GOODWE

INSTALLATION MANUAL

GOODWE PVBM

UP TO A SUSTAINABLE FUTURE

POLARIS SERIES(HOOP INSTALLATION)

BMT-P2/132A(535W)

GOODWE TECHNOLOGIES CO., LTD.

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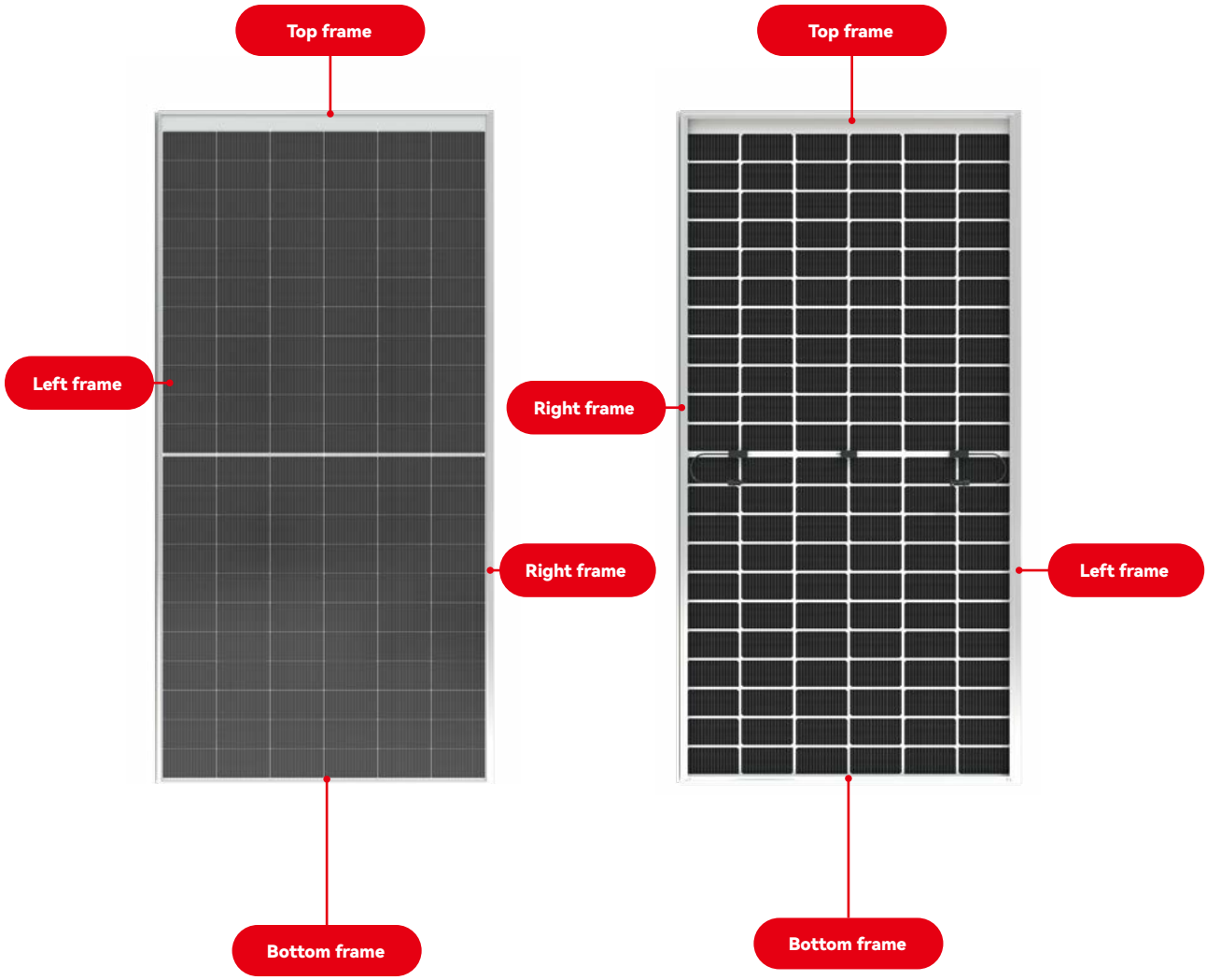
CONTENT

1 DESCRIPTION OF THE MAIN STRUCTURE OF POLARIS SERIES



Installation Altitude <2000m
Fire Protection Level: CLASS A (IEC61730-2-MST23)
Protection Level: Class II
Mechanical Load: 5400Pa (Front) ; 2400Pa (Back)

2 INSTALLATION ACCESSORIES LIST

2.1 POLARIS BASIC ACCESSORY KIT (STANDARD)

Positioning hook

Function	Fix the position of Polaris product
Quantity	2

Tape

Function	Adhere waterproof strip
Quantity	/

Waterproof strip

Function	Stop water
Quantity	/

2.2 POLARIS INSTALLATION ACCESSORY KIT (OPTIONAL, CAN BE SOURCED LOCALLY)

Fastening Hoop(120)

Size	M8x52x120
Function	Fix clip
Quantity	1

Short clip

Size	/
Function	Fix Polaris tile
Quantity	1

Fastening Hoop(140)

Size	M8x52x140
Function	Fix clip
Quantity	2

Tall clip

Size	/
Function	Fix Polaris tile
Quantity	2

Mounting support

Size	/
Function	Elevate Polaris tile
Quantity	1

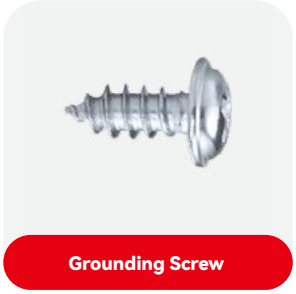
2.2 GROUNDING KIT(OPTIONAL, CAN BE SOURCED LOCALLY)

Grounding Cable

Function	Grounding of Polaris tile
Quantity	1

Grounding Washer

Function	Grounding of Polaris tile
Quantity	2



Grounding Screw

Function	Fixing of grounding elements
Quantity	2

3 INSTALLATION TOOLS LIST

3.1 CONSTRUCTION TOOLS LIST(NOT PROVIDED BY GOODWE)

Steel Measure Tape

Electric Drill

(M8, length ≥ 60mm)

Magnetic hex socket

Note: This list only indicates the main tools required for the installation of Polaris series structure system of the product and does not include the tools used for the installation of the roof support section and the electrical section.

3.2 ELECTRICAL TOOLS LIST(NOT PROVIDED BY GOODWE)

Needle Nose Plier

Wire Cutter

PV Special Crimping Pliers

Wire Stripping Pliers

Joint Wrench

4 SAFETY WARNING

WARNING

- The product can generate electricity under sunlight, so it is strictly prohibited to short-circuit the output cable. Otherwise, the output cable may overheat, resulting in the melting of the cable's outer casing.
- Installation should be stopped when it is raining, the roof is damp or the ground is wet, otherwise there is a risk of falling or electric shock.
- Construction personnel should wear non-slip footwear or slip resistant shoe covers during construction and have reliable protection against falls.
- Construction should be strictly carried out in accordance with the product construction node drawings, while avoiding reverse water impact on the Sun shed system, otherwise there is a risk of water leakage.

BE CAREFUL

- DO NOT lift the product by the junction boxes or cables, as it is likely to damage the product or result in the falling down of components.
- During the process of transportation, the product is prone to breakage if it falls down.
- DO NOT twist the product during installation, this will damage the product or cause other damages.
- DO NOT bring the product into direct contact with any rigid material, as this will cause them to break.
- The product should be installed on a roof pitched 5° to 45° to ensure roof water tightness.
- When construction is interrupted, unconnected cable connectors should be protected against water.

5 INSTALLATION WORK OF PRODUCT

5.1 PRODUCT ROOFING INSTALLATION

Unpacking and stacking

- DO NOT stack the product boxes after unpacking. (Cut the outer packing tape connecting the two tow products and separate the upper and lower tow).
- The storage of the product should ensure that the outer packaging is intact, and the storage area should be protected from dampness, direct sunlight, and waterproof measures should be taken to prevent the pallets and packaging boxes from getting wet;
- The product storage area should be dry, flat and the ground should be with a slope of less than 10°;
- A safety distance of 30cm between the boxes is recommended;
- DO NOT stack other items on top of the products or packing boxes;
- DO NOT unpack in the rain, as the carton will be soft and may damage the products. Therefore, it is recommended to avoid working on rainy days;
- DO NOT carry products when working outdoors in the wind. It is advised to fix the disassembled products to avoid the damage caused by wind;
- Please stack the products in a ventilated, rain-proof and dry place before unpacking them.;
- Please use scissors or utility knife to cut off the packing strips, do not scratch the glass, and confirm the number of products in time after opening the box;
- A support should be placed behind the product to prevent it from collapsing after unpacking.
- The products should not be unpacked before long distance transportation. Short on-site single piece manual transportation is acceptable.;
- Please wear protective gloves during unpacking and handling to avoid scratching your hands or leaving fingerprints on the glass.;
- Every product should be carried by two people. Do not pull on the junction box under any circumstances. It is advised to grasp the sides of the tile when carrying it.;
- Use scissors to cut off the ties holding the connecting wires before installation to avoid the connector striking the back and damaging the product;
- Put the remaining products together in a centralized location after installation;

Roof substrate acceptance check

- The installation position of steel structural columns should be accurate, ensuring that the columns are perpendicular to the horizontal plane, and the installation should be firm.
- The weld should achieve: uniform appearance, good formation, smooth transition between welds and between weld and base metal, and clean removal of weld slag and spatter.
- The main keel plane should be flat and have sufficient strength, and the drainage slope should meet the design requirements (as shown in Figure 1). It is recommended that the drainage slope be between 6° and 10° and not less than 6° .

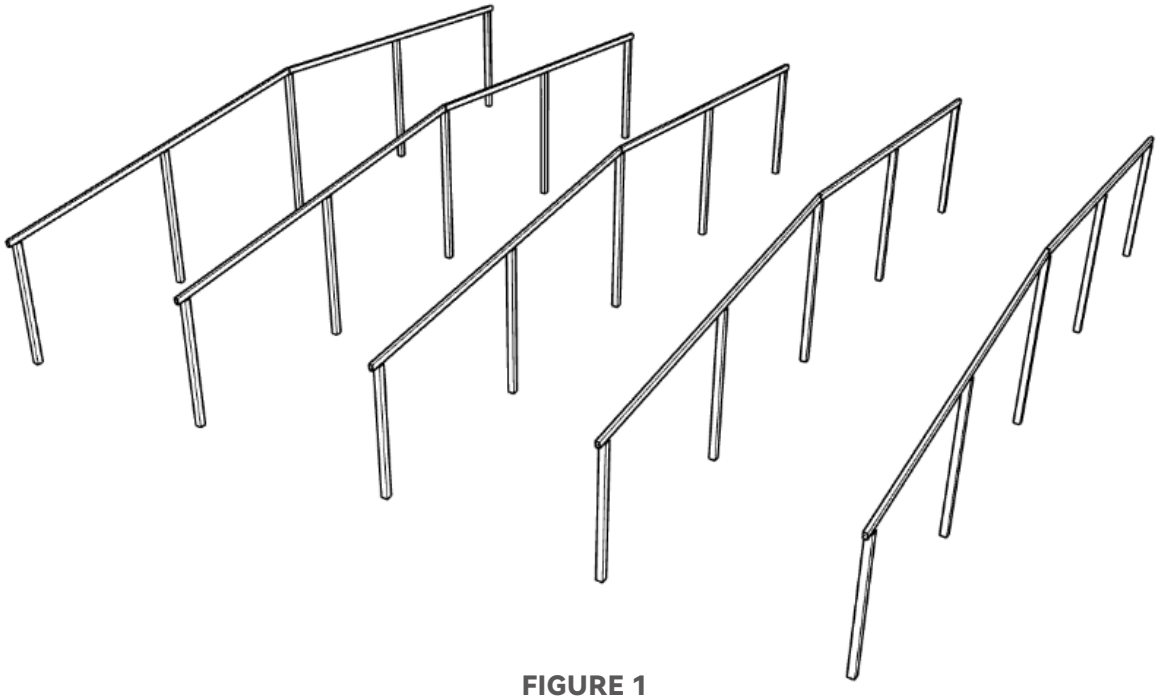


FIGURE 1

Purlin installation:

● The specifications of the purlins should meet the structural calculation strength, and the side of the purlin installed with the product should be flat, with a width of about 40mm;

● The purlin spacing is installed from bottom to top according to the dimensions as shown in the drawing. The purlin connection should be firm, straight and have a smooth surface. When the lowest row of products extends out of the gable end, the distance of the lowest purlin from the lower end of the main keel is dim=593mm, and the remaining adjacent purlin spacing dimensions are A=1055mm. The actual installation deviation of adjacent purlin spacing is ≤ 5mm, and the distance of the upper purlin from the ridge line of the steel structure is dim=370mm. cross section of steel structure installation (Figure 2)

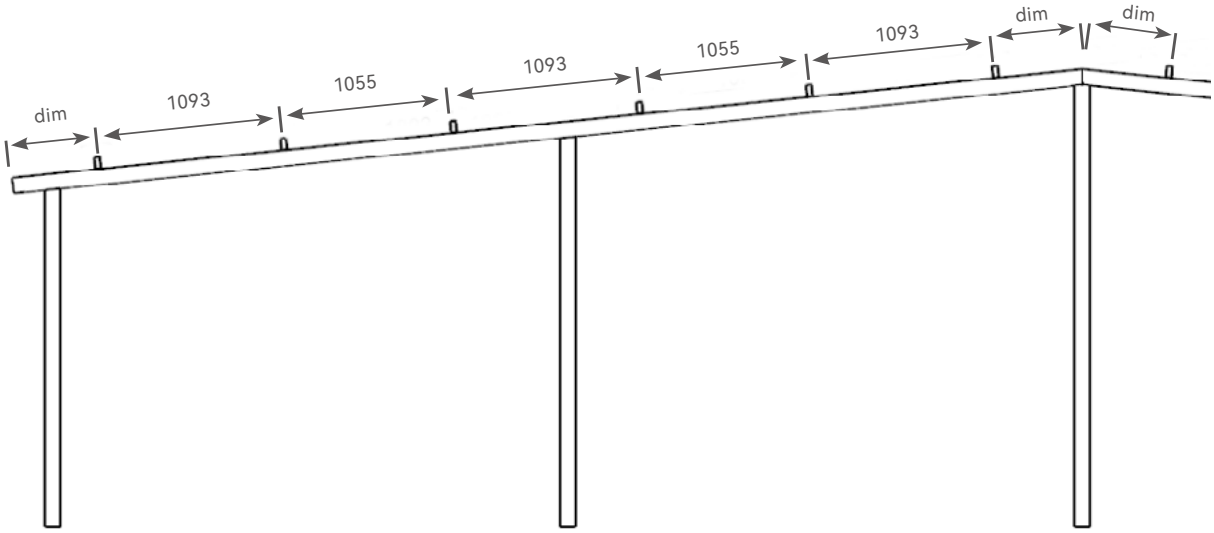


FIGURE 2

● The purlins are installed in turn, the installation effect is shown as Figure 3;

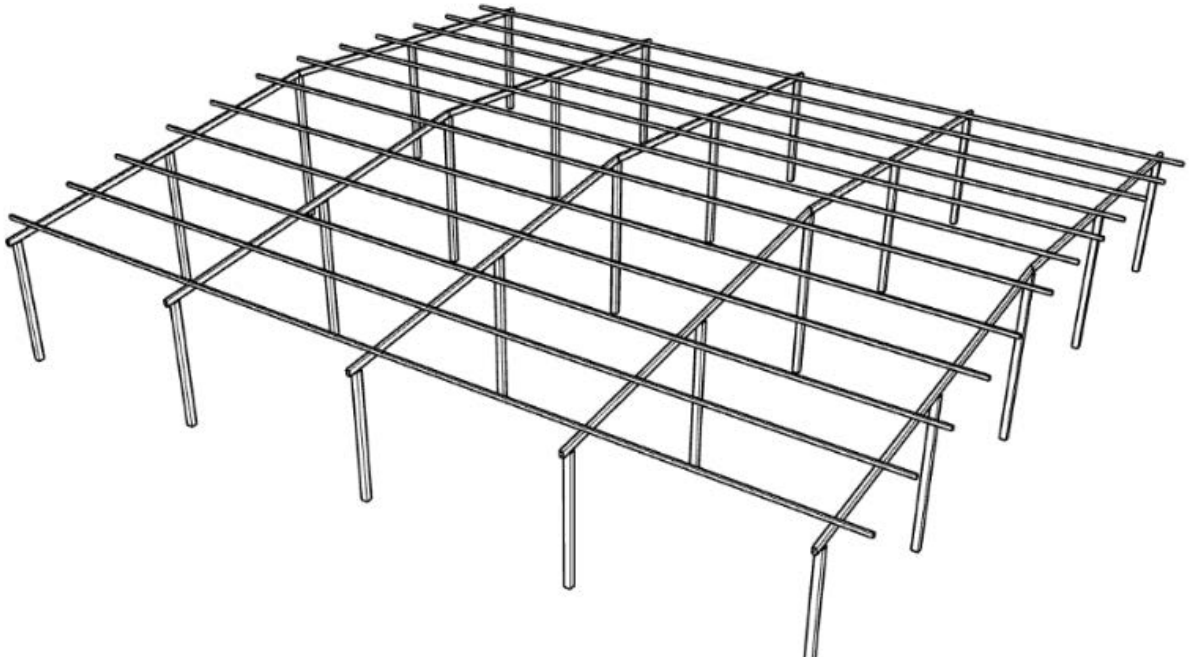


FIGURE 3

The installation of support fittings and mounting clips (Mounting clips and hoop sets are to be selected according to the purlin size, the following description is only for purlins with a section size of 40*80mm)

● First it is necessary to thread the hoop (120) into the short clip to form upper fastener assemblies (Figure 4) and then thread the hoop (140) into tall clip to form bottom fastener assemblies (Figure 5); Note the different lengths of hoop used for different assembly.

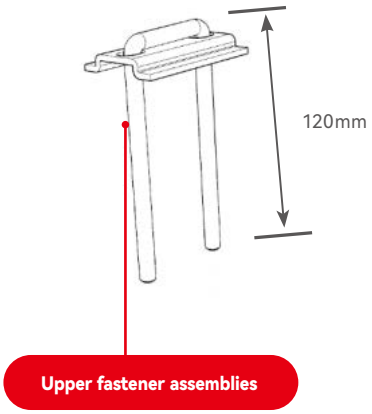


FIGURE 4

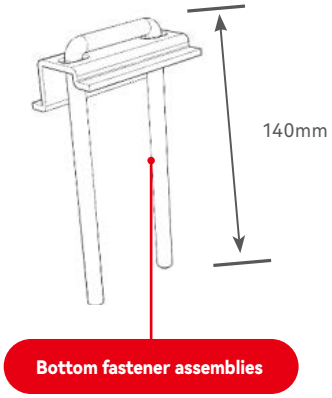


FIGURE 5

● Place mounting support and bottom fastener assemblies on the first row of purlins from bottom to top (Figure 6) ;

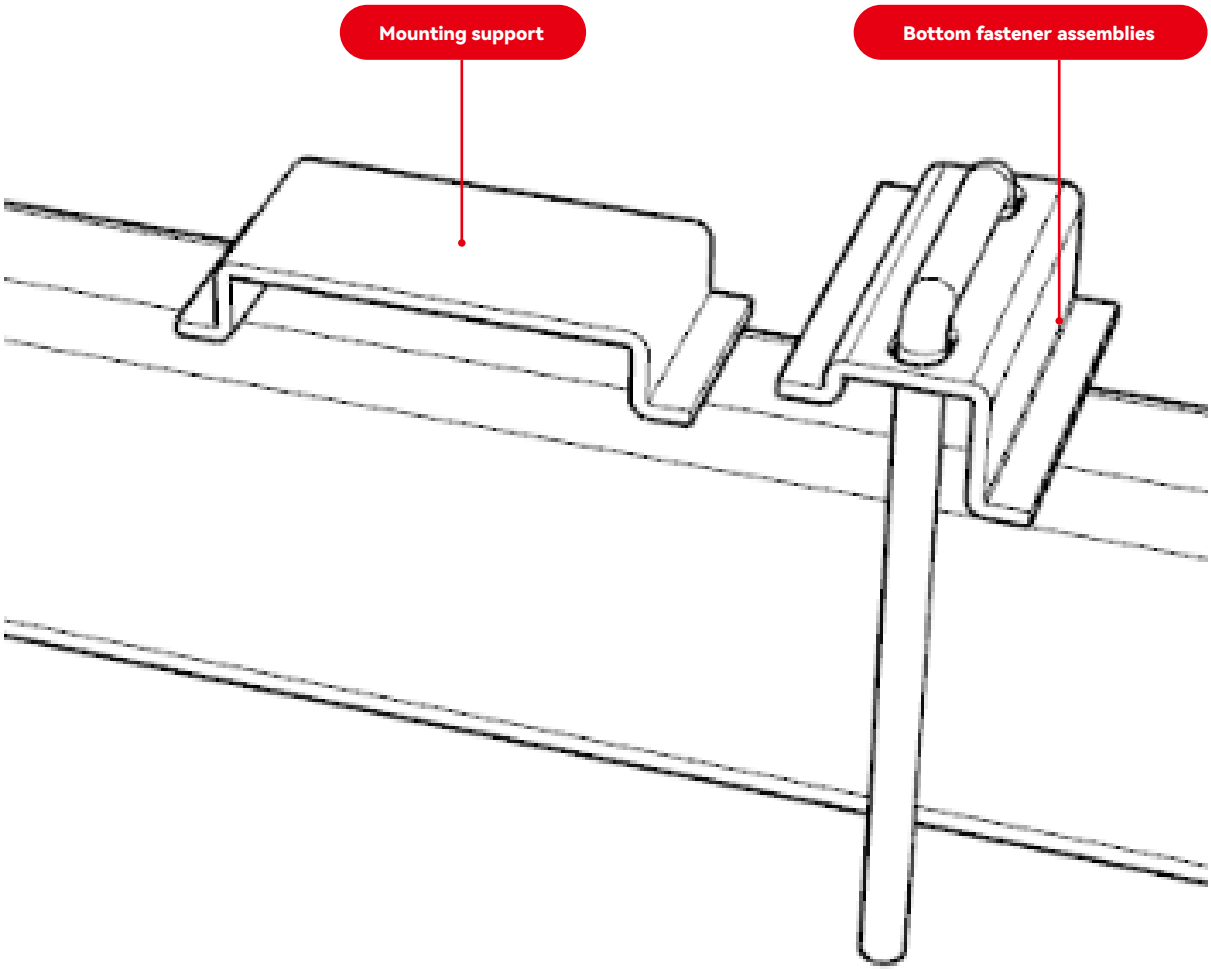


FIGURE 6

● Place the mounting support and bottom fastener assemblies on the other side; The distance between two mounting supports is 1147mm (Figure 7). Two bottom fastener assemblies are all located between the two Mounting supports.

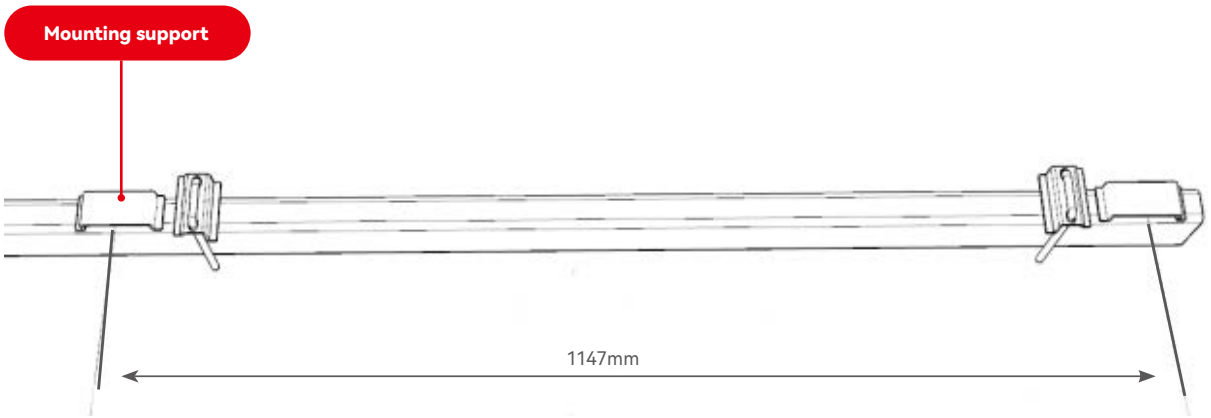


FIGURE 7

● Place the upper fastener assemblies on the second row of purlins and the position of mounting accessories are as follows (Figure 8) ;

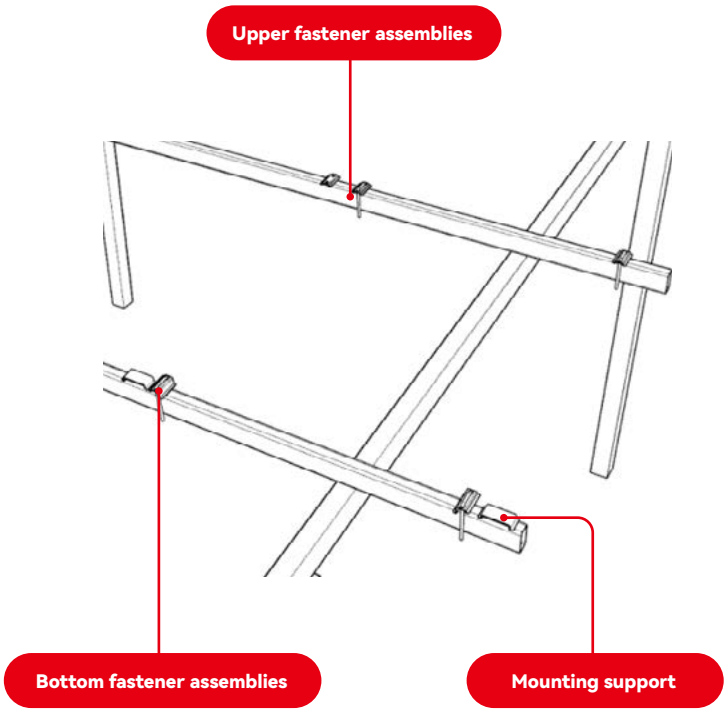


FIGURE 8

Product Installation:

● After the installation of the fittings is completed, the products are installed one row at a time from bottom to top. Firstly, install the products in the first row at the bottom, place them on the Mounting support, and make sure that the left and right frames are on the half of the mounting support.(Figure 9)

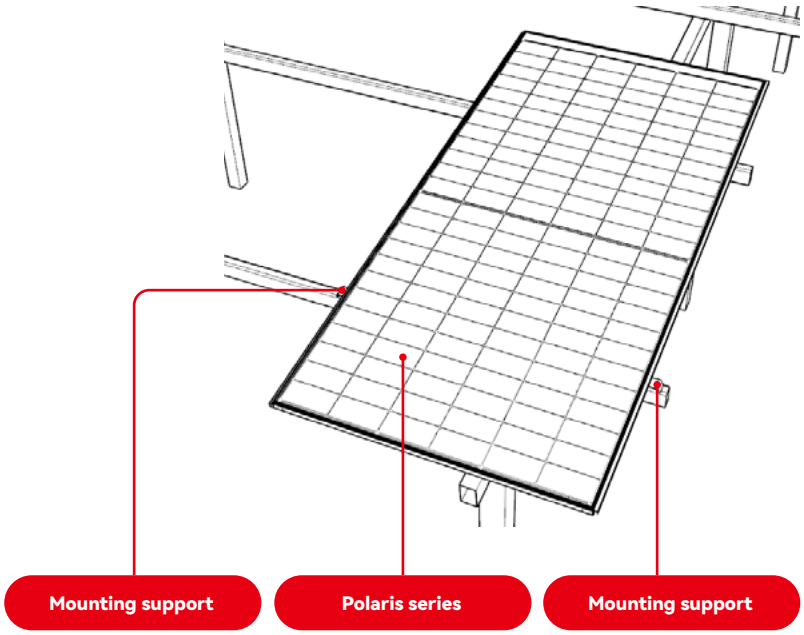


FIGURE 9

● Adjust the product to keep its length direction parallel to the main keel. The distance from the lower frame of the product to the center of the first row of purlins is 542mm, and the distance from the upper frame to the center of the second row of purlins is 545mm. (Figure 10)

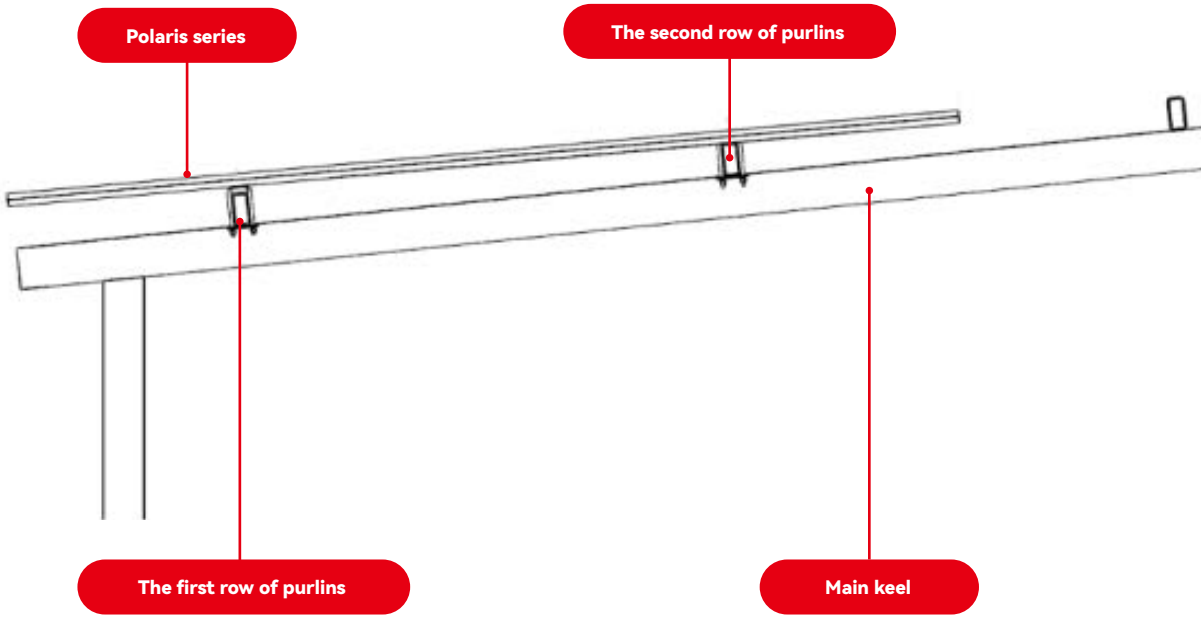


FIGURE 10

● Once the product position is determined, start installing the left-side upper fastener assemblies above the product (as shown in Figure 11). Place the upper fastener assemblies into the groove that contacts the second row of purlins and the product, and place the square plate at the opening of the hoop. Tighten the nut to fix the assembly onto the purlin. Similarly, install the right-side upper fastener assemblies (as shown in Figure 12).

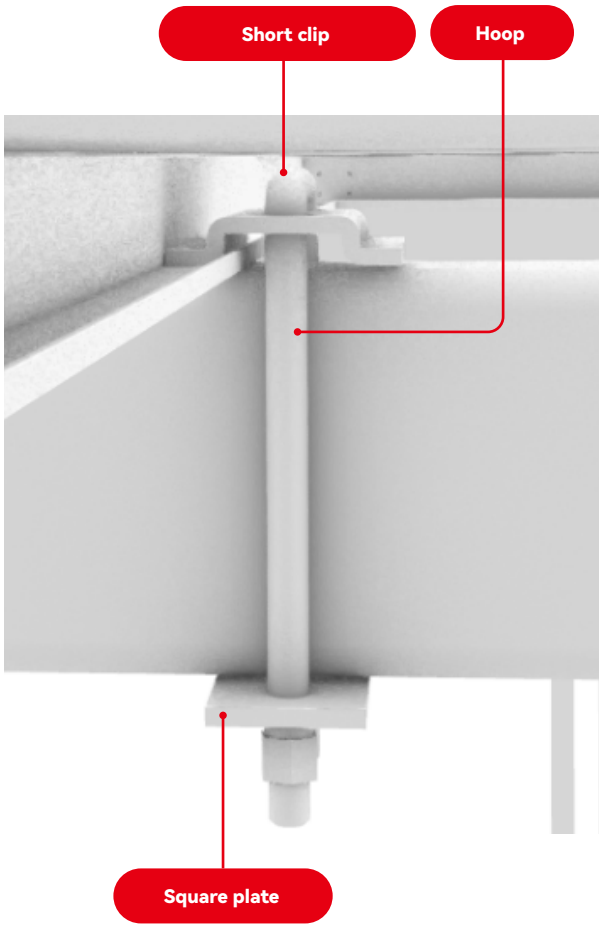


FIGURE 11

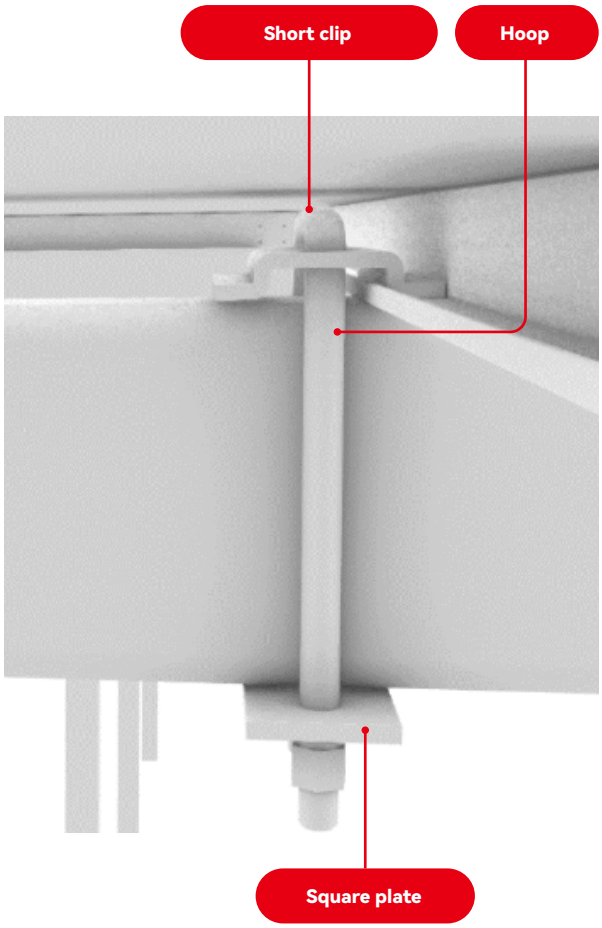


FIGURE 12

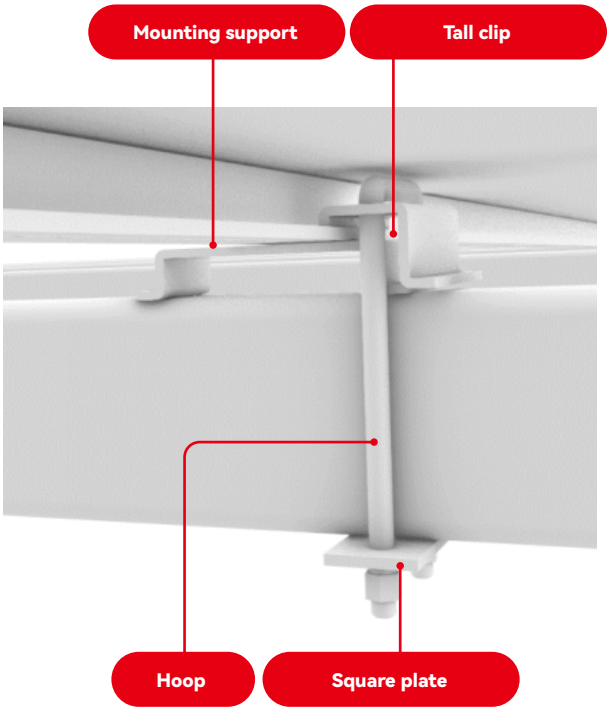


FIGURE 13

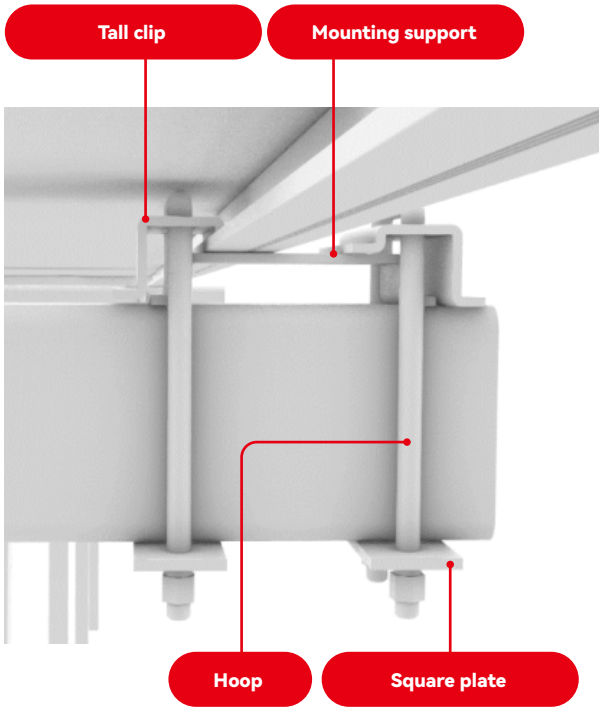


FIGURE 14

● Install the left-side support fitting assembly below the product (Figure 13). Place the bottom fastener assemblies into the groove of the product frame, and place the square plate at the opening of the hoop. Tighten the nut to fix the assembly onto the purlin. Similarly, install the right-side support fitting assembly (as shown in Figure 14). At this point, the first product has been installed.

● For the installation of the second product, first place upper fastener assemblies and mounting support in position (as shown in Figure 15). The distance between the two upper fastener assemblies is still 1147mm, and the two bottom fastener assemblies are still located between the two mounting supports.

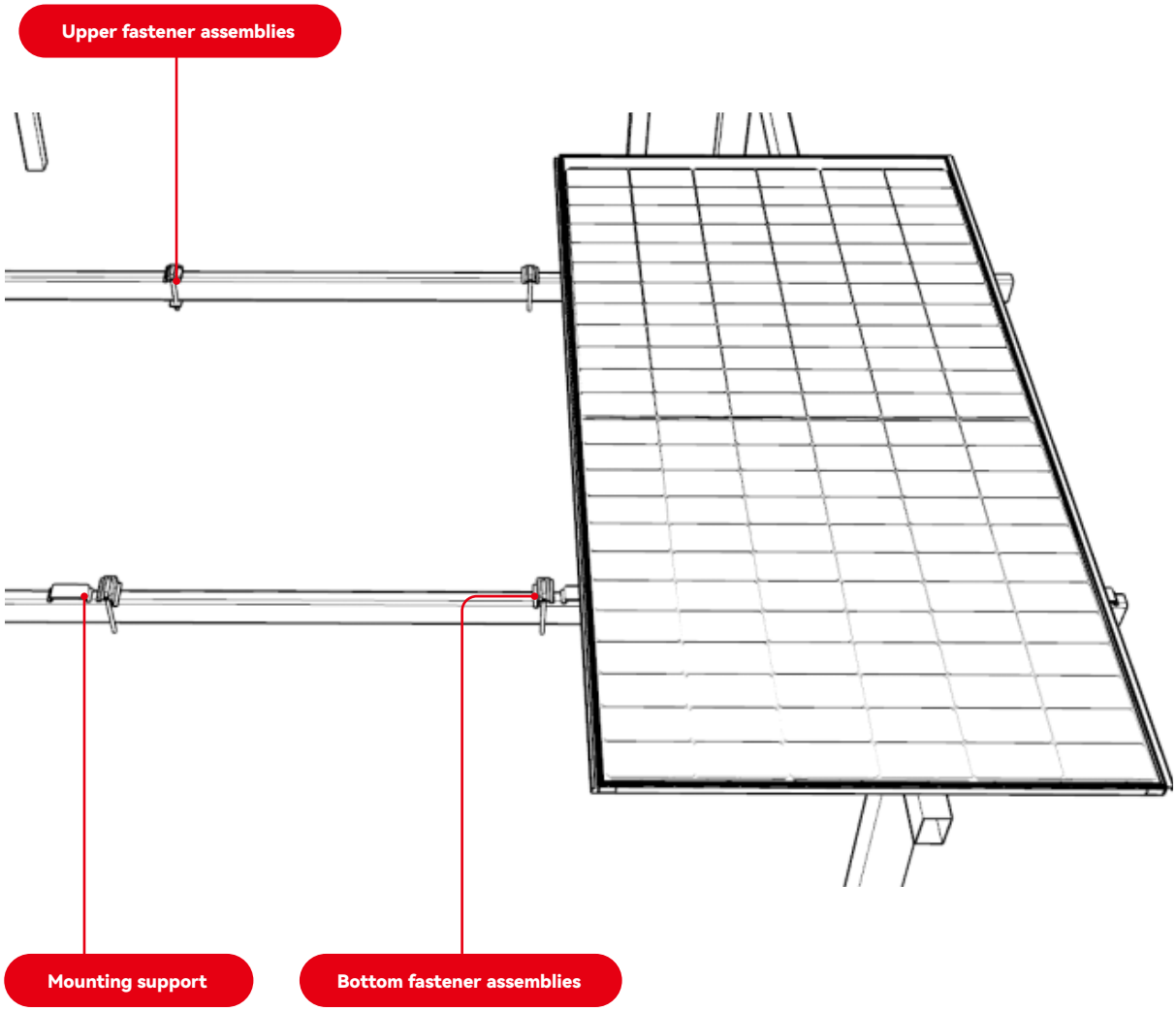


FIGURE 15

● Place the second product's right side tightly against the left frame of the first product and align the top and bottom edges with those of the first product (Figure 13);

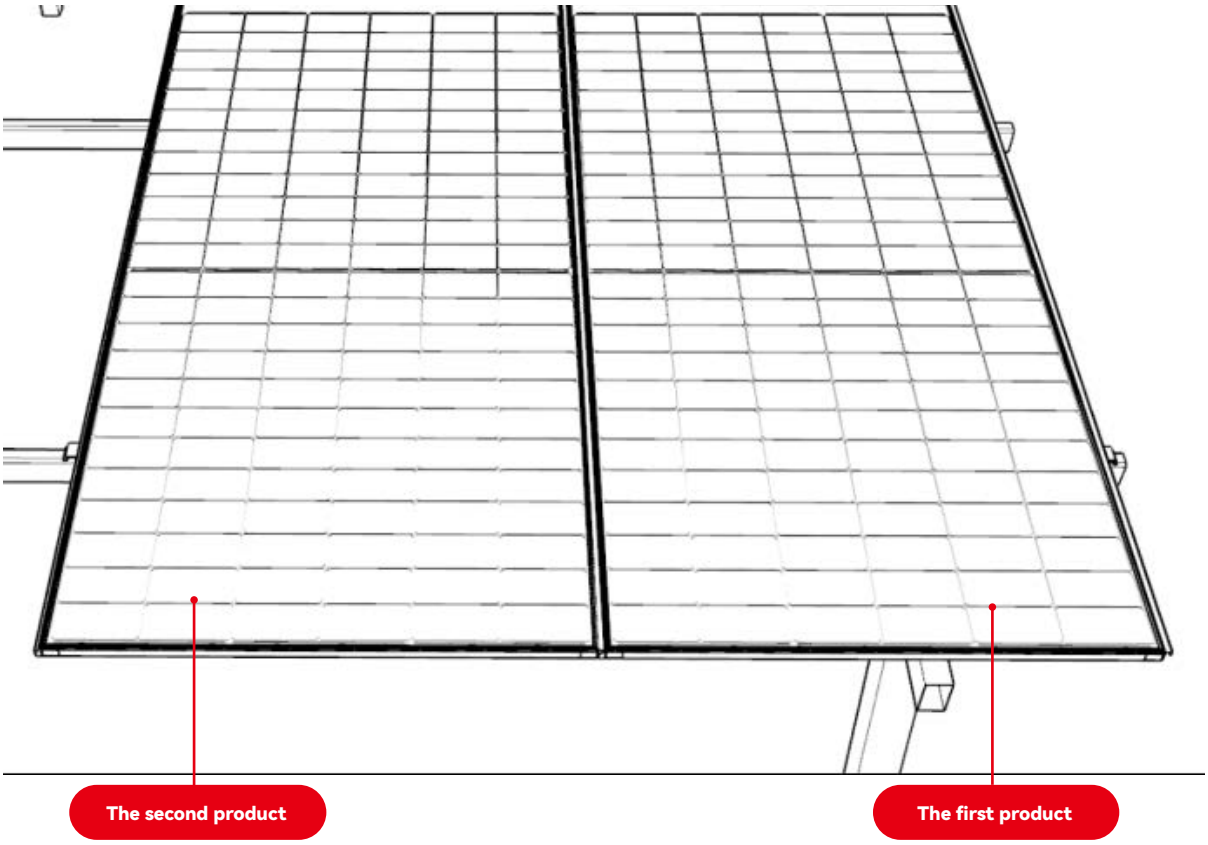


FIGURE 16

● Then, referring to the installation steps of the first product, install the upper left mounting clip assembly of the second product (Figure 17).

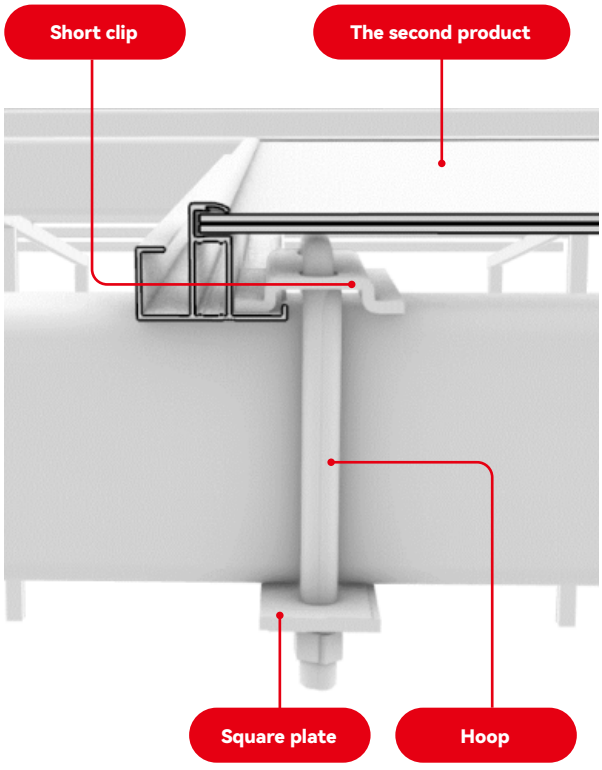


FIGURE 17

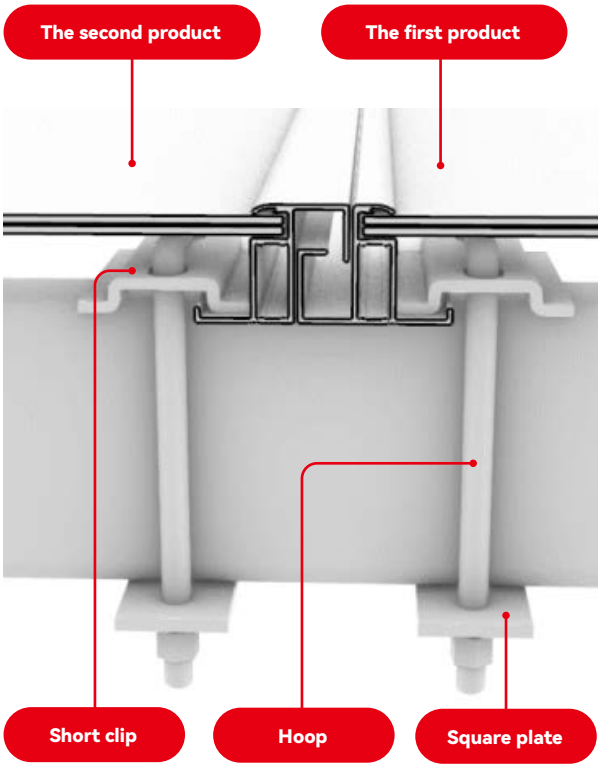


FIGURE 18

● Install the upper fastener assemblies on the upper right side of the second product, as shown in the section view in Figure 18;

● Refer to the installation steps of the first product and fix the Mounting support on the lower left of the second product. The section view is as Figure 19.

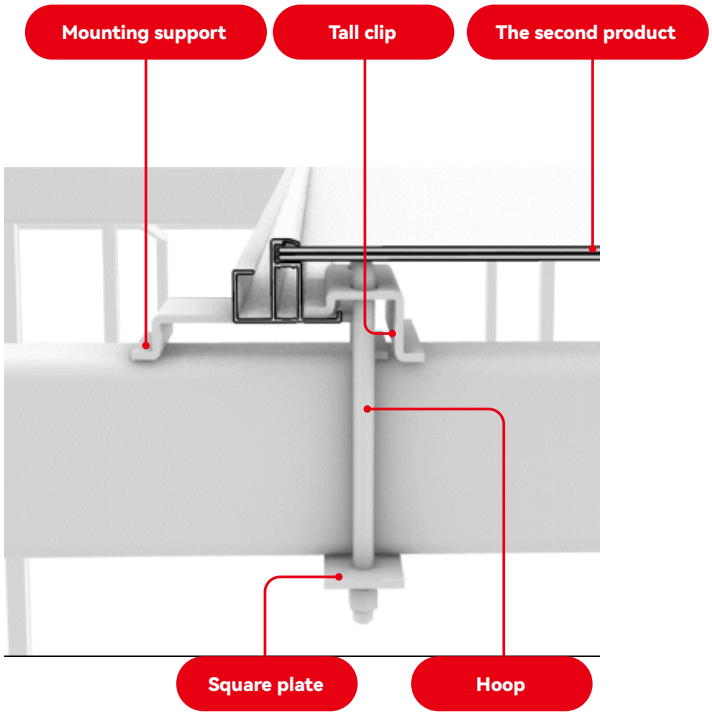


FIGURE 19

● Fix the fittings on the lower right of the product and the section view is as shown in Figure 20.

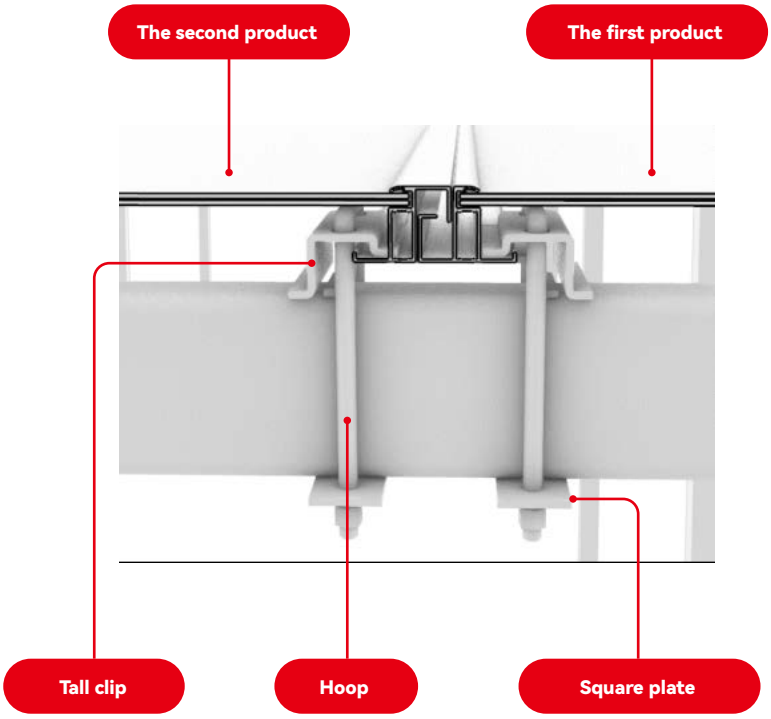


FIGURE 20

● Following the installation method of the second product, install the remaining products from right to left, until the first row of products is installed. (Figure 21)

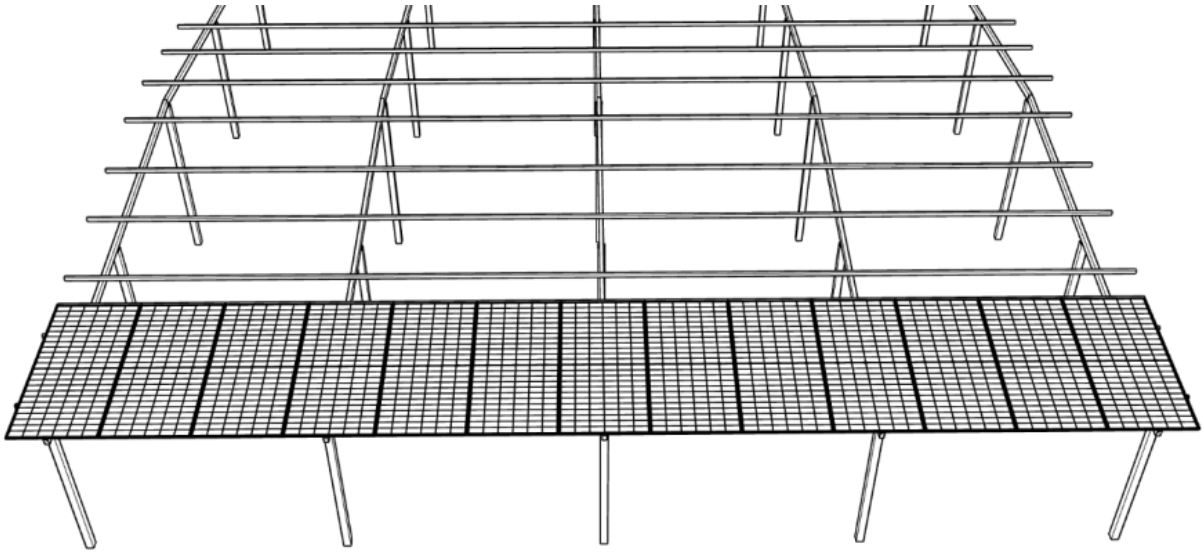


FIGURE 21

● Use tape to adhere the waterproof strip along the upper edge of the frame of the first row of products. Ensure that the edge of the waterproof strip is aligned with the upper edge of the frame (Figure 22). With this, installation of the first row of products is completed.

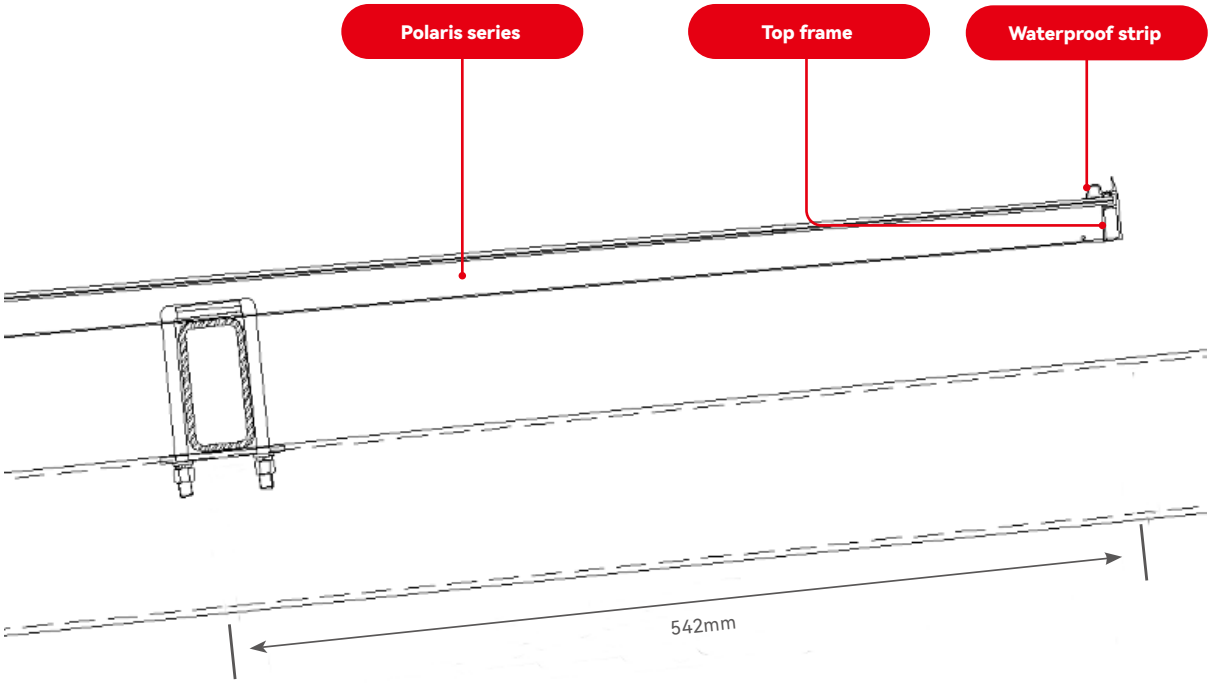


FIGURE 22

● Before installation of the second row of the products, install two positioning hooks on the bottom frame of the product. (Figure 23) The distance between two positioning hooks and the right and left frames should be 200mm (Figure 24).

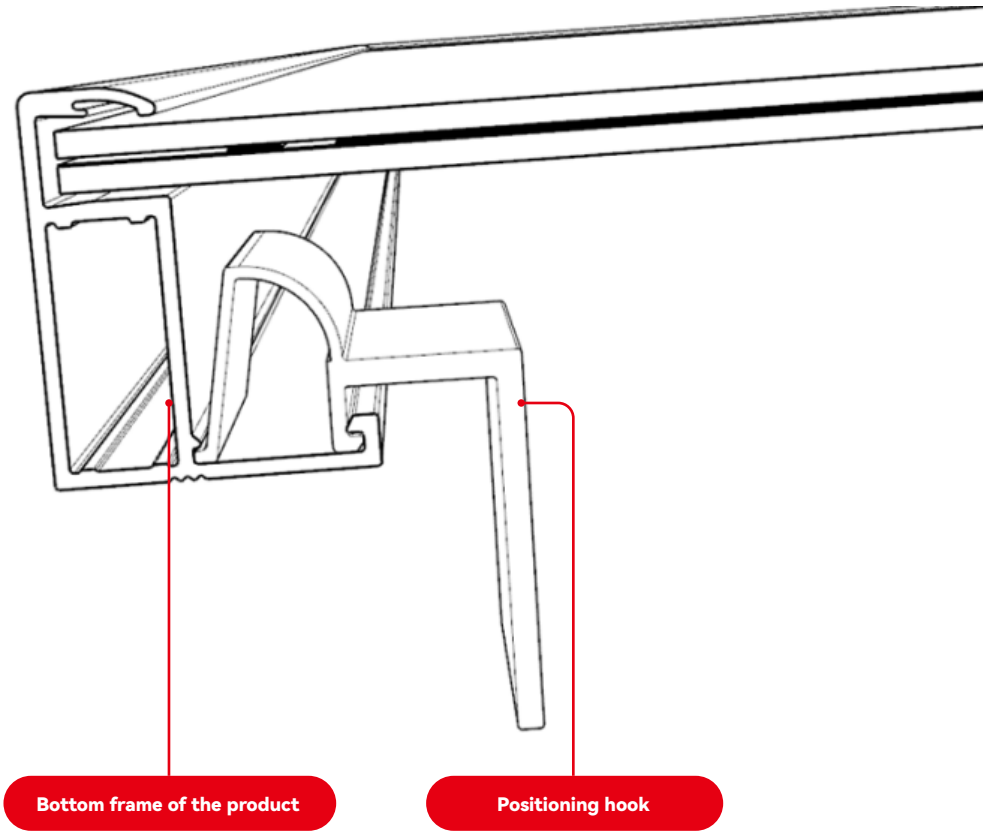


FIGURE 23

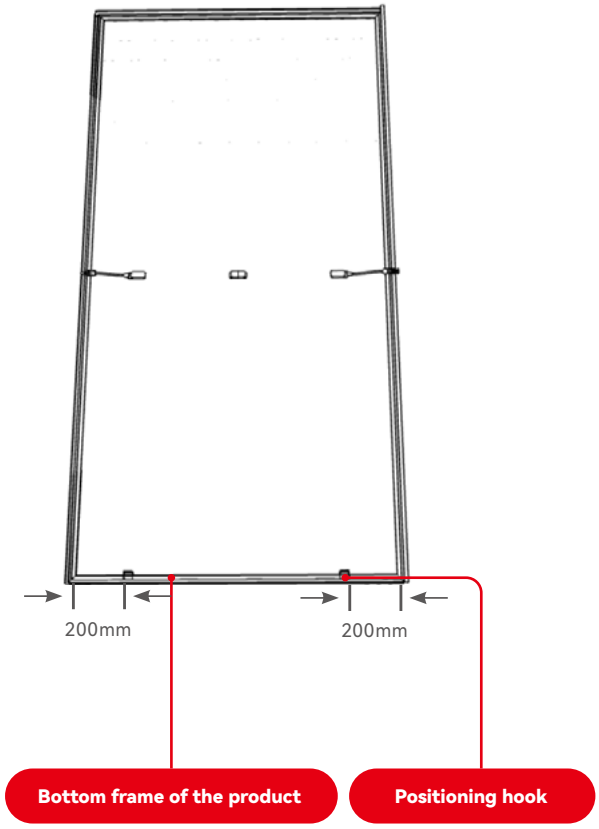


FIGURE 24

● Following the installation method of the first product in the first row, place mounting support and bottom fastener assemblies on the third row of purlins, and place upper fastener assemblies on the fourth row of purlins. Then, place the products with the installed positioning hooks on top of the first row, using positioning hooks for positioning in a lap joint manner. (Figure 25).

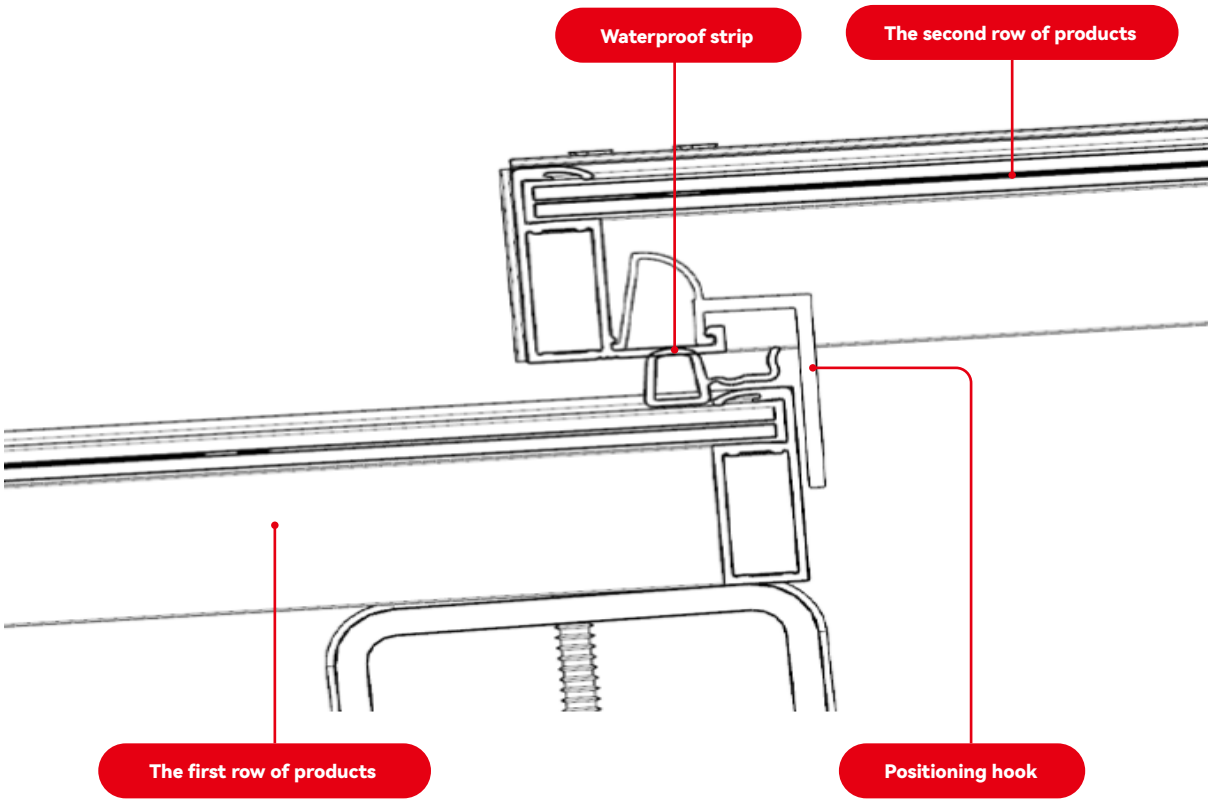


FIGURE 25

● The products are fixed according to the installation method of the first row of products, which are installed one by one, until the entire second row is installed (Figure 26).

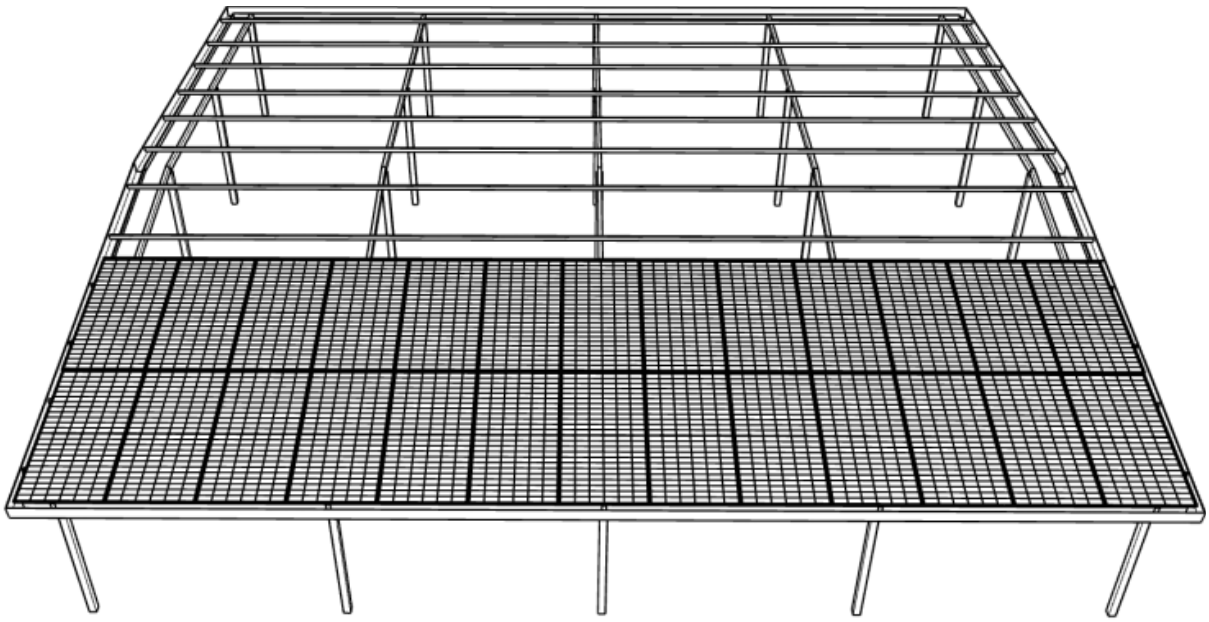


FIGURE 26

● Install the finished ridge gutter.(Figure 27)

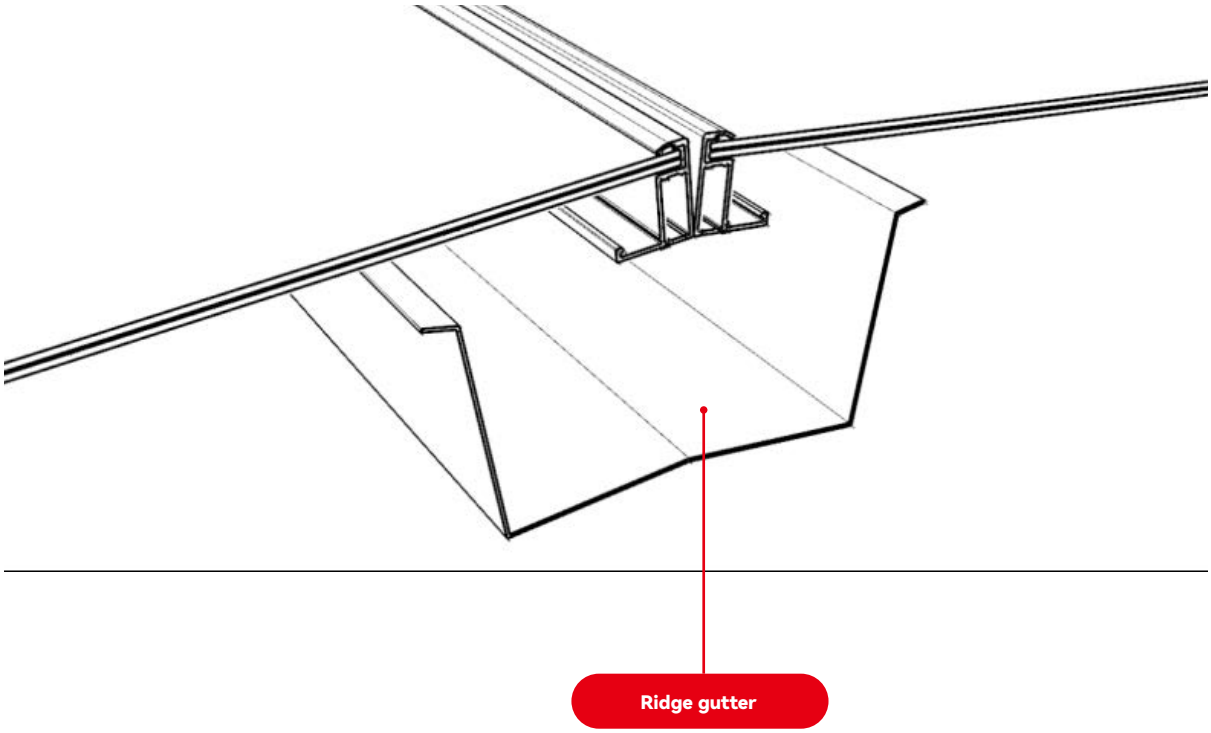


FIGURE 27

● Install row by row until the entire roof is completed (Figure 28). The top row of products does not need to be adhered with waterproof strip.

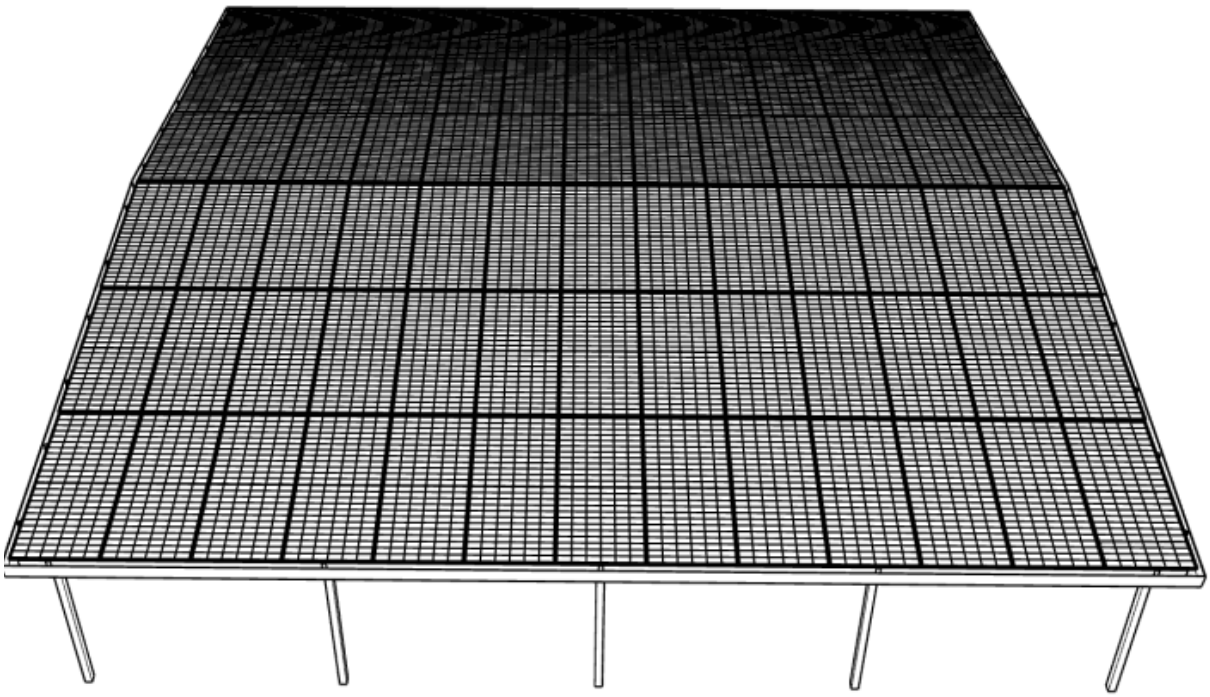


FIGURE 28

● Install the finished gutter around the perimeter (Figure 29) to complete the installation.

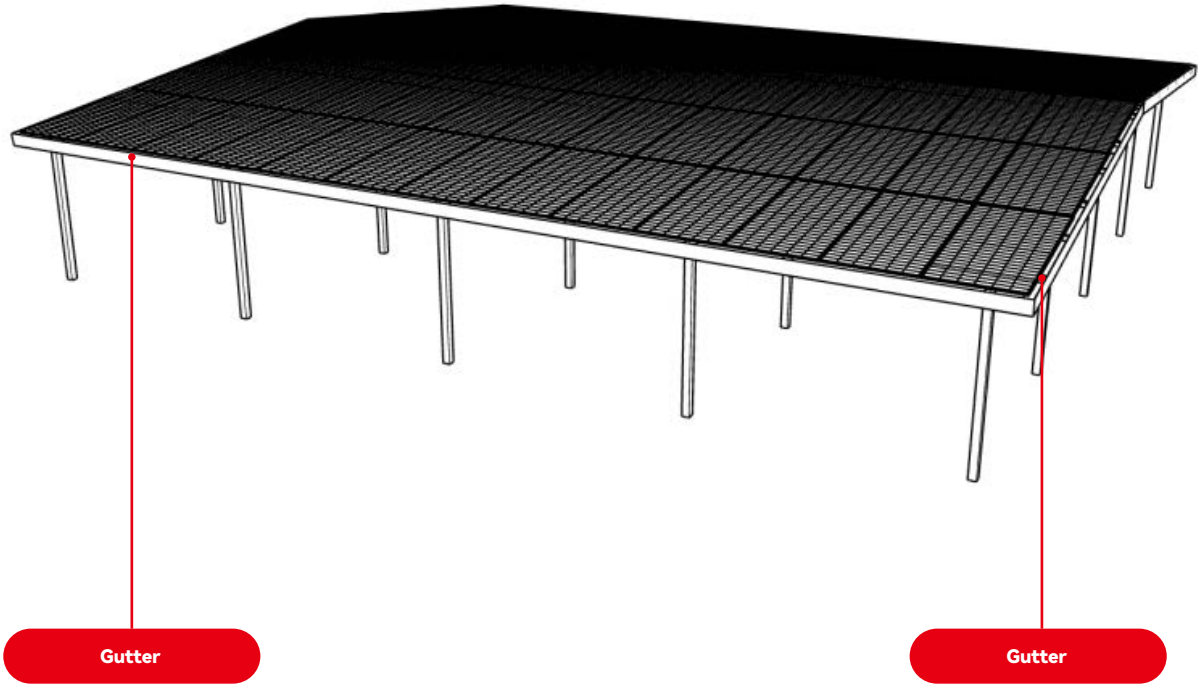


FIGURE 29

6 ELECTRICAL INSTALLATION

6.1 ELECTRICAL PROPERTIES

Electrical properties

● When the products are connected in a string, the final voltage is the sum of a single product. When the products are connected in parallel, the final current is the sum of a single product, as shown in Figure 30. Products of different electrical properties models cannot be connected in a string.

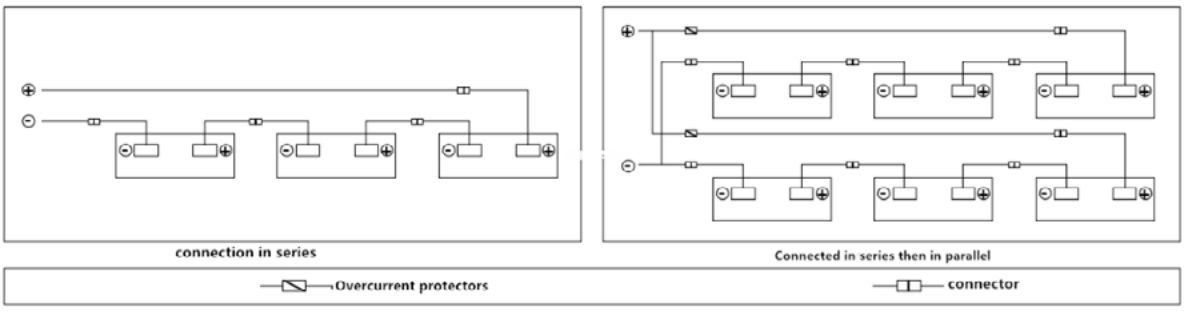


FIGURE 30 SERIES-PARALLEL ELECTRICAL DIAGRAM

● The maximum quantity of single-string products that can be connected in series must be calculated according to the requirements of the relevant regulations. The value of the open-circuit voltage at the expected minimum local temperature conditions must not exceed the value of the maximum system voltage specified for the product (the maximum system voltage for the product is DC1500V - the actual system voltage is designed according to the selection of the product model and inverter) and the value required for other DC electrical components.
● The open circuit voltage correction factor can be calculated according to the following formula: CVoc=1-βVoc×(25-T). T is the minimum expected ambient temperature at the system installation location and β(% /° C) is the temperature coefficient of the selected product Voc (refer to the corresponding product data sheet).
● If a reverse current exceeding the maximum fuse current of the product may pass through the product, an overcurrent protection device of the same size must be used to protect the product. If the number of parallel connections is greater than or equal to 2 strings, there must be an overcurrent protection device on each string.

6.2 CABLE AND CONNECTION WIRE

● The Polaris series should be connected by using IP68 rated junction boxes, which should 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 IP68 rated connectors to facilitate series connection between products. A single product has two separate wires connected to the junction box, one positive and one negative. The two products can be connected in series by inserting the positive connector into the socket of the negative lead of the adjacent product.
● Use dedicated solar cables and appropriate connectors (wires should be encased in age-resistant conduit or, if exposed to air, they 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 need to use a single-core PV-specific cable with appropriate insulation to withstand the maximum open-circuit voltage (as approved by EN 50618). Appropriate wire sizes need to be selected to reduce the voltage drop.
● All wiring and electrical connections meet the requirements of the appropriate National Electrical Code. When fixing the cable to cable bracket, avoid mechanical damage to the cable or the product. Do not squeeze the cable by force. The cable must be fixed to the bracket by specially designed aging resistant cable ties and cable clips. Although the cable is resistant to aging and water, it should be protected from direct sunlight and rain.
The minimum bend radius of the cable should be 43mm.

FIGURE 31 MINIMUM BENDING RADIUS OF THE CABLE

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 any other unfavorable condition. 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 vapor and dust as soon as possible after the module is mechanically installed to the roof. Avoid having connectors being exposed to direct sunlight and immersed in water. Avoid having connectors falling on the ground or on 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 a solar module 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 REQUIREMENTS FOR PRODUCT INSTALLATION

Inspection before installation.
● No visible defects.
● Models and specifications should meet the requirements of the design drawings.
● Accessories and spare parts are available;
Main tool preparation
● Multimeter: For measuring the open circuit voltage of the product.
● Electric welding machine: For bracket lightning protection and grounding operations.
● Angle measuring instrument, level, etc.: measuring the installation angle of the array.
● Installation tools and accessories mentioned in section 3.

6.6 MATERIAL PREPARATION

Please check the correct type and quantity of the arriving material according to the list above the configuration sheet.
Product electrical wiring requirements
● Wiring with clear, unambiguous and easily understood wire number identification.
● Jumper cable diameter must be longer than the product line cable diameter, and the flame retardant and insulation performance should not be worse than that of the original product cable.
● Products should be connected to each other in the shortest possible way. For products

that require long straddle connections, try to minimize the difference in the total length of the cables connected to each group of strings.

● The wiring terminals should be in good contact. When connecting each part of the product in series, a multimeter should be used to test if there is broken parts along the wire.

6.7ELECTRICAL WIRING OF THE PRODUCT

● Please wiring in accordance with the way in the electrical schematic.

● For products connected in series, the "+" pole of one product is connected to the "-" pole of another product. Extension cables are required if connection of products between different rows is needed. Please use extension cables that are for solar application specifically. (Figure 32)

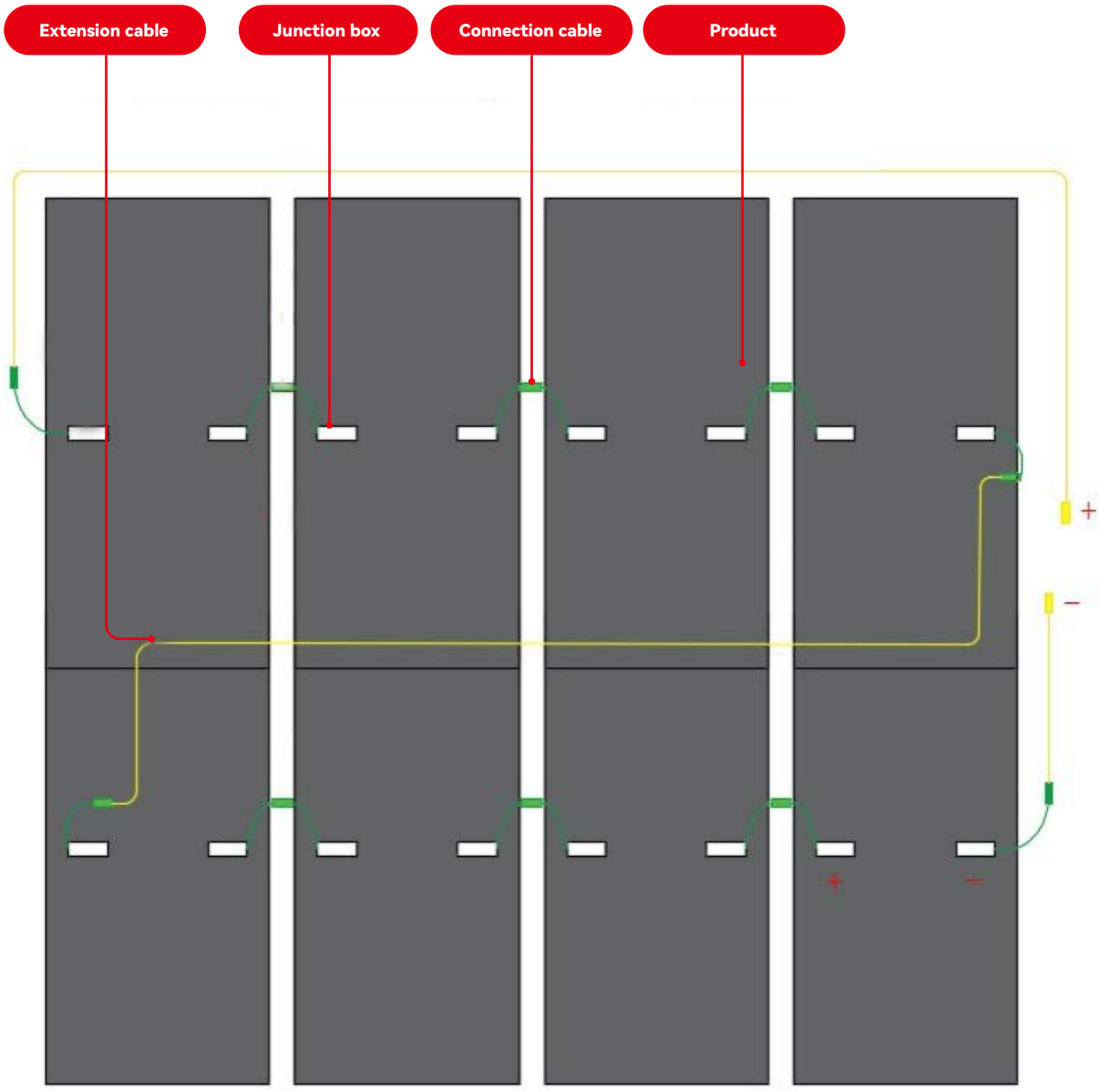


FIGURE 32 PRODUCT JUMPER CONNECTION OPERATION INSTRUCTION (BACK VIEW OF THE ROOF)

● When a group of series connections are connected as shown in the drawing, the remaining group of "+" and "–" pole terminals are connected to the combiner connector or combiner box.
● Parallel connection of all accessory strings are done at the combiner connector or combiner box.
Note: This document only describes the wiring requirements and wiring principles. Since the roof of each site may not be the same, it is not possible to make uniform wiring process for each project here. Wiring can be done later in accordance with the product installation layout drawings in each project.

6.7 STRING COMBINER BOX INSTALLATION REQUIREMENTS

● Please connect the combiner kit to the product array according to the electrical schematic.
● Docking plugs to be plugged in place and firmly connected.
● The combiner kit can be fixed on the bracket, the alignment is neat and easy to maintain.
● The connection of the cable should avoid cable stress and friction due to wind-blown vibration and damage to the outer skin of the cable.
● After the butt terminals of the convergence kit are connected, use the same cable clamps as the butt terminals of the product to clamp up the ends of the terminals.

7 SYSTEM CONSTRUCTION

7.1 CONSTRUCTION PROCESS

Operating conditions
● Assembly of product array is completed.
● Installation of inverter and distribution box is completed.

Preparation of main tools
● Impact drill: For drilling holes in the installation position of PVC and other line pipes and pipe cards.
● Crimper: For on-site DC cable splice plug production.
● Multimeter, megohmmeter: For cable conduction and insulation testing.
● Wire stripping pliers: for cable stripping.

Main Materials
● DC cables for photovoltaics.
● AC cables.
● Cable DC connectors use the same type of the product or a compatible one which satisfy local standards and requirements.

Installation Engineering Process

Determine the cable run and AC/DC conduit requirement after on-site measurement

- Conduit is required for cables between array and inverter.
- Conduit is required for cables between inverter and distribution box, distribution box and household electricity box.

Conduit laying requirements

- When laying electrical conduits on the wall, they should be laid in the corners of the wall, in the same direction along rainfall pipes and air-conditioning pipes.
- It is advisable to avoid the crossover of AC and DC directions in the piping between equipment.

Cable laying

Requirements for cable laying:

- When wiring each system, the type of conductor, voltage level, etc. are inspected according to the provisions of the current national standards.
- Remove water and debris from the conduit or wire channel before threading.
- When using the crimping method to connect the wire, the specifications of the terminal copper sleeve crimp should be consistent with the cross-section of the cable core.
- AC and DC cables should be run in different conduits to ensure safety.
- After the cable is installed, the joints should be glued and sealed to prevent water from seeping into the conduit. The opening of exposed conduits should be plugged with soft cloth to avoid the entry of foreign objects.
- Cable bending radius ≥ 6D.
- Wiring through conduits to avoid high temperature heat generating objects as much as possible.
- Conduits need to be secured by conduit clips.
- The AC and DC cables connected to the inverter and distribution box should to be marked with the cable number at both ends.

DC side cable connector installation.

- Arrange cable connectors and pins according to their intended polarity.
- Strip the DC PV cable by using wire strippers according to the length of the copper core pins.
- Insert the DC PV cable into the pins, and crimp the pins.
- Insert the pins into the male and female connectors and fasten them with the special screwdriver.
- Plugging in the male and female cable connectors and test the tightness of the connection.

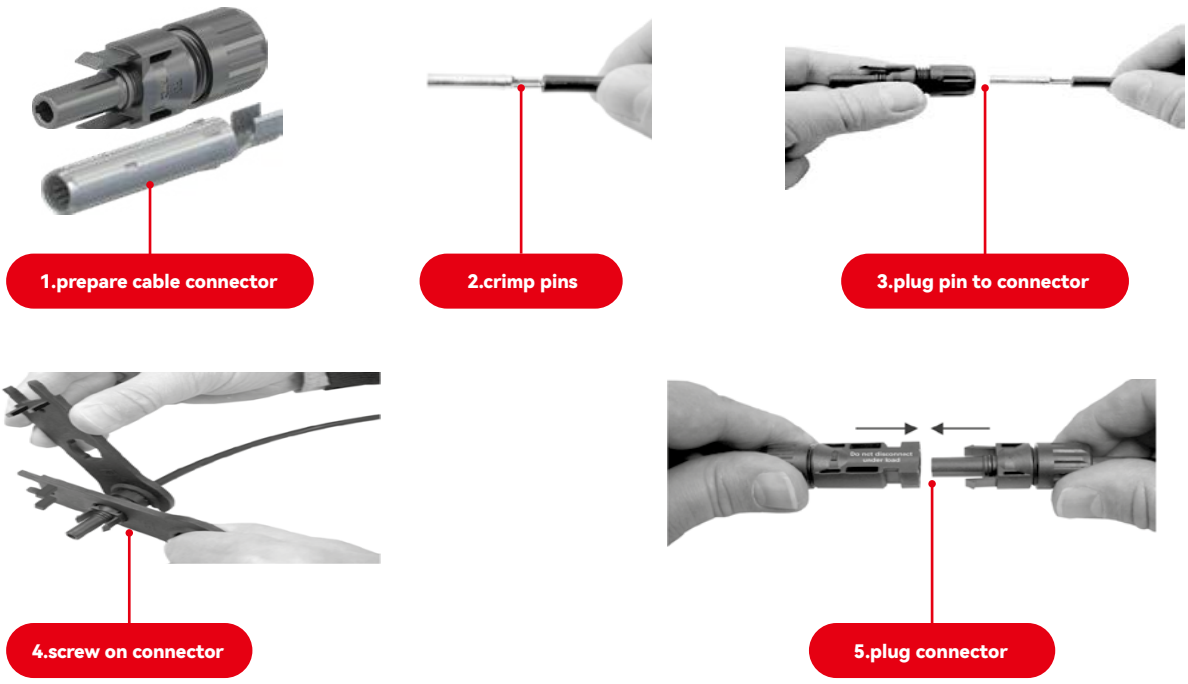


FIGURE 33 CABLE CONNECTOR PRODUCTION METHOD

Sub-project requirements

- PVC flame-retardant rigid plastic pipe and its attached oxygen index should be 27% or more.
- Insulation of the cables should be tested before being threaded into conduits.
- The minimum allowable bending radius of the cable laid through the pipe is six times of cable diameter.
- The conduit clip spacing of exposed conduits should be:

Φ20 pipes are laid openly along the wall with a maximum distance of 1.5m between pipe clips;
Φ25 pipes are laid openly along the wall with a maximum distance of 2m between pipe clips.
Allowable value of deviation for the laying of open piping.

Straightness	<1.5mm/m
Verticality	<1.5mm/m

- Cables from different circuits, different voltages or AC and DC cables, should not be worn in the same conduit.
- There shall be no joints in the wires in the conduits.
- Connect the plugs tightly.

7.2 LIGHTNING PROTECTION & GROUNDING

Lightning protection

- Refer to the "GB 50057-2010 Building Lightning Protection Design Code" when implementing.

Functional grounding - Repeated grounding of distribution boxes and inverters
Functional grounding:

- Repeat grounding for distribution boxes and inverters. Use tinned copper braid or soft

copper wire to connect the grounding row of the equipment to the grounding electrode across.
Note:
This conductive layer on the inside of the glass cover cannot be repaired once it is damaged, and can cause significant power loss.

Grounding resistance measurement:
● The comprehensive grounding resistance value of the system is required to be no more than 4Ω

Pre-commissioning check
● Connect the product array, inverter and AC grid correctly according to the installation procedure described previously. Ensure that the AC and DC side voltages meet the machine start-up conditions.

Product array
● Before the inverter is turned on and running, the product array on the site needs to be checked to see if the open circuit voltage of each product meets the requirements.
① Record all measured values on site accurately.
② Ensure that the positive and negative polarity is correct, otherwise the machine can be seriously damaged.
③ Use megohmmeter to test the positive pole and negative pole of each product array to the earth insulation resistance> 40MΩ.

Newsletter and Accessories
● Check whether the communication cable is properly and firmly connected, and whether the shield is well grounded (preferably with double-ended grounding).

Network
● Checking whether the network can be connected to the outside (sending data).
● Check if you can read data from external connections (remote services).

Power generation trial run
● Ensure that the above inspection items meet the requirements.
● Close the DC input side circuit breaker.
● Close the grid-side circuit breaker.
● The inverter will start itself and generate electricity on the grid when the conditions required for normal operation of the machine are met.
● The grid-connected inverter requires no human control after normal operation and has automatic shutdown and start-up functions after a fault.

Shutdown process
● The grid-connected inverters will shut down when the sun is not enough to generate electricity.
● Emergency shutdown process: When there is a danger of electric shock to personnel or

other emergencies, please disconnect the grid side circuit breaker and DC side circuit breaker.

7.3 SAFETY PRECAUTIONS

Electrocution operation requirements:

● Requirements: Professional electricians and welders are required to be licensed to work.

Product DC side connection

● DO NOT open the junction box on the back of the product.

● DO NOT touch the positive and negative poles of the product with your hands at the same time.

● DO NOT unplug the positive and negative terminals of the string directly under the normal operation of the inverter.

● DO NOT apply mechanical force to the back of the product.

● Measure the positive and negative insulation resistance to ground after the DC line between the square array and the inverter is laid to avoid grounding electrocution accidents caused by the broken outer skin of the cable.

Wiring of inverter and distribution box side

● After the AC cable is laid, first carry out the measurement of insulation resistance between each phase, zero and ground. Only after the measured resistance value is qualified, you can carry out electrical commissioning.

● Stripping length should meet construction process requirements when producing cable head. The cable needs to be crimped tight with no false connection when it is into the circuit breaker.

8 OPERATION AND MAINTENANCE

Products require regular inspection and maintenance, especially during the warranty period. To ensure optimum performance, GOODWE recommends the following measures:

8.1 VISUAL INSPECTION:

Visual inspection of the product for damage or other conspicuous features, focusing on the following:

● Whether the glass of the product is broken.

● Whether corrosion has occurred near the fingers of cell, which is caused by water vapor entering the product due to breakage of the surface encapsulation material during installation or transport.

● Whether the back plate of the product has broken.

● Whether the product has signs of ageing, including animal damage, weathering, corrosion

and whether the connection of connectors are tight and whether the products are well grounded.

- The surface of the product should not be touched with sharp objects;
- The products should not be shaded;
- Whether there is any loosening or damage to the fixing of the product to the purlin or to the base. Please make timely adjustment or repair if any damage is identified.

8.2 CLEANING

- Dust and dirt on the surface of the product will reduce the power output. GOODWE 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.
- Please remove snow and ice without force. Please use a soft broom in order not to damage the protective layer of the product.
- Do not use rough and sharp tools to clean products.
- To reduce potential electric shock or burns, GOODWE recommends cleaning the product in the early morning or late evening when there are low irradiation levels and low temperatures.
- Do not clean products with broken glass or back plates, exposed wires or broken features to avoid the risk of electric shock.
- Always wear rubber gloves whilst servicing, washing, or cleaning the modules and pay attention to the connection of cables and electrics.

8.3 CONNECTORS AND CABLE CONNECTIONS

It is recommended to carry a preventative inspection every 6 months

- Check whether the junction box sealant has cracks or gaps.
- Check whether the connectors are sealed and the cable connections are secure.

9 DISASSEMBLY AND REPAIR

If the installed product is damaged or malfunctioned, you need to repair and replace the damaged parts as soon as possible. For the maintenance and replacement, please refer to the following detailed steps.
Please wear non-slip shoes or non-slip shoe cover, when disassembling the products.

9.1 PRODUCT DISASSEMBLY

- Firstly, disconnect the cable connectors of the target product
- Secondly, remove the nuts of the hoop on the long side frames of the target product and the product on the left side, and remove all the installation fittings at the upper end (Figure 34) and lower end (Figure 35).

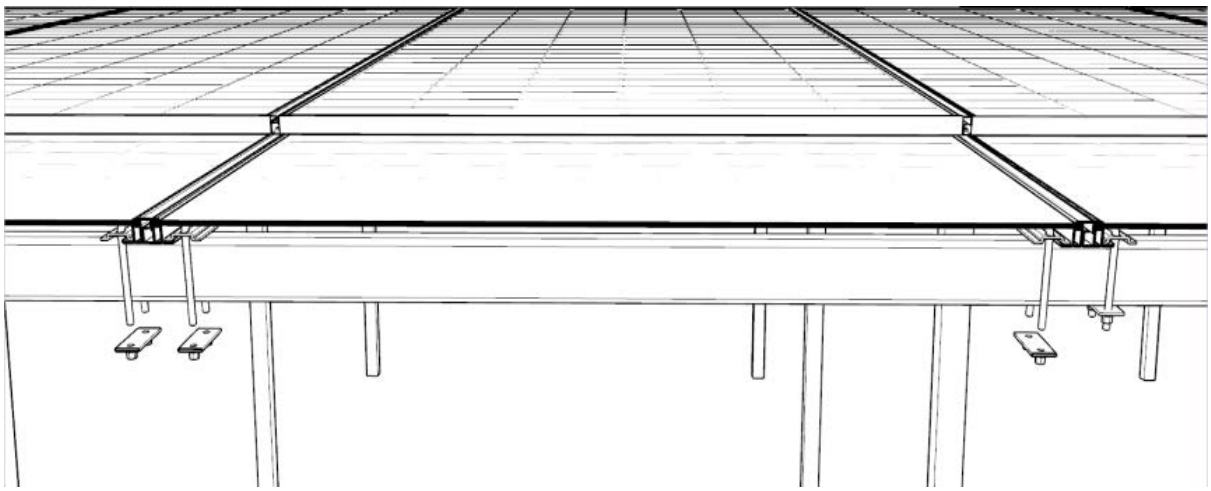


FIGURE 34

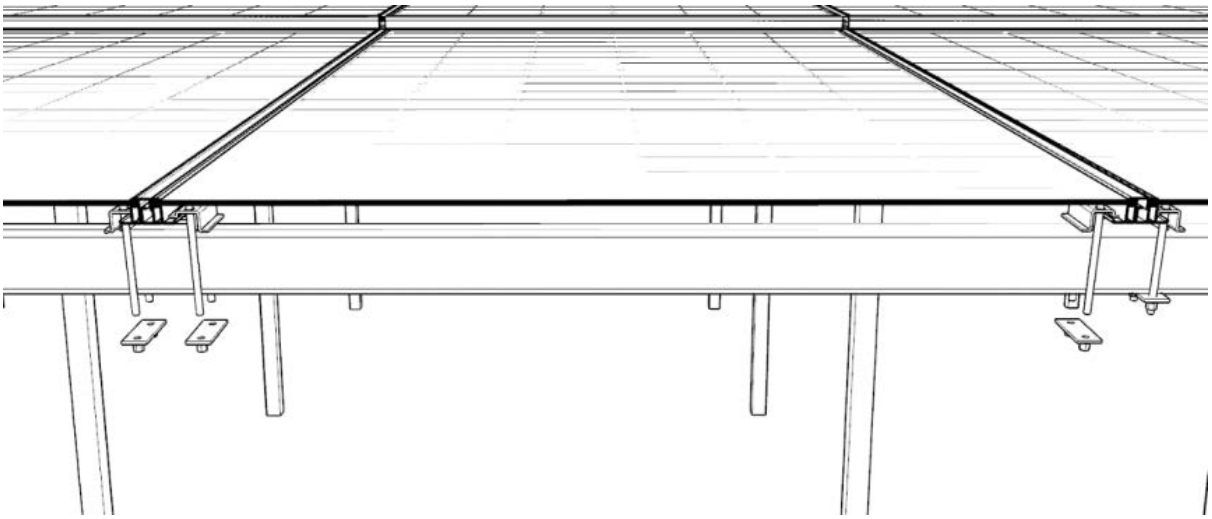


FIGURE 35

● Peel off the waterproof strip on the upper frame of the target product and then slightly lift the right frame of the left product adjacent to the target product. (Figure 36)

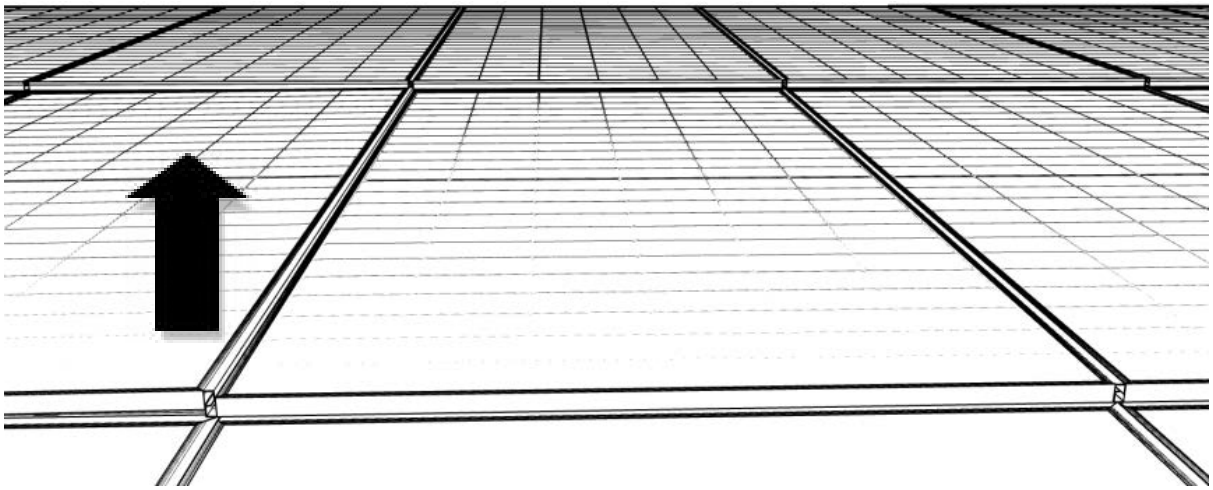


FIGURE 36

● Move the target product slightly downward to detach it from the lower frame of the upper product.(Figure 37)

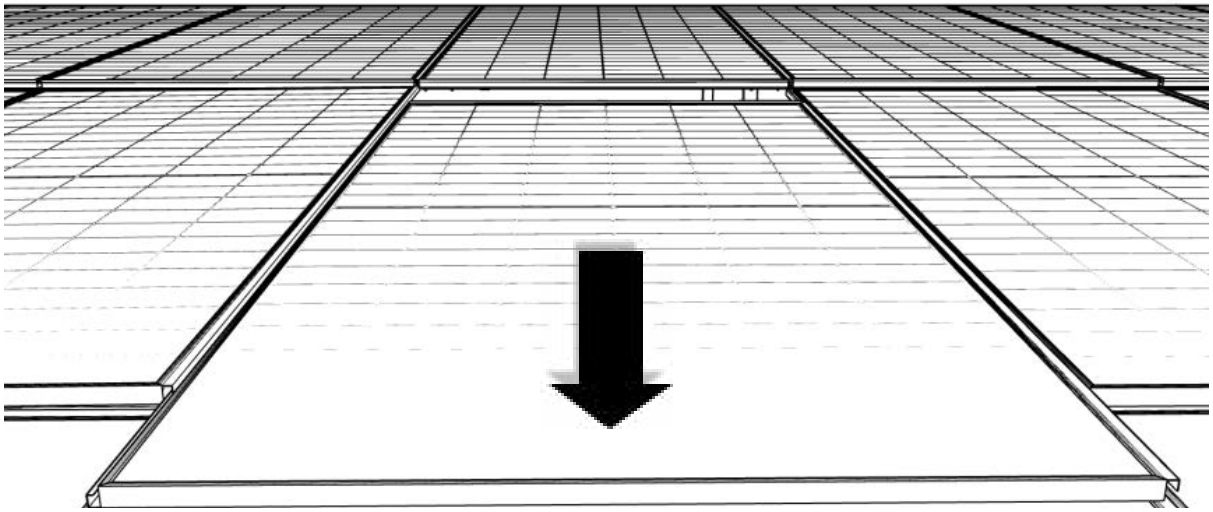


FIGURE 37

● Move the target product slightly downward to detach it from the lower frame of the upper product.(Figure 37)

● Lift up the target product and remove the whole product. (Figure 38)

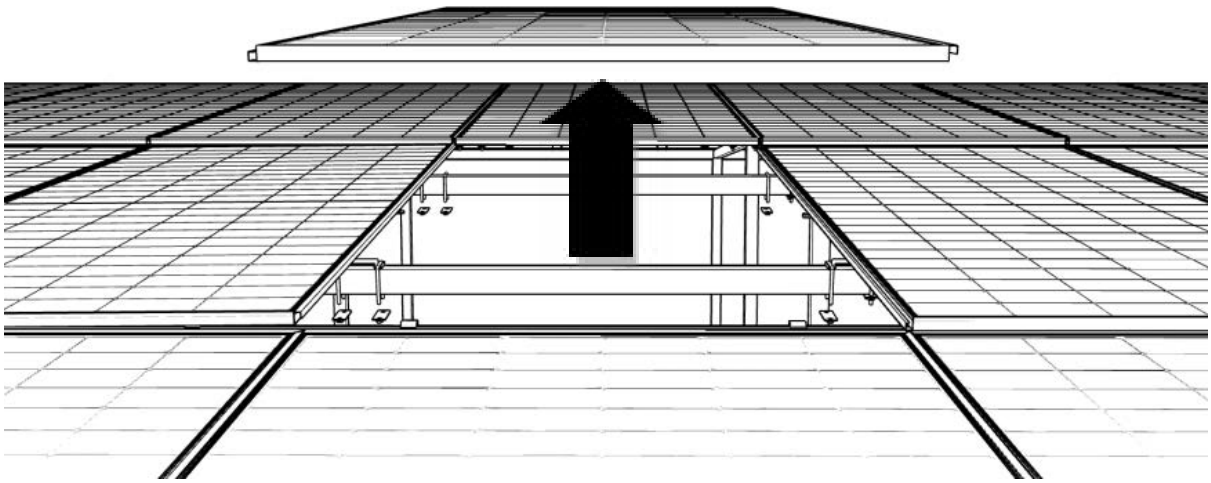


FIGURE 38

9.2 PRODUCT REPLACEMENT AND INSTALLATION

● Loosen the product fasteners above the replaced product to make the lower frame lifted slightly.
● Insert the left frame of the new product under the right frame of the product on the left side, so that the frames fit tightly together.
● Push the upper frame of the new product from bottom to top into the positioning hook of the product above the original target product, ensuring that the left and right gaps between the two products meet the requirements and the upper and lower parts of the two products are properly overlapped.
● Adjust the position of the waterproof strip of the replaced product and fix it in place.
● Use installation clamps to re-fix the long borders of the replaced product, the product on the left side, and the product above it.
● Connect the leads of the replaced product with those of the other products securely, and check if the circuit is properly connected.
● The replacement installation is completed.

10 CAUTIONS

- All electrical installations must meet electrical installation standards and be completed by an electrical professional. Ensure that all input and output switches are off.
- Do not connect the DC input to the inverter output and prohibit the output circuit from being short-circuited or grounded.
- In order to reduce the power loss of the DC input, the connection line to the inverter should be as short as possible.
- Different color 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 black cable.
- To ensure balance between the product strings, the selected DC cables should have the same cross-sectional area.
- Make sure to use opaque material to cover the product or disconnect the DC side before making electrical connections.
- The grounding terminal of the system must be reliably grounded, and make the length of the grounding wire as short as possible. Do not ground together with other high-current equipment such as welding machines and motors.

MANUFACTURER

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