

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	1 / 15

1. Introduction

This manual contains important safety instruction for lightweight photovoltaic modules (hereafter referred to as “modules”) of DAS SOLAR CO., LTD. Failing to comply to this safety guidelines may result in loss of life or property.

Installers should follow all safety precautions described in this guide as well as local codes when installing the module.

Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should be performed by qualified personnel with electrician license.

Keep this guide in a safe place for operation and maintenance of the modules. Under the premise of following the requirements of this installation manual, please rest assured to use.

Installer must inform the end customer (or consumer) of the above.

1.1 Disclaimer

DAS SOLAR reserves the right to change this installation manual without prior notice. If the customer fails to follow the requirements listed in this manual during the installation of the modules, the limited warranty of the products provided to the customer will be invalid.

1.2 Scope of Liability

DAS SOLAR is not responsible for any form of damage, including but not limited to, module operation, system installation, physical injury, injury and property loss caused by failure to comply with instructions in this manual.

2. Product Introduction

DAS SOLAR lightweight module is lightweight product. DAS SOLAR lightweight module is capable for integrated photovoltaic building installations on residential roof and commercial roof systems.

DAS SOLAR lightweight module will be pre-loaded with double side tape.

Advantages: Lightweight, flexibility, easy installation, quick installation, No rack and No drill.

Features:

- The front panel is made from fluorine-containing composite material with no glass structure, which reduces the weight by 60%.
- Lightweight modules can be bent, the bending degree can reach 30°.
- There is no gap in the connection between the cells, adding 7% cells area on the same module area to increase the power generation density.
- Quick installation by double-sided foam tape, which fits curved surface or irregular roof in various application scenarios.
- Reduce the shading loss of the photovoltaic system through bypass diode.

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	2 / 15

3. Safety Measures

3.1 Warning

Read and understand all safety rules before installing, wiring, operating or maintaining modules. When the module is exposed to sunlight or other light sources, direct current is generated and the array comprised of the modules will may cause fatal shock and/or burns.

3.2 Conventional Safety

- A. All installations must be in full compliance with local regulations and corresponding national or international electrical standards.
- B. Do not use or install damaged modules, and damaged modules shall not be repaired without permission from DAS SOLAR. The electrical part of the module may lead to electric shock hazard. Do not split or remove any part of the module. Do not use mirrors or lenses to focus sunlight on the modules.
- C. Do not connect the positive terminal of a single module from the positive terminal of the cable. Please make sure that the polarity of each module or module string is not opposite to other modules or module strings. Do confirm no gap between insulating washer of each connector. Gap between insulating washer of each connector may lead to electric shock hazard.
- D. Shall not exceed the certified maximum system voltage of adopted module.
- E. Do not install or handle modules when the module installation area is humid or the weather are rainy, snowy or windy. The modules are fixed by tape, ensure that the installation and construction of the modules the weather is sunny.
- F. Damaged junction box and connector may lead to electric shock hazard.

3.3 Operation Safety

- A. To avoid damage to the modules, do not scratch or hit the modules, and do not use paint or adhesives on the surface of the modules. To prevent the insulation effect of the modules from being reduced, please avoid scratching, cutting cables and connectors or exposing them to the sun for a long time. Do not drop the module or allow objects to fall on the module. Do not place any heavy or sharp objects on the module.
- B. In the event of a fire, disconnect the power than extinguishing the fire according to the fire protection requirements.
- C. Please operate in a dry environment, and only use dry tools. Do not work in a humid environment without wearing any protectors. Under the sun, Whether the module is connected to the system or not, please do not directly touch the junction box, connector, cable and other charged objects of the module without any protection.
- D. Do not climb, tread, stand, walk or jump directly on packages or modules.

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	3 / 15

E. Do not pull the modules directly when placing them on any platform.

4. Unload, Transportation and Storage

Preventive measures and general safety rules:

- A. Modules should be well stored in the package before installation. Protect the package from damage. Transport or unpack the modules as per the recommended procedures, avoiding scratching or striking on them. When in transportation, do not put pressure directly on the modules. Any improper behaviors during the transportation or installation may damage the modules and make the warranty invalid. Do not allow stepping or standing on the package or the surface of modules.
- B. Please handle modules only in dry conditions. Before installation, ensure all modules and electrical contacts are clean and dry. In case it is required the modules be stored temporarily in the open air for a period, please always make modules covered up and faced down on a soft and flat surface, preventing the internal water or connector damage;
- C. Unpacking must be carried out by two or more persons at the same time. It is forbidden to carry the modules by catching the junction boxes or wires. Carry the modules with two hands and do not stack up them. Do not put the modules in a place that is not supported or fixed. Do not allow any heavy stuff or sharp-pointed objects on the modules.

4.1 Marks on outer package

4.1.1 Do not discard the modules at will; special recycling is required 	4.1.2 Modules shall be kept dry without exposing to the rain or moisture 
4.1.3 Modules in carton are fragile, which shall be handled with care 	4.1.4 The package shall be transported upright 

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	4 / 15

4.1.5

Do not step on the package and module



4.1.6

Do not surpass the Maximum piles numbered 2 on outer packaging when stacking the modules

2

4.2 Unloading Warning

- Use the correct lifting fixture to handle, no more than 2 pallets for one time lifting. Before lifting, please confirm whether the tray and the carton are damaged or warped as well as the hoisting rope is firm and solid or not. Before lifting landing on the ground, two persons shall hold the carton from two sides gently to put it on a relatively flat place.
- When storing the modules at the project site temporarily, store the modules in a dry and ventilated place with no stacking, cover the modules with waterproof cloth reinforced by curtain or net bag to prevent them from moisture or rainwater.

4.3 Secondary Transportation and Warning

- Do not remove the original packaging if the modules require long-distance transport or long-term storage. The finished package can be transported by land, sea or air. During transport, make sure that the package is fixed to the shipping platform without moving. When transporting by truck, normally stack no more than two layers, not allowing cutting the packing straps.
- Do not unpack the modules or stack more than one layer when transporting at the project site. Please fix the package on the vehicle without moving. No transport or handling by pedicab. No binding and carrying the modules on the back of single person. Do not carry or pull the modules by handling the junction box or wires.

4.4 Storage

- Do not expose the modules to rain or moisture. In case the modules are required be stored temporarily in the open air for a period, please always make modules covered up and faced down on a soft and flat surface, preventing the internal water or connector damage.
- Do not remove the original packaging if the modules require long-distance transport or long-term storage.
- Warehouse storage at the project site (Humidity < 70%; Temp.: -20°C ~+50°C): stack no more than 2 layers; normal warehouse storage (Humidity < 70%; Temp.: -20°C ~+50°C):

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	5 / 15

stack no more than 2 layers.

5. Unpacking Instruction

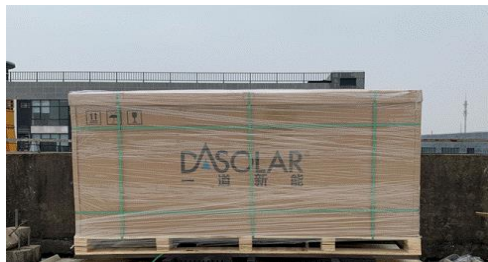
5.1 Unpacking Safety

- As for outdoors unpacking, it is prohibited to operate in rainy days. Because the carton will become soft and damaged after it gets wet in the rain. The modules inside the carton will slide out and may cause damage or injury to personnel. If the wind is blowing on site, it is necessary to pay special attention to safety; especially in high wind conditions, it is not recommended to move the modules, and the unpacked modules shall be fixed properly.
- The operation ground is required to be level to ensure that the package can be placed stably, avoiding dumping.
- Wear protective gloves during unpacking to avoid hand injury and fingerprints on the front surface of the module.
- Module information can be checked on the outer package. Please read the instructions before unpacking.
- Each module shall be handled by two persons. It is forbidden to carry the module by pulling the wires or junction boxes. Please carry the modules with two hands and not overlap them.
- The modules released from the package should all be well installed without left and stacked on site.

5.2 Unpacking Steps:

- Before unpacking, please check the product name and serial number on the A4 paper. Please read the unpacking instructions carefully and the customized unpacking method is not allowed.
- Cut the packing straps at longer side firstly and then short side in vertical direction of the tray with blade or scissors. Cover off the carton and take out two or three of the upper lifting holders.
- Two persons stand, on the both sides of the box and, catch a module at the same time. One hand holds the top corner of module, and the other hand holds the short side, and then take out the module at the same time. When unpacking on a level surface, take out the modules from one side to the other in turn, and then carry them by two persons. When unpacking on an unlevel surface, do use an upholder to prevent the modules from toppling over.
- As soon as the module is taken out from the package, do not lean it on the mounting posts or at any place which is not supported or fixed.

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	6 / 15

A		B	
			
C		D	

6. Installation

DAS lightweight module have passed the IEC certification. and the modules after the expiration of life need to be disposed of reasonably according to local laws and regulations.

6.1 Installation Safety

- DAS SOLAR's module can be mounted in horizontal or vertical direction, but horizontal installation minimizes the shading effect of dusts on the module.
- Before installation, do not remove the package of modules and preserve them in the carton
- When installing modules, please only operate in a dry environment and only use dry tools. Do not operate in a humid environment without any protective measures. Do not install modules in the rain, snow or high winds. Please keep the connector dry and clean when installing the modules to avoid the risk of electric shock. Please do not operate when the connector is wet, or it may cause electric shock. Please install immediately after unpacking.
- Do not wear metal rings, wristwatches, earrings, nose rings, lip rings or other metal materials when installing or repairing modules and solar systems.
- Cover modules completely with opaque material to prevent electrical shock during assembly

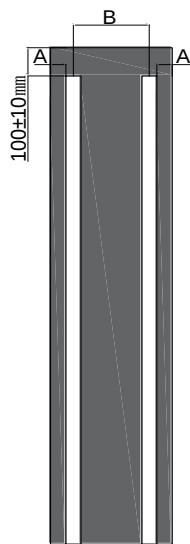
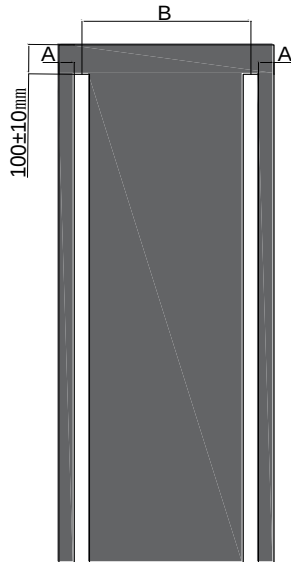
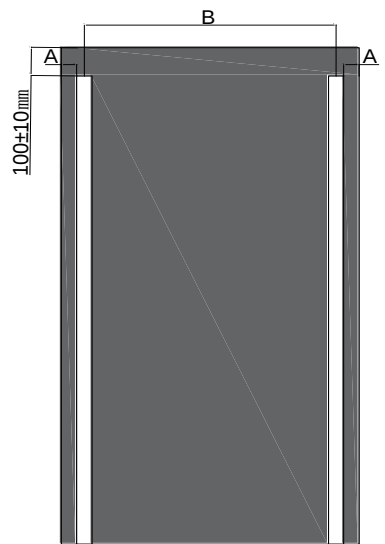
Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	7 / 15

and wiring. Do not open the electrical connection or unplug the connector when the circuit is under load. Do not touch the modules when unnecessary after installation; high temperature may be generated by module surface which can cause burns and electric shocks.

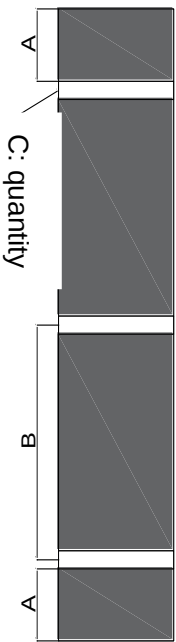
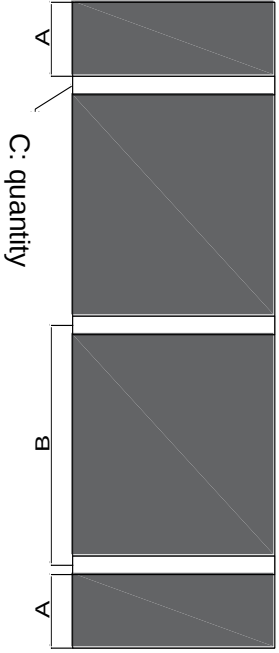
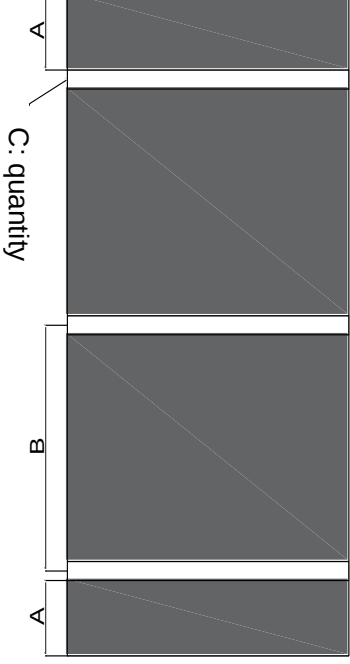
- F. When installing modules, do not work alone and always maintain a team of two or more person.
- G. After installation, the cables shall be secured or tied up so that it will not be exposed to direct sunlight to prevent deterioration. Low-hanging cables can cause all sorts of problems, such as leaks in ponding and outbreak of fire.
- H. The module application class is class A.

6.2 Installation Method

6.2.1 Schematic diagram for lightweight module with tape (white area means double-side tape)

Item	LOFP	LOEP	LOCP
Portrait			

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	8 / 15

Landscape	 The gap between tapes and quantity of tapes can be adjusted according to gap of ribs.	 The gap between tapes and quantity of tapes can be adjusted according to gap of ribs.	 The gap between tapes and quantity of tapes can be adjusted according to gap of ribs.
	In the diagram, dimension A means the distance between the tape and the edge, dimension B means the distance between the tapes, quantity C means the number of tapes. The pasting requirements are as follows: 1.The total tape area of LOFP tape should be $\geq 185.52\text{cm}^2$, the total tape area of LOEP tape should be $\geq 325.14\text{cm}^2$, the total tape area of LOCP tape should be $\geq 459.88\text{cm}^2$. 2.Dimension A: $\leq 350\text{mm}$. 3.Dimension B is the size from equalizing the whole module, which can be adjusted when the total pasting area is satisfied. 4.Quantity C is it can be adjusted according to the ribs of the steel tile as long as the total pasting area is satisfied.		

The installation of modules must follow the examples and suggestions. If the installation method is different from the announcement of DAS SOLAR, please consult DAS SOLAR local technical supporter or after-sales staff, and obtain the approval of DAS SOLAR, otherwise the modules will be damaged and the warranty will be invalid.

- The mechanical load (including snow load and wind load) of modules depends on how it is installed and should be calculated by a professional system designer based on the actual situation and environmental conditions.
- During installation or use, the drain hole must not be blocked in any case.

6.2.2 Environmental Requirement

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	9 / 15

DAS SOLAR lightweight modules should be installed in a location that meets the following requirements.

- A. The modules shall not be in the environment of highly corrosive chemicals or flammable vapors or gases (e.g. discharge areas of pollution sources such as factories).
- B. The installation position should be planned according to the design requirements, avoiding the position with the maximum wind buoyancy such as corner and roof edge.
- C. The ambient temperature during installation should be between 4.4 ° c ~ 35 ° c (40°F ~ 95°F), while the temperature is higher than 35 ° c (95°F), which may make it difficult to separate the molding paper from the double-sided tape. When the temperature is lower than 4.4 ° c (40°F), the double-sided tape may not stick firmly on the installation contact surface. The minimum installation temperature is recommended to be greater than or equal to 4.4 ° c (40°F). When installing in a hot environment, store modules in a cool area to prevent double-sided tape from overheating.

6.2.3 Roofs Requirements

DAS SOLAR lightweight modules should be installed in a location that meets the following-requirements.

- A. DAS SOLAR lightweight modules shall not be installed in buildings and other systems or modules that may cause damaging mechanical or electrical effects on PV modules
- B. Installation of DAS SOLAR lightweight modules shall not exceed the roof system fire rating and slope limits
- C. DAS SOLAR lightweight modules warranty does not include the modules installed in a waterlogged location
 - To ensure effective drainage, the roof should be a sloping roof
 - Do not install lightweight modules within 2m from the roof drain, in low-lying areas and in any low-lying areas on the roof
 - Do not immerse lightweight modules in water or always keep them in a spraying environment.
- D. Do not install lightweight modules directly at the links between existing roofs.
- E. Lightweight modules are attached with double-sided tape before delivery, and can be directly adhered to the roof system.

6.2.4 Installation of Lightweight Modules

6.2.4.1 Conditions and preparation of instillation substrates

- A. DAS SOLAR lightweight modules with double-side tape are suitable for bonding to clean, dry, not weathered color steel tile, color steel roof, The roof shall meet the minimum requirements of direct paste.
- B. The roof where the lightweight modules are placed should be flat, smooth and wrinkle-free.

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	10 / 15

Avoid irregular areas and concave areas on the roof where surface deformation of lightweight modules may occur during pasting to the roof.

- C. Clean the roof surface firstly, then use the fiber debris cloth or paper towel wipe, make the roof completely dry. Ensure there is no debris, talc, dust, oil, ice, snow, and water. These stuff will reduce the pasting effect and shorten the service life of double-sided tape.

6.2.4.2 Installation of Lightweight Modules

Step 1: Clean the base by water	
Step 2: Tear off the release paper of the double-sided tape for paste	 Portrait tape: Remove the double-sided tape release papers until to the middle position of the module, place the module, apply pressure on the pasting position to paste. Then remove the remaining release papers and apply pressure on the pasting position to paste Landscape tape: Remove the double-sided tape release paper from either end, place the modules, apply pressure to the pasting position to paste. Then, remove the rest of the release papers in turn, apply pressure to the pasting position to paste.
Step 3: Install the module and apply roller pressure	

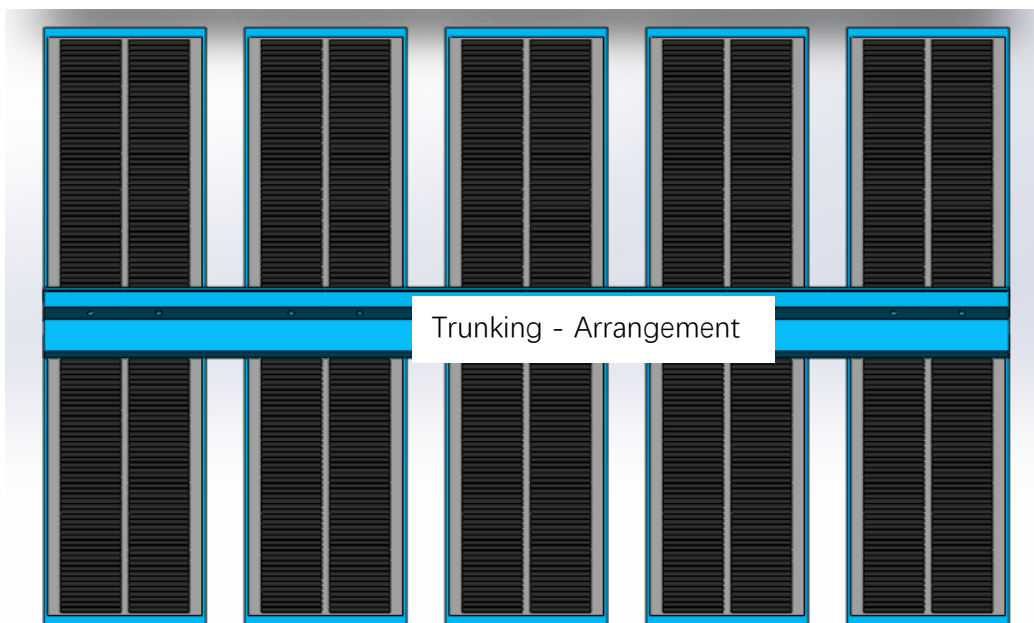
Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	11 / 15



After the double-sided tape being attached to the roof, use a clean resin roller to apply even pressure for fastening
The applied pressure is dead-weight pressure of soft roller itself.

6.2.4.3 Connection and Wiring

Each lightweight module is equipped with two cables and a pair of connectors, allowing you to use MC4 compatible connectors for positive and negative connections. The following installation slots are recommended for connection and wiring



Note:

All the installation methods introduced here are for reference only, and DAS SOLAR is not responsible for providing the relevant installation parts, designing and installing the system.

Mechanical loading and safety must be performed by a professional system installer or experienced person.

Before installation, it also needs to confirm the following items:

- Check for bugs or other debris before installation, and erase if any

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	12 / 15

b) Check that the serial number of the module is correct

6.2.5 Grounding

DAS SOLAR lightweight module is not equipped with a metal frame, so there is no need to ground the equipment. The electrical grounding of the photovoltaic circuit could be located inside the Inverter.

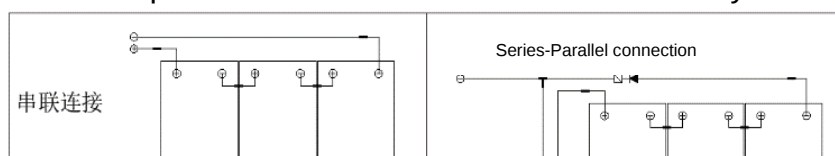
6.2.6 Electrical Installation

All wiring shall be performed by qualified installers in accordance with local regulations and procedures. Modules can be connected in series to increase the working voltage by inserting the positive connector of one module into the negative connector of another one. Always make sure the contacts are corrosion-free, clean, and dry before connecting the modules. If a set module string is connected to another in the opposite polarity, irreparable damage can be done to the module. Before parallel connection, be sure to confirm the voltage and polarity of each array. If the measurement finds that the polarity between the arrays is opposite or the voltage difference is more than 10V, check the configuration before making the connection.

- All other cables and connectors used to connect DC systems shall have similar (or higher) specifications. DAS SOLAR suggests that all cables should be placed in suitable pipelines and away from places prone to water accumulation.
- Each module has two standard output cables and connectors at each terminal. DAS SOLAR module is equipped with a 4mm² squared DC copper stranded cable, and rated voltage 1500V DC, insulation layer is resistance 90°C, UV resistant, all cables used to connect the DC system must have the same or better parameters mentioned above. DAS SOLAR requires that all wiring and electrical connections must comply with the corresponding requirements of the national electrical regulations

6.2.6.1 Wiring

In order to ensure the normal operation of the system, when connecting modules or connecting loads (such as inverter, battery, etc.), observe the correct polarity connection of the cable (as shown in figure 1 and figure 2). The bypass diode may be damaged if the modules are not connected properly. Modules can be wired in series to increase voltage. A series connection is a connection between a positive terminal of one module and a negative terminal of the next module. Figure 1 shows how the modules are wired in series. Modules can be connected in parallel to increase current (figure 2). Parallel connection is the connection of wires from the positive terminal of one module to the positive terminal of the next module. The number of modules in series and parallel should be designed reasonably according to the system configuration. All the above instructions must be complied with to meet DAS SOLAR's warranty.



Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	13 / 15

Series
connection

6.2.6.2 Fuse

When installing the fuse, should be connected to the non-grounded electrode of the module string (if the system is not grounded, the fuse should be connected both on positive and negative poles).

- The maximum fuse rating of the specific module is available on the product label and product data sheet.
- The rating of the fuse also corresponds to the maximum reverse current that the module can withstand (when an array is shaded, the array will be loaded into other parallel module arrays to generate current), thus affecting the number of parallel connected arrays.
- It is forbidden to connect two or more series fuses in parallel.

7. Maintenance

7.1 The visual inspection and replacement of the Modules

Regularly check whether the modules in the arrays are damaged. If any damage module is found, replace the module of the same model, such as module rupture, cable breakage, junction box damage and other factors leading to functional and safety failure of the modules.

Well-designed solar systems require minimal maintenance, but there are simple steps that can be taken to improve system performance and reliability

- It shall be maintained at least once a year by trained personnel, maintenance personnel shall wear rubber gloves and insulated boots at all times during the operation to remove any objects that may cover the solar module and affect its performance.
- Check that the installed hardware is secured in place.
- Check all array fuses in each ungrounded electrode for proper operation.
- If the module is damaged, it needs to be replaced. Module must be replaced with the same type. Do not touch live parts of cables and connectors directly when replacing components. Proper safety devices (insulating tools, insulating gloves, insulating boots, etc.) should be used when handling components.

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	14 / 15

- E. Remove the module starting from position without double-sided tape when do replacement. Then clean the adhesive with a clean solvent and install the module and wire again according to the installation method.
- F. Please cover the front surface of the module with an opaque material during repair. when exposing to the sunlight. Module exposed to sunlight will generate high voltages and are extremely dangerous.
- G. DAS SOLAR module junction box is equipped with bypass diodes, which minimizes the loss of heat and current to the module.

7.2 Inspection of the connector and the cable

- A. Check all cables to verify that they are securely connected; DAS SOLAR suggests that all cables should be run in proper pipelines and located away from easy catchments
- B. It is recommended that electrical, grounding and mechanical connections be checked every six months to ensure they are clean, safe, free of damage and free of rust, the mounting parts have been properly tightened. Check all cables to make sure the joints are tight.

7.3 Cleaning

The amount of electricity generated by a solar module is proportional to the amount of light falling on it. Modules generate relatively little power when shaded, so it's important to keep them clean.

- A. The module should be cleaned when the irradiance is less than 200W/m², so as to avoid the large difference between the water temperature and the air temperature during cleaning, so as not to cause the cracks. Hard water should be softened firstly before cleaning, and wipe the remaining water on the surface of the module.
- B. It is strictly forbidden to clean modules under the weather conditions with wind force greater than grade 4, heavy rain or heavy snow.
- C. When using high-pressure water to clean the surface of the modules, the water pressure used should not exceed 70 kPa. and the modules are strictly forbidden to bear additional external forces.
- D. During the cleaning of modules, it is strictly forbidden to step on modules and splash water onto the back of modules and cables. The connector should be clean and dry to prevent electric shock and fire hazard. Strictly prohibit the use of steam cleaner. When cleaning modules, use soft cloth, mild detergent and clean water. Do not put modules into water directly. Be care for avoiding serious thermal shock that could damage the module.
- E. If the surface of the module has grease and other difficult to clean substances, use frictionless neutral liquid cleaner, do not use the organic solvent containing alkali, acid cleaning module. It is strictly forbidden to use corrosive solvent or hard object to wipe the photovoltaic module.
- F. If you are not sure if you need to clear the module, start by cleaning particularly dirty arrays. If

Third-order file	Document number	DAS-MP-023-A06
Installation Manual of DAS Solar Lightweight Modules (Double-sided tape)	Edition	V02
	Page number	15 / 15

the improvement percentage is less than 5%, cleaning is usually not required. The above verification should only be carried out under the condition of constant daily illumination (sunny day, strong sunshine and cloudless).

G. The back of the module usually does not need to be cleaned. If you need to clean the back of the module, pay attention to avoid the cleaning solution to the bottom of the material.

H. Vegetation should be trimmed regularly to avoid shading modules.

7.4 Water Quality Requirement

PH: 5 ~7;

Chloride or salt content: 0 - 3,000 mg/L

Turbidity: 0-30 NTU

Conductivity: 1500~3000 μ s/cm

Total dissolved solids (TDS): $\leq$ 1000 mg/L

Hardness of water: 0-40 mg/L

Non-alkaline water must be used, when available, use softened water

7.5 Check after Cleaning

A. The overall appearance of visual module is clean, bright and stain free. Sampling check whether there is accumulated dust on the surface of modules; No obvious scratch marks on the surface of modules; There is no man-made fracture on the surface of modules.

B. After cleaning, there is no inclination or bending of the rack. the wiring terminals of components not fall off, etc

C. After cleaning the module, complete the cleaning record.

7.6 Troubleshooting

If the installation fails to work properly, please inform the installer immediately.

8. Technical problems or claims

For technical support or claims, please contact the installer.