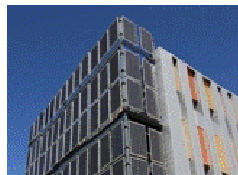
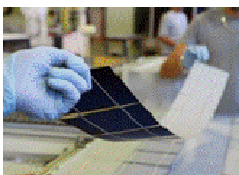


Installation manual for Solaria photovoltaic standard modules

S5M

IEC Edition 2.1

Revision Date: 01/12/2010



Installation Manual

Tips For the Installer

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- Product Identification
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- Unpacking And Transitory Use Of The Module
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Solaria Photovoltaic Modules

INSTALLATION, USE & MAINTENANCE INSTRUCTIONS

This document contains information about the installation and safety issues of the photovoltaic modules manufactured by Solaria. Before handling or connecting the modules it is very important to read and understand all the instructions. The module produces electricity as soon as the cells are exposed to sunlight. This manual is valid for the following families of SOLARIA's standard photovoltaic modules: **S6M2G** and **S6P2G**.

DISCLAIMER





The manufacturer assumes NO liability for damage incurred due to non-compliance of these instructions. These instructions are only for specialists who are familiar with the installation due to their technical qualification.

PRODUCT CERTIFICATE & GUARANTEE

SOLARIA photovoltaic modules are manufactured with high quality materials, according to the international IEC 61215:2005 standards. The modules are Class A rated according to the IEC 61730-1:2004 standards, and they meet electrical safety Class II requirements established in the IEC 61140 standard.

SAFETY WARNINGS

- Do not touch the electrical terminals when the module is exposed to the light or while the module is installed. The photovoltaic modules produce electricity when they are exposed to the light so the contact with the conductor poles of the module can produce sparks or burns.
- Cover the front side of the module with an opaque element during the installation in order to avoid the generation of electrical current during the stages of mechanical and electrical installation.

- Use only insulated tools that have the necessary requirements to operate in electrical installations
-  DO NOT use modules near to equipments or in places where inflammable gases are accumulated.
-  DO NOT handle the modules if they are wet.
- Disconnect the module from other electrical sources, as for example batteries during installation or any other maintenance activity. Read carefully manufacturer's instructions when using batteries.
-  DO NOT touch the terminals with bare hands.
- When working both in "rooftop and ground mounted installations", installers must wear electrical safety boots.
- When assembling on the roof check existing regulations and safety instructions to prevent from falling objects and ensure you follow accident prevention regulations and use appropriate safety rails.
- Respect the polarity for modules cables interconnections with other modules or with another electric element.
-  DO NOT disconnect the terminals while the photovoltaic modules generate electricity and are connected to the grid; in this way you will avoid the risk of electrical shock.
- Never dismantle the junction box, frame or any other component of the module.
- When assembling and servicing photovoltaic modules observe national grid regulations and safety instructions for the installation of electrical devices and any regulations from the utility regarding the network parallel operation of photovoltaic systems.

- When installing any product for lightning and surge protection read carefully the manufacturer's specifications and national grid regulations

⚠ Danger of Death!

- **Before any operation of maintenance and during installation, switch the modules off with a disconnection switch. Working with conductors which conduct direct current can cause electric arcs.**
- DO NOT exceed the maximum system voltage specified in the label of the module under any ambient temperatures.


⚠ Danger of Death!

- **When connecting/disconnecting the modules to the inverter take special care and perform the operation under secure conditions. Observe carefully the instructions of the manufacturer of the inverter. Even after disconnection of the inverter there is a risk of electric shock.**


PRODUCT IDENTIFICATION


SOLARIA photovoltaic modules have a label at the rear side that provides detailed information for the identification of the product:


- Name of module type, formed by an "S", followed by a number and a second letter that determines the technology of the cells. The word that identifies the family (for example "2G") is followed by a number that shows the nominal power of the PV module
- The serial number, used to identify the specific product. Every module has a unique serial number.
- Electrical characteristics of the module.
- Maximum voltage system.


 Photovoltaic Module
SOLARIA S6P2G 235
SERIAL NUMBER: 1013432-40000


Max. power (W)	235 (-0+5)	Electrical measurements under Standard Test Conditions (STC): 1000 W/m ² - AM 1.5 - 25°C
Vmp (V)	30,50	
Imp (A)	7,71	Maximum system voltage: 1000V Maximum series fuses: 15 A
Voc (V)	37,60	
Isc (A)	8,40	

 WARNING: ELECTRICAL HAZARD

 Safety application Class A

 IEC 61215 and IEC 61730 approval

 Made in Spain

 ISO 9001 and 14001

Minimum cable section:
No.12 AWG / φ2,1 mm
Tmin=-40°C / Tmax=90°C

SOLARIA ENERGÍA Y MEDIO AMBIENTE
Puertollano, Ciudad Real (Spain) www.solariaenergia.com

DO NOT remove the label.

If you remove the label, SOLARIA will not be responsible for the warranty of the product.

FIRE SAFETY

- SOLARIA recommend to check local authority guidelines and requirements for building safety.
- DO NOT install modules near equipment or locations where flammable gases can be produced or located.
- When installing on a roof, modules must be mounted on an approved fire resistant cover for this type of installation
- Operating temperature: All Solaria modules must be mounted in environments that ensure Solaria modules will operate within the following maximum and minimum operating temperature:

Maximum Operating Temperature	+90° Celsius, +194° Fahrenheit
Minimum Operating Temperature	-40° Celsius, - 104° Fahrenheit

UNPACKING & TRANSITORY USE OF THE MODULE

- Preserve the module in its package until it is ready for installation
- It's recommendable to make all necessary product inspection to the delivery product.
- Do not use the junction box or external connection wires to handle the module.
- Do not put the modules on the frame corners or on top of each other. This could damage the frames and shall lead the withdrawal of the guarantee of the module.
- It's recommended to open the top and front side of the packaging for the extraction of the modules. Please do this operation carefully to do not damage the glass or the backsheet.
- Do not store the modules on wet locations.
- Store modules with good ventilation and keep contacts free of dust.
- Protect the glass and the backsheet of the module against scratching or other damages.

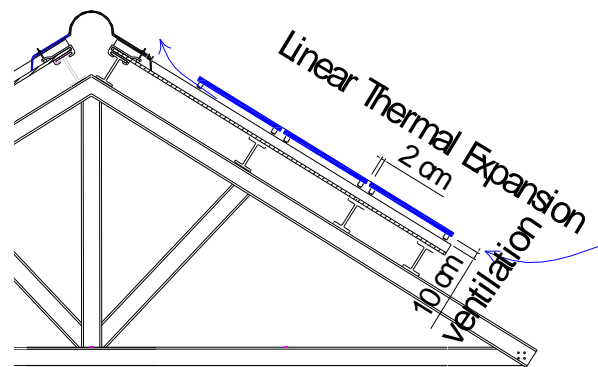
MECHANICAL INSTALLATION

Site Selection

Select a suitable location to install the module. It should be positioned avoiding any shadow from other objects between 9.00 and 15.00h (during the shortest day of the year). The photovoltaic modules should typically face South in the Northern Hemisphere and typically should face North in the Southern Hemisphere. An ideal installation should be with no shading effect at any time during the year. **Modules must be correctly fixed in their place so they can resist any load, including wind and the weight of the snow.**

Ventilation

- It's recommendable to install the modules leaving a separation of 2 cm between them to allow a correct thermal expansion.
- Assembling on roof allows good ventilation in the back side of the modules assuring enough distance between the back side and the mounting structure. Minimum distance between the wall or roof and the modules must be approximately **10 centimeters** to allow air to circulate behind the module and to dissipate any condensation or moisture. Install the modules in a way that air can flow between the roof and the module.



Assembling

Manufacturer recommends to attach the modules to the support structure using the proper fixing systems according to the information provided in this manual. The damages caused by a wrong attachment, not following this recommendation, will not be covered by the warranty.

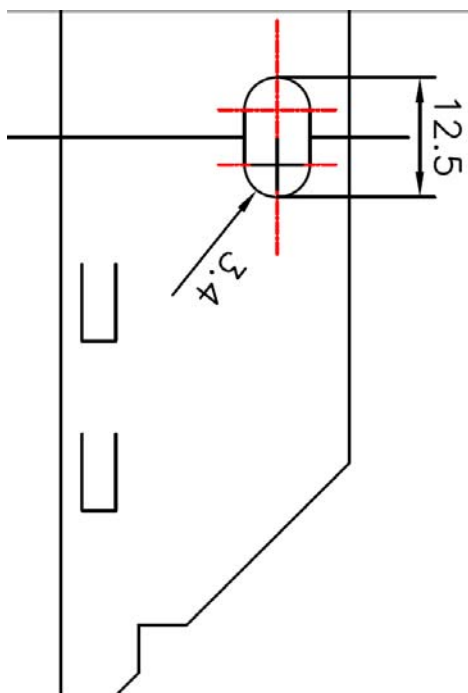
Do not make drills in the frame or in the glass of the module. Otherwise, SOLARIA will not be responsible for the warranty of the product.

Mechanical Load

- Modules must be properly fixed so they can resist any load, including wind and snow load specified in the product data sheet. The attachments must be dimensioned to cope with location's load requirements.

Clamping System & Assembly boreholes

- Solaria PV modules can either be installed in a vertical or horizontal position **by using stainless steel screws on the existing assembly boreholes factory carved on the module frame or by using module clamps on the module frame.**
- If the module is installed in a horizontal position, **it must be fixed with a screw fitting or clamp on the long side of the frame. DO NOT** fix the module using the short side of the frame.
- The **minimum number of attachment points** will be **4** as the number of the mounting frame holes (see the detail of the drawing below) or **4 module clamps** located in the right area (see **attachment guidelines**).



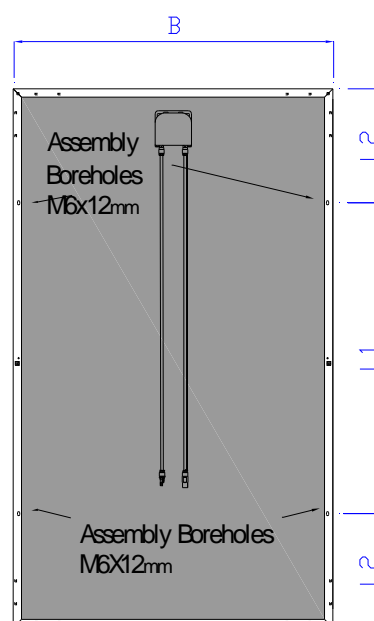
Detail of one attachment point (mm)

Clamping System

Modules can be fixed to the structure by using fixing module clamps. Module clamps must not deform the frame and must not come in contact with the front glass.

Assembly boreholes (with screw fitting)

Frame Holes: Secure the module to the structure by using the mounting holes with a screw fitting. Four 0.25" or M6 stainless steel bolts, with nuts, washers, and lock washer are recommended per module.

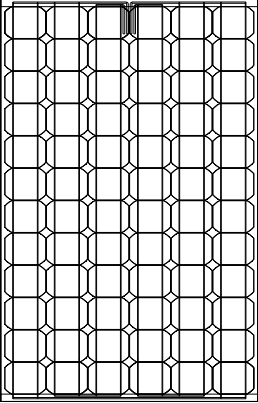
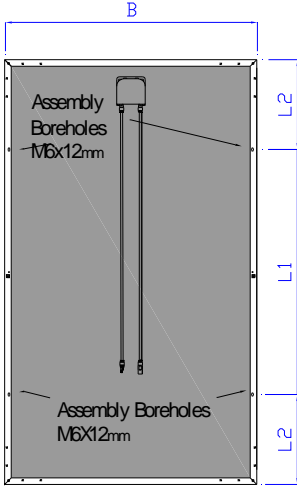
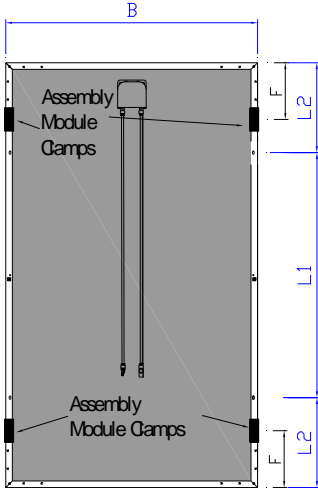
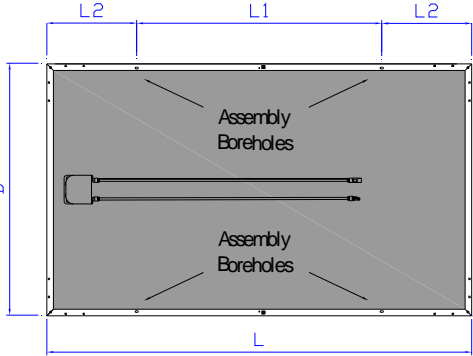
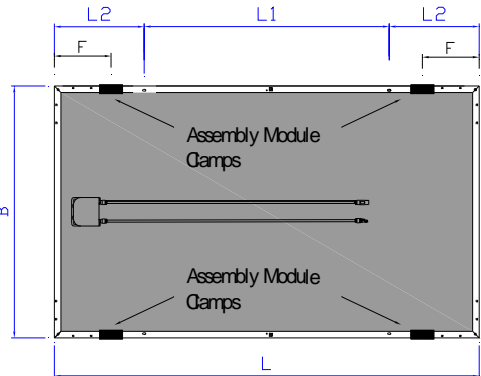


For other types of mounting methods, please consult SOLARIA.

Any different mounting methodology not checked with Solaria first, will cancel the warranty of the product and the module certification

Attachments Guideline

Maximum load 5.400 Pa

MODULE TYPE	VERTICAL ASSEMBLY	HORIZONTAL ASSEMBLY
<p style="text-align: center;">S5M</p> 	<p style="text-align: center;"><u>Screw fitting on assembly boreholes</u></p>  <p>L = 1584 mm / B = 790 mm L1 = 950 mm L2 = 317 mm</p> <p style="text-align: center;"><u>Assembly with Module Clamps</u></p>  <p>■ Module Clamp F = Distance to the module's clamp axis</p> <p>Fmin = 1/4 L Fmax = 1/8 L</p> <p>L = 1584 mm / B = 790 mm L1 = 950 mm L2 = 317 mm Clamps must be fixed on the longer side of the frame</p>	<p style="text-align: center;"><u>Screw fitting on assembly boreholes</u></p>  <p>L = 1584 mm / B = 790 mm L1 = 950 mm L2 = 317 mm</p> <p style="text-align: center;"><u>Assembly with Module Clamps</u></p>  <p>■ Module Clamp F = Distance to the module's clamp axis</p> <p>Fmin = 1/4 L Fmax = 1/8 L</p> <p>L = 1584 mm / B = 790 mm L1 = 950 mm L2 = 317 mm Clamps must be fixed on the longer side of the frame</p>

ELECTRICAL INSTRUCTIONS

- Photovoltaic systems should be installed by qualified personnel only.
- In order to protect the module against hot spots, the photovoltaic modules have **protection diodes (by-pass diodes)** integrated in the junction box, **installed in the back side of the module**.
- In normal conditions, SOLARIA modules can produce more current and voltage than the indicated in the standard conditions that appear in the module label. For this reason, the **Isc** and **Voc** values should be multiplied by a **1,25 factor for the design of the fuses, wiring and other elements** of the installation.
- Equipments and wiring should be suitable for electrical photovoltaic systems. Use only UV-resistant and weather-resistant elements. For the wire section calculations the directive "2006/95/EC" were used.
- The **fuses amperage** used to protect the system from overcurrents are **15A**. These fuses should be placed in series with the module/s.
- Observe that electrical continuity exists between the frames of the module because corner key used between frames is Aluminum 6060 Treatment T6. SOLARIA photovoltaic modules must be ground connected for safety reasons.

Connecting modules in series

- Note that if modules are connected in series, the total voltage will be equal to the sum of the individual voltages, so modules connected in parallel don't make the system voltage to be higher than the maximum system voltage specified in the module label. All modules connected in series must be modules of the same model.

- SOLARIA photovoltaic modules guarantee an electrical isolation up to a Vdc of 1000 V. Consequently, modules can be connected in series up to the voltage mentioned above.

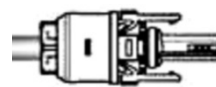
Connecting modules in parallel

- If the modules are connected in parallel, total current will be the sum of all the individual currents, which must be considered for the selection of the type of connectors and the wire section calculations.

Wiring and Junction Box

- **DO NOT open the junction box.**
- The **junction box** has an **IP65** protection degree, with **fast no- error connectors** with **IP67** protection degree.
- Modules incorporate a solar cable with the following specifications:

Size and type characteristics of the wires: 2 solar black cables of 100 cm and a section of 4mm² with Tyco Solar-Lock connectors. Plugs are marked with the respective polarity. The Minus pole is minus-coded and the Plus pole is neutrally coded:



Minus Pole

(Female Cable Coupler)



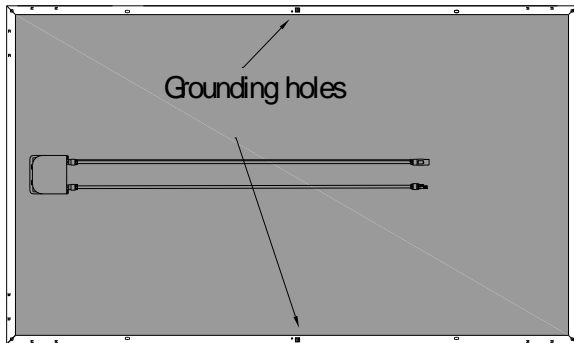
Plus Pole

(Male Cable Coupler)

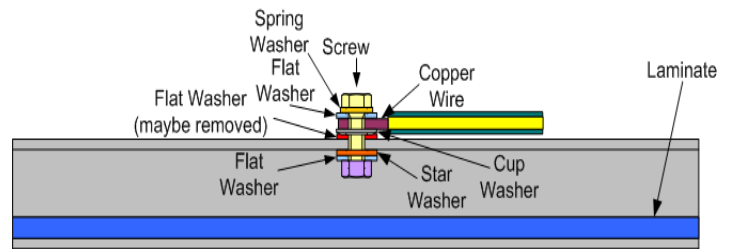
Thermal Characteristics: Solar black cables must work in a range of temperature between: - 40 ° C and + 90 ° C.

GROUNDING

- SOLARIA photovoltaic modules should be ground connected for safety reasons. Modules have several holes in the frame for this purpose, and wiring to ground will be done using any of them. Please follow instructions of grounding section. This connection should be done according to the standards and local regulations.



- SOLARIA recommends the following method for grounding the module frame:
 - Modules frame have two 0.16" grounding holes that should be ground connected for safety and protection reasons.
 - A stainless steel bolt M4 of 2 cm length (Torque grading 1.08 Nm) will be used. A nut M4 stainless steel will be used.
 - It is suggested to use a single ground conductor 12 AWG (General Cable H07V-U).
 - A spring stainless steel M4, 3 flats washer stainless steel M4, a cup washer M4, and a star washer stainless steel M4, will be used to assembly the grounding.



MAINTENANCE, CLEANING & RECYCLING

- It's recommended to wear rubber gloves for electrical insulation whilst maintaining, washing or cleaning modules.
- Do not walk or rest on the surface of the module and do not drop anything on top of the module.
- SOLARIA photovoltaic modules do not need a high level of maintenance, but it is advisable to check their electrical and mechanical connections periodically.
- When necessary, you can clean the surface of the glass with water, a soft window cleaner (not abrasive) and a cloth to avoid damages on the surface.
- Non aggressive and abrasive cleaners or chemicals should ever be used on the treated front glass. No alkali based chemicals should be used including ammonia based solutions.
- SOLARIA suggest to check electrical connections for loose connections and corrosion.
- In case of covering the surface of the module by snow, DO NOT use any type of scraper. Perform the operation with any other object than cutting or stabbing.
- To recycle the modules observe current national requirements and consult a qualified and authorized specialist.

DATA SHEET

Module Series	Model	Dimensions (±3 mm)	Weight (kg)	Electrical Performance @ STC (*)					Max.System Voltage [Vdc]	Max.Fuses Series [A]
				Maximum Power Pmp [Wp]	Voltage at Max.Power Vmp [V]	Current at Max. Power Imp [A]	Open Circuit Voltage Voc [V]	Short Circuit Current Isc [A]		
72 cells 125 x 125 mm Monocrystalline Silicon PV Module	S5M155	1584x790x35	14,3	155	34,52	4,49	43,5	4,95	1000	15
	S5M160	1584x790x35	14,3	160	34,86	4,59	43,71	5,08	1000	15
	S5M165	1584x790x35	14,3	165	35,69	4,62	44,22	5,11	1000	15
	S5M170	1584x790x35	14,3	170	35,75	4,77	44,37	5,16	1000	15
	S5M175	1584x790x35	14,3	175	36,16	4,84	44,45	5,18	1000	15
	S5M180	1584x790x35	14,3	180	36,55	4,93	44,72	5,25	1000	15
	S5M185	1584x790x35	14,3	185	36,93	5,01	44,98	5,31	1000	15

(*) Electric values under Standard Test Conditions (STC) with an irradiation of 1000 W/m², at an AM 1.5 solar spectrum and a Temperature of 25° C.