1 INTRODUCTION

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 and operation manual (hereafter also referred to as the “Manual”) provides instructions for the safe installation and operation 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.

Please ensure that this Manual is available to the operator at all times.

This Manual should be given to all subsequent owners or users of the solar modules.

All supplements received from the manufacturer should be included.

If your questions are not satisfactorily answered in the manual, please observe all other applicable documents.

Please ensure that this Manual is available to the operator at all times.

Please contact your system supplier.

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

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Additional information can be found on our website at www.q-cells.com.
Validity
These instructions are only valid for crystalline solar modules from the company Q CELLS as specified at chapter „2.1 Technical Specifications“. 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 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.

Additional 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
In addition to this Manual following technical information are relevant:

<table>
<thead>
<tr>
<th>DOCUMENT TYPE</th>
<th>TYPE</th>
<th>Q PEAK DUO-G5</th>
<th>Q PEAK DUO-BLK-G5</th>
<th>Q PLUS DUO-G5</th>
<th>Q PLUS DUO-BFR-G5</th>
</tr>
</thead>
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<td>Type</td>
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<td>Q.ANTUM DUO</td>
<td>Q.ANTUM DUO</td>
<td>Q.ANTUM DUO</td>
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</tr>
<tr>
<td>Area</td>
<td>1.69 m²</td>
<td>1.69 m²</td>
<td>1.69 m²</td>
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<tr>
<td>Weight</td>
<td>18.7 kg</td>
<td>19.2 kg</td>
<td>18.7 kg</td>
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<tr>
<td>Max. system voltage VSYS</td>
<td>1000 V</td>
<td>1000 V</td>
<td>1500 V</td>
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<tr>
<td>Max. reverse current</td>
<td>20 A</td>
<td>20 A</td>
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</table>

Permissible temperature range
–40°C to +85°C (–40°F bis +185°F)

Junction box protection class
IP67 with bypass diode

Connector protection class
IP68 and IP65

Fire protection class
C C C C

Max. test load Push/Pull
5,400 Pa / 4,000 Pa
5,400 Pa / 4,000 Pa
5,400 Pa / 4,000 Pa
5,400 Pa / 4,000 Pa

Max. design load Push/Pull
3,600 Pa / 2,867 Pa
3,600 Pa / 2,867 Pa
3,600 Pa / 2,867 Pa
3,600 Pa / 2,867 Pa

Certificates
VDE Quality Tested; CE-compliant; IEC 61215:2016; IEC 61730:2016; Application Class II; UL 1703

1 Test and design load in accordance with IEC 61215:2016, depending on mounting options (see section „2.3 Mounting Options“)
### 2 PLANNING

#### 2.2 REQUIREMENTS

**Installation Site**

- Please note the following guidelines that apply to the installation site:
  - The modules have been tested according to IEC 61215.
  - Solar modules are not explosion-proof and are not suitable for use in explosive environments.
  - 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 close proximity to air conditioning systems.
  - Do not install modules above 4000 m (13120 ft) altitude.
  - Do not use modules as a substitute for the normal roofing.
  - Do not install modules in locations where they may be submerged in water.
  - Do not install modules in locations with increased salt content in the air (e.g. close to the sea).
  - Ensure that the drainage holes in the frame are not covered.
  - Maintain the permissible angle of inclination.
    - Minimum angle of inclination: 3°
    - Inclination angles above 75° may be limited by local regulations.
    - ≥2° self-cleaning effect.
    - Follow the directions for installation angles <5° ("Grounding", page 18).

**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).

**Mounting Structure Requirements**

- The modules shall be installed and operated on mounting structures that comply with any applicable laws and stipulations as well as with the following:
  - Conform to the necessary structural requirements.
  - Compliant with local snow and wind loads.
  - Properly fastened to the ground, the roof, or the façade.

**Mounting System Requirements**

- Use customary clamps that satisfy the following requirements:
  - Clamp height compliant with a 32 mm frame height.
  - Clamp width: ≥ 40 mm.
  - Clamp depth: 7-12 mm. (applicable for all CL clamping mounting options)
  - Clamp do not deform the frame.
  - Clamps that satisfy the structural requirements of the installation site.
  - Long-term stable clamps that securely affix the module to the mounting frame.

**Module Orientation Requirements**

- Vertical or horizontal installation is permitted.
  - Ensure that rain and melting snow can run off freely. No water accumulation.
  - Ensure that the drainage holes in the frame are not covered. No sealing.

**Fig. 3:** Installation options for crystalline Q CELLS modules. All dimensions are given in mm. Also observe the maximum test loads and clamping range as specified on the following page.

The illustrated installation options apply for both horizontal and vertical module orientation.
## 2 PLANNING
### 2.3 MOUNTING OPTIONS

#### Specifications

<table>
<thead>
<tr>
<th>MODULE TYPE</th>
<th>MOUNTING OPTION</th>
<th>POSITION OF CLAMPS* (MM)</th>
<th>TEST LOAD</th>
<th>DESIGN LOAD</th>
<th>SAFETY FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.PLUS DUO-G5.X</td>
<td>CL1 / CL3</td>
<td>250 - 450</td>
<td>5400/4000</td>
<td>3600/2670</td>
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<tr>
<td>Q.PLUS DUO BLK-G5.X</td>
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<td></td>
<td></td>
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<tr>
<td>Q.PLUS DUO-G5.X</td>
<td>IP1</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.PLUS DUO-BFR-G5.X</td>
<td>CL1</td>
<td>0 - 250</td>
<td>2400/2400</td>
<td>1600/1600</td>
<td>1.5</td>
</tr>
<tr>
<td>Q.PEAK DUO-G5.X</td>
<td>CL2a (with rails) / CL2b (without rails)</td>
<td>0 - 300</td>
<td>4000/4000</td>
<td>2670/2670</td>
<td></td>
</tr>
<tr>
<td>Q.PEAK DUO-G5.X</td>
<td>CL4</td>
<td>0 - 300</td>
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<td>CL5</td>
<td>short side: 0 - 250</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>long side: 300 - 450</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The below mounting options are only possible under certain conditions.

#### Notes

- Use M8 corrosion-proof screws and washers (diameter ≥ 15.8 mm or ≥ 0.62 in) for FB1 and FB2 mounting.
- Module bend under loads. Therefore, sharp objects (e.g., screws) must not be mounted near the module backside.
- The loads in the table are related to the mechanical stability of the solar modules. The mechanical stability of the mounting system including clamps has to be evaluated by the system supplier. The Q CELLS listed test load values were determined with the following clamp parameters: clamp width = 40 mm and clamp depth = 10 mm. The system installer is responsible for the determination of location-specific load requirements.
- Ensure, that the subconstruction does not touch the junction box (even under load). Ensure that the clamps or insertion profiles etc. do not touch the glass (even under load).
- Ensure, that the connection cables of the junction box do not run between laminate and mounting rails.
- Ensure, minimum support depth of 15 mm on the back side of the module for IP1, IP2, CL2a, CL3, CL4 and CL5. Ensure minimum support depth of 10 mm on the front side of the module for IP1 and IP2.
- CL1, CL2a and CL3 with rails: Ensure that module frame is fixed directly on the rail of the substructure (no spacer allowed between the module and substructure).
- Module bend under loads. Therefore, sharp objects (e.g., screws) must not be mounted near the module backside.
- Use M8 corrosion-proof screws and washers (diameter ≥ 15.8 mm or ≥ 0.62 in) for FB1 and FB2 mounting.

### 2.4 ELECTRICAL LAYOUT

#### Module Selection

For detailed key electrical data, please refer to the actual data sheet referring to the relevant Module (available at www.q-cells.com).
- For maximum energy yields, mismatches of specified electric current (I_{MP}) of more than 5 % should be avoided for all modules connected in series.
- Ensure that the maximum reverse current load capacity indicated in the data sheet is met. 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 a single inverter or MPP tracker.
  2) **Layout with string fuses:** Place fuses for each string of modules at the plus and minus ends. Use gPV-fuses according to IEC 60269-6. Observe the maximum permitted number of strings as indicated in the specifications provided by the respective string fuse manufacturer and the technical guidelines.

#### 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_{MC}) of components
- Calculating the current measurement values (I_{MC}) 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 of all the relevant modules to be installed.
- Take into account all possible operating situations and all relevant technical norms and regulations when designing the system. It has to be ensured 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 met.

**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.

<table>
<thead>
<tr>
<th><img src="image1.png" alt="Warning! Fire Risk!" /></th>
<th><img src="image2.png" alt="Danger! Risk of fatal injury due to electric shock!" /></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="GB" /> <img src="image4" alt="I" /> <img src="image5" alt="D" /></td>
<td><img src="image6.png" alt="Do not install damaged modules." /> <img src="image7.png" alt="Inform your distributor of any damages immediately." /></td>
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<tr>
<td><img src="image8.png" alt="Inspect the packaging for damages." /> <img src="image9.png" alt="Contact the transport company regarding any damage to the packaging and follow their instructions." /> <img src="image10.png" alt="Follow any instructions on the packaging." /></td>
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<tr>
<td><img src="image12.png" alt="Leave modules in their original packaging until installation." /> <img src="image13.png" alt="Store the modules securely in cool and dry rooms. The packaging is not weatherproof." /></td>
<td><img src="image14.png" alt="Note! Module damage may occur!" /></td>
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<tr>
<td><img src="image15.png" alt="Never lift or move the module with the connection cables or junction box. Carry modules upright and horizontally as shown." /></td>
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<tr>
<td><img src="image17.png" alt="Never step on modules." /> <img src="image18.png" alt="Do not subject modules to any mechanical stress." /> <img src="image19.png" alt="Do not allow any objects to fall onto modules" /></td>
<td><img src="image20.png" alt="Only make modifications to the module which have been confirmed in writing by Q CELLS." /></td>
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<td><img src="image21.png" alt="Do not install modules indoors." /> <img src="image22.png" alt="Do not install modules on moving objects." /></td>
<td><img src="image23.png" alt="Do not install modules near flammable gas / vapors." /> <img src="image24.png" alt="Do not install modules in close proximity to air conditioning systems." /></td>
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<tr>
<td><img src="image25.png" alt="Do not drop modules." /></td>
<td><img src="image26.png" alt="Do not stack modules." /></td>
</tr>
</tbody>
</table>
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.

**Do not carry out the installation alone.**

**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.

**Option 1:**
- Fasten the module with 4 clamps in the specified clamping range, see Fig. 3, p. 7.
- Maintain an interval of at least 10 mm between two modules along the short side and 5 mm along the long side.
- Tighten clamps according to manufacturer’s instructions.

**Option 2:**
- Install the module at the 4 mounting points, see Fig. 3, p. 7.
- Tighten screws according to manufacturer’s instructions.

**Option 3:**
- Install the module using mounting profiles, see Fig. 3, p. 7.

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

3 INSTALLATION

3.3 MODULE INSTALLATION
**4 ELECTRICAL CONNECTION**

**4.1 SAFETY**

DANGER! Risk of fatal injury due to electric shock!

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

- Do NOT unplug the cable when under load.
- Do NOT connect any exposed cable ends.
- Electrical work may only be performed by qualified and skilled personnel (see page 3).

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 be aware 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.

- 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 time intervals specified by the inverter manufacturer after switching off the inverter.
- Make sure that the plugs can not be connected unintentionally.
- Before working on the contacts, check them for safety extra-low voltage.

- 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.
- Cover connectors by suitable protective caps until installation.

- Only use dry, insulated tools for electrical work.

- Insulate any exposed cable ends.
- Only connect cables with plugs.

**4.2 ELECTRICAL INSTALLATION SAFETY**

1. Switch off the inverter.

2. Switch off the DC circuit breaker.

3. Measure shutdown in DC String. (no DC current flow).

4. Disconnect plugs by the use of appropriate and qualified tools of the manufacturer.

5. When connecting the modules proceed in reverse order.

- Electrical work may only be performed by qualified and skilled personnel (see page 3).
- Ensure correct polarity.

Danger! Risk of fatal injury due to electric shock!

- Be sure to maintain the time intervals as specified by the inverter manufacturer between switching off the inverter and beginning any further work.
### 4 ELECTRICAL CONNECTION

#### 4.3 CONNECTION OF MODULES

- Use solar cables for the connection at the junction box outlet.
- Use the same, inverter-compatible plugs.
- Use minimum 4 mm² copper wires insulated for a minimum of 90 °C for field connections.

**Note! Module damage may occur!**
- Ensure that the cabling is not under mechanical stress (Comply with bending radius of ≥ 60 mm).
- Ensure that the cables do not run between module and mounting rail or structure (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 for a tight connection between the plugs. Plugs click together audibly.**

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

**To avoid complex cabling arrangements, it is often advantageous to rotate some modules 180°.**
- Module orientation can clearly be identified from the front side by the serial number and barcode labelled behind the module glass on the side with negative connection cable.

#### 4.4 AFTER INSTALLATION

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

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

**Ensure that the plug connections are secured away from any water-channeling surface.**

**Integrate the system into the existing lightening protection system in accordance with the applicable local regulations.**

**Note! Module damage may occur!**
- Ensure that the cabling is not exposed and/or hanging and is protected from dirt, moisture and mechanical friction.

**Ensure that all dry cleaning or use of rotating brushes.**
- Modules must be cleaned manually and only with sufficient water.
Protective Grounding
- The modules must be grounded in accordance with the local statutory regulations.

Functional grounding
- For installations located in tropic regions (between 23.5° N and 23.5° S) with a module tilt of < 5°, functional grounding at the negative generator connection on the DC side must be implemented.
- Ensure that the difference of potential between the negative generator connection and the local earth potential (e.g. substructure, PE of the inverter) on each string in operation mode is positive or 0 V.
- Follow the directions of the inverter manufacturer and local statutory regulations.
- Only use inverters which include licensed grounding kits.
- Functional grounding has also to be implemented in installation sites with increased salt content in the air. (e.g. close to the sea).

**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 by yourself.
- Please contact a Q CELLS Technical Customer Service Department.
- Dispose of modules in accordance with the local disposal regulations.

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 PV system has to be inspected regularly by certified personnel.
- The time intervals and extent of the inspection can depend on local circumstances (e.g. salt, ammonia content in the air, high humidity etc.). The customer/operator must inform himself about time intervals and extend of necessary inspections.
- Inspections have to be performed especially after extraordinary events (e.g. storm, hail, high snow loads etc.)
- During the inspections it has to be checked that the components are secure, undamaged and clean.

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.

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