

Component
User Manual

Lightweight Module
User Manual

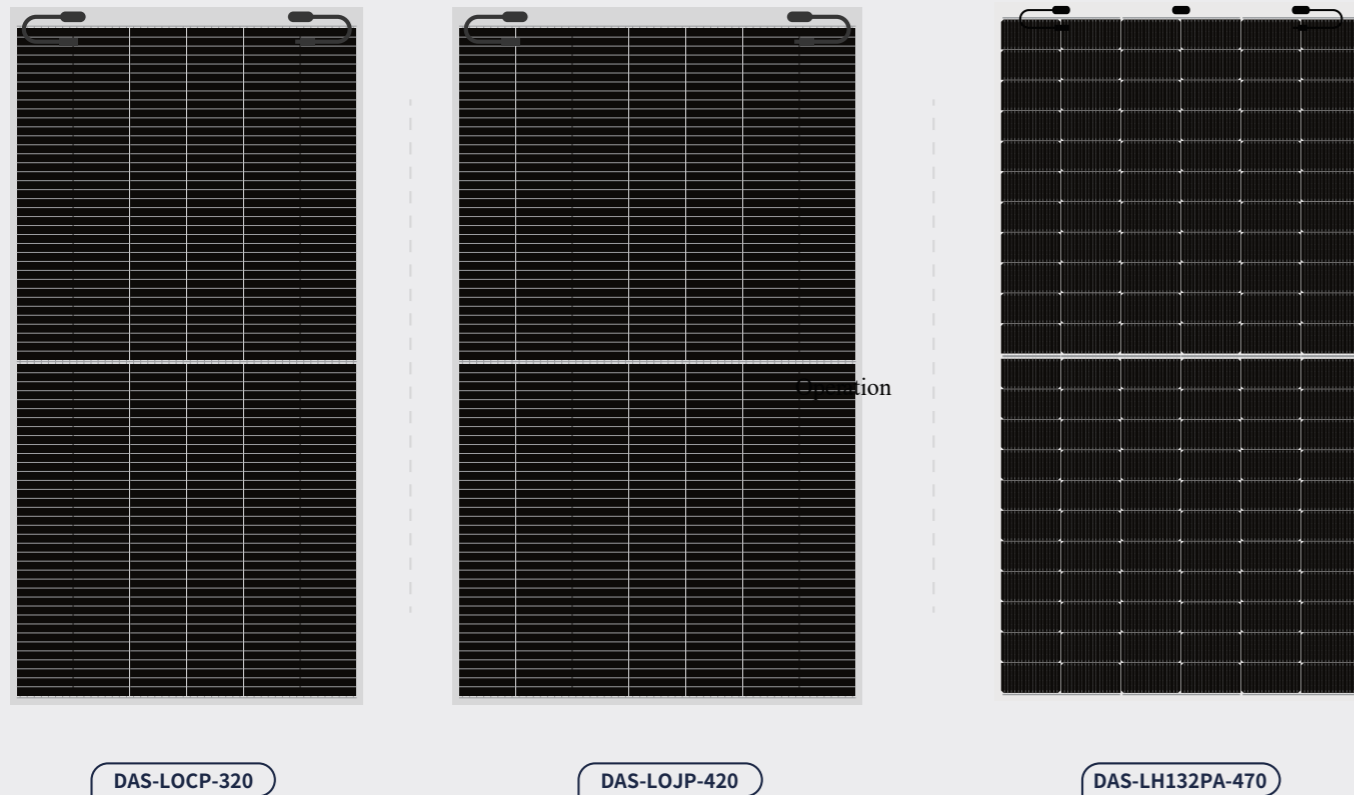
DAS-LOCP-320 DAS-LOJP-420 DAS-LH132PA-470



LIST OF APPLICABLE PRODUCTS

Applicable product list

Product type



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Release and Implementation

01 User manual introduction

Thank you for choosing our products! This manual contains relevant information and data in connection with the installation mode and safety operation of the photovoltaic modules (hereinafter referred to as "Module") manufactured by DAS Solar Co. , Ltd., hereinafter referred to as "Juhe New Energy". Any violation of these safety instructions may lead to casualties or property loss.

Before module installation, installation personnel shall go through and understand these instructions. Should you have any concerns, please contact the service department of Juhe New Energy or our local representative for further information. Installation personnel shall comply with all safety precautions set out in this manual, local requirements, and regulations of the law and authorized institutions. Prior to installation the solar photovoltaic system, installation personnel shall clearly understand its mechanical and electrical requirements. The operation of the photovoltaic system requires relevant expertise, and therefore the system installation and maintenance shall be performed by qualified personnel with professional skills and knowledge.

Please keep this manual in a secure place, and adopt it as the basis for operation, maintenance and servicing, or use it upon resale or disposal of the modules. Our modules pass the tests of global detection and certification institutions, and can be used safely provided that the requirements set out in the provisions of this manual are observed. Any module installation operator shall notify the above requirements to the end users (or consumers).

1.1 Disclaimer

Juhe New Energy reserves the right to revise this manual without prior notice. If the customer fails to comply with the requirements set out in this manual during the installation process of the Module, the limited product warranty offered to the customer will be invalidated. This manual is of no significance to the warranty, whether explicit or implied. This manual doesn't contain any information in relation to any compensation plans for any losses, Module damage or other costs arising from or in relation to the installation, operation, use and maintenance of the Module. Juhe New Energy disclaims any liability for any infringement on any patent rights or third-party rights arising from the operation or use of the Module.

1.2 Scope of liability

Juhe New Energy disclaims any liability for any following kinds of injuries and losses, including but not limited to any physical injuries or property losses resulted from Module misoperation, Module system installation failure, and violation of the instructions set out in this manual.



Mandatory
MANDATORY
WARNING



Prohibited
ABSOLUTE
PROHIBITION

Otherwise the product may be damaged or the user's personal safety may be endangered.

02 Preventive safety measures

2.1 Warning



Please read and understand all safety rules prior to installation, wiring, operation or maintenance of the Module. Photovoltaic Modules may generate power energy when directly exposed to light sources, and a photovoltaic array comprised of multiple Modules may create dangers critical electric shock or burning, thus any person without authorization and related training shall not contact the photovoltaic Module and its wiring terminals, etc.

2.2 General safety

- ◆ Modules shall be stored in their original packaging boxes prior to installation, and the packaging shall be protected from damage. The modules shall be transported and the modules shall be unpacked According to the recommended shipping methods and unpacking procedures. To avoid damage to the modules, the modules must not be scratched or impacted. The direct pressure must not be applied onto the module during transportation. Improper transportation or installation may damage the module and void the warranty. No one shall step on or stand on top of the module box or the module.
- ◆ The packaging boxes shall be placed upright during lifting, then lifted to the nodes of the roof support beams, unpacked immediately, spread face-to-face, and placed parallel to the support flutes in the area to be installed or on an unused pallet (no connector terminals are allowed to be placed on the ground), and the modules which have not been unpacked shall not be left on the roof for a long time.
- ◆ They shall only be used in a dry environment and the operator shall ensure that all modules and electrical contacts are clean and dry prior to installation; if uninstalled modules need to be stored outdoors for a period of time, the modules shall be always covered and the condition that they are placed face down on a soft surface shall be ensured, the connectors shall be overhung to prevent damage from water accumulation inside the modules and induced arcing from the connectors conducting to ground;
- ◆ When unpacking, two or more persons must operate it at the same time. The module must not be lifted by grasping the module junction box or lead wire, both hands shall be used to carry the module and the module must not be overlapped; the module shall not be placed in an unsupported or unfixed environment; any heavy objects or sharp objects shall not be placed on the module.

2.3 General Safety

- ◆ Juhe New Energy lightweight modules meet Application Class II. This class of modules can be used in systems that are potentially accessible to the public and greater than 50V DC or 240W or more.
- ◆ When the modules are installed on the roof, the overall fire rating of the final structure needs to be considered. The overall maintenance at a later stage shall be also considered. The roof on which the PV system is to be installed must be evaluated by a design institute expert or engineer, a formal and complete structural analysis shall be provided, and it shall be proven to be able to withstand the additional system mounting stresses, including the weight of the PV modules themselves.
- ◆ For your safety, please do not work on the roof without safety precautions including, but not limited to, fall protection, ladders or stairs and personal protective equipment. For your safety, it is strictly forbidden to install or handle modules in hazardous environments, including but not limited to strong winds or gusts, wet or sandy roofs.

02 Preventive safety measures

2.4 Electrical performance safety

- ◆ Installers must follow all safety precautions, local requirements and legal or authorized agencies as described in this guide. The operation of PV systems requires relevant expertise and must be installed and maintained by qualified personnel with specialized knowledge. Personnel without authorization and relevant training shall not touch the PV modules and approach the installation area or module storage area.
- ◆ The broken modules must not be used. Broken modules must not be repaired and contact with the surface of the module may result in a risk of electric shock. The module must not be disassembled or any part of the module must not be removed. The sunlight must not be artificially collected on these solar modules.
- ◆ The individual PV modules must not be connected from the positive end of the cable to the positive end of the module. The condition that the polarity of each module or string of modules is not opposite to the other modules or strings of modules shall be ensured. The condition that there are no gaps between the individual insulation gaskets of the connector shall be ensured; The gaps between insulation gaskets may result in a risk of fire or electric shock.
- ◆ The maximum system voltage must not exceed the certified maximum system voltage of the module being used, as required by the National Electrical Code.
- ◆ The modules must not be installed or operated during wet or windy weather in the area where the modules are installed. The modules are fixed with structural adhesive and you need to ensure that it is sunny when the modules are installed and constructed.
- ◆ Damaged junction boxes and broken connectors are a potential electrical hazard and a scratch hazard. Do not use damaged modules and do not disassemble modules.

2.5 Operational safety

- ◆ To avoid damage to the modules, the modules shall not be scratched or impacted, and the paint or adhesives shall not be used on the front and back of the modules. To prevent degradation of the insulation of the module, the scratching, cutting cables and connectors or exposing them to sunlight for long periods of time must be avoided. The module must not be dropped or objects must not be allowed to fall on the module. Any heavy or sharp objects must not be placed on the module.
- ◆ In case of fire, the power supply shall be disconnected before extinguishing the fire in accordance with fire fighting requirements
- ◆ The operators shall work only in a dry environment and use only dry tools. They shall not work in a wet environment without wearing any protective measures. They shall not touch the modules' junction boxes, connectors, cables and other live bodies directly with your hands without any protection under sunlight, regardless of whether the PV modules are connected to the system or not.
- ◆ Climbing, stepping, standing, walking or jumping directly on the package or module is prohibited.
- ◆ It is forbidden to place the module on any platform for bracketing the module.

2.5 Operational safety

- ◆ During the process of handling, packing, unpacking, placing and transporting the modules, attention shall be paid to the front or back protection of the modules to avoid the surface of the modules touching other objects and causing scratches or dirt on the front or back of the modules.
- ◆ The modules shall be carried vertically by two people with two hands, one hand dragging the bottom edge of the modules and the other hand holding the top edge of the modules, and it is strictly forbidden to carry the modules horizontally.
- ◆ The pasting surface shall be clean and dry, and there shall be no floating dust, dirt, or particle residue under visual inspection.
- ◆ It is forbidden to press, pinch, and fling the module cell area with the fingers during the handling and installation process.
- ◆ Foggy, windy, rainy and snowy weather construction is prohibited.
- ◆ After installation and before cable connection, it is forbidden to place connectors on the ground. In case of rain and snow, the terminals need to be protected by winding film or plastic bags.
- ◆ Color steel tile surface modules shall be spread out and placed face to face, with the long side parallel to the corrugated direction. If the support spacing is >240MM, it shall be placed in the area where the rails have been installed to avoid deformation caused by high temperature exposure.

2.6 Fire Safety

Before installing the modules, please consult local laws and regulations to comply with the requirements for fire resistance in buildings. According to the corresponding certification standard, the fire resistance level of Juhé New Energy lightweight modules is UL CLASS C. The structure of the roof and the installation method may affect the fire safety performance of the building. Please use appropriate module accessories such as fuses, circuit breakers, and grounding connectors as required by local codes.

03 Precautions for handling, storage and transportation

- 3.1 Turnover precautions**
- ◆ Please use forklift to unload the Module from the truck (up to two trays of Modules at one time), and place the Module on the level ground.
 - ◆ Do not stack the Modules in the project site, so as to prevent collision and damage.
 - ◆ Please use rainproof fabrics to cover the Modules when they are pending for turnover for a long period so as to prevent dampness, and do not unwrap the packing.
 - ◆ Packaged Modules can be transported through land transportation, sea shipping or air transportation, and make sure the module package is not rolling during transportation.
 - ◆ Turnover In terms of general transport trucks, up to 2 levels of stacking can be allowed for Module transportation.
 - ◆ When handling or installing the Module, do not support the Module through its back plate, avoid carrying the Module on the operator's back, and avoid use rope to carrying the Module.

- 3.2 Storage precautions:**
- ◆ The modules must not be exposed to rain or moisture, when the uninstalled modules need to be stored outdoors for a period of time, the modules shall be always covered, the condition that the lightweight modules are protected with the cell side down shall be ensured, and the connectors shall be overhung on a soft surface to prevent water from accumulating inside the modules and damage to the connectors.
 - ◆ If modules are to be transported for a long distance or stored for a long period of time, the modules must not be removed from their original packaging and a waterproof and light-proof rain cloth must be used to protect them.
 - ◆ Attention shall be paid to the weather conditions at the project site during installation, the situation that the modules with packing boxes experience alternating weather of direct rain and direct sunlight outdoors shall be avoided as much as possible, and for the packing boxes, the protective measures shall be taken against rain and light in time.
 - ◆ Warehouse storage (humidity <70%; temperature: -20°C~+50°C): static stacking and stacking of 2 pallets of light weight modules series modules;

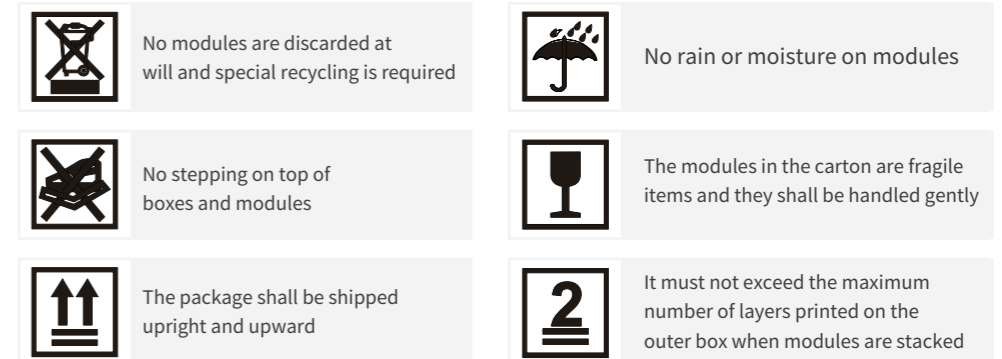


3.3 Unloading mode and precautions

When the modules are unloaded from the transport vehicle, the reasonable lifting fixtures shall be used and up to 2 pallets of modules are allowed at one time during lifting. Before lifting, the relevant personnel shall make sure the pallets and cartons are not damaged or skewed, and that the lifting ropes are strong and secure.

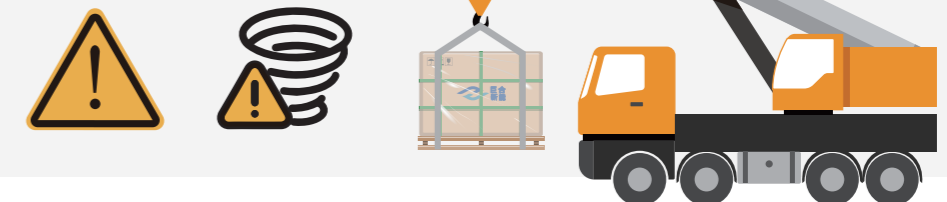
When the lifting is almost on the ground, two people, one on each side, shall hold the carton gently on a relatively flat position on the project site. Alternatively, a forklift shall be used to unload the modules from the truck and the unloaded modules shall be placed on a level surface.

When the modules are stored briefly at the project site, the modules shall be placed in a ventilated and dry place. The stacking of the modules at the project site is prohibited, and the modules shall be covered with a rain cover and the rain cover shall be reinforced with a cloth curtain or net belt to prevent the modules from moisture and rain. The packaging instructions are as follows:



Hoisting and handling:

It is strictly forbidden to lift the PV modules under the weather conditions of wind level greater than 6 (Beaufort wind level), heavy rain or snow, and the horizontal packaging allows a maximum of 1 pallet of modules to be hoisted at one time



When the crane is used to unload, please use special tooling. Before lifting, please choose a lifting tool with sufficient tension according to the weight and size of the module, and adjust the position of the sling to keep the center of gravity of the module smooth. Please operate the spreader at an even speed, and hold the carton gently on a relatively flat position when the lifting is close to the ground.

03 Precautions for handling, storage and transportation

Hoisting and handling:

The height of the handling platform shall be on the same level with the carriage to the greatest extent, and the driving speed of the forklift shall be controlled within 5km/h upon straight running, and 3km/h upon steering. Emergency stop and start shall be avoided.



If the packing case shields the view of the forklift driver, the driver is advised to reversely run the forklift during the handling process, and a specialized person shall be assigned to monitor and provide guidance, so as to prevent collision with any persons or articles and avoid injury accidents or damage of the Module due to drop of the packing case. After transporting the packing case the installation site, please place it on the level and hardened ground.

General warehousing forklift: ♦ Please used forklift with appropriate lifting capacity, according to the weight of the Module. The depth of the fork sticking into the tray shall not be less than three fourths of the tray length (length of fork not less than LN3/4 of tray length). It is advised to extend the height or width of the forklift load-backrest to prevent direct collision of the forklift with Module glass.

- ♦ In order to ensure better stability of forklift operation, please make sure that the fork spacing shall be adjusted to the largest extent possible while avoiding collision with the two corners of the tray.
- ♦ Please slowly operate the forklift, and do not crush the carton or tray. Please provide protective buffering materials beforehand (for the section highlighted in yellow in the figure, please use silicone, rubber, EPE or similar materials) to prevent damage of the Module inside the packing case due to external force.



3.4 Project site transport

Project site transport refers to loading and transport of the tray-based Modules between from the storage site to the project site after the Modules arrive at the storage site.

Forklift specification requirement:

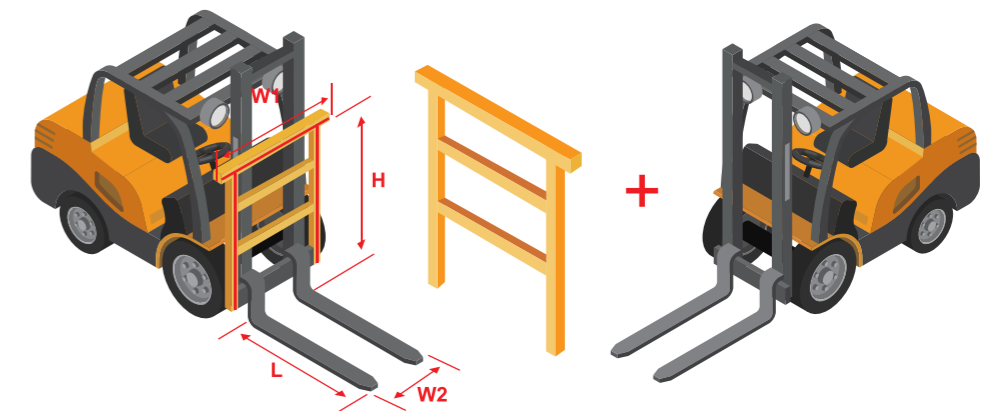
Please uniformly use forklifts with the rated lifting capacity of N3.5t for loading and transfer of the Modules, and avoid direct contact of the fork protrusion with the cartons or Modules so as to prevent damage of the Modules due to collision.

Fork length (L) N1.0 m	shall be N1.0m, and fork interval (W2) shall be adjusted to approach the two corners of the tray to the greatest extent.
Gantry height (H) N1.5 m	Gantry height (H) shall be N1.5m or gantry width (W1) shall be N2.5m.

The gantry shall be vertical to the fork, and the gantry structure shall be sturdy (able to bear the load of N1.5t). When the entire tray of Module is leaned on the gantry, the gantry shall not be deformed due to stress.

The injunction part of the top beam of gantry and the Module packing shall be protected with buffering materials (silicone, rubber, or EPE), to avoid damage of the Module and profiles.

The specification and operating specification of forklift include but not limited to the above information.



The driver shall operate the fork to slowly stick into the space baseplate and the panel from the long edge side of the tray, and avoid colliding with the Module, and make sure that both sides of the fork gantry are approaching simultaneously. When transporting the module with the forklift, lean the packing case onto the fork gantry, and make sure to fasten the Module with safety ropes featuring the tensile strength of N2000kgf. Upon loading with the forklift, first steadily place the packing case on the ground, then remove the safety ropes when the tilting risk is negligible. Control the driving speed of the forklift during transport, and slowly withdraw the fork when unloading, so as to prevent tilting.



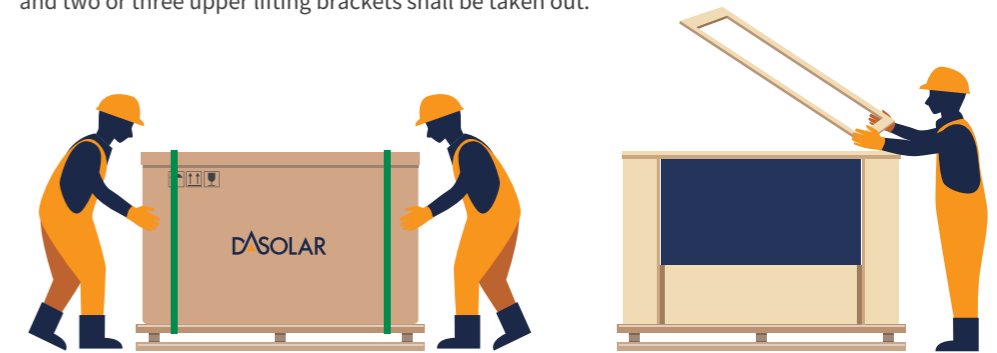
03 Precautions for handling, storage and transportation

- 3.5 Secondary transport** ♦ If the secondary long-distance transportation or long-term storage of the modules is required, the removal of the original packaging is prohibited. The finished module package can be transported by land, sea or air.
- ♦ During transportation, please secure the packaging boxes to the transportation platform to ensure that the package does not roll over. For ground transportation, 2 layers shall be stacked at most during normal trucking and the cutting of the packing straps is prohibited.
 - ♦ When consigning at the project site, the dismantling of the original packaging is not allowed, and only 1 layer is allowed during transportation. During transportation, please fix the packing boxes on the transportation platform to ensure that the packaging will not tumble.
 - ♦ It is forbidden to use tricycle to transfer the modules, tie and carry the modules with the rope, carry the modules by single person, or carry and drag the modules through the wires or junction box of the modules.
 - ♦ When transported through small truck, the horizontal packing can't be allowed for stacking, and the Module must be fixed onto the trunk with safety ropes on the four sides, and the contact part between the safety rope and the carton must be isolated with corrugated paper or other buffering material. During the transport, the driving speed must be controlled according to road conditions.
 - ♦ When transporting the Module through a van truck or non-van truck, different trays must be stuffed to leave no space, and any empty space at the rear of the van must be stuffed and reinforced to prevent the Module's movement to the rear during transport. When transporting the Modules through a non-van truck, each tray of Modules must be fixed onto the transport vehicle with safety ropes.
 - ♦ The tray must be placed within the loading area of the transport vehicle.

04 Unpacking method

4.1 Notes

- ♦ Before unpacking, the product name and serial number on the A4 paper of the outer carton shall be checked, and the custom-made unpacking method is prohibited.
- ♦ When unpacking, all vertical straps shall be cut with a razor blade or scissors, the long side straps shall be cut first, then the short side straps shall be cut; the top cover of the carton shall be taken off and two or three upper lifting brackets shall be taken out.



- ♦ The blank area at the corner edge of the module shall be held with one hand, and the blank area at the short side of the module with the other hand while gently taking the module out vertically upward.
- ♦ If the unpacking is made on a horizontal surface, the modules shall be removed in sequence from one side of the package toward the other, and then carried vertically with two people. If the unpacking is made on a non-horizontal surface, a supportive removal tool shall be used when the carton is removed to prevent the module from falling sideways.



- ♦ After the modules are removed from the packing boxes, they must not be leaned against the mounting post or placed in an environment where it is not reliably supported or secured.

04 Unpacking method

- 4.2 Unpacking safety**
- ◆ Please do not handle the Modules in windy conditions, and properly secure the unpacked Modules.
 - ◆ Do not move the leaning posts during the unpacking process, so as to prevent tilting of the Modules.
 - ◆ Do not carry out outdoor unpacking operations in harsh weather conditions such as rain and snow.
 - ◆ Prior to removing the inner packing straps, please carry out proper protection to prevent titling of the whole unit of Modules.
 - ◆ The operation ground shall be able to ensure that the packing case is steadily placed and tilting is avoided.
 - ◆ Do not lean the Module on the installation post. Do not use wooden strips or other items to directly contact and support the rear side of the Module.
 - ◆ Do not handle the Module by a single operator, so as to avoid scratches, deformation or cracks of the Module due to sliding and collision of the Module with other Modules. When lifting the Module, do not pull the wiring box or cables to withdraw the Module.
 - ◆ Please carry out the operation in strict accordance with the requirements of unpacking instructions. When removing the packing straps of horizontal packing, please provide protective measures to avoid scratching your face or eyes, and avoid standing on the tray during unpacking, but handle the Modules from the two sides of the tray.

05 Introduction to installation method

- 5.1 Security requirements**
- ◆ The modules of the Juhe New Energy Lightweight Series have been certified by IEC, and PV modules at the end of their service life shall be reasonably disposed according to local laws and regulations.
 - ◆ The module packaging shall not be removed, and the modules shall be leaved in the carton before installation.
 - ◆ When installing modules, the operator shall work only in a dry environment and use only dry tools. They shall not work in a wet environment without wearing any protective measures. They shall not install modules in rain, snow or windy conditions. The connectors shall be kept dry and clean when modules are installed to avoid the risk of electric shock. The operator shall not perform any work if the terminals of the module are wet to avoid electric shock. Please install immediately after opening the box.
 - ◆ During module installation and wiring, the connector terminals must be placed in the air and not directly on the ground. The electrical connections shall not be disconnected or the connectors shall not be pulled out while the circuit is under load. The operator shall not touch the modules unnecessarily after installation; the high temperatures may be generated on the surface of the modules; the burns and electric shock hazards may occur.
 - ◆ The mounting surface must be safe for personnel to work, stand, and other operations.
 - ◆ The operator shall not work alone when installing modules, and a team of 2 or more people working shall be always kept.
 - ◆ After the module installation is finished, the cable shall be fixed up or tied so that it will not be exposed to direct sunlight after installation and cable deterioration can be prevented. Low hanging cables may cause various problems, such as leakage and fire at water accumulation.
 - ◆ The application class of Juhe New Energy lightweight modules is Class A.
- 5.2 General Requirements**
- ◆ Lightweight modules are suitable for being bonded to clean, dry, un-weathered color steel tile, color steel sheet roofing, subject to the support requirements of the scenario and the minimum requirements for direct bonding.
 - ◆ The roofing surface where the lightweight modules are placed shall be flat, smooth and free of creases. Irregular areas and depressed areas on the roof shall be avoided where the process of bonding to the roof may cause deformation of the surface of the lightweight module.
 - ◆ The installation substrate to be bonded shall be cleaned with the cleaning solvent prior to bonding the module and wiped with a clean, fiber-free rag or paper towel after cleaning to allow the roof to dry completely. It shall make sure there is no debris, talc, dust, oil, ice, snow, moisture, etc., which can reduce the effectiveness of the bonding and shorten the life of the bonding material.
 - ◆ If there are rust stains on the installation surface, you need to use steel brush and sandpaper to remove rust first, and the industrial anti-rust paint treatment shall be performed to dry before installation.
 - ◆ The following installation methods of Juhe New Energy lightweight modules have passed the 2400 PA test load.

05 Introduction to installation method

5.3 Mechanical installation For Juhe New Energy lightweight modules, the neutral silicone structural adhesive is used as the adhesive material and double-sided adhesive tape to assist in positioning. It is very suitable for color steel tile roof installation.

5.3.1 Installation of color steel tiles **A Confirm color steel tile material, size and appearance characteristics**

Color Steel Tile Material

Steel plate coated with color PE coating on the surface of galvanized steel plate, aluminized steel plate, tin-plated steel plate or cold-rolled steel plate.

Color steel tile size and appearance characteristics

Trapezoidal color steel tile, angle chi type color steel tile (it needs to add rail installation, support spacing $\leq 240\text{MM}$), upright locking edge color steel tile (it needs to add rail installation, support spacing $\leq 240\text{MM}$)

Color Steel Tile Type	Trapezoidal color steel tiles	Angle Chi type color steel tile	Upright locking edge color steel tiles
Corrugated width (mm)	≥ 15	≥ 3	≥ 3
Corrugated spacing (center spacing mm)	≤ 240	≤ 430	≤ 488

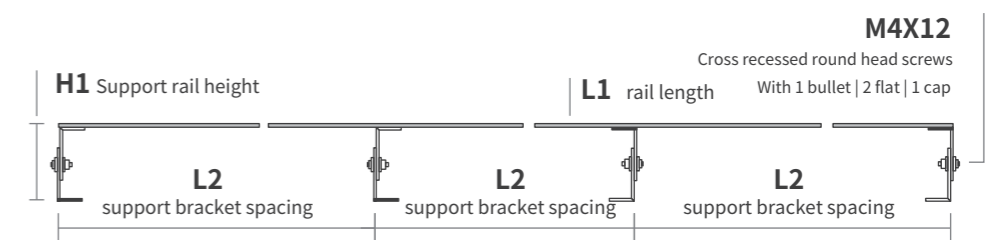
B Prepare the corresponding paste material

Serial No.	Construction temperature conditions	Paste material	Positioning material	Tape specification
1	$0^{\circ}\text{C} < T \leq 5^{\circ}\text{C}$	Neutral silicone structural adhesive	Double-sided pressure-sensitive adhesive tape	Acrylic Thickness $\geq 2\text{mm}$
2	$5^{\circ}\text{C} < T < 30^{\circ}\text{C}$	Neutral silicone structural adhesive	/	/
3	$T \geq 30^{\circ}\text{C}$	Neutral silicone structural adhesive	Double-sided nano tape	Acrylic soft plastic Thickness $\geq 2\text{mm}$

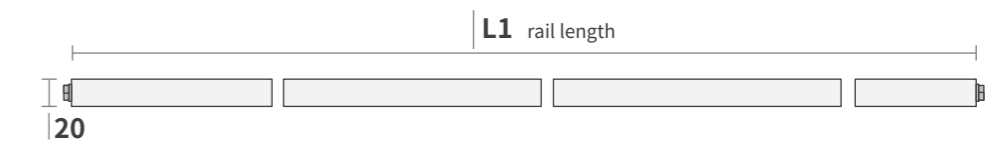
If you need to use the adhesive material approved by Juhe New Energy, please contact Juhe New Energy for supplier information.

C Prepare the corresponding rail material

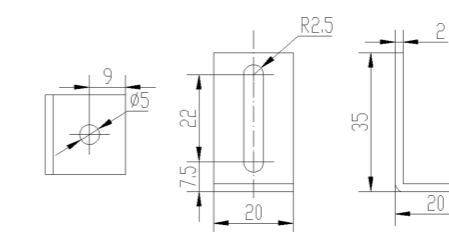
Guide rail installation schematic-1



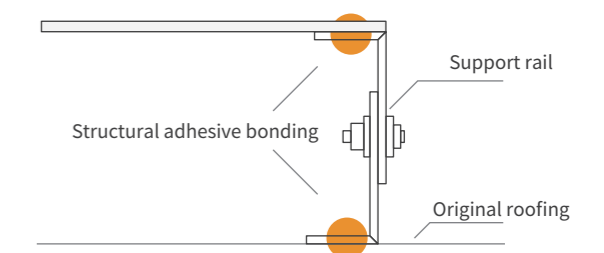
Length of rail-2



Bracket diagram-3



Support installation detail drawing-4



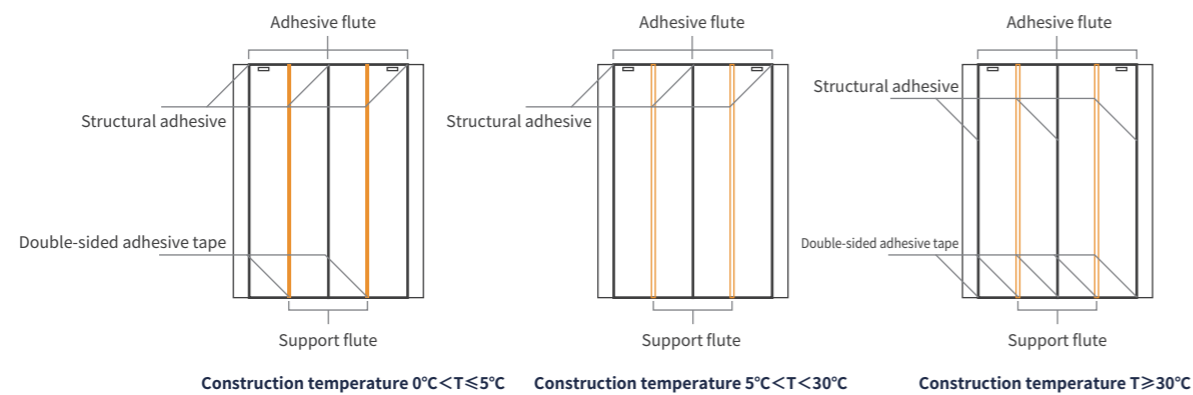
Rail length L1	Number of support brackets	Number of support brackets	Support bracket distance L2	Support rail height H1
DAS-LOCP	1770	4	590	Color steel tile valley peak to valley bottom height
DAS-LOJP	1985	4	661	Color steel tile valley peak to valley bottom height
DAS-LH132PA	2148	4	680	Color steel tile valley peak to valley bottom height

05 Introduction to installation method

5.3.1 Installation of color steel tiles

D Lightweight module paste - vertical paste

Both sides of the support flute are equally divided into rows, under different construction temperature conditions, the paste schematic and construction method selection refer to the following table:

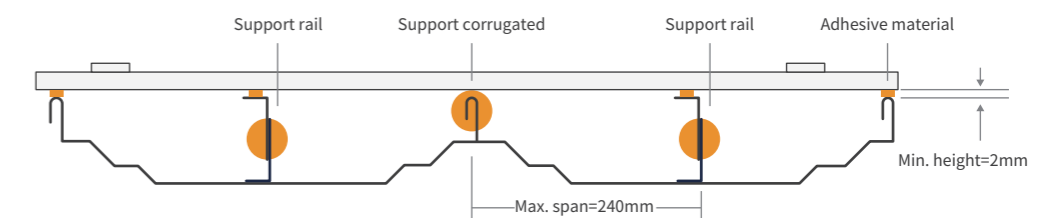


Module type	Construction temperature	Adhesion method	Double-sided adhesive tape selection	Structural adhesive L1		Double-sided adhesive L2	
				Length (mm)	Quantity (strip)	Length (mm)	Quantity (strip)
DAS-LOCP	$0^{\circ}\text{C} < T \leq 5^{\circ}\text{C}$	Adhesive for flute structure, double-sided adhesive for supporting flute	Acrylic tape: thickness*width $\geq 2.0\text{mm} * 20\text{mm}$	1770	3	1770	2
	$5^{\circ}\text{C} < T < 30^{\circ}\text{C}$	Adhesive for flute structure	No paste	1770	3	0	0
	$T \geq 30^{\circ}\text{C}$	Adhesive for flute structure, double-sided adhesive for supporting flute	Nano double-sided adhesive tape: thickness * width $\geq 2.0\text{mm} * 20\text{mm}$	1670	3	50	10
DAS-LOJP	$0^{\circ}\text{C} < T \leq 5^{\circ}\text{C}$	Adhesive for flute structure, double-sided adhesive for supporting flute	Acrylic tape: thickness*width $\geq 2.0\text{mm} * 20\text{mm}$	1985	3	1985	2
	$5^{\circ}\text{C} < T < 30^{\circ}\text{C}$	Adhesive for flute structure	No paste	1985	3	0	0
	$T \geq 30^{\circ}\text{C}$	Adhesive for flute structure, double-sided adhesive for supporting flute	Nano double-sided adhesive tape: thickness * width $\geq 2.0\text{mm} * 20\text{mm}$	1885	3	50	10
DAS-LH132PA	$0^{\circ}\text{C} < T \leq 5^{\circ}\text{C}$	Adhesive for flute structure, double-sided adhesive for supporting flute	Acrylic tape: thickness*width $\geq 2.0\text{mm} * 20\text{mm}$	2148	3	2148	2
	$5^{\circ}\text{C} < T < 30^{\circ}\text{C}$	Adhesive for flute structure	No paste	2148	3	0	0
	$T \geq 30^{\circ}\text{C}$	Adhesive for flute structure, double-sided adhesive for supporting flute	Nano double-sided adhesive tape: thickness * width $\geq 2.0\text{mm} * 20\text{mm}$	2028	3	50	10

Remark

- Support spacing $\leq 240\text{mm}$; when the support spacing $> 240\text{mm}$, it is necessary to increase the support rail to meet the installation requirements.
- According to the construction temperature conditions, refer to the construction method selection reference table for construction and installation.
- Lightweight modules are placed face to face and parallel to the support flute in the area to be installed (it is strictly forbidden to place connector terminals directly to the ground) in a quantity $\leq 24\text{H}$ of installation is appropriate.
- The above paste method is applicable to Juhé New Energy lightweight modules DAS-LOCP-320, DAS-LOJP-420 and DAS-LH132-PA-470.

E Lightweight module-vertical installation



Module type	Trapezoidal color steel tile	Angle-chip tiles	Upright locking edge color steel tile
	Number of support corrugated(Pcs)	Number of support corrugated(Pcs)	Number of support corrugated(Pcs)
DAS-LOCP	≥ 5	≥ 5	≥ 5
DAS-LOJP	≥ 6	≥ 5	≥ 5
DAS-LH132PA	≥ 6	≥ 5	≥ 5

F Lightweight module-vertical arrangement



- The long side of the module is installed parallel to the color steel tile valley peak corrugated, and the module gap needs to be $\geq 10\text{MM}$ to avoid dust accumulation between modules.
- For the arrangement design, no less than 300MM wiring channel needs to be reserved, which is convenient for system connection and maintenance.
- Wires and cables are strictly prohibited from blocking the frontal cell area of the module, and connector terminals are strictly prohibited from being placed directly to the ground.
- The overall requirement of the module: no shadow shading, if there is the shadow shading on the installation surface and other circumstances, the designed space shall be reserved according to the actual shadow length.

05 Introduction to installation method

5.3.2 Glass plane installation **A** Confirm the glass plane roof, dimensions and appearance characteristics

B Prepare the corresponding adhesive materials

Serial No.	Adhesive material	Specification
1	Double-sided pressure-sensitive adhesive tape	Acrylic, thickness $\geq 2\text{mm}$
2	Neutral silicone structural adhesive	One-module

If you need to use the adhesive material approved by Juhé New Energy, please contact Juhé New Energy for supplier information.

C Module pasting

Operation steps

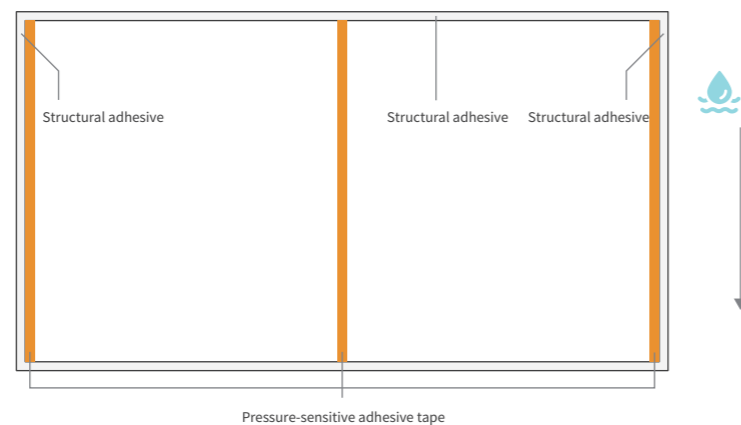
Easy and reliable operation, "one clearing, two fixing, three gluing, four installation, five roller pressing and laminating".

Installation form

It can be installed in horizontal and vertical rows in the direction of the building roof flow.

HORIZONTAL INSTALLATION

Pressure-sensitive adhesive tape specifications 20mm * 2mm + structural adhesive sealant protection in the flowing direction upper end and at the edge of both sides.



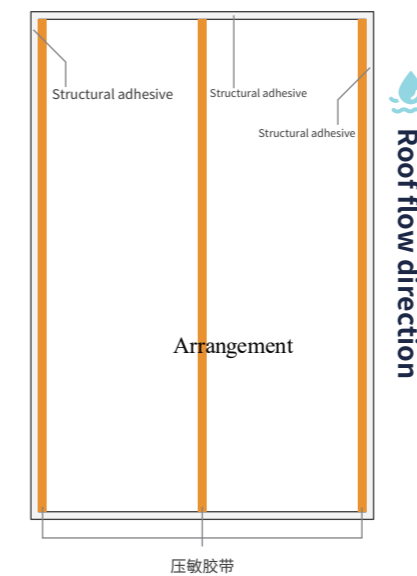
Pressure-sensitive adhesive tape

3 strips are glued in equal parts, specification 20MM*2MM, length: equal to that of the aluminum foil on the back of the module;

Structural adhesive

3 pieces of adhesive* are glued immediately adjacent to the outer edge of the tape, the length of which is equal to the length and width of the module respectively, and the width*height of the adhesive type $\geq 6*2\text{mm}$;

Longitudinal installation



Pressure-sensitive adhesive tape specification: 20mm * 2mm + structural adhesive sealant protection in the flowing direction upper end and at the edge of both sides

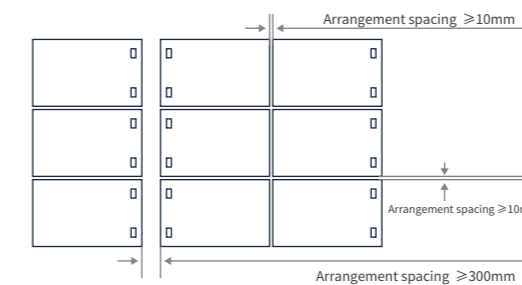
Pressure-sensitive adhesive tape

3 strips are glued in equal parts, specification: 20mm*2mm, length: equal to that of the aluminum foil on the back of the module;

Structural adhesive

3 pieces of adhesive* are glued immediately adjacent to the outer edge of the tape, the length of which is equal to the length and width of the module respectively, and the width*height of the adhesive type $\geq 6*2\text{mm}$;

D Lightweight module- horizontal arrangement

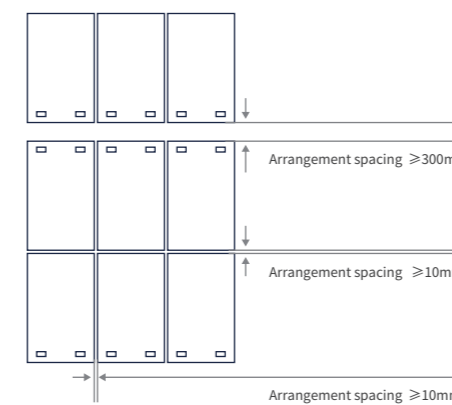


◆ Meet the row spacing head line box end $\geq 300\text{mm}$,

◆ The internal row spacing of the tail and array $\geq 10\text{mm}$,

◆ Adjust according to the actual situation of the installation surface

D Lightweight module-vertical rows



◆ Meet the row spacing head line box end $\geq 300\text{mm}$,

◆ The internal row spacing of the tail and array $\geq 10\text{mm}$,

◆ Adjust according to the actual situation of the installation surface

05 Introduction to installation method

5.3.3 Glazed tile,
cylinder tile surface installation

A Confirm tile roof, size and appearance characteristics

B Prepare corresponding paste material

Serial No.	Paste material	Specification
1	Double-sided pressure-sensitive adhesive tape	Acrylic, thickness $\geq 2\text{mm}$
2	Neutral silicone structural adhesive	One-module

If you need to use the adhesive material approved by Juhe New Energy, please contact Juhe New Energy for supplier information.

C Module pasting

Operation steps

Easy and reliable operation, "one-clearing, two-fixing, three-gluing, four-in-stallation, five-roller pressing and laminating".

Installation form

It can be installed in horizontal and vertical rows in the direction of the building's roof inclination.

Horizontal installation

Pressure-sensitive adhesive tape specification: 20mm * 2mm + structural adhesive sealant protection in the flowing direction upper end and at the edge of both sides



□ Module gluing area

■ Double-sided adhesive pasting area

Pressure-sensitive adhesive tape

When the roof inclination $\geq 20^\circ$, the double-sided adhesive auxiliary paste is required for fixing, the double-sided adhesive station paste position is tile crest on the flute along the bottom of the high convexity, tape points ≥ 36 (double-sided adhesive length: 80MM);

Structural glue

Head, tail gluing area: "double layer, double strip", central gluing area: "single layer, double strip", gluing position: corresponding to the corrugated crest high convex for gluing, gluing width * height $\geq 6 * 2\text{MM}$;

Longitudinal installation



□ Module gluing area

■ Double-sided adhesive pasting area

Pressure-sensitive adhesive tape specification: 20mm * 2mm + structural adhesive sealant protection in flowing direction upper end and at the edge of both sides

Pressure-sensitive adhesive tape

When the roof inclination $\geq 20^\circ$, the double-sided adhesive auxiliary paste is required for fixing, the double-sided adhesive station paste position is the tile crest on the flute along the bottom of the high bump, the number of tape ≥ 2 (the length of the double-sided adhesive is equal to that of the module);

Structural glue

Head and tail gluing area: "double layer, double strip", central gluing area: "single layer, double strip", gluing position: corresponding to the corrugated crest high convex for gluing, gluing width * height $\geq 6 * 2\text{mm}$;

5.3.4 EPS INSTALLATION ON CEMENT FLAT ROOF

A Confirm cement flat roof, dimensions and appearance characteristics

B EPS installation method

Module version	EPS tilt angle	EPS specification	Adhesive	Structural adhesive
DAS-LOJP	5°	EPS1-1985*70* (150.1/144.0) mm	EPS module bottom side full coating	(Outside & middle) The length of gluing is equal to the length of the module *4 strips
		EPS2-1985*70*(117.6/111.5) mm		
		EPS3-1985*50*(85.1/80.8) mm		
		EPS4-1985*50*(54.3/50) mm		
	0°	EPS-1985*50*50mm	EPS module bottom side full coating	(Outside & middle) The length of gluing is equal to the length of the module *4 strips

05 Introduction to installation method

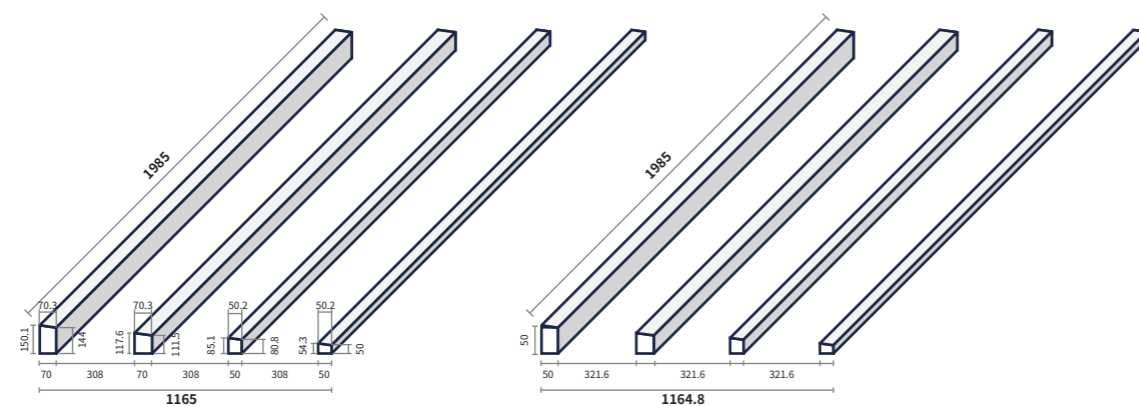
5.3.4 EPS installation on cement flat roof

Operation steps

Installation surface cleaning, positioning marking, adhesive mixing, adhesive application, EPS module installation, positioning gluing, module installation

Horizontal installation

Placed in the direction of the roof water flow Structural adhesive



Structural adhesive

In the middle of the EPS, even gluing: "4, the length of the adhesive strip and the long side of the module: equal, the width of the adhesive type "height: > 6 * 2MM.

5.3.5 Lightweight installation



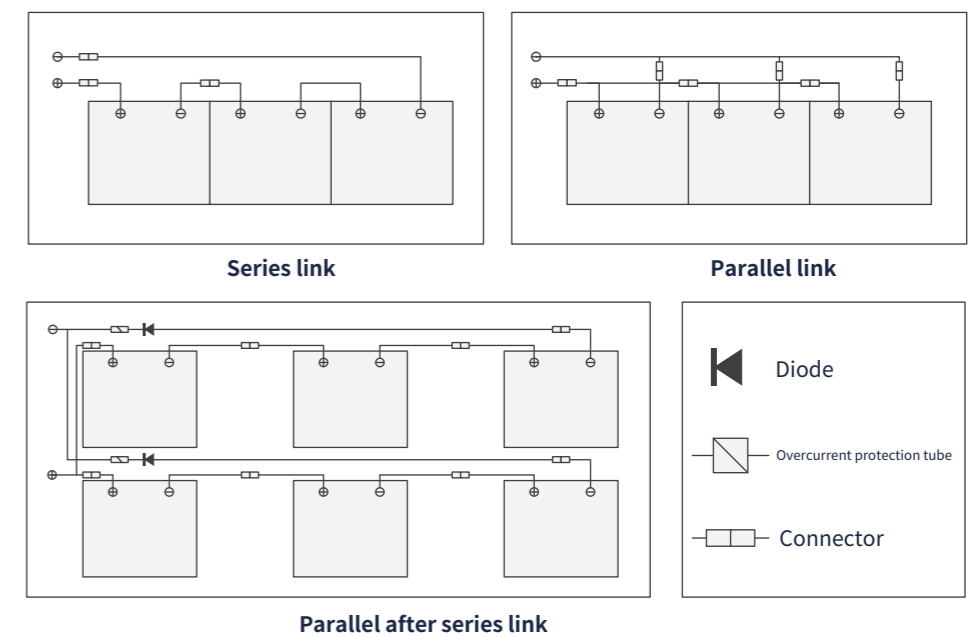
Lightweight products can be installed only if the above confirmed materials and building roof types are used with the corresponding adhesive materials; for materials and building roof types not in the list, please contact Product Development Department for relevant evaluation.

06 Electrical installation

6.1 Electrical Performance

The electrical performance parameters of the module such as ISC, VOC and P_{MAX} are subject to ±3% error from the nominal values under standard test conditions. Standard test conditions for modules: irradiance: 1000 W/M², cell temperature: 25°C, atmospheric mass: AM1.5.

When modules are connected in a string, the final voltage is the sum of the individual modules, when modules are connected in parallel, the final current is the sum of the individual modules, and modules of different electrical performance models cannot be connected in a string.



The maximum number of single-string modules 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 maximum system voltage value specified for the module (the maximum system voltage of DC1000V for Juhe New Energy lightweight modules - the actual system voltage is designed according to the selection of module type and inverter) and the value required for other DC electrical modules.

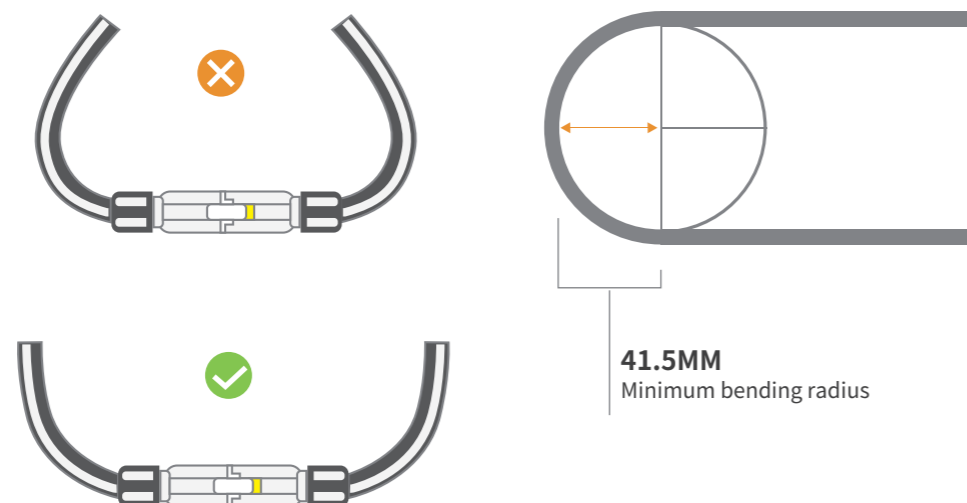
The open circuit voltage correction factor can be calculated according to the following formula: $CV_{oc} = 1 - \beta V_{oc} \times (25 - T)$. T is the minimum expected ambient temperature at the system installation location and β (% /°C) is the temperature coefficient of the selected module Voc (refer to the corresponding module parameter table).

If a reverse current exceeding the maximum fuse current of the module may pass through the module, an overcurrent protection device of the same size must be used to protect the module. If the number of parallel connections is greater than or equal to 2 strings, there must be an overcurrent protection device on each string of modules, as shown in Figure 1.

06 Electrical installation

6.2 CABLE AND CONNECTING WIRES

- ◆ The connection of modules shall be made with junction boxes of IP68 protection class, which shall provide safety protection for the wires and their corresponding connections, and shall provide accessible protection for non-insulated live parts. The junction box is composed of connected cable wires and IP68 protection grade connectors to facilitate series connection between modules. A single module has two separate wires connected to the junction box, one positive and one negative. Two modules can be connected in series by inserting the positive connector at the other end of one module wire into the socket of the negative wire of the adjacent module.
- ◆ Special solar cables and appropriate connectors shall be used according to local fire, building and electrical codes (the wires shall be encased in conduit with anti-aging properties or, if exposed to air, anti-aging properties shall be provided), and the condition that the cables have good electrical and mechanical properties shall be ensured.
- ◆ Installers shall only use single-wire solar cables, 2.5-16MM² (5-14AWG), 90°C rated, with appropriate insulation to withstand the maximum possible system open-circuit voltage (as approved by EN50618). Appropriate wire sizes need to be selected to reduce voltage drop.
- ◆ Juhe New Energy requires that all wiring and electrical connections meet the requirements of the appropriate National Electrical Code.
- ◆ When the cable wire is fixed on the bracket, it is necessary to avoid mechanical damage to the cable wire or the module. No one shall press the cable by force. The cable shall be fixed on the bracket by specially designed aging resistant cable ties and cable clips. Although the cable is aging resistant and waterproof, it shall be protected from direct sunlight and rain.
- ◆ The minimum bending radius of the cable shall be 41.5MM.



6.3 Connectors

- ◆ Please keep the connector dry and clean, and make sure the nut of the connector is tightened before connecting. Please do not connect the connector when it is wet, dirty or in other unfavorable condition. If the connector is not connected positively or negatively, 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 installed. Please avoid the connectors being exposed to direct sunlight and immersed in water. Please avoid connectors falling on the ground or roof.
- ◆ Faulty connections may produce arcing and electric shock. Please make sure all electrical connections are secure. Please make sure all connectors with locking are fully connected.
- ◆ Connecting connectors of different models is not recommended to be used together (please contact Juhe New Energy if you need to use them).

6.4 Bypass Diodes

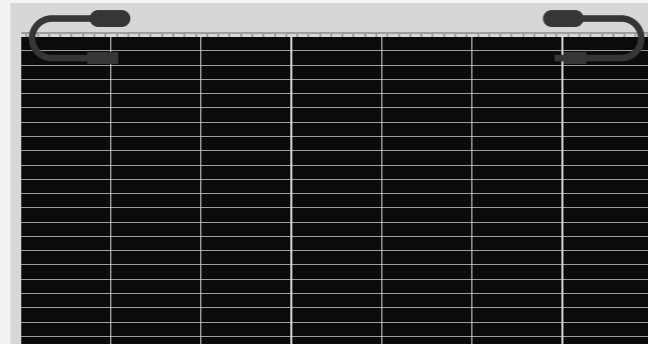
The cell strings in the Juhe New Energy lightweight modules are protected by bypass diodes in parallel and encapsulated in a junction box. When a hot spot phenomenon occurs locally in the module, the diode shall be activated so that the main current no longer flows from the hot spot cells, thus limiting module heating and performance loss. Attention shall be paid that the bypass diode is not an overcurrent protection device.

When a diode failure is identified or suspected, the installer or system maintainer shall contact Juhe Solar. Attempts to open the module's junction box on your own are strictly prohibited.

07 landing

7.1 Module grounding

Juhe New Energy lightweight photovoltaic modules are not equipped with a metal frame, so grounding is not required for them.



7.2 Grounding of other materials

- ◆ For the grounding system of the bridge or inverter frame of the roof light weight module, the original lightning protection grounding system of the building is used, and the grounding resistance is less than 4Ω, which requires actual measurement on site, and if it does not meet the requirements, then the artificial grounding pole is added outside the building until it meets the requirements.
- ◆ For the artificial grounding, every certain distance with 2.5M long No. 5 angle is used as a vertical grounding body, and 25*4 hot dipped galvanized flat steel is used between angle irons for reliable connection. A circle of 25*4 hot dipped galvanized flat steel shall be laid around the array as a lightning protection grounding network construction measured, if the requirements are not met, additional artificial grounding electrode shall be laid continuously to meet the requirements.

08 Electrical installation

8.1 Cleaning

- ◆ The amount of electricity generated by a solar module is proportional to the amount of light falling on it. Modules whose cells are shaded can produce relatively less power, so it is important to keep the modules clean.
- ◆ The PV module shall be cleaned under the situation that the irradiance is lower than 200W/M², and a large difference shall be avoided between the water temperature used for cleaning and the air temperature, so as to avoid lobes; The hard water needs to be softened for module cleaning, and the water left on the module surface shall be dried.
- ◆ It is strictly forbidden to clean PV modules under the meteorological conditions of wind greater than level 4, heavy rain or snow.
- ◆ When the pressure water flow is used to clean the module surface, the water pressure used shall not exceed 70 kPa, and it is strictly forbidden for the module to bear additional external force.
- ◆ When PV modules are cleaned, it is strictly forbidden to step on the modules, to splash water onto the back of the modules and cables, to keep the connectors clean and dry or to prevent electric shock and fire hazards; it is strictly forbidden to use steam cleaners; when the modules are cleaned, the soft cloth or soft roller and water shall be used to clean, the modules shall not be put directly into water. Care shall be taken to avoid serious thermal shock that may damage the module.
- ◆ When it is difficult to clean substances such as oil and dirt on the surface of PV modules, the frictionless neutral liquid cleaners shall be used, the organic solvents containing alkali or acid shall not be used to clean the modules. It is strictly forbidden to use corrosive solvents or wipe PV modules with hard objects.
- ◆ If you are not sure whether you need to remove the array or cross section, a particularly dirty array shall be selected first to start the removal. If the improvement percentage is less than 5%, the cleaning is usually not required. The above verification shall be done only under constant insolation rate (sunny day, strong sunlight, no clouds).
- ◆ The cleaning operation and maintenance of PV arrays, which is generally cleaned once every six months, shall be done according to the surrounding environment of the project site and the dirty surface of the arrays.
- ◆ The vegetation shall be cut regularly to avoid vegetation from shading PV modules.

Water quality requirements

PH: 5 ~7;	Chloride or salt content: 0 - 3,000 mg/L
Turbidity: 0-30 NTU	Electrical conductivity: 1500~3000 μs/cm
Total dissolved solid: ≤1000 mg/L	Water hardness: 0-40 mg/L
The non-alkaline water must be used, and when the conditions are met, the softened water shall be used.	

08 Electrical installation

8.2 MODULES APPEARANCE INSPECTION

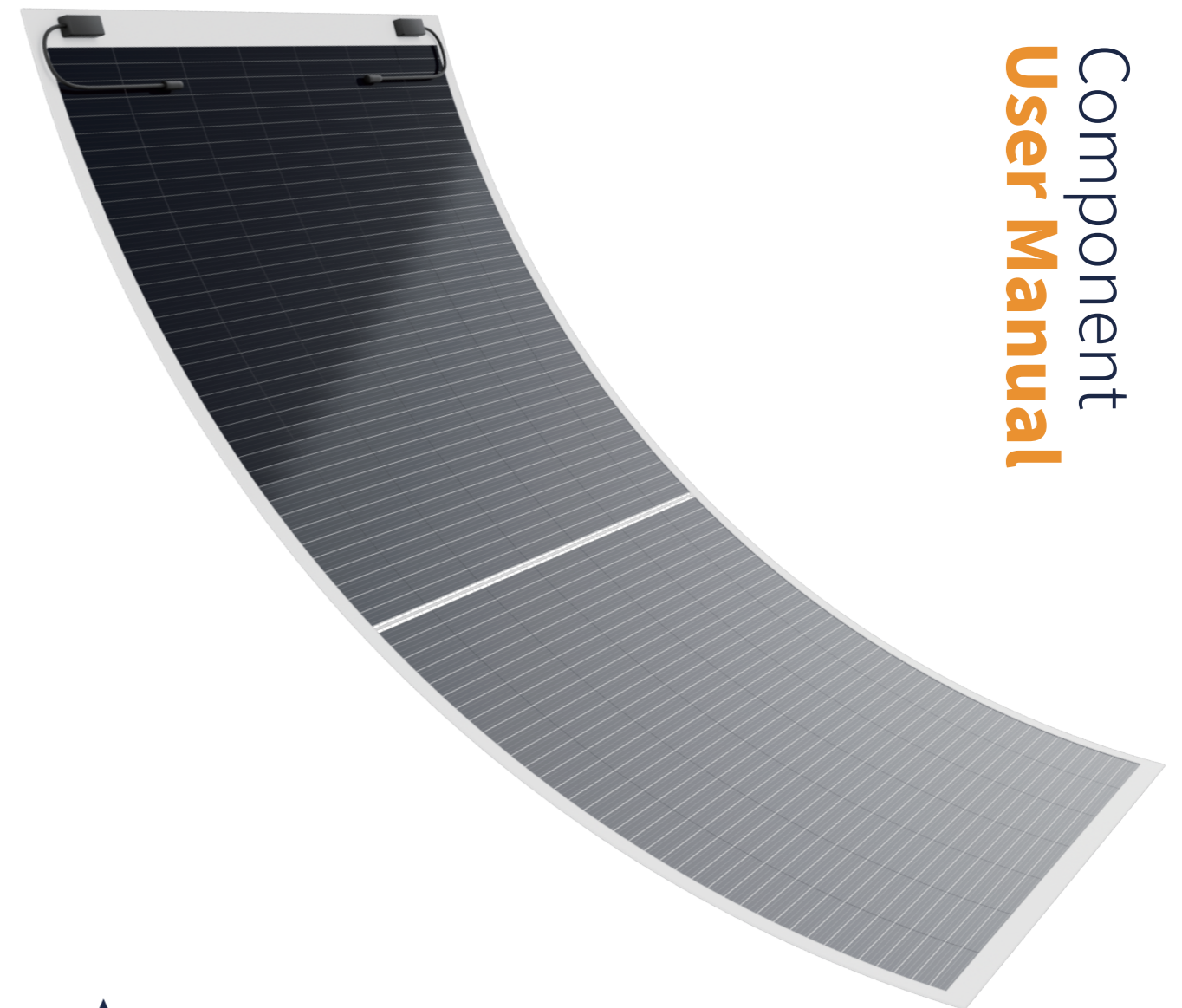
- ◆ Modules in PV arrays shall be inspected regularly for damage. If damage is found, it must be replaced with the same type of module, such as broken modules, broken cables, damaged junction boxes, and other factors that lead to functional and safety failures of the modules.
- ◆ A well-designed solar system rarely requires maintenance, but there are simple steps that can be taken to improve system performance and reliability.
- ◆ Maintenance shall be performed by trained personnel at least once every six months; maintenance personnel shall wear rubber gloves and insulated boots at all times during work to remove any obstructions that could obscure the solar modules and thus affect their performance.
- ◆ Whether the hardware of the installation is fastened in place shall be checked.
- ◆ Whether all array fuses in each non-grounded pole are working properly shall be checked.
- ◆ If the module is damaged, it needs to be replaced. The modules must be replaced with the same type. No one shall touch the live parts of cables and connectors when modules are replaced. Proper safety guards (insulated tools, insulated gloves, insulated boots, etc.) shall be used when handling the modules.
- ◆ When the modules are replaced, the operator shall remove the unstructured adhesive, clean the adhesive with cleaning solvent and then re-install and wire the modules according to the installation method.
- ◆ Use opaque material to cover the front surface of the module when repairing. Modules exposed to sunlight can generate high voltage, which is extremely dangerous.
- ◆ Juhe New Energy PV module junction box is equipped with bypass diodes, which will minimize the loss of module heating and current.

8.3 Connector and cable inspection

- ◆ Check all cables to verify that they are securely connected; Juhe recommends that all cables shall be operated in proper ducting and sited away from areas prone to water collection.
- ◆ It is recommended to check the electrical, grounding and mechanical connection parts every 6 months to make sure they are clean, safe, undamaged and rust-free, that the mountings are properly tightened and that all cables are checked to make sure the connectors are tight.

09 Release and Execution

This document is managed by the product development department of Juhe New Energy
The final implementation and interpretation right belongs to R&D Center



Component
User Manual

DASOLAR