General Installation Manual

Introduction

Thank you for selecting a photovoltaic module from PVP Photovoltaic GmbH. This manual applies to the product group PVP-AxxxM, PVP-AxxxP PVP-GExxxP with frame and PVP-GExxxM with frame. Please read this document entirely before installing your photovoltaic module.

Disclaimer of Liability

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General Information

A special qualification and a high level of expertise are required for the installation of photovoltaic modules. Therefore, the installation should only be performed by qualified experts, including authorised companies and electrical technicians.

WARNING

- All instructions should be carefully read and understood prior to wiring and installation, initial operation or maintenance. Physical contact with components carrying electricity, e.g. connection terminals, may result in burns, the formation of sparks or a fatal electric shock, regardless of whether the module is connected or disconnected.
- The installer carries the risk for all injuries, which he may encounter during installation, including the risk of an electric shock.
- Photovoltaic modules produce direct current upon being exposed to sunlight or other light sources. Even if individual modules only produce low voltages and a low current, there is a threat of electric shock and burns.
- To avoid the threat of an electric shock or injuries, the front side of the glass surface must be covered with a dense, opaque material during the installation and when handling.
- Upon the modules being connected in parallel, a higher current is produced and the threat of electric shock increases. The risk of an electric shock also increases if the modules are connected in a series and thus a higher voltage is produced.
- To avoid an electric shock, always work only in dry conditions with dry modules and tools.
- To prevent the risk of personal injury and damage to the module, do not stand or step on a module.
- To avoid the threat of an electric shock or fire, do not damage the back of the module.

- To avoid an electric shock or injury, unauthorised persons and children should not be allowed in the vicinity of the installation of the photovoltaic modules.
- To avoid an electric shock or injury, the modules must be fully earthed.
- To avoid the threat of an electric shock, fire or injuries, never disassemble photovoltaic modules or remove installed components.
- To avoid an electric shock or injury, do not touch the connection terminals when the module is exposed to a light source. Furthermore, take suitable caution to protect yourself from direct contact with components carrying electricity in excess of 30V.
- Handle the modules with care. At least 2 people should carry the module by its frame. Non-slip gloves must be worn during this process.
- The modules may never be carried by the connection cables or the junction box.
- To avoid the risk of an electric shock, injury or damage to the module, do not allow anything to drop on the surface of the module.
- To avoid the risk of an electric shock, fire or injuries, please ensure that all system components do not pose a mechanical or electrical threat to the module.
- Photovoltaic modules may not be installed in the vicinity of flammable gases or vapours as sparks may form.
- Never allow a module to drop.
- Never leave a module unprotected or unsecured.
- Never installed or use a damaged module.
- To avoid the threat of damage or fire, do not concentrate sunlight on a module.
- To avoid an electric shock or injuries, do not touch the connections of the junction box.
- Never modify the wiring of the bypass diodes.
- Never install modules from this product group as an integrated system in a building or above flammable construction materials.
- Never allow a counter current to flow through a module.

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CAUTION

- Only use the modules for the intended purpose.
- Never coat the front or rear surfaces of a module with paint or adhesives as this can lead to outages, functional impairments, damages or other problems.
- Never disconnect the plug connection when under load.

GENERAL SAFETY GUIDELINES

Please follow all requirements regarding approval, installation and inspection.

- Prior to the installation of the modules, please contact the appropriate authorities to determine the necessary requirements regarding installation, approval and inspection.
- It is necessary to ensure adequate stability of the construction or structure (roof, façade, etc.) to which the module is intended to be mounted.
- Special constructions or structures are necessary for proper installation of the modules on roofs.
- Modules of a different configuration may not be used within a single system.
- The structure of a roof as well as the construction of the module have an effect on the fire resistance of a building. Improper installation can potentially increase the risk of fire. Additional devices such as isolating switches, grounding conductors, and fuses, etc. may be necessary.
- Please follow the respective safety measures of the other system components.
- The product group PVP-AxxxM, PVP-AxxxP PVP-GExxxP with frame and PVP-GExxxM with frame have only the certification for roof and outdoor applications.

INSTALLATION

General Information

The following section comprises mechanical and electrical characteristics for the use of modules from PVP Photovoltaic GmbH. Please read the instructions thoroughly prior to installation or use of the modules.

- To ensure that the modules withstand all expected loads such as wind and snow loads, they must be installed firmly and securely.
- Never install damaged modules from PVP Photovoltaic GmbH.
- The use of a torque key is recommended for the installation of the modules.
- To mount the modules, the 4 mounting holes (d=9mm) provided on the frame can be used. Spring rings and washers must be used for this.
- Drilling additional holes is not allowed as this will result in the forfeiture of any warranty rights.
- Use only corrosion-resistant mounting materials.
- The module must be mounted at least at the 4 provided points or holes.

- When using clamps to mount the modules, the contact surface should be 800mm² per clamp. Mounting systems recommended by authorised expert retailers must be used for this. These must be installed as presented in the shaded area in Figure 1.
- The module may not be mounted on the short sides as the load capacity of the module of 5,400 N/m² can otherwise no longer be guaranteed.
- The installation location of the modules must be selected in such a manner that they are not positioned in the shade of other objects such as trees or buildings. It is also necessary to consider potential partial shade created by objects throughout the day.

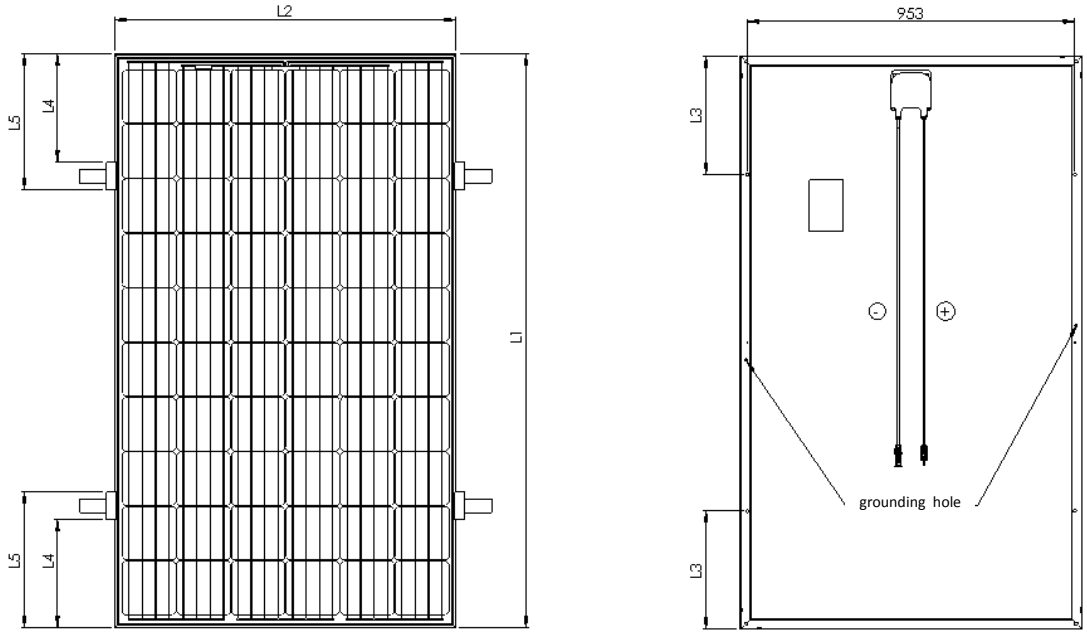

Figure 1: Attachment points for the PV module

max. load	length	module type PVP-AxxxM / PVP-AxxxM 48 cells	60 cells	72 cells
	L1 [mm]	1358	1668	1988
	L2 [mm]	994	994	994
	L3 [mm]	272	344	399
2400 N/m²	L4 [mm]	170	220	270
	L5 [mm]	355	430	510
5400 N/m²	L4 [mm]	200	260	310
	L5 [mm]	320	390	465
8000 N/m²	L4 [mm]	200	260	-
	L5 [mm]	320	390	-

Table 1: Length

max. load	length	Module type with frame PVP-GExxxP	PVP-GExxxM
	L1 [mm]	1679	1679
	L2 [mm]	992	992
8000 N/m²	L3 [mm]	340	340
2400 N/m²	L4 [mm]	230	230
	L5 [mm]	450	450
8000 N/m²	L4 [mm]	270	270
	L5 [mm]	405	405

Tabelle 2: length

Notes Regarding the Installation

- To ensure that air can circulate behind the back of the module, an open distance between the mounting surface and the frame of the module is necessary. This will allow condensation and moisture to escape.
- The modules must be installed in such a manner that air can circulate between the mounting surface and the module.
- Shade, partial shade or soil on the modules lead to a decrease of the electricity yield.

Normal Operating Conditions

PVP Photovoltaic GmbH recommends operating the modules under normal operating conditions.

Installation locations, which do not comply with normal operating conditions or which are dominated by special conditions, should be avoided. The following normal operating conditions apply for modules from PVP Photovoltaic GmbH:

- The modules are intended for terrestrial use, not for use in space or other special conditions (see below).
- The operating temperature must lie between -40°C and +85°C.
- The relative humidity must lie between 45% and 85%.
- The module is suitable for wind and snow loads of up to 8.000 N/m² (depending on type).

Special Conditions

- The installation location and operating temperatures deviate from the normal operating conditions.
- The installation location is seriously affected by harmful salts.
- Snow and hail damage is prevalent at the installation location.
- Sand and dust damage is prevalent at the installation location.
- Other special conditions, such as air pollution, acid rain, chemically aggressive vapours, soot and other contaminating factors occur at the installation location.

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Specifications

Notes Regarding the Specifications

- The specified electrical ratings were measured under standard test conditions (STC) and are subject to a measurement uncertainty of +/- 3%. The STC are: 1000W/m² of irradiance, 25°C cell temperature and a solar spectral irradiance according to IEC 60904-3.
- Under normal environmental conditions, photovoltaic modules can experience conditions that result in the production of a higher current and/or voltage as listed under standard test conditions. Accordingly, the values for short-circuit current (Isc) and open-circuit voltage (Voc) as specified on the module should be multiplied by a factor of 1.25 to determine the voltage ratings of components, the rated current of conductors, the fuse sizes and the dimensioning of the controls, which are connected to the outlet of the PV modules.
- The current outputs provided in the specifications were measured under standard test conditions. However, these conditions may not occur frequently in actual practice.

Application Class of the Module

PV modules from PVP Photovoltaic GmbH are qualified for use in the application class A. This means for: hazardous voltages (IEC 61730 greater than 50VDC, EN 61730 greater than 120V DC), systems of hazardous outputs (greater than 240W), where unlimited access is generally to be expected. For modules, which are qualified in this application class according to EN IEC 61730-1 and 2, it is assumed that they meet the requirements of protection class II.

Mechanical Load

- The modules must be mounted at the 4 specified positions as demonstrated in Figure 1 and written in table 1.
- As a result, a maximum pressure load of 8.000N/m² or 2.400N/m² is possible.

Product Fire Rating

PV modules from PVP Photovoltaic GmbH comply with the fire rating C provided by ANSI/UL790. To comply with their conditions during an installation, these must be properly mounted over a roof covering, which is fire-resistant for the application, with an elevated stand or a frame. The certification is not valid if the modules are installed in a roof or into a wall of a building.

Wiring

General Information

- All wiring may only be performed by qualified and authorised specialists.
- All wiring must be performed according to applicable electrical codes.
- To ensure personal safety and protection and to prevent damages, all wiring must be protected accordingly.
- Do not connect modules without a junction box.
- All modules connected in a series or in parallel must be of the same module category and product type.

- A maximum of modules connected in a series have to be calculated with n_{MODUL} x Voc $\leq$ $V_{MAXSYSTEM}$
- A maximum of 2 modules may be connected in parallel.
- Never combine modules from PVP Photovoltaic GmbH with modules from other manufacturers.
- To avoid the threat of an electric shock, do not disconnect and close the connections while under load.
- The size of the cables used for wiring must satisfy the respectively applicable codes for electrical devices.
- The polarity must be checked prior to connecting.
- Please ensure that appropriate measures are made to prevent unauthorised access to high voltage systems and set an appropriate over-current/surge protection.

Module Wiring

- The maximum amount of modules to be connected depends on the legal provisions, the maximum permissible amperage and nominal voltages specified on the rating plate on the module, the method of installation as well as the specifications of the additional features, such as the inverter.
- PV modules from PVP Photovoltaic GmbH are not suitable for off-grid or battery charging systems due to their operating voltage.
- PV modules from PVP Photovoltaic GmbH contain bypass diodes. The bypass diodes, the cables or the junction box can be damaged with an improper connection of the modules.

Array Wiring

Array wiring is understood as multiple modules from PVP Photovoltaic GmbH that are connected to a group on a supporting structure.

- Isolated copper wiring suitable for exterior use and capable of withstanding the maximum possible open-circuit voltage and the maximum possible short-circuit current must be used.
- You can find respective requirements in this regard under you locally-applicable regulations.

Grounding Wire

- The modules must be earthed through the provided holes on the frame of the module (see Figure 1) or in a proper manner through other electrically conductive materials, such as the supporting structure. This may only be performed by a qualified specialist.
- Please ensure that effective connections are used, such as rivets, solder, hard soldering, screw connections or welds. These must penetrate through all non-conductive layers, such as paint, anodised layers or enamel lacquer.
- The grounding wire can be mounted to the frame of the module at one of the 4mm holes designated for grounding with an acceptable nut, bolt, or screw connection or an earth terminal. M4 screws must be used for this.
- Grounding must be conducted according to IEC 61730-1.

Module Terminals

- A junction box is available for the electrical connection of the modules from PVP Photovoltaic GmbH.
- The junction boxes are equipped with a solar cable and a cross-section of 4mm² and Tyco PV4 / MC4 compatible, which must be used for the electrical connection.

Junction Box and Terminals

- Every module from PVP Photovoltaic GmbH is provided with a junction box with positive and negative polarity connections as well as bypass diodes.
- One connection terminal is available for every polarity (the polarity is visible on the housing of the junction box).

Conduit

- For the use of conduit, please adhere to the local regulations for the exterior installation of conductive wiring in conduit.
- In is necessary to ensure that all mountings are properly installed to protect the wiring from moisture and damage.
- UV-resistant cables with a minimum cross-section of 4mm² must be used.
- The heat resistance of the cables must be at least - +85°C.

Diodes

Bypass Diodes

- If the modules connected in the series are partially shaded, a reverse voltage can occur in the cells or modules as the electricity from the other cells of the same series connection necessarily flow through the partially shaded area. As a result, undesired heat may develop.
- By using a diode to bypass the shaded area, the heating as well as the reduction of electricity in the affected group is minimised.
- Every module from PVP Photovoltaic GmbH is equipped with bypass diodes during manufacturing. The diodes installed by the manufacturer provide suitable protection of the respective circuit of a system within the given system voltage so that additional bypass diodes are not necessary.

Certifications

The modules shown in table 2 are certified and meet the requirements according to IEC 61215, IEC 61730-1 and IEC 61730-2 and carry the CE marking.

Type		
48 cells	PVP-AxxxM	PVP-AxxxP
60 cells	PVP-AxxxM	PVP-AxxxP
72 cells	PVP-AxxxM	PVP-AxxxP
60 cells	PVP-GExxxM	PVP-GExxxP

Table 3: certified modules

Maintenance

- To maintain optimal output performance of the photovoltaic modules, a certain level of system maintenance is recommended.
- Contamination on the surface of the module may reduce the output.
- Cleaning the surface of the module with water and a soft cloth or sponge is recommended.
- Persistent dirt can be dissolved with a mild, non-abrasive cleaning agent.
- Inspecting the electrical and mechanical connections once a year is recommended.
- If you intend to perform electrical or mechanical inspections or maintenance, it is recommended that you commission an authorised specialist to avoid the threat of an electric shock or injuries.
- Returning modules from PVP Photovoltaic GmbH is only possible following written consent from PVP Photovoltaic GmbH.
- Within the context of ongoing product improvement and development, PVP Photovoltaic GmbH reserves the right to undertake changes to the product specifications at its discretion, without prior notice and at any time.

Module Characteristics

Electrical and mechanical characteristics are shown in the datasheets on our homepage www.pvp.co.at

