

Roofit.solar Safety Instruction:

Thank you for choosing Roofit.solar BIPV modules.

This manual contains safety and handling instructions for low voltage connections and components (400/230V) and solar PV systems with an open circuit D.C. voltage below 1000 V.

Designing and installation of Roofit.solar PV systems and electrical configuration of these systems must be done by authorized specialists.

For installation guidance, please refer to '**Click System Installation Manual**' and/or '**Double Seam Installation Manual**'.

Roofit.solar instruction and safety manuals meant for systems integrated on metal roofs.

Each Roofit.solar PV panel contains a sticker that describes;

Nameplate: describes the product type, weight, dimensions, peak power, max. power current, max. power voltage, open circuit voltage, short circuit current, all as measured under standard test conditions and normal conditions.

Nameplate also requires a unique serial number for each Roofit.solar module. Certification and safety precautions are also given on the nameplate.

Barcode: allows Roofit.solar to monitor each module quality during production and to be sure it is ready to pack and deliver.



A Roofit.solar module consists of two parts:

- an '**active PV area**',
- and a self-supported **metal roofing element** that 'active PV area' is integrated into.

General Safety:



Warning! **Hazard of falling from roofs!**

Installation should start after safety precautions have been identified and taken, including without limitation fall protection measures, ladders or scaffolds, and personal protective equipment. Protective wear must be worn according to local regulations and to best industry practices.

Keep unauthorized people away from the installation, especially, children. Keep unauthorized people away under the roof; any accident that leads modules falling from the rooftop can cause severe injuries.

Do not attempt to service the installation on your own unless it is agreed prior to install with an installation specialist. Always contact a qualified professional from Roofit.solar or its distributors before installation.

Roofit.solar and its distributors are not liable for any damages caused by inappropriate installation, use, or maintenance of Roofit.solar modules, including without limitation damages, losses, and expenses caused by unauthorized specialists who are nonobservance of the instructions of referred manuals or caused by or in connection with products.

Do not install when there are strong or gusty winds, frosted roof surfaces or wet conditions. Use roof covers to cover already installed modules on the roof in case of rain if the installation takes more than one day.

Product Safety:

Roofit.solar modules are equipped with factory installed junction boxes to their metal profile, and jumper cables/connectors with IP65/IP67 protection grade are delivered together with the modules separately.

Each module has three junction boxes that are pre-connected; the positive (+) terminal has a female connector while the negative (-) terminal has a male connector. The module wiring is intended for series connections (i.e. female (+) to male (-) interconnections. **Watch junction boxes and jumper cables while maneuvering panels on the roof.** Do not use the junction boxes or jumper cables as a grip.

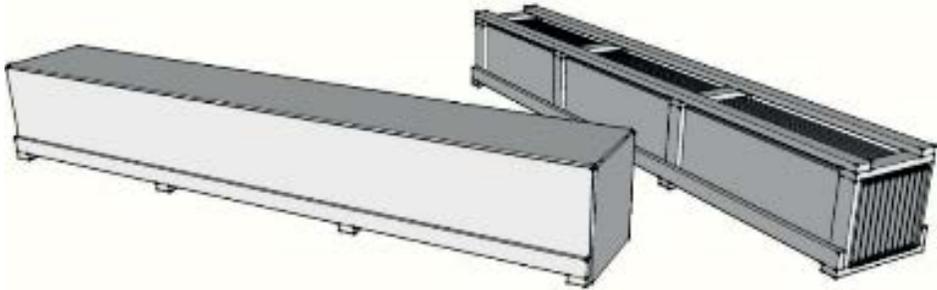
Do not attempt to repair any part of the module. PV modules with broken glass cannot be repaired and must not be used. Contact with any part of broken PV modules can result in lethal shock. Broken or damaged PV modules must be handled carefully and disposed properly. If you find a broken or defective module contact your installer and follow their instructions. Only a professional can repair the installation and bring it back to function.

Do not damage or scratch the PV module surfaces. Especially do not apply paint or adhesive to the surfaces that will cover solar cells. Do not place any heavy objects on the modules to avoid glass breakage.

Do not use mirrors or other magnifiers to concentrate sunlight onto the modules. Artificially concentrated light shall not be directed on the modules.

Handling and Transport Safety:

Roofit.solar modules come as vertically aligned in a wooden container with a pallette. Unloading should be done with a forklift. Repacking modules using different methods and materials may lead to module damage or scratches and breakage.



Packaging pallet illustration

Please acknowledge weights of modules that are in the package while unloading them and take precautions for overlifting.

NOTE: Roofit.solar designs different packaging and crating depending on specific BIPV solution. Roofit.solar reserves the right to change packaging design without previous notice.

Do not put down the modules on any hard surfaces that can break 'active PV area'. Always put down the modules on the soft surfaces.

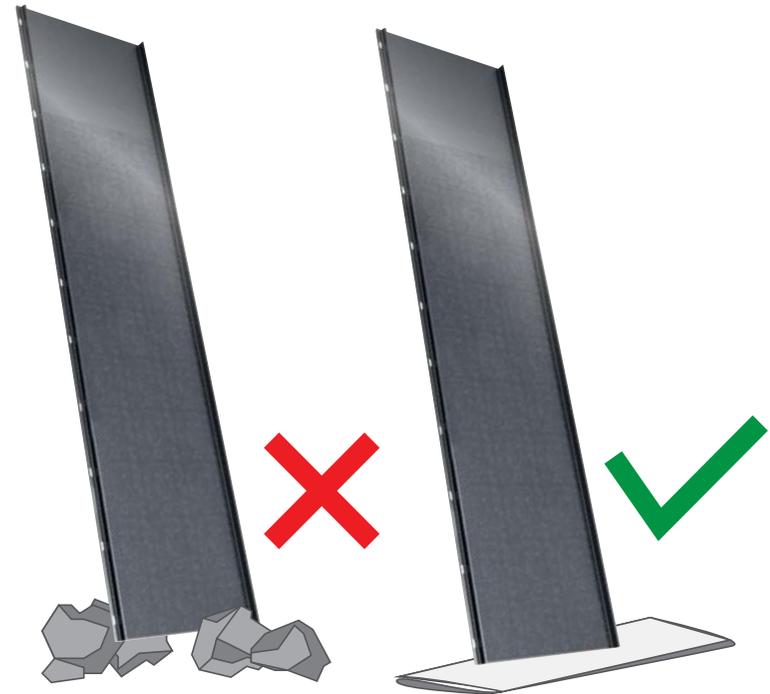
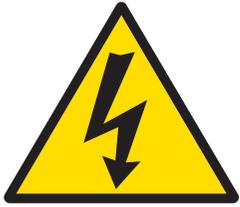


Figure 1. Handling Roofit.solar modules on surfaces.

Be cautious for sharp edges of metal backsheet of Roofit.solar modules. Always wear protective gloves during installation, especially during metal cutting.

Electronic Configuration and Connections:



Warning!
Electrical equipment!



Warning!
Potential lethal shock
from electrically live parts!

When exposed to light (even under low light conditions), PV modules produce almost full voltage. Current and power increase with light intensity. Never disconnect electrical connections under load, because direct current can arc across gaps.

A PV module may experience different conditions that produce more current and/or voltage than reported at Standard Test Conditions (1000 W/m², AM 1.5 and 25 °C cell temperature). Normal cell operating temperature of Roofit. solar modules is 45 °C.

Installation at locations with lower operating temperatures can lead to voltage deviations from Standard Test Conditions. Please refer to product datasheets for Temperature Coefficient values to calculate the factor to be multiplied with and determining component voltage ratings, conductor ampacities, fuse sizes, and size of controls connected to the PV output. All other electrical DC components should not be exceeded in open-circuit operation at the lowest temperature expected

at the PV system location.

Due to their locks, click system installation requires shifted configuration. Double seam can be installed in one row or with shifted configuration. Please check your local building regulations before installing any system.

Both system connectors are engaged behind battens. For more detailed installation for both click and double seam systems, please refer to Roofit.solar installation manuals. Jumper cables (junction box cables) must be reachable behind the battens before seaming or fastening modules.

Make sure that the jumper cables are fully engaged when two modules are connected to each other, and connectors are locked completely (Figure 2).

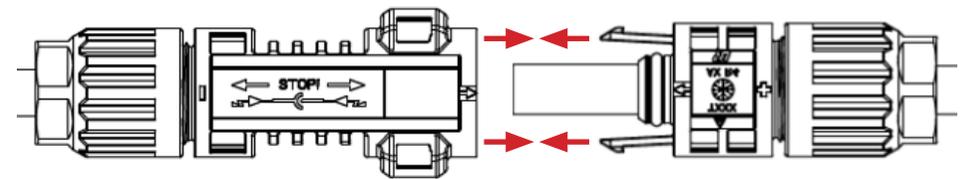


Figure 2. Jumper cables connection.

Do not try to connect the system without consulting a special electrician.

Roofit.solar modules come with jumper cables that are sealed with dust caps. Do not take out these dust caps until just before the connector engagement with another jumper cables.

The first and the last modules in the serial connected system are connected to the inverter (Figure 3). Typical electrical configurations for click system and double seam can be seen in Figure 4. Each electrical configuration is unique for each system installation and must be done by an authorized electrician.

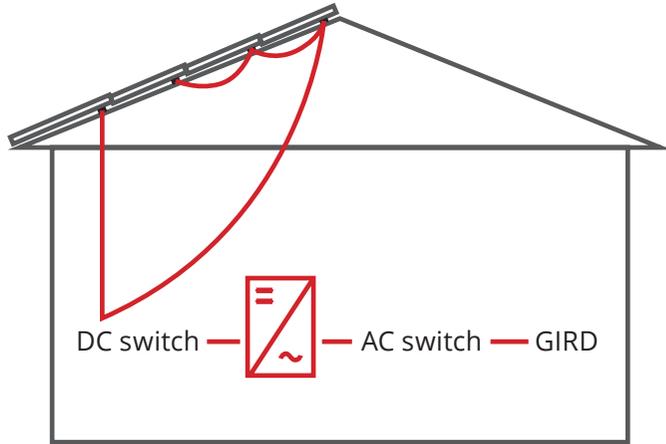


Figure 3. Roofit.solar system connection to the grid.

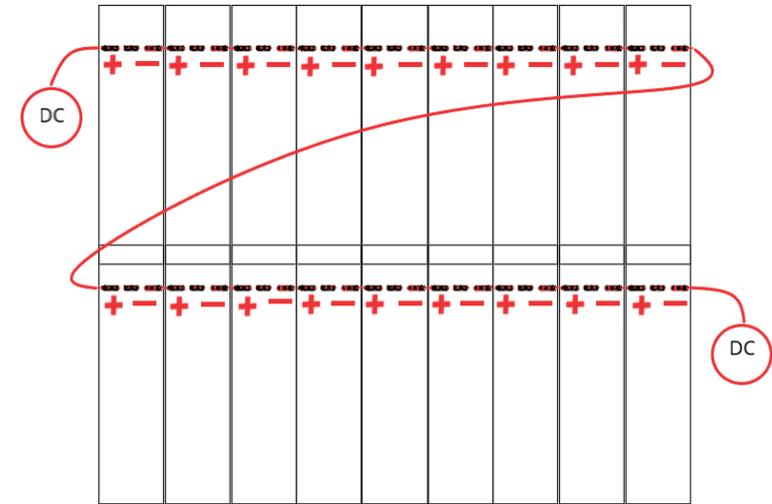
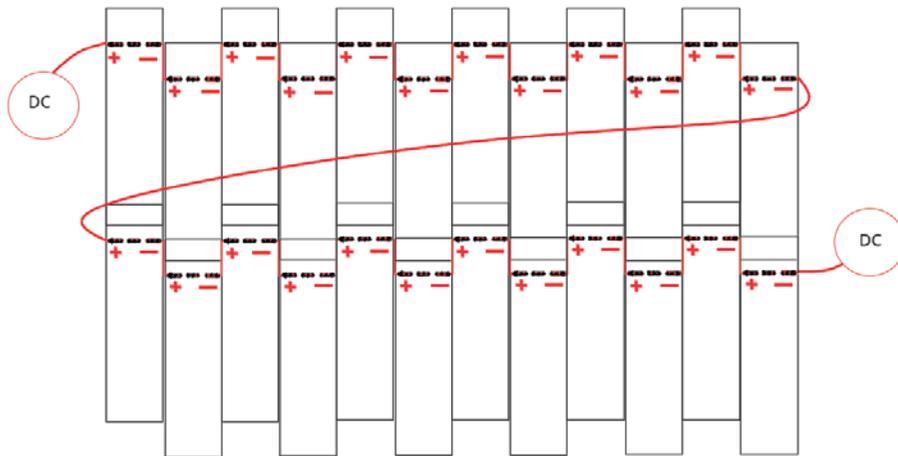


Figure 4. Click and double seam installed systems electrical configurations.

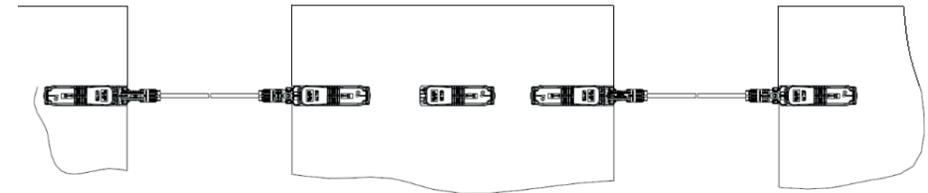


Figure 5. Serial wiring diagram close-up.

Rating required for minimum Field Wiring:

Testing Standard	Rated Voltage	Temperature Range
IEC 52790:2014	DC 1000 V	-40 to +85

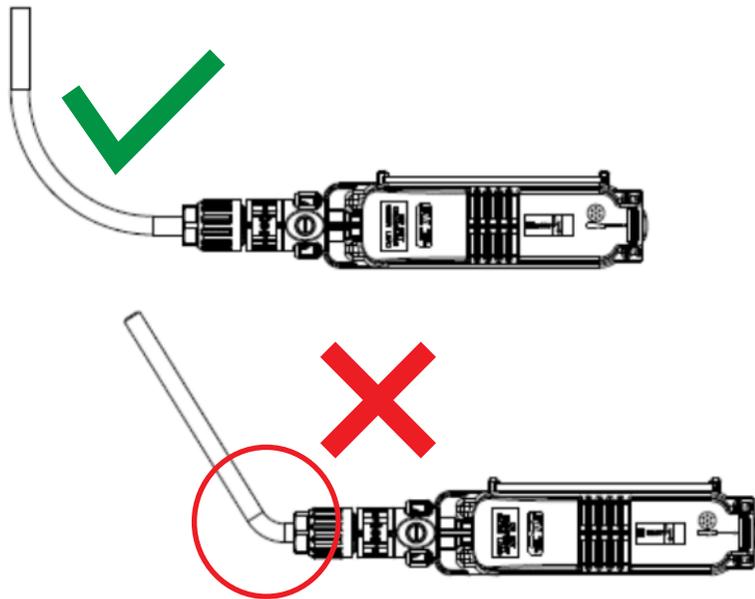


Figure 6. Jumper cables safety.

The cables must not be bent in the direct exit of the cable screw joint (Figure 6). A minimum bend radius of greater than five times the diameter of the largest cable must be maintained.

NOTE: If Roofit.solar modules are connected in series in a PV system, the total string voltage MUST NOT exceed 1000 VDC system voltage.

If there are more than two strings with same number of Roofit.solar modules connected in parallel in a PV system, total parallel strings MUST NOT exceed maximum reverse current.

Warning: All other electrical components will be in a PV system should be compatible with MC4 connector of junction boxes.

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Fire Safety:



Warning!
Fire hazard in case of incorrect installation!

Roofit.solar modules are tested according to CEN TS 1187 for fire safety and comply with EN 13501-5:2016 B-roof (t2) classification criteria when installed.

Installing Roofit.solar modules may affect the fire safety. The use of improper installation methods may result in the unexpected fire. **In case of fire, Roofit.solar modules will continue producing a potentially lethal voltage** even in cases of cable isolation is destroyed or compromised, low radiation, modules disconnected from the inverter, and/or modules partially or completely destroyed.

Installing Roofit.solar modules **should not be installed** near in locations **with hazardous flammable gases.**

During a fire, stay away from all elements of the PV system, until the area is safe. Inform firefighters about the existence of a photovoltaic system in the building.

Roofit.solar highly recommends a solution against damage or fire risks that can result from arc and sparking, deteriorated wires, poor connections and breaches in the wire insulation. Integrating an **Arc Fault Circuit Interrupter (AFCI)** for each system installation is highly recommended for such fire risks.

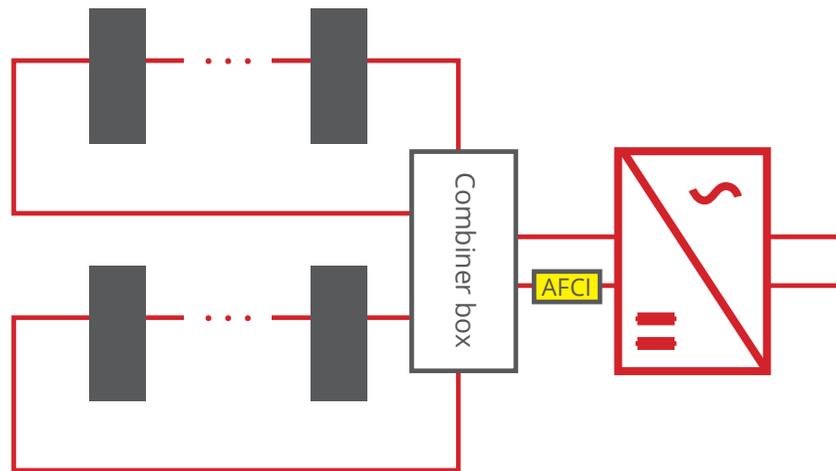


Figure 7. AFCI for PV systems

Roofit.solar also highly recommends also **DC switch disconnectors** to switch the PV system off and disconnects them from grid connection in case of emergency.

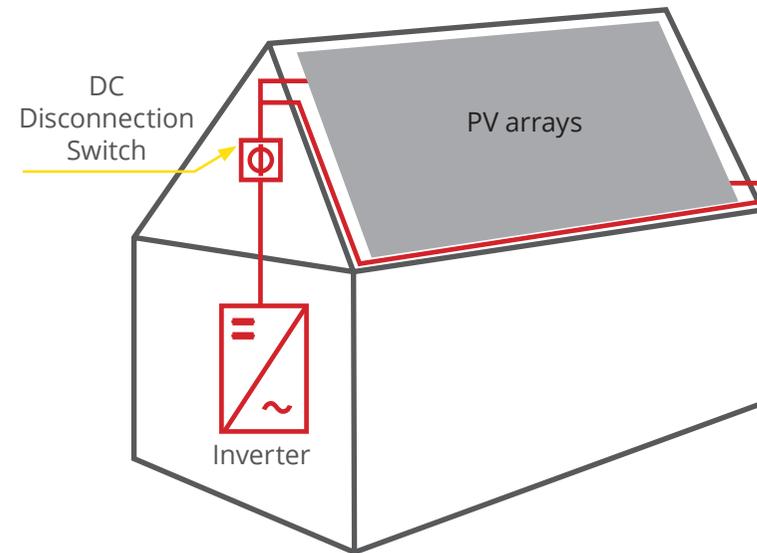


Figure 8. DC Disconnecting switch.

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