With solar modules from Hanwha Q CELLS GmbH (hereafter referred to as "Q CELLS") you can directly transform the sun’s limitless energy into environmentally-friendly solar electricity.

In order to ensure the maximum performance of your Q CELLS solar modules, please read the following instructions carefully and observe all guidelines. Non-compliance may result in damage and/or physical injury.

This installation manual provides instructions for the safe installation of crystalline solar modules.

Please read these instructions carefully before proceeding with your installation.

Please retain these instructions for the life of the solar modules.

All supplements received from the manufacturer should be included.

Please observe all other applicable documents.

Intended Use

This manual is valid for Africa, Asia, Europe, Latin America, South America. These instructions contain information regarding the safe handling and use of quality crystalline solar modules from Q CELLS and for their installation, mounting, wiring, and maintenance.

Symbols and Labels

The following symbols and labels are used throughout the installation manual for ease of use.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤</td>
<td>Procedure with one or more steps.</td>
</tr>
<tr>
<td>•</td>
<td>Lists of items</td>
</tr>
<tr>
<td>✔</td>
<td>Ensure that when carrying out a procedure, you check the results of said procedure.</td>
</tr>
<tr>
<td>❌</td>
<td>Prohibited</td>
</tr>
<tr>
<td>☢️</td>
<td>Beware of possible danger or damage. Categories:</td>
</tr>
<tr>
<td></td>
<td>• Danger: Risk of fatal injury</td>
</tr>
<tr>
<td></td>
<td>• Attention: Risk of serious injury or damage to property</td>
</tr>
<tr>
<td></td>
<td>• Note: Risk of damage to product</td>
</tr>
</tbody>
</table>

Safety Regulations

The solar module operator is responsible for compliance with all applicable statutory requirements and regulations.

- The following regulations and standards must be upheld at all times during the installation, operation, and maintenance of the solar modules:
  - Installation and Operation Manual.
  - Other applicable documents (such as country-specific regulations for pressure equipment, operational safety, hazardous goods, and environmental protection).
  - Regulations and requirements specific to the system.
  - Applicable country-specific laws, regulations, and provisions governing the planning, installation, and operation of solar power systems and work on roofs.
  - Valid international, national, and regional regulations governing work with direct current, especially those applicable to the installation of electrical devices and systems, and regulations issued by the respective energy provider governing the parallel operation of solar power systems.
  - Accident-prevention regulations.
  - Regulations of the Bau-Berufsgenossenschaft (German institution for statutory accident insurance and prevention in the building trade).

Qualified & Skilled Personnel

Both, the operator and installer are responsible for ensuring that installation, maintenance, connection to the grid, and dismantling are carried out by trained and qualified specialists with approved training certificates (issued by a state or federal organization) for the respective specialist trade.

Electrical work may only be performed by an officially certified tradesperson in accordance with the applicable DIN norms, VDE regulations, accident-prevention regulations, and the regulations of the local energy provider.
1 INTRODUCTION

Validity
These instructions are only valid for crystalline solar modules from the company Q CELLS. Q CELLS assumes no liability for damage resulting from failure to observe these instructions.

- Please observe the wiring and dimensioning of the system.
- The installer of the system is responsible for compliance with all necessary safety regulations during set-up and installation.
- Q CELLS assumes no liability on the basis of these instructions. Q CELLS is only liable in the context of contractual agreements or in the context of accepted guarantees. Q CELLS accepts no other responsibility for the functionality and safety of the modules.
- Please observe the instructions for any other system components that may be part of the complete solar power system. It may be necessary to carry out a structural analysis for the entire project.
- If your questions are not satisfactorily answered in the manual, please contact your system supplier.

Additional information can be found on our website at www.q-cells.com.

Information for the Operator
- Please keep this manual for the entire life of the solar power system.
- Please contact your system supplier for information concerning the formal requirements for solar power systems.
- Please be sure to contact the relevant local authorities and energy providers regarding regulations and permit requirements prior to installation of the solar power system. Your financial success depends on the fulfillment of these requirements.

Other applicable documents
This installation manual is only valid in combination with the following technical information.

DOCUMENT TYPE
- Product data sheet
- Packaging and transport of crystalline modules

2 PLANNING

2.1 Technical specifications

Additional information can be found in the currently valid data sheets available at www.q-cells.com.

<table>
<thead>
<tr>
<th>PRODUCT LINE</th>
<th>Q.PRO-G3</th>
<th>Q.PRO BLK-G3</th>
</tr>
</thead>
<tbody>
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<td>Polycrystalline</td>
<td>Polycrystalline</td>
</tr>
<tr>
<td>Area (m²)</td>
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<tr>
<td>Frame height</td>
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<td>35</td>
</tr>
<tr>
<td>Weight (kg)</td>
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<td>19.0</td>
</tr>
<tr>
<td>Max. system voltage V sys (V)</td>
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<td>1000</td>
</tr>
<tr>
<td>Max. reverse current (A)</td>
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<td>20</td>
</tr>
<tr>
<td>Permissible temperature range</td>
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<td>-40 °C to +85 °C (-40 °F bis +185 °F)</td>
</tr>
<tr>
<td>Junction box protection class</td>
<td>IP67 with bypass diode</td>
<td>IP67 with bypass diode</td>
</tr>
<tr>
<td>Connector protection class</td>
<td>IP68</td>
<td>IP68</td>
</tr>
<tr>
<td>Fire protection class</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Snow load (Pa)</td>
<td>5400</td>
<td>5400</td>
</tr>
<tr>
<td>Wind load (Pa)</td>
<td>5400</td>
<td>5400</td>
</tr>
<tr>
<td>Certificates</td>
<td>VDE Quality Tested; CE-compliant; IEC 61215 (Ed.2) see page 9 et sqq.; IEC 61730 (Ed.1) Application Class A</td>
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<table>
<thead>
<tr>
<th>PRODUCT LINE</th>
<th>Q.PEAK-G3</th>
<th>Q.PEAK S-G3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Monocrystalline</td>
<td>Monocrystalline</td>
</tr>
<tr>
<td>Area (m²)</td>
<td>1.67</td>
<td>1.35</td>
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<td>Frame height</td>
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<td>35</td>
</tr>
<tr>
<td>Weight (kg)</td>
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<td>15.5</td>
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<td>1000</td>
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<td>Max. reverse current (A)</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Permissible temperature range</td>
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</tr>
</tbody>
</table>

1 tested according to IEC 61215
Installation Site

Please note the following guidelines that apply to the installation site:

- The modules have been tested according to IEC 61215 for operation in a temperate climate.
- Solar modules are not explosion-proof.
- Do not operate solar modules near highly flammable gas and vapors (e.g., gas tanks, gas stations).
- Do not install modules in enclosed space.
- Do not install modules in locations where they may be submerged in water for lengthy periods.
- Do not use modules as a substitute for the normal roofing (e.g., modules are not rainproof).

Prevention of Shadowing Effects

Optimal solar irradiation leads to maximum energy output:

- For this reason, install the modules so that they face the sun.
- Avoid shadowing (due to objects such as buildings, chimneys or trees).
- Avoid partial shading (for example through overhead lines, dirt, snow).

Limitations

The solar modules are designed for the following applications:

- Operating temperatures from -40 °C to +85 °C (-40 °F to +185 °F).
- Wind and snow loads up to max. 5,400 Pa (as tested according to IEC 61215).
- Installation using a mounting frame for solar modules.

Mounting Frame Requirements

Requirements for the mounting frame:

- Conforms to the necessary structural requirements.
- Compliant with local snow and wind loads.
- Properly fastened to the ground, the roof, or the façade.
- Forces acting on the module are relayed to the mounting substructure.
- Ensures sufficient rear ventilation of the module.
- Guarantees long-term stability.
- Has electrochemical series that prevent corrosion among different metals.
- Allows for stress-free expansion and contraction due to temperature fluctuations.
- Ensure that no mechanical stresses (e.g., caused by vibrations, twisting, or expansion) are generated on the module.
- Ensure that the clamps and the mounting frame are compatible.

Clamp System Requirements

Use customary clamps that satisfy the following requirements:

- Clamp width: ≥ 40 mm.
### Specifications

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Mounting Option</th>
<th>Clamping Range (mm)</th>
<th>Allowed Static Load (Pa)</th>
<th>Test Load Acc. IEC 61215 (Pa)</th>
</tr>
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<tbody>
<tr>
<td>Q.PRO-G3</td>
<td>CL1</td>
<td>Push: 245 - 345</td>
<td>3500</td>
<td>5400</td>
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<tr>
<td></td>
<td></td>
<td>Pull: 245 - 345</td>
<td>2400</td>
<td></td>
</tr>
<tr>
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<td>CL3</td>
<td>Push: 245 - 445</td>
<td>4000</td>
<td></td>
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<td>Q.PEAK-G3</td>
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<td>1800</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pull: 0 - 300</td>
<td>1600</td>
<td></td>
</tr>
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<td>FB1</td>
<td>Push: -</td>
<td>3500</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Pull: -</td>
<td>3100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FB2</td>
<td>Push: -</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pull: -</td>
<td>3100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP1</td>
<td>Push: -</td>
<td>3700</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pull: -</td>
<td>3700</td>
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</tr>
<tr>
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<td>IP2</td>
<td>Push: -</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Pull: -</td>
<td>1800</td>
<td></td>
</tr>
</tbody>
</table>

1. Distance between outer edge of module and middle of the clamp.

2. Describes the maximum module surface load (vertical to the module surface) regarding safety factors (e.g. EUROCODE).

For this purpose, the load value determined by load tests according to various criteria: laminate overlay, plastic deformation, module failure, and were divided with a safety factor. The minimum calculated load value corresponds to the maximum permitted load.
Module Selection
For detailed key electrical data, please refer to the product data sheet for the respective product.
- Only connect modules of the same type and the same power class.

Safety Factor
During normal operation, a module may generate a greater current and/or higher voltage than that determined under standardized test conditions. Please use a safety factor of 1.25 for the following:
- Calculating the voltage measurement values (V_{oc}) of components
- Calculating the current measurement values (I_{sc}) of conductors
- Sizing of control systems connected to the outlets of the solar modules

- Please follow the valid national guidelines for the installation of electrical systems.

Series Connection
Connection of modules in series is only permitted up to the maximum system voltage as listed in the applicable data sheet.
- Take into account all possible operating situations and all relevant technical norms and regulations when designing the system. This will ensure that the maximum system voltage, including all necessary safety margins, is not exceeded.
- Take the voltage limit of the inverter into account when determining the maximum number of modules in the string.

Parallel Connection
Modules may be damaged by the occurrence of reverse currents (caused by module defects, ground leaks, or defective insulation).
- Ensure that the maximum reverse current load capacity indicated in the data sheet is observed.
In order to limit reverse currents that may occur, we recommend using the following safety options:
1) Layout with a limited number of parallel connected strings:
Without undertaking further current blocking measures, a maximum of two module strings may be operated in parallel on an inverter or MPP tracker.

2) Layout with string fuses:
Place fuses for each string of modules at the plus and minus ends. Observe the maximum permitted number of strings as indicated in the specifications provided by the respective string fuse manufacturer and the technical guidelines.

NOTE!
When installing different product versions, the lowest minimum permitted reverse current load capacity applies.

Inverters
Inverters with or without transformers may be used.
3 INSTALLATION 3.1 Safety and transport

⚠️ Ensure that all personnel are aware of and adhere to accident-prevention and safety regulations.
⚠️ While working wear clean gloves.

⚠️ WARNING! Fire Risk!
- Do not stack modules.
- Do not install modules near flammable gas/vapors.

⚠️ DANGER! Risk of fatal injury due to electric shock!
- Do not install damaged modules.
- Inform your dealer of any damages immediately.

⚠️ DANGER! Risk of fatal injury due to electric shock!
- Cover the modules with an opaque material during installation.

⚠️ NOTE! Module damage may occur!
- Never lift or move the module with the connection cables or junction box.
- Carry modules upright and horizontally as shown.

⚠️ NOTE! Module damage may occur!
- Never step on modules.
- Do not subject modules to any mechanical stress.
- Do not allow any objects to fall onto modules.

⚠️ NOTE! Module damage may occur!
- Only make modifications to the module which have been confirmed in writing by Q CELLS.

⚠️ NOTE! Module damage may occur!
- Do not stack modules.

⚠️ NOTE! Module damage may occur!
- Do not install modules indoors.
- Do not install modules on moving objects.

⚠️ NOTE! Module damage may occur!
- Do not drop modules.

⚠️ Inspect the packaging for damages.
- Contact the transport company regarding any damage to the packaging.
- Follow any instructions on the packaging.

⚠️ Leave modules in their original packaging until installation.
- Store the modules securely in cool and dry rooms. The packaging is not weatherproof.

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NOTE! Module damage may occur!
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- Do not stack modules.
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3 INSTALLATION

3.2 Preparation of installation

**DANGER! Risk of fatal injury due to electric shock!**
- Block off the installation zone.
- Keep children and unauthorized individuals away from the solar power system.

**WARNING! Risk of injury due to falling modules!**
- Secure modules during installation.
- Do not install modules in windy or wet weather.

**DANGER! Risk of fatal injury due to electric shock!**
- Only use dry, insulated tools.

**DANGER! Risk of fatal injury due to electric shock!**
- Ensure that modules and tools are not subject to moisture or rain at any time during installation.

**WARNING! Risk of injury due to falling modules!**
- Do not carry out the installation alone.

**DANGER! Risk of fatal injury due to electric shock!**
- Only install undamaged modules and components.
- Do not drill any other holes.

**NOTE! Module damage may occur!**
- Do not subject modules to mechanical tension. Max. torsion 10 mm/m.

**Option 1:**
- Fasten the module with 4 clamps in the specified clamping range, see Fig. 3, p. 8.
- Tighten clamps according to manufacturer’s instructions.

**Option 2:**
- Install the module at the 4 mounting points, see Fig. 3, p. 8.
- Tighten clamps according to manufacturer’s instructions.

**Option 3:**
- Install the module using mounting profiles, Fig. 3, p. 8.

**Option 2:**
- Maintain an interval of at least 10 mm between two modules.
4.1 Safety

**DANGER! Risk of fatal injury due to electric shock!**

When disconnecting an electric circuit carrying direct current, electric arcs can occur that may result in life-threatening injuries.

- Do not unplug the cable when under load.
- Do not connect any exposed cable ends.
- Do NOT touch the poles at the same time.

A solar module generates electrical current and voltage even at a low intensity of illumination. Sparks and electric arcs may result from the separation of a closed circuit. These can result in life-threatening injuries. The danger increases when several modules are connected in series.

- Please ensure that the entire open circuit voltage is active even at low levels of solar irradiation.
- Please follow the valid national regulations and safety guidelines for the installation of electrical devices and systems.
- Please make sure to take all necessary safety precautions.

With module or phase voltages of more than 120 V, the extra-low voltage range is exceeded.

- Carry out work on the inverter and the wiring with extreme caution.
- Ensure that the modules are disconnected at the inverter prior to separation.
- Be sure to observe the specified time intervals after switching off the inverter. High-voltage components need time to discharge.

**DANGER! Risk of fatal injury due to electric shock!**

- Never open the junction box.
- Do not remove bypass diodes.

**DANGER! Risk of fatal injury due to electric shock!**

- Never touch live contacts with bare hands.
- Do not touch the poles at the same time.

**DANGER! Risk of fatal injury due to electric shock!**

- Only use dry, insulated tools for electrical work.
- Insulate any exposed cable ends.
- Only connect cables with plugs.

**DANGER! Risk of fatal injury due to electric shock!**

- Ensure correct polarity.

1. Switch off the inverter.
2. Cover the modules to be disconnected.
3. Switch off the DC circuit breaker.
4. Disconnect plugs by the use of appropriate and qualified tools of the manufacturer Tyco or Multicontact (adequate for PV4 plug type).
4.3 Connection of modules

- Use solar cables for the connection at the junction box outlet.
- Use the same, inverter-compatible plugs.

**NOTE! Module damage may occur!**
- Ensure that the cabling is not under stress.
- Ensure that the cables do not run between module and subconstruction (danger of pinch).

**DANGER! Risk of fatal injury due to electric shock!**
- Ensure that all electrical components are in a proper, dry, and safe condition.

- Ensure a tight connection between the plugs. Plugs click together audibly.

- A module with 1,210 mm-long cable can be wired as a "2nd next neighbor".
  - "2nd next neighbor" - Wiring without a return cable.
  - Standard wiring with a return cable.

- Do not connect modules with different orientations or angles of inclination in the same string.

**NOTE! Module damage may occur!**
- Ensure that the plug connections are not level with a water-channeling surface.

**WARNING! Fire Risk!**
- Do not use light concentrators (e.g. mirrors or lenses).

- Ensure that the cabling is not exposed and/or hanging and is protected from dirt and moisture.

- Ensure that all necessary safety and functional tests have been carried out according to current industry standards.

- Integrate the system into the existing lightening protection system in accordance with the applicable local regulations.
5 GROUNDING

Protective Grounding
- The modules must be grounded in accordance with the local statutory regulations.

Functional grounding
- When using an installation tilt of <5° a functional grounding at the negative generator connection must be implemented.
- Ensure that the difference of potential between the negative generator connection and the PE(N) of every MPP tracker of the respective inverters is 0 V.
- Follow the directions of the inverter manufacturer.
- Only use inverters which include licensed grounding kits.

6 FAULTS AND DEFECTS

DANGER!
Risk of fatal injury due to electric shock!
- Do not attempt to fix any problems yourself (e.g., glass cracks, damaged cables).
- Please contact an installer or Q CELLS Technical Customer Service Department.

7 DISPOSAL

- Do not disconnect modules yourself.
- Please commission a trade specialist.
- Dispose of modules in accordance with the local disposal regulations.

8 ELECTRICAL CONNECTION

Q CELLS solar modules are known for a long operating life and minimal maintenance effort and expense. Dirt and grime are usually washed away by rain. If the module is fully or partially shaded by dirt or debris (e.g., plants, bird droppings), it needs to be cleaned to prevent a loss of performance.

Maintenance
- The system should be inspected by an installer annually to check the following:
  - all system components sit securely and are corrosion free,
  - the connection is secure and all electrical components are clean and undamaged.

Cleaning

WARNING!
Risk of injury due to hot and live modules!
- Only clean modules that have cooled down.
- Do not carry or wear any electrically conductive parts.

WARNING!
Risk of falling due to unsecured access!
- Never access the installation area alone or without taking adequate security precautions.
- Please commission a trade specialist.

Clean the modules as follows:

NOTE!
Module surface damage may occur!
- Remove snow and ice without force (e.g. with a very soft broom)
- Do not scratch off dirt.
- Rinse dirt off with lukewarm water (dust, leaves, etc.)
- Use a soft cellulose cloth (kitchen roll) or sponge to carefully wipe off stubborn dirt. Do not use microfleece wool or cotton cloths.
- Use an alcohol based glass cleaner. Do not use abrasive detergents or tensides.

Isopropyl alcohol (IPA) can be used selectively to remove stubborn dirt and stains within one hour after emergence.
- Please follow the safety guidelines provided by the IPA manufacturer.
- Do not let IPA run down between the module and the frame or into the module edges.

NOTE! Module damage may occur!
- Do not clean modules with water if there is a risk of frost.

NOTE! Module damage may occur!
- Remove dirt with lukewarm water, a broom, or a soft cloth.
- Do not use tensides, scrapers, or any high-pressure water cleaning equipment.

NOTE! Module damage may occur!
- Do not clean modules with water if there is a risk of frost.

NOTE! Module damage may occur!
- Free the substructure from any dirt and debris (leaves, bird nests, etc.).