

Suzhou Talesun Solar Technologies Co., Ltd.	Technical Specifications	
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1 INTRODUCTION

1.1 PURPOSE OF THE MANUAL

This guide contains information on precautions to be used during the handling and installation of Suzhou Talesun Solar Technologies Co., Ltd. photovoltaic modules along with technical instructions to be followed during installation, mounting, wiring and maintenance thereof. Suzhou Talesun Solar Technologies Co., Ltd. hereafter is referred to as “Talesun”. Any divergence from the contents of this manual during the handling, installation, or maintenance of Talesun’s products will render the warranty and any guarantees there under null and void.

Information for installers

- ✧ Installers must read and understand this manual before installation.
- ✧ Please ensure that installation, operation and maintenance of your photovoltaic system is only carried out by qualified persons able to carry out the technical procedures described in this manual, i.e. system planers, installers and maintenance personnel, and is carried out in accordance with all safety precautions in this manual and any and all applicable local codes. If you do not possess these qualifications, you may not carry out the work described herein except for cleaning.
- ✧ This manual and the instructions set forth herein are part of the product and should therefore be kept for the entire useful life of the solar installation.

Information for operators

- ✧ Keep these instructions safe for the entire useful life of the solar installation.
- ✧ Please contact your plant supplier for information concerning the formal requirements for solar systems. Please be sure to learn about directives and permit requirements from the responsible local authorities and energy providers prior to installation of the solar plant.
- ✧ We recommend that you insure your solar system against natural hazards (e.g. against lightning strikes).

1.2 DISCLAIMER OF LIABILITY

- ✧ These instructions are only valid for products of Talesun.
- ✧ The information in this manual is based on Talesun’s knowledge and experience and is believed to be reliable; but such information including product specification (without limitations) and suggestions do not constitute a warranty, expressed or implied. Talesun reserves the right to change the manual, the PV products, the specifications, or product information sheets without prior notice.
- ✧ Because of the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic products are beyond Talesun’s control, Talesun assumes no liability for damage, loss, or expense arising out of or in any way connected with such installation, operation, use or maintenance. Talesun assumes no responsibility extending beyond the functional capability and safety of the modules. This manual is only for reference.
- ✧ No license is granted by implication or otherwise under any patent or patent rights.
- ✧ Special module’s installation according to the module’s specification or contract terms.
- ✧ If your questions are not adequately addressed in this manual, please first contact your system supplier. You can find

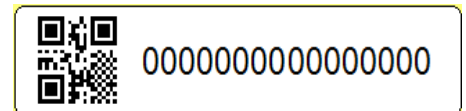
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more information on our website www.talesun.com.

1.3 PRODUCTION IDENTIFICATION

Each module has three labels that provide the following information:

- ✧ Nameplate: describes the product type; rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions; weight, dimension etc.; the maximum system voltage is 1000 volts DC is shown on the nameplate. Maximum fuse rating is also shown.
- ✧ “QA Pass” stamp: module will be strictly inspected according to standard and get a QA Pass stamp on the backsheets.
- ✧ one dimensional bar code or QR Code: The serial number has 16 digits. There are two bar codes on each module. One is permanently attached to the interior of the module and is visible when viewing the front of the module, and another is stuck to the rear side of the module.
- ✧ Removing a label will make the Talesun warranty void.



2 SAFETY GUIDELINES

GENERAL SAFETY GUIDELINES

DANGER! Danger due to electric shock!

All installations must be performed in compliance with all applicable regional and local codes, or other national or international electrical standards as applicable.

- ✧ A solar modules can generate currents and voltages even in low light intensities. Therefore, contact with live modules should be avoided and isolation of live circuits should be taken before any connection or disconnection operation.
- ✧ Physically disconnecting contacts in a live electrical circuit can cause arcing, resulting in grave or mortal injury. The severity increases when several modules are connected in series.
- ✧ Cover the solar modules with opaque material for the entire duration of assembly. Only then is the module reliably de-energized.
- ✧ Never disconnect plugs when under load. Be aware that even without the presence of daylight, residual charge may still be present in the plant. Ensure that the modules are first disconnected from the inverter prior to opening any contacts in the solar installation.
- ✧ Artificially concentrated sunlight shall not be directed on the module. Solar modules produce electrical energy when light shines on their front and rear surface. The DC voltage may exceed 30V. Contact with a DC voltage of 30V or more is potentially hazardous.
- ✧ In the case of module or phase voltages of more than 120 V, the extra-low voltage range is left. Undertake the necessary protective and precautionary measures.
- ✧ Do not insert electrically conductive parts into the plugs and junction box. Do not touch the contacts or exposed terminals.
- ✧ Keep children and unauthorized persons away from the modules.
- ✧ In case of modules damage or misoperation of pv array, please contact Talesun technical customer service.
- ✧ Do not wear metallic ornaments or metallic devices while installing or troubleshooting photovoltaic systems. Please wear appropriate personal protective equipment. .



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- ✧ If fire, please do not use water to extinguish the fire at the power source
- ✧ In case of wet or windy weather, do not install or processing modules.
WARNING! Danger of injury due to broken glass! Risk of injury due to falling modules!
- ✧ The modules are primarily made of glass and must therefore be handled with appropriate caution.
- ✧ In order to ensure safe mounting, familiarize yourself with all applicable national regulations for work safety and accident prevention.
- ✧ Wear suitable protective clothing (e.g. safety shoes, protective gloves) in order to prevent injuries.
- ✧ To prevent injury, wear appropriate protective clothing (e.g. safety shoes, protective gloves). Note: for Talesun single glass module model description, the system voltage including "(H)" is 1500V, , and the system voltage of double glass module is 1500V. Therefore, the working voltage that the protective clothing provided for workers can withstand shall not be less than 1500V.
- ✧ Under normal conditions, photovoltaic modules may experience more current and/or voltage generation under stricter conditions than under standard test conditions. Therefore, when determining the rated voltage of the modules, the rated current of the conductor, the size of the fuse and the size of the control device connected to the PV output, the ISC and VOC values marked on the modules should be multiplied by 1,25 times.
- ✧ Modules rated for this grade of application may be used to operate in systems with dc voltages greater than 50V or 240W, where general access points are expected. Modules qualified for safety pass this part IEC61730 and are considered to meet the requirements of safety class II in this application class.

2.1 PRODUCT PRECAUTION

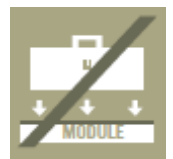
- ✧ Do not attempt to disassemble the modules.
- ✧ Do not remove any attached nameplates or modules from the modules.
- ✧ Do not open the junction box under any circumstances.
- ✧ Do not plug plugs with blocked or contaminated connections
- ✧ Only carry out modifications to the modules that have been confirmed by Talesun in writing in advance.
- ✧ Do not carry out any extra drilling (e.g. for fasteners) on the modules.
- ✧ Use only insulated tools that are approved for work on electrical installations.
- ✧ Do not use light concentrators (e.g. mirrors or lenses) to attempt to increase the capacity of the module. The module may be damaged. This also voids the warranty.
- ✧ Do not squeeze or knocked with sharp objects, collision, scratching photovoltaic modules of toughened glass.



2.2 TRANSPORT AND STORAGE SAFETY GUIDELINES

Inappropriate transport and installation may break the module. To prevent damage of the modules:

- ✧ Transport the modules in their original packaging until installation.
- ✧ Store the modules securely in cool and dry rooms. The packaging is not weather-resistant!
- ✧ Protect the modules against scratches and other damage, especially from impact at the edges or improper storage.
- ✧ Ensure modules do not bow under their own weight.
- ✧ Do not rest a module unprotected on its edges. This can damage the module and the frame.
- ✧ Do not lift or move the modules using the cables or at the junction box under any circumstances!
- ✧ Do not set the modules down hard on any surface.



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- ✧ Do not subject the module surfaces to mechanical stress.
- ✧ Do not stand on the modules.
- ✧ Do not drop or place objects on the modules.

3 MECHANICAL INSTALLATION

3.1 SELECTING THE LOCATION

- ✧ The modules are certified according to the norm IEC 61215 and others, and are suitable for safe operation in moderate climates. The operator needs to consider the effect of the high altitude on the operation of the module, when the modules are installed at high altitude.
- ✧ **Do not install or use modules in areas that may be exposed to strong corrosive substances, such as salt, salt spray, salt water, active chemical vapor corrosion, acid rain, or any other substance that will corrode the modules, affect the safety or performance of the modules.** Do not place the modules in standing water. The projection grade of the junction box is IP68.
- ✧ Do not install the modules near flammable gases and vapors (e.g. gas containers) or near open flames and flammable materials. Solar modules are not explosion-proof operating equipment.
- ✧ Long-term exposure to salt mist (i.e., marine environments) and sulfur -containing conditions will cause a risk of module corrosion.
- ✧ A module is considered shade-free when it is entirely unshaded throughout the year (e.g. by buildings, chimneys, trees). Even partial shading of the modules (e.g. by overhead lines, dirt, snow) should be avoided.

3.2 SELECTING THE PROPER SUPPORTING FRAME

Always observe the instructions and safety precautions included with the support frames to be used with the modules.

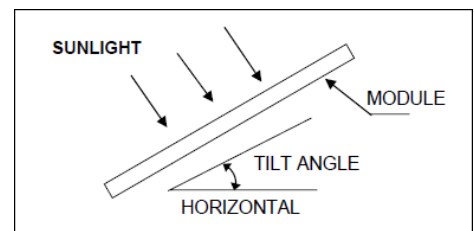
Install each module to a mounting structure:

- ✧ That is made of durable, corrosion-resistant and UV-resistant material.
- ✧ That can transfer forces on the module to the assembly substructure.
- ✧ That ensures that no mechanical stress (e.g. caused by vibrations, twisting or expansion) is generated on the module.
- ✧ That ensures sufficient back ventilation of the module.
- ✧ That ensures long term stability.
- ✧ That will not give rise to galvanic corrosion in case of direct metal contact (i.e. grounding lead, screws, washers, etc.).
- ✧ That allows for strain-free expansion and contraction due to natural ambient temperature variations.

3.3 GENERAL INSTALLATION

Modules connected in series should be installed at the same orientation and angle. Different orientations or angles may cause a loss of power output due to the change in sunlight exposure.

- ✧ When developing the final layout of photovoltaic system, consider keeping suitable access to allow the maintenance and inspection works. To minimize risk in the event of an indirect lightning strike, avoid forming loops when designing the system.
- ✧ The minimum spacing between the two modules is 10mm.
- ✧ Select an installation mode, which should not block the drainage holes.



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Ensure that the drainage holes are unblocked during installation and use.

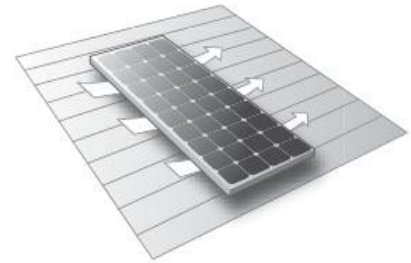
- ✧ The optimal tilt angle of the module depends on the respective latitude. We recommend a photovoltaic simulation tool to ensure the optimal orientation.

Ground mount

- ✧ Select the height of the mounting system to prevent the lowest edge of the module from being covered by snow for a long time in winter in areas that experience heavy snowfalls.
- ✧ In addition, assure the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by sand and stones driven by wind.

Roof mount

- ✧ When installing a module on a roof or building, ensure that it is securely fastened and cannot fall as a result of wind or snow loads.
- ✧ Make sure there is adequate ventilation space under the modules. At least 10 mm clearance between the modules is required to allow thermal expansion of the bracket. Other installation methods may affect UL certification or fire rating.
- ✧ For roof mounting applications the assembly is to be mounted over a fire resistant roof covering rated for the application. Talesun modules have been listed as Class C according to UL790 standard.
- ✧ Any roof penetration required to mount the module must be properly sealed to prevent leaks.
- ✧ In some cases, a special support frame may be necessary.
- ✧ The roof installation of solar modules may affect the fireproofing of the building construction.
- ✧ Do not install modules on a roof or building during strong winds to prevent accidents.
- ✧ All module support structures used to support PV modules at correct tilt angles should be wind and snow load rated by appropriate local and civil codes prior to installation.

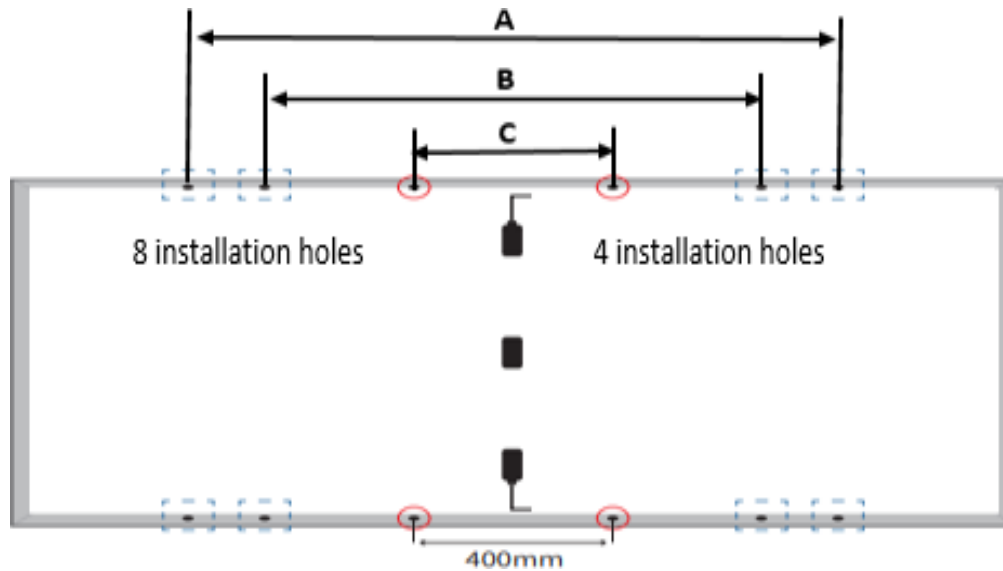


3.4 INSTALLATION METHOD

- ✧ Single-sided module is installed with mounting holes, and the mounting structure is perpendicular to the bottom of the long side frame.
- ✧ Bifacial module is installed with both mounting holes and Clamping Installation. To avoid shielding and to comply with load requirements, the installation structure should be mounted parallel under the long-side frame, Modules must be securely attached to the mounting structure using six pre-drilled mounting holes in the frame.

1. Frame Holes Mounting


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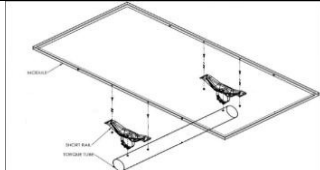



✧ Use mounting holes of A or B or C , safety factor $\gamma_m=1.5$, and this value can decrease if modules are not mounted following the instructions above.

Installation Mode	Module Type	pitch(mm)			Load Design value	Installation legend	Screw legend	
		A	B	C				
Insatall with A or B holes Guide rail vertical long side of module;	TP6F60M	1290±1	990±1	/	+ 3600Pa - 1600Pa			
	TP6F72M	1620±1	1300±1					
	TP6L72M	1620±1	1300±1					
	TP6L60M	1290±1	990±1					
	TP7F60M	1400±1	990±1	/				
	TP7F66M							
	TP7F72M							
	TP7F78M							
	TP7F54M							
	TP8F54M	1400±1	/	/				
	TP8F60M							
	TP8F66M							
	TP7F54M (FEATHER)	1400±1	990±1	/				+ 2400Pa - 1600Pa
	TN7F54M	1400±1	990±1	/				+ 3600Pa - 1600Pa
TN7F60M	1400±1	990±1	/					
TN7F72M	1400±1	990±1	/					
TP6G60M	1290±1	990±1						
TP6G72M	1620±1	1300±1						
TD6G72M								

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Install with the A or B holes Guide rail parallel long side of module	TD6G60M	1290±1	990±1	/	+ 3600Pa - 1600Pa	
	TD6I60M	1290±1	990±1			
	TD6I72M	1620±1	1300±1			
	TD7G54M	1400±1	990±1	/		
	TD7G60M					
	TD7G66M					
	TD7G72M					
	TD7G78M	1400±1	/			
	TD8G54M					
	TD8G60M					
	TD8G66M	1400±1	990±1	/		
	TP7G72M					
	TP7G54M	1400±1	990±1	/	+ 2400Pa - 1600Pa	
		1400±1	990±1	/		
	TM7G54M	1400±1	990±1	/	+ 3600Pa	
	TM7G72M	1400±1	990±1	/	- 1600Pa	

Install with the C mounting hole and short rail, the shaft is vertically on the long side of module	TP6L60M TP6L72M TD6I60M TD6I72M	/		400±1	+ 1600P a - 1600P a	
Install with the C&B mounting holes and supplemental rail, the shaft is vertically on the long side of module	TP7F60M TP7F66M TP7F72M TP7G72M TD7G66M TD7G60M TD7G72M TN7F60M TN7F72M TM7G72M	/	990±1	400±1		

- ✧ Modules should be bolted to support structures through mounting holes located in the frame's back flanges only. Do not drill additional holes. Doing so will void the warranty.
- ✧ M8 coarse thread bolts shall be used for the mounting holes of A or B; The mounting hole of C uses M6 coarse thread bolts.
- ✧ Each module must be securely fastened at a minimum of 4 points. If additional wind or snow loads are anticipated for this installation, additional mounting points should be used. System designer and installer are responsible for load calculations and for proper design of support structure.
- ✧ Use appropriate corrosion resistant fasteners, including bolts, spring washers, flat washers, nuts. The tightening torque of M8 coarse thread bolt should be 16 ~ 20 nm; The tightening torque of M6 coarse thread bolt shall be 10 ~ 16 nm, depending on the bolt quality. The parts in contact with the frame shall use flat washers with a diameter of 16mm or more and a thickness of ≥ 1.8 mm.
- ✧ Follow mounting guidelines recommended by the PV mounting supplier. The mounting design must be certified by a registered professional engineer.
- ✧ The mounting design and procedures shall comply with local codes and all authorities having jurisdiction.

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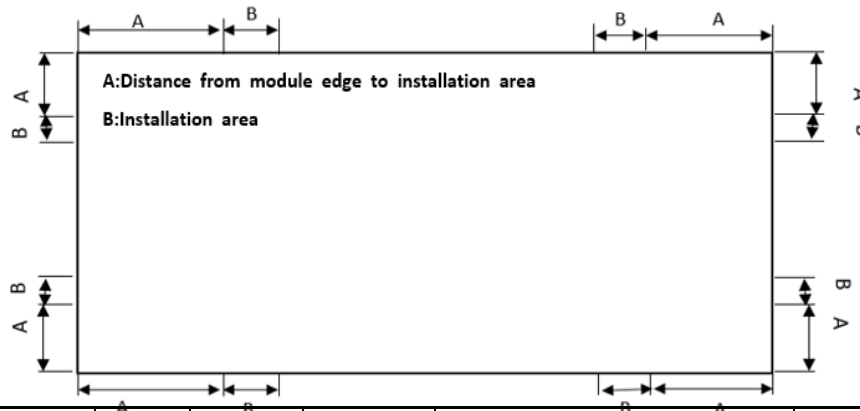
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- ✧ Ensure that the drainage openings of the frame are left open following installation to allow water runoff. This prevents frost damage.
- ✧ Install the module in such a way that rainwater and snowmelt can run off freely to avoid standing water or puddling.

2. Clamping installation

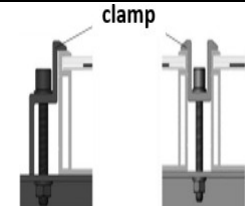
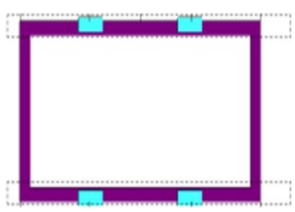
- ✧ Modules can be clamped in. Modules must be securely attached to the mounting structure with at least four clips on the frame.
- ✧ The modules must be properly secured to their support so that they can withstand live load condition, including wind uplift, to the pressure they have been certified for. It's the installer's responsibility to ensure the clamps used to secure the modules are strong enough.
- ✧ The modules are not subject to wind or snow loads exceeding the maximum permissible loads.
- ✧ The module clamps which are used must not come into contact with the front glass and must not deform the frame. Avoid shadowing effects from the module clamps. Drain holes in the module frame must not be closed or obscured by the clamps.
- ✧ The different values of "A" and "B" are shown in the following table (single side vertical long side installation and double side parallel long side installation). $\gamma_m=1.5$




Installation Mode	Module Type	A(mm)	B(mm)	Load	Installation legend	Clamping legend
				Design value		
Long-side fixture installation, the mounting rail is vertical to the long	TP6F60M	250	100	+ 3600Pa - 1600pa		
	TP6F72M	400	100			
	TP6L72M	440	100			
	TP6L60M	290	100			
	TP7F60M	380	100			
	TP7F66M	420	100			
	TP7F72M	520	100			
	TP7G72M	520	100			
	TP7F78M	560	100			
	TP7F54M	270	100			
	TP8F54M	390	100			
	TP8F60M	440	100			
TP8F66M	490	100				

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side of module	TP7F54M (FEATHER)	270	100	-2400Pa - 1600pa		 <p>clamp</p> <p>The end clamp installation Middle fixture installation</p>
	TN7F54M	270	100	+ 3600Pa - 1600pa		
	TN7F60M	380	100			
	TN7F72M	520	100			
Long-side fixture installation, the installation guide rail is	TP6G60M	270	100	+ 3600Pa - 1600pa		
	TP6G72M	430	100			
	TD6G72M	430	100			
	TD6G60M	270	100			
	TD6I72M	455	100			
	TD6I60M	290	100			

parallel to the long side of module	TD7G78M	500	100			
	TD7G60M	380	100			
	TD7G72M	460	100			
	TD7G66M	420	100			
	TD7G54M	270	100			
	TD8G54M	390	100			
	TD8G60M	440	100			
	TD8G66M	490	100			
	TP7G54M	270	100			-2400Pa
	TN7G72M	460	100			- 1600pa
	TM7G54M	270	100			+ 3600Pa - 1600pa
TM7G60M	380	100				
TM7G72M	460	100				
Short side fixture installation, the installation rail is vertical to the long side of module	TP7F54M/ TP7F54M (FEATHER) TN7F54M	100	140	+ 1600Pa -1067pa		

✧ The installation structure of modules must be made of corrosion-resistant and UV resistant materials. It is recommended to use a pressure block that can at least fix M8 bolts. For example, the tightening torque of M8 bolts should be within the range of 16 ~ 20nm. Make sure that the pressure block will not fail due to deformation or

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corrosion during the overall loading of the module.

- ✧ The minimum recommended length for each clamp is 50mm. The pressure block overlaps the frame of the module by at least 8mm, but not more than 12mm
- ✧ If the modules is not installed according to the above instructions, the actual load bearing value may be reduced.
- ✧ This manual is just for reference. Customer can select the corresponding installation manual based on the purchased module.

4 ELECTRICAL INSTALLATION

4.1 MODULE SELECTION

- ✧ Only connect modules of the same type, same configurations and same power class in the same system. This is the only way to achieve optimal yields.

4.2 SAFTY FACTOR

- ✧ Under normal conditions, a photovoltaic module may experience conditions that produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of I_{SC} and V_{OC} marked on modules should be multiplied by a factor of 1.25 when determining modules voltage ratings, conductor capacities, fuse sizes and size of controls connected to the module output.

Alternatively, all valid national regulations for the installation of electrical systems are to be applied.

Installer need to pay more attention to avoid the PID phenomenon, when installing the electrical system.

4.3 GENERAL INSTALLATION

- ✧ Before installing modules, contact the appropriate authorities to determine permissions, installation and inspection requirements to follow that apply to your site and installation.
- ✧ Check applicable building codes to ensure that the construction or structure (roof, facade, support, etc.) where the modules are being installed is strong enough to support the weight of the modules and all other system modules.
- ✧ When high current is required, several photovoltaic modules can be connected in parallel; The total current is equal to the sum of the respective currents, and each module (or a series of modules in series) must be equipped with the specified maximum current fuse. The recommended number of parallel modules is one.
- ✧ When a high voltage needs to be obtained, several PV modules can be connected in series with the total voltage equal to the sum of their voltages. However, the maximum system voltage must be lower than the highest certified voltage and the maximum input voltage for inverters and other electrical equipment in the installed system. The maximum number of modules in series is $(N) = \text{System } V_{\text{max}} / \{V_{\text{oc}} (\text{at STC}) \times [1 + (t - 25) * K_v]\}$, where:
 - Voc (at STC): Open circuit voltage of each module (refer to product label or data sheet)
 - t: The lowest expected ambient temperature
 - Kv: Thermal coefficient of open circuit voltage for the module (refer to data sheet)
- ✧ Connect an appropriate number of modules according to the voltage specification of the inverter used by the system. Even under the worst local temperature conditions, the voltage generated by the connected modules shall not be higher than the voltage allowed by the system.
- ✧ It is recommended to connect modules with similar electrical properties on the same string to reduce array mismatch effects .
- ✧ Use pv cables specified in local fire, building and electrical codes and matching plugs (wiring should be placed in light-resistant conduits or light-resistant materials if exposed to air). Ensure that they are placed under optimum electrical and mechanical conditions.
- ✧ Only photovoltaic cables can be used as connection cables. It is recommended to use the same type of connector from the same manufacturer in a photovoltaic system and to connect inverter-compatible connectors. During installation,

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disassembly, maintenance, and any other related process, the force between the cable and the connector shall not be greater than 90N to avoid improper connection or damage of the connector and the cable caused by human factors, which may affect the electrical safety or service life of the product.

- ✧ Ensure that all electrical modules are in a proper, dry and safe condition. In this way you avoid electrical short-circuits or dangerous contact voltages due to defective or damaged cables.
- ✧ Always avoid mechanical stressing of the connection cables.
- ✧ Ensure the tight connection and correct connection between individual connectors (especially for inverters).
- ✧ the minimum bending radius of the cable is 43mm.



4.4 GROUNDING

- ✧ Module borders must be properly grounded. The ground wire must be properly fixed to the frame of the modules to ensure good electrical contact. Use the recommended type or equivalent connecting cable.
- ✧ In addition, from the system side, the negative grounding of the inverter can effectively reduce the PID effect of the modules. However, professional personnel are required to operate the matching negative grounding of the inverter.
- ✧ If the support frame is made of metal, the surface of the frame must be electroplated and have excellent conductivity.
- ✧ The following are three grounding methods for reference:

Grounding Type	Requirement	Legend
Using grounding clamp	<ol style="list-style-type: none"> 1. Grounding clamp: Tyco 1954381-1 (recommended). 2. There is a grounding hole with a diameter of 4.2mm at the middle edge of the frame on the back of the module. The median line of the grounding mark coincides with the median line of the hole and is consistent with the length direction of the frame. 3. The grounding between modules must be confirmed by a qualified electrician, and the grounding device must be manufactured by a qualified electrical manufacturer. The recommended torque value is 2.3 N.M. The grounding clamp uses 12 AWG copper core wire. The copper wire shall not be damaged by pressure during installation. 	

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<p>Install with mounting holes</p>	<p>1. The existing but unused mounting holes on the assembly can be used to install the grounding device. Align the grounding clip with the frame mounting hole. Use the grounding bolt to pass through the grounding clip and frame. Put the toothed gasket on the other side and tighten the lock nut. Pass the grounding wire through the grounding clamp. The material and size of the grounding wire shall meet the requirements of relevant local national, regional or international regulations, laws and standards.</p> <p>2. Tighten the ground wire fastening bolt, and then the installation is completed.</p>							
<p>Install with grounding holes</p>	<p>1. The grounding hardware includes: grounding screw, flat washer, star washer and grounding wire. Other related hardware shall be stainless steel. Please do not drill holes or modify the frame of the modules. Talesun limited warranty will be invalid.</p> <p>2. Talesun recommends that the grounding resistance $< 1 \Omega$. The electrical contact point is formed by penetrating the anodized coating of the aluminum frame and tightening the mounting screw (together with the star washer) to an appropriate torque of 3-7 N.M.</p>	<table border="1"> <thead> <tr> <th>spare parts</th> <th>Diagram</th> <th>Connection mode</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Place the star washer, flat washer and grounding wire in turn, screw through the grounding hole and tighten it to secure the adjacent modules.</td> </tr> </tbody> </table>	spare parts	Diagram	Connection mode			Place the star washer, flat washer and grounding wire in turn, screw through the grounding hole and tighten it to secure the adjacent modules.
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5 COMMISSION AND MAINTENANCE

5.1 BLOCKING DIODES AND BYPASS DIODES

- ✧ Blocking diodes prevent current flowing from the battery to the module when no electricity is being generated. It is recommended to use blocking diodes when a charging regulator is not used. Your specialist dealer can advise you regarding the suitable types.
- ✧ In systems with more than two modules in series, high reverse current can flow through cells that are shaded partially or outright when part of a module is shaded and the rest is exposed to the sun. These currents can cause the affected cells to get very hot and could even damage the module. To protect module from such high reverse currents, by-pass diodes are used in modules. All modules rated greater than 55 Watt have bypass diodes already integrated in the junction box. In the unlikely event of diode failure, it can be easily replaced; however, doing so will void warranty unless this exchange is made by an authorized person.
- ✧ Protect yourself from electric shocks while debugging or maintaining the solar power system.

5.2 TROUBLESHOOTING



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DANGER! Life danger due to electric shock!

- ✧ Please do not attempt to correct problems on your own!
- ✧ In case of problems or damaged modules (for example, glass breakage, damaged cables) please contact your installer or the Talesun Technical Customer Service.

5.3 MAINTENANCE

- ✧ Talesun modules shall be inspected and maintained regularly after installation. The dirt is typically washed away by rain. However, rain may not adequately clear more stubborn grime (i.e. pollen, vegetation, bird droppings, etc.). Such soiling which shades the active area of the module can lead to a reduction in the system's performance. Talesun recommends the following maintenance in order to ensure optimum performance of the module:
- ✧ Clean the glass surface if necessary. Make sure to use clean water and soft sponge or cloth, and use mild and non abrasive cleaning agent to remove stubborn stains; Talesun limited warranty will be invalid due to damage caused by improper cleaning methods.
- ✧ Check the electrical and mechanical connections every six months to verify that they are clean, secure and undamaged.
- ✧ If any problem arises, have them investigated by a module specialist. Attention: observe the maintenance instructions for all modules used in the system, such as support frames, charging regulators, inverters, batteries etc.
- ✧ The right of final interpretation belongs to Suzhou Talesun Photovoltaic Technology Co., Ltd.

CHINA

1# Talesun Road, Shajiabang, Changshu, Jiangsu Province, P.R. China 215542

Email: sales@talesun.com/marketing@talesun.com

Web: www.talesun.com

Sales Hotline: +86 400 885 1098

TEL: +86 512 8235 5888

FAX: +86 512 8235 5588

JAPAN

6F, 3-22-1, Toranomom, Minato-ku, Tokyo, Japan (105-0001)

Email: japan@talesun.com

Web: www.talesun.com/?jp

T: +03 5733 3498

F: +03 34341515

USA

25 METRO DRIVE, Suite 228, San Jose, CA, 95 110 USA..

Email: sales@talesun.com

Tel: (408) 638-7627

Fax: (408) 642-1279

UK

Talesun Energy UK Ltd. 42, Upper Berkeley Street, London, W1H5PW United Kingdom
Suzhou Talesun Solar Technologies Co., Ltd

Address: No. 1 Talesun Road, Changkun Industrial Park, Shajiabang Town, Changshu, Suzhou, Jiangsu Province, 215542, P.R.China

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Email: projects@talesunenergy.com

Web: www.talesun-eu.com

Tel: +44 (0)20 3752 6516

GERMANY

Central Tower Munich, Landsberger Strasse 110, 80339 Munich, Germany

Email: info@talesunenergy.com

Web: www.talesun-eu.com

T: +49(0)89- 189 177-0

F: +49(0)89-189-177-499

THAILAND

Thai-China Industrial Park in Rayong,

Email: Marketing.hq@talesun.com

TEL: +86 512 8235 5258

FRANCE

2405, Route des Dolines-06560 SophiaAntipolis-France

Email: Sales@talesun.com

TEL: +33 489 82 92 78