

Installation and operating manual

Photovoltaic modules

Ganymed[®] M series

Ganymed[®] P series

Io[®] M series

Io[®] P series

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Please read the entire installation and operating manual before transporting, installing or operating the solar modules! It contains important safety information.

The warranty will be voided if you fail to follow the instructions in this manual when using the solar modules.

This documentation is current as of January, 2009. We reserve the right to update the information therein without prior notice.

1. Safety information

Electrical installation and commissioning may only be performed by licensed electricians in accordance with the information below. Improper installation or commissioning may result in damage to property and injury to persons.

Personal fall protection systems should be used when working on rooftop solar generators. All applicable occupational health and safety regulations must be followed. For your own safety and to protect your solar modules, please observe the following information:

- When carrying out installation and maintenance work on solar modules, follow all applicable regulations and safety measures for the installation of electrical equipment and systems as well as the regulations issued by your energy supply company concerning grid-parallel operation of solar power systems.
- Make sure that the solar module is mechanically sound before installing it.
- Damage to the rear surface insulation film can have serious consequences (delamination, health and injury risk). Do not install or operate a module with damaged rear surface insulation film.
- When modules are connected in series (addition of module voltages), voltages may arise that exceed the safety extra-low voltage of 120 V DC!
- Note that the full open circuit voltage of the modules is generated even at low light levels.
- Disconnecting the direct current of live cables leads to arcing. Be sure to disconnect the inverter from the AC mains grid before carrying out any work, especially before disconnecting the plug connectors in the DC circuit.
- Due to the risk of arcing, solar modules must never be installed near easily flammable materials, gases or vapors.
- Observe all guidelines regarding fires in electrical systems.
- The maximum permitted system voltage of the solar modules must never be exceeded, even in low temperatures (see data sheet and module type plate).
- Treat the solar module like a glass product and do not walk or step on it.
- Never leave a solar module detached or unsecured.
- Do not install solar modules that have broken glass.
- Comply with the safety information provided by the manufacturers of all other components in the solar power system.

2. Positioning information

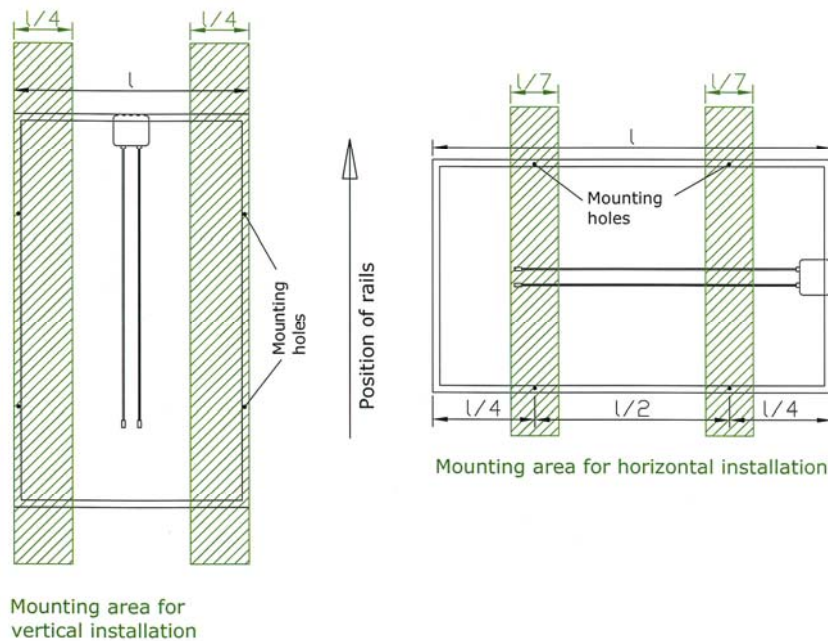
To ensure the highest annual energy yield possible, we recommend a module position that meets the following criteria:

- Align the front of the solar module to the south.
- In Germany, select a tilt angle based on local and structural conditions ($30^\circ \pm 15^\circ$). Specific information on optimal module positions can be found in the relevant technical literature.
- All the modules of a photovoltaic generator must be aligned at the same angle (both horizontally and vertically). Use a separate inverter if there are any angle deviations.
- In order to ensure sufficient self-cleaning, the tilt angle should be at least 10° .
- Position the solar module so that shading (even partial) is avoided. Shading can lead to performance loss and PV generator failures.
- Ensure that the rear of each module is well ventilated.
- To avoid excessive stress on the modules from wind, position them so that a minimum distance to building edges is maintained in accordance with DIN 1055-4.
- Prevent the modules from coming into direct contact with salty air (near the ocean).
- Focusing sunlight onto the modules via a mirror or lens is prohibited.

3. Installation information

- Any additional loads caused by the PV system must be included in the statics analysis of the overall structure.
- Material-related stability, bending and load verifications must be conducted by the system builder or operator.
- Mount the modules on suitable substructures.
- Note the mounting areas shown in Figure 1.
- Only use suitable clamping systems for installation. Make sure the solar module is flat and tension-free when mounting it on the substructure.
- Prevent all contact corrosion between the solar module and substructure when using varying materials.
- Do not drill, nail or weld the module frame in place.
- Attach the solar modules so that they are able to withstand all foreseeable loads and weather-related effects.
- Only use corrosion-free screws for installation.
- When mounting the solar module, it must be free of all mechanical tension and kept at a minimum distance of 5 mm from the next module to compensate for any material expansions due to temperature fluctuations.
- An adequate lightning protection system is recommended, especially in exposed areas.
- When integrating the solar module with existing lightning protection measures, be sure to observe all applicable regulations.
- Only mount the solar module vertically with the connection box pointing up or horizontally.
- When tilting the module, make sure no rain water or condensation is able to flow towards the high-strength cable glands on the connection box.
- The solar module must not come into contact with back water or condensation water. The ventilation openings in the frame must not be closed.

Figure 1



4. Electrical connections

The solar modules are designed for use in grid-connected solar generators. If they are used for any other purpose, note the different technical conditions. The solar modules may only be installed by qualified specialist companies. During installation, the relevant standards and regulations for PV systems such as VDE regulations, DIN standards, VDEW guidelines, the technical connection conditions of your network operator and all applicable industrial safety requirements must be observed.

- Only use suitable cables when wiring the module strings for outdoor installation (UV and ozone resistant).
- The cables must have a minimum cross-section of 4mm² and the insulation must be compatible with the maximum open-circuit voltage of the system.
- Shield the cables from damage.
- The connection boxes with pre-connected cables may not be opened for electrical wiring.
- Do not clean the connection boxes and cables with substances containing oil, grease

or alcohol.

- During installation, make sure the module connection cable has sufficient strain relief.
- The connecting cables are fitted with a heavy duty plug connector system for the photovoltaic panels. Either the plugs are labeled with their specific polarity or the connection cables are colored red for positive and blue for negative.
- Be sure to note the polarity when connecting the solar modules to the inverter. Reverse polarity will result in the destruction of important technical components such as the inverter.
- Never disconnect or connect the plug contacts under load! You may disconnect or connect the plugs while energized, i.e., the inverter must be disconnected from the DC mains grid.
- To avoid the risk of electric shock, all of the solar module frames and the support structure for equipotential bonding must be properly grounded. We recommend establishing a ground connection outside of the building. When doing so, observe all legal regulations applicable in your region and the recommendations of the inverter manufacturer and your insurance company.

5. Servicing and maintenance

A small amount of service and maintenance work is necessary to ensure the optimal performance of the solar modules. Service and maintenance work should be carried out once every 6 months.

- Dirt build-up on the front glass surface reduces the performance of the solar module.
- If there is a considerable amount of dirt, we recommend cleaning the glass surface of the module with water that has the same temperature as the module and a soft brush. Do not use aggressive cleaning agents.
- Make sure all electrical and mechanical connections are clean, tight and in sound condition.
- Any irregularities must be corrected immediately.
- Regular inspection of yields by the operator is recommended.

6. Disposal

Defective or old solar modules must be properly disposed of. They may not be thrown out with household garbage; either contact your local disposal company or return them to ersol Crystalline Modules GmbH.

7. Storage and transport

When storing and transporting solar modules, make sure that each module is adequately supported. Stacking package units may damage the solar modules and must be avoided!

We recommend that you store all solar modules inside and in the original packaging until final installation. Since the original packaging is composed of non-impregnated cardboard, they must be stored in a dry location. Insert intermediary layers between the individual solar modules. The solar modules must be secured against tipping.

Avoid any damage to the modules during transport and unloading at the site of installation (e.g., roof).