Installation Manual

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SONNETEK PV modules

General Installation Manual for Sonnetek Co., Ltd. Photovoltaic Modules Please read this manual completely before installing or using the Sonnetek modules.

INTRODUCTION

Thank you for choosing Sonnetek Co., Ltd. Photovoltaic modules. With proper operation and maintenance, SONNETEK PV modules will provide you with clean, renewable solar electricity for many years. Retain this manual for reference. This manual contains important installation, maintenance and safety information. Retain this instruction booklet for future reference. The word "module" as used in this manual refers to one or more photovoltaic modules.

Disclaimer of Liability

SONNETEK does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation use or maintenance by using this manual. SONNETEK assumes no responsibility for any infringement of patents or other rights of third parties, which may result from use of the module. No license is granted by implication or under any patent or patent rights. The information in this manual is believed to be reliable, but does not constitute an expressed and implied warranty. SONNETEK reserves the right to make changes to the product, specifications, or manual without prior notice.

General Information

The installation of solar modules requires a great degree of skill and should only be performed by qualified licensed professionals, including, without limitation, licensed contractors and licensed electricians.

install, wire operate and maintain the photovoltaic module. Contact with electrically active parts of the module such as terminals can result in burns, sparks, and lethal shock whether the module is connected or disconnected.

- **The installer assumes the risk of all injury that might occur during installation, including, without limitation, the risk of electric shock.**
- **PV modules generate DC electrical energy when exposed to sunlight or other light sources. Although single modules produce only a low voltage and current, shocks and burns are still a potential hazard.**
- **To avoid the hazard of electric shock and injury, cover all over the front surface of PV modules with a dense opaque material such as the cardboard box during installing and handling modules.**
- **The shock hazard increases as modules are connected in parallel producing higher current. The shock hazard increases as modules are connected in series producing higher voltages.**
- **To avoid the hazard of electric shock, work only under dry conditions, with dry module and tools.**
- **Do not stand or step on a module to avoid the hazard of injury and the damage to a module.**
- **Do not damage the back sheet of a module, to avoid the hazard of electric shocks and fire.**
- **To avoid the hazard of electric shock and injury, Children and unauthorized persons should not be allowed near the installation of the solar cell modules.**
- **To avoid the hazard of electric shock and injury, be sure to ground the modules completely.**
- **To avoid the hazard of electric shock, fire and injury, do not disassemble the module, or remove any part installed by the manufacturer.**
- **Unauthorized persons except the qualified licensed professional should not open the cover of the junction box to avoid the hazard of electric shock.**
- **Do not touch terminals while a module(s) is exposed to light. Provide suitable guards to prevent yourself contacting directly with 30 VDC or greater to avoid the hazard of electric shock or injury.**
- **When carrying a module, more than two persons should carry it by the frame and wear non-slip gloves to avoid the hazard of injury by slipping down the module on a foot or cutting by an edge of the frame and so on.**
- **Do not carry a module by wire or junction box to avoid the hazard of electric shock and injury or any troubles in a module, which it may cause.**
- **Do not drop anything on the surfaces of modules to avoid the**

hazard of electric shock and injury or any troubles, which it may cause.

. **■ To avoid the hazard of electric shock and fire, be sure that other system components do not cause any hazard of any mechanical or electrical nature to the module.**

. **■ Since sparks may be generated, do not install module where flammable gases or vapors are present.**

. **■ Never leave a module unsupported or unsecured. Do not drop module and do not allow objects to fall on module to avoid the hazard of injury or any troubles in modules, which it may cause.**

. **■ Do not use or install broken modules to avoid the hazard of electric shock and injury.**

. **■ Artificially concentrate sunlight shall not be directed on the module to avoid the hazard of fire or any trouble.**

. **■ Do not touch the J-box terminals to avoid the hazard of electric shock and injury.**

. **■ Do not change wiring of bypass diodes to avoid the hazard of electric shock and injury.**

. **■ Use module for its intended function only.**

. **■ Do not treat the back sheet and front surface with paint or adhesives to avoid any troubles.**

GENERATE SAFTY

Follow all permission, installation and inspection requirements

. ' Before installing module, contact appropriate authorities to determine permission, installation and inspection requirements, which should be followed. This should be done not only for installations in conjunction with buildings, but also for marine and motor vehicle applications for which additional requirements may apply.

. ' (USA) Electrically ground modules for all systems of any voltage. If not otherwise specified, it is recommended that requirements of the latest related National Electrical Code and national or international electrical standards be followed.

. ' Be sure that the construction intended to install modules on its rooftop has enough strength. For modules mounted on roof, special

construction may be required to help provide proper installation. Both roof construction and module installation design have an effect on the fire resistance of the building. Improper installation may contribute to hazards in the event of fire. Additional devices such as ground fault, fuses and disconnects may be required.

. ' Do not use modules of different configurations in the same system.

. ' Follow all safety precautions of other used components.

(USA) Underwriters Laboratory Listing Information:

To satisfy the conditions of the UL

Listing when installing the modules,

be sure to:

1) Use only stranded or solid copper

single -conductor type UF cable or USE cable, rated sunlight resistant, for modules and interconnect wiring that is exposed to weather.

2) Observe the requirements described by note under Specification in 3. Installation.

3) Grounding of module frame is required. When ground wires greater than $6mm^2$ (No.10 AWG) are required, the installer will need to provide suitable terminal connectors to interface with the No.10 binding screw provided with each module.

INSTALLATION

General

' Please read this guide completely before installing or using the modules. This section contains electrical and mechanical specifications before using our SONNETEK photovoltaic modules.

. ' Modules should be firmly fixed in place in a manner suitable to withstand all expected loads, including wind and snow loads.

. ' Do not drill additional mounting holes in the module frames, as it will void the warranty.

. ' The appropriate material should be employed for mounting hardware

to prevent the module frame, mounting structure and hardware itself from corrosion.

Please install modules at the place where they are not shaded by the obstacles like building and trees. Especially, please pay attention to avoid partially shading modules by something in daytime.

Please contact your local dealer with questions regarding mounting profiles for modules.

Notes on Installation

. ' Clearance between the module frame and the mounting surface is required to allow cooling air to circulate around the back of the module. This also allows any condensation or moisture to dissipate. The module should never be sealed to the mounting surface with sealant that prevents air from circulating under the module.

. ' (USA): To satisfy the UL Listing fire class rating C for the concerned modules, the recommended standoff height is 4 inch minimum. If other mounting means are employed, this may affect the Listing fire class rating.

Standard Operating Condition

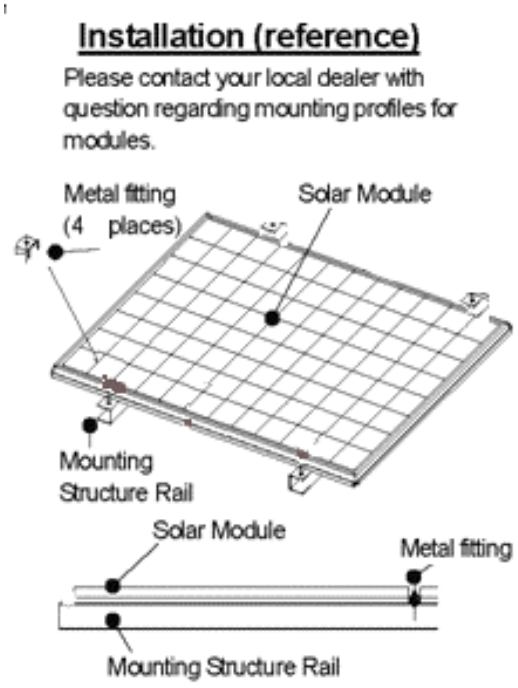


Figure 1: Installation

Standard operating condition (SOC) of our solar cell modules is as

recommended that the modules should be operated in the SOC. The installation

place with 2 conditions beyond SOC or with the special conditions should be avoided.

1. Standard operating condition

(1) The modules should be operated only in terrestrial use except space use or other use in the special conditions.

(2) The cell operating temperature should be within -40℃ to 85℃.

(3) The installation place should be less than 1000m above sea level.

2. Special conditions

(1) The ambient temperature and installation place are different from the SOC

(2) The salt damage is heavy at installation place.

(3) The hail and snow damages are heavy at installation place

(4) The sand and dust damages are heavy at installation place

(5) The other special conditions (with air pollution, or with chemically active vapor, or so)

SPECIFICATION

Notes on specification

(1) Rated electrical characteristics are within ±10% of measured values at Standard Test Conditions of 1000W/ ㎡, 25 ℃ cell temperature and AM 1.5 solar spectral irradiance.

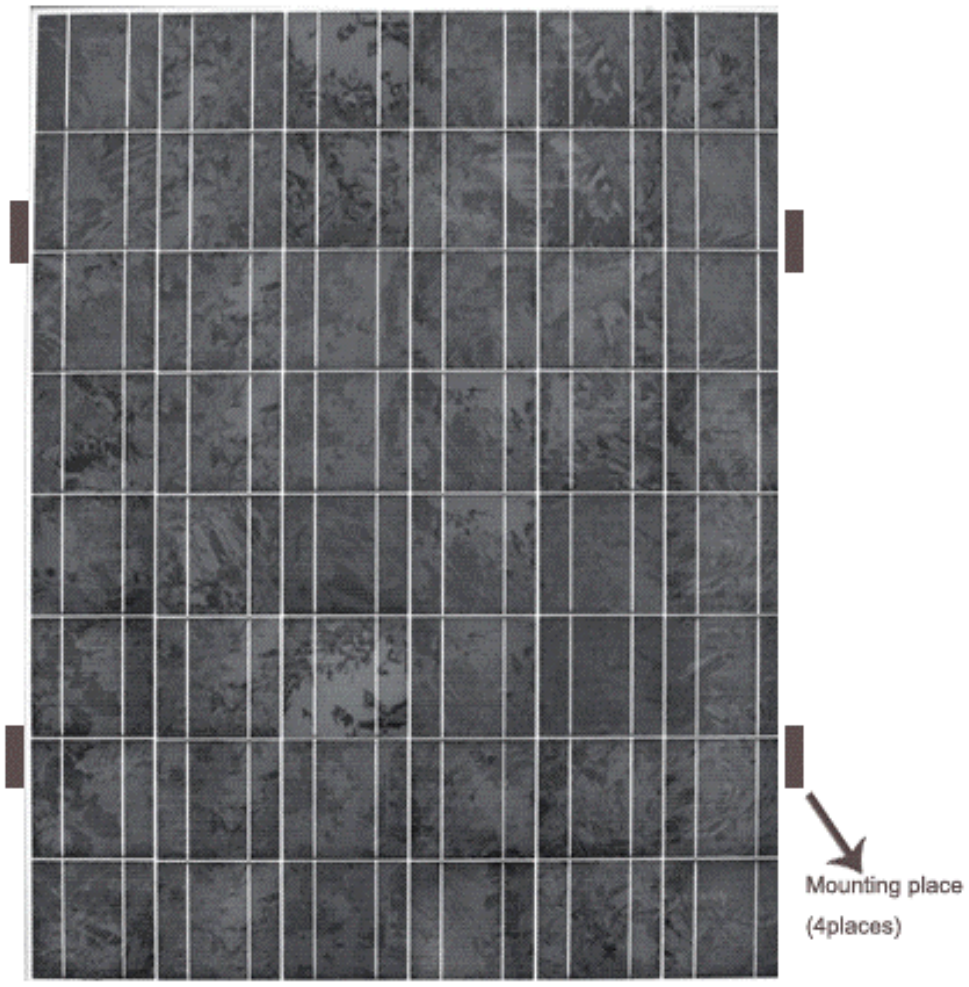
(2) Under normal conditions, a photovoltaic module may experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of Isc and Voc marked on UL listed modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes, and size of controls connected to the module output.

USA: Refer to Section 690-8 of the
U.S. National Electrical Code for an additional multiplying factor of 1.25, which maybe be applicable.

(3) The current output for these modules as shown in the Specifications is measured at Standard test conditions. These conditions may not be frequently observed in actual practice

Mechanical Loading

The modules should be mounted at the four quarter points The means offers a maximum loading of 2400N/m² on the module surface.



Front

Mechanical / Electrical Specifications

Module Type	ST-YL175	ST-YL170	ST-YL165	ST-YL160	ST-YL155	ST-YL150
Cell Number in Series	48	48	48	48	48	48
Rated Power, Watts (Pmax)	175	170	165	160	155	150
Maximum Power Voltage (Vpmax)	23.5V	23V	23V	23V	22.5V	22.5V
Maximum Power Current (Ipmax)	7.6A	7.4A	7.2A	7.0A	6.9A	6.7A
Open Circuit Voltage (Voc)	29.5V	29V	29V	29V	29V	29V
Short Circuit Current (Isc)	8.2A	8.0A	7.9A	7.7A	7.4A	7.2A
Cell Type	156	156	156	156	156	156
Maximum System Voc	600V	600V	600V	600V	600V	600V
Mechanical Specification						
Module Type	ST-YL175	ST-YL170	ST-YL165	ST-YL160	ST-YL155	ST-YL150
Length, mm	1310	1310	1310	1310	1310	1310
Width, mm	990	990	990	990	990	990
Depth (frame), mm	50	50	50	50	50	50
Depth(including j-box), mm	50	50	50	50	50	50
Weight, kg (pounds)	15.4	15.4	15.4	15.4	15.4	15.4

Module Type	120(17)1447*663	110(17)1447*663	85(17)1172*541	8017)1172*541	75(17)1172*541	50(17)P974*453	40(17)P516*663	30(17)P754*
Cell Number in Series	36	36	36	36	36	36	36	36
Rated Power, Watts (Pmax)	120	110	85	80	75	50	40	30
Maximum Power Voltage (Vpmax)	17.5V	17.5V	17.5V	17.5V	17.5V	17.5V	17.0V	17.0V
Maximum Power Current (Ipmax)	7.15A	6.29A	4.86A	4.60A	4.28A	2.86A	2.25A	1.80A
Open Circuit Voltage (Voc)	22.0V	22.0V	22.0V	22.0V	22.0V	22.0V	21.0V	21.0V
Short Circuit Current (Isc)	8.10A	7.14A	5.53A	4.90A	4.75A	3.20A	2.70A	2.20A
Cell Type	156	156	125	125	125	103	155	155
Maximum System Voc	600V	600V	600V	600V	600V	600V	600V	600V
Mechanical Specification								
Module Type	120(17)1447*663	110(17)1447*663	85(17)1172*541	8017)1172*541	75(17)1172*541	50(17)P974*453	40(17)P516*663	30(17)P754*350
Length, mm	1447	1447	1172	1172	1172	974	516	754
Width, mm	663	663	541	541	541	453	663	350
Depth (frame), mm	35	35	35	35	35	35	25	25
Depth(including j-box), mm	35	35	35	35	35	35	25	25
Weight, kg (pounds)	11.4	11.4	7.7	7.7	7.7	5.4	4.1	4.1

The values in the above table are nominal.

WIRING

General

All wiring should be done in accordance with applicable electrical codes.

USA: Wiring methods should be in

accordance with the NEC.

All wiring should be done by a qualified, licensed professional. · Wiring should be protected to help ensure personal safety and to prevent its damage. · All modules connected in series should be of the same model number/type. · Do not connect modules in parallel without using a connection box.

Module wiring: The maximum number of SONNETEK modules that can be wired in series is N=Vmax. /1.25Voc

Array Wiring

The term "array" is used to describe the assembly of several modules on a support structure with associated wiring. Use copper wire that is sunlight resistant and is insulated to withstand the maximum possible system open circuit voltage. Check your local codes for requirements.

Earth Ground Wiring

Grounding should be carried out by these curement to the module or array frame to avoid the hazards of electric shock or fire. Each framed module has a hole in the longer side frame rail to connect a grounding conductor to the module metal frame (see Fig3).

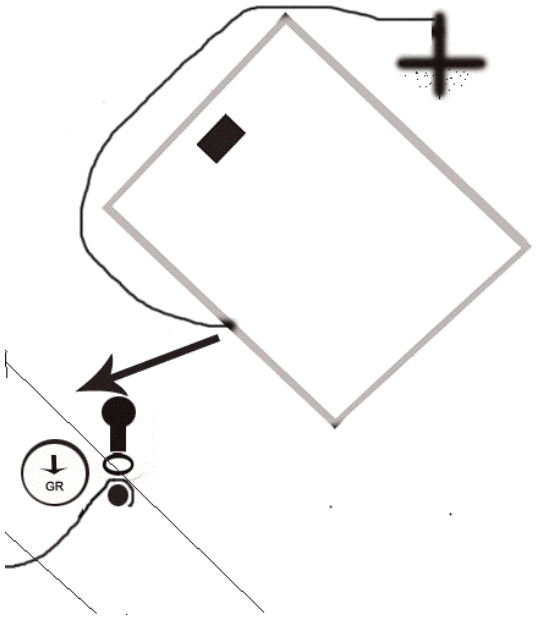


Figure 3:
A module ground position

Notes on Earth Ground Wiring

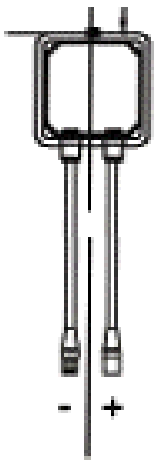
(USA): Grounding is achieved by the securement to the array frame. The array frame shall be grounded in accordance with NEC Article 250. Do not use the copper components directly against the aluminum frame, which causes dissimilar metal reactions

Module Terminations

A junction box as terminal enclosure is equipped for electrical connections on SONNETEK modules. Please contact your local dealer with questions regarding other electrical connections for modules.

J-box configuration and description of terminals (for reference)

Modules equipped with one j-box contain terminals for both positive and negative polarity, and bypass diodes. (see Fig4).



Negative (-) Positive (+)

Figure 4: Sketch Map of junction box

When the modules in series strings are shaded partially, it may cause a reverse voltage across cells or modules, because the current from other cells in the same series is forced to flow through the shaded area, and then undesirable heating may occur. The use of a diode to bypass the shaded area can minimize both heating and reduction of array current. All Tianwei Yingli modules are equipped with factory installed bypass diodes. The factory-installed diodes provide proper circuit protection for the systems within the specified system voltage, so that you don't need any other additional bypass diodes. Contact your authorized Tianwei Yingli distributor or dealer for proper diode type, if necessary to add or change diodes due to system specification

MAINTAINANCE

Some maintenance is recommended to maintain optimal output performance of solar cell modules. If the module surface becomes dirty, it may cause reduction of output power. It is recommended to clean the surface with water and soft cloth or sponge. A mild non-abrasive detergent may be applied for the persistent dirt. And it is also recommended to inspect the electrical and mechanical connections annually. If you need electrical and mechanical inspection or maintenance, it is recommended to have the authorized professional carry out the inspection or maintenance to avoid the hazards of electric shock or injury.

The return of any modules will not be accepted by SONNETEK unless prior written authorization has been given by SONNETEK.

As part of our policy of continuous improvement SONNETEK reserves the right to change products specifications at any time without prior notice.