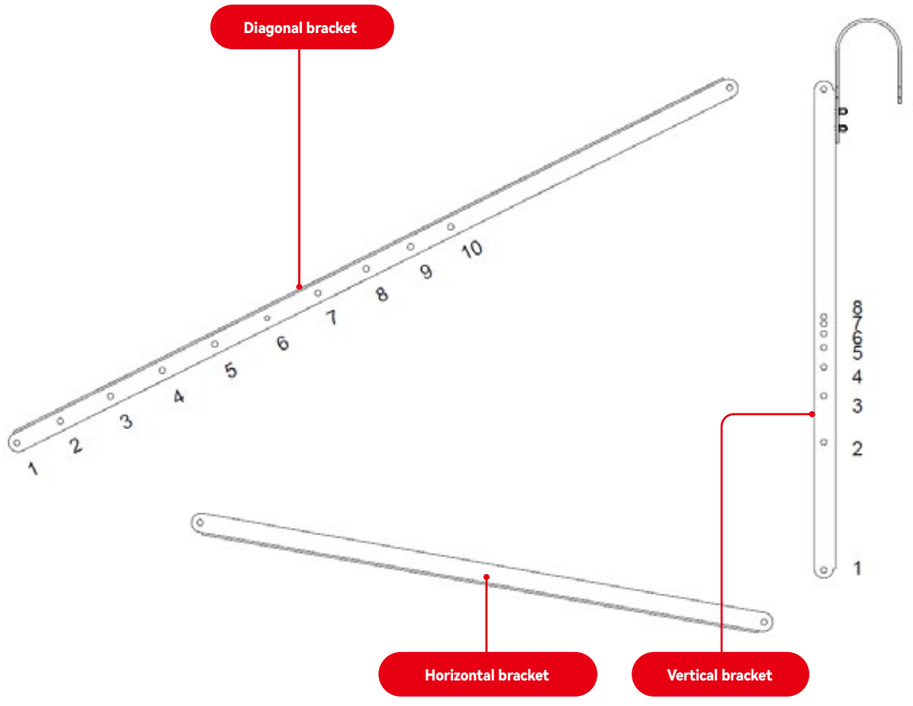
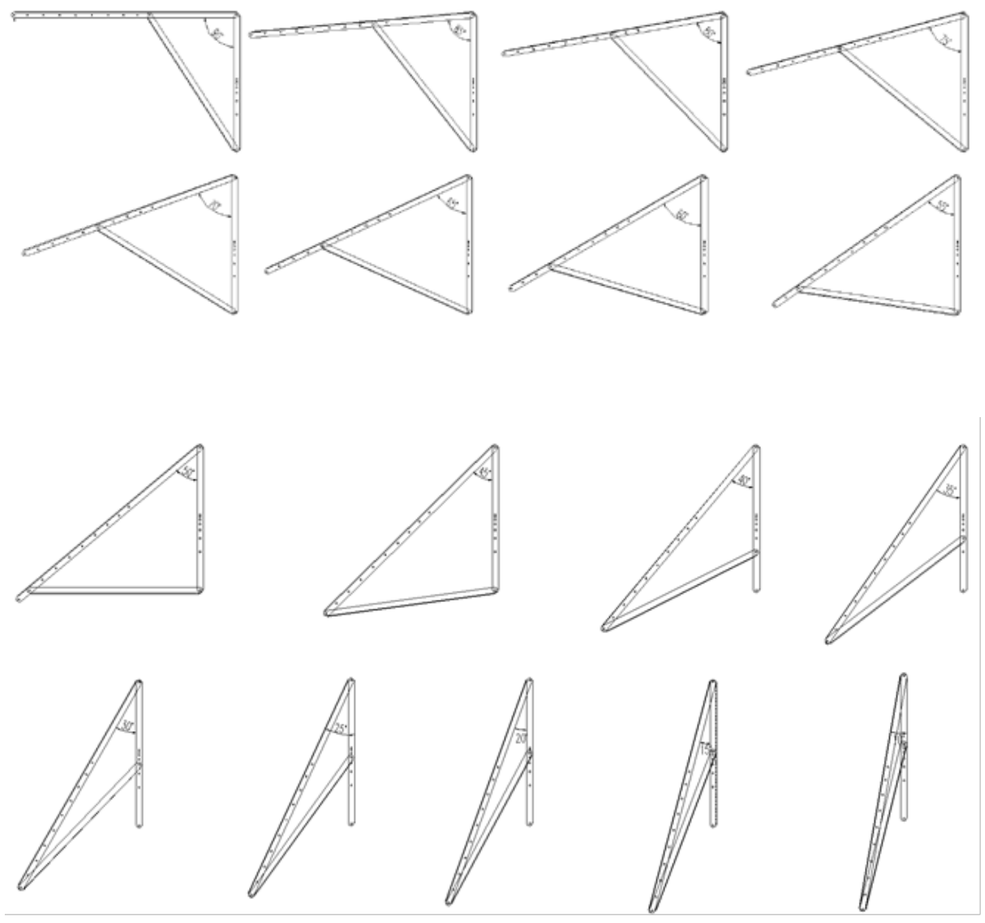


FIGURE 1

● Different angle adjustments and hole position combinations illustrated (Figure 2).



● Table of hole position combinations for vertical bracket and diagonal bracket corresponding to different installation angles.

INSTALLATION ANGLE	VERTICAL BRACKET HOLE POSITION	DIAGONAL BRACKET HOLE POSITION
90°	Hole No.1	Hole No.10
85°	Hole No.1	Hole No.9
80°	Hole No.1	Hole No.8
75°	Hole No.1	Hole No.7
70°	Hole No.1	Hole No.6
65°	Hole No.1	Hole No.5
60°	Hole No.1	Hole No.4
55°	Hole No.1	Hole No.3
50°	Hole No.1	Hole No.2
45°	Hole No.1	Hole No.1
40°	Hole No.2	Hole No.1
35°	Hole No.3	Hole No.1
30°	Hole No.4	Hole No.1
25°	Hole No.5	Hole No.1
20°	Hole No.6	Hole No.1
15°	Hole No.7	Hole No.1
10°	Hole No.8	Hole No.1

Note: If the installation inclination is close to 0°, it can be installed without the horizontal bracket.

5.6 TORQUE SPECIFICATION FOR BOLT INSTALLATION:

Recommended torque for M8 bolts is 16N~20N.

6 ELECTRICAL INSTALLATION

6.1 ELECTRICAL PERFORMANCE

The nominal values of electrical performance parameters such as Isc, Voc and Pmax of Suncake Products have an error of ±3% from those under standard test conditions. Standard test conditions for Suncake Products: irradiance 1000 W/m2, cell temperature 25° C, atmospheric mass AM 1.5. Please refer to the product technical specification for more details.

6.2 CABLES AND CONNECTING WIRES

Suncake products shall be connected by using IP67-rated junction boxes, which shall provide safe protection for the conductors and their corresponding connections, and accessible protection for non-insulated live parts. The junction box consists of a connected cable and IP67-rated connectors.

● Use dedicated solar cables and appropriate connectors (wires should be encased in age-resistant conduit or, if exposed to air, should be age-resistant themselves) and ensure that the cables are electrically and mechanically sound, in accordance with local fire, building and electrical codes. Installers should only use single-core solar cables, 2.5-16mm2 (5-14 AWG), 90° C rated, with appropriate insulation to withstand the maximum possible system open circuit voltage (as approved by EN 50618). Appropriate wire sizes need to be selected to minimize voltage drop. All wiring and electrical connections comply with the requirements of the appropriate National Electrical Code or standard. Avoid mechanical damage to the cable or Suncake products when the cable is secured to the bracket. DO NOT press the cable with force. The cable shall be secured to the bracket by specially designed aging-resistant cable ties and wire clips. Although the cable is resistant to aging and water, it should be protected from direct sunlight and rain. The minimum bending radius of the cable should be 43mm.

6.3 CONNECTOR

● Please keep the connector dry and clean, and make sure that the nut of the connector is tightened before connecting. DO NOT connect the connector when it is wet, dirty or in other unfavorable conditions. If the connector is not connected properly to the other polarity, the connector is not waterproof. It is necessary to connect or take appropriate measures to avoid the infiltration of water vapour and dust as soon as possible after the module is mechanically installed on the roof. Avoid having connectors exposed to direct sunlight and immersed in water. Avoid having connectors falling on the ground or the roof. Incorrect connections may produce arcing and electric shock. Make sure all electrical connections are secure. Make sure that all connectors with locking are fully connected.

● It is not recommended that connectors of different models be connected and used together.

6.4 BYPASS DIODE

● The cell strings within the Suncake product are protected by bypass diodes in parallel and encapsulated in a junction box. When a hot spot phenomenon occurs locally in a module, the diode will activate so that string current no longer flows from the hot spot cells, thus limiting module heating and performance loss. Note that the bypass diode is not an overcurrent protection device. Contact the installer or system maintainer when a diode failure is detected or suspected. DO NOT attempt to open the module's junction box by yourself.

6.5 ELECTRICAL REQUIREMENT OF THE SUNCAKE PRODUCTS

1、Inspection before installation
① No visible defects.
② Models and specifications should meet the requirements of the design drawings.
③ Accessories and spare parts are available;
④ Please refer to the product specification for electrical parameters.
2、Main tools preparation
① Multimeter: For measuring the open-circuit voltage of Suncake Products.
② Angle measuring instrument, level, etc.: measuring the installation angle of the Suncake Product array.
③ Installation tools and spare parts are covered in Section 3.

6.6 MATERIAL PREPARATION

Please check the model and quantity of the materials received against the list on the configuration sheet.
1、Electrical Wiring Requirements for Suncake Products:
① Wiring with clear, unambiguous and easily understood wire number identification.
② Jumper cable diameter must exceed the original Suncake Product cable diameter, and flame retardant and insulation performance should also be no less than that of the Suncake Product cable.
③ Suncake Products should be connected in the shortest cable run possible.
When Suncake Products require long straddle connections, try to minimize the difference in the total length of each set of string-connected cables.
④ The wiring terminals should be in good contact. When connecting each part of the Suncake Product in series, it is best to test once each section is completed with a multimeter-to-string connectivity.

2、Electrical wiring method of Suncake Products
2.1 Electrical wiring method for an 800w balcony solar system with 4 pcs Suncake products
① First, connect the positive and negative terminals of two Suncake products in series using DC wires, and then parallelly connect the two sets of series-connected products to the micro-inverter DC port, as shown in Figure 6-1.
② Connect the micro-inverter AC output directly to the household socket. Installation is complete, as shown in Figure 6-2."

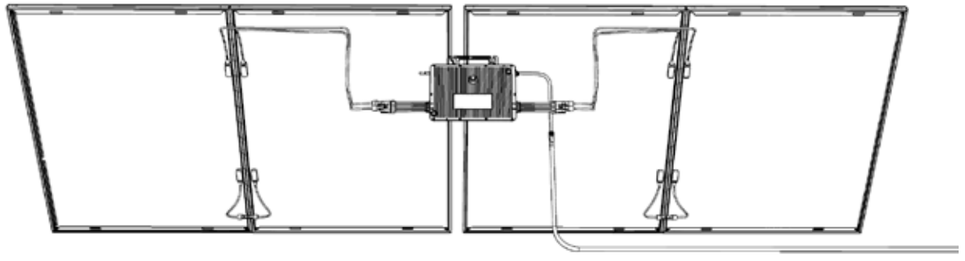


FIGURE 6-1
THE SUNCAKE PRODUCTS ARE FIRST CONNECTED IN SERIES AND THEN CONNECTED IN PARALLEL TO THE MICRO-INVERTER

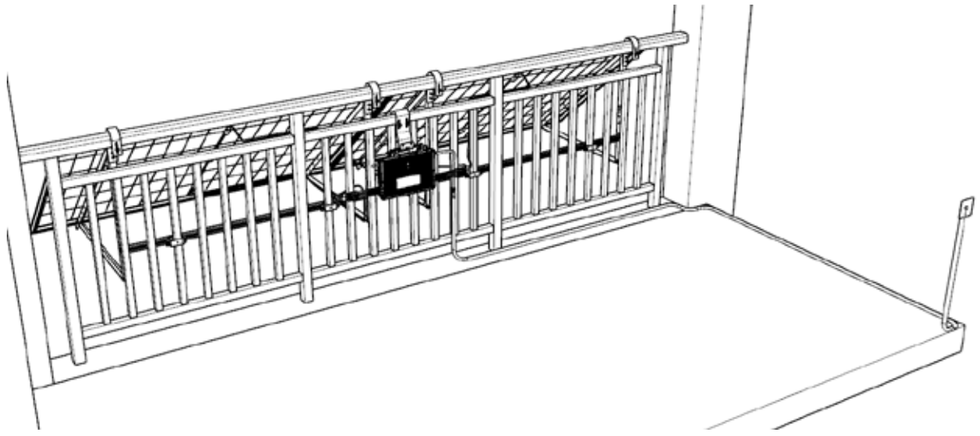


FIGURE 6-2
AC CABLE OF MICRO-INVERTER TO THE SOCKET

2.2 Electrical Wiring Method for a 600W/800W balcony solar System with two 300W/400W Suncake Products:
① Parallelly connect the positive and negative terminals of two Suncake products to the micro-inverter DC ports separately, as shown in Figure 6-3.
② Connect the micro-inverter AC output directly to the household socket and then the installation is complete

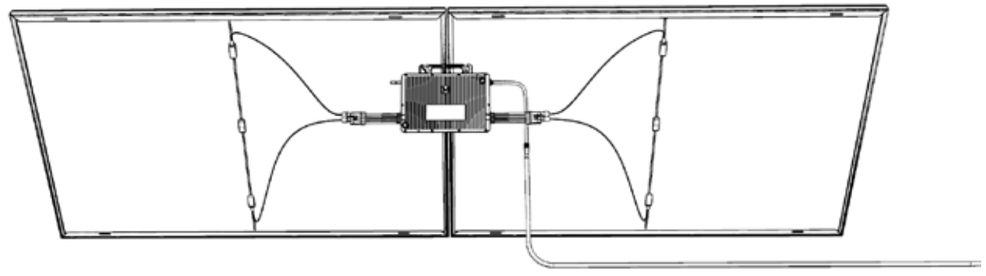


FIGURE 6-3
SUNCAKE PRODUCTS ARE CONNECTED IN PARALLEL INTO MICRO-INVERTER

7 OPERATION AND MAINTENANCE

Products require regular inspection and maintenance, especially during the warranty period. To ensure optimum performance, it is necessary to unplug the DC power cord before performing maintenance. SHAWLLAR recommends the following measures:

7.1 VISUAL INSPECTION

Visual inspection of the product for damage or other conspicuous features, focusing on the following:
① Whether the glass of the product is broken.
② Whether corrosion has occurred near the fingers of cell, which is caused by water vapour entering the product due to breakage of the surface encapsulation material during installation or transport.
③ Whether the back plate of the product has broken.
④Whether the product has signs of aging, including animal damage, weathering, corrosion and whether the connection of connectors is tight and whether the products are well grounded.
⑤ The surface of the product should not be touched with sharp objects;
⑥ The products should not be shaded;

7.2 CLEANING

① Dust and dirt on the surface of the product will reduce the power output. SHAWLLAR recommends using a sponge or soft cloth containing water to wipe the glass surface and strictly forbids the use of cleaning agents containing acids or alkalis to clean the product.
② Please remove snow and ice without force. Please use a soft broom in order not to damage the protective layer of the product.

③ DO NOT use rough and sharp tools to clean products.
④ To reduce potential electric shock or burns, SHAWLLAR recommends cleaning the product in the early morning or late evening when there are low irradiation levels and low temperatures.
⑤ DO NOT clean products with broken glass or back plates, exposed wires or broken features to avoid the risk of electric shock.
⑥ Always wear rubber gloves whilst servicing, washing, or cleaning the modules and pay attention to the connection of cables and electrics.

7.3 CONNECTORS AND CABLE CONNECTIONS

It is recommended to carry out a preventative inspection every 6 months
① Check whether the junction box sealant has cracks or gaps.
② Check whether the connectors are sealed and the cable connections are secure.
The following maintenance measures are recommended to ensure that the products achieve optimum performance and maximum system power generation.

8 CAUTIONS

1. Product appearance inspection focuses on the following:
① Whether the product is damaged or not.
② Whether sharp objects are touching the surface of the product.
③ Whether the product is shaded by obstacles and foreign objects, newly grown trees, newly erected poles, etc.
④ Whether there is corrosion near the cell grid wire.

2. Product cleaning.
The accumulation of dust or dirt on the surface of the product will reduce the power output. It should be cleaned regularly to keep the surface clean, and generally should be cleaned at least once a month. Cleaning frequency should be adjusted depending on the local environment.
Please note the following when cleaning photovoltaic products:
① Make sure the products and cables are not broken before cleaning the product.
② First rinse the product with clean water, and then wipe the water stains dry with a soft cloth, it is strictly prohibited to use corrosive solvents to clean or wipe PV products with hard objects.
③ PV products should be cleaned at irradiance below 200W/m2, preferably when there is no sunlight or in the morning and evening.
④ It is strictly forbidden to wash PV products during strong wind (wind force greater than 4), heavy rain or heavy snow.
Attention: DO NOT walk, stand or sit on the product for product cleaning.
3. Product connector and cable inspection. It is recommended to inspect them every six months in a preventive manner.

①Inspect PV products for signs of aging. This includes possible rodent damage, weather aging, and that all connectors are tightly connected and free of corrosion.
② DO NOT disassemble the product by yourself if it is damaged, please inform the professional to handle it.

4. All electrical installations must comply with electrical installation standards and be completed by an electrical professional. Ensure that all input and output switches are off.

5. DO NOT connect the DC cable to the inverter AC output socket, and DO NOT short-circuit or ground the output circuit.

6. The cable route between the DC input and the inverter should be as short as possible.

7. Different colour cables should be selected to differentiate the connection process. The positive terminal is connected to the red cable and the negative terminal is connected to the blue cable.

8. To ensure a balance between the product strings, the selected DC cables should have the same cross-sectional area.

9. Make sure to cover the product with an opaque material or disconnect the DC side circuit breaker before making electrical connections. The product array will generate dangerous voltages when exposed to sunlight.

9 RECOMMENDED INSTALLATION ANGLE

Country	Germany	Austria	Czech Republic	France	Greece	Finland
Angle	40°	40°	40°	40°	35°	50°