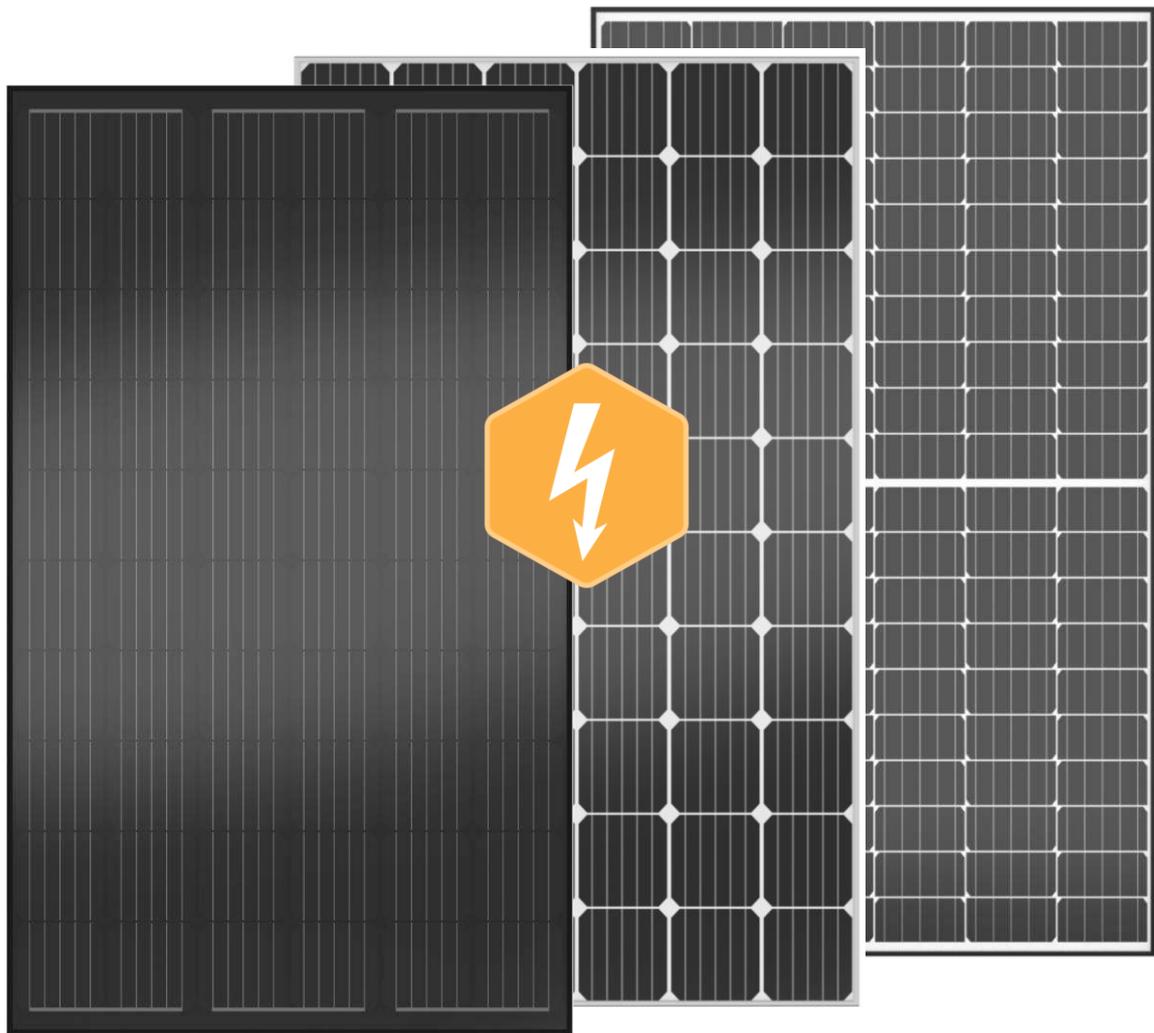


Installation, operation and maintenance instructions

DualSun FLASH



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[DualSun online library](#)



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We reserve the right at any time to make any changes that we deem useful.
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1 Introduction

1.1 Symbols used in this document



Important remark
Security note



Risk of electric shock



Risk of falling



Risk of falling objects



High temperature risk



Information, advice, recommendation, etc.



Mandatory use of the safety harness during any height intervention



Use of protective goggles



Mandatory use of safety shoes



Mandatory use of gloves



Mandatory use of helmet



Switching off the electrical circuit upstream and downstream of the inverter

String: single circuit of modules mounted in series.

1.2 General safety instructions

Please read this installation manual thoroughly and in detail in order to be able to fully exploit the functionality of the product. DualSun disclaims all liability for defects and damages resulting from failure to comply with the installation instructions (improper use, incorrect installation, handling error, etc...).



- It is important to follow these instructions for the safety of people. Improper assembly may cause serious injury. The end user must keep these safety instructions.



- For installations on roofs, it is necessary to respect the safety standards of the persons, relating to roof work and sealing of roofs and relating to scaffolding work with safety net by mounting the respective devices before starting the work. Refer to the recommendation published by the national risk prevention organization.



- The use of gloves is mandatory when handling the panels to avoid any risk of injury or burns.
- Installation, control, commissioning, maintenance and troubleshooting of the system must only be carried out by qualified personnel.
- The correct operation of the installation is guaranteed only if the installation and assembly have been made in the rules of art.
- Installation should not be used if there are signs of damage.
- Unplug all connecting cables from the power supply before intervening on the installation.



- All electrical work must be carried out according to local directives.
- The entire solar installation must be mounted and operated in accordance with the recognised technical rules.

1.3 General standards to be respected

To ensure safe, ecological and economical operation, all applicable regional and national standards, rules and directives must be met, particularly those mentioned below:

- IEC/EN 61215 1 and 2 Edition 1: qualification of design and approval of crystalline silicon photovoltaic (PV) modules for terrestrial application
- IEC/EN 61730 1 and 2 Edition 2: qualification for the operating safety of photovoltaic modules (PV) – part 1: requirements for construction and part 2: requirements for testing.

The installation and safety instructions must be met.

Comply with the regulations on the prevention of occupational accidents prescribed by professional associations, in particular those relating to roof work.

The entire solar installation must be mounted and operated in accordance with the recognised technical rules.

All electrical work must be carried out according to local directives.

2 General description

2.1 General recommendations

2.1.1 Handling

DualSun modules must be handled like any glass product. To avoid accidents, injuries, or damage to the module during work, the following precautions must always be followed:

- Do not walk on the modules.
- Do not drop anything on the modules.
- Protect modules from possible scratch on front and rear faces
- Do not exert any mechanical tension on the electrical connection.
- Always lift and transport the modules with both hands and never use the junction box as a carrying handle.

For the complete process of DualSun modules unconditioning and handling, see the DualSun file No. XX-04.

2.1.2 Transportation

In order not to damage the modules during transport, the following instructions must be followed:

- Transport stacked modules vertically, with a separator that supports the frame level of each module.
- Do not remove the original packaging until the time of installation.
- Do not apply mechanical pressure to the modules (for example, do not attach the modules using a strap, or place any objects on the surface of the modules).

2.1.3 Storage

When storing, to avoid accidents or damaging the modules, the following instructions must be followed:

- Store the modules vertically.
- Do not store the modules on the edges, in a corner, or on an irregular surface.
- Do not place any objects on the surface of the modules.
- When choosing a suitable storage location, make sure that:
 - the location is dry and cool,
 - No object can fall on the module and thus damage it.



If a DualSun module is damaged or broken, it is necessary to replace it. Never install a damaged module.

2.2 Technical considerations

Throughout the year, the system is exposed to external weather and natural conditions (Sun, wind, rain, hail, snow, thunderstorms, dead leaves, dust, bird droppings, etc.) that influence the performance and lifespan of the modules. To extend the life of the modules and to ensure that the installation is functioning properly, important factors and adjustment parameters are to be considered:

2.2.1 Static requirements on the roof

The Solar Installer must ensure that the roof structure can carry the weight of the system.

2.2.2 Tilt angle

The optimal mounting position of DualSun solar panels results in a 90° incidence angle of sun rays relative to the surface of the panels (i.e. Perpendicular to the panels). To maximize the productivity of the installation, panels should be positioned at the optimum orientation and tilt angle. Those angles depend on the geographical location of the installation and can be calculated by a qualified system designer. All panels in a string should, wherever possible, have the same orientation and tilt angles to ensure the system does not underperform due to mismatched outputs.

2.2.3 Wind and snow load

The module has been tested up to a pressure of **5400 Pa** in negative pressure (snow) and **2400 Pa** in positive pressure or negative (wind) without damage. It meets the requirements of the standard IEC/EN 61215 for wind speeds up to 130 km/h.



130 km/h

2.2.4 System location

The overall output of the photovoltaic system in series is always limited by the module delivering the lowest power. Different factors can influence the performance of a module (faults, shading, different orientations) and impact the entire system.

Therefore, it is necessary to study the implantation to avoid a shading effect on the modules in series.

In addition, all panels must be mounted with the same orientation. It is advisable to align all modules to the South, to achieve optimum performance.

DualSun suggests installing the modules in areas where temperatures range from -20 °C to + 50 °C, which corresponds to the minimum and maximum monthly average temperatures, in compliance with IEC 60364-5-51. The extreme operating temperatures of the modules are included between -40 °C and + 85 °C.

In areas with high snow conditions and exposed to strong winds, the assembly of the modules must be carried out in such a way as to ensure sufficient nominal resistance and in accordance with local regulations.

Some operating environments are not recommended for DualSun modules, and **are excluded from the DualSun limited warranty**:

- No panel should be mounted on a site where it can be exposed to direct contact with saltwater, salt mist, acid rain, active chemical vapours or any other aggressive environment.
- DualSun modules must not be installed near flammable liquids, gases, hazardous materials or any type of vehicle.
- The maximum altitude the PV module is designed for $\leq 2000\text{m}$

2.2.5 Types of mounting

The fastening of the modules must be secured by at least 4 points and spread according to the areas specified in the diagram shown in chapter 3.2.

2.2.5.1 Integrated assembly

This assembly guarantees the retention of the original functionality of the roof. Special attention should be paid to the insulation as well as to the protection against rain and humidity. To achieve this level of sealing, the module must be mounted on a special frame that can route rainwater and withstand the wind and snow loads occurring in the geographical area of the installation.

2.2.5.2 Over the roof assembly

The modules can be mounted on a frame designed to support the photovoltaic panels. This framework must be able to withstand the wind and snow loads occurring in the geographical area of the installation. When fastening and connecting the system to the building, it is necessary to avoid damage or destruction of the roof covering in order to maintain optimum resistance against rain and moisture.



Figure 1 : installation on K2 overlay system



The instructions given in the installation guide for the mounting system must be followed for proper installation.

2.2.6 Fire/explosion protection

Do not install the DualSun modules in the vicinity of highly flammable gases, vapours, or dust (e.g., next to a gas station or containers). The national and local fire prevention standards and regulations must be respected during installation. For installations located on a roof, the modules must be mounted on a fire-resistant roofing cover adapted to the application.

The DualSun modules have a class C fire resistance according to IEC/EN 61730-2.

3 Mechanical installation



The installation of DualSun panels must be managed and carried out by trained and qualified personnel. The system must be assembled and operated according to the instructions provided, to comply with the local and national health and safety, and risk prevention regulations.

When assembling and operating the system, no unauthorized person shall be located on or around the roof of the facility.

3.1 Installing DualSun modules

The DualSun panels can be installed both in portrait and landscape orientation.

DualSun does not provide the mounting system for fastening the modules on the roof: please refer to the installation instructions of the chosen mounting system, to install the modules whether for an integrated or for a superimposed installation, in landscape or portrait.



The list of mounting systems compatible with DualSun modules is available in the "Mounting systems compatibility" document on our [website dedicated to professionals](#)



Even when the solar radiation is low, the photovoltaic part of the system produces direct current (DC). This DC current circulates from the module towards the inverter, do not manipulate the module or the connections without protections.



The modules are class II qualified in compliance with IEC/EN 61215-2 and IEC/EN 61730-1 standards. These standards concern PV modules for use on buildings, or on ground structures.

DualSun panels also have the U.S. UL 1703 certificate

Artificially concentrated solar radiation should not be directed to the module.

The mounting system must have a flat surface for mounting the panel and must not cause twisting or stress on the panel, even in case of thermal expansion.

We also remind that the sealing is not ensured by the panels but by the roof covering system and that the evacuation of the water must be foreseen.

It is necessary to provide a space between the frame of the panels and the structure or the floor to avoid damage to the cables.

The panel mounting systems must be installed only on buildings that have been formally validated for structural integrity, and which have been considered capable of supporting the additional weight of the panels and mounting systems, by a certified building specialist or engineer.

The supplier of the mounting system must take into account the galvanic corrosion which may appear between the aluminium frame of the panels and the mounting system or the grounding parts if they are made of different metals.

The module is only certified when its original frame is completely intact. Do not remove or modify the module frame in any way. Drilling additional mounting holes or removing stacking pins are likely to damage the module and reduce the strength of the frame, and thus are not allowed.

The use of flanges and fasteners with additional grounding bolts or grounding connectors shall be in accordance with this safety and installation instruction manual and according to the conditions in section 4.3.

The modules can be installed according to the following methods:

1. **Frame holes: attach the module to the structure using the factory-made mounting holes. It is recommended to use four M8x16 mm stainless steel screws with bolts, washers and lock washers for each module.** The maximum tightening torque of the bolts is 24 N.m.
2. **Callipers or clamps:** the brackets can be mounted on the longitudinal (longest side) or lateral (shortest side) side of the module. The areas allocated to these clamps are specified in chapter 3.2 below. Installers must ensure that the resistance of the clamps is sufficient given the maximum pressure to which the module can be exposed. The clamps are not supplied by DualSun.



It is important to make sure that the clamping brackets do not distort the top of the aluminium frame of the DualSun panel, this may weaken or even break the glass.



The tightening torque of the clamps must not exceed 24 N. m.



The compatibility of the mounting system with the modules must be assessed before any installation, especially when the system does not use brackets or clamps.

3.2 Mounting specificities of DualSun Flash panel

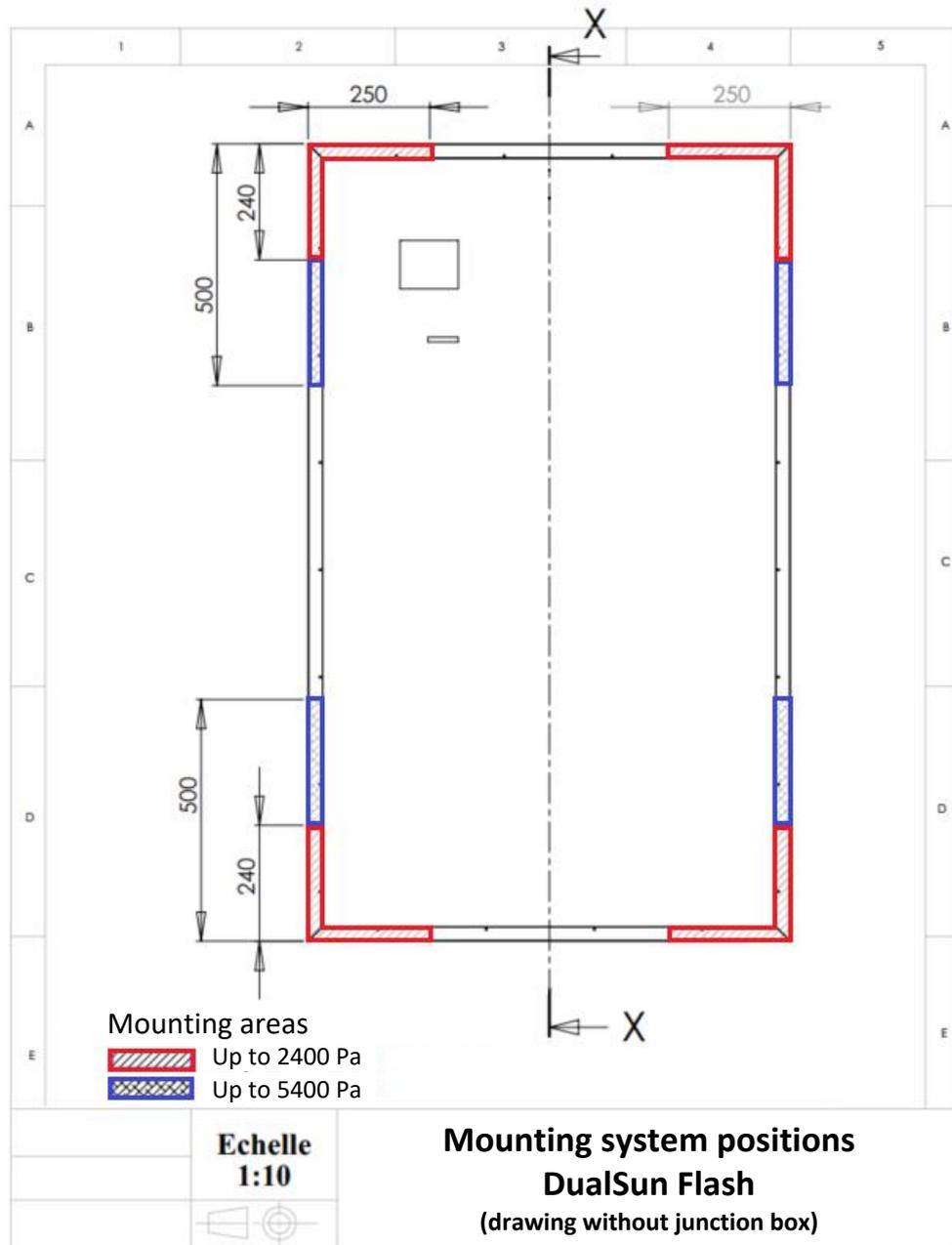


Figure 2 : Possible positions of the clamps to fasten Dualsun Flash panels

4 Electrical installation

The nominal electrical parameters I_{cc} , V_{co} and P_{max} of the modules are determined under standard test conditions STC (standard testing condition): illumination of 1000 W/m^2 with a spectrum of 1.5 AM and a cell temperature of 25°C . These values may vary from $\pm 3\%$.

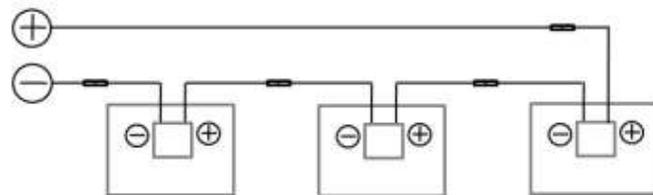


*Under normal conditions, a photovoltaic module is likely to be exposed to conditions that produce more current and/or voltage than standard test conditions values. Therefore, **the maximum rated values of I_{cc} and V_{co} on the module should be multiplied by 1.25 when determining the nominal voltage of the components, the nominal current of the conductors, the size of the fuses, and the size of the control devices connected to the PV output.***

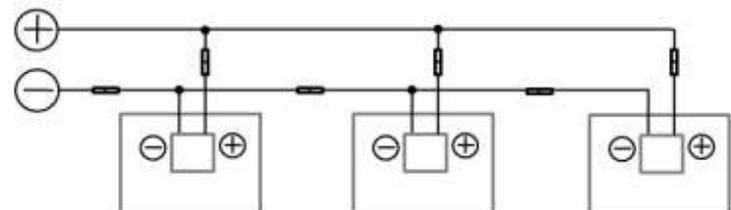


4.1 Electrical connection

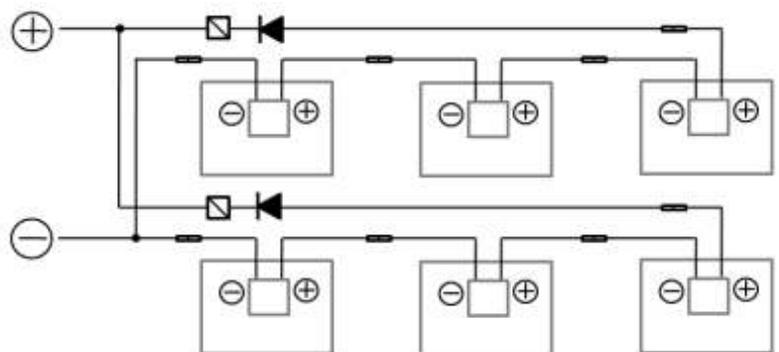
Serial wiring



Parallel wiring



Serial/parallel wiring



Diode



Overcurrent protection



Connector

Figure 3 : Electrical wiring configurations

4.1.1 Serial wiring

To connect modules in series, the maximum number of connectable modules is to be determined. For this, it is necessary to determine the maximum tension of the string. This is calculated by summing the open circuit voltage (V_{co}) of each module when the ambient temperature is at its minimum value. Apply the temperature coefficient to determine the V_{co} value at the temperature considered.

The maximum open circuit voltage of the string must never exceed the maximum system voltage. See module datasheet.



For modules installed in series, only modules with the same nominal currents will be used.

To determine the number of maximum modules that can be connected in series:

$$N = \frac{\text{Maximum system voltage}}{1,15 \cdot V_{co}}$$

where:

- N = maximum number of modules in series
- V_{co} = open circuit voltage of each module, when the ambient temperature is at its minimum value (refer to the product datasheet in chapter **Erreur ! Source du renvoi introuvable.**)



If additional PV modules are to be installed in a string with the DualSun modules, their power and current must be equal to those of the DualSun panels within the tolerances of the manufacturers.

4.1.2 Parallel wiring

For DualSun modules connected in parallel, protection against the corresponding overcurrent must be used. For this purpose, a DC voltage fuse must be used to prevent reverse current. Refer to the inverse maximum current value of the product datasheet to determine the value of the protection. In addition, the operating conditions and design rules of the inverter manufacturer must be met.



Refer to the inverter instructions



For modules connected in parallel, only modules with the same nominal voltages will be used.

The electrical installation must be carried out by qualified personnel in accordance with current safety standards and IEC/EN 61730.

Refer to the grid operator requirements when installing the system.

The installation must be equipped with a circuit breaker to isolate at the same time all the cables that are not grounded by a minimum spacing of 3 mm at the contact level.

4.2 Electrical fittings, cables and diodes

The DualSun solar modules are supplied with cables, connectors, and a pre-equipped junction box. Before installation, check that the plugs and connections are not damaged.

Connect the positive plug of a module to the negative plug of the next module; see identification of the polarity of the MC4 connectors below:



Figure 4 : MC4 connectors

To connect the modules, special solar cables with a minimum diameter of 4 mm² and the appropriate connectors must be used. These cables must be UV- and wear-resistant. Avoid leaving the cables exposed to the elements or place them in a protective sheath. **Observe a minimum cable bend radius of 40 mm.**

When connecting the connectors, it is important to ensure that they are connected in a watertight manner (minimum IP67).

When handling these cables, it is necessary to ensure that the tools used are dry.

All modules are supplied with pre-installed bypass diodes to minimize the hot spots and power losses of the modules in the case of shading (partial).



Never connect or disconnect a live circuit.



Never open the junction box.

DualSun module junction box contains bypass diodes which are in parallel connection with the cell strands. If heat spot occurs locally, the diode will come into operation to stop the main current from flowing through the heat spot cells in order to restrain module overheating and performance loss. However, the bypass diode is not the overcurrent protection device.

If the diode is suspected to get out of order, the installer or system maintenance supplier shall contact DualSun.

The diode type is 20SQ045 (for SUNTER, rated current is 15A, peak reverse voltage is 45V).

The replacement of the bypass diodes shall be done by qualified personnel only.

The maximum rating of a fuse connected in series with a cell string is typically 15A, but the actual module specific rating can be found on the product label and in the product datasheet.

Diodes that are used as blocking diodes must have a:

- Rated Average Forward Current [IF(AV)] above the maximum system current at the highest module operating temperature.
- Rated Repetitive Peak Reverse Voltage [VRRM] above the maximum system voltage at the lowest module operating temperature.

4.3 Grounding and lightning protection



The evaluation and design of the grounding system and lightning protection of PV installations must be carried out by trained and qualified personnel. Refer imperatively to applicable local regulations to meet all specific requirements.

The DualSun modules must be grounded. The grounding can be carried out through the holes made for this purpose in the framework of each module. These holes are used to attach the grounding cable and connect it to the equipotential link.



It is necessary to ensure that the grounding is carried out with the appropriate connections (stainless steel), to avoid anodizing or oxidation of the module frame at the level of the drilling intended for grounding. The grounding device must be in good contact with the aluminium frame of the module.



To obtain the optimum output power, DualSun recommends that the negative poles of the DC circuit of the module group be grounded.

The frame of the DualSun panels comes with two earthed holes at each corner of the frame.

Avoid direct contacts between aluminium and copper by using an intermediate metal such as stainless steel or tin.

4.4 Indirect lightning strike

The installation must also be protected from indirect lightning strikes. Indeed, the drivers of the system can become inductive if a lightning strike erupts in the vicinity of the installation. To prevent this phenomenon, the electrical cable loops must be avoided and the surface between the cables must be as small as possible, as can be seen in the graph below:

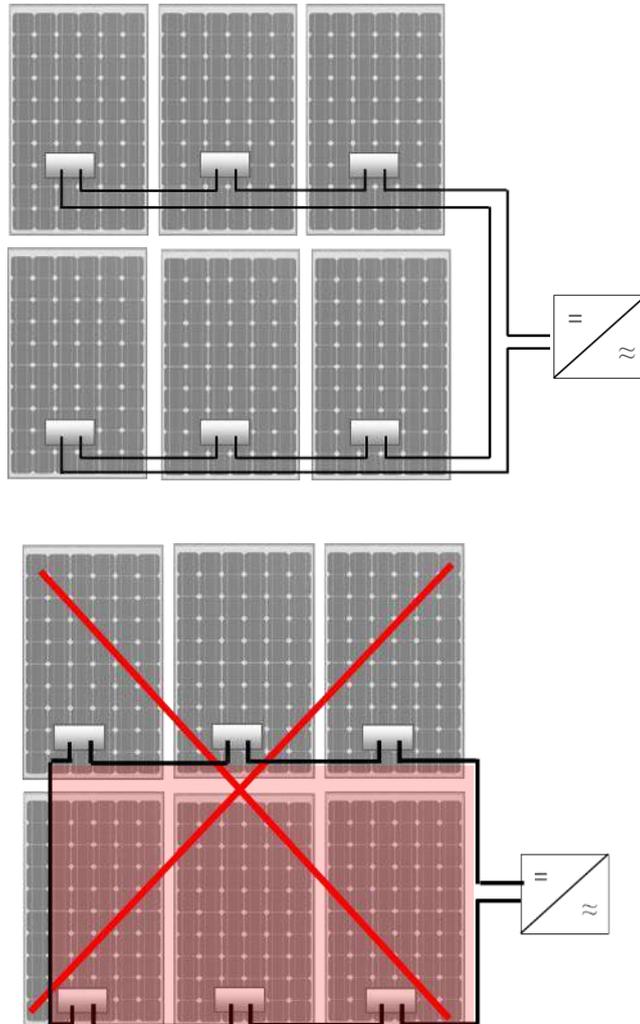


Figure 5 : Simplified diagrams showing two examples of good and poor grounding of a PV field

5 Cleaning the surface of the modules



The higher the level of contamination of the PV system surface, the less the cells are able to absorb the energy contained by the incident sunlight.

By tilting slightly, the panels relative to the horizontal, the rain and snow can clean the surface, and thus temporarily protect them from additional contamination. However, after a while, dust, leaves or bird droppings will salt the glass in front and thus reduce the output power.

In case of persistent soiling, the panels must be washed with cold water and a soft sponge.



Never use solvents or a pressure washer, and never scrape the surface of the panel. Cleaning operations must be carried out by qualified professionals.

6 Decommissioning the installation

Before any operation on the appliance/installation, the power supply and the injection must be switched off (e.g. via the appropriate fuse or a general switch) and to prevent any re-operation.

For any intervention involving disassembly of the regulations, make sure that the internal components are not likely to cause a static discharge.

6.1 Disassembling a module

If it proves necessary to disassemble a module, the following procedure must be followed:



- Turn off the electrical circuit upstream and downstream of the inverter.
- Risk of electrocution. Refer to the inverter/micro-inverter manufacturer's manual for this. It may be necessary to use a particular disconnection tool. Disconnect the module from its support.
- Unplug the electrical connectors.
- Unplug the grounding module.

6.2 Waste treatment

For the waste treatment of a used DualSun system, the applicable regional and national regulations must be met.

7 Responsibilities

<i>DualSun</i>	<i>installer</i>	<i>user</i>
<p>DualSun products are produced in compliance with the requirements of the various applicable European directives.</p>	<p>Installation and first commissioning must be carried out in accordance with the rules of the art in conformity with:</p> <ul style="list-style-type: none"> • the instructions in the installation manual, • the legislation and standards in force. <p>The installer must inform the user of the need for regular maintenance.</p>	<p>The user must employ qualified professionals:</p> <ul style="list-style-type: none"> • to carry out the installation and to carry out the first commissioning, • to carry out the regular maintenance of the installation. <p>The user must keep the installation-related documents close to the system components.</p>

7.1 Warranty conditions

See the document "DualSun – Contractual warranty" for DualSun products.

For the other components of the installation, see the warranty conditions of the different manufacturers.

7.2 Disclaimer

DualSun's liability cannot be incurred in the following cases:

- Failure to comply with the instructions contained in the notice concerning installation, use, operation and maintenance of the installation.
- Failure to comply with the safety rules set out in the recommendation published by the national risk prevention body