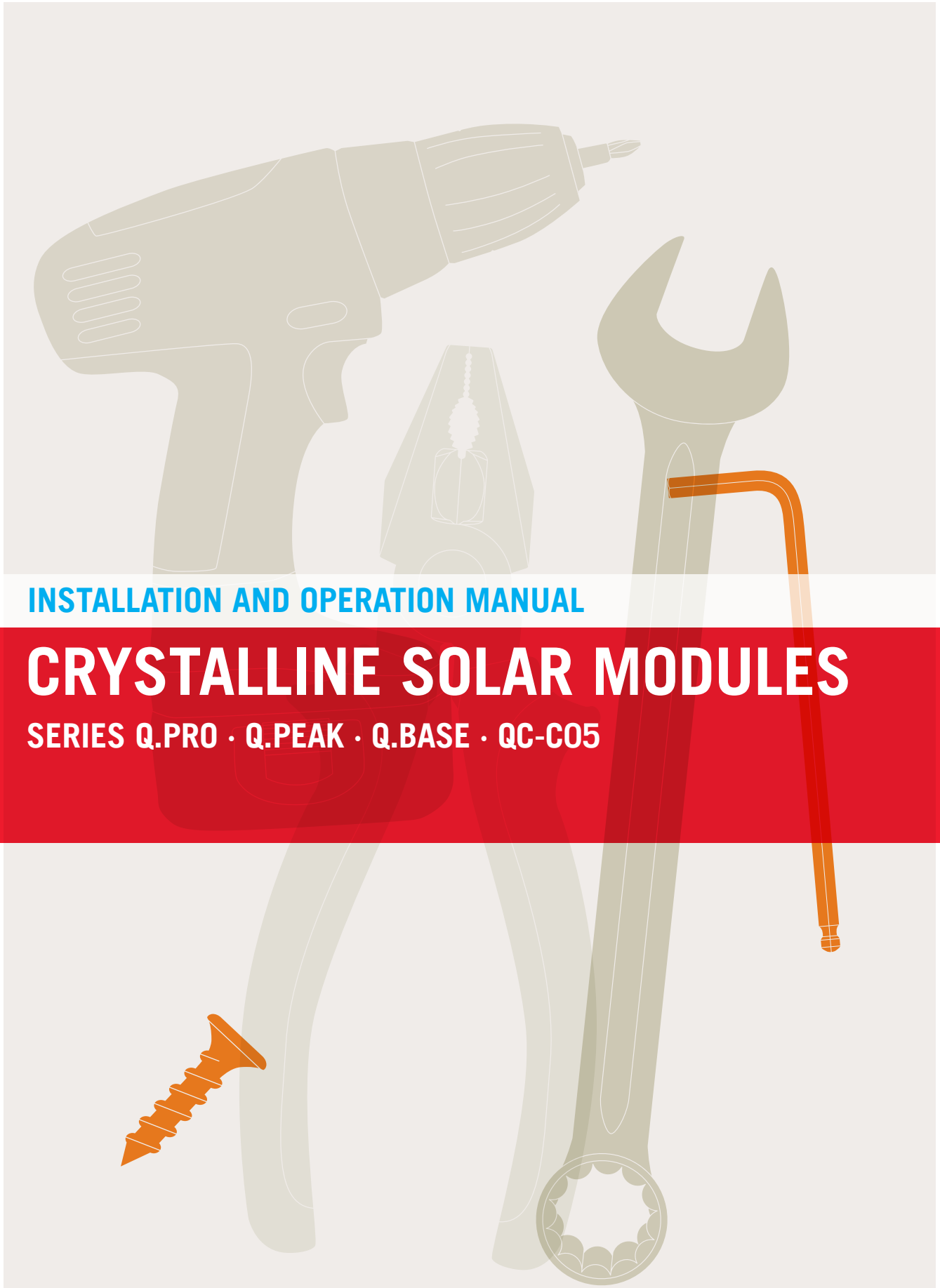


INSTALLATION AND OPERATION MANUAL

CRYSTALLINE SOLAR MODULES

SERIES Q.PRO · Q.PEAK · Q.BASE · QC-C05

Valid for Africa, Asia, Europe, Latin America, South America

Q.CELLS

DOCUMENTREVISION 05
This document applies for Africa, Asia, Europe, Latin America and South America for the following products as of July 2011: Q.PRO, Q.PRO-G2, Q.PEAK, Q.PEAK BLK, Q.BASE, Q.BASE-G2, QC-C05 and replaces all previous revisions of the installation and operation manual for these solar modules.

Technical parameters and design are subject to change. The data sheets and client information valid at the point in time when the relevant module was manufactured apply for the carrying out of installation, mounting or maintenance work on the solar modules.

1 INTRODUCTION

Q-Cells solar modules allow you to directly transform the unlimited energy provided by the sun into electrical energy in an environmentally friendly way.
In order to be able to completely exploit the full performance capacity of the Q-Cells solar modules, please read and apply the following instructions carefully. Failure to observe them may result in bodily injury and property damage.

This manual applies for Africa, Asia, Europe, Latin America and South America. It provides information on safety precautions to be used during the handling and installation of Q-Cells SE solar modules along with technical instructions to be followed during installation, mounting, wiring and maintenance.
Note the following module type classification:
• Q.BASE corresponds to QC-C05.

Please ensure that installation, operation and maintenance on your photovoltaic system is only carried out by qualified persons able to carry out the technical procedures described in this manual, i.e. system planer, installer and maintenance personnel. If you do not possess these qualifications, you may not carry out the work described except for cleaning (Chapter 6).

Information for installers
Ensure that the solar system is set up, expanded, modified and maintained in accordance with the requisite local and federal laws and regulations, as well as with the generally recognized electrical and building codes of the country in which it will be operated.
Hand over the installation and operation manual to the respective operator of the solar system after installation. Inform the operator that these instructions are part of the product and should be kept for the entire useful life of the solar installation.

Information for operators
Do not forget to register your solar array!
The full warranty of Q-Cells modules is subject to registration and in accordance to the valid regional warranty terms. Ask our Technical Customer Service (service@q-cells.com) for your personal registration documents.
Keep these instructions safe for the entire useful life of the module. Please read the chapters 6 (cleaning and maintenance) and 7 (troubleshooting) carefully.
Please contact your plant supplier for information concerning the formal requirements for solar systems. Please be sure to learn about directives and permit requirements from the responsible local authorities and energy providers prior to installation of the solar plant. You can only ensure economic success when these requirements have been taken into account. In your own interest, make sure to acquire the necessary permits from the authorities and contracts with the energy providers. We recommend that you insure your solar system against natural hazard (e.g. against lightning strike).

Disclaimer
These instructions are only valid for products of the Q-Cells SE company. Q-Cells assumes no liability for damage resulting from failure to observe these instructions. Please note that the wiring and dimensioning of the plant, as well as the observance of all necessary safety regulations when laying out and installing the system are the responsibility of the installer of the plant. These instructions do not provide a basis for liability of Q-Cells SE. Q-Cells SE is only liable in the context of contractual agreements or in the context of accepted guarantees.It assumes no responsibility extending beyond the functional capability and safety of the modules.
Please also observe the instructions for the other components of the solar system. It may be necessary to generate and evaluate the statics for the entire project. If your questions are not adequately addressed in these instructions, please first contact your system supplier. You can find more information at our website www.q-cells.com.

2 PRODUCT DESCRIPTION

TECHNICAL DATA (you can find additional data in the respectively valid data sheets at www.q-cells.com)						
PRODUCT LINE	Q.BASE (QC-CO5)	Q.BASE-G2	Q.PRO	Q.PRO-G2	Q.PEAK	Q.PEAK BLK
Type	Multicrystalline	Multicrystalline	Multicrystalline	Multicrystalline	Monocrystalline	Monocrystalline
Area [m²]	1,67	1,67	1,67	1,67	1,67	1,67
Weight [kg]	21	21	20	20	20	20
Max. system voltage V_{sys} [V]	1000	1000	1000	1000	1000	1000
Max. reverse current I_R [A]	20	20	20	20	20	20
Junction box	Protection class IP 65 with bypass diode		Protection class IP 67 with bypass diode		Protection class IP 67 with bypass diode	
Connector	IP67*	IP 68*	IP 68*	IP 68*	IP 68*	IP 68*
Flammability rating	C	C	C	C	C	C
Wind / snow load [Pa]	5400	5400	5400	5400	5400	5400
Certificates	All modules: CE-compliant; IEC 61215 (Ed.2); IEC 61730 (Ed.1), application class A					

* combinable with MC4

FIGURE 1A: Exterior dimensions (in mm) and components for Q.BASE and Q.PRO

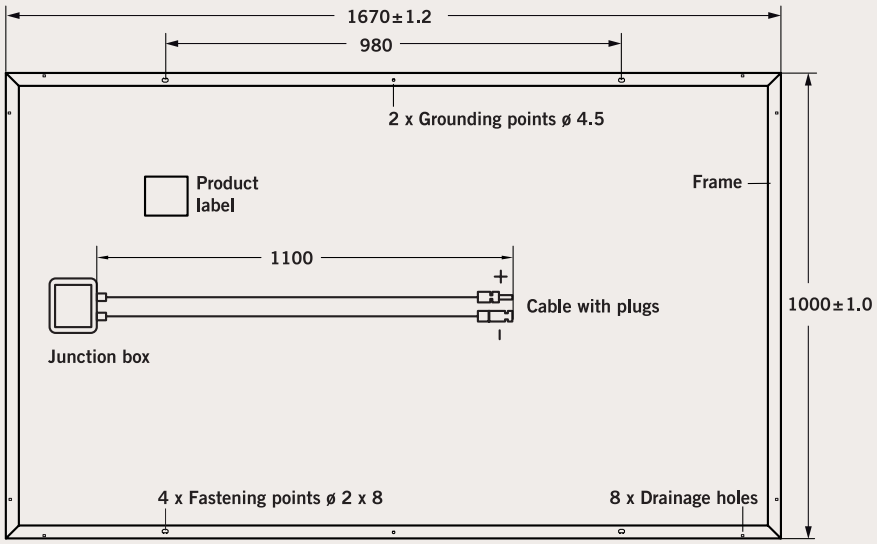
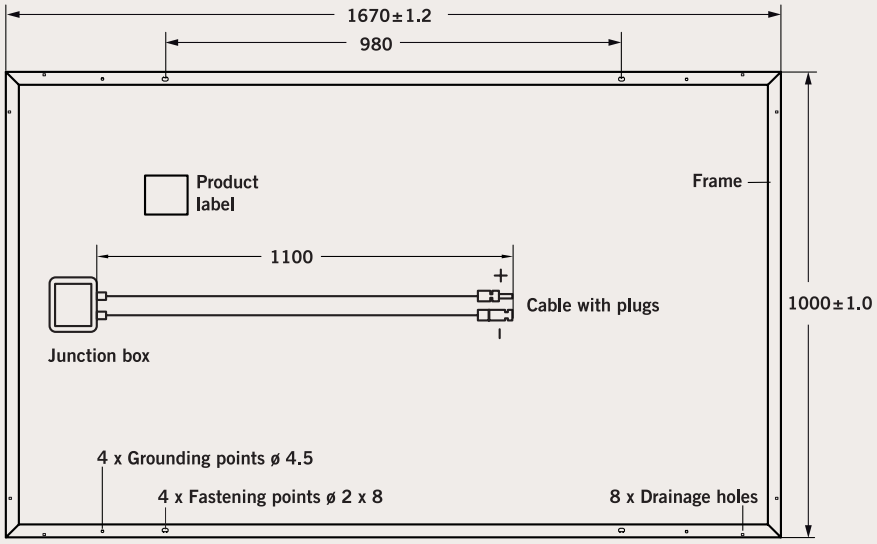


FIGURE 1B: Exterior dimensions (in mm) and components for Q.BASE-G2, Q.PRO-G2, Q.PEAK, Q.PEAK BLK



3 SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS

DANGER! Danger due to electric shock!

A solar module generates electricity and voltage even at low intensity of illumination. Physically disconnecting contacts in a live electrical circuit can cause arching, resulting in grave or mortal injury. The severity increases when several modules are connected in series.

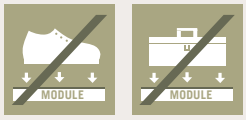
- Never disconnect plugs when under load. Be aware that even without the presence of daylight, residual charge may still be present in the plant. Ensure that the modules are first disconnected from the inverter prior to opening any contacts in the solar installation.
- Cover the solar modules with opaque material for the entire duration of assembly. Only then is the module reliably de-energised.
- The regulations and safety instructions for the installation of electrical devices and systems must be observed.
- In the case of module or phase voltages of more than 120 V, the extra-low voltage range is left. Undertake the necessary protection and cautionary measures.
- Do not insert electrically conductive parts into the plugs and junction box. Do not touch the contacts or exposed terminals.
- Keep children and unauthorized people away from the modules.
- In case of damaged modules or operational errors of the solar array, always contact your installer or the Q-Cells Technical Costumer Service (see Chapter 6).

WARNING! Danger of injury due to broken glass! Risk of injury due to falling modules!

The modules are primarily made of glass and must therefore be handled with appropriate caution.

- In order to ensure safe mounting, orient yourself to the national regulations for work safety and accident prevention.
- Wear suitable protective clothing (e.g. safety shoes, protective gloves) in order to prevent injuries.

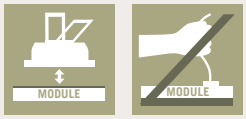
PRODUCT PROTECTION



- Protect the modules against scratches and other damage, especially from impact at the edges or improper storage.
- Do not subject the module surfaces to mechanical stress. Do not stand on the modules. Do not drop or place objects on the modules.
- Only carry out modifications of the module that have been confirmed by Q-Cells in writing in advance. Do not carry out any extra drilling (e.g. for fasteners) on the solar module.
- Do not open the junction box under any circumstances.
- Do not use light concentrators (e.g. mirrors or lenses) in attempting to increase the capacity of the module. The module may be damaged. This also voids the warranty.

3.1 TRANSPORT AND STORAGE

TRANSPORT / STORAGE



To prevent damage of the modules

- Store the modules securely in cool and dry rooms. The packaging is not weather-resistant!
- Transport the module in its original packaging until installation.
- Use a glass suction cup to remove and transport a module or hold the module at the edges. Carry the module vertically over longer distances.
- Do not lift or move the module using the cables or at the junction box under any circumstances!
- Do not stack the modules.
- Do not rest the module unprotected on its edges.

4 AREA OF USAGE AND INSTALLATION LOCATION

INSTALLATION LOCATION

- The modules are certified according to the norm IEC 61215 for safe operation in moderate climates.
- The permitted module temperatures lie between -40 °C and +85 °C. Please ensure that adequate ventilation exists below the module so that elevated module temperatures can be avoided.
- Observe the requirements for a functional grounding depending on the installation location (see Chapter 5.4 „Grounding“).
- Do not expose the modules to chemicals.
- Do not place the modules in standing water. The junction box is splash-proof only.
- Do not install the modules near highly flammable gases and vapors (e.g. gas containers) or near open flame and flammable materials. Solar modules are not explosion-proof operating equipment.
- The modules are not suitable for mobile usage or for indoor installations.

AVOIDANCE OF SHADING

Optimal solar irradiation results in a maximum energy yield. For this reason, set up the modules so that they are facing the sun.

Avoid shading of the modules, as this has a negative impact on the energy yield. A module is considered shade-free when it is entirely unshaded throughout the year (e.g. by buildings, chimneys, trees). Even partial shading of the modules (e.g. by overhead lines, dirt, snow) should be avoided (see also Chapter 7 “Cleaning and maintenance”).

Also, refer to the specifications for module orientation and tilt angle (see Chapter 5.1).

5 LAYOUT, ASSEMBLY AND INSTALLATION

SAFETY INSTRUCTIONS

WARNING! Damaged module components may cause risk of fire hazard!

- Only install undamaged solar modules.
- Ensure that the junction box, cable and connectors are undamaged prior to installation.
- Do not open the junction box under any circumstances.

- Always store the solar modules securely in a dry place. The packaging is not weatherproof!
- The voltage of a module is higher at lower temperatures and/or higher irradiation than the Standard Test Conditions (25 °C, 1000 W/m²). This must be considered so that the overall voltage of the module strings does not exceed 1000 VDC (according to IEC 61215, Ed. 1 / 61730, Ed. 2) or 600 VDC (accordng to UL 1703).
- Observe the requirements for a functional grounding depending on the installation location (see Chapter 5.4 „Grounding“).
- Integrate the solar system in the existing lightning protection system, in accordance with the local regulations.

- Do not install or perform the modules in strong wind or rain. We recommend that mounting and installation only be performed in dry weather.
- During mounting on buildings, there is a danger that tools, mounting materials or solar modules can fall and injure people. For this reason, block off the danger area on the ground before beginning installation work.
- Warn people near the danger area or in the building. Keep children away from the installation site.
- Carry out wiring work in such a way that people are not endangered, that no damage can occur and that it is not placed in water at any time.
- Protect all parts of the module during transport and installation from mechanical stresses (e.g. from pressure, tension, torsional stress). Ensure that the bend radius of the connection cables is kept greater than 60 mm at all times.
- The solar modules, especially the connectors and tools, must be dry during installation.

OCCUPATIONAL SAFETY REGULATIONS

In order to ensure safe mounting, familiarize yourself with the national regulations for occupational safety and accident prevention.

The regulations and safety instructions applicable for the installation of electrical devices and systems must be observed.

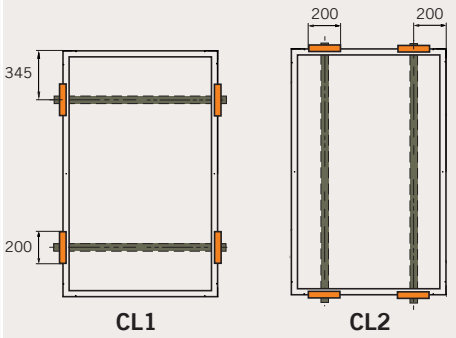
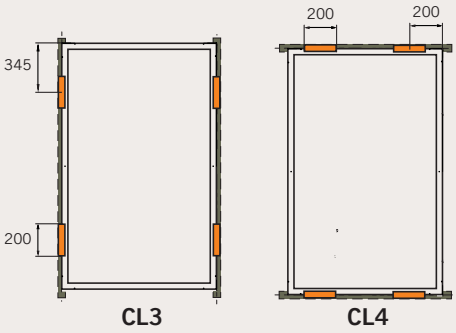
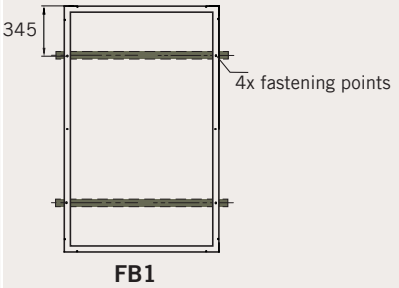
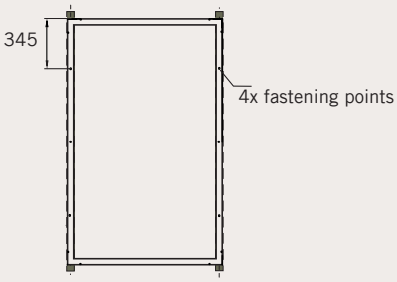
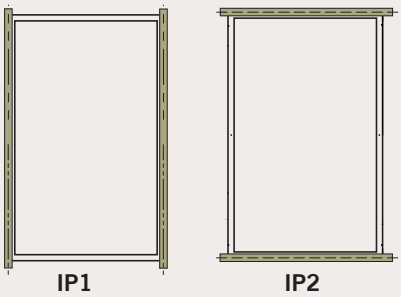
FIRE PROTECTION

Also observe valid regulations and safety instructions concerning the fire protection classification for rooftop installations. The module belongs to fire protection class C.

5.1 MOUNTING VARIANTS

Figure 2: Mounting variants for crystalline Q-Cells modules. All measures in mm.
The illustrated mounting variants apply for installations in portrait and landscape format.

Module | Clamping area | Substructure | Insertion profile

INSTALLATION TYPE	LATERAL SUPPORT	LONGITUDINAL SUPPORT
INSTALLATION WITH CLAMPS		
INSTALLATION AT THE FASTENING POINTS		
INSTALLATION WITH INSERTION PROFILE	n/a	

SPECIFICATIONS

MOUNTING VARIANTS CL2, CL4 AND IP2
This represents the most stressing mounting variant for a module. With this mounting variant, the wind and snow load limit is reduced to 2400 Pa.

MOUNTING VARIANTS FB1 AND FB2:
All fastenting points are on the backside of the frame.

5.2 MECHANICAL ASSEMBLY

MODULE POSITIONING

CAUTION! Incorrect orientation of the module presents a fire hazard!

- The modules may be installed in landscape or portrait format.
- Install the module in such a way that the junction box is positioned in the upper area of the module.
- Ensure that the drainage openings of the frame are left open following installation to allow water runoff. This prevents frost damage.

- Install the modules with a minimum tilt angle of 3°.
- For installations with a tilt angle <20°, regularly check for dirt built up (soiling, bird droppings, etc.). Rain should help to remove soiled areas, though regular cleaning is recommended for all installations (see Chapter 7 “Cleaning and maintenance”).
- Install the module in such a way that rainwater and snowmelt can run off freely to avoid standing water or puddling.
- The optimal tilt angle of the module depends on the respective latitude. We recommend a photovoltaics simulation tool to ensure the optimal orientation.

WIND/SNOW LOAD

Framed modules are suitable for use with wind and snow loads up to 5400 Pa.

MOUNTING FRAME

Install the module to a mounting structure:

- that corresponds to the necessary statics and the local snow and wind loads.
- that is correctly fastened in the ground, on the roof or on the facade.
- that can transfer forces on the module to the assembly substructure.
- that ensures that no mechanical stresses (e.g. caused by vibrations, twisting or expansion) are generated on the module.
- that ensures sufficient back ventilation of the module.
- that ensures long term stability.
- that will not give rise to galvanic corrosion in case of direct metal contact (i.e. grounding lead, screws, washers, etc.)
- that allows for strain-free expansion and contraction due to natural ambient temperature variations.

Clamps and rail system must be constructed as a coordinated unit.

MODULE FASTENING

To ensure a long-term stability of the solar modules:

- Install the module and clamps according to the mounting variants. Adhere to the defined clamp areas in Figure 2 (Chapter 5.1).
- Position the module planar.
- Install the modules with a minumum distance of 10 mm to each other.
- Use all fastening points and avoid direct contact between the glass and mounting material.
- Fasten the module to the sides using 4 clamps each and with a recommended torque of 18 Nm. In this way you avoid bends, mechanical stresses and twisting.

GENERAL REQUIREMENTS FOR THE CLAMP SYSTEM:

Customary clamps that satisfy the following requirements may be used:

- Clamp width: ≥ 40 mm
- Clamp height corresponding to 50 mm frame height
- Clamp depth: 7–12 mm
- Clamp area surface (clamp depth x clamp width): ≥ 400 mm²
- Statics in accordance with the requirements of the location

5.3 ELECTRICAL LAYOUT

YOU CAN FIND THE DETAILED ELECTRICAL PARAMETERS IN THE PRODUCT DATA SHEET.

MODULE SELECTION

Only connect modules of the same type and the same power class. This is the only way to achieve optimal yields.

SAFETY FACTOR

It may occur during normal operation that the module provides a greater current and/or a higher voltage than that determined under standardized test conditions. You should therefore include a safety factor of 1.25 for:

- the determination of the voltage measurement values (Voc) of components,
- the determination of the current measurement values (Isc) of conductors,
- the evaluation of control systems connected to the output of photovoltaic modules.

Alternatively, the respectively valid national regulations for the installation of electrical systems are to be applied.

SERIES CONNECTION

- Only connect modules with the same power class. Please particularly observe the sorting given in the data sheet and the tolerance ranges for the V_{oc} and V_{mp}.
- Connection of modules in series is only permitted up to the maximum system voltage specified in the respective valid data sheet revision.
- Operate taking into account all working conditions and relevant technical regulations and standards. In this way you ensure that the maximum system voltage, including the necessary safety margins are not exceeded.
- Also take the voltage limitation of the inverter into account when establishing the string length.

PARALLEL CONNECTION

Only connect modules of the same type and the same voltage class.
Ensure the observance of the maximum reverse current load capacity given in the data sheet. In the event of reverse currents (caused by module defects, ground leakage or isolation failure), modules can otherwise be damaged.
In order to safely account for reverse currents, we recommend the following fuse variants:

1) LAYOUT WITH LIMITATION OF THE NUMBER OF STRINGS CONNECTED PARALLEL: Without further measures for current blocking, a maximum of three module strings may be operated parallel on an inverter or on a MPP tracker.

2) LAYOUT WITH STRING DIODES: when more than three strings are connected parallel, a maximum of 3 strings respectively must be protected against reverse currents from the remaining system with a shared string diode.

3) LAYOUT WITH STRING FUSES: Place fuses for each string of modules at the plus and minus sides. Observe the maximum permitted number of strings according to the specifications of the respective string fuse manufacturer and the technical guidelines.

BEWARE! When installing modules from different product revisions (e.g. Q.PRO and Q.PRO-G2), observe the minimum permissible limitation of the product revisions used.

INVERTER

For installations ≥ 500 m from sea, the modules can be operated with inverters with or without a transformer.
For installations < 500 m from sea, functional grounding according to Chapter 5.4 is required. In this case only use galvanic isolated inverters (inverters with a transformer).

5.4 GROUNDING

FUNCTIONAL GROUNDING

In case modules are installed within 500 m of the coastline, a functional grounding of the photovoltaic generator has to be installed.

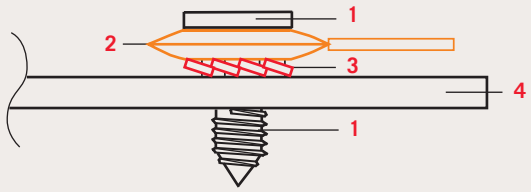
DANGER! Incorrect grounding causes risk of fire hazard!
The direct grounding of the positive or negative conductor is only permitted if any hazards for persons can be excluded. Comply to all valid regulations for personal safety and fire prevention.

For the installation of a functional grounding:
- Only use galvanic isolated inverters (inverters with transformers).
- Only ground the negative conductor of the PV-generator.
- Only unse grounding kits which are compliant with the inverter.
- Meet all earthing instructions of the inverter manufacturer.

SYSTEM BONDING

In accordance with local statutory regulations, apply a system bonding to the grounding points (Figures 1A, 1B). Attach the system bonding as shown in Figure 3. Use Parker screws according to DIN 7981, material A2, size 5.5 mm x 16 mm.

FIGURE 3: Attachment of the grounding



1 Stainless Parker screw
2 Stainless washer (cable lug)
3 Stainless serrated lock washer
4 Module frame

5.5 ELECTRICAL INSTALLATION

SAFETY INSTRUCTIONS

DANGER! Life danger due to electric shock!
Physically disconnecting contacts in a live electrical circuit can cause arching, resulting in grave or mortal injury.
- Carry out work on the inverter and the electrical cables with extreme caution.
- Never disconnect the plug when under load.
- Ensure that the modules are disconnected at the inverter prior to disconnection from one another.
- Be absolutely certain to observe the time intervals specified by the manufacturer after switching off the inverter and prior to starting subsequent work such that the energised components can be discharged.
- Cover the module for the duration of the assembly with opaque material. Only then is the module reliably de-energised.
- Never touch live contacts with your bare hands. Use only insulated, dry tools for the installation.
- Pay attention to the correct polarity when connecting. The connectors are labelled with plus for the positive terminal and minus for the negative terminal.
- Do not open the junction box under any circumstances. The bypass diode must not be removed.

5.5 ELECTRICAL INSTALLATION

CONNECTION CABLES AND CONNECTORS

Observe the following when selecting and using connection lines and connectors:

- Only use solar cables as connection cables. Use connectors of the same type and manufacturer within a solar system, and compatible connectors to connect the inverter.
- Ensure that all electrical components are in a proper, dry and safe condition. In this way you avoid electrical short-circuits or dangerous contact voltages due to defective or damaged cables.
- Always avoid mechanical stressing of the connection cables.
- Ensure a tight connection between the individual connectors (especially to the inverter). Make sure they click together properly.

AFTER COMPLETION OF INSTALLATION

Upon completion of the installation, ensure that:

- the wiring is protected from dirt and moisture.
- the plug connections do not lie on a water-channeling surface and are properly connected.
- all necessary safety and functional tests have been carried out according to the current state of technology.

6 CLEANING AND MAINTENANCE

Q-Cells modules are built to last and require minimal maintenance. Light dirt is typically washed away by rain. However, rain may not adequately clear more stubborn grime (i.e. pollen, vegetation, bird droppings, etc.). Such soiling which shades the active area of the module can lead to a reduction in the system's performance.

SAFETY INSTRUCTIONS

WARNING! Danger of injury from heated and live modules!
Only clean the modules when the module temperature lies between 10 °C and 30 °C, e.g. in the early morning or late evening. Do not wear electrically conductive parts.

WARNING! Risk of falling during maintenance of roof installations and building-integrated installations!
Never enter the installation area alone and unsecured. We recommend commissioning a specialist company to perform this work. Consult your installer on location.

CLEANING

As the operator, you should regularly remove dirt built up from the modules. In addition to the safety instructions and chapter 3, observe the following points:

- Never step on the modules. Do not subject the modules to mechanical stress.
- Avoid cleaning with water when there is a danger of frost and strong temperature differences between the module, water and air.
- Hard water used as a cleaning agent should be decalcified beforehand in order to avoid water staining. Remove any standing water from the module.
- Do not use abrasive detergents or surface-active agents (e.g. soap). Do not scratch dirt off. This can damage the surface of the module.

Only remove snow and ice without exerting force (e.g. with a broom).
Proceed as follows to remove dirt from the **top of the module**:

1. Rinse coarse dirt (dust, leaves, etc.) from the module with lukewarm water.
2. Moisten stubborn stains and remove them carefully.

Use lukewarm water and a soft cloth or sponge. If necessary, it is possible to use isopropanol (IPA) **selectively**. Follow the safety instructions on the IPA packaging. Ensure that the IPA does not run off between the module and the frame or into the module edges.

Free the **substructure and rear side** of dirt (leaves, bird nests, etc.). In the case of ground-mounted installations, we recommend regularly trimming of the vegetation order to avoid partial shading. Be sure to pay attention to the cables and stones.

MAINTENANCE

The solar system should be inspected annually by a specialist installer for:
- secure fastening, and corrosion-free system components
- secure connection, cleanliness and integrity of all electrical components
- the contact resistances of the grounding.

7 TROUBLESHOOTING

DANGER! Life danger due to electric shock!
- Please do not attempt to correct problems on your own!
- In case of problems or damaged modules (for example, glass breakage, damaged cables) please contact your installer or the Q-Cells Technical Customer Service.

8 DECOMMISSIONING AND RECYCLING

Do not decommission the module on your own. Commission a specialist company for this purpose. Q-Cells is a member of the European PV Cycle Association and accepts our product responsibility. You can give back modules of Q-Cells SE and allow them to be processed within the PV Cycle member states. More information can be found at www.pvcycle.com.

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