



bluebird SOLAR
co-powering the future

INSTALLATION MANUAL

APPLICABLE MODULES

Model Code	Cell Technology	XXX = Wattage (in steps of 5W)	MODULE SIZE (L X W X H) +/- 10 mm
BBS24P672FXXX	Poly Crystalline	320-345	1960 x 990 x 35 1980 x 1000 x 35
BBS24M672FXXX	P Type Mono Perc	400-415	1980 x 1000 x 35
BBS24M7108CXXX BBS24M7108CXXX-TB BBS24M7108CXXX-GG	P Type Mono Perc N Type TOPCon	400-425 430-450	1735 x 1133 x 35
BBS24M7120CXXX- BBS24M7120CXXX-TB BBS24M7120CXXX-GG	P Type Mono Perc N Type TOPCon	430-460 465-500	1920 x 1133 x 35
BBS24M7132CXXX- BBS24M7132CXXX-TB BBS24M7132CXXX-GG	P Type Mono Perc N Type TOPCon	465-510 515-550	2100 x 1133 x 35
BBS24M7144CXXX- BBS24M7144CXXX-TB BBS24M7144CXXX-GG	P Type Mono Perc N Type TOPCon	515-560 565-605	2278 x 1133 x 35
BBS24M8108CXXX BBS24M8108CXXX-TB BBS24M8108CXXX-GG	P Type Mono Perc N Type TOPCon	495-555 560-600	1965 x 1303 x 35
BBS24M8120CXXX BBS24M8120CXXX-TB BBS24M8120CXXX-GG	P Type Mono Perc N Type TOPCon	560-620 625-670	2175 x 1303 x 35
BBS24M8132CXXX BBS24M8132CXXX-TB BBS24M8132CXXX-GG	P Type Mono Perc N Type TOPCon	625-680 685-735	2385 x 1303 x 35
(TB- Bifacial Transparent Backsheet, GG- Bifacial Glass to Glass)			

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1. DISCLAIMER OF LIABILITY

- The usage of this manual, installation, handling of Bluebird Solar modules are beyond Bluebird Solar's control. Bluebird Solar does not assume any responsibility against failure to follow instructions resulting in any Loss, Damage, Injury or Expense due to Improper Installation, Handling, Usage or Maintenance.
- Bluebird 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 this regard whether expressly or impliedly by Implication or under any patent rights.
- All information given in this manual is based on Bluebird Solar knowledge and experience. Bluebird Solar reserve the rights to change this manual and module specification without prior notice.

2. SAFETY PRECAUTION

- Bluebird Solar PV modules are Application Class II PV modules, PV modules generate electricity upon direct exposure to light, which can produce electrical shock. Use of insulated tools and gloves is recommended while working with modules in sunlight. No metallic contacts should be on the human body.
- No one should stand on the front and backside of the PV module as non-uniform localized pressure might cause damage to the solar cells inside the module.
- The front surface of the module is constructed with tempered glass and hence it should be handled with utmost care. If the glass breaks then human contact with the surface can lead to electric shock particularly when the ambient condition is wet. Broken modules cannot be repaired and they should be disposed of properly.
- All electrical connectors should be well protected against corrosion and soiling. Ensure that connectors are corrosion free, cleaned with absolutely no gaps between the contacts. Gap can result in an Electrical Arcing causing a Fire Hazard. For personal safety do not install/ handle PV modules under adverse environmental conditions viz. gusty winds, wet frosted roof surfaces.
- Ensure the polarity of the modules or strings are not reversed considering the other modules in the string
- Concentrating artificial sunlight on solar modules is not allowed as it will degrade its performance and lifespan.
- Bluebird Solar modules are certified for operating in installations at voltages up to 1500 Vdc. Consider this value while designing the power plant considering the temperature ranges in the location of the power plant. Mixing of 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.
- To allow for increased output of a module or panel resulting from certain conditions of use, the installation instructions for a module or panel shall include the following statement or under normal conditions, a photovoltaic module is likely to experience conditions that produce more equivalent current and/or voltage than reported at standard test conditions.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of ISC and VOC marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor current ratings and size of controls connected to the PV output.

2.1 FIRE SAFETY

- BBS PV Modules have a Class C fire resistance rating for glass to back-sheet module and Class B fire resistance rating for glass to glass module in accordance with UL 61730/ IEC 61730 certification. "The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions." Rooftop installations should be placed over fire resistant roof coverings only. Roof constructions and installations may affect the fire safety of a building; improper installation may create hazards in the event of a fire.
- Unskilled installation procedure, using defective/worn out parts may result in an electrical hazard during operation. In order to prevent the risk of fire in this case, SPV modules should not be installed near highly inflammable liquids/gasses, or locations with hazardous materials.
- In the case of a fire, SPV modules may produce dangerous voltage/surge current, even if they have been disconnected from the inverter, or have been partly or entirely destroyed, or the naked wiring destroyed. In the event of fire, inform the fire/safety team about the particular hazards from the PV system, and stay away from all elements of the PV system during and after a fire until the necessary steps have been taken to mitigate the risk.

3. UNPACKING AND STORAGE

- At receipt of PV modules, verify the product details as it had been ordered. Packing list pasted outside the box contains all details including the serial no of modules.
- Request for the **PACKAGING AND UNLOADING MANUAL**, If not received with shipping documents.
- Do NOT stack packing boxes (pallets) more than 2 boxes high. If pallets are stored temporarily outside, then the external protective cover to be placed and stack height should not be more than 1 pallet high.
- Unpacking of PV modules should always be done in the vertical manner as mentioned in the '**Packaging and Unloading manual**', by two persons. Also care should be taken for preventing toppling of the modules in a partially opened pallet.
- PV module surfaces may get damaged/scratched if not handled carefully. No paint or adhesive to be applied to any of the surfaces including frame.
- Do NOT connect male & female connectors of the Junction box cable of the module.
- Do NOT use a knife to cut the zip-ties, but use wire cutting pliers.
- Do NOT place modules directly on top of each other.
- Do NOT uplift modules by their cables or junction boxes.

3.1 MODULE IDENTIFICATION

Each module has a unique serial number, which is laminated inside the glass. Please do not tamper with the serial number of the module and always record the serial numbers during installation for your future records. A nameplate containing model name, electrical and safety characteristics of the module is also affixed on the back side.

4. INSTALLATION ENVIRONMENT

4.1 CLIMATE CONDITIONS

- Bluebird Solar modules are certified for IEC 61215, IEC 61730-I & II, IEC 62804-1. In addition to the required IEC certification to meet European standards, Bluebird Solar products have also been tested and certified 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 sand storms. Although Bluebird Solar PV modules have passed Salt mist (IEC 61701) corrosion test with a salt concentration of 5 % by weight, galvanic corrosion can occur between the aluminum frame and mounting or ground materials if such materials are made of dissimilar metals. Stainless steel and aluminum metal direct contact is recommended for seaside installations to avoid metal corrosion.
- Please consult the Bluebird Solar Private Limited technical support department for more information on the use of modules in special climates, such as an altitude greater than 2000m, heavy snow, severe hail storm, hurricane etc.
- **ENVIRONMENT**

Ambient temperature: -40 °C to +50 °C

Operating temperature: -40 °C to +85 °C

Storage temperature: -20 °C to +50 °C

Humidity: < 85 RH%

Mechanical load pressure: Test Load of 3600 Pa on the front and 1600 Pa on the rear with a safety factor for mechanical load of 1.5.*

*** NOTE:**

The mechanical load bearing capacity depends upon the Installer's mounting methods and failure to follow the instructions of this manual may result in different capabilities to withstand snow and wind loads. The system installer should ensure that installation methods used meet these requirements and any local codes and regulations.

5. SITE SELECTION

- PV modules should be installed in a place where there is no shading across the location throughout the year. Shading can be minimized by having the distance between the obstruction and solar array be more than thrice the height of obstruction.
- PV modules should typically face south in the northern hemisphere and north in the southern hemisphere. Bluebird Solar modules can be mounted either in landscape or portrait orientation however, the impact of dirt shading the solar cells can be minimized by orienting the product in portrait.
- For optimum energy production, solar modules should normally be mounted facing the equator at an angle to the horizontal plane equivalent to the latitude of the installation. If the PV module is placed at a different angle or orientation, then it could have a direct impact on the generation output.
- Any slope of less than 1:2.4 is required to maintain the fire class rating; Glass to back-sheet Modules are Class C fire resistance rated and **glass to glass modules are Class B fire resistance rated.**
- Avoid using mounting methods where drainage holes are blocked.
- PV modules should not be installed in such a way it will be immersed under water under any circumstances and should not also be installed in a moving vehicle / vessel.
- The module is considered to be in compliance with IEC 61730 only when the module is mounted in the manner specified in this manual. A module with exposed conductive parts is considered to be in compliance with IEC 61730 only when it is electrically grounded in accordance with BBSPL's instructions and requirements of **the national electrical code, ANSI/NFPA 70(2014-2017)**

6. MOUNTING INSTRUCTIONS

6.1 MOUNTING METHODS:

Corrosion proof M8 bolts to be used on the PV modules mounting holes, which are on the rear side of the module. PV modules can be fixed either by bolt method or by the clamp method. Regardless of the mounting method, the modules should ensure that:

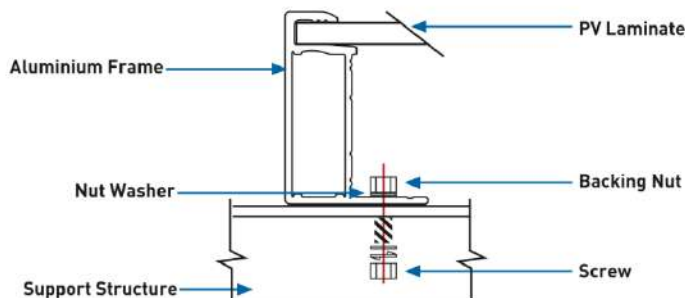
- 120 mm clearance is provided between module frames and the surface of the roof or the wall.
- Minimum distance of 10.50mm between 2 modules.
- Drainage holes are not blocked under any circumstances

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 thermal expansion of support structures. When modules are ground mounted, select the height of the mounting system in such a way to prevent the lowest edge of the module from being covered by snow for a long time in winter in areas that experience severe snowfall. If snow settles on the PV modules regular cleaning of snow and other foreign particles are highly recommended for long term reliability of the PV modules, failure to comply may result in damage of the module resulting in deformation and not covered under warranty

The minimum mechanical means is to be used for securing of the module or panel to the roof as per the instructions below, For a non-integral module or panel, the assembly is to be mounted over a fire resistant roof covering rated for the application.

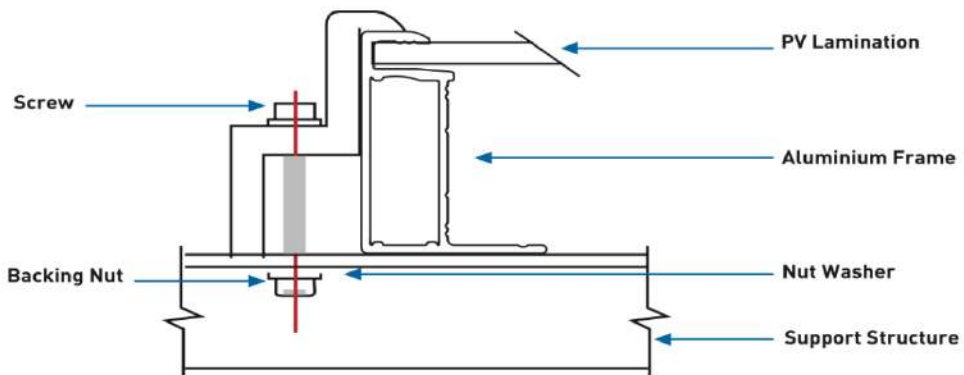
A. Mounting With Frame Bolt Holes

The frames of each module has 8* (9 mm*14 mm/ 8mm*12mm) mounting holes. Bluebird Solar strongly recommends the use of corrosion proof (stainless steel) fixings. The modules should be secured with a M8 - Grade 8.8 (1/4"-20 Grade B7) coarse thread bolt, two flat washers, spring washer and a nut as shown. The assembly should be tightened to a torque of minimum 16-20 Nm

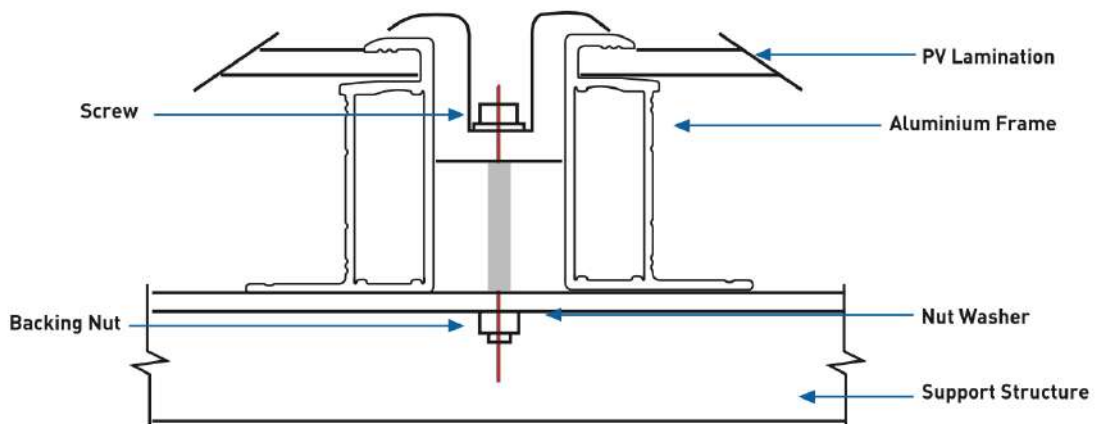


B. Mounting With Clamp Fixing

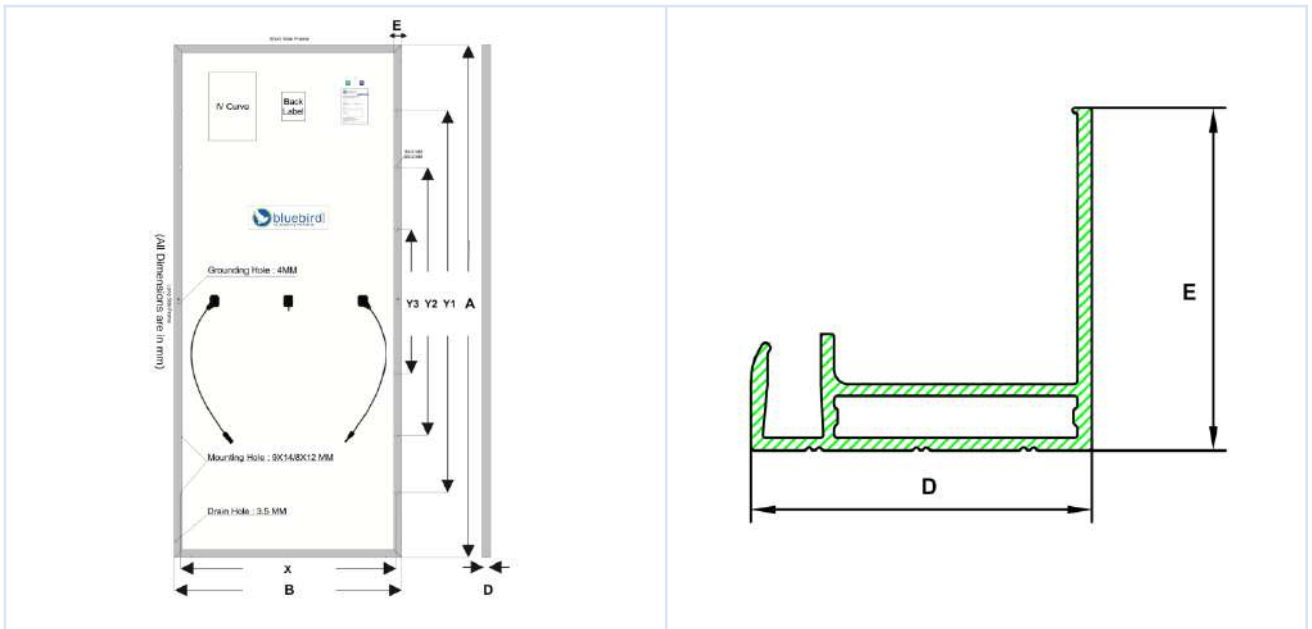
- It is recommended to use clamps which have EPDM or any other Insulation material.
- A minimum number of 4 Clamps are required to mount the module on the mounting rails. Two clamps on each of the long sides of the module and 2 clamps on each of the short sides of the module. Bluebird Solar Modules are certified for 2400Pa (50.12 lb/ft²) wind load, and 5400Pa (112.8lb/ft²) Snow load on the front side.
- Clamp design should be such that, there is neither contact between the clamp and the glass, nor any shading on the generating surface.
- There shouldn't be any modification to the module frame under any circumstances.



CORNER MODULE INSTALLATION

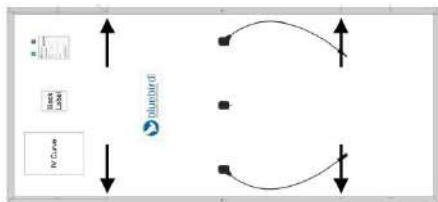
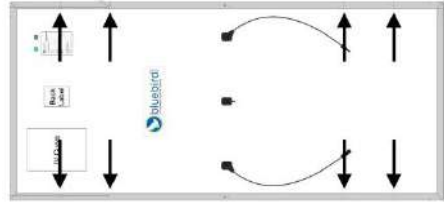

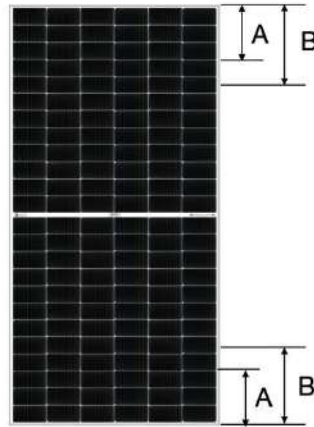


MECHANICAL DRAWING

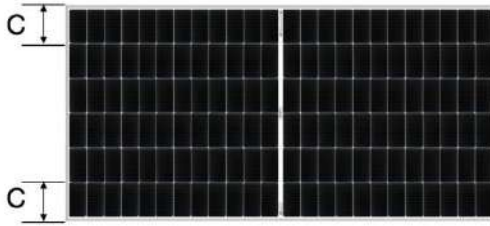


Technology	MODEL	Wattage	Length (A) (+/- 10 mm)	Width (B) (+/- 5 mm)	Y Pitch 1 (Y1) (+/- 5mm)	Y Pitch 2 (Y2) (+/- 5mm)	Y Pitch 3* (Y3) (+/- 5mm)	X Pitch (X) (+/- 5mm)	Frame CS Height (D)	Frame CS Width (E) long/short
Poly Crystalline (M2/G1)	BBS24P672FXXX	320-345	1960 1985	990 1000	1675	1175	400	950 960	35	30
Mono Crystalline (G1)	BBS24M672FXXX	400-415	1985	1000	1675	1175	400	960	35	30
Mono Crystalline / TOPCon (M10)	BBS24M7108CXXX BBS24M7108CXXX-TB BBS24M7108CXXX-GG	400-425 430-450	1735	1133	1400	1175	400	1095	35	30/20
Mono Crystalline/ TOPCon (M10)	BBS24M7120CXXX- BBS24M7120CXXX-TB BBS24M7120CXXX-GG	430-460 465-500	1925	1133	1675	1175	400	1095	35	30/20
Mono Crystalline/ TOPCon (M10)	BBS24M7132CXXX- BBS24M7132CXXX-TB BBS24M7132CXXX-GG	465-510 515-550	2100	1133	1675	1175	400	1095	35	30/20
Mono Crystalline/ TopCon (M10)	BBS24M7144CXXX- BBS24M7144CXXX-TB BBS24M7144CXXX-GG	515-560 565-605	2278	1133	1675	1175	400	1095	35	30/20
Mono Crystalline/ TopCon (M12)	BBS24M8108CXXX BBS24M8108CXXX-TB BBS24M8108CXXX-GG	495-555 560-600	1965	1303	1675	1175	400	1265	35	30/20
Mono Crystalline/ TopCon (M12)	BBS24M8120CXXX BBS24M8120CXXX-TB BBS24M8120CXXX-GG	560-620 625-670	2175	1303	1675	1175	400	1265	35	30/20
Mono Crystalline/ TopCon (M12)	BBS24M8132CXXX BBS24M8132CXXX-TB BBS24M8132CXXX-GG	625-680 685-735	2385	1303	1675	1175	400	1265	35	30/20

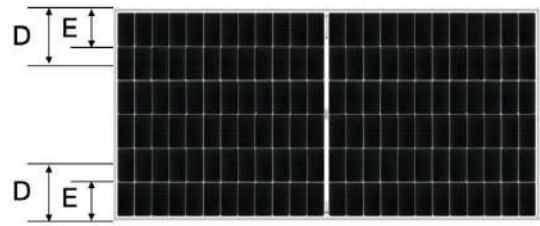
Holes At Y3 Distance are used in MMS with single axis Tracking system. These holes can be used for additional load handling capabilities of the structure in case of fixed type MMS

LOAD CONDITION: 2400 Pa				LOAD CONDITION: 5400 Pa			
1. LOAD CONDITION DIAGRAMS FOR MOUNTING WITH BOLTS:							
							
Use 4 Mounting Holes				Use 8 Mounting Holes			
2. LOAD CONDITION DIAGRAMS FOR MOUNTING WITH CLAMPS ON LONG SIDE :							
							
Use 2 Clamps along each length of the Module				Use 4 Clamps along each length of the Module			
Model Code	Cell Technology	No. Of Cells	Maximum Power Range (Pmpp, W)	Length mm	Mounting Hole Distance (X Pitch, mm)	A mm	B mm
BBS24P672FXXX	Poly Crystalline	72	320-345	1960 1985	950 960	245 250	490 500
BBS24M672FXXX	P Type Mono Perc	72	400-415	1985	960	250	500
BBS24M7108CXXX BBS24M7108CXXX-TB BBS24M7108CXXX-GG	P Type Mono Perc N Type TOPCon	108	400-425 430-450	1735	1095	215	435
BBS24M7120CXXX- BBS24M7120CXXX-TB BBS24M7120CXXX-GG	P Type Mono Perc N Type TOPCon	120	430-460 465-500	1925	1095	240	475
BBS24M7132CXXX- BBS24M7132CXXX-TB BBS24M7132CXXX-GG	P Type Mono Perc N Type TOPCon	132	465-510 515-550	2100	1095	260	525
BBS24M7144CXXX- BBS24M7144CXXX-TB BBS24M7144CXXX-GG	P Type Mono Perc N Type TOPCon	144	515-560 565-605	2278	1095	285	570
BBS24M8108CXXX BBS24M8108CXXX-TB BBS24M8108CXXX-GG	P Type Mono Perc N Type TOPCon	108	495-555 560-600	1965	1265	245	490
BBS24M8120CXXX BBS24M8120CXXX-TB BBS24M8120CXXX-GG	P Type Mono Perc N Type TOPCon	120	560-620 625-670	2175	1265	270	545
BBS24M8132CXXX BBS24M8132CXXX-TB BBS24M8132CXXX-GG	P Type Mono Perc N Type TOPCon	132	625-680 685-735	2385	1265	300	595

1. LOAD CONDITION DIAGRAMS FOR MOUNTING WITH CLAMPS ON SHORT SIDE



Use 2 Clamps along each width of the Module



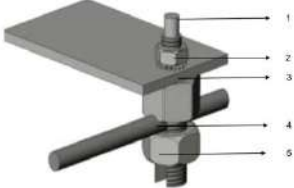
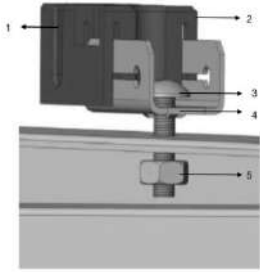
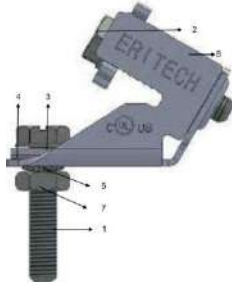
Use 4 Clamps along each width of the Module

Model Code	Cell Technology	No. Of Cells	Maximum Power Range (Pmpp, W)	Length mm	Mounting Hole Distance (X Pitch, mm)	C mm	D mm	E mm
BBS24P672FXXX	Poly Crystalline	72	320-345	1960 1985	950 960	245 250	200	50
BBS24M672FXXX	P Type Mono Perc	72	400-415	1985	960	250	200	50
BBS24M7108CXXX BBS24M7108CXXX-TB BBS24M7108CXXX-GG	P Type Mono Perc N Type TOPCon	108	400-425 430-450	1735	1095	285	225	55
BBS24M7120CXXX- BBS24M7120CXXX-TB BBS24M7120CXXX-GG	P Type Mono Perc N Type TOPCon	120	430-460 465-500	1925	1095	285	225	55
BBS24M7132CXXX- BBS24M7132CXXX-TB BBS24M7132CXXX-GG	P Type Mono Perc N Type TOPCon	132	465-510 515-550	2100	1095	285	225	55
BBS24M7144CXXX- BBS24M7144CXXX-TB BBS24M7144CXXX-GG	P Type Mono Perc N Type TOPCon	144	515-560 565-605	2278	1095	285	225	55
BBS24M8108CXXX BBS24M8108CXXX-TB BBS24M8108CXXX-GG	P Type Mono Perc N Type TOPCon	108	495-555 560-600	1965	1265	325	260	65
BBS24M8120CXXX BBS24M8120CXXX-TB BBS24M8120CXXX-GG	P Type Mono Perc N Type TOPCon	120	560-620 625-670	2175	1265	325	260	65
BBS24M8132CXXX BBS24M8132CXXX-TB BBS24M8132CXXX-GG	P Type Mono Perc N Type TOPCon	132	625-680 685-735	2385	1265	325	260	65

Different mounting configurations can be tried as per Installer's calculations; however, failure to comply with the above suggestions may result in a lowering of load handling capabilities and may lead to failure of any overload situation, which may not be covered under product warranty.

6.2 GROUNDING

- All module mounting frames and mounting racks need to be grounded according to the respective regional electric codes (IEC, UL etc.). The module frame must be properly grounded. The grounding wire must be properly fastened to the module frame to ensure good electrical contact. Use the recommended connector type, or an equivalent, for this wire.
- Bonding the module frame and all metallic structural members together achieve proper grounding continuously using a suitable grounding conductor. Grounding conductor or strap may be copper, copper alloy, or other material acceptable for use as an electrical conductor. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.
- Bluebird Solar modules can be installed with the use of third party listed grounding devices for grounding the metallic frames of PV modules. The devices have to be installed in accordance with the grounding device manufacturer's specified instructions.
- Please refer to the "Product Catalog" link for detailed grounding hole location and size at www.Bluebirdsolar.com
- Following are the recommended grounding methods:

METHOD 1: GROUNDING BOLT # 2058729-1	METHOD 2: GROUNDING BOLT # 1954381-2	METHOD 3: ERICO GROUND BOLT # EL6CS14-6
		
1) Wire bolt and slot 2) Mounting wash hex nut 3) Aluminum frame 4) 4 to 16 mm2 cable 5) HEX nut	1) Wire slot 2) Slider 3) Bolt 4) Base 5) Nut	1) Mechanical Bolt A 2) Mechanical Bolt B 3) Belleville Washer 4) Flat Washer 5) Clearance Hole 6) Machine Bolt Hex Nut with Lock Washer 7) Grounding Bolt
<ul style="list-style-type: none"> Tyco grounding hardware comes in a package that includes the grounding bolt, mounting and grounding hex nut Electrical contact is made by penetrating the anodized coating of the aluminum frame, and tightening the mounting Grounding wire size (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 45 in lb 	<ul style="list-style-type: none"> Tyco grounding hardware comes in a package that includes the grounding bolt, mounting and grounding hex nut Electrical contact is made by penetrating the anodized coating of the aluminum frame, and tightening the mounting hex nut (come with the star washer) to the proper torque of 25 in lb Grounding wire size (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 45 in lb The Tyco grounding bolt is only listed for use with 6 to 12 AWG bare solid copper wire. 	<ul style="list-style-type: none"> The lug should be installed on a surface that is larger than the bottom surface of the washer lug The lug should be installed in the grounding holes provided on the PV module Machine bolt A should be torqued to 35 in lb, to secure the grounding bolt to module frame The grounding bolt is only listed for use with 6-12 AWG bare solid copper wire For proper wire binding, machine bolt B should be torqued to 35 in lb.

Where common grounding hardware [nuts, bolts, star washers, split-ring lock washers, flat washers and the like] is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions. Common hardware items such as nuts, bolts, star washers, lock washers and the like have not been evaluated for electrical conductivity or for use as grounding devices and should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirement in UL61730/ IEC 61730, may be used for grounding connections in accordance with the instructions provided with the module

6.3 MODULE WIRING

- All wiring should be performed, by qualified installers, in accordance with the local codes and regulations.
- 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. Before connecting modules, always ensure that the contacts are corrosion free, clean and dry.
- The connectors used for interconnecting the modules and connectors used for connecting the strings and/or to the String Combiner Box, i.e. field connectors shall be of same make and same part no. of connector which is fixed with module junction box for better compatibility.
- Products 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 10 V between strings then check the string configuration before making the connection. Module wiring should be performed by professional expert installers in accordance with local regulations and national codes.
- PV modules can be connected in Series to have an increase in the Operating Voltage. The positive connector plug of the module is connected to the negative connector plug of another module until there is a click sound. Only if there is a click sound assume the modules are connected.
Bluebird Solar modules are provided with standard copper cables with a 4 mm² cross-sectional area and are rated for 1500V (IEC) for maximum system voltage, 90C and are UV resistant. Ensure the cables are not exposed to water logged areas.
- The maximum voltage of the system should be lesser than the certified system voltage (typically 1500V) or the maximum input voltage of the inverter. Since $V_{oc} \propto (1/T)$, the open circuit voltage of the array needs to be calculated at the lowest ambient temperature for the location of the power plant.

This can be done using the formula below,

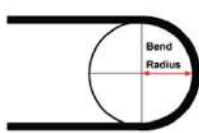
$$\text{Max System voltage} = X * V_{oc} * [1 + ((T - V_{oc} (\%) \times (25 - T_{min})))]$$

Where X - No: modules which are connected in series.

V_{oc} - Open circuit voltage of each module (Refer to the Data Sheet)

$T - V_{oc}$ - Thermal coefficient of open circuit voltage for the module in Percentage (Refer to the Data Sheet)

T_{min} - Minimum ambient temperature of the location of the plant



Bending radius of junction box cable should be minimum 42 mm



Incorrect routing of cable



Correct routing of cable

7. ELECTRICAL CONFIGURATION

Solar array generates DC electricity once sunlight falls on the modules and the inverter is in active mode once the minimum voltage and current requirements are met and is converted into AC Power appropriately.

CAUTION:

The modules are rated to operate at potentially lethal DC Voltages which have the potential to cause severe electric hazards in the form of shock, arcing and other fire hazards. Hence only trained professionals are requested to operate on the panels and the DC solar array and the DC combiner box. The PV modules are certified to operate at 1500V DC. Always a rated isolator (DC Switch) is to be used to interrupt the current flow while disconnecting the connectors. Even after disconnecting, the DC power may be active for some time, hence only expert operators are recommended to operate upon the panels, string combiner box, etc. Bluebird Solar will not be responsible for any electrical accidents occurring in power plants using Bluebird Solar modules

7.1 FUSING

Please rate the fuses for maximum Vdc and connected in each, non-grounded pole of the solar Array. (If the system is a floating system then fuses should be connected in both positive or negative poles). The maximum Fuse Rating connected in series with the array string is usually 25 A, but the actual module specific rating can be found on the module data sheet. The fuse rating also corresponds to maximum reverse current that a module will be able to withstand. 25 A fuse per series string is recommended.

Electrical Specifications [Nominal Values: for 144 Cell model]:

Maximum System Voltage: 1500V

Maximum Series Fuse: 25 A

Fire Rating Class: Fire Rating Class C Type 1 (For Glass to back-sheet module)

Dimensions: 2278 x 11 x 35 mm

Weight: 28.2 kg

Bypass Diodes: 3 Bypass Diodes

Typically, modules consist of bypass diodes in the junction box. Rated electrical characteristics are within $\pm 10\%$ of measured values at standard test conditions of 1000 W/m², 25°C cell temperature and air mass 1.5 solar spectral irradiance.

7.2 INVERTER SELECTION AND COMPATIBILITY:

Only connect the quantity of modules that corresponds to the voltage specifications of the inverters used in the system. When installed as per IEC norms and regulations, Bluebird Solar modules normally do not need to be electronically connected to earth and can operate with either, galvanically isolated (with transformer) and transformer less inverters. If the system is located in hot and very humid locations then galvanically isolated Inverters with Transformers must be used and the negative pole of the array must be connected to earth. It is recommended to Install Inverter with Negative earthing to avoid the PID effect. If a Transformer less Inverter is used in hot humid climatic locations, The Installer should ensure the right active kind of negative earthing kit is to be installed by consulting and having assurance from the inverter supplier.

7.3 ELECTRICAL PARAMETERS

Model Code	Cell Technology	No. Of Cells	Maximum Power Range (Pmpp,W)	Rated Short Circuit Current Range (Isc,A)	Rated Open Circuit Voltage Range (Voc/V)	Rated Current at Pmax Range (Impp, A)	Rated Voltage at Pmax Range (Vmpp,V)	MODULE SIZE (L X W X H) +/- 10 mm
BBS24P672FXXX	Poly Crystalline	72	320-345	8.93-9.31	45.58-47.44	8.44-8.81	38.64-40.33	1960 x 990 x 35 1980 x 1000 x 35
BBS24M672FXXX	P Type Mono Perc	72	400-415	10.10-10.20	48.96-49.61	9.56-9.78	41.76-42.48	1980 x 1000 x 35
BBS24M7108CXXX BBS24M7108CXXX-TB BBS24M7108CXXX-GG	P Type Mono Perc N Type TOPCon	108	400-425 430-450	13.36-13.80 13.90-14.26	35.62-37.59 38.24-39.44	12.47-12.98 13.33-13.82	31.76-32.69 32.13-33.68	1735 x 1133 x 35
BBS24M7120CXXX- BBS24M7120CXXX-TB BBS24M7120CXXX-GG	P Type Mono Perc N Type TOPCon	120	430-460 465-500	13.36-13.80 13.90-14.26	40.68-41.77 42.48-43.82	12.47-12.98 13.33-13.82	35.28-36.32 35.70-37.42	1920 x 1133 x 35
BBS24M7132CXXX- BBS24M7132CXXX-TB BBS24M7132CXXX-GG	P Type Mono Perc N Type TOPCon	132	465-510 515-550	13.36-13.80 13.90-14.26	44.75-45.94 46.73-48.18	12.47-12.98 13.33-13.82	38.81-39.95 39.27-41.16	2100 x 1133 x 35
BBS24M7144CXXX- BBS24M7144CXXX-TB BBS24M7144CXXX-GG	P Type Mono Perc N Type TOPCon	144	515-560 565-605	13.36-13.80 13.90-14.26	48.82-50.12 50.98-52.58	12.47-12.98 13.33-13.82	42.34-43.58 42.84-44.90	2278 x 1133 x 35
BBS24M8108CXXX BBS24M8108CXXX-TB BBS24M8108CXXX-GG	P Type Mono Perc N Type TOPCon	108	495-555 560-600	17.96-18.39 **	36.72-37.70 **	16.99-17.46 **	31.00-32.24 **	1965 x 1303 x 35
BBS24M8120CXXX BBS24M8120CXXX-TB BBS24M8120CXXX-GG	P Type Mono Perc N Type TOPCon	120	560-620 625-670	17.96-18.39 **	40.80-41.89 **	16.99-17.46 **	34.44-35.82 **	2175 x 1303 x 35
BBS24M8132CXXX BBS24M8132CXXX-TB BBS24M8132CXXX-GG	P Type Mono Perc N Type TOPCon	132	625-680 685-735	17.96-18.39 **	44.88-46.08 **	16.99-17.46 **	37.88-39.40 **	2385 x 1303 x 35
Maximum System Voltage: 1500 Vdc Maximum Fuse Rating: 25A Overcurrent Protection Rating: 25A								

(TB- Bifacial Transparent Backsheet,
GG- Bifacial Glass to Glass)

** Information to be made available in Future Revisions

8. MAINTENANCE AND CARE

- Well-designed PV Plant requires minimum maintenance but however with further maintenance the performance and the reliability of the system can be improved
- Yearly maintenance by a trained professional is usually advised
- Check that the mounting structures are properly laid and the modules are held tightly and are in accordance with the mounting instructions given above
- Ensure no part of the light falling area of the module is shaded, any leaves / trees or any object which causes shading has to be removed accordingly
- Ensure all the cable assembly is tight and no part of cable assembly will be exposed to water logging
- Check that the string fuses in each non/earthed pole are in operation
- It is recommended to check TDS of the cleaning water on regular basis. TDS should be maintained below 500 mg/L & total hardness shall be less than 75 mg/L
- For cleaning of the solar PV modules, clean the modules using a soft module cleaning kit . A soft cloth with mild soft detergent can be used as an alternative. Use water only with the same temperature as of the module else thermal shocks can be created and can damage the module
- Do not open the junction box to change the diodes even if they are defective. Please contact with PV module manufacturer in case of known or suspected diode failure
- Ensure the module is cleaned without causing any damage like micro-crack, etc. to the module
- Cover the front surface of modules by an opaque material when repairing. Modules when exposed to sunlight generate high voltage and are dangerous
- Always recommended to have the module clean and tidy for maximum power generation from the solar PV module
- The back surface of the solar module doesn't require any specific cleaning unless any dirt or debris is stuck on the back sheet. While cleaning the dirt on the back sheet avoid any sharp object, which can damage the substrate material and cause a slit
- Do not open the junction box to change the diodes even if they are defective. Please contact with PV module installer in case of known or suspected diode failure
- Cover the front and back surface of modules by an opaque material when repairing. Modules when exposed to sunlight generate high voltage and are dangerous

9. WARNING

While performing any electrical maintenance, the system must be completely shut down and maintenance should be performed by experts. Failure to comply with norms may result in lethal shocks, burns and sometimes even death.



bluebird SOLAR
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