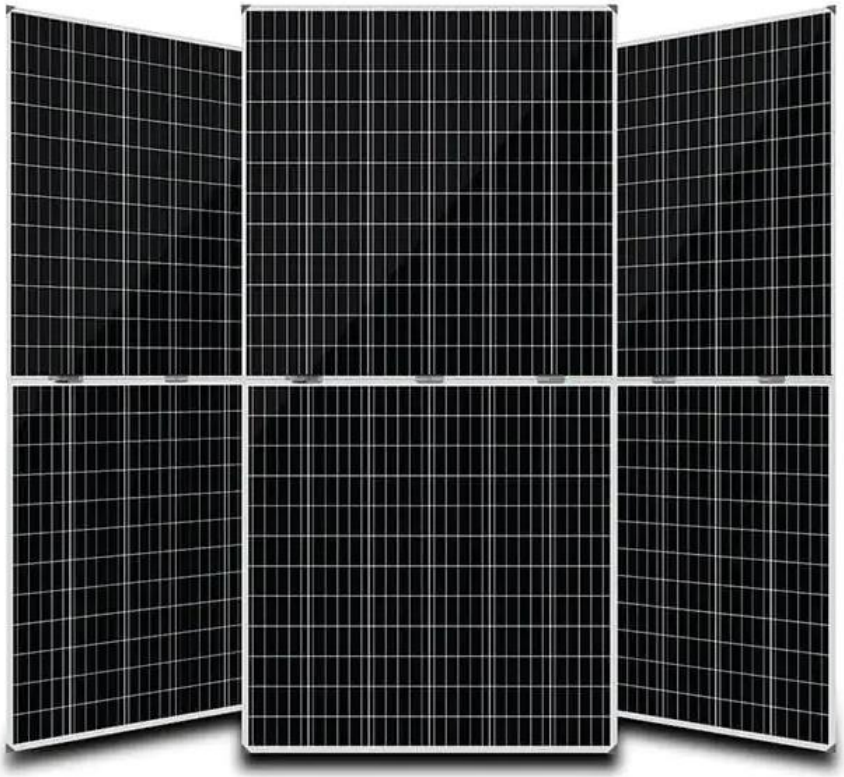
INSTALLATION MANUAL

APPLICABLE MODULES TYPE:

SHD-72HP (PPP = 520 – 550)
SHD-72HN (PPP = 555 – 595)

IEC VERSION



Contents

1. Introduction

This Manual applies to the installation, maintenance and use of the framed series solar modules manufactured by Sheida Industries LLC. (hereinafter referred to as "Sheida Solar"). Failure to follow these safety instructions could result in personal injury or property damage.

Installation and operation of solar modules require specialized skills, and only professional personnel or technically qualified and licensed personnel should install. Please read the "Installation Manual" carefully before using and operating the modules.

1.1. Liability Disclaimer/Limitations

Sheida Solar reserves the right to change this Installation Manual without prior notice. Failure of the customer to follow the requirements outlined in this Manual during the installation of the module will result in the invalidity of the product's limited warranty.

Sheida Solar assumes no Responsibility for Infringement of Intellectual Property Rights or other rights of third parties that may result from use of the module. No license is granted in these regards whether expressly or impliedly by Implication or under any patent rights

All information given in this manual is based on Sheida Solar knowledge and experience. Sheida Solar reserves the right to change this manual and module specification without prior notice.

Sheida Solar is not responsible for any form of damage, including but not limited to module operation and system installation error, and personnel injury, hurt, and property loss resulted from failure to follow the instructions in this Manual.

2. Safety Precautions

Below guidelines will help to protect you and your team from any hazard situation installing, wiring, operating, or maintaining Sheida modules.

2.1. General & Handling Safety

- PV modules generate Direct current (DC), when the front surface of the module is exposed to direct sunlight or other light sources.
- Sheida Solar recommends that PV module installation should be conducted by personnel with experience in PV system installation. Operation by personnel who are not familiar with the relevant safety procedures will be very dangerous.
- The trained professional should remove metallic wearables and should wear proper PPE (Personal Protective Equipment) and ESD and rubber (insulating) material products.
- For personal safety do not install/ handle PV modules under adverse environmental conditions viz. gusty winds, wet frosted roof surfaces.
- Direct contact with the live parts of the module, may result in death of personnel whether connected to the module or not due to high current.
- Access to the installation area or module storage area should be restricted to Authorized Person only.
- Connecting or disconnecting the module when it is energized or connected with an external power supply is dangerous and not recommended.
- Artificially concentrating light on solar modules can lead to poor performance and decrease in the module life span.
- Sheida Solar modules are certified for operating in installations at 1500 Vdc.
- SHD-144H-PPP, SHD-120H-PPP, SHD-72-PPP, SHD-72-PPP have 1500VDc max system voltage, (PPP = Power Wattage of Modules).
- Mixing power classes in one string is not allowed and can be harmful. Damages of modules due to this mixing can lead to invalidity of product warranty.

- Solar modules may produce more current or voltage under different environmental conditions than reported during STC.
- Modules with similar kind/type should be installed in a string.
- Before turning ON the system, check the polarity of the modules or strings not reversed based on other strings.

Image.1: Incorrect method of installation

- Standing or walking or leaning as shown in Image.1 on the panels could lead to damage to the solar cells inside the modules.
- The front surface of the module is constructed with tempered glass and ARC coated; hence it should be handled with utmost care. Human Contact should be with broken glass, as it can lead to electric shock particularly when the ambient condition is wet. Broken modules cannot be repaired, and they should be disposed of properly with proper method.
- Damaging or scratching the front or back side of the panels should be avoided all the time.
- Touching to the junction box or connectors barehanded should be avoided when modules are under sunlight irrespective of its connection status to the system.
- Loosing or unscrewing of bolts used to fix modules should not be allowed as it may reduce the modules load rating and increase the chances of damage.

2.2. Fire Safety

Sheida's PV Modules have a Class C fire resistance rating in accordance with IEC61730 certification.

- The PV System should be installed over fire resistant material suitable for Solar module fire class.
- Installation of the system should be under the observation of certified electrical and fire contractors to maintain the fire safety standards of building.
- Installation should be at the places away from sites producing flammable gases to avoid the fire risk.
- The Connectors should be kept away at dry locations and well protected against corrosion and soiling. Any modules with corroded conditions should not be used to reduce the risk of fire hazard.
- All the connections should be fitted/made with no gap between them. Failure of it can link to Electrical Arcing and cause hazards like electric shock or fire.
- Using water to extinguish fire caused due to failure of electrical components should be avoided all the time.
- The fire rating of this module is valid only when mounted in the manner specified in the module under Module Mounting section.
- During the fire breakout, Solar Photovoltaic Modules can continually produce dangerous voltage or current even though.
    - They are disconnected from the inverter.
    - They have been partly destroyed.
    - The system wiring is destroyed.

In case of fire due to PV system or related, inform the nearest fire team and stay away from all the components of the system and modules until the preventive measures have been taken or marked safe area by fire team.

3. Transportation, Unloading and Unpackaging

3.1. Module Identification

- All the modules have Unique Serial Number, laminated behind the Tempered Glass.
- Serial Number should be recorded before installation for the future record.

3.2. Packaging Identification

- Modules are packed in the corrugated box fixed on the pallet.
- All the box contains packaging list, make details and packaging symbols on outer side. Packaging symbols Details as shown in Image.2.

Image.2: Pallet & Box front view

	Fragile item inside the box		This side up arrow to unload themodules
	Handle with care		Keep Packaging Dry
	The box is recyclable	2	Stacking limitation is 2

3.3. Transportation

- Transportation should be done in the original Sheida Packaging.
- PV Modules pallet can be transported by air, water, or road.
- Packaging should not be stacked more than 2 in the container or truck.
- Transportation by a single person on the back or by rope is not allowed.
- Transportation of modules without proper packaging should not be allowed.

3.4. Unloading Methods

- Pallets should be unloaded with hoist, lifting fixture (Hydra or Hoist Crane), or with forklifts. Any other method other than mentioned should not be used.
- Before lifting or removing modules pallets make sure that the corrugated box or pallet is not damaged. If any damage occurs, inform the supplier along with proof.
- While using a lifting fixture, make sure that not more than 2 are lifted at a time.
- Using forklift or automatic stackers, only a single pallet should be unloaded from the truck. Avoid using forklifts if the weather doesn't permit.
- After unloading pallets place it on the flat ground.
- Storing more than 1 stack at the project site is strictly prohibited.
- If unpacking takes time, then cover the remaining pallets with rain proof material to avoid it from getting exposure to moisture.

3.5. Unpackaging

3.5.1. General Details

- Ensure that the area where unpackaging takes place is in level to avoid sliding of the material.
- Break the seal of container and take the photo of it.
- Unpacking teams should wear protective gloves and shoes to avoid injuries.
- During rainy season, unpackaging outdoors should be avoided as corrugated boxes become soft and get damaged. The modules may have chances to slide and damage.

- All the modules' details in the box can be found on the box. Please read and understand the instructions properly before executing the task.
- During unpackaging each module should be unpacked by two people. The module should be lifted from the short side only as shown
- Lifting/unpacking module from long side or by pulling junction box should.
- While unpacking ensure that one module doesn't Image.3: Unpacking method of the Modules from the box.
  fall onto another as it can damage that module.
- Bending or twisting of the modules should be avoided any time during installation process and unpacking process as it can create micro-cracks in the cells and compromise the module life span and warranty terms.
- Ensure that +ve and -ve ends of the junction box of the same module are not shorted any time during and after installation.

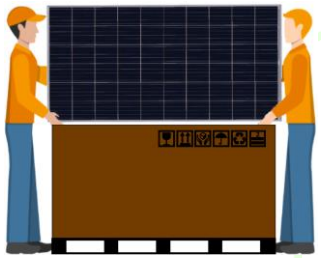


Image.3: Unpacking method of the Modules from the box.

3.5.2. Unpackaging Steps

- Before opening the box, verify the details provided as per packaging list and serial number.
- Place the box near the supportive area or put extra support while opening it.
- Cut all the straps on the corrugated box to loosen the box.
- Remove the top cover/lid of the box and keep aside.
- Ensure the support is strong to stop the sliding of module from the side if any occur.
- Modules should be removed with the help of two people, as shown in the Image.3.
- If the modules are left in the box, then it should be removed and stack the modules flat on the pallet and should be repacked as shown in Image.4. The horizontal stacking of modules limit is 16 modules for SHD144-PPP type of models.

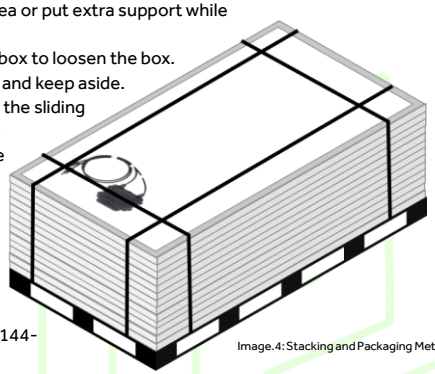


Image.4: Stacking and Packaging Method

3.6. Storage

- Ensure that storage area is well ventilated, waterproof, and dry place.
- Do not remove the original packaging if storage is required for longer term.
- If stored in open condition, then cover the modules with waterproof material to prevent it from moisture.
- While storing the modules ensure that storage condition like temperature is between -20℃ to +50℃ and humidity <85% RH.
- Storing of modules in the warehouses should not be more than 2 layers as shown in Image.5.

Image.5: Correct Stacking Layers of Modules.

4. Environmental Conditions

4.1. Climate Conditions

- Sheida Solar modules are tested for IEC 61215, IEC 61730 – 1 and 2, IEC 62804 (PID TEST).
- Sheida Modules are Class A for application class. Our modules are qualified for safety as Safety Class II under this application class.
- To meet European standards, our products have also been tested for resistance to ammonia fumes -IEC 62716, that may be present in barns sheltering cattle, pigs, as well as sustainability for Installation in Humid (coastal) areas of high sandstorms.
- Sheida Solar modules have certified with Salt mist - IEC 61701, corrosion test with a salt concentration of 5 % by weight, galvanic corrosion can occur between the supporting frame and mounting or ground materials if such materials are made of dissimilar metals.

4.2 Environmental Conditions

- Operating Temperature: -40℃ to +85℃
- Ambient Temperature: -40℃ to +55℃
- Storage Temperature: -20℃ to +50℃.
- Humidity: ≤ 85 RH%
- Safety Factor:3
- Mechanical Load1: 5400 Pa on the front side and 2400 Pa on the rear/back side
- Rated Electrical Characteristics: Within 10% of the measured at STC.

1The Mechanical Load depends on the installer mounting method and stability of structure. Failure to follow the installation guide would result in a decrease in the load capacity during different scenarios. The system installers are required to ensure that installation method as per required conditions and meet the requirement and local regulations.

5. Site Selection

- PV modules should be installed at the location where there is no shading across the project site throughout the year.
- Modules should be installed at the distance of 3 times of height of obstruction, if any at the project site.
- PV modules are prescribed to install at the optimized tilt angle to maximize the yield and generation.
- The tilt angle estimation of the PV module alludes to estimating the point between the module and the even ground surface. For various locations there are distinctive mounting angles.
- Sheida Solar prescribes that the mounting tilt angle should not be under 10°, or as per nearby guidelines or follow the proposals of experienced PV module installers.
- In the Northern Hemisphere, the PV modules ought to be installed facing south, and in the Southern Hemisphere, the PV modules ought to be installed facing north.
- Any incline of under 1:2.4 is required to keep up the fire class rating; Modules are Class C Fire Rated.
- When introducing PV modules on a rooftop, the rooftop must be secured with a layer of flame-resistant material appropriate to this class, and sufficient ventilation must be guaranteed between the back sheet and the establishment surface.
- In areas that are 50m ~ 500mm from the sea, hardened steel, or aluminum materials must be utilized to contact the PV modules, and the establishment position must be treated with anti-corrosion treatment.
-
- Abstain from utilizing mounting strategies where waste openings are blocked.
- PV modules ought not be introduced in such a manner it will be inundated submerged Make sure that there is more than a 5 mm gap between modules to prevent buckling caused by thermal expansion. under any conditions and ought not be likewise introduced in a moving vehicle/vessel.

6. Mounting Instructions

6.1 Mounting Methods

- Sheida Solar modules can be mounted in portrait or landscape orientation.

- Modules of type SHD-72H or SHD-60H should be installed in the long side or vertical racking when installers decide to install module in landscape orientation as shown in Image.
- PV Modules can be fixed by bolt method or by clamp method, but regardless of method below details should be followed:
  - Minimum distance between two modules should be.
  - 10.50 mm.
  - A clearance of at
  - least 115 mm (4.5in)
  - should be provided between modules frame and the surface of the wall or roof.
  - The minimum distance between the racking of the modules and the long side is 150mm.
  - Drainage holes in the modules should never be blocked anytime during installation or during use of it.

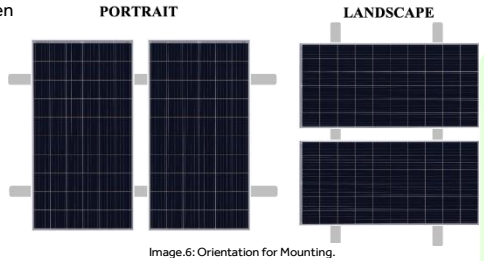


Image.6: Orientation for Mounting.

- PV modules are not to be subjected to wind or snow loads exceeding the maximum permissible loads and should not be subjected to excessive forces due to the thermal expansion of support structures. Careful consideration must be shown during system design and installation such that thermal expansion of support structures does not cause any breakage of PV modules which will not be part of Sheida Solar's Warranty Card.
- Ground mounted modules should be placed with appropriate height to prevent the lowest edge of PV module from being covered by snow for longer duration.
- Snow and dirt particles settled on the panels should be regularly cleaned to ensure long term reliability of PV Modules. Failure of this may result is degradation of the power generation and life span of the modules which will not be covered under the warranty.

6.1.1 Mounting Methods

- The module frame has 8 mounting holes of 9 x 14 mm, and center 4 mounting holes of 7 x 10 mm ideally placed to optimize the load and to secure modules to the supporting structure.
- To increase the life and strength of mounting, Sheida Solar recommends using corrosion-proof stainless-steel fixtures.
- Fasten the holes with M8 bolt, spring washer, washer and nut using torque of 10-20 Nm.

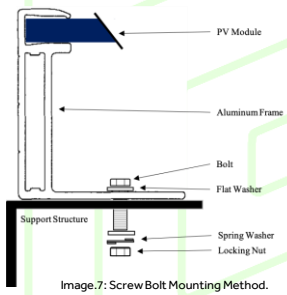


Image.7: Screw Bolt Mounting Method.

- Make sure that there is more than a 5 mm gap between modules to prevent buckling caused by thermal expansion.

6.1.2. Mounting with Clamps

- Clamping method is the secure way on leveled base profile.
- Based on tests, experiments and experience, Contender Solar recommends using clamps with EPDM or with insulating washer.
- To fix the module on the mounting rail, a total of 4 clamps are required.
- To fix modules with clamps, customers should not modify the aluminum frame.
- The clamps should be fixed in such a way that they don't touch the glass and don't deform the frame.
- Fasten the clamp to the support with the help of M8 bolt, flat washer and locking nut.
- The fixing of clamp should not cause any shadow effect on the module.
- Ensure that clamp has reached at least 5mm from the edge of the aluminum frame.

- When choosing this type of clamp-mounting method, use at least four clamps on each module, two clamps should be attached on each long side of the module (for portrait orientation) or each short side of the module (for landscape orientation). Depending on local wind and snow loads, additional clamps may be required to ensure that modules can bear the load.

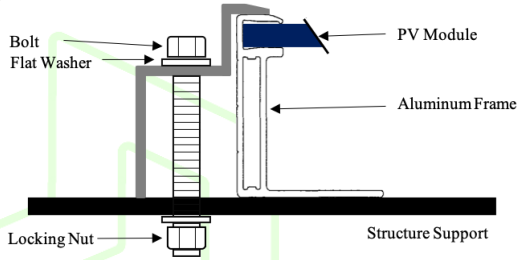


Image.8: Fringe Clamp Mounting Method.

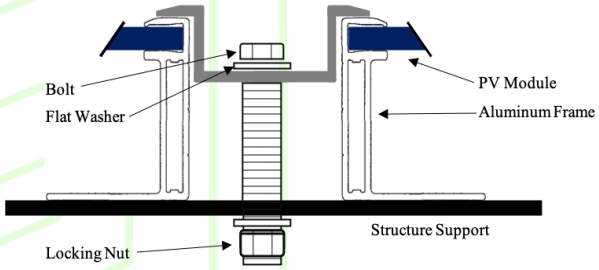
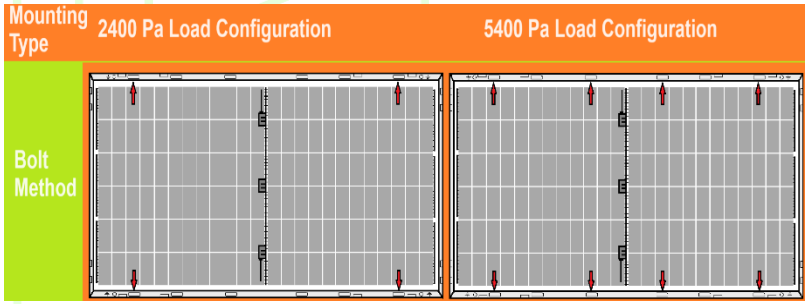


Image.9: Middle Module Clamp Mounting Method.

6.1.3. Mounting Method Configuration



*Note: A, B, and C in the highlighted orange and purple block is the mounting area for the PV module for that following mounting type and load capacity. Example A – Area between 0 and ¼ Length of the module can be used in clamp method to fix the module with support structure, which will ensure the strength as per the load capacity and in the normal environmental conditions.

Model Name	SHD72	SHD144H
Cell Quantity	72 Full Cells	144 Cut Cells
Length (L) (in mm)	2278	2278
Width (W) (in mm)	1134	1134
Range A (in mm)	0 < A < 571	0 < A < 571
Range B (in mm)	521 < B < 621	521 < B < 621
Range C (in mm)	0 < C < 283.5	0 < C < 283.5

6.2 Grounding Methods

- All the mounting racks and frames of PV Modules need to be grounded in accordance with the regional/national electrical code guidelines.
- The grounding conductor or strap may be copper, copper alloy, or any other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.
- Sheida Solar uses an anodized aluminum frame to avoid corrosion. So, the frame should be connected with the grounding equipment to prevent static shock and thunder.
- The frames are pre-drilled with a 4mm diameter of hole for grounding purpose. These holes should only be used for grounding purposes and not for mounting purposes. And additional drills should be always avoided as it may result in damage to the modules and would also void the warranty.
- Sheida recommends the specific connector type and wires and the same or can be installed with the use of third party listed grounding devices. These devices should be installed as per their installation manual or manufacturer's specified instructions.

6.2.1. Tyco Grounding Bolt #2058729-1

- Tyco grounding device package includes the mounting and grounding bolt, hex nut.

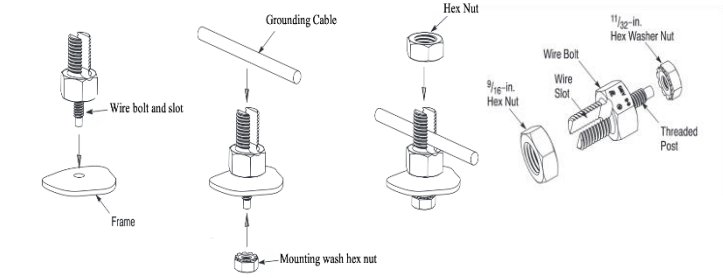


Image.10: Grounding Bolt #2058729-1

- Electrical Contact is made by penetrating the anodized coating of the aluminum frame and tightening the mounting hex nut along with washer to the proper torque of 2.82Nm or 25lbf.in.
- Grounding wire size between 6 to 12 AWG solid bare copper should be selected and installed underneath the wire binding bolt.
- The wire binding bolt should be tightened to the proper torque of 5.08Nm.
- For detailed installation method refer Instruction Sheet of Ground Clip Assembly 2058728-1 from TE Connectivity.

6.2.2. Tyco Grounding Bolt #1954381-2

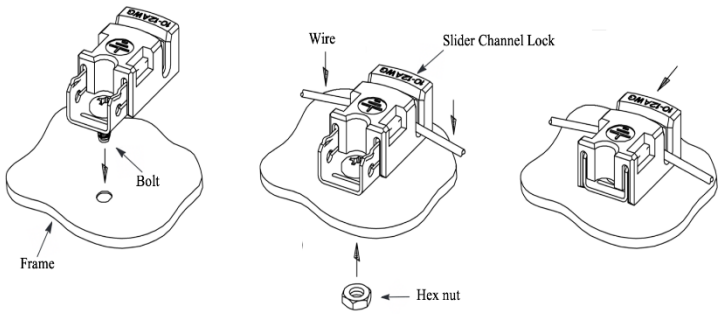


Image.11: Grounding Bolt #1954381-2 Method.

- Tyco grounding device package includes the mounting and grounding bolt, hex nut.
- Electrical Contact is made by penetrating the anodized coating of the aluminum frame and tightening the screw nut along with washer to the proper torque of 2.0Nm.
- Grounding wire size between 6 to 12 AWG solid copper should only be selected and installed underneath the wire slot.
- The wire should be placed in the wire slot and slide the channel lock to cover the wire base and will terminate the wire.
- For detailed installation method refer Instruction Sheet of Ground Clip Assembly 1954381 from TE Connectivity.

6.2.3 Erico Grounding Bolt #C

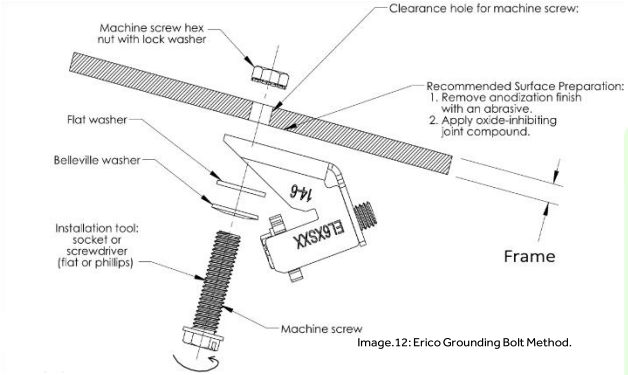


Image.12: Erico Grounding Bolt Method.

- The lug should be installed on a surface that is larger than the bottom surface of the lug.
- The lug should be fixed in the pre-drilled groundling hole in the frame.
- Machine screw to be fixed with torque of 4Nm to secure grounding bolt to the frame.
- Grounding wire size between 6 to 12 AWG solid copper should only be selected and installed underneath the wire slot.
- Machine screw on the top of grounding device should be tightened with torque of 4Nm for proper wire binding.

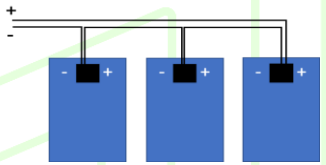
7. Electrical Configuration

- Electrical wiring should be done as per the local and regional authority regulations and code and should be done by qualified and licensed installers.
- Standard Test Condition (STC) for solar modules are:
  - Irradiance: 1000 W/m2
  - Cell Temperature: 25°C
  - Air Mass (AM): 1.5
- PV Modules electrical characteristics such as Isc, Voc and Pmax are measured with
- +/- 3% of measurement uncertainty at STC.
- Modules can be connected in series to increase the operating voltage by plugging the positive plug of one module into the negative socket of the next.
- Under normal conditions, modules may produce higher voltage or current than was tested under STC.
- Always ensure that the contacts of modules are corrosion free, clean and dry before installing it.
- Product can be irreparably damaged if an array string is connected in reverse polarity to another.
- Always verify the voltage and polarity of each individual string before making a parallel connection. If you measure a reversed polarity or a difference of more than 10V between strings, then check the string configuration before making the connection.
- The maximum modules to be connected in series strings needs to be calculated as per applicable local regulations such that specified maximum system voltage of the modules (1500V according to the safety appraisal of the IEC 61730:2023) does not exceed in open circuit operations at the lowest temperature for the located power plant.
- Formula to calculate Maximum System Voltage.
  - N x Voc x [1 + [[Tα – Voc(%)] - [25 – Tmin]]]
    - N – number of modules which are connected in series
    - Voc – Open Circuit Voltage of each Module (Refer Section or Data Sheet for more details)
    - Tα – Voc(%) – Thermal coefficient of open circuit voltage for the module in Percentage.
    - Tmin – Minimum Ambient Temperature
- There is always a risk of Lightening to PV Power plants and PV modules.
- We request the Installer and the customer to analyze the risk of lightning as per IEC 62305-2 and install Lightening arrestors and SPD's such that no part of PV system and PV Module is affected by Lightening or any other high voltage surges.
- To ensure effective protection for entire power plants along with PV modules, a lightning protection system with optimally coordinated elements with air- termination system, earth-termination system, lightning equipotential bonding, surge protective devices for any DC input/output devices as per IEC 61643-11. Consistent lightning and surge protection for all systems allows to considerably increase the performance ratio of Solar PV power.

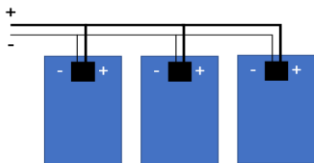
While disconnecting the array from the circuit, use rated Isolator or DC switch. DC power after disconnection may be active for some time and hence it is recommended only trained people should operate or handle upon modules, string Combiner Box etc. Sheida solar is not responsible for any electrical type of accident occurring in Power plants using the modules.

7.1. Electrical Wiring

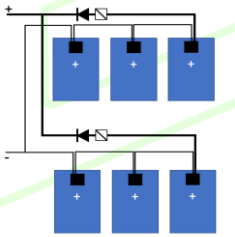
Series Wiring



Parallel Wiring



Series – Parallel Wiring



7.1.1. Cables & Wiring

- Ensure that all wiring and electrical connections comply with the appropriate National Electrical Code.
- All the modules have 2 standards 90°C sunlight resistant output cables, each terminated with plug & play MC4 compatible connectors.
- The PV Wire cables are 12AWG in size. This cable is suitable for applications where wiring is exposed to the direct sunlight.

- Sheida Solar modules are provided with stranded copper cables with a cross-sectional area of 4mm² which are UV resistant, and its temperature range is between -40 to +90. All the cables used to connect to the DC system should have a similar (or better) specification.
- Ensure that cable fixed on the mounting structure are fixed in a way that mechanical damage to cable or the modules is avoided.
- Ensure that the cables are not stressed at any time.
- The minimum cables bending radius should be 24.4mm and junction box radius to
- be 42 mm. Any damage caused by the overbending or cable mismanagement, then it won't be considered under Sheida Solar warranty.
- To protect the cable from water and other exposure particles we recommend running the cable in proper conduits.

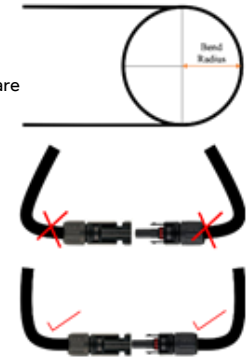


Image.13: Correct Bending Method of Cables.

7.1.2 Connectors

- Always keep the connectors dry, clean and moisture free.
- Ingress Protection (IP) safety level can be only fulfilled by clean and dry connectors.
- Ensure that connectors caps are hand tight before connecting to the module.
- Do not make electrical connections with soiled, wet or with any faulty connectors.
- Avoid direct exposure of the connector with sunlight and water.
- Do not rest connectors on the ground or any roof surface.
- Faulty connections can result in arcs and electrical shock.

Ensure that all the electrical and connectors connections are properly tight. Ensure that all the connectors are fully engaged and locked.

7.1.3. Bypass Diode

- The junction box used in the Sheida Solar modules contains bypass diode connected in parallel with the cell strings.
- Bypass diodes divert current from the cell strings in the event of partial shading and limiting the modules heating and performance losses.
- If any bypass diode seems to be not working or any if any failure is found, then customer shall contact Sheida team. Never replace the junction box without Sheida trained employee.

7.2. Fuse Ratings

- Specific ratings for Maximum rating of fuse can be found on product label at the back of each module and in the datasheet provided by Sheida Solar.
- Maximum rating of a fuse is 25A if connected in series with an array string.
- Fuse Rating indicates the maximum reverse current a module can withstand.
- Do NOT share a fuse in a Combiner Box with two or more strings in parallel connection.
- When fuses are fitted, they should be rated for the maximum DC voltage and connected in each, non- grounded pole of the array.

7.3. Electrical Parameters

- For Electrical Parameters datasheet, refer online at the website www.Sheidasolar.com

7.4. Inverter Selection and Compatibility

- To ensure proper functioning of PV modules under positive voltage, then choose the inverters with isolation transformers in hot and wet areas.
- When the system is installed as per IEC guidelines, Sheida Solar modules do not need to be electronically connected to earth and can be operated either with galvanically isolated (transformer) and transformer-less inverters.
- It is recommended to use inverter negatively earthed installation to avoid the PID (Potential Induced Degradation).
- If transformers less inverters used in hot humid climatic sites, then installers should ensure the right active negative earthing kit is to be installed by consulting and having assurance from the inverter supplier.

8. Operations and Maintenance

For ensuring better performance and reliability of the system, users are required to perform the regular inspection and cleaning of the modules. The users are responsible to report the damages found to the supplier with 10 Days to claim under warranty during the warranty period.

8.1. Visual Inspection of Modules

- Inspect the modules visually to find whether there are any appearance defects or not.
- To do so, the following needs to be observed.
  - Glass breakages
  - Corrosion along cell busbar
  - Cable breakages
  - Burning vestige on the back sheet
  - Junction box damages
  - Visible scratches on the surface
- It is advised to do Preventive inspection every six months.
- Ensure that the mounting structure is proper, and modules are tightened properly.
- Check the operating status of all the string fuses in each non-grounded pole.
- Ensure that sufficient irradiance is fallen on the modules. Remove any obstruction objects which can create shadows on the modules.
- In case of replacement of the modules, similar models should only be allowed to be replaced. Contact Sheida Solar Team for the detailed instructions to replace the module. Avoid any untrained installer to replace the modules as it can lead to electrical hazard.

8.2 Inspection of Connectors and Cables

- It is recommended to implement the following maintenance once a year:
  - Check Sealant bonding around the junction box and ensure there are no cracks on it.
  - Check that the connections of the cables and connectors are tightly locked and ensure they are not immersed or directly exposed to water or sunlight.

8.3. Cleaning

- Cleaning the modules is the important part as shaded cells will generate less electricity.
- While cleaning modules ensure that
  - no stepping on the modules
  - no spraying of water on the backside of the modules or on the connectors and cables,
  - connectors are kept dry and clean.
- Dust settled on the top of the modules may reduce the power out but can also cause hotspot effect.
- The bird drops or other foreign particles can be severe (severity depends on the transparency ratio), and it needs to be cleaned sooner.
- During heavy rain, snow or heavy wind (Grade more than 4) cleaning of the PV modules should be avoided.
- For cleaning modules with water, the following care needs to be taken:
  - Water Temperature: Temperature similar to modules to avoid thermal shock.
  - PH level: 5 – 7
  - Total dissolved solids (TDS): <750 mg/L
  - Water hardness: <40 mg/L

- Chloride and salinity: <3000 mg/L, Turbidity: <30 NTU
- Type: Non-alkaline water or demineralized water

- For cleaning the modules, use soft cloth together with the detergent and clean water.
- During the cleaning of the modules with pressurized water, ensure that water pressure applied on the front glass is below 700KPa (14619 psf).
- While cleaning always use dry or wet soft cloth and avoid any use of sharp object.
- Cleaning on the backside should be avoided unless the modules are installed flat at 0℃ or unless the dirt or any objects are stuck on the back sheet.
- Do not use any solvent or cleaning agent which contains acid or alkali or any agent like Toluene, IPA other than industrial grade for cleaning the modules. For more details list of solvents to be avoided while cleaning modules, contact Sheida Solar at info@Sheidasolar.com

9. Warning

While performing any type of electrical maintenance, ensure that the system is completely shut down and it is performed by licensed, qualified and trained professionals only. Failure in complying the standards may result in electrical hazards, lethal electric shock, burns or death (in some case). Sheida Solar will not be responsible for any accident occurring at the location using Sheida Solar modules.

10. Contact Details

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