



Industronic Solar

Manual de instalación

Panel Solar 365 w

Q CELLS Q.Peak L-G5 365

Conserve este manual porque contiene información útil para su equipo



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With solar modules from Hanwha 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 Hanwha 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 (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 installation manual is available to the operator at all times.
- ➔ This installation manual should be given to all subsequent owners or users 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 North America. These instructions contain information regarding the safe handling and use of quality crystalline solar modules from Hanwha 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.

SYMBOL	DESCRIPTION
➔	Procedure with one or more steps.
•	Lists of items
✓	Ensure that when carrying out a procedure, you check the results of said procedure.
⊘	Prohibited.
	Beware of possible danger or damage. Categories: <ul style="list-style-type: none"> • Danger: Risk of fatal injury • Attention: Risk of serious injury or damage to property • Note: Risk of damage to product

Units

Where both metric and U.S. units (for example inches) are shown, metric units are definitive. References to “Data Sheet” or “Module Data Sheet” refer to the Module Data Sheet applicable to the module being used.

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, codes (NEC, CEC), standards (NRTL, OSHA), 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.

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 UL standards, NEC regulations (USA) or CEC regulations (Canada) as well as accident-prevention regulations, and the regulations of the local energy provider.

Validity

These instructions are only valid for crystalline solar modules from the company Hanwha Q CELLS. Hanwha 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.

Hanwha Q CELLS assumes no liability on the basis of these instructions. Hanwha Q CELLS is only liable in the context of contractual agreements or in the context of accepted guarantees. Hanwha 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 information

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

PRODUCT LINE	Q.PLUS L-G4.1/ Q.PEAK L-G4.1/ Q.PEAK L-G5.1	Q.PLUS L-G4.2/ Q.PLUS L-G4.2/TAA/ Q.PEAK L-G4.2/ Q.PEAK L-G5.2
Type	Q.ANTUM	Q.ANTUM
Length [in]	78.5 (1994 mm)	78.5 (1994 mm)
Width [in]	39.4 (1000 mm)	39.4 (1000 mm)
Frame height [in]	1.38 (35 mm)	1.38 (35 mm)
Weight [lb]	50.7 (23 kg)	50.7 (23 kg)
Max. system voltage V_{sys} [V]	1000	1500
Max. fuse rating [A]	20	20
Permissible temperature range [°F (°C)]	-40 to +185 (-40 to +85)	
Junction box protection class	≥ IP67 with bypass diodes	≥ IP67 with bypass diodes
Connector protection class	IP68	IP68
Fire protection class	C / Type 1	C / Type 1
Max. test load push/pull ¹ [lbs/ft ²]	112 (5400 Pa)/ 50 (2400 Pa)	112 (5400 Pa)/ 50 (2400 Pa)
Max. design load push ¹ [lbs/ft ²]	75 (3600 Pa)	75 (3600 Pa)
Max. design load pull ¹ [lbs/ft ²]	33 (1600 Pa)	33 (1600 Pa)
Certificates	CE-compliant; IEC 61215:2016; IEC 61730:2016; Application Class A; UL 1703	

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

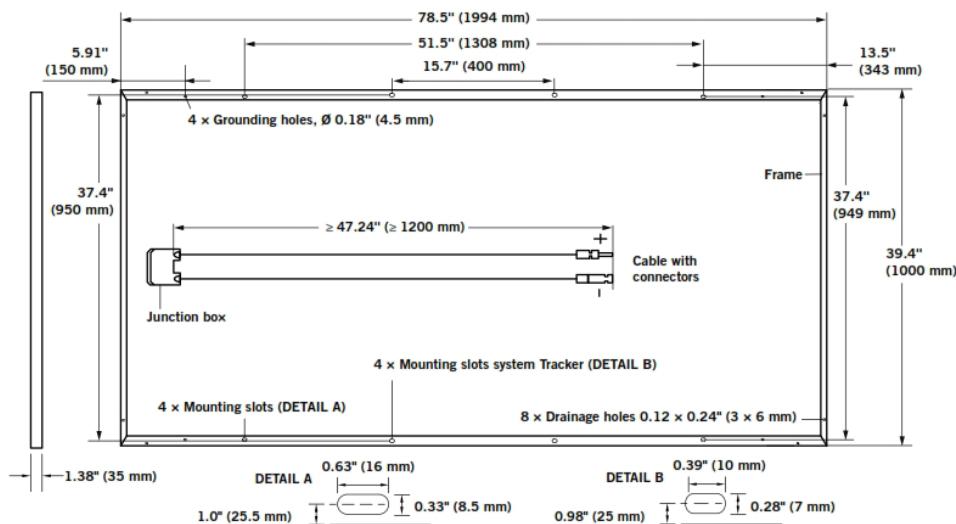


Fig. 1: External dimensions (inch and mm) and components for Q.PLUS L-G4.1, Q.PEAK L-G4.1, Q.PEAK L-G5.1, Q.PLUS L-G4.2, Q.PLUS L-G4.2/TAA, Q.PEAK L-G4.2, Q.PEAK L-G5.2

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.
- ➔ 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.
- ➔ Do not use modules as a substitute for the normal roofing (e.g. modules are not rainproof).
- ➔ Do not install modules above 13.120ft (4000m) altitude above sea level.
- ➔ In locations with increased salt content in the air (e.g. close to the sea) special precautions must be taken (see “Grounding” and “Maintenance”).
- ➔ Do not bring any chemical substance (e.g. oil, solvent etc.) into contact with any part of the panel. Only substances, which are released by Q CELLS, are allowed to be used during installation, operation and maintenance.
- ➔ Any installation of modules on surfaces of water is prohibited. This includes installations on floating as well as pile-based platforms. Hanwha Q CELLS may extend the coverage of its warranty to such installations, based on a case by case assessment of the system design and location. A prior written consent by the warrantor is required in any case.

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 $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+185\text{ }^{\circ}\text{F}$).
- Pull loads and push loads according to chapter 2.3 mounting options (allowed static load requirements ('Test Load' in accordance with IEC 61215 and 'Design Load x1.5' in accordance with UL 1703).
- Installation using a mounting frame for solar modules.

Mounting Structure Requirements

Requirements for the mounting frame:

- Conform 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.
- Avoid the use of different metals to prevent contact corrosions.
- 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 comply with the requirements:

- Clamp width: $\geq 1.50\text{ in}$ (38 mm).
- Clamp height compliant with a 1.38 in (35 mm) frame height.
- Clamp depth: 0.20–0.47 in (5–12 mm). (applicable for all CL and TC clamping mounting options at section „2.3 Mounting options“)
- Clamps are not in contact with the front glass.
- Clamps 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.

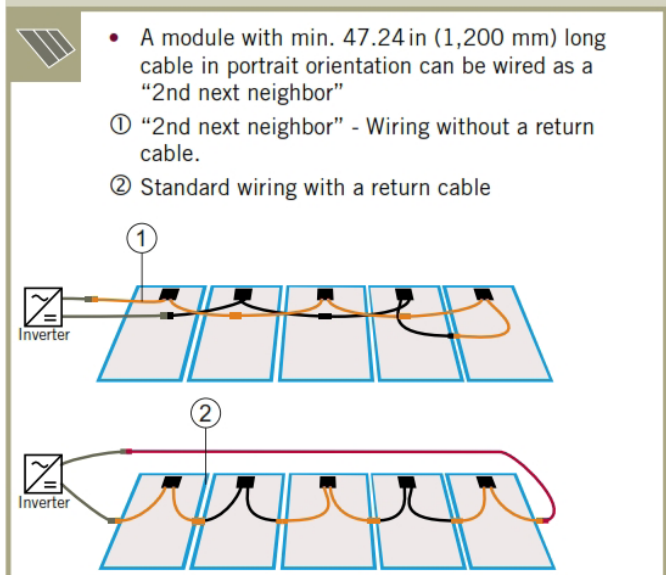
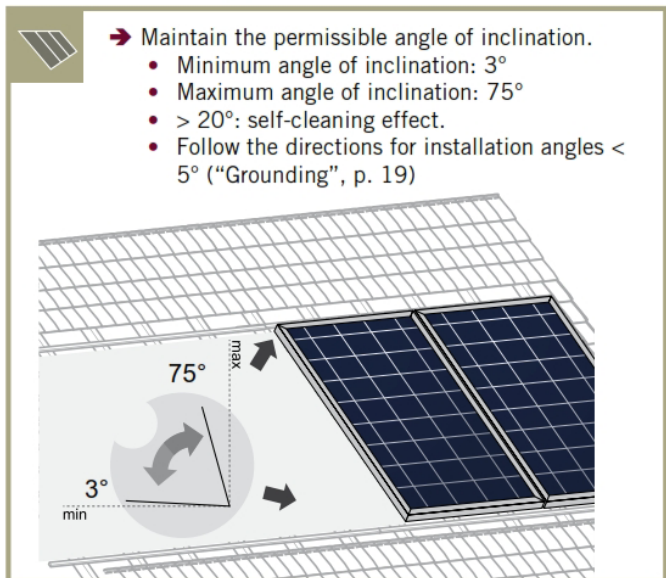
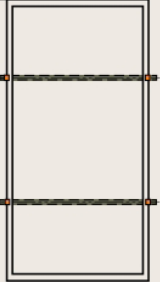



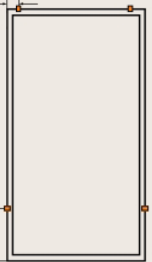
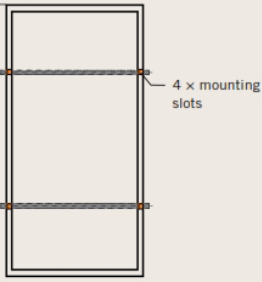

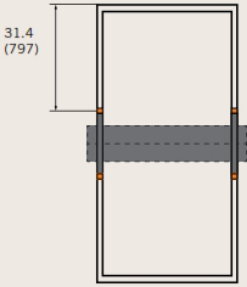
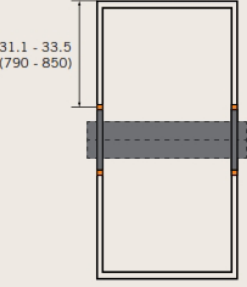


Fig. 2: Installation options for crystalline Q CELLS modules. All dimensions are given in inch (mm in brackets). Also observe the allowed static loads and clamping range as specified on page 9. The illustrated installation options apply for both horizontal and vertical module orientation.

Module
 Clamp
 Subconstruction
 Mounting profile

TYPE OF INSTALLATION	POINT MOUNTING SYSTEM	LINEAR MOUNTING SYSTEM
<p>INSTALLATION WITH CLAMPS</p>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: left; margin-right: 10px;"> <p>0-9.8 (0-250)</p> <p>9.8-19.7 (250-500)</p> </div>  <div style="margin-left: 10px;"> <p>CL1</p> </div> </div> <div style="display: flex; justify-content: space-around; width: 100%;"> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: left; margin-right: 10px;"> <p>0 - 11.8 (0 - 300)</p> </div>  <div style="margin-left: 10px;"> <p>CL2a</p> </div> </div> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: left; margin-right: 10px;"> <p>0 - 11.8 (0 - 300)</p> </div>  <div style="margin-left: 10px;"> <p>CL2b</p> </div> </div> </div> </div>	<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: left; margin-right: 10px;"> <p>9.8-19.7 (250 - 500)</p> </div>  <div style="margin-left: 10px;"> <p>CL3</p> </div> </div>
<p>HYBRID CLAMPING</p>	<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: left; margin-right: 10px;"> <p>3.94 - 9.84 (100 - 250)</p> <p>9.84 - 19.7 (250 - 500)</p> </div>  <div style="margin-left: 10px;"> <p>CL5</p> </div> </div>	
<p>INSTALLATION ON MOUNTING POINTS</p>	<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: left; margin-right: 10px;"> <p>13.5 (343)</p> </div>  <div style="margin-left: 10px;"> <p>4 x mounting slots</p> <p>FB1</p> </div> </div>	

TYPE OF INSTALLATION	POINT MOUNTING SYSTEM	LINEAR MOUNTING SYSTEM
INSTALLATION WITH INSERTION PROFILES	NOT PERMITTED	 <p style="text-align: center;">IP1 IP2</p>
TRACKER INSTALLATION ON MOUNTING POINTS	 <p style="text-align: center;">TB1</p>	
TRACKER INSTALLATION WITH CLAMPS	 <p style="text-align: center;">TC1</p>	

Specifications

MODULE TYPE	MOUNTING OPTION	POSITION OF CLAMPS ¹ [IN (MM)]	TEST-LOAD PUSH/PULL ² [PA]	DESIGN LOAD PUSH/PULL ² [PA]	SAFETY FACTOR
Q.PLUS L-G4.1 Q.PLUS L-G4.2 Q.PEAK L-G4.1 Q.PEAK L-G4.2 Q.PEAK L-G5.1 Q.PEAK L-G5.2 Q.PLUS L-G4.2/TAA	CL1 (4 point clamping on long side)	9.8-19.7 (250-500)	5400/2400	3600/1600	1.5
	FB1 (4 screws mounting on long side)	13.5 (343)			
	CL3 (4 point clamping on long side)	9.8-19.7 (250-500)	3600/2400	2400/1600	1.5
	IP1 (Slide-in / long side)	-	3600/2400	2400/1600	1.5
	CL1 (4 point clamping on long side)	0-9.8 (0-250)	2400/2400	1600/1600	1.5
	CL5	Shortside: 3.94-9.84 (100-250) Longside: 9.84-19.7 (250-500)	3600/2400	2400/1600	1.5
	Tracker TB1 (4 point tracker mounting on long side)	31.4 (797) at Tracker holes	2400/2400	1600/1600	1.5
	Tracker TC1 (4 point tracker mounting on long side)	31.1-33.5 (790-850)	2400/2400	1600/1600	1.5

➔ The below mounting options are only possible under certain conditions.

MODULE TYPE	MOUNTING OPTION	POSITION OF CLAMPS ¹ [IN (MM)]	TEST-LOAD PUSH/PULL ³ [PA]	DESIGN LOAD PUSH/PULL ³ [PA]	SAFETY FACTOR
Q.PLUS L-G4.1 Q.PLUS L-G4.2 Q.PEAK L-G4.1 Q.PEAK L-G4.2 Q.PEAK L-G5.1 Q.PEAK L-G5.2 Q.PLUS L-G4.2/TAA	CL2a (with rails)	0-11.8 (0-300)	2400/1600	1600/1067	1.5
	CL2b (without rails)	0-11.8 (0-300)	1800/1600	1200/1067	1.5
	IP2 (Slide-in / short side)	-	1800/1600	1200/1067	1.5

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

² Loads according to IEC 61215-2:2016 and UL 1703.

³ Test procedure according to IEC 61215-2:2016 and UL 1703. Mounting options do not fulfill the requirements of the standards.

ATTENTION

- ➔ 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 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 0.79 in (20 mm) on the back side of the module for IP1, IP2, CL2b and CL5. Ensure minimum support depth of 0.39 in (10 mm) on the front side of the module for IP1 and IP2.
- ➔ CL1 and CL2a 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) shall not be mounted near the module backside.
- ➔ Use M8 corrosion-proof screws and washers (diameter \geq 15.8 mm or \geq 0.62 in) for FB1 and FB2 mounting.
- ➔ Use M6 corrosion-proof screws and washers (diameter \geq 13.2 mm or \geq 0.52 in) for TB1 mounting.

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 (refer to section 690-8 of the NEC for an additional multiplying factor of 125 percent [80 percent derating] which may be applicable).

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 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 an 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.

NOTE!

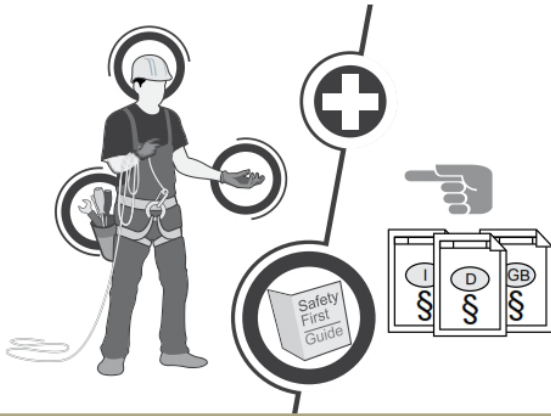
When installing different product versions, the lowest minimum permitted reverse current load capacity applies.

Inverters

Inverters with or without transformers may be used.

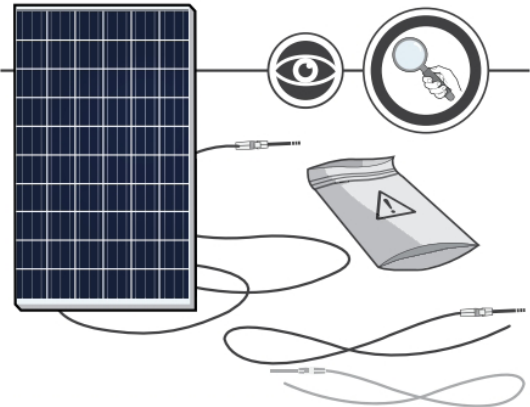


- Ensure that all personnel are aware of and adhere to accident-prevention and safety regulations.
- While working wear clean gloves.

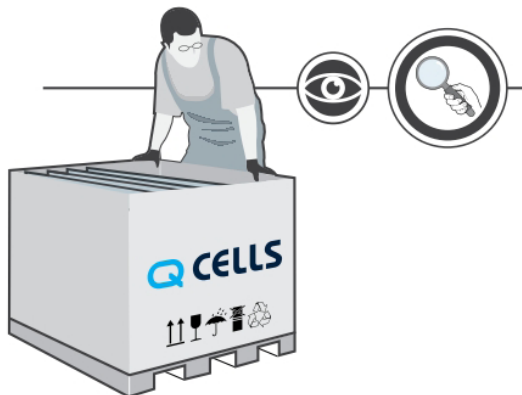


DANGER! Risk of fatal injury due to electric shock!

- Do not install damaged modules.
- Inform your vendor of any damages immediately.

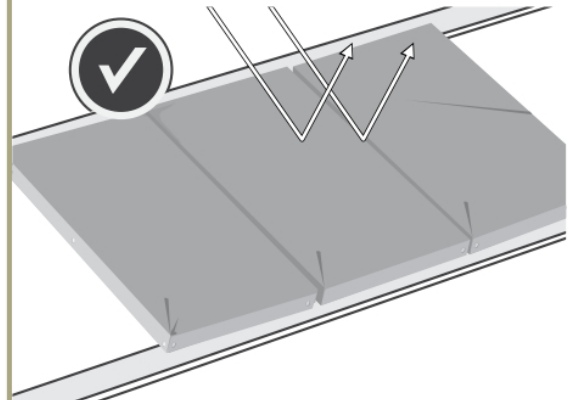


- Inspect the packaging for damages.
- Contact the transport company regarding any damage to the packaging.
- Follow any instructions on the packaging.

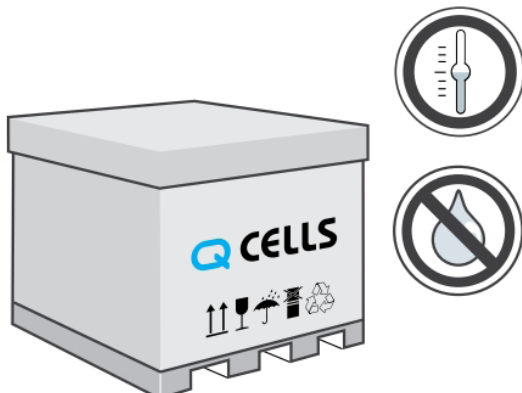


DANGER! Risk of fatal injury due to electric shock!

- Cover the modules with an opaque material during installation.

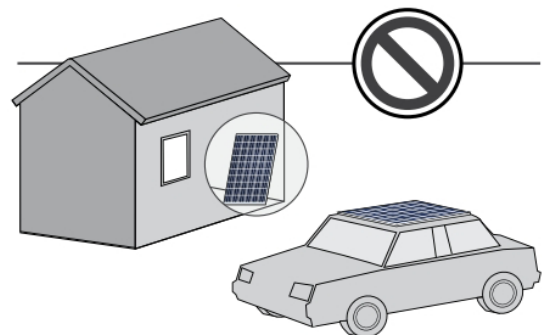


- Leave modules in their original packaging until installation.
- Store the modules securely in cool and dry rooms. The packaging is not weatherproof.



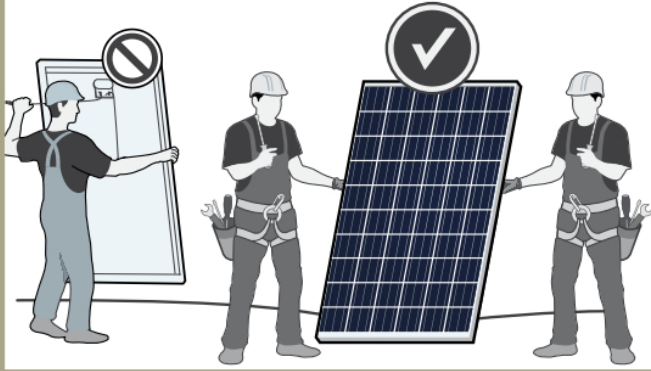
WARNING! Fire Risk!

- Do not install modules indoors.
- Do not install modules on moving objects.

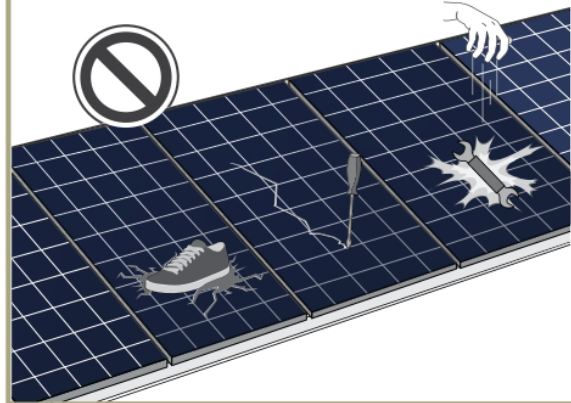


**NOTE! Module damage may occur!**

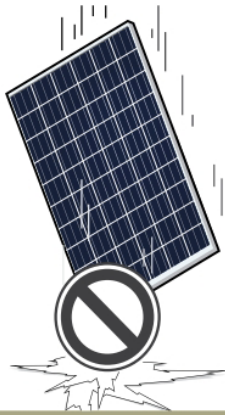
- ➔ Never lift or move the module with the connection cables or junction box.
- ➔ Carry modules upright and horizontally as shown.

**NOTE! Module damage may occur!**

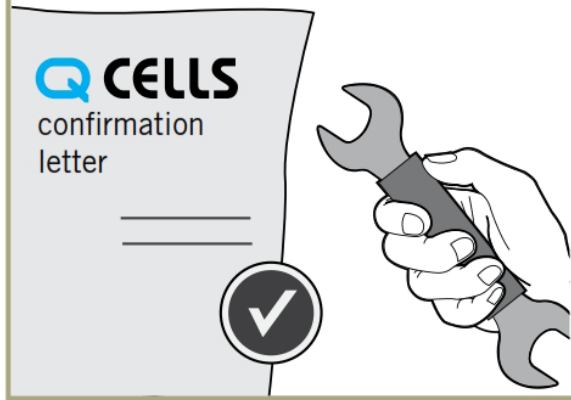
- ➔ Never step on modules.
- ➔ Do not subject modules to any mechanical stress.
- ➔ Do not allow any objects to fall onto modules

**NOTE! Module damage may occur!**

- ➔ Do not drop modules.

**NOTE! Module damage may occur!**

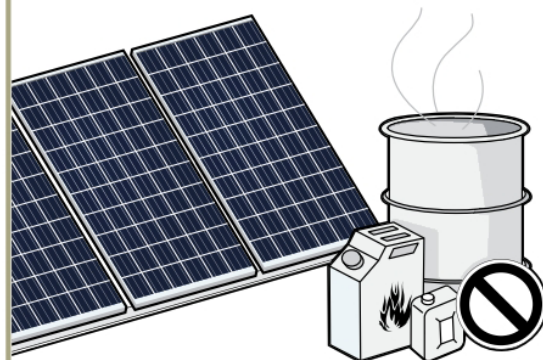
- ➔ Only make modifications to the module which have been confirmed in writing by Q CELLS.

**NOTE! Module damage may occur!**

- ➔ Do not stack modules.

**NOTE! Module damage may occur!**

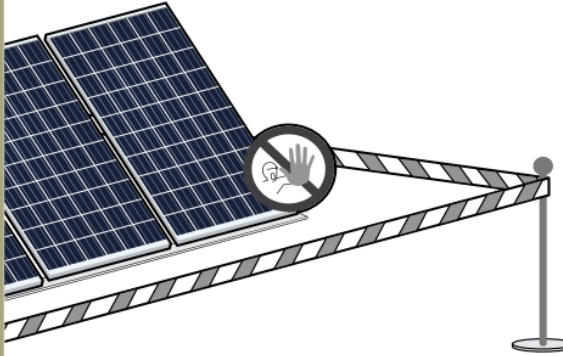
- ➔ Do not install modules near flammable gas/vapors.
- ➔ Do not install modules in close proximity to air conditioning systems.





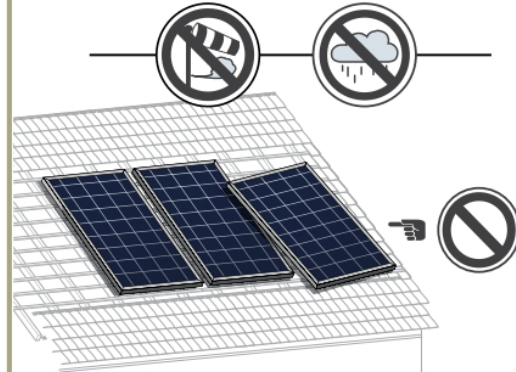
DANGER! Risk of fatal injury due to electric shock!

- ➔ Block off the installation zone.
- ➔ Keep children and unauthorized individuals away from the solar power system.



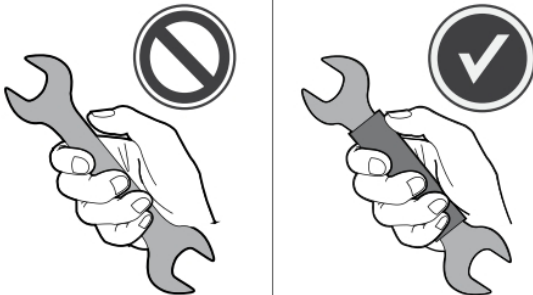
WARNING! Risk of injury due to falling modules!

- ➔ Secure modules during installation.
- ➔ Do not install modules in windy or wet weather.

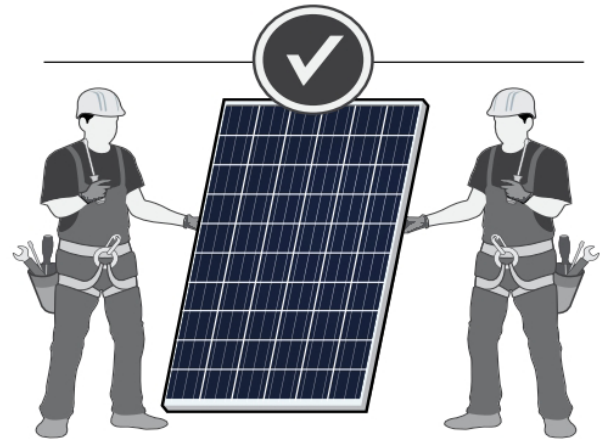


DANGER! Risk of fatal injury due to electric shock!

- ➔ Only use dry, insulated tools.

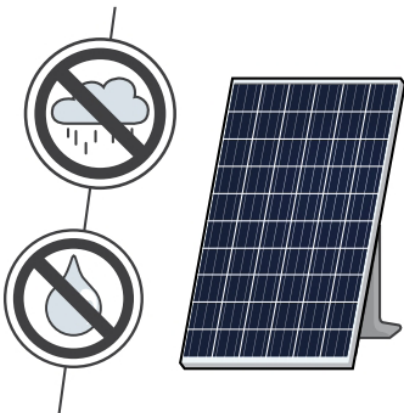


- ➔ Do not carry out the installation alone.

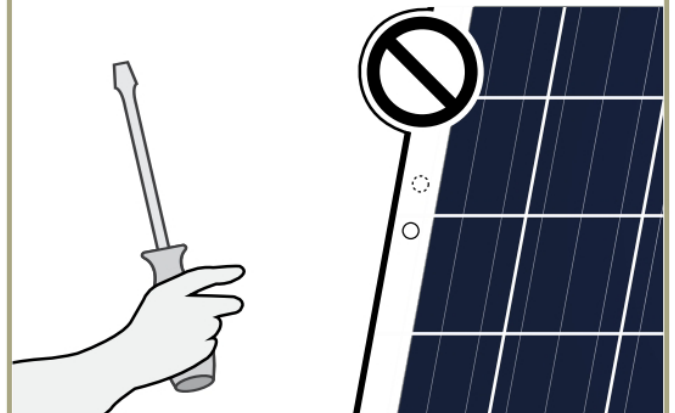


DANGER! Risk of fatal injury due to electric shock!

- ➔ Ensure that modules and tools are not subject to moisture or rain at any time during installation.

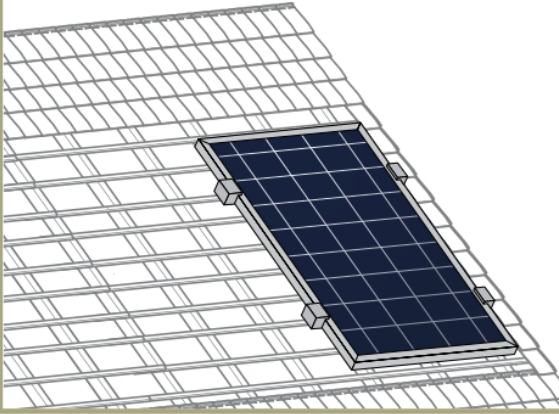


- Only install undamaged modules and components.
- ➔ Do not drill any other holes (e.g. do not drill any additional holes).

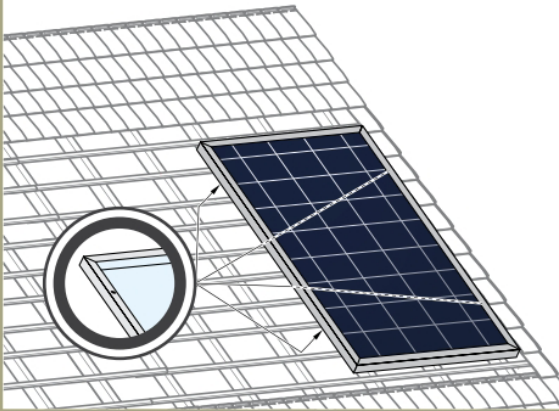


**Option 1:**

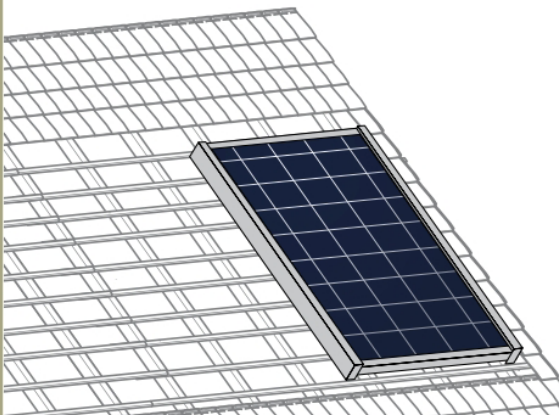
- Fasten the module with 4 clamps in the specified clamping range, see page 7.
- Tighten clamps according to manufacturer's instructions.

**Option 2:**

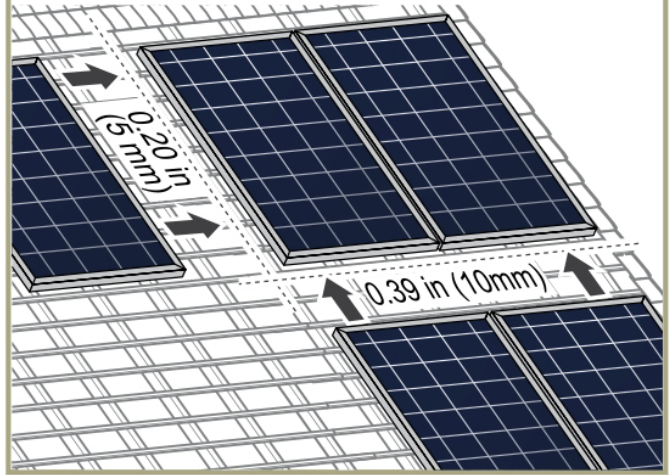
- Install the module at the 4 mounting points, see page 7.
- Tighten screws according to manufacturer's instructions.

**Option 3:**

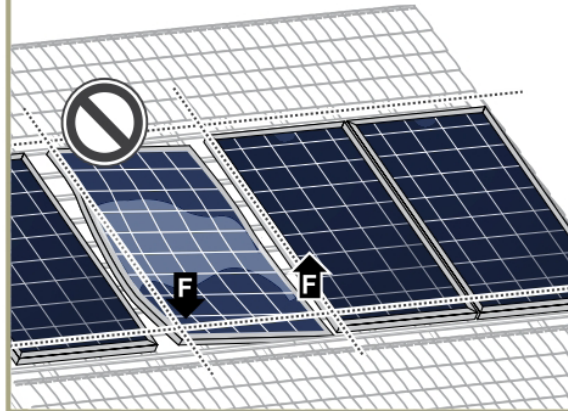
- Install the module using mounting profiles, see page 7.



- Maintain an interval of at least 0.39 in (10 mm) between two modules along the short side and 0.20 in (5 mm) along the long side.

**NOTE! Module damage may occur!**

- Do not subject modules to mechanical tension. Max. torsion 0.39 in/yd (10 mm/m).



**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.

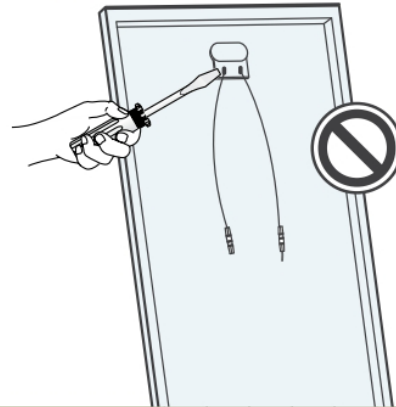
- ➔ Do NOT unplug the cable when under load.
- ➔ Do NOT connect any exposed cable ends.

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.

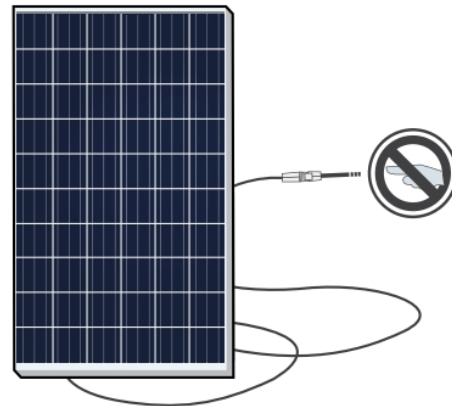
- ➔ Please be aware of the entire open circuit voltage is active even at low levels of solar irradiation.
- ➔ Please follow the valid national regulations and safety guidelines for the installation of electrical devices and systems.
- ➔ Please make sure to take all necessary safety precautions. With 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.
- ➔ Change of bypass diodes is only allowed by qualified and trained personnel in disconnected and covered state.

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

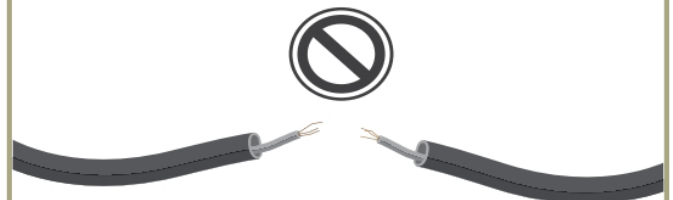
- ➔ Never touch live contacts with bare hands.
- ➔ Cover connectors by suitable protective caps until installation.

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

- ➔ Only use dry, insulated tools for electrical work.

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

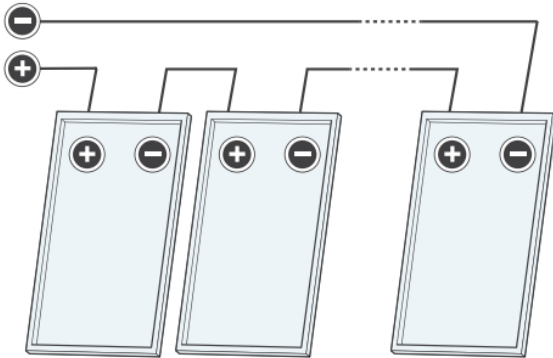
- ➔ Insulate any exposed cable ends.
- ➔ Only connect cables with plugs.





DANGER! Risk of fatal injury due to electric shock!

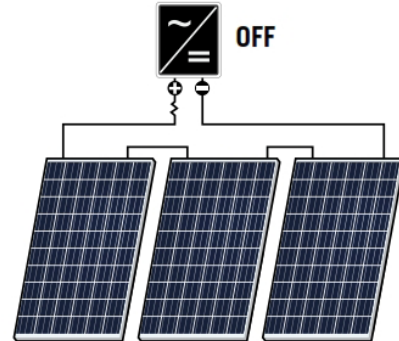
➔ Ensure correct polarity.



DANGER! Risk of fatal injury due to electric shock!

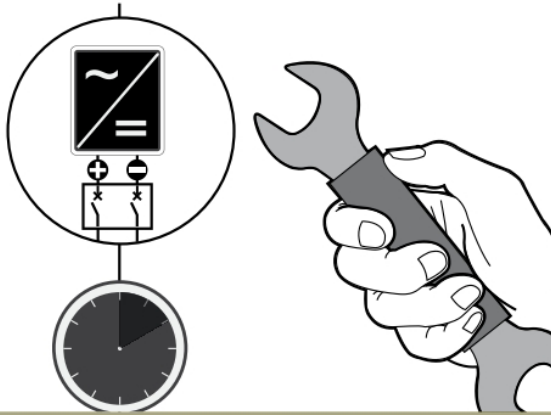
➔ Never plug or unplug the cable when under load. Modules must not carry any current.

1. Switch off the inverter.

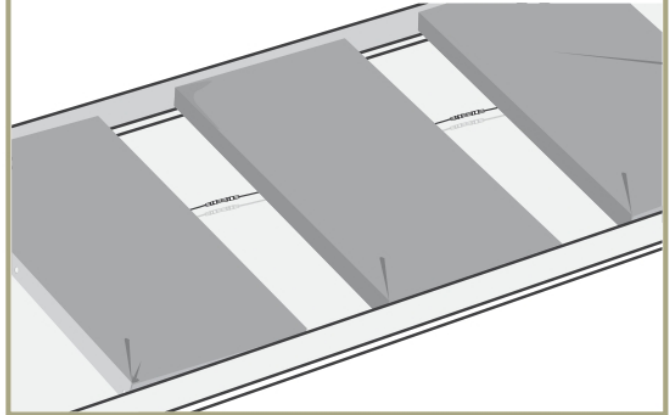


DANGER! Risk of fatal injury due to electric shock!

➔ Be sure to maintain the time intervals as specified by the inverter manufacturer between switching off the inverter and beginning any further work.

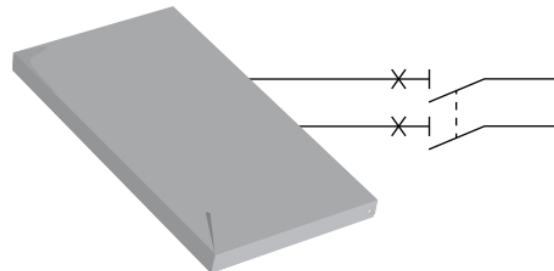


2. Cover the modules to be connected or disconnected.



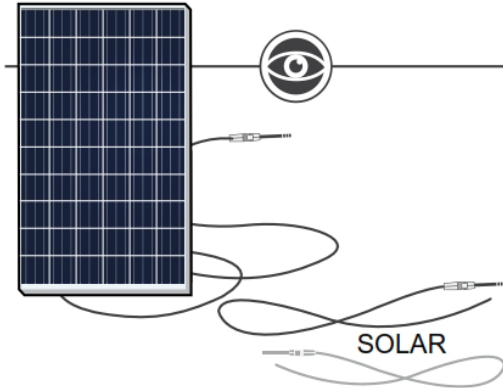
3. Switch off the DC circuit breaker.

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



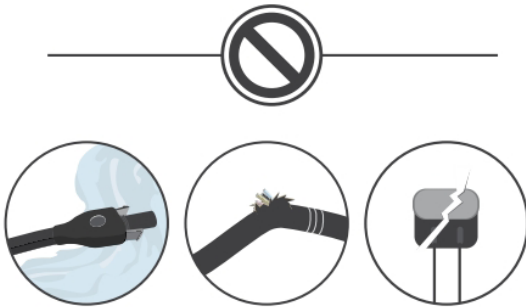


- ➔ Use solar cables for the connection at the junction box outlet.
- ➔ Use the same, inverter-compatible plugs.
- ➔ Use minimum 4 mm² copper wires insulated for a minimum of 90°C for field connections.

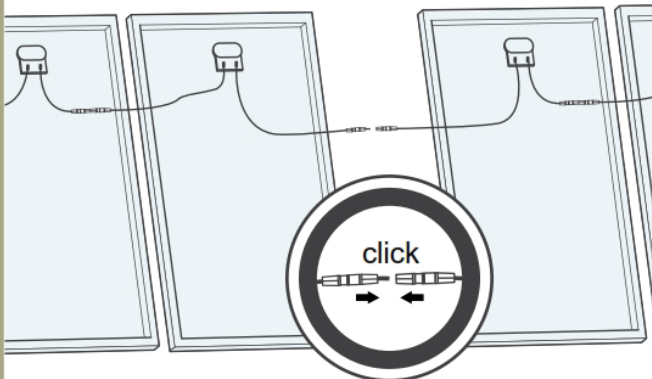


DANGER! Risk of fatal injury due to electric shock!

- ➔ Ensure that all electrical components are in a proper, dry, and safe condition.

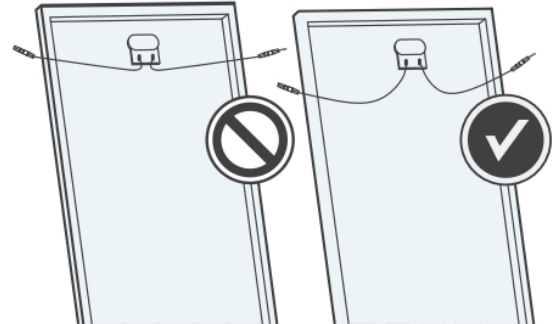


- ➔ Ensure for a tight connection between the plugs. Plugs click together audibly.

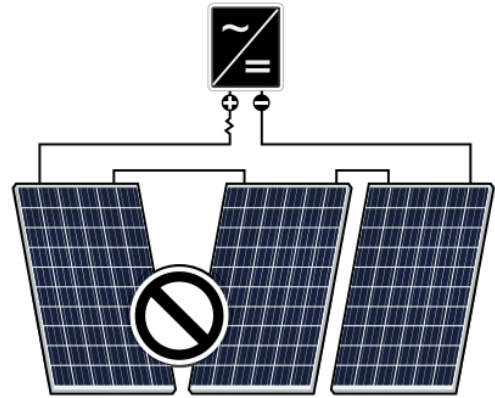


NOTE! Module damage may occur!

- ➔ Ensure that the cabling is not under stress.
- ➔ Ensure that the cables do not run between module and subconstruction (danger of pinch).

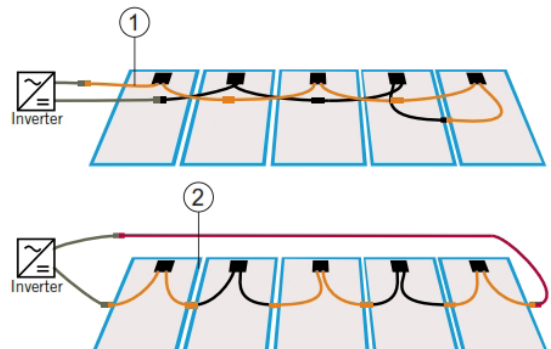


- ➔ Do not connect modules with different orientations or angles of inclination in the same string.



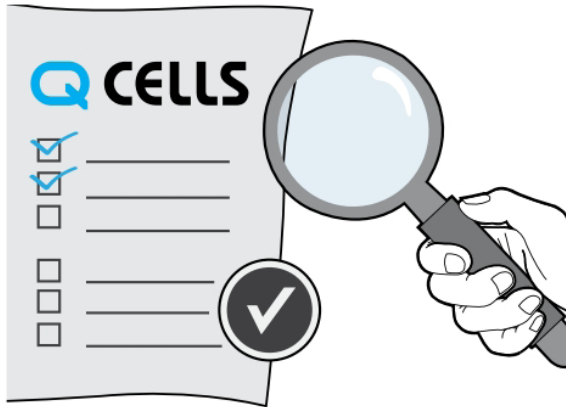
- A module with min. 47.24 in (1,200 mm) long cable in portrait orientation can be wired as a "2nd next neighbor"

- ① "2nd next neighbor" - Wiring without a return cable.
- ② Standard wiring with a return cable



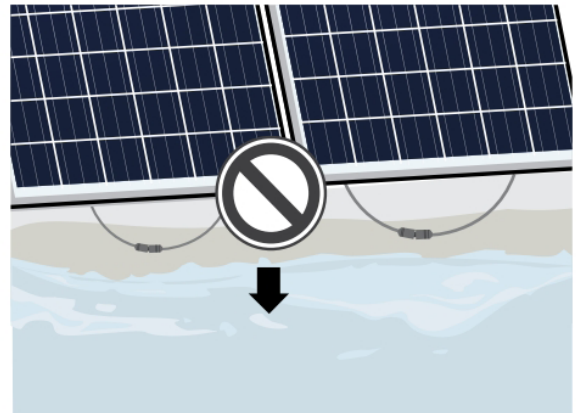


- Ensure that all necessary safety and functional tests have been carried out according to current applicable standards.

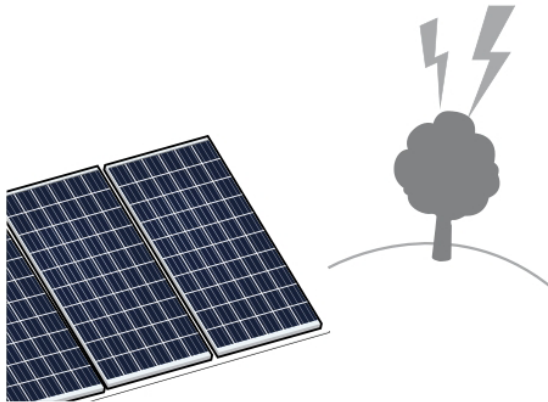


NOTE! Module damage may occur!

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

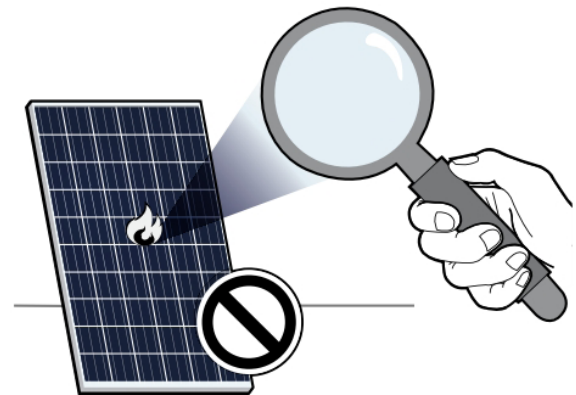


- Integrate the system into the existing lightning protection system in accordance with the applicable local regulations.

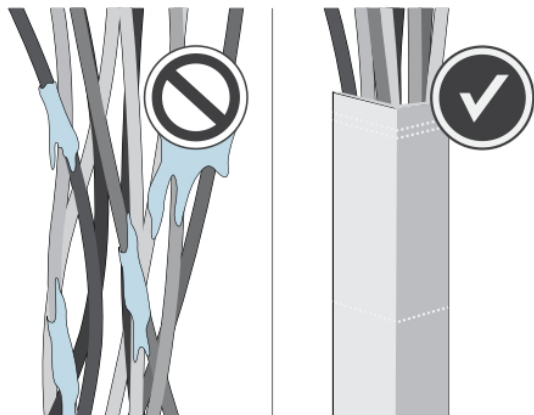


WARNING! Fire Risk!

- 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, moisture and mechanical friction.



Functional grounding

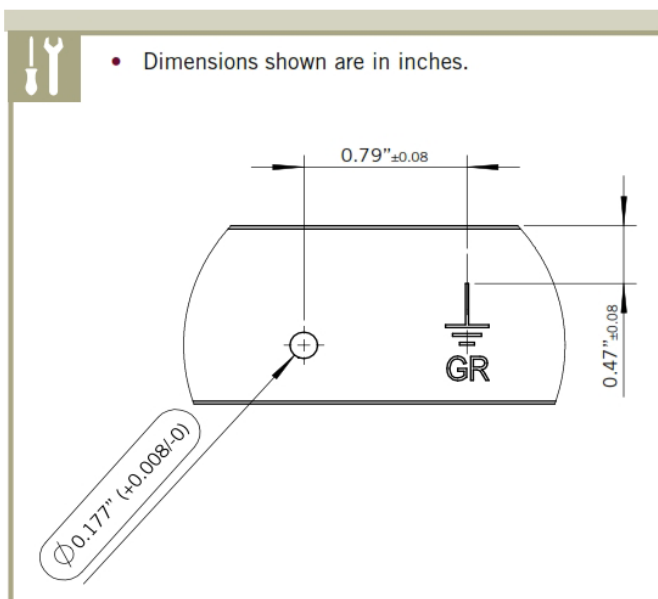
- For installations located in tropic regions (between 23.5° N and 23.5° S) with a module tilt of < 5°, functional grounding at the negative generator connection on the DC side must be implemented.
- ➔ Ensure that the difference of potential between the negative generator connection and the PE(N) of every MPP tracker of the respective inverters is 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).

Protective Grounding

In order to prevent electrical shock or fire, the frame of the module as well as any non-current-carrying metal parts of the system must be grounded. While this section provides some information about grounding the Q CELLS frames and modules, reference should be made to local statutes and regulations for specific requirements on grounding. The U.S. National Electrical Code addresses these issues in Article 250.

Proper grounding is achieved by bonding all exposed non-current-carrying metal equipment to the appropriately sized equipment grounding conductor (EGC) or racking system that can be used for integrated grounding.

Q CELLS frames are protected from corrosion with an anodized coating, which has to be penetrated in order to ensure proper bonding. The different methods listed below are suggested methods for an appropriate bond between the frame and the EGC or racking system (that will have to be properly grounded). The method appropriate for any individual installation will depend on multiple factors.



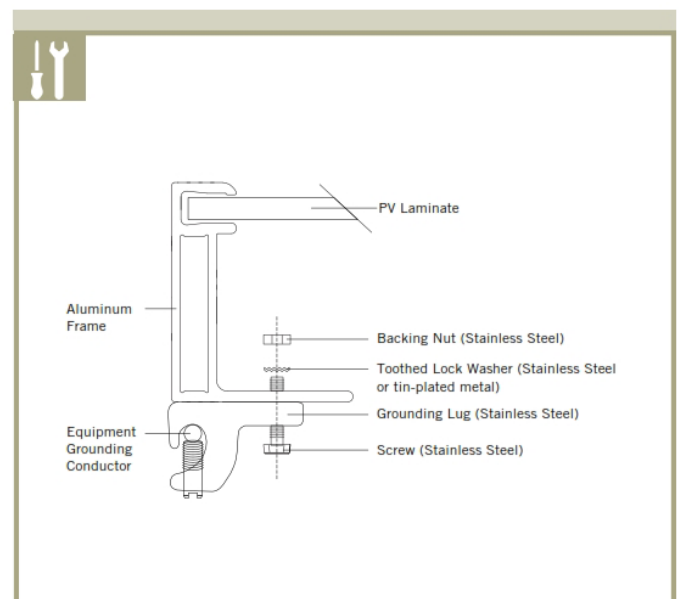
Option A: Use of a grounding lug

A listed grounding lug can be bonded to the frame using the grounding holes pre-drilled in the frame. These holes are marked with a ground symbol, as shown below on the frame section drawing: To install the grounding lug, follow the specified instructions of the manufacturer. The grounding lug should be made of stainless steel or tin plated metals such as aluminum to avoid corrosion. The grounding lug should be attached to the frame grounding hole using a stainless steel screw, toothed lock washer or KEPS nut (in order to penetrate the anodized layer) and backing nut. Care should be taken to avoid the use of grounding hardware of dissimilar metals, which may lead to corrosion.

Option B: Integrated grounding methods

The Q CELLS modules can be bonded with the racking system using UL1703 or UL2703 certified integrated grounding methods. The racking system will then have to be grounded so that the overall system is properly grounded. The listed racking system and grounding device should be installed in accordance with the manufacturers' instructions.

An example of such integrated grounding method is the use of a washer recognized as meeting UL2703 requirements between the module and the racking system, when mounting the module. For example, WEEB washers are generally compatible with Q CELLS modules, however each combination module / racking system requires a specific WEEB washer size. Note that WEEB washers are intended for single use only; they must not be reused after removal or loosening. Refer to Wiley's installation instructions for the specific use of WEEB washers.



**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.

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

Hanwha 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.

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 micro fleece wool or cotton cloths.
- ➔ Use an alcohol based glass cleaner. Do not use abrasive detergents or tensides.

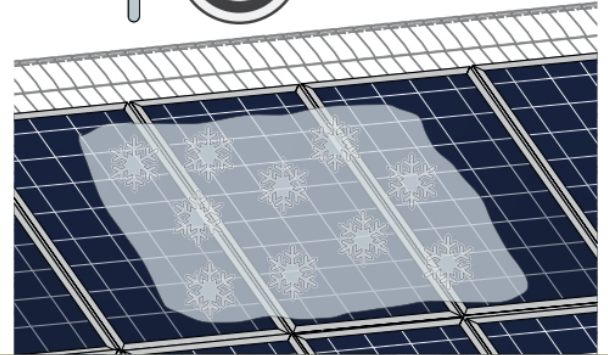
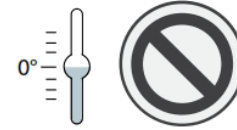
Isopropyl alcohol (IPA) can be used selectively to remove stubborn dirt and stains within one hour after emergence.

- ➔ 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.

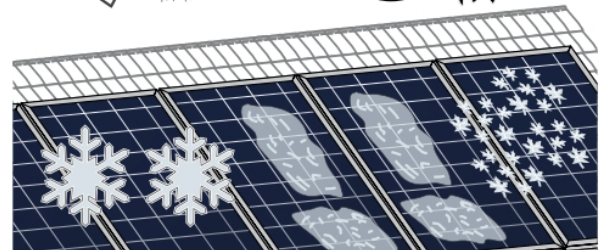


NOTE! Module damage may occur!

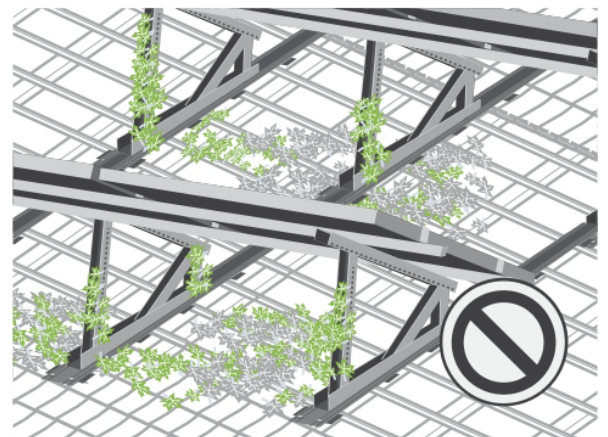
- ➔ Do not clean modules with water if there is a risk of frost.



- ➔ Remove dirt with lukewarm water, a broom, or a soft cloth.
- ➔ Do not use tensides, scrapers, or any high-pressure water cleaning equipment.



- ➔ Free the substructure from any dirt and debris (leaves, bird nests, etc.).



LIMITED WARRANTY FOR CRYSTALLINE PHOTOVOLTAIC MODULES FROM HANWHA Q CELLS

Valid from February 1st, 2018

GENERAL TERMS

Provider of this Limited Warranty for PV Modules is Hanwha Q CELLS (Qidong) Co., Ltd. No.888 Linyang Road, Qidong 226200 Jiangsu, P.R. China ("Hanwha Q CELLS") and the warranty provided herein shall exclusively apply to the following photovoltaic modules of Hanwha Q CELLS (the "PV Modules"), which are sold and installed within Ascension Island, Albania, Algeria, Anguilla, Argentina, Aruba, Bahrain, Bangladesh, Bermuda, Bhutan, Bolivia, Bonaire, Bosnia and Herzegovina, Botswana, Brazil, British Indian Ocean Territory, British Virgin Islands, Brunei, Burkina Faso, Canada, Cambodia, Cameroon, Cayman Islands, China, Cook Islands, Columbia, Costa Rica, Curaçao, Chile, Dubai, Dominican Republic, Ecuador, El Salvador, Egypt, Falkland Islands, Fiji, French Polynesia, Gabon, Greenland, Guernsey, Guatemala, Guyana, Haiti, Honduras, Iceland, India, Indonesia, Iran, Iraq, Israel, Ivory Coast, Japan, Jersey, Jordan, Kazakhstan, Korea, Kosovo, Kuwait, Kenya, Laos, Lebanon, Macedonia, Madagascar, Malaysia, Maldives, Mauritania, Mauritius Island, Mexico, Montenegro, Montserrat, Morocco, Myanmar, Nauru, Nepal, New Caledonia, Nicaragua, Nigeria, Northern Cyprus, Oman, Pakistan, Palestine, Panama, Paraguay, Peru, Philippines, Puerto Rico, Qatar, Republic of Belarus, Republic of Rwanda, Russia, Saba and Sint Eustatius, Saint-Barthélemy, Saint Helena, Sri Lanka, Saint-Pierre und Miquelon, Samoa, Saudi Arabia, Senegal, Serbia, Singapore, Sint Maarten, Solomon Islands, South Africa, South Georgia and South Sandwich Islands, Sudan, Suriname, Switzerland, Taiwan, Tanzania, Thailand, Togo, Tonga, Tristan da Cunha, Tunisia, Turks- und Caicos Islands, United States of America, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Wallis and Futuna, Yemen with the following nomenclature (Module Type):

- Q.PEAK-G5, Q.PEAK-G5.1, Q.PEAK-G5.O.G, Q.PEAK-G5.2
- Q.PEAK L-G5, Q.PEAK L-G5.1, Q.PEAK L-G5.2, Q.PEAK L-G5.O.G

This Limited Warranty for PV Modules takes effect from February 1st 2018 and shall remain valid until a new version of warranty applying to same territory is released.

CHAPTER I: TWELVE YEARS LIMITED PRODUCT WARRANTY

Subject to Chapters III and IV hereof, Hanwha Q CELLS warrants to the original buyer (the "Buyer") that the PV Modules shall be free from any defect in materials and workmanship that has an effect on module functionality under normal application, installation, use and service conditions as specified in Hanwha Q CELLS standard product documentation as updated from time to time (the "Product Documentation"). If, during a peri-

od of twelve (12) years from the date of dispatch of the PV Modules to the Buyer from Hanwha Q CELLS factory plus six (6) calendar months or the date of receipt of the PV Modules of the Buyer, whichever date is earlier (the "Warranty Start Date"), the PV Modules fail to conform to the warranty under this Chapter I (the "Twelve Years Limited Product Warranty"), then Hanwha Q CELLS will, at its sole discretion, either repair or replace the defective PV Modules, or refund the residual value¹ of the PV Modules at the time of Hanwha Q CELLS confirmation of the Buyer's claim.

For the avoidance of doubt, any cosmetic changes, or other changes in the PV Modules appearance, which include but not limited to any color change, abrasion, scratching, oxidation, mold and mechanical wear-out, or any other change attributable to or caused by the normal wear and tear over time, or localized impact, that occurs after the Warranty Start Date, shall be exempt from the Twelve Years Limited Product Warranty. The Buyer will be entitled to make claims under the Twelve Years Limited Product Warranty only if the Buyer has provided documented evidence sufficient to prove that the malfunctioning or non-conformity of the PV Modules results exclusively from the defect of the PV Modules and is covered by the Twelve Years Limited Product Warranty.

The Twelve Years Limited Product Warranty shall only cover the claims received by Hanwha Q CELLS before the end of the twelve years warranty period starting from the Warranty Start Date.

The remedies set forth in this Chapter I shall be the Buyer's sole and exclusive remedies under the Twelve Years Limited Product Warranty.

The Twelve Years Limited Product Warranty does not warrant a specific power output of the PV Modules, which shall be exclusively covered under Chapter II hereinafter (the "Guaranteed Peak Power Output Limited Warranty").

CHAPTER II: GUARANTEED PEAK POWER OUTPUT LIMITED WARRANTY

Provided that the PV Modules are used under normal application, installation, use and service conditions as specified in Hanwha Q CELLS Product Documentation and subject to Chapters III and IV hereof, the following Guaranteed Peak Power Output Limited Warranty is provided by Hanwha Q CELLS.

1. First Year Guaranteed Peak Power Output Limited Warranty

Hanwha Q CELLS warrants the power output of the PV Modules as stated below for a period of the first year from the Warranty Start Date.

¹ For the purpose of calculating the residual value, the formula shall be: the spot price of a comparable PV Module × (1 - a/12). In the above formula, "a" stands for the actual use life of the PV Modules starting from the Warranty Start Date.

² "Peak Power at STC" is the power in Watt peak that a PV module generates in its Maximum Power Point. "STC" are as follows (a) light spectrum of AM 1.5, (b) an irradiation of 1,000 W per m² and (c) a cell temperature of 25 degree centigrade at right angle irradiation. The measurements are carried out in accordance with IEC 60904 as tested at the connectors or junction box terminals – as applicable – per calibration and testing standards of Hanwha Q CELLS valid at the date of manufacture of the PV Modules. Hanwha Q CELLS calibration standards shall be compliant with the standards applied by international institutions accredited for this purpose.

If the minimum "Peak Power Output at STC"² for typical mono PV Modules reduces to less than ninety-seven percent (97%) of the labeled power output classification as specified in Hanwha Q CELLS Product Documentation. Hanwha Q CELLS will, at its sole discretion, either a) provide additional PV Modules to the Buyer, or b) repair these underpowered PV Modules, in either case, to restore the actual power output to the guaranteed level as specified in this Section 1, or c) otherwise provide monetary compensation which shall be calculated by multiplying (x) the difference between the actual peak power output of the PV Modules and the guaranteed peak power output as specified in this Section 1 by (y) the then current per watt market price of the comparable PV Modules in a similar market.

2. Second Year to Twenty-fourth Year Guaranteed Peak Power Output Limited Warranty

Hanwha Q CELLS warrants that, for a period from the second year to the twenty-fourth year, the maximum annual power decline of the typical mono PV Modules will not be more than zero point six percent (0.6%). If there is any decline exceeding the limitation specified hereinabove, Hanwha Q CELLS will, at its sole discretion, either a) provide additional PV Modules to the Buyer, or b) repair the underpowered PV Modules, in either case, to restore the actual power output to the guaranteed level as specified in this Section 2, or c) otherwise provide monetary compensation which shall be calculated by multiplying (x) the difference between the actual peak power output of the PV Modules and the guaranteed peak power output as specified in this Section 2 by (y) the then current per watt market price of the comparable PV Modules in a similar market.

3. 25 Years Guaranteed Peak Power Output Limited Warranty

Hanwha Q CELLS warrants the power output of the PV Modules as stated below for a period of twenty-five (25) years from the Warranty Start Date. If the minimum "Peak Power Output at STC"² for the typical mono PV Modules reduces to less than eighty-three percent (83%) of the labeled power output classification as specified in Hanwha Q CELLS Product Documentation. Hanwha Q CELLS will, at its sole discretion, either a) provide additional PV Modules to the Buyer, or b) repair the underpowered PV Modules, in either case, to restore the power output to the guaranteed level as specified in this Section 3, or c) otherwise provide monetary compensation which shall be calculated by multiplying (x) the difference between the actual power output of the PV Modules and the guaranteed power output as specified in this Section 3 by (y) the then current per watt market price of the comparable PV Modules in a similar market.

4. For purpose of this Chapter II, labeled power output classification in Hanwha Q CELLS Product Documentation is the power in Watt peak that a PV Module generates in its maximum power point under STC. The actual power output of the PV Modules shall be determined for verification under STC only. The actual power output measurement shall be either carried out by a Hanwha Q CELLS entity or by a Hanwha Q CELLS recognized third party testing institute. Testing equipment tolerances will be applied to all actual power output measurements.

5. The Guaranteed Peak Power Output Limited Warranty shall only cover the claims received by Hanwha Q CELLS before the end of the respective warranty period in this Chapter II starting from the Warranty Start Date.

6. The remedies set forth in this Chapter II shall be the Buyer's sole and exclusive remedies under the Guaranteed Peak Power Output Limited Warranty.

CHAPTER III: EXCLUSIONS AND LIMITATIONS

1. The exclusions and limitations listed below shall apply to all the warranties set forth in above Chapters I and II.

2. Exclusions and Limitations

a. The "Twelve Years Limited Product Warranty" and the "Guaranteed Peak Power Output Limited Warranty" do not apply when:

- i. The PV Modules are improperly installed, wired, maintained, or are subjected to inadequate system design, auxiliary instrument, device of the photovoltaic power system;
 - ii. The PV Modules are subjected to inappropriate handling, including but not limited to handling during transportation or storage, abuse, neglect, vandalism, vermin or accident;
 - iii. The PV Modules are moved from its original installation location, uninstalled, reinstalled or otherwise altered;
 - iv. The PV Modules are installed in an environment which exceeds "Operating Conditions" as defined in product specifications and installation manual, installed in a mobile or marine environment, subjected to improper voltage or power surges, abnormal environmental conditions (such as acid rain, salt damage or other corrosive chemical), or affected by dust, powders, assembled mass(es) or other pollutant(s) that is generated or resulted from an industrial setting and cannot be cleared through ordinary methods generally adopted by the PV Modules industry;
 - v. The PV Modules are subjected to inappropriate maintenance, including maintenance by an unauthorized service technician or in non-conformance with Hanwha Q CELLS installation manual;
 - vi. The PV Modules are subjected to external accidents or forces such as animals, fire, explosion, and civil disorder;
 - vii. The PV Modules are subjected to other unforeseen circumstances or causes outside Hanwha Q CELLS reasonable control, including but not limited to, electrical surges, lightning, earthquakes, typhoons, hurricanes, tornadoes, volcanic action, floods, tsunamis, snow damage, heavy hail, etc;
 - viii. The manufacture of the PV Modules is in accordance to the design, technical drawings, formulae or other specifications furnished by the Buyer; or
 - ix. Any warranty claim, in any event, is not submitted to Hanwha Q CELLS within the applicable warranty period.
- b. The Buyer shall carry the burden of proof to prove that it is eligible for coverage and that none of the exclusions and limitations listed in this Chapter III shall apply.

CHAPTER IV: GENERAL TERMS AND CONDITIONS

The General Terms and Conditions listed below shall apply to all the warranties set forth in above Chapters I and II.

1. Disclaimers and Limitation of Liability

a. DISCLAIMERS

HANWHA Q CELLS PROVIDES ALL DOCUMENTS AND INFORMATION ON AN „AS IS“ BASIS. THE WARRANTIES PROVIDED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, USE OR APPLICATION, UNLESS I) SUCH OTHER WARRANTIES ARE EXPRESSLY AGREED TO IN WRITING BY HANWHA Q CELLS UNDER THE RELEVANT SALES AGREEMENT EXECUTED BETWEEN HANWHA Q CELLS AND THE BUYER OR II) OTHER STATUTORY WARRANTY WHICH IS EXPRESSLY PROVIDED IN ANY APPLICABLE MANDATORY LAWS. HANWHA Q CELLS DOES NOT WARRANT THAT THE OPERATION OF THE PV MODULES WILL ACHIEVE THE RESULTS INTENDED BY THE BUYER. IN THE EVENT THAT ANY PROVISION HEREOF (OR ANY PART THEREIN) SHOULD FOR ANY REASON BE HELD INEFFECTIVE UNDER APPLICABLE LAW, THE REMAINDER OF THE PROVISION SHALL REMAIN IN FULL FORCE AND EFFECT.

THE WARRANTIES PROVIDED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER OBLIGATIONS ON THE PART OF HANWHA Q CELLS IN RELATION TO THE DEFECT OF THE PV MODULES UNLESS SUCH OTHER OBLIGATIONS ARE EXPRESSLY AGREED TO IN WRITING BY HANWHA Q CELLS UNDER THE RELEVANT SALES AGREEMENT.

b. LIMITATION OF LIABILITY

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, HANWHA Q CELLS HEREBY DISCLAIMS, AND SHALL HAVE NO RESPONSIBILITY OR LIABILITY WHATSOEVER FOR DAMAGE TO PROPERTY, OR FOR OTHER LOSS FROM ANY CAUSE WHATSOEVER ARISING OUT OF OR RELATED TO THE PERFORMANCE OR NONPERFORMANCE OF THE RELEVANT SALES AGREEMENT, ANY OF THE PV MODULES OR THEIR USE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, UNDER NO CIRCUMSTANCES SHALL HANWHA Q CELLS BE LIABLE TO THE BUYER, FOR ANY LOST PROFITS, LOSS OF USE, LOSS OF DATA OR EQUIPMENT DOWNTIME, OR FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND, HOWSOEVER ARISING, RELATED TO THE PV MODULES, WHETHER OR NOT HANWHA Q CELLS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, HANWHA Q CELLS AGGREGATE LIABILITY, IF ANY, FOR DAMAGES OR OTHERWISE, SHALL NOT EXCEED THE PURCHASE PRICE RECEIVED BY HANWHA Q CELLS FROM THE BUYER.

HANWHA Q CELLS LIABILITY FOR FRAUDULENT OR WILFUL INTENT, GROSS NEGLIGENCE OR PERSONAL INJURY, IN EACH CASE, UNDER APPLICABLE MANDATORY LIABILITY LAW SHALL REMAIN UNAFFECTED.

THE BUYER ACKNOWLEDGES THAT THE FOREGOING LIMITATIONS ON LIABILITY UNDER THIS PARAGRAPH b) ARE AN ESSENTIAL ELEMENT OF THE RELEVANT SALES AGREEMENT BETWEEN THE PARTIES AND THAT IN THE ABSENCE OF SUCH LIMITATIONS THE PURCHASE PRICE OF THE PV MODULES WOULD BE SUBSTANTIALLY HIGHER.

SOME JURISDICTIONS LIMIT OR DO NOT PERMIT DISCLAIMERS OF LIABILITY, SO THIS PROVISION MAY NOT APPLY TO THE BUYER IN SAID JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS OR THE EXCLUSION OF DAMAGES SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO THE BUYER IN SAID JURISDICTION. THE BUYER MAY HAVE SPECIFIC LEGAL RIGHTS OUTSIDE THIS LIMITED WARRANTY FOR PV MODULES, AND MAY ALSO HAVE OTHER MANDATORY RIGHTS THAT VARY FROM JURISDICTION TO JURISDICTION, WHICH SHALL REMAIN UNAFFECTED.

- c. The warranty provided under Chapter I “Twelve Years Limited Product Warranty” and Chapter II “Guaranteed Peak Power Output Limited Warranty” covers only the transportation cost for reshipment of any repaired or replaced PV Modules to the destination port set forth in the relevant sales agreement, and cover neither customs clearance, taxes, any other costs related to installation, removal, or reinstallation of the PV Modules, nor any transportation charges for the return of PV Modules to Hanwha Q CELLS.
- d. Warranty claims will be honored only if the PV Modules can be identified as being manufactured by Hanwha Q CELLS, as indicated by the information on the labels of the PV Modules.

2. Assignment of the Limited Warranty for PV Modules

This Limited Warranty for PV Modules in its entirety, extends only to the Buyer, and is transferrable in its entirety to any other person to whom title to the PV Modules has been transferred provided that a) a prior written notice of such transfer has been received by Hanwha Q CELLS, and b) the PV Modules remain installed in their original installation location³.

3. Obtaining Warranty Performance/Claim Procedure

- a. The Buyer shall notify Hanwha Q CELLS promptly (in no event later than thirty (30) days) from discovery of any breach of the Limited Warranty for PV Modules within applicable warranty period. The notice shall be in writing and shall include the description of the claim, corresponding PV Modules serial number(s), proof of purchase such as the commercial invoice and sufficient evidences proving such breach of the Limited Warranty for PV Modules.

³ This Limited Warranty for PV Modules applies only to PV-Modules that have been installed for the first time and remains in all countries except for 1) countries of the European Union, 2) Australia

- b. The return of any PV Modules will not be accepted unless prior written authorization has been given by Hanwha Q CELLS.
- c. Any replaced PV Modules shall become the property of Hanwha Q CELLS unless otherwise notified by it. Hanwha Q CELLS shall be entitled to deliver other comparable PV Modules (different in size, color, shape and/or power output performance) in situations where it deems fit. The repair or replacement of the PV Modules or the delivery with additional PV Modules shall not extend the applicable original warranty period of the "Twelve Years Limited Product Warranty" and the "Guaranteed Peak Power Output Limited Warranty".

4. Disputes

- a. Any dispute arising from or in connection with the claim(s) under this Limited Warranty for PV Modules shall be submitted to binding arbitration and subject to the choice of law as provided in the relevant sales agreement executed between Hanwha Q CELLS and the Buyer. Notwithstanding the above, Technical Related Disputes (as defined below) shall be first submitted to non-binding expert's evaluation as provided below.
- b. For purpose of clarification, in this Limited Warranty for PV Modules, the term "Technical Related Disputes" shall mean disputes regarding the function or malfunction of the PV Modules or other related products. The Technical Related Disputes shall be evaluated by an expert appointed by one of the following test institutions listed in paragraph (c) below. The appointed expert shall provide its expert opinion regarding the function of the PV Modules, and the causes of the malfunction (if applicable). The expert shall also provide a suggestion for the adequate resolution of the dispute including monetary compensation if needed. The specific institution which will appoint the expert shall be the institution in paragraph (c) below whose physical location is the closest in distance to the location of the PV Modules in dispute.
- c. Fraunhofer ISE in Freiburg, the Federal Republic of Germany or other TÜV areas
- d. The expert's opinion shall be non binding on either party to this Limited Warranty for PV Modules, but may be used as admissible evidence if the dispute is to be resolved through arbitration, court proceeding or any other form of dispute resolution that the parties may agree upon. For the avoidance of doubt, both parties reserve the right to submit the case to arbitration pursuant to paragraph a) above and to present alternative expert opinion(s) to the arbitration tribunal.
- e. The parties shall cooperate to fully accommodate the appointed expert and shall provide the expert the necessary assistance to promptly complete its tasks. The parties shall bear the fees to be paid to the expert according to their degree of responsibility for any claim under this Limited Warranty for PV Modules.

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