

# *Installation manual*



R-TG 108p.3, R-TG 108n.3, R-TG 108h.3, R-BG 108h.3, R-BG 108n.3, C-TG 144p.2, R-BF 108p.3, R-BF 108n.3, R-BF 120p.2, R-WF 108p.3, R-WF 108n.3, R-WF 120p.2, R-WF 120p.2-CH, C-WF 144p.2, L-TG 120p.2, R-WF 48p, R-WF 60p



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## 1. Introduction

Congratulations on the purchase of your high-quality PV module from SOLYCO Solar AG to generate your own green electricity.

SOLYCO PV modules are highly reliable thanks to the selection of high-quality materials. The quality of the solar modules is ensured by multiple tests of the products throughout the production process.

Further tests subject the products to long-term stress, and they are continuously optimized using the information obtained. If used and treated properly, SOLYCO PV modules will work reliably for decades. As a result, SOLYCO PV modules generate a reliable yield. We wish you a bountiful harvest. As a result, SOLYCO PV modules generate a reliable yield. We wish you a good harvest.

Please read these assembly and installation instructions carefully before starting installation, commissioning and maintenance. Failure to observe the assembly and installation instructions may result in personal injury and/or property damage. Please keep these instructions in a safe place.

The instructions are intended for installers and trained specialist personnel who are experienced in the assembly, operation, maintenance and dismantling of photovoltaic systems.

### Symbols used

Risk of death or death due to electric shock.

Caution

Notes



## 2. General information



The installation and electrical interconnection of photovoltaic systems must only be carried out by qualified personnel who are familiar with these activities through their professional qualifications. For the assembly of the other components, the corresponding assembly instructions of the respective manufacturer must be observed. The manufacturer cannot monitor either compliance with these instructions or the conditions under which they are carried out.

The installation instructions must be made available to the operator as part of the documentation of the solar system, and they must be kept by the operator. When planning, constructing and operating grid-connected photovoltaic systems, observe the guidelines, laws and regulations of the respective country. For additional requirements, contact your relevant local authorities and grid operator.

### 2.1 Regulations and standards

The listed standards and regulations represent only a selection and therefore they are not claimed to be complete. Before and during installation, please ensure that the locally applicable standards, building regulations and accident-prevention regulations are observed.

In addition to any possible local regulations, the following rules in particular must be observed:

- T712 VDE 0105 T100 Operation of electrical equipment
- DIN 18382 Electrical cable and wiring systems in buildings
- DIN 18334 Carpentry and timber construction work
- DIN 18338 Roofing and roof waterproofing work



- DIN 18339 Plumbing work
- DIN 18351 Facade work
- DIN 18451 Scaffolding Eurocode 1 (DIN EN 1991-1) Load assumptions for load-bearing structures
- DIN V VDE V 0126-1-1 Automatic activation point for PV systems
- VDE 0298 T4 Rubber-insulated cables
- VDE 0185 Lightning protection DIN EN 61724 Monitoring of the operating behaviour of photovoltaic systems
- VDI 6012 Bl. 2 Decentralized energy systems in the building
- UVV of the professional associations

## 2.2 Closure clause

The information contained in this installation and assembly manual may be changed by SOLYCO Solar AG without prior notice.

SOLYCO Solar AG provides no warranty, either express or implied, for the information contained in these installation and assembly instructions.

## 2.3 Limitation of liability

Improper execution of installation can cause damage to property and consequently endanger persons.

SOLYCO Solar AG accepts no responsibility or liability whatsoever for loss, damage or costs resulting from or in any way connected with faulty installation, improper operation and improper use or maintenance.

The general terms and conditions of business and warranty of SOLYCO Solar AG apply. The warranty conditions can be found at [www.solyco.com](http://www.solyco.com).

## 2.4 General hazard warning



Risk of death from electric shock and electric arc

- Modules are always energized when exposed to light.
- The modules can only be fused at the DC switch; in the event of a fault (short circuit, ground fault), the system continues to run on the DC side.
- Non-extinguishing arcs may occur when disconnecting contacts under load. Do not insert (electrically conductive) parts into plugs or sockets of the modules.
- Do not install solar modules and cables with wet connectors. Tools and the working environment should be dry.
- Observe the mounting instructions of the inverter manufacturer.
- Do not use any damaged modules.
- Keep children away from modules, inverters and other live components of the system.
- Carry out all work on pipes with extreme caution. The safety instructions of manufacturers of other system components must be followed.

## 2.5 General warnings notices



Risk of damage to product or environment

- Do not remove any part or nameplate affixed by the manufacturer.
- Modules must not be disassembled.
- Do not expose modules to artificially concentrated sunlight.
- Do not apply paint or adhesives to modules or handle them with sharp objects.
- Do not clean modules with cleaners containing solvents, as they may damage the anti-reflective coated glass surface.
- Do not place the modules in locations where easily combustible gases can be generated or collected.
- Before installing the system, check the static stability of the building and the system to be erected.
- The modules are only intended for use under temperate climatic conditions (see data sheet).
- Keep children away from the modules during transport and installation.

## 2.6 General safety instructions



Interim storage, removal from packaging and transport

- The modules are approved for operating temperatures of -40°C to +85°C.
- The maximum recommended installation height for SOLYCO PV modules is 2000m.
- Due to salty sea air, the modules should be installed at least 3km from any body of salt water.



### 3. Transportation

- Always take the greatest care when handling the modules.
- Always transport the modules in the packaging provided.
- Always transport the modules with two people using both hands.
- Protective gloves and safety shoes should be worn.
- Do not use the junction box or the connection cables as a handle.
- Avoid deflection of the modules.
- Do not load, step on or drop modules.
- Do not handle modules with sharp or pointed objects.
- Keep all electrical contacts clean and dry.
- Interim storage only in dry rooms.

You should immediately check the delivered goods and their packaging for transport damage. If you notice any damage, it is essential to note the damage on the delivery note.

The damage should be described in detail per pallet and supported by photographic documentation. Have the forwarding agent countersign the notes.



## 4. Mechanical assembly



### General notes on module installation

The modules must be installed without voltage. The modules do not serve as a flexurally rigid connecting or fastening element.

The SOLYCO PV modules are suitable for roof-mounted and ground-mounted systems. For mounting on roofs, use materials suitable for the application.

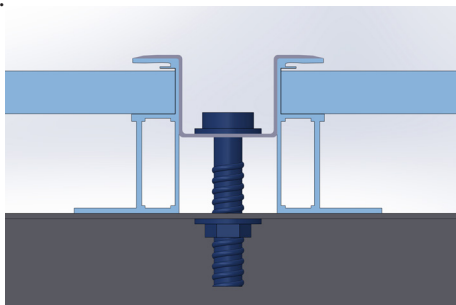
All modules must be secured to the designated locations with at least four clamps or four screws. The modules can be mounted either vertically or horizontally. Observe the permissible loads of the respective mounting options in Chapter 4.4.

Due to thermal expansion, a minimum distance of 10mm should be maintained between the modules.

In order to avoid increased loads on modules in the edge zones and corner areas, it may be necessary to maintain minimum distances from building edges or to provide separate proof. The wind load to be applied for the project location must be determined from the wind zone map, which takes into account the location situation in addition to the wind zones.

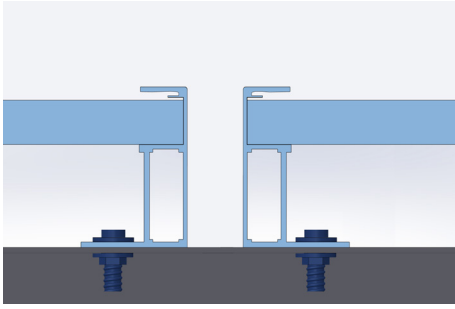
### 4.1 Mounting with suitable module clamps

For the positions for fixing the module clamps, refer to Chapter 4.4.



- Use M8 fixing screws.
- The clamps must be at least 7mm on the module frame.
- The clamps should have an insertion length of a minimum of 40mm.
- The module clamps should not come into contact with the front glass and must not deform the frame.
- Make sure that no shading effects emanate from the module clamps.
- The module frame must not be changed under any circumstances.
- Use at least four clamps to fix the modules to the mounting rails of the support structure
- The torque applied should be based on the mechanical construction standard, according to the screws used by the customer (M8 = 16 - 20Nm).
- 
- 
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### 4.2 Mounting with screws



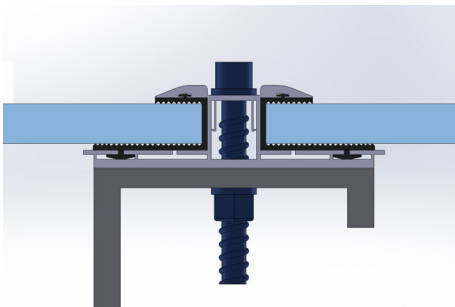
Four to eight slot-hole mounting holes are provided in the frame of each module. These are arranged in such a way that optimum load-bearing capacity and fixing of the modules to the supporting structure is ensured.

For the longest possible mounting lifetime, we strongly recommend the use of corrosion-resistant components.

Fasten the modules as shown in the illustration at all four mounting points with an M8 screw plus a lock washer, washer and nut. The torque applied should be between 16 and

20Nm. The torque applied should be between 16 and 20Nm.

### 4.3 Fastening with suitable laminate clamps



The frameless modules must not be mounted with any clamps. The laminate clamps should be approved by SOLYCO Solar AG prior to installation. The use of non-approved laminate clamps will void any product and performance warranty claims.

For the positions for fixing the module clamps, please refer to chapter 4.4.

- M8 fastening screws should be used.

- The torque of these screws is to be 16 – 20 Nm.
- The clamps must lie at least 10 mm on the modules.
- The clamps should have an insertion length of a minimum of 150mm.
- Make sure that no shading effects emanate from the module clamps.  
To ensure this, note the specified distance of the cells from the edge on the data sheet.
- Use at least four clamps to fix the modules to the mounting rails of the support structure

### 4.4 Clamping ranges and permissible load capacities

The mounting method with clamps and mounting rails corresponds to the test parameters for certification according to IEC 61215:2016 and IEC 61730:2016.

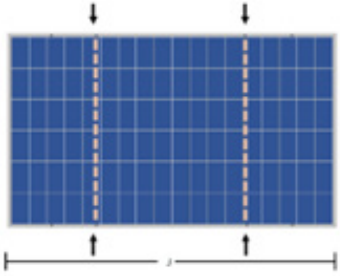
The centre of the clamp point and clamp edges must be fully installed in the permitted mounting area.

A safety factor of 1.5 is applied to the design load. This results in the pressure and tensile load to be applied during the mechanical load test (static).





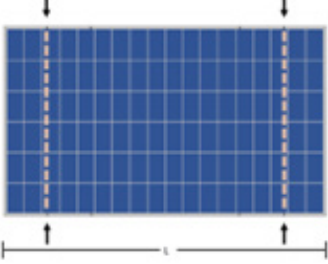
#### 4.4.1 Fitting to inner mounting holes

<b>Overview</b>	<b>Description</b>
	<p>The modules are fastened to the inner mounting holes on the module carrier. The support rail runs parallel to the short sides.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	5400Pa	2400Pa	Inner mounting holes
R-TG 108p.3	5400Pa	2400Pa	„
R-TG 108h.3	5400Pa	2400Pa	„
R-BG 108n.3	5400Pa	2400Pa	„
R-BG 108h.3	5400Pa	2400Pa	„
R-WF 108n.3	5400Pa	2400Pa	„
R-WF 108p.3	5400Pa	2400Pa	„
R-WF 120p.2	5400Pa	2400Pa	„
R-BF 108p.3	5400Pa	2400Pa	„
R-BF 108n.3	5400Pa	2400Pa	„
R-BF 120p.2	5400Pa	2400Pa	„
R-WF 60p	5400Pa	2400Pa	„
R-WF 48p	5400Pa	2400Pa	„
R-WF 120p.2 CH	5400Pa	2400Pa	„
C-TG 144p.2	2400Pa	2400Pa	„
R-WF 144p.2	2400Pa	2400Pa	„



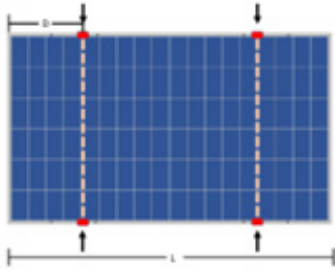
### 4.4.2 Bolting to external mounting holes

<b>Overview</b>	<b>Description</b>
	<p>The modules are attached to the module rail at the specified mounting positions on the long side by means of module clamps. The support rail runs parallel to the short sides.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	2400Pa	2400Pa	Outer mounting holes
R-TG 108h.3	2400Pa	2400Pa	”
R-TG 108p.3	2400Pa	2400Pa	”
R-BG 108h.3	2400Pa	2400Pa	”
R-BG 108n.3	2400Pa	2400Pa	”
R-WF 108n.3	2400Pa	2400Pa	”
R-WF 108p.3	2400Pa	2400Pa	”
R-WF 120p.2	2400Pa	2400Pa	”
R-BF 108n.3	2400Pa	2400Pa	”
R-BF 108p.3	2400Pa	2400Pa	”
R-BF 120p.2	2400Pa	2400Pa	”
R-WF 60p	2400Pa	2400Pa	”
R-WF 48p	2400Pa	2400Pa	”
R-WF 120p.2 CH	2400Pa	2400Pa	”
C-TG 144p.2	2400Pa	2400Pa	”
C-WF 144p.2	3600Pa	3600Pa	”



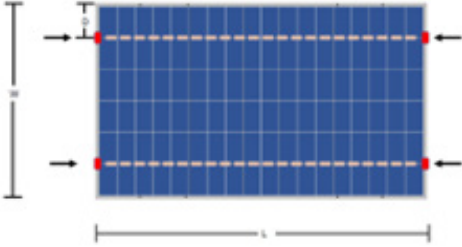
### 4.4.3 Clamping at four points on the long side of the module

<b>Overview</b>	<b>Description</b>
	<p>The modules are attached to the module rail at the specified mounting positions on the long side by means of module clamps. The support rail runs parallel to the short sides.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	2400Pa	2400Pa	D = ¼ L ±50mm
R-TG 108p.3	2400Pa	2400Pa	”
R-TG 108h.3	2400Pa	2400Pa	”
R-BG 108n.3	2400Pa	2400Pa	”
R-BG 108h.3	2400Pa	2400Pa	”
R-WF 108n.3	3600Pa	1600Pa	”
R-WF 108p.3	3600Pa	1600Pa	”
R-WF 120p.2	3600Pa	1600Pa	”
R-BF 108p.3	3600Pa	1600Pa	”
R-BF 108p.3	3600Pa	1600Pa	”
R-BF 120p.2	3600Pa	1600Pa	”
R-WF 60p	5400Pa	2400Pa	”
R-WF 48p	5400Pa	2400Pa	”
R-WF 120p.2 CH	3600Pa	1600Pa	”
C-TG 144p.2	2400Pa	2400Pa	”
C-WF 144p.2	5400Pa	3600Pa	”



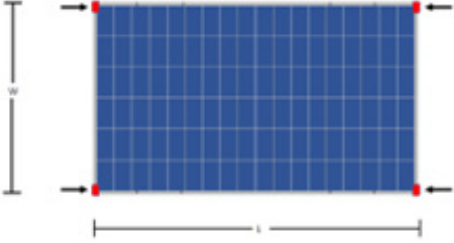
#### 4.4.4 Clamping at four points on the short sides of the module

<b>Overview</b>	<b>Description</b>
	<p>The modules are attached to the module support rail at the specified mounting positions on the short side by means of module clamps. The support rail runs parallel to the long sides.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	2400Pa	2400Pa	D = 1/5 W ±50mm
R-TG 108p.3	2400Pa	2400Pa	„
R-TG 108h.3	2400Pa	2400Pa	„
R-BG 108n.3	2400Pa	2400Pa	„
R-BG 108h.3	2400Pa	2400Pa	„
R-BF 108n.3	3600Pa	1600Pa	„
R-BF 108p.3	3600Pa	1600Pa	„
R-BF 120p.2	3600Pa	1600Pa	„
R-WF 108n.3	3600Pa	1600Pa	„
R-WF 108p.3	3600Pa	1600Pa	„
R-WF 120p.2	3600Pa	1600Pa	„
R-WF 60p	5400Pa	2400Pa	„
R-WF 48p	5400Pa	2400Pa	„
R-WF 120p.2 CH	3600Pa	1600Pa	„
C-WF 144p.2	5400Pa	3600Pa	„
C-TG 144p.2	2400Pa	2400Pa	D = 50mm – 250mm



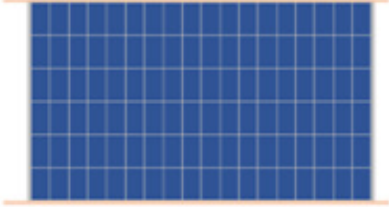
### 4.4.5 Clamping at the corners of the short module side

<b>Overview</b>	<b>Description</b>
	<p>The modules are attached to the module support rail at the corners on the short side by means of module clamps. There are no module supports running under the modules or under the module frame.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	2400Pa	2400Pa	Corner points short side
R-TG 108p.3	2400Pa	2400Pa	”
R-TG 108h.3	2400Pa	2400Pa	”
R-BG 108n.3	2400Pa	2400Pa	”
R-BG 108h.3	2400Pa	2400Pa	”
R-BF 108n.3	1600Pa	1600Pa	”
R-BF 108p.3	1600Pa	1600Pa	”
R-WF 108n.3	1600Pa	1600Pa	”
R-WF 108p.3	1600Pa	1600Pa	”
R-BF 120p.2	1600Pa	1600Pa	”
R-WF 120p.2	1600Pa	1600Pa	”



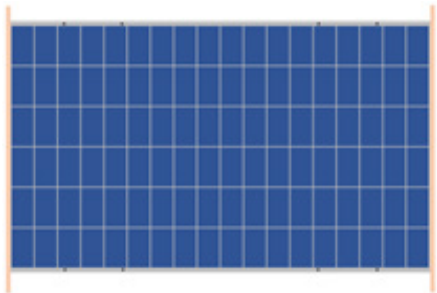
### 4.4.6 Long-side mounting – insertion system

<b>Overview</b>	<b>Description</b>
	<p>The modules are attached to the long side with the insertion system. The module support rail runs parallel under the long sides.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	5400Pa	2400Pa	Insertion system - long side
R-TG 108p.3	5400Pa	2400Pa	„
R-TG 108h.3	5400Pa	2400Pa	„
R-BG 108n.3	5400Pa	2400Pa	„
R-BG 108h.3	5400Pa	2400Pa	„
R-BF 108n.3	5400Pa	2400Pa	„
R-BF 108p.3	5400Pa	2400Pa	„
R-BF 120p.2	5400Pa	2400Pa	„
R-WF 108n.3	5400Pa	2400Pa	„
R-WF 108p.3	5400Pa	2400Pa	„
R-WF 120p.2	5400Pa	2400Pa	„
R-WF 60p	5400Pa	2400Pa	„
R-WF 48p	5400Pa	2400Pa	„
R-WF 120p.2 CH	5400Pa	2400Pa	„
C-WF 144p.2	2400Pa	2400Pa	„
C-TG 144p.2	2400Pa	2400Pa	„



### 4.4.7 Short-side mounting – insertion system

<b>Overview</b>	<b>Description</b>
	<p>The modules are attached to the short side with the insertion system. The support rail runs parallel under the short sides.</p>

<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
R-TG 108n.3	2400Pa	2400Pa	Insertion system - short side
R-TG 108p.3	2400Pa	2400Pa	„
R-TG 108h.3	2400Pa	2400Pa	„
R-BG 108n.3	2400Pa	2400Pa	„
R-BG 108h.3	2400Pa	2400Pa	„
R-BF 108n.3	1600Pa	1600Pa	„
R-BF 108p.3	1600Pa	1600Pa	„
R-BF 120p.2	1600Pa	1600Pa	„
R-WF 108n.3	1600Pa	1600Pa	„
R-WF 108p.3	1600Pa	1600Pa	„
R-WF 120p.2	1600Pa	1600Pa	„



#### 4.4.8 Fixing with four laminate clamps on the long sides

<b>Overview</b>		<b>Description</b>	
		<p>The modules are attached to the module carrier using four laminate clamps at the specified mounting positions on the long side. There are no module supports running under the modules or under the module frame.</p>	
<b>Module type</b>	<b>Max. pressure load</b>	<b>Max. suction load</b>	<b>Mounting position</b>
L-TG 120p.2	1600Pa	1600Pa	D = 300-400mm





## 5. Electrical installation



Risk of death from electric shock and electric arc



Consider locally applicable standards and regulations.

**SOLYCO PV modules are classified in application class A** (certified according to IEC 61730) and comply with protection class II, provided that electrical installation has been carried out in accordance with regulations.

**When laying the cables** it must generally be ensured that the connecting cables of the modules are not exposed to mechanical stresses. The modules must be installed without voltage.

**The maximum permissible bending radii** of the connecting cables must be observed. Conductor loops should be avoided or kept to a minimum to reduce the risk of indirect lightning strikes.

**Unplugged contact plugs** must be protected from all kinds of contamination. This includes the time span of installation, storage, and transportation.

**Corroded plug connections** caused by leaks cause high contact resistance. This can lead to a deterioration in performance or even damage to your system.

**The cables and connectors should not rest on the floor** and should not be exposed to high humidity.

**Opening and modification of the junction box**, its removal from the connecting cables or disassembly of the frame or frame parts are **not approved**. Use only standardized photovoltaic cables with a cable cross-section of at least 4mm<sup>2</sup>.

It is possible that higher currents and voltages are generated than under the standardized STC test conditions according to the type plate and data sheet. **This must be taken into account when designing equipment** such as cables, fuses and controls. For this purpose, the information on the PV module for the short-circuit current ISC and the open-circuit voltage Uoc (set at the lowest expected temperature at the site of use) should be applied with a factor of 1.25 under STC conditions.

### 5.1 Interconnection



Note: Only modules of the same type and performance class should be interconnected.

Interconnection limits for series connection or for modules in one string: For the maximum series arrangement of modules, the specified system voltage (U<sub>max. Syst.</sub> = 1500V see data sheet) must be obeyed

Calculation formula for determining the maximum number (interconnection limit) of PV modules connected in series:

$$\text{Max. Modulanzahl in Serie} \leq \frac{\text{max. Systemspannung (1500 V)}}{U_{OC} + T_k (U_{OC}) * \Delta T}$$

Max. System voltage: The lowest value in the system is decisive



- Uoc: PV module open-circuit voltage (see data sheet)  
 TK (Uoc): Temperature coefficient of the PV module open circuit voltage  
 ΔT: Temperature difference between STC (25°C) and the lowest ambient temperature

Without a string fuse, a maximum of two module strings may be arranged in parallel (see the calculation formula below). Please note the value specified in the data sheet(15A) for the reverse current carrying capacity.

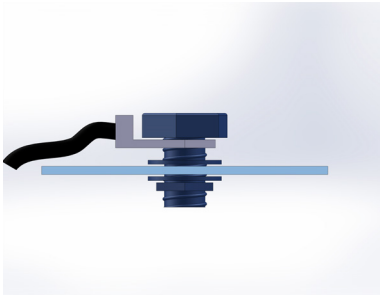
Interconnection limits for parallel connection or for strings connected in parallel. Calculation formula for determining the maximum number (interconnection limit) of strings connected in parallel:

$$\text{Max. Anzahl Paralleler Strings} \leq \frac{I_R}{I_{SC} + Tk(I_{SC}) * \Delta T}$$

- IR: Max. Reverse current carrying capacity of the PV module according to data sheet  
 Isc: Short-circuit current of the PV module according to data sheet  
 TK (Isc): Temperature coefficient of the PV module short-circuit current according to data sheet  
 ΔT: Temperature difference between STC (25°C) and the highest PV module temperature

## 5.2 Grounding

Even if the modules are certified according to protection class II, the circumstances may require the installation of equipotential bonding.



SOLYCO PV modules have 5.1mm (Ø) ground bores (6x) in all 4 poles and offer the option of installing equipotential bonding cables to ground the system.

All local regulations and ordinances for electrical installations must be adhered to during installation.

Modules without a module frame have no grounding capability.

## 5.3 Check before commissioning

Checklist before commissioning:

- Check for insulation faults and closing behaviour
- Check the open-circuit voltage to detect circuit faults
- Has the polarity been correctly observed?
- Check the connectors for correct seating



## 6. Maintenance and servicing



Observe the safety and warning instructions when servicing and cleaning. The general and local regulations must be observed.

A photovoltaic system requires relatively little maintenance. The cleaning effect from the combination of module inclination and rain is usually sufficient for normal contamination such as dust and dirt. Heavy soiling, such as leaves or bird droppings, should be removed to prevent partial shading and resulting yield reduction. The module surface can be cleaned with plenty of water and a soft sponge. Do not use metal objects or aggressive cleaning agents to avoid damaging the surface.

In addition, the following points should be checked by a specialist company at fixed intervals:

- Strength of the substructure on the battens
- Integrity, tight fit and corrosion-free operation of cable connections, screw connections and clamp connections
- Functionality of the fuse components
- Measurement of string voltages and currents during operation

## 7. Malfunction and complaint

If, despite the high-quality standards of our PV modules, you have a reason to complain, please contact your dealer directly or contact:

SOLYCO Solar AG  
Baseler Straße 60  
12205 Berlin  
+49 30 403 619 42  
M: info@solyco.com  
www.solyco.com

## 8. Disposal and recycling



Note

Defective or old solar modules must be disposed of properly and must not be disposed of along with household waste.

We offer our customers the return of SOLYCO PV modules and their recycling. For more information, you can contact us by e-mail or telephone, or at

The company SOLYCO SOLAR AG is registered as a manufacturer of the device type Large Photovoltaic Modules under the WEEE Reg. No. EN 63944028.