ENERGIZING LIFE TOGETHER

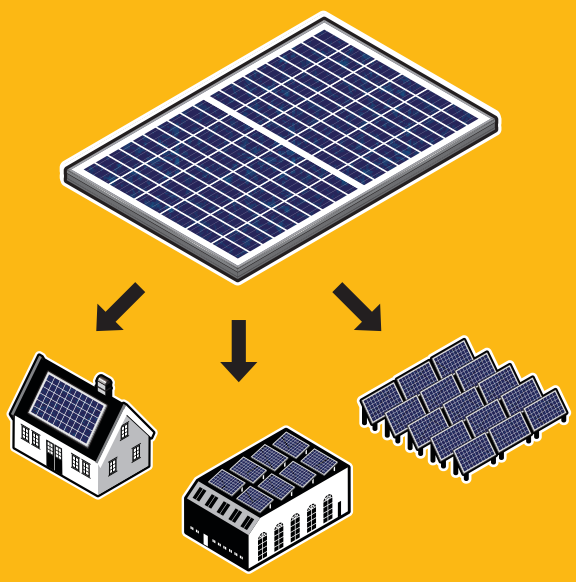
REC

INSTALLATION MANUAL

REC TWINPEAK SERIES

For the installation of REC TwinPeak Series solar panels certified according to IEC 61215 / 61730:

- REC TwinPeak Series
- REC TwinPeak BLK Series
- REC TwinPeak BLK2 Series
- REC TwinPeak IQ Series
- REC TwinPeak 2 Series
- REC TwinPeak 2 BLK Series
- REC TwinPeak 2 BLK Series
- REC TwinPeak 2 IQ Series



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Caution: Only qualified personnel should perform work on photovoltaic systems such as installation, commissioning, maintenance and repairs. Be sure to follow the safety instructions for all system components. Ensure relevant local codes and regulations for health and safety and accident prevention are observed.

INTRODUCTION

Thank you for choosing REC photovoltaic panels. REC TwinPeak solar panels are ideal for delivering long-lasting and reliable power output. The panels have been created through intelligent design and are manufactured to the highest quality and environmental standards. With correct installation and maintenance, REC panels will provide clean, renewable energy for many years.

Please read this entire manual carefully. It contains critical information on safety, as well as detailed instructions for installation, operation and maintenance of this panel. Failure to follow the procedures contained within will invalidate the warranty (available to download from our website). Review all instructions and safety notes before working on the system. Failure to do so may lead to injury or damage to property.

HOW TO USE THIS MANUAL

This installation manual describes the procedures for mounting all REC TwinPeak solar panels in a photovoltaic array (certified according to IEC 61215 and IEC 61730 standards), including REC TwinPeak panels with a black backsheet and/or a black frame, and REC TwinPeak 2 Series panels from hereon all referred to as REC TwinPeak panels; see annex at rear for specific instructions for installing REC TwinPeak IQ Series panels. The drawings within refer to all frame, backsheet and cell color types and are meant to be a generic representation of the instructions detailed in the text regardless of the color depicted. Review this entire manual before commencing installation of the panels and ensure you are working from the latest version. Throughout the manual, you will see icons which highlight important information or notes:

Indicates potential for damage to the array or property or personal safety.

Indicates important notes on best practice to help with the installation.

For further information on installation procedures, please call your panel distributor or contact your local REC Solar office. Details can be found at www.recgroup.com.

YOUR RESPONSIBILITY AS AN INSTALLER

Installers are responsible for the safe and effective installation and operation of the photovoltaic system and for adhering to all local and national standards and regulations. Prior to installation, check all applicable regulations and permits concerning solar systems and ensure all local directives are observed.

- Ensure the REC panels are in a suitable condition for use and appropriate for the particular installation and environment
- Use only parts that comply with the specifications set out in this manual
- Ensure a safe installation of all aspects of the electrical array

All equipment should be properly maintained and inspected prior to use.

SUPPORT

Do not attempt to install REC TwinPeak Series solar panels when you are unsure of the procedure or suitability. For questions or guidance with your installation, please call your distributor or contact your REC sales office, which can be found at: www.recgroup.com/en/contacts.

LIABILITY DISCLAIMER

REC SOLAR PTE. LTD. accepts no liability for the usability and functionality of its photovoltaic panels if the instructions in this guide are not observed. Since compliance with this guide and the conditions and methods of installation, operation, use and maintenance of the panels are not checked or monitored by REC SOLAR PTE. LTD., REC SOLAR PTE. LTD. accepts no liability for damage arising from improper application or incorrect installation, operation or maintenance. This does not apply to damages due to a panel fault, in cases of loss of life, bodily injury or damage to health or in the event of a grossly negligent breach of obligations on the part of REC SOLAR PTE. LTD. and/or in the event of an intentional or grossly negligent breach of obligations by a legal representative or vicarious agent. REC reserves the right to make changes or amendments to this manual at any time, without prior notice.

This document may be produced in different languages. If there is any conflict, the English language version shall be definitive.

LIMITED WARRANTY

The REC Limited Warranty is available to download from www.recgroup.com. Ignoring the instructions in this manual may be classed as improper installation or use and invalidate the Warranty. If you have any questions about installation and the Warranty validity, please contact REC's technical support.

ELECTRICAL INSTALLATION

ELECTRICAL REQUIREMENTS

i) Application Class

REC TwinPeak panels are rated for use in electrical application class A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: higher than 120 V), hazardous power applications (higher than 240 W) where general contact access is anticipated (panels qualified for safety through EN IEC 61730-1 and -2 within this application class are considered to meet the requirements for Safety Class II).

ii) System Requirements

REC TwinPeak panels are only for use where they meet the specific technical requirements of the complete system. Ensure other components will not cause mechanical or electrical damage to the panels. Only panels of the same type and power class should be connected.

iii) String configuration

When using string configuration, plan and execute it according to inverter manufacturer's instructions. The number of panels connected to an inverter must be within the inverter voltage limits and operating range. Do not exceed the total system voltage permitted by the manufacturer, nor under any circumstance exceed the maximum system voltage of 1000 V. The maximum system fuse rating is 25 A, the maximum reverse current is 25 A.

iv) String connection

Panels connected in series must have the same amp rating. The maximum number of panels that can be connected in series depends upon system design, type of inverter and environmental conditions. There are no restrictions on the number of panels that may be connected in parallel. Panel configuration must correspond to the specifications of other system components e.g., inverter. Refer to the reverse current rating of the panel (indicated in the Technical Characteristics section to the rear of this manual or on the panel datasheet).

v) Wiring layout

To minimize voltage surges (e.g., indirect lightning strikes), cables of the same string must be bundled together so loops are as small as possible. String configurations must be checked before commissioning. If open circuit voltage (V_{OC}) and short circuit current (I_{SC}) deviate from specification, this may indicate a configuration fault. Correct DC polarity must be observed at all times.

vi) Electrical Ratings

Electrical ratings are within 3% of measured values at Standard Test Conditions (STC). Allow for increased panel output as a result of conditions different to STC by multiplying the I_{SC} and V_{OC} values by a factor of 1.25 (or according to local regulations for electrical system installation).

SAFETY MEASURES

All relevant codes and regulations should be referred to and observed as well as regulations on working at heights and fall protection.

i) Safety in the working area

Installation of REC TwinPeak panels may involve rooftop work. Ensure all local regulations regarding working at heights are followed. Before beginning work on a photovoltaic system, ensure all working surfaces are structurally sound and capable of bearing the weight of employees and required equipment. Remember to isolate the system from the grid before carrying out any maintenance or repair work.

ii) Preventing current generation

To prevent the panels automatically generating current (electricity) when exposed to light, shield the system with a non-transparent cover during installation, maintenance or repair work.

iii) Specific hazards of DC electricity

Solar panels generate direct current (DC). Once current is flowing, breaking or opening a connection (e.g., disconnecting two panels) can cause an electrical arc. Unlike low voltage AC wiring, DC arcs are not self-extinguishing. They are potentially lethal burn and fire hazards:

- Follow panel and inverter manufacturers' installation, handling and operating instructions.
- Remove/open the inverter AC fuse/circuit breaker before disconnecting from the public grid.
- Switch off or disconnect the inverter and wait for the time specified by the manufacturer before commencing work. High-voltage components need sufficient time to discharge.

iv) Safety requirements

The voltage produced by a single panel and panels connected in series (voltages added together) or in parallel (currents added together) can be dangerous. Although the fully insulated plug contacts on the panel's output cables provide touch-safe protection, the following points must be observed during handling to avoid the risk of sparking, fire hazards, burns and lethal electric shocks.

- Exercise extreme caution when wiring panels and look out for damaged or dirty cables etc.
- Never insert metallic or other conductive objects into plugs or sockets.
- Ensure that all electrical connections are completely dry before assembly.
- Keep all materials, tools and working conditions dry and tidy.
- Use appropriate safety equipment e.g., non-slip footwear, insulated gloves and insulated tools.
- Solar panels produce current when exposed to sunlight. Do not connect the system to the inverter during solar exposure.

MECHANICAL INSTALLATION

FIRE GUIDELINES

REC TwinPeak panels have a Class C fire classification. Utilize the following fire safety guidelines when installing REC TwinPeak panels:

- Check with local authorities for fire safety guidelines and requirements for any building or structure on to which the panels will be installed.
- The system design must ensure that it can be easily accessed in the event of a building fire.
- Check with local authorities for applicable regulations concerning setbacks or other placement restrictions that may apply for roof-mounted arrays.
- The use of DC ground fault interrupters is recommended. This may also be required by local and national codes.
- All electrical appliances are a fire risk. The panel must therefore be mounted over a fire retardant roof covering rated for the application and a distance of 60 mm between the panel and the mounting surface, allowing free circulation of air beneath the panels must be respected at all times.

ORIENTATION

To maximize system output, panels should be installed at the optimum orientation and tilt angle. The specifics of this depend on location and can be calculated by a qualified system designer.

Dependent on local conditions, a lower angle of installation will potentially increase the requirement for regular cleaning.

The optimal mounting position of panels results in the sun's rays falling perpendicular (i.e., at 90°) to the surface. All panels in a string should, wherever possible, have the same orientation and tilt to ensure the system does not underperform due to mismatched outputs.

The panels should not be exposed to artificially concentrated light.

ENVIRONMENTAL FACTORS

REC TwinPeak panels are designed to provide decades of durable and stable output. Ambient operating temperatures must be between -40 and +85°C.

The panels are not suitable for installation in potentially hazardous locations nor should they be installed in the following locations:

- Near sources of flammable gases or vapors e.g., gas stations, gas containers or spray paint facilities.
- Near open flames.
- Under water or in water features.
- Where exposed to sulfur e.g., near sulfur springs or volcanoes.
- Where the panels may be exposed to harmful chemicals.

Ensure panels are not exposed to direct contact with salt water/spray and avoid installation in areas subject to high salt mist content.

For installations on water e.g., floating pontoons, see Annex 1 at the rear of this manual.

PANEL HANDLING

To avoid damage to the solar cells and other components, all solar panels should be handled with care and protected from damage at all times. All warnings and instructions on the packaging should be observed. Follow these guidelines when unpacking, transporting or storing panels:

- Record the serial numbers prior to installation and note the information in the system documentation.
- Carry the panels using both hands and do not use the junction box as a grip.
- Do not allow the panels to sag or bow under their own weight when being carried.
- Do not subject the panels to loads or stresses, e.g., leaning on them or through the placing of weight on them.
- Do not stand on the panels.
- Avoid dropping the panels as any damage caused may be unseen.
- Keep all electrical contacts clean and dry.
- Store panels in a dry and properly ventilated room.
- Do not apply force to the backsheet.
- Avoid using sharp or pointed objects if panels require marking.
- Never apply paints, adhesives or detergents to the back of the laminate.
- Do not use any solar panel that is damaged or been tampered with.
- Never attempt to disassemble, modify or adapt the panels or labels in any way as this will void the warranty.

Do not use a panel which is broken or damaged. If the panel front glass is broken or laminate back sheet is damaged, it can expose personnel to hazardous voltages.

MOUNTING THE PANELS

REC TwinPeak panels are designed for capturing solar radiation and are not suitable for installation as overhead or vertical glazing. The junction box on the rear of the panel is protected to IP67 and allows panels to be mounted in any orientation.

The panels must be installed so that the cells are not shaded as this will drastically reduce electrical output. If partial shading is inevitable at certain times of the day or year, it must be kept to an absolute minimum.

There are different options for securing an REC TwinPeak panel, depending on the design load of the array. Ensure the mounting structure design can withstand anticipated wind and snow loads. Mounting hardware is not supplied by REC. Follow the mounting hardware manufacturer's instructions and recommendations at all times.

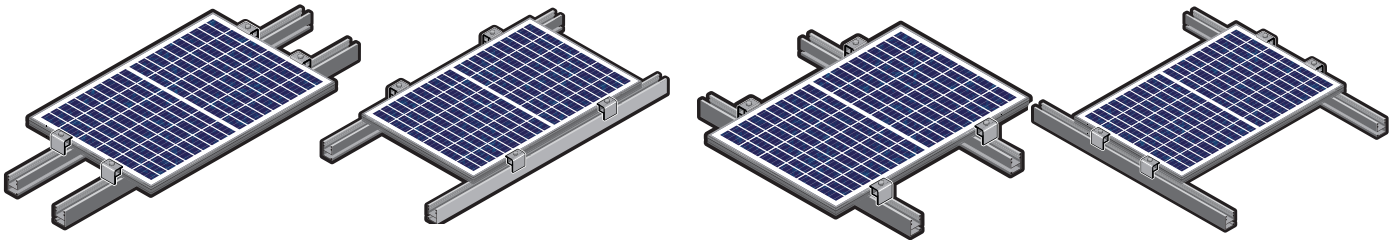
Remove any labels or stickers that may be on the front of the panels (where applicable) and ensure no residue is left on the glass.

Ensuring sufficient airflow and adequate cooling of the panels can help improve performance. There must be a minimum distance of 60 mm between the uppermost part of the roof and the lowest part of the panel.

RAIL SPECIFICATIONS

REC TwinPeak panels are typically installed on a rail-based mounting system. If using mounting rails, ensure they run under the frame or parallel to the frame (fig 1), directly under the clamping zones (fig 4).

Fig. 1: Rail positioning examples:



(a) rails parallel to the long side

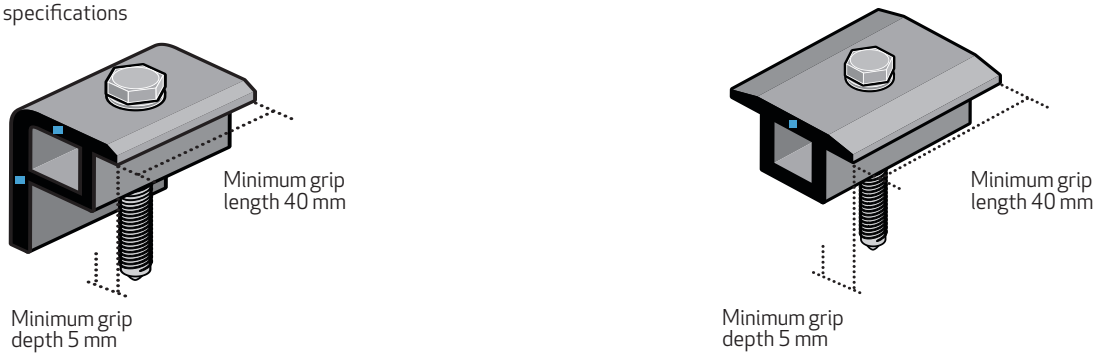
(b) rails parallel to the short side

The overlap between the support rail and the outer edge of the frame must be a minimum of 6 mm.

CLAMP SPECIFICATION

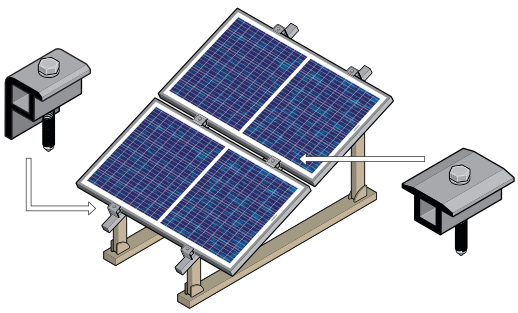
Ensure the clamps used are suitable for the planned installation and expected system design loads.

Fig. 2: Clamp specifications



- Minimum grip length of 40 mm, minimum grip depth of 5 mm (fig. 2). The grip must not overlap the panel frame and cause shading.
- The panel must be clamped by a minimum of two clamps per side (four clamping points per panel) (fig 3).
- Use appropriate bolted connections as per clamp manufacturer's instructions.
- Follow the clamp manufacturer's recommended applied torque to fasten the clamps.

Fig. 3: Panels secured at four points.



In areas of snow build-up, panels can be subjected to forces in excess of the stated limit even when snow depth does not appear extreme, causing damage to the framework. If the installation is likely to be affected by this, further suitable panel support is recommended on the lower row of panels.

CLAMP MOUNTING POSITIONS

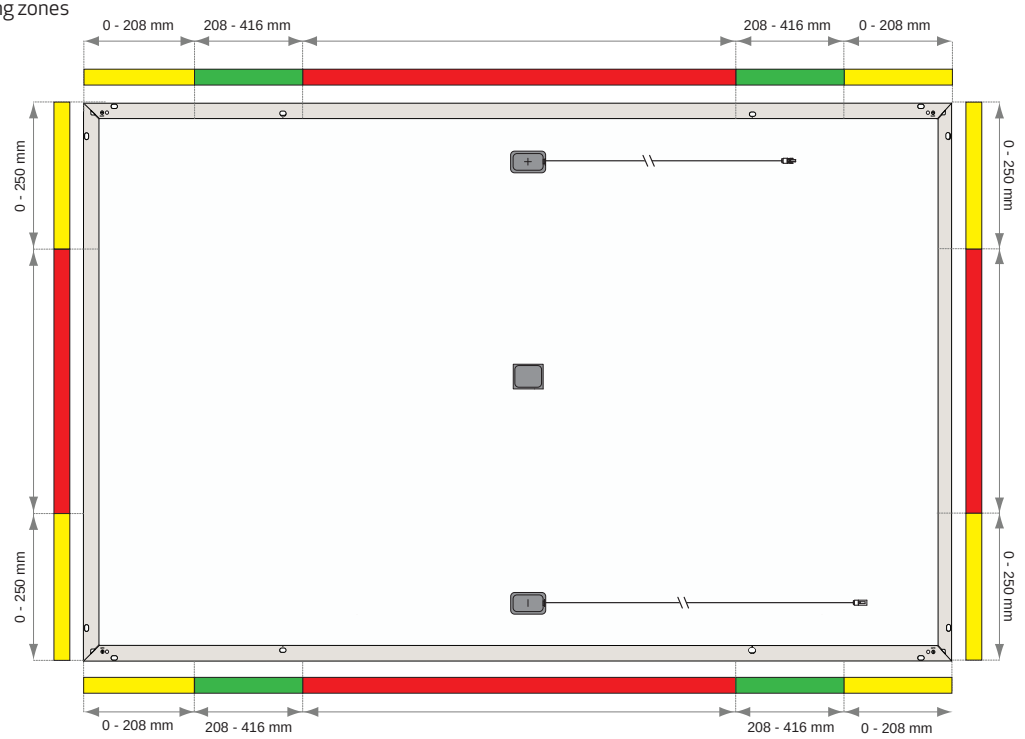
REC TwinPeak panels can be fixed on both the long and the short side of the panel within the constraints shown in fig. 4. The panels are built to withstand a downward force of up to 5400 Pa (550 kg/m²) or 2400 Pa (244 kg/m²) according to where they are clamped. Site-specific loads such as wind or snow which may exert forces in a different way need to be taken into consideration to ensure this limit is not exceeded for each respective mounting option.

Clamping within the green zone (208 - 416 mm) is certified for design loads up to 5400 Pa (550 kg/m²)

Clamping within the yellow zone (0 - 208 mm long side, 250 mm short side) is certified for design loads up to 2400 Pa (244 kg/m²)

Clamping within the red zone is not permitted (> 416 mm long side, > 250 mm short side).

Fig. 4: Clamping zones



A minimum of four clamps must be fully located in the same colored zone to be certified to that value. If the panel is secured by four clamps in two different zones (i.e., green and yellow), it is certified to the lowest value only.

MOUNTING HOLES

REC TwinPeak panels can be secured to the mounting structure using the mounting holes found on the underside of the frame (6.6 x 11 mm, spaced 450 mm from the midpoint of the long side) (fig. 5). The panels can withstand a downward force of up to 5400 Pa (550 kg/m²) when secured using the mounting holes. Bolts of size 6 mm secured with 6 mm locking nuts with a flange should be used to secure the frame to the mounting structure (fig. 6). Observe the following procedures when using mounting holes:

- The mounting construction should be of aluminium or galvanized steel to avoid galvanic corrosion and be appropriate for the local environment.
- Additional electrical bonding to Ground is required for the support structure (see Grounding).
- All four mounting holes in the frame must be used.
- Tighten fastenings using a torque wrench according to the understructure manufacturer's instructions.

The product warranty will be voided if additional holes are made in the frame. All fixing and fastening materials must be corrosion resistant.

Fig. 5: Mounting holes

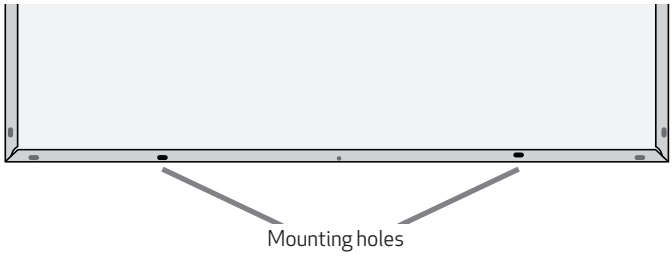
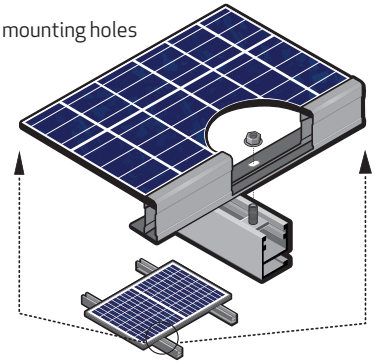


Fig. 6: Mounting using mounting holes



SLIDE-IN SYSTEMS

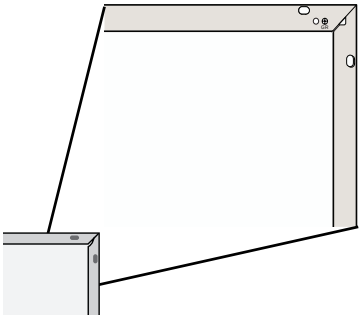
REC TwinPeak panels may also be installed using slide-in systems. Such mounting systems must meet the same specifications regarding grip lengths and depths as clamps and be able to withstand the correct load pressures. When installing with slide-in systems, the drainage holes (fig. 7) must not be covered. For any questions regarding installation on such systems, please contact REC directly.

DRAINAGE HOLES

Each corner of the panel frame has small drainage holes (fig. 7) to allow water caused by rain or snow melt to exit the frame easily and to minimize damage caused by freezing and thawing. These must not be used for mounting the panel.

Ensure the drainage holes are not covered by the mounting structure.

Fig. 7: Drainage holes

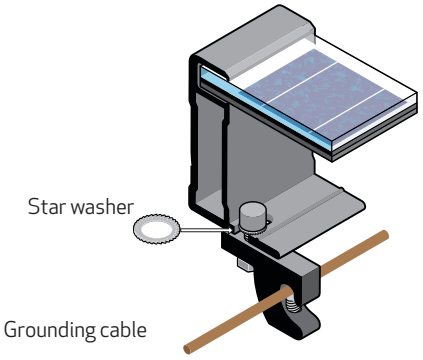


GROUNDING

Local regulations may require grounding of the panels. Check all applicable requirements before beginning installation. Where grounding is necessary, it must be done using an electrical connection from the panel frame:

- Suitable grounding lugs must be used.
- Grounding cable size should be between 2.1 mm² - 21.2 mm².
- Attach grounds to the grounding holes in the panel frames.
- Fix lug to the frame using a star washer and lock nut, ensuring a conductive connection (fig. 8).
- Place the star washer between the frame and the nut, using a 5 mm diameter stainless steel bolt and locking nut to mount the lug to the panel frame and tighten according to the manufacturer's recommended torque.

Fig. 8: Recommended grounding



Grounding dimensions and wire fastening torque:

Cross section [mm²]	Type	Torque [Nm]
13.3 - 21.2	Stranded	3.9
8.4	Stranded	3.4
2.1 - 5.3	Stranded / Solid	2.8

To avoid galvanic corrosion, stainless steel fastening materials are preferred, however galvanized or hot dipped zinc plated fasteners are equally suitable.

Negative grounding of the modules is not required.

CONNECTIONS AND CONNECTORS

The connectors on REC TwinPeak panels are rated IP67 only when connected. All connectors and cables must be secure and tight as well as electrically and mechanically sound. UV-resistant cables and connectors approved for outdoor use must be used. Conductor gauge must be chosen to ensure DC power losses (voltage drop) are kept to a minimum (<1%).

Observe all local regulations when selecting cables. For string connections, use minimum 4 mm^2 or copper wires insulated for a maximum operating temperature of 90°C. Secure cables using UV-resistant cable ties or other device. Loose and unsecured cables must be protected from damage (e.g., mechanical, abrasion, sharp objects, animals). Avoid exposing cables to direct sunlight and permanent tension.

In order to ensure durable and safe connections between panels and BOS equipment, the following instructions must be followed in order to protect the electrical connections from the elements. More detailed information is given in the Guide to Best Practice - Connections and Connectors which can be found via the REC online Download Center (www.recgroup.com/downloads).

Safety is paramount when working with electrical connectors. Ensure that any installation work is not carried out on live or load-carrying parts. Connections must not be disconnected under load and the system must be isolated from the grid before carrying out any maintenance or repair work.

CONNECTORS

To ensure connector compatibility and reduce the potential for damage to the solar modules and wider installation, REC recommends that mated connectors are from the same manufacturer and of the same connector type. REC factory installed connectors are of the 'MC4 type' design. This means that REC only permits the mating of factory-installed connectors to connectors of the same manufacturer and type and to Multi-Contact MC4 connectors.

Some countries and/or regions have specific regulations regarding the mating of connectors. Installers are responsible for ensuring the compliancy of the system with such local regulations.

REC factory installed connectors are of the 'MC4 type' design. This means that REC only permits the mating of factory-installed connectors to connectors of the same manufacturer and type and to Multi-Contact MC4 connectors.

Excepting the replacement of a factory-installed connector with a third brand of connector to ensure a 'like-for-like' connection, the REC warranty will be voided by any modification to the cable and/or connector. The connector replacement procedure must be carried out correctly and according to the replacement connector manufacturer's instructions. The selected third-brand connectors must also fulfil all relevant technical specifications and be certified according to applicable standards (e.g., IEC 50521 and IEC 62852) so as to ensure they are fit for purpose and safety. The REC warranty does not extend to cover the replacement connectors.

- The secure connection of connectors is identified by a firm click once inserted.
- The use of any chemicals or lubricants on the connectors or contacts must be carried out in line with the connector manufacturer's instructions.

Any other modification to the panel is prohibited, including the opening of the junction box, unless explicitly authorized by REC. Doing so will invalidate the warranty.

PROTECTING THE CABLES

- To prevent stress on the junction box casing, ensure the cable exits the junction box in a straight line before any bend in the cable.
- The cables on REC TwinPeak panels have a minimum bending radius of 30 mm to avoid damage to the insulation (fig. 9).

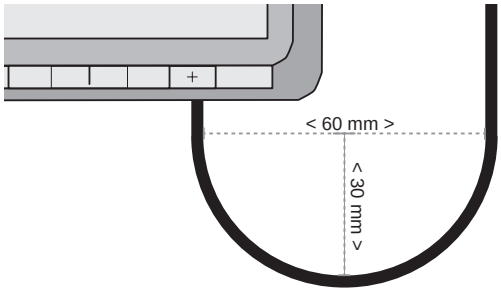


Fig. 9: Minimum bend radius of 30 mm and cable exiting the junction box

- Ensure cables do not hang loose where they may be damaged through friction or stress, e.g., caused by wind or grazing animals.
- Shield connectors from falling or dropping water by locating them directly beneath a panel.
- Cables must be firmly secured to the structure, without over-tightening, as this can deform the cable insulation.

SECURING CABLES AND CONNECTORS

- When securing the connector, place it away from the mounting structure with sufficient air circulation all around. This allows the connector to dry effectively and avoids the risk of damage or degradation of the connection.
- Good practice is to secure the cable either side of the connectors, ensuring no stress is exerted on the connector casing or cable entry.

To enable correct cooling and drying of the connectors, do not add extra protection to the connector, e.g., heat shrink, grease or tape.

MAINTENANCE

CLEANING INSTRUCTIONS

REC TwinPeak solar panels have been designed for easy maintenance. Normal rainfall will naturally clean the panels if installed at a sufficient angle. The need for cleaning will vary dependent on location, rainfall, pollution and angle of installation – the lower the angle of installation, the more cleaning will be required. To optimize electrical output it is recommended to clean the panels when dirt can be seen on the glass surface.

Cleaning of the panels should be carried out in the early morning when the panels are cool to avoid thermal shock.

If dirt remains on the panel, it may cause cell shading which will reduce power output or even cause further damage. To clean either the front or rear of the panels, use only deionized water at ambient temperature and a sponge, microfiber cloth or a soft brush to wipe away the dirt (rainwater, tap water or diluted alcohol may also be used as a secondary solution). For further cleaning a mild, biological and biodegradable washing-up liquid may be used.

When cleaning the panel, take care not to scratch the surface or introduce foreign elements that may cause damage. Ensure the water used is free from grit and physical contaminants that may damage the panel. Always rinse the panel with plenty of water. If soiling remains on the panel, repeat the cleaning process. If stains require more effort to be removed, Isopropyl alcohol of a concentration less than 10% may be used. Acid or Alkali detergent may not be used.

Use of high pressure hoses or cleaners is not permitted as these may damage the panel, laminate or cells.

Using a rubber squeegee, wipe the panel surface from the top downwards motion to remove any residual water from the panel glass. Panels can be left to dry in the air or wiped dry with a chamois. Avoid putting pressure on the panel surface when drying.

For more information on cleaning REC panels, consult the Cleaning Information Sheet available to download from the online REC Download Center www.recgroup.com/downloads.

SYSTEM INSPECTION

The system should be inspected regularly to ensure that:

- Fasteners are secure, tight and free from corrosion.
- Electrical connections are secure, tight, clean, and free of corrosion.
- The mechanical integrity of the cables is intact.
- Bonding points to ground are tight, secure and free from corrosion (which could break the continuity between the panels and ground).

RECYCLING

REC has made every effort to ensure panel packaging is kept to a minimum. The paper and cardboard packaging can be recycled and the protective wrapping and panel separating blocks are also recyclable in many areas. Recycle according to local guidelines and regulations.

DISPOSAL OF OLD ELECTRICAL AND ELECTRONIC EQUIPMENT (APPLICABLE TO E.U. COUNTRIES ONLY)

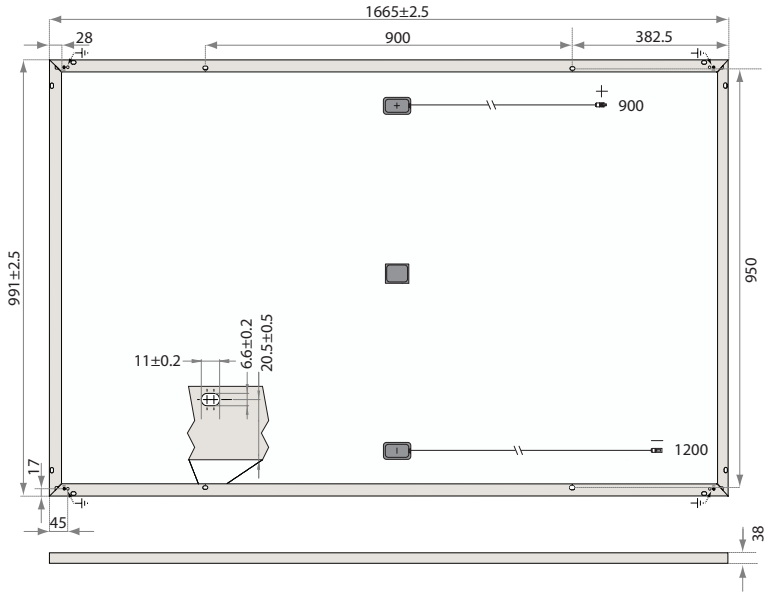
For installations in the European Union, this product is subject to WEEE regulations. The symbol above indicates that this product shall not be treated as household waste and must be disposed of at an appropriate collection point for the recycling of electrical and electronic equipment. The recycling of the different components and materials will help to conserve natural resources.

By ensuring REC TwinPeak panels are disposed of correctly, you will help prevent potential negative consequences for the environment and human health which could otherwise be caused by inappropriate waste treatment. For more information about recycling of this product, please contact your local recycling authorities or recycling center.

PANEL INFORMATION

TECHNICAL CHARACTERISTICS: REC TWINPEAK SERIES

Fig. 10: Panel dimensions: REC TwinPeak Series (mm)



MECHANICAL DATA

Dimensions	1665 x 991 x 38 mm
Area	1.65 m^2
Weight	18 kg

MAXIMUM RATINGS

Operational Temperature	-40 ... +85°C
Maximum System Voltage	1000 V
Maximum Snow Load (IEC 61215)	550 kg/m^2 (5400 Pa)
Maximum Wind Load (IEC 61215)	244 kg/m^2 (2400 Pa)
Max Series Fuse Rating	25 A
Max Reverse Current	25 A

GENERAL DATA

Cell Type:	120 REC HC multi-crystalline 3 strings of 40 half-cut cells
Glass:	3.2 mm solar glass with anti-reflective surface treatment
Back Sheet:	Highly resistant polyester
Frame:	Anodized aluminium (available in silver or black*)
Junction Box:	3-part with bypass diodes, IP67 rated 4 mm^2 solar cable, 0.9 m + 1.2 m
Connectors*:	Multi-Contact MC4 PV-KBT4/PV-KST4 (4 mm^2), IP67 Tonglin TL-Cable01 (4 mm^2), IP67

*Depending on product type chosen

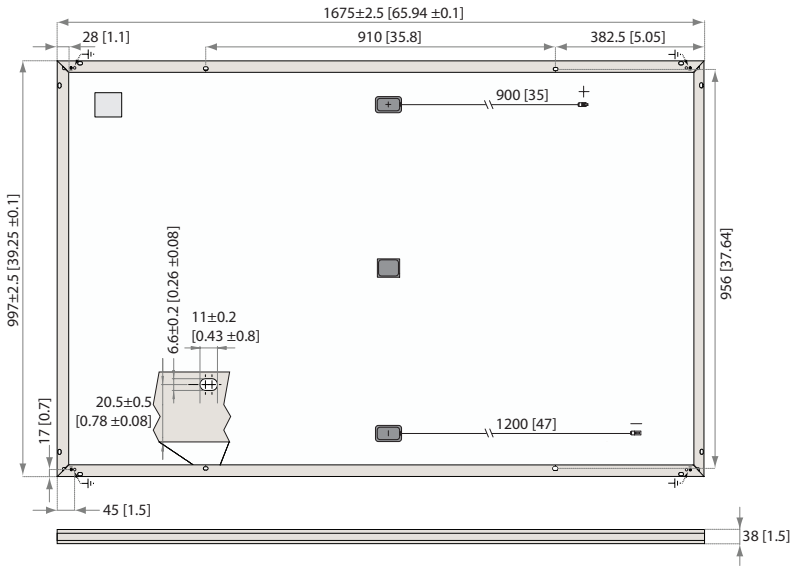
ELECTRICAL DATA @ STC

Product Code*: RECxxxTP						
Nominal Power - P_{MPP} (Wp)	265	270	275	280	285	290
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V_{MPP} (V)	31.1	31.2	31.4	31.9	32.1	32.3
Nominal Power Current - I_{MPP} (A)	8.53	8.66	8.76	8.78	8.90	8.98
Open Circuit Voltage - V_{OC} (V)	38.3	38.6	38.8	39.2	39.5	39.7
Short Circuit Current - I_{SC} (A)	9.21	9.29	9.40	9.44	9.54	9.62
Panel Efficiency (%)	16.1	16.4	16.7	17.0	17.3	17.6

Values at standard test conditions STC (airmass AM 1.5, irradiance 1000 W/m^2, cell temperature 25°C).
At low irradiance of 200 W/m^2 (AM 1.5 and cell temperature 25°C) at least 94% of the STC panel efficiency will be achieved.

*Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above, and can be followed by the suffixes BLK, IQ, IQ BLK, ECO.

Fig. 11: Panel dimensions REC TwinPeak 2 Series (mm [in])



MECHANICAL DATA

Dimensions	1675 x 997 x 38 mm
Area	1.67 m²
Weight	18.5 kg

MAXIMUM RATINGS

Operational Temperature	-40 ... +85°C
Maximum System Voltage	1000 V
Maximum Snow Load (IEC 61215)	550 kg/m² (5400 Pa)
Maximum Wind Load (IEC 61215)	244 kg/m² (2400 Pa)
Max Series Fuse Rating	25 A
Max Reverse Current	25 A

GENERAL DATA

Cell Type:	120 REC HC multicrystalline 6 strings of 20 half-cut cells
Glass:	3.2 mm solar glass with anti-reflective surface treatment
Back Sheet:	Highly resistant polyester polyolefin construction
Frame:	Anodized aluminium (silver or black*)
Junction Box:	3-part with bypass diodes, IP67 rated 4 mm² solar cable, 0.9 m + 1.2 m
Connectors*:	Multi-Contact MC4 PV-KBT4/PV-KST4 (4 mm²), IP67 Tonglin TLcable-01 (4 mm²), IP67

*Depending on product type chosen

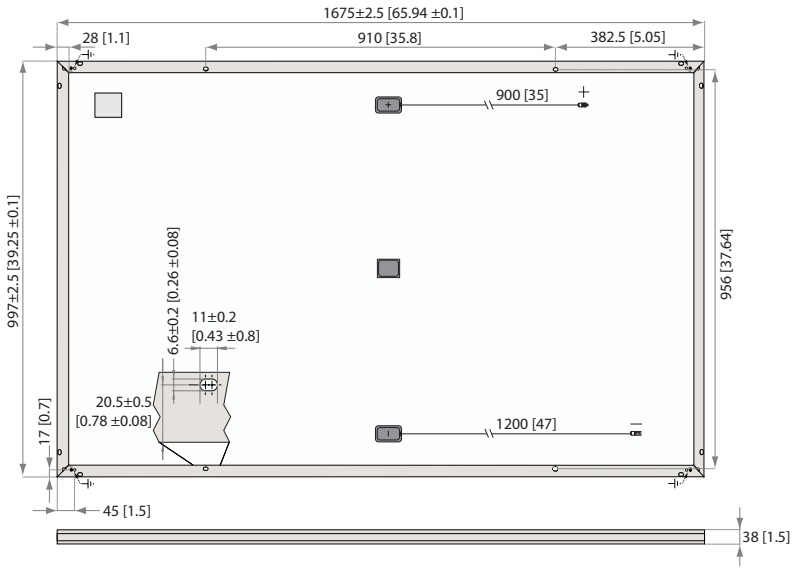
ELECTRICAL DATA @ STC*

	Product Code*: RECxxxTP2				
Nominal Power - P_{MPP} (Wp)	275	280	285	290	295
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V_{MPP} (V)	31.5	31.7	31.9	32.1	32.3
Nominal Power Current - I_{MPP} (A)	8.74	8.84	8.95	9.05	9.14
Open Circuit Voltage - V_{OC} (V)	38.2	38.4	38.6	38.8	39.0
Short Circuit Current - I_{SC} (A)	9.30	9.39	9.49	9.58	9.65
Panel Efficiency (%)	16.5	16.8	17.1	17.4	17.7

Values at standard test conditions STC (airmass AM 1.5, irradiance 1000 W/m², cell temperature 25°C).
At low irradiance of 200 W/m² (AM 1.5 and cell temperature 25°C) at least 94% of the STC panel efficiency will be achieved.

*Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above, and can be followed by the suffixes BLK, IQ, IQ BLK.

Fig. 12: Panel dimensions REC TwinPeak 2 BLK2 Series (mm [in])



MECHANICAL DATA

Dimensions	1675 x 997 x 38 mm
Area	1.67 m^2
Weight	18.5 kg

MAXIMUM RATINGS

Operational Temperature	-40 ... +85°C
Maximum System Voltage	1000 V
Maximum Snow Load (IEC 61215)	550 kg/m² (5400 Pa)
Maximum Wind Load (IEC 61215)	244 kg/m² (2400 Pa)
Max Series Fuse Rating	25 A
Max Reverse Current	25 A

GENERAL DATA

Cell Type:	120 REC HC multicrystalline 6 strings of 20 half-cut cells
Glass:	3.2 mm solar glass with anti-reflective surface treatment
Back Sheet:	Highly resistant polyester polyolefin construction
Frame:	Anodized aluminium (black)
Junction Box:	3-part with bypass diodes, IP67 rated 4 mm² solar cable, 0.9 m + 1.2 m
Connectors*:	Multi-Contact MC4 PV-KBT4/PV-KST4 (4 mm²), IP67 Tonglin TLcable-01 (4 mm²), IP67

*Depending on product type chosen

ELECTRICAL DATA @ STC*	Product Code*: RECxxxTP2 BLK2					
Nominal Power - P_{MPP} (Wp)	265	270	275	280	285	290
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V_{MPP} (V)	31.2	31.4	31.6	31.8	32.0	32.2
Nominal Power Current - I_{MPP} (A)	8.50	8.61	8.71	8.82	8.92	9.02
Open Circuit Voltage - V_{OC} (V)	37.8	38.0	38.2	38.4	38.6	38.8
Short Circuit Current - I_{SC} (A)	9.07	9.18	9.28	9.39	9.40	9.51
Panel Efficiency (%)	15.9	16.2	16.5	16.8	17.1	17.4

Values at standard test conditions STC (airmass AM 1.5, irradiance 1000 W/m², cell temperature 25°C).
At low irradiance of 200 W/m² (AM 1.5 and cell temperature 25°C) at least 94% of the STC panel efficiency will be achieved.

*Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above.

ANNEX 1. USE OF POWER OPTIMIZERS

Panels of the REC TwinPeak IQ Series only have been certified according to IEC 61215/61730 and UL 1703 for use with pre-installed power optimizers. When installing REC TwinPeak IQ Series panels, care must be taken to ensure a safe and correct panel installation. When installing REC TwinPeak IQ Series panels, follow the instructions below specific for such applications in addition to the above module mounting instructions. Failure to do so may invalidate the warranty on the solar panel and/or the power optimizer.

It is prohibited to make any modification to the mounting of the optimizer and the frame e.g., tightening the bolt, unless explicitly authorized by REC. Doing so will invalidate the warranty.

PANEL HANDLING

Due to the addition of the power optimizer, REC TwinPeak IQ solar panels have different dimensions to them than standard panels and extra care should be taken when handling and transporting them, including the following guidelines, in addition to those mentioned for standard panels.

- Extra care must be taken if re-stacking panels after initial unpacking due to the protruding optimizer from the rear.
- Panels must not be stacked horizontally as the attached power optimizer may be bent or broken if laid flat, or it may damage other hardware.
- Do not pull on the optimizer or any cables as this will damage the junction box, power optimizer and/or the bracket.
- Never apply any stickers or tape to any part of the power optimizer.

SAFETY REQUIREMENTS

With the solar panel connected to the optimizer, optimizer output is limited to 1 V across the optimizer output terminal. Treat the REC TwinPeak IQ Series panel and power optimizer with care, keeping in mind that the optimizer is a safety feature that helps prevent accidents.

The power optimizer used on REC TwinPeak IQ Series solar panels has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against detrimental interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may interfere with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause any interference with radio or television reception, which can be determined by turning the equipment OFF and ON, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications made to the solar panel or the power optimizer not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

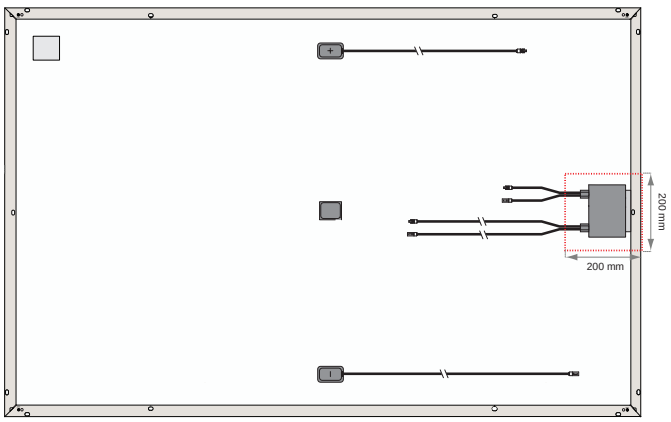
INSTALLATION RESTRICTIONS

When installing REC TwinPeak IQ series panels, the following instructions must be followed. For instructions on connecting the optimizer to the solar module, please see the optimizer manufacturer's instructions.

There is an additional hole on the center of the short side frame of the module. This hole must be kept free and is not to be used for mounting or as a grounding point.

- Ensure that the Rail Exclusion Zone around the optimizer as shown in fig. 13 is kept clear from rails or other parts of the mounting structure.
- Ensure that the drainage holes in the panel frame are not covered by any part of the mounting structure.
- Allow a minimum gap of 25 mm around the optimizer in order to ensure free circulation of air and allowing effective cooling.

Fig. 13: Rail Exclusion Zone for REC TwinPeak IQ Series, showing position of the power optimizer on the frame



Ensure that no rails are installed in the Rail Exclusion Zone around the power optimizer as this may interfere with or damage the power optimizer unit. The Rail Exclusion Zone measures 200 mm x 200 mm as marked in red in the above diagram.

Regularly check that the mechanical integrity of the optimizer mounted to the frame is intact (e.g., that there is no rust or corrosion on the bolt assembly securing the optimizer in place).

ANNEX 2. INSTALLATIONS ON WATER PLATFORMS

REC TwinPeak solar panels may be installed on water platform-type mounting systems (note that the certification testing of solar panels does not include testing on these types of systems). When installing REC TwinPeak panels on fixed position (e.g., anchored) water platforms, for example, floating pontoons, follow the instructions below specific to such applications. Failure to do so will invalidate the warranty.

For all installations on water platforms, first advise REC before the start of installation in case of any site specific instructions or constraints

INSTALLATION ENVIRONMENT

i) Installation site

- REC panels may only be installed on closed bodies of fresh water where water salinity does not exceed 25 mS/cm at 25°C (15 PSU). This specifically excludes mounting on sea and ocean applications.
- The maximum permitted wave height must not exceed 1 m from the crest to the trough of the wave.

ii) Floating platforms

- When using a floating platform, follow the manufacturer's instructions regarding installation, maintenance, inspection and cleaning at all times.

iii) Minimum installation height

- The minimum installation height of REC TwinPeak panels on floating platform systems is 15 cm and is defined as the height between the water surface and the lowest edge/part of the panel during normal operation. This will help to shield the panel from direct water spray.

INSTALLATION INSTRUCTION

i) System installation

- All cables used for the installation must have sufficient length and slack to prevent damage due to water level changes and wave motions.

Negative system grounding is required for REC TwinPeak panels installed on a floating platform

ii) Mounting panels

- Installation of REC TwinPeak panels must be in accordance with the aforementioned standard mounting instructions.
- The junction box should be oriented as far as possible from the water surface according to system design and the junction box, cables and connectors must be protected from direct water splash.
- The installation must allow for sufficient spacing between individual panels, in order to avoid all contact as caused by the natural movement and flexing of the floating structure.

iii) Panel protection

- In areas with high avian activity, additional bird repelling devices may be installed as long as they do not adversely affect system performance.
- If using lightning protection equipment on the floating installation, all relevant local regulations must be respected.

MAINTENANCE

- Regularly inspect the installation to ensure all panels are securely mounted.

For installations with high avian activity, system cleaning may be required at more frequent intervals to reduce shading of panels caused by bird defecation

SAFETY

- Immediately disconnect the system if the installation or the floating platform exhibits deviation from standard operating conditions.
- In the event of the floating platform being submerged, disconnect the DC connection at the inverter immediately. Do not attempt to salvage panels when sunlight is present.

DECLARATION OF CONFORMITY

EU Declaration of Conformity

Issuer's name and address:

REC SOLAR PTE. LTD.
20 Tuas South Avenue 14
SINGAPORE 637312
SINGAPORE

Product: Crystalline silicon terrestrial photovoltaic modules

Type designation:

RECxxxPEy REC Peak Energy Series; RECxxxPE Plusy REC Peak Energy Plus Series;
RECxxxPEDy REC Peak Energy Dark Series;
RECxxxPEIy REC Peak Energy Integrated Series;
RECxxxPE-EUy REC Peak Energy EU Series;
RECxxxPE Z-Linky REC Peak Energy Z-Link Series;
RECxxxPE Z-Link-Sy REC Peak Energy Z-Link-S Series;
RECxxxPE2y REC Peak Energy2 Series; RECxxxPE 72y REC Peak Energy 72 Series;
RECxxxTPy REC TwinPeak Series; RECxxxTP2y REC TwinPeak2 Series;
RECxxxTP2Ly REC TwinPeak2L Series; RECxxxPE 72 XVy REC Peak Energy 72 XV Series;
RECxxxPEM 72y REC Peak Energy Mono 72 Series;
RECxxxTP 72y REC TwinPeak 72 Series; RECxxxPEMy REC Peak Energy Mono Series;
RECxxxPE Z-Link-My REC Peak Energy Mono Series;
RECxxxTP2M 72y REC TwinPeak2 Mono 72 Series

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

2014/35/EU

"Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits".

The technical documentation and full compliance with the standards listed below proves the conformity of the product with the requirements of the above-mentioned EC Directive:

DIN EN 61215 (VDE 0126-31):2006-02; EN 61215:2005-08
DIN EN 61730-1 (VDE 0126 Teil 30-1):2007-10; EN 61730-1:2007-05
DIN EN 61730-1/A1 (VDE 0126-30-1/A1):2012-09; EN 61730-1:2007/A1:2012
DIN EN 61730-1/A2 (VDE 0126-30-1/A2):2014-01; EN 61730-1:2007/A2:2013
DIN EN 61730-1/A11 (VDE 0126-30-1/A11):2015-08; EN 61730-1:2007/A11:2014
DIN EN 61730-2 (VDE 0126-30-2):2012-09; EN 61730-2:2007 + A1:2012
IEC 61215:2005
IEC 61730-1:2004
IEC 61730-1:2004/AMD1:2011
IEC 61730-1:2004/AMD2:2013
IEC 61730-2:2004
IEC 61730-2:2004/AMD1:2011

Remark: The VDE Testing and Certification Institute, Merianstr. 28, 63069 Offenbach (Germany), has tested and certified the product according to these standards.

Certificate No.	*40039382*
File Reference	*5017538-3972-0001 / 230714 / ET2 / ROT*

This declaration is issued under the sole responsibility of the manufacturer.

Singapore, 14th Nov 2016

Ter Seon Kim – Chief Operating Officer

DOCUMENT HISTORY

Date	Revision Number	Reason
10.2014	A	First release
12.2014	A.2	Update to Electrical data @ STC (275 Wp I_{MPP})
12.2014	A.3	Revision of low light behavior data in Electrical Data
03.2015	B	Updates to include all REC TwinPeak product variants
11.2015	B.2	Updates to General Data, update to Electrical Data @ STC (280 Wp)
03.2016	C	Addition of Annex 1 for REC TwinPeak IQ Series and note on negative grounding
04.2016	D	Addition of Annex 2 for floating solar installations, addition of watt classes 285 & 290 Wp, addition of Connectors and Connections chapter
08.2016	D.2	Addition of watt classes 285 & 290 Wp
09.2016	E	Addition of Connectors and Connections chapter
11.2016	F	Inclusion of Technical Specifications for REC TwinPeak 2 Series panels

REC SOLAR PTE. LTD.
20 TUAS SOUTH AVENUE 14
SINGAPORE 637312
SINGAPORE
Tel: +65 6495 9228
Mail: post@recgroup.com

www.recgroup.com