

TRIENERGIA

ITALIAN PV MANUFACTURER

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TRIENERGIA
ENERGY DESIGN

Installation, use and maintenance manual of the TRlxxxBC-xB modules



 **ITALY**
modules

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INSTALLATION, USE AND MAINTENANCE MANUAL OF THE TRIxxxBC-xB modules

Before installation

This manual contains general and safety instructions to be observed during the installation and use of the TRIxxxBC-xB photovoltaic modules manufactured and distributed by Trienergia.



Carefully read the manual before installation.



All installation and safety instructions must be fully understood before installing, wiring, commissioning or performing maintenance on PV modules. Failure to follow the instructions can result in injury and property damage. This manual is intended for qualified personnel and specialized technicians only. The TRIxxxBC-xB photovoltaic modules are photovoltaic panels used to transform solar irradiation into electricity.

Photovoltaic modules are designed to be used in photovoltaic systems. Any other application is to be considered non-conforming.



Disclaimer

Trienergia assumes no responsibility and does not grant any warranty in case of damage resulting from improper installation.



Safety

The guidelines on the prevention of accidents, the rules and regulations issued by the organizations and bodies in charge apply to the installation, use and maintenance phases. Follow the relevant local and national regulations. Also follow the individual safety regulations for the other components of the photovoltaic system.



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**Warnings related to the danger due to the presence of electric voltage**

The safety instructions and mandatory directives listed below must be observed:

- Installation and maintenance must only be carried out by qualified personnel, in compliance with local directives;
- Keep children away when installing the photovoltaic system and photovoltaic modules;
- Danger of death due to electrical discharges and arc flashes;
- Contact with live electrical parts of the PV module, such as terminals and connectors, can cause burns, sparks and lethal electrical shocks;
- Comply with the specific safety instructions regarding the use of direct current and photovoltaic systems. When exposed to sunlight, photovoltaic modules produce direct current in hazardous amounts even in a single module. Photovoltaic modules are protected only with a DC switch;
- Never disconnect under load. Arc loads may occur that cannot be deleted;
- Do not touch the junction box, cable terminations and connecting plugs with bare hands during installation or in direct sunlight, whether the PV module is connected or not;
- Do not insert any component into the sockets or plugs;
- Do not perform any work if the weather is wet, in order to avoid electric shocks. Do not use wet tools. Do not work on the wet terminals of the photovoltaic module;
- Use insulated tools and rubber gloves suitable for working on electrical equipment;
- Always make sure that the photovoltaic module has been correctly fixed.



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**Warnings related to the danger of accidents**

The safety instructions and mandatory directives listed below must be observed:

- Installation and maintenance must only be carried out by qualified personnel, in compliance with local directives;
- Apply the necessary fall prevention measures during work at height. Follow the applicable directives and recommendations of the work safety agencies or relevant organizations;
- Do not work under rain, snow or wind;
- If you work at height, pay attention to falling objects;
- Handle damaged or broken photovoltaic modules with care using appropriate safety devices;
- Do not touch the glass surface and the rear side or the frames of the photovoltaic modules with bare hands, always use safety gloves;
- Sun rays can overheat the glass surface and the module frame, causing burns to the skin. Use safety gloves.



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**Warnings related to the use of photovoltaic modules**

The safety instructions and mandatory directives listed below must be observed:

- Individuals who do not have the necessary technical knowledge regarding photovoltaic modules or precautions to take when handling damaged photovoltaic modules must keep a safe distance to avoid injury or electric shock;
- Do not artificially concentrate sunlight on the photovoltaic module by means of mirrors, lenses or other objects;
- Avoid shading the photovoltaic module, even partially, to avoid interruptions in performance and damaging the module under certain conditions;
- Put the photovoltaic modules in environments where the operating temperature is within the range between -40°C and $+90^{\circ}\text{C}$. This condition is very important in order to ensure sufficient ventilation behind the photovoltaic modules in case of installation in environments particularly hot;
- Do not use the photovoltaic modules in environments where they could come into contact with salt water;
- Make sure that there are no flammable gases in the area of installation;
- If the photovoltaic module is installed on a roof, ensure that the roof is fire-resistant and suitable for mounting a photovoltaic system;
- If a photovoltaic module or another component needs to be replaced, ensure that the properties and performance of the new element are compatible with those of the replaced element and the system in which it is inserted;
- Do not clean the glass surface of the photovoltaic module with alkaline detergents.



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Warnings related to the installation of the photovoltaic modules

The safety instructions and mandatory directives listed below must be observed:

- Assembly and installation must only be carried out by qualified personnel, in compliance with local directives;
- Handle the photovoltaic modules with particular care;
- Do not use damaged photovoltaic modules;
- Pay particular attention when transporting the photovoltaic module. Be careful not to drop the module and avoid excessive loads. The solar cells in the module are very thin and naturally fragile;
- Do not step on the photovoltaic module and prevent any object from falling over it;
- Do not damage or scratch the back of the photovoltaic module;
- Do not hit any component of the photovoltaic module;
- Do not lift the photovoltaic module by gripping the junction box or cables. Do not pull, twist or scratch the cables;
- Do not disassemble the photovoltaic module and do not make unauthorized modifications. Do not remove any labels. Do not drill holes through the frame or the glass because it would compromise the stability of the frame or the glass;
- Do not cover the water drain holes in the module frame. Damages due to freezing may occur if the frame is filled with water;
- Make sure that the insulating coating of the frame is not scratched, in order to avoid corrosion phenomena that may compromise the stability of the frame;
- Make sure that the connectors are properly tightened and check the wiring operation;
- Only use devices, connectors, cables and mounting systems suitable for photovoltaic systems;
- After installation, check the correct operation of the photovoltaic module and system.



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**Mechanical installation**

The TRIxxxBC-xB photovoltaic modules are designed for a maximum test load of 3.600 Pa (including a safety factor of 1,5) when installed on a mounting system designed for this type of load. Make sure that the wind and snow load do not exceed this limit at the installation site. In case of roof mounting, make sure that it is able to support the load of the photovoltaic system. Assemble the photovoltaic modules according to the procedures described below. The photovoltaic modules can be fixed to the mounting system using the appropriate clamps. The TRIxxxBC-xB photovoltaic modules can be mounted at any angle.

Choose the orientation of the modules to ensure maximum exposure to the sun. The ideal exposure is towards the south in the northern hemisphere and towards the north in the southern hemisphere. In Central Europe the inclination should be around 30 °, while in Southern Europe it should be slightly lower. The inclination should preferably be not less than 10 ° - 15 ° because the self-cleaning function of the surface of the modules would be compromised.

Make sure that the modules are not covered by shadows due to the presence of antennas, chimneys, trees or other similar elements.



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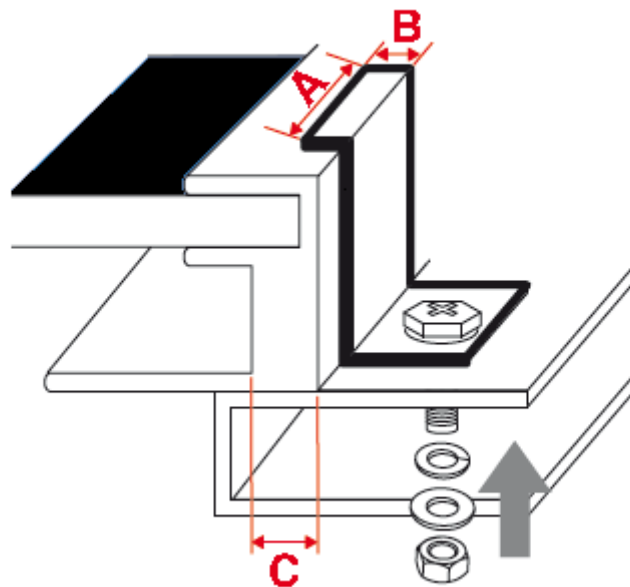
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**Assembly using the module clamps on the long side**

Photovoltaic modules must be fixed using the appropriate clamps. To do this, use four terminal clamps for each photovoltaic module. If several modules are installed one after the other, use the intermediate clamps between modules. Fix the appropriate clamps for photovoltaic modules, following the measurements A and B specified in the chart below. The following figure, which represents the fixing clamp, is for demonstration purposes only. Therefore, other types of clamps can also be used, but they shall comply with the following dimensions.

Min. width of A Clamp 70mm

Min. depth of B terminal 10mm



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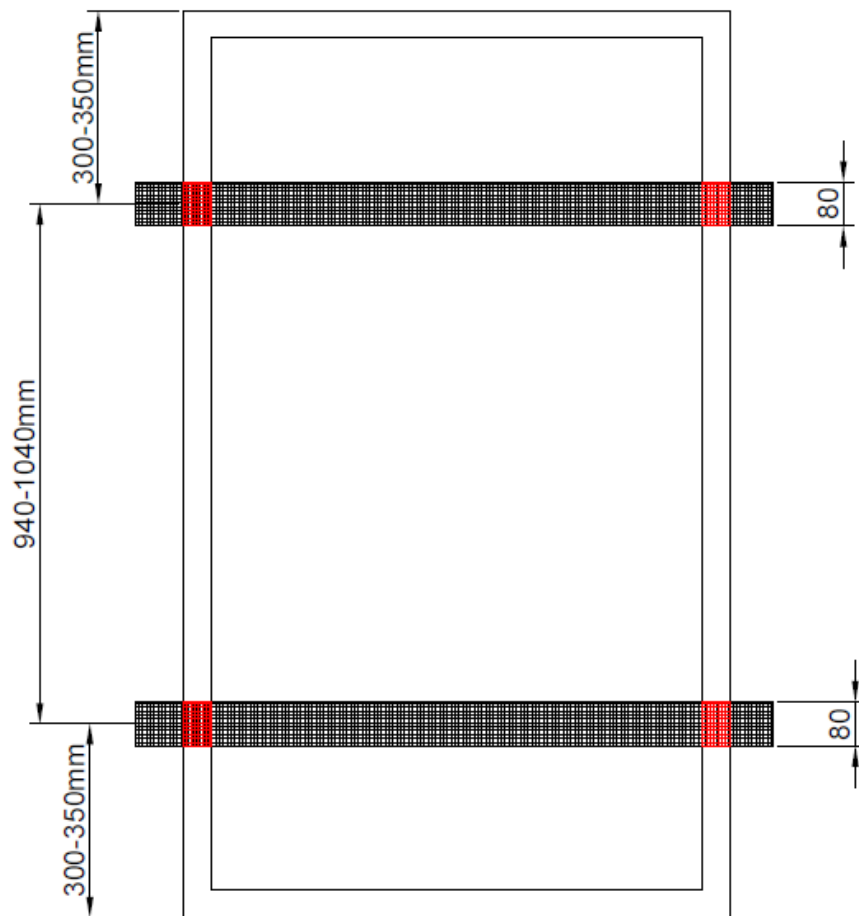
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Set the fixing points on the photovoltaic module as shown in the following images.

In case of installation of several photovoltaic modules next to each other, leave a space between modules. Never fit modules attached one to another as this may cause damage due to size changes caused by temperature. The minimum recommended distance between the modules is 5mm.

60 cell modules



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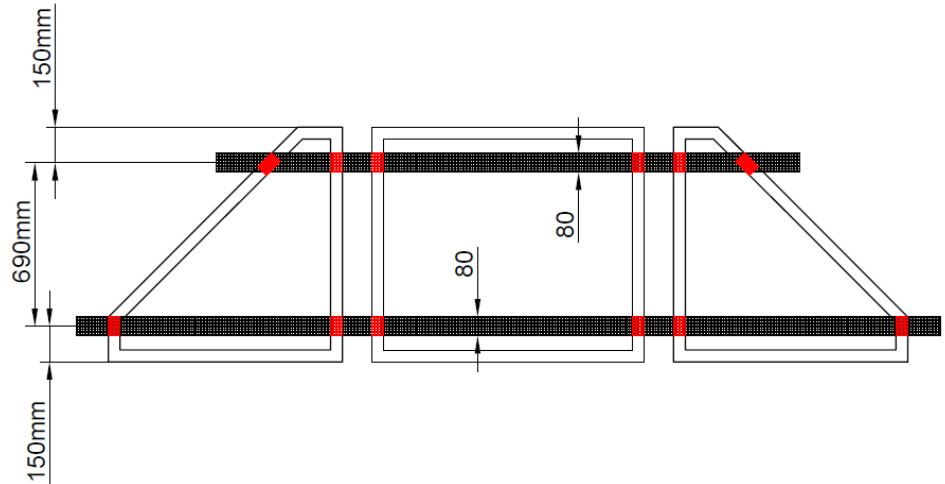
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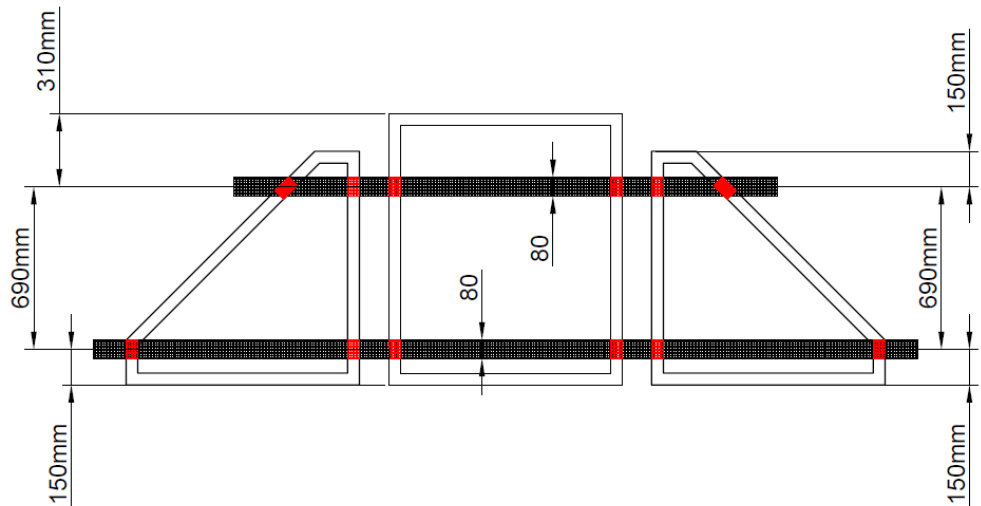
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Trienergia System: 42 cell module (in horizontal position) with 21 cell modules



Trienergia System: 42 cell module (in vertical position) with 21 cell modules



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**Electrical installation****Wiring**

The TRIxxxBC-xB photovoltaic modules can be connected in series or in parallel according to the electric power to be obtained. Use photovoltaic modules of the same type in combined connection or in any case verify the electrotechnical compatibility of the modules belonging to the same string / independent input of the inverter.

Series connection

Do not exceed the maximum system voltage. Photovoltaic modules can be connected in series to achieve a higher output voltage. Series connection is preferable if the systems have no shadings. The series connection has the following advantages:

- photovoltaic modules can be assembled easily and quickly;
- higher voltages make cross-sections of smaller cables possible;
- the higher voltages result in smaller currents and therefore lower power losses.

Parallel connection

PV modules can be connected in parallel to achieve a higher output current. Each string, or photovoltaic module in series, shall be fused before being combined with other strings. For this purpose, the TRIxxxBC-xB modules are equipped with bypass diodes located in the junction box. Comply with the applicable regional and local regulations regarding fuse requirements and limitations in the maximum number of PV modules for parallel connection. The maximum number of photovoltaic modules for parallel connection without additional precautions, such as fuses or blocking diodes, is one string of modules. The number of strings is not limited if adequate precautions have been taken to block the reverse current, such as fuses to protect the photovoltaic module and the cable against overcurrent or blocking diodes for uneven string voltage.



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**Maintenance and inspections**

Service and maintenance on the TRlxxxBC-xB photovoltaic modules must only be carried out by qualified personnel. Do not clean the glass surface with alkaline detergents. Avoid prolonged stagnation of water on the glass. Be careful not to break or damage the grounding wire during routine maintenance of the photovoltaic module.

It is recommended to perform the following maintenance and inspection procedures regularly:

- Cleaning of glass surfaces;
- Snow removal, if necessary;
- Visual inspection of the fixing system;
- Visual inspection of photovoltaic modules;
- Visual inspection of electrical connections;
- Performance verification.

**Disposal**

For any questions regarding the disposal or recycling of the TRlxxxBC-xB photovoltaic modules contact Trienergia using the contact details in the header.

