Installation and Safety Instructions IEC version

THIS DOCUMENT APPLIES TO THE FOLLOWING RECOM PHOTOVOLTAIC MODULES:

60 Cell Monocrystalline Silicon Modules
RCM-xxx-6MB (xxx=270-310)

60 Cell Polycrystalline Silicon Modules
RCM-xxx-6PB (xxx=260-280)

72 Cell Monocrystalline Silicon Modules
RCM-xxx-6MA (xxx=315-360)

72 Cell Polycrystalline Silicon Modules
RCM-xxx-6PA (xxx=310-340)

120 Cell Monocrystalline Silicon Modules
RCM-xxx-6MH (xxx=285-325)

144 Cell Monocrystalline Silicon Modules
RCM-xxx-6MH (xxx=370-390)

120 Cell Polycrystalline Silicon Modules
RCM-xxx-6MH (xxx=265-290)

144 Cell Polycrystalline Silicon Modules
RCM-xxx-6MH (xxx=320-340)

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Table of Contents

1. INTRODUCTION 3

How to use the manual 3

General guidelines 3

Handling safety 4

Installation safety 5

Fire safety 5

2. PRODUCT IDENTIFICATION 6

3. MECHANICAL INSTALLATION 6

Selecting the location 6

General installation guidelines 6

Installation method 7

Attachment guidelines 8

4. ELECTRICAL INSTALLATION 10

General installation guidelines 10

Grounding 11

5. MAINTENANCE 11

6. DISCLAIMER OF LIABILITY 12

7. DECOMMISSIONING AND RECYCLING 12

8. PRODUCT INFORMATION 13

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1.INTRODUCTION

Thank you for selecting RECOM Photovoltaic Modules. The RECOM Photovoltaic Modules are designed and manufactured to the highest quality standards. With correct installation and maintenance, RECOM modules will keep providing clean energy for many years.

How to use this manual

- This manual contains information regarding the installation and safe handling of RECOM RCM-xxx-6MB (xxx= 270-310), RCM-xxx-6PB (xxx= 260-280), RCM-xxx-6MA (xxx= 315-360), RCM-xxx-6PA (xxx= 310-340), photovoltaic modules (hereafter referred to as "modules"), manufactured by RECOM AG, hereafter referred to as "RECOM".
- Installers must read and understand this guide prior to installation. For any questions, please contact our Global Quality & Customer Support department for further information. Installers should follow all safety precautions described in this guide as well as local codes when installing a module.
- Before installing a solar photovoltaic system, installers should familiarize themselves with its mechanical and electrical requirements. Keep this guide in a safe place for future reference (operation and maintenance) and in case of sale or disposal of the modules.

General Guidelines

- Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should only be performed by qualified persons.
- Installers should assume all risks of injury that might occur during installation, including, but not limited to, the risk of electric shock.
- One single module may generate more than 30V DC when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
- Our module application class is class A, modules rated for use in this application class may be used in systems operating at greater than 50V DC or 240W, where general contact access is anticipated.
- Do not disconnect under load.
- Photovoltaic solar modules convert light energy to direct current electrical energy. They are designed for outdoor use. Modules can be ground mounted, mounted on rooftops, vehicles or boats. The proper design of support structures lies within responsibility of the system designers and installers.

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- Do not use mirrors or other magnifiers to concentrate sunlight onto the modules. Artificially concentrated light shall not be directed on the modules.
- When installing the system, abide to all local, regional and national statutory regulations. Obtain a building permit if necessary.
- Under standard test conditions, the electrical characteristics are within ±10 percent of the indicated values of Isc and Voc (irradiance of 1000W/cm², AM 1.5 spectrum, cell temperature 25°C).
- Only use equipment, connectors, wiring and support frames suitable for solar electric systems.

Handling Safety

- Do not lift the module by grasping the module's junction box or electrical leads.
- Do not stand or step on the module.
- Do not drop the module or allow objects to fall on the module.
- To avoid glass breakage, do not place any heavy objects on the module.
- Be cautious when setting the module down on to a surface.
- Inappropriate transport and installation may break the module.
- Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules.
- Do not apply paint or adhesive to the module top surface.
- To avoid damage to the backsheet, do not scratch or hit the backsheet.
- Do not drill holes in the frame. This may compromise the frame strength and cause corrosion of the frame.
- Do not scratch the anodized coating of the frame (except for grounding connection). It may cause corrosion of the frame or compromise the frame strength.
- Be careful when setting the panel down onto a surface, particularly when placing it on a corner.
- A panel with broken glass or torn backsheet cannot be repaired and must not be used since contact with any panel surface or the frame can cause an electric shock.
- Work only under dry conditions, and use only dry tools. Do not handle panels when they are wet unless wearing appropriate protective equipment.
- When storing uninstalled panels outdoors for any period of time, always cover the panels and ensure that the glass faces upwards to stop water from collecting inside the panel and causing damage to exposed connectors.

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Installation Safety

- Never open electrical connections or unplug connectors while the circuit is under load.
- Contact with electrically charged parts of the panels, such as terminals, can result in burns, sparks and lethal shock whether or not the panel is connected.
- Do not touch the PV module unnecessarily during installation. The glass surface and the frame may be hot; there is a risk of burns and electric shock.
- Do not work in the rain, snow or in windy conditions.
- Avoid exposing cables to direct sunlight in order to prevent their degradation.
- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Completely cover the module with an opaque material during installation to prevent electricity from being generated.
- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic objects while installing or troubleshooting photovoltaic systems.
- Use only insulated tools that are approved for working on electrical installations.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charging regulators, inverters, storage batteries, rechargeable batteries, etc.
- Only use connectors to connect modules to form a string, or connect to another device. Removing the module connectors will render the warranty void.

Fire Safety

- Consult your local authority for guidelines and requirements for building or structural fire safety.
- Roof constructions and installations may affect the fire safety of a building; improper installation may create hazards in the event of a fire.
- Use components such as ground fault circuit breakers and fuses as required by local authority.
- Do not use panels near equipment or in places where flammable gases may be generated.
- The modules have been rated Fire Class C, and are suitable for mounting onto a fire retardant roof covering rated for the application at a minimum distance of 10 cm from the panel to the roof plane.

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2.PRODUCT IDENTIFICATION

Each module has label providing the following information:

Nameplate label: describes the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current, (all as measured under standard test conditions), weight, dimensions and the maximum system voltage of 1,000 volts DC. The nameplate is attached on the backsheet of the module.

3. MECHANICAL INSTALLATION

Selecting the location

- Select a suitable location for installing the modules.
- The modules should be facing south in northern latitudes and north in southern latitudes.
- For detailed information on the best installation angle, refer to standard solar photovoltaic installation guides or consult a reputable solar installer or systems integrator.
- The module should not be continuously shaded.
- Do not install modules near equipment or in locations where flammable gases may be generated or collected.
- Do not install modules under water or in continuous contact with water.
- Do not install modules in locations where they may be exposed to sulfur or harmful, corrosive chemicals.
- Do not install modules in environments with excessive dust, sand, salt mist or pollution.

General Installation Guidelines

- The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material.
- In regions with heavy snowfall in winter, select the height of the mounting system so that the lowest edge of the module is not covered by snow for any length of time.
- In addition, ensure that the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by flying sand.
- The modules must be securely attached to the mounting structure.
- Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof plane and the frame of the module is generally recommended.
- Always observe the instructions and safety precautions included with the module support frames.
- Do not attempt to drill holes in the glass surface of the modules as this will void the warranty.

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- Do not drill additional mounting holes in the frames of the modules as this will void the warranty.
- Before installing modules on a roof, ensure that the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.
- When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated winds for the area.
- Dust building up on the surface of the module can impair module performance.
- RECOM recommends installing the modules with a tilt angle of at least 10 degrees, making it easier for dust to be washed off by rain.
- Observe the linear thermal expansion of the module frames (the recommended minimum distance
- between two modules 2 cm).
- Always keep the backsheet of the module free from foreign objects or structural elements, which could come into contact with the panel, especially when the module is under mechanical load.
- Ensure modules are not subjected to wind or snow loads exceeding the maximum permissible loads, and are not subject to excessive forces due to the thermal expansion of the support structures. See the following sections for more detailed information.

Installation Methods

- The module must always be mounted in the manner specified in these instructions.
- The modules can be installed on the frame using mounting holes, clamps or an insertion system. The modules must be installed according to the following examples. Not mounting the modules according to these instructions will void the warranty.
- The modules can be installed in both landscape and portrait modes.
- The modules must be properly secured to their support so that they can withstand live load conditions, including wind uplift or snow load, to the pressure they have been certified for. It is the installer's responsibility to ensure that the clamps used to secure the modules are strong enough and are made of corrosion-resistant materials.
- Be sure that the clamps overlap the module frame by at least 9mm and that they do not bend or distort the frame.
- The module clamps must not come into contact with the front glass or deform the frame in any way. Avoid shading effects from the module clamps and insertion systems. Drainage holes in the module frame must not be closed or obscured by the clamps.

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Attachment Guidelines

Select the proper installation method depending on the mounting method and the load (See Fig. 1 for more detailed information).

1 Mounting holes

Secure the module to the frame structure using the module mounting holes. A set of one stainless steel M6 bolt, one nut, two washers and two lock washers is recommended for each hole. Refer to Fig. 1 for location of holes.

2 Clamps

The module may be fastened to the support frame by using clamps on the long or short side of the module frame. Refer to Fig. 1 for instructions.

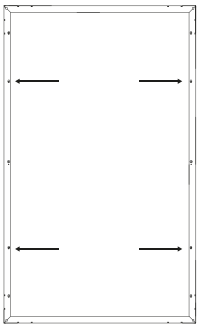
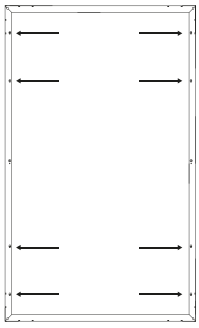
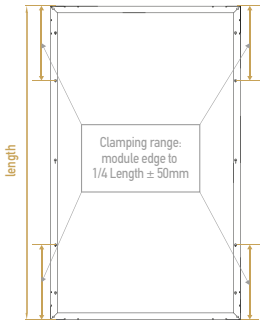
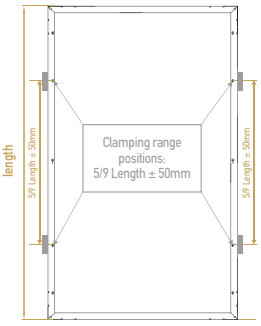
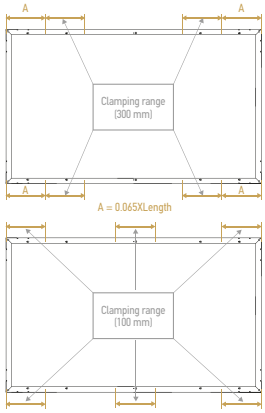
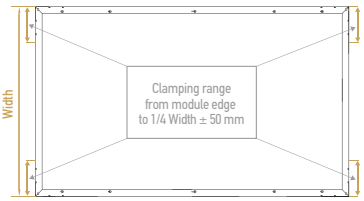
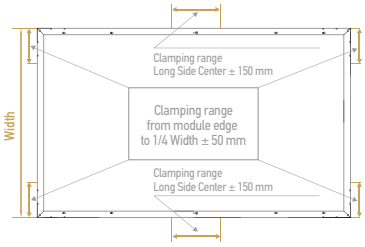
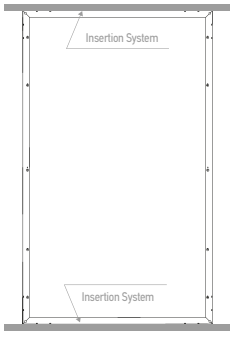
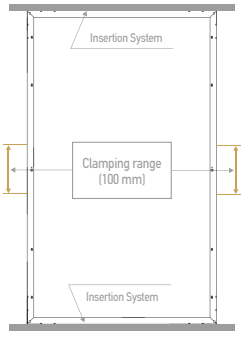
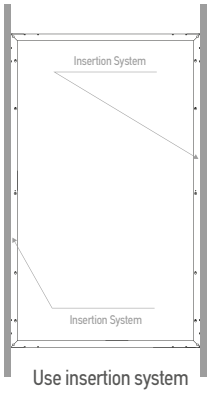
3 Insertion system

The module may be mounted on the support by using an appropriate insertion system with or without additional clamps. The insertion system may fasten the long or the short side of the module frame. Refer to Fig. 1 for instructions.

- The design load is 2,400 Pascal (Pa) for wind uplift and up to 5,400 Pascal (Pa) for snow (static) load.
- Refer to Fig. 1 for the static design loads of each mounting configuration. The installation methods applicable for 5,400 Pa are also valid for 3,800 Pa and 2,400 Pa. The installation methods applicable for 3,800 Pa are also valid for 2,400 Pa.

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Figure 1.

	2,400 Pa Load (50lb/ft²)	3,800 Pa Load (80lb/ft²)	5,400 Pa Load (113lb/ft²)
Mounting holes system		 Use 4 mounting holes	 Use 8 mounting holes
Clamping System (attachement to the long side of the frame)	 Use 4 clamps	 Use 4 clamps	
Clamping System (to the short side of the frame)	 Use 4 clamps on short side		 Use 4 clamps on short side and 2 clamps at the center of each long side of the frame
Insertion System	 Use insertion system on short side		 Use insertion system on short side and 2 clamps at the center of each long side  Use insertion system on long sides

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4. ELECTRICAL INSTALLATION

General Installation Guidelines

- Any hardware used must be compatible with the mounting structure material to avoid galvanic corrosion.
- It is not recommended to use modules with different configurations (grounding, wiring) in the same system.
- For applications requiring a high operating voltage several modules can be connected in series to form a string of modules. The system voltage is then equal to the sum of the voltage of each module.
- For applications requiring high operating currents several strings of modules can be connected in parallel; the system current is then equal to the sum of the current of each string of modules.
- The maximum number of series connected modules depends on system design, the type of inverter used and environmental conditions. The number of modules connected to an inverter should be within the inverter voltage limits and operating range. Do not exceed the maximum system voltage permitted by the manufacturer. Do not exceed the maximum system voltage of 1,000V.
- There is no limitation on the number of modules that can be connected in parallel; the number of modules is determined by system design parameters such as current or power output.
- In the case of parallel connection a protection against excessive reverse currents must be installed. The maximum allowed reverse current is 15A and the maximum series fuse rating is 15A.
- 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 ampacities, fuse sizes, and size of controls connected to the PV output.
- All relevant electrical installation codes and regulations should be observed for regulations on working at heights and fall protection.
- To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current. For field connections, use minimum 4mm² copper wires insulated for an operating temperature of 85°C. Use connectors with an operating temperature of 105°C.
- The module junction box is rated IP67. Our modules are supplied with connectors to be used for system electrical connections.
- All connectors and cables must be securely fastened. They must also have UV resistance and approval for outside use. Secure cables using UV-resistant cable ties or other UV-resistant devices. Loose cables must be protected from abrasion, sharp objects, animals etc. Avoid exposing cables as far as possible to direct sunlight and permanent tension.

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- The DC current generated by photovoltaic systems can be converted into AC and fed into a public grid. As local utilities' policies on connecting renewable energy systems to their grids vary from region to region, a qualified system designer or integrator should always be consulted. Building permits, inspections and approvals by the local utility are generally required.

Grounding

- All module frames and mounting racks must be properly grounded. All work must be carried by authorized installers in conformance to State and local codes and electricity standards.
- Proper grounding is achieved by bonding the module frame and all metallic structural members together continuously using a suitable grounding conductor. Grounding conductor 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.
- RECOM modules can be installed with the use of third party grounding devices for grounding the frames of PV modules. The devices have to be installed in accordance with the grounding device manufacturer's specified instructions.
- Attach the grounding conductor at one of the two designated grounding holes (see Product Information) on the module frame.
- To avoid galvanic corrosion, use preferably stainless steel fastening materials.
- To avoid electrical shock, ground the frame of the module or array before wiring the system.

5. MAINTENANCE

- To ensure optimum module performance, RECOM recommends the following maintenance measures:
- Clean the glass surface of the module when required. If dirt is allowed to accumulate, it will reduce power output or even cause further damage. Always use clean, soft water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent may be used to remove stubborn dirt. Do not use high pressure hoses, they may damage the module. Clean the modules in the early morning to avoid thermal shock and damage. Never attempt to clean broken modules.
- Check the electrical, grounding and mechanical connections every six months to verify that they are clean, secure, undamaged and free of corrosion.
- If any problem arises, consult a professional for suggestions.
- Caution: observe the maintenance instructions for all components used in the system, such as support frames, charging regulators, inverters, batteries etc.

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6. DISCLAIMER OF LIABILITY

- As the adherence to this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) products are beyond RECOM's control, RECOM does not accept responsibility and expressly disclaims liability for any loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.
- No responsibility is assumed by RECOM for any infringement of patents or other rights of third parties, which may result from the use of the PV product. No license is granted by implication or otherwise under any patent or patent rights.
- The information in this manual is based on RECOM's best knowledge and experience and is believed to be reliable; but such information including product specification (without limitations) and suggestions do not constitute a warranty, express or implied. RECOM reserves the right to change the manual, the PV product, the specifications, or product information sheets without prior notice.

7. DECOMMISSIONING AND RECYCLING

- The dismantling of PV systems must be performed with the same care and safety precautions used during the initial installation. The PV system can generate hazardous voltage even after the system has been disconnected. Follow safety regulations for working with live electrical equipment.
- RECOM is a member of PV Cycle, the European association for voluntary take back and recycling of PV modules. Please contact PV Cycle at www.pvcycle.org for details regarding the recycling process.

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8.PRODUCT INFORMATION

Structural Drawings

Can be provided upon request at **technical@recom-solar.com** or through the appointed account manager, along with the order number i.e. invoice number and/or any further needed information.

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