

## PV MODULE INSTALLATION MANUAL

Framed Modules:	<b>Tarka - Tarka Classic - Tarka 48 -Tarka 72</b> VSPS – VSMS
Frameless Modules:	<b>Sanka</b> VSPL – VSML
GlassGlass module:	<b>Biva</b> VSPB - VSMB

### 1. INTRODUCTION

The user manual contains information regarding the installation and safe handling of VOLTEC Solar PV modules. All instructions should be read and understood before attempting installation. If there are any questions, please contact VOLTEC Solar for further information. The installer should conform to all safety precautions in the manual when installing modules. Before installing a solar PV system, the installer should become familiar with the mechanical and electrical requirements for PV system. Keep this user manual in a safe place for future reference.

*Frameless Modules (laminates)*

*The particular points for this type of modules are listed in italics*

*In the text that follows, unless indicated in italics or relating solely to the laminate and glass glass module, the terms module, PV module panel are used interchangeably for framed modules, laminated or glass glass module.*

Panneaux cadrés :	Tarka :	module with 60 cells and frame profile 42 x 30
	Tarka 48:	module with 48 cells and frame profile 42 x 30
	Tarka 72:	module with 72 cells and frame profile 42 x 37

### 2. GENERAL INSTRUCTIONS

Do not use the PV module where failure could result in death, personal injury or damage to property.

Make certain that PV module conforms to the specifications of the global system.

### 21. HANDLING

Handle the PV module with care. Wear clean and flowing gloves to avoid direct hand contact with the glass. In the case of using suction cups or handling straps ensure they are clean and free of any fat or abrasive material. Avoid any contact of the glass with a fatty substance or containing silicone. Do not put on, move or drop any object whatsoever on the glass.

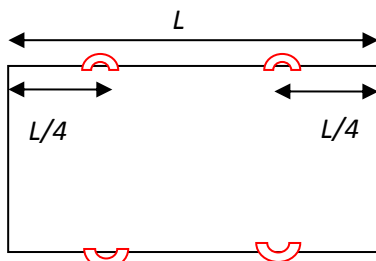
Do not disassemble the PV module.

Do not alter or remove any component.

Do not bend the PV module: risk of breaking the cells (micro cracks)

Do not stand or step on a module to avoid personal injury and the damage to a module: may break cells (microcracks) and damage to the glass surface (scratches, dirt).

*Frameless laminates are particularly flexible. They must be handled in upright position as much as possible. When they are to the horizontal, to ensure gripping of the large size and about on a quarter of the length.*



Do not impact on front or rear surface of the PV module. Rear surface may be damaged by sharp objects.

Do not throw and drop the PV module.

*A shock on the edge or corner of a laminate can cause glass breakage and cracking over its entire surface (tempered glass). The panel will be useless.*

Do not touch live parts of wires, cables, connectors, or junction boxes. Be sure the circuit breaker is off if it is applicable. Always use appropriate safety equipment (insulated tools, insulating gloves, insulating shoes, etc.).

Do not use the cables or connectors as a handle.

## 22. STORAGE

The modules should be stored as they are delivered by Voltec Solar, on a flat, horizontal, palletized and separated by black plastic corners that prevent them from slipping. The free storage without corners and glass against glass is prohibited. The modules are delivered to the vertical pallet with cardboard packaging and strapping. They must be stored as is. Once the straps are removed, the modules must be in support or placed horizontally with the cartons corners as separators.

*Laminates must be strictly stored in their original packaging, vertically. The Storage horizontal, glass against glass, or junction box against the rear face is prohibited.*

## 23. INSTALLATION SAFETY

Installers should be qualified personnel who are experienced with electrical work and the installation of PV systems. Handling precautions apply and must be strictly adhered to when installing modules (see § 2.1).

Fasten the PV modules to the mounting frame firmly so that the modules will not be affected by wind and snow loads. The frame should meet relevant building standards.

Do not block frame drain holes.

Do not use damaged PV modules. A damaged PV module may cause a fire or an electrical shock with personal injury or even death.

Do not expose the PV module to artificially concentrated sunlight

The PV module exposed to sunlight generates high voltage and current. Contact with the module output wiring may cause a fire or an electrical shock.

Connect a circuit breaker or some equipment to detect the leakage current and then break the circuit.

Never open electrical connections or unplug connectors while the circuit is under load (PV under sun).

Do not use PV modules of different characteristics and electrical properties in the same system.

Only connect in series modules with the same rated output current.

On site, check the open circuit voltage of the modules with a multimeter; the measured voltage should be approximately equal to the voltage indicated on the module datasheet.

If modules are connected in series, the total voltage is equal to the sum of the individual module voltages.

The open circuit Voltage exceeds the rated voltage. Take care that the open circuit voltage at the lowest temperature reported for the area multiplied by the number of modules in series is not higher than the specified maximum system voltage of the PV module and all other electrical DC components (DC protection and inverter in particular)

Only connect in parallel modules or series combinations of modules with the same voltage. If modules are connected in parallel, the total current is equal to the sum of individual module or series combination currents.

Do not connect PV modules or strings in parallel without using a proper rated over-current device.

In parallel configuration be sure to use only modules of the same type. If more than two strings are configured in parallel, it is necessary to use a junction box. The maximum reverse current is indicated on the data sheet VOLTEC SOLAR modules. The junction box must be fitted with a protective device whose size is less than or equal to the value of reverse current specified on the datasheet.

Under normal conditions, a photovoltaic panel is likely to experience conditions that produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of  $I_{sc}$  and  $V_{oc}$  marked on the back of panel should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes, and size of controls connected to the PV output.

We recommend limiting the number of module connected in series to the maximum values specified indicated in the following table:

Module reference	Maximal number of module per string
TARKA 48	30
TARKA 60, Sanka, Biva	23
TARKA 72	19

Example:  $V_{max} = 1000 \text{ V}$  and  $V_{oc,module} \text{ (Open circuit Voltage)} = 38 \text{ V}$

With 24 modules in serie  $\Rightarrow V_{oc,String} = 24 \times 38 = 912 \text{ V}$  in STC conditions ( $T^\circ = 25^\circ$ ).

If  $T^\circ = -10^\circ \text{ C}$  and voltage coefficient =  $-128 \text{ mV/k}$ , then  $V_{oc,String} = 24 \times (38 + ((25 - (-10)) \times 0,128)) = 1019 \text{ VDC}$

*Vmax at -10° is higher than Vmax determined at 25°. The number of modules by string is limited to 23*

VOLTEC Solar PV modules are qualified for safeties through EN IEC 61730-1, 61730-2 and 61215.

They meet the requirements of electrical class A: dangerous electrical installations generally available (according to EN IEC 61730, hazardous voltage above 120 VDC). VOLTEC SOLAR PV modules meet the requirements of protection class II. The safety class is equal to EN IEC 61140.

## **24. FIRE SAFETY**

Refer to the local authority for guidelines and requirements for building or structural fire safety.

The roof construction and installation may affect the fire safety of a building; improper installation may contribute to hazards in the event of fire.

For roof application, the panels should be mounted over a fire resistant covering rated for the application.

It may be necessary to use components such as earth ground fault circuit breakers, fuses and circuit breakers.

Do not use panels near equipment or locations where flammable gases can be generated or can be collected.

## **3. MECHANICAL INSTALLATION**

### **31. SELECTING THE LOCATION**

Select a suitable location for installation of the module.

The panels must be mounted to maximize direct exposure to sunlight and to eliminate or minimize shadowing.

For optimum performance, the module must be facing true south in northern latitudes and true north in southern latitudes.

Panels can be mounted at any angle from vertical to horizontal orientation. Attention should be paid to avoid low tilt angles which may cause the accumulation of dirt on the glass against the frame edge. The accumulation of dirt on the panel surface can shade the active solar cells and have a negative impact on electrical performance. The most appropriate average inclination is 30 ° to the horizontal. For detailed information on optimal module orientation, refer to standard solar PV installation guides or a reputable solar installer or systems integrator.

The modules should not be shaded at any time of the day from trees, chimney, antenna or other building, etc. The shadow stops partially or completely, as the case, the functioning of the panels. The result is a lack of production and therefore a financial loss.

The maximum load permitted is applied to the uniformly distributed wind and snow load. Avoid placing panels in locations exposed from wind gusts, snow, or ice accumulation.

## **32. SELECTING THE PROPER MOUNTING STRUCTURE AND HARDWARE**

Load and resistance calculations are the responsibility of the system designer or installer.

Ensure that the panels are not subject to wind or snow loads exceeding the maximum permissible loads and are not subject to excessive forces due to thermal expansion of the support structure

The mounting structure that will receive the panels must be capable of supporting efforts that create the panels, wind, and snow. These vary depending on geographic location. The mounting structure and hardware must be made of durable, corrosion and UV resistant material.

Read the local settings before making the choice.

For roof mounted systems, provide adequate ventilation in the back of the panel to ensure proper cooling (> 5 cm).

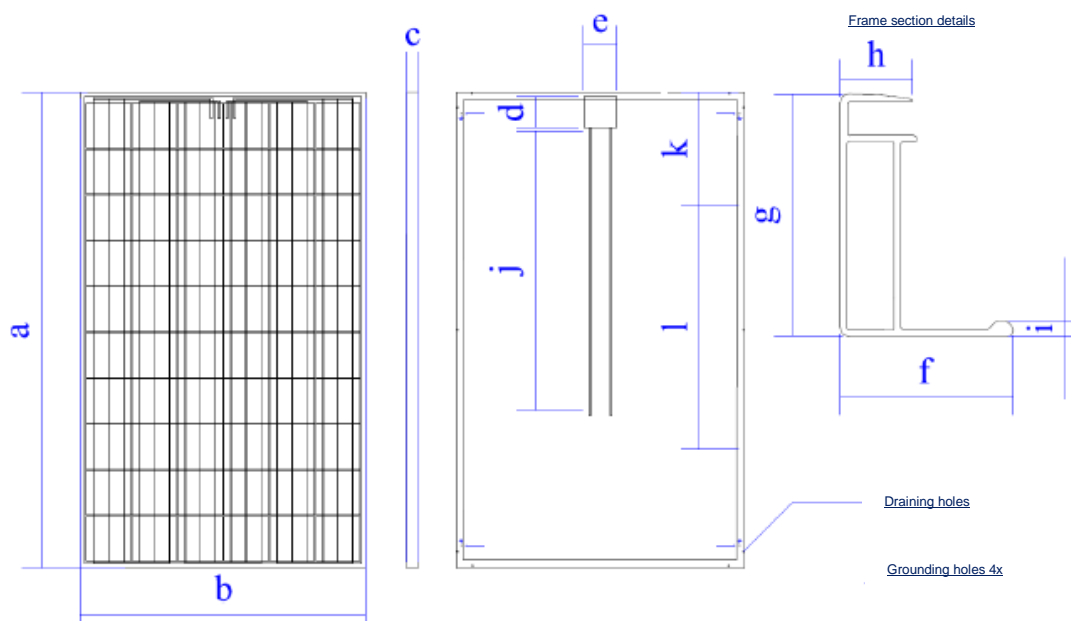
Panels must be securely fastened using support frames or mounting accessories specially designed for PV applications. Always keep the back surface of the panel free from any foreign objects or structural elements which could come into contact with the panel, particularly when it is subjected to mechanical loading

*Laminates and modules Glass - Glass: a mounting structure needs to be chosen, ensuring rigidity, protection of edges and corners and fixing.*

## **33. FIXING ON THE MOUNTING STRUCTURE**

Observe all instructions and safety precautions included with the mounting system to be used with the modules.

Modules must be securely attached to the mounting structure using four fixing points for a typical installation. If heavy wind or snow loads are anticipated, additional mounting points should also be used. Refer to the recommendations of the supplier of integration system.



Model	Module dimensions (mm)			Junction box dimensions (mm)		Aluminium frame Profile dimension (mm)				Cable length h (mm)	Fixation holes or clamps position* (mm)	
	A	B	C	d	e	f	g	h	i	j	K	L
TARKA	1660	998	42	98	95	30	42	12.5	-	1000	415	830
TARKA 72	1980	998	42	98	95	30	42	12.5	-	1000	495	990
SANKA	1640	980	5	98	95	-	-	-	-	1000	275	1090
BIVA	1658	992	5,4	98	95	-	-	-	-	1000	280	1100

If the fixation positions are different than indicated above, a loading test must be done to validate the mechanical behavior.

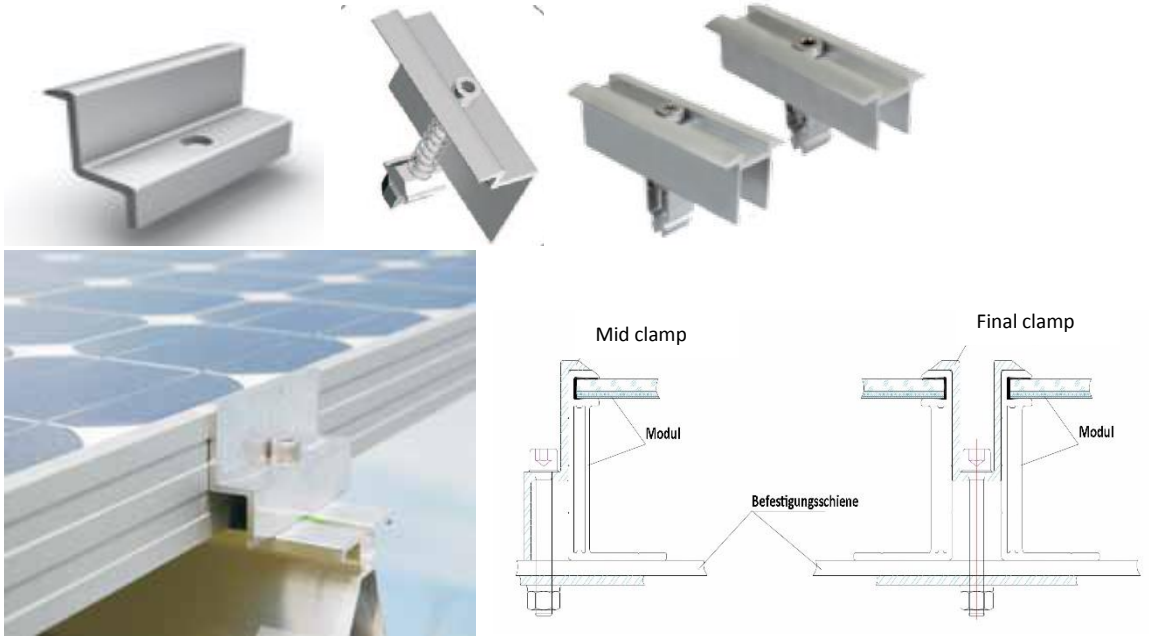
### 332. MOUNTING WITH CLAMPS

Base profile of the mounting structure should be placed in perpendicular to the longer side of the module. Module shall be fixed at 4 places or more on the longer side frames. Refer to the figure below for the allowable area to be fixed.

Use clamping material with sufficient strength and the shape that can withstand forces from wind pressure and snowfall pressure specific to local climate.

Example : Non exhaustive examples of systems and clamps:

- K2 system, mid clamp kit standard K2 ref P1004197 for frames height 42mm
- Schletter system, mid clamp ref. 130002-001 131002-001 or, final clamp ref. 130001-042 131001-042 for frame height 42 mm



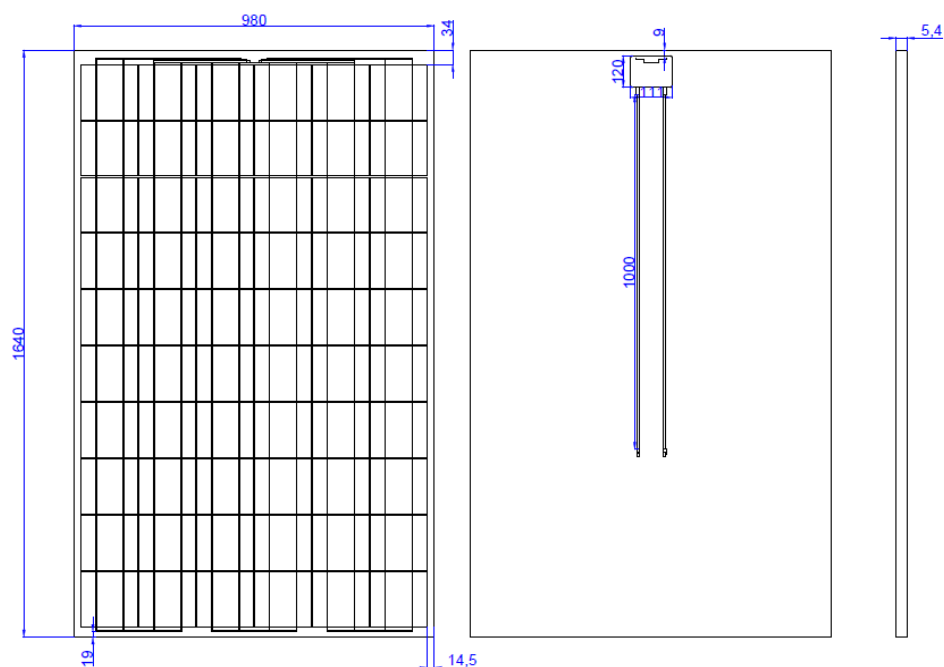
NOTA : During installation, clamps surface in contact with the module frame must be higher than 70%. Fastening torque specified by the mounting system manufacturer must be respected.

In case of non-respect of this condition, the module warranties will not be applicable.

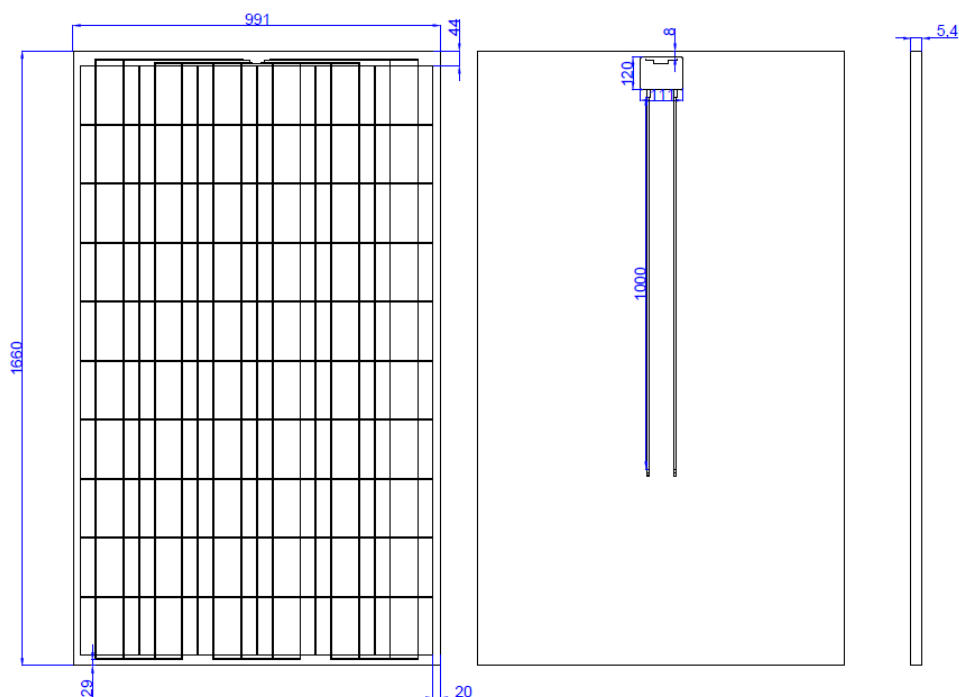
### 3.4 MOUNTING LAMINATES SANKA AND GLASS-GLASS BIVA ON THE STRUCTURE

Follow all instructions and safety precautions of the manufacturer for the implementation of the integration system. Modules must be securely attached to the mounting structure. Eligible expenses are lower than for framed modules. Allowable loads are lower than for framed modules. **A verification of resistance is required for each cases of employment.** If significant wind or snow loads are predictable, predict additional points of fixation. Refer to the recommendations of the mounting system supplier.

### Scheme of laminates SANKA



### Scheme of Glass-Glass module BIVA



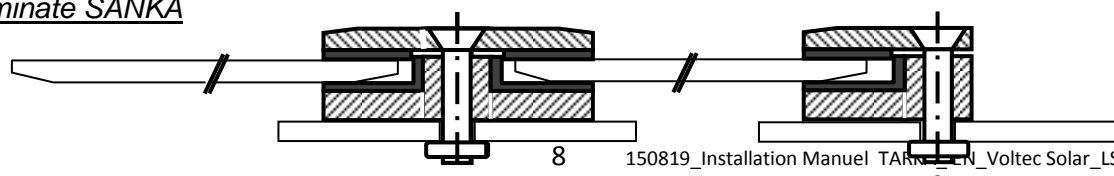
Examples of fixations:

*Schletter System, middle clamp ref. 132202-308, final clamp réf. 132102-308*

*Middle-Clamp*

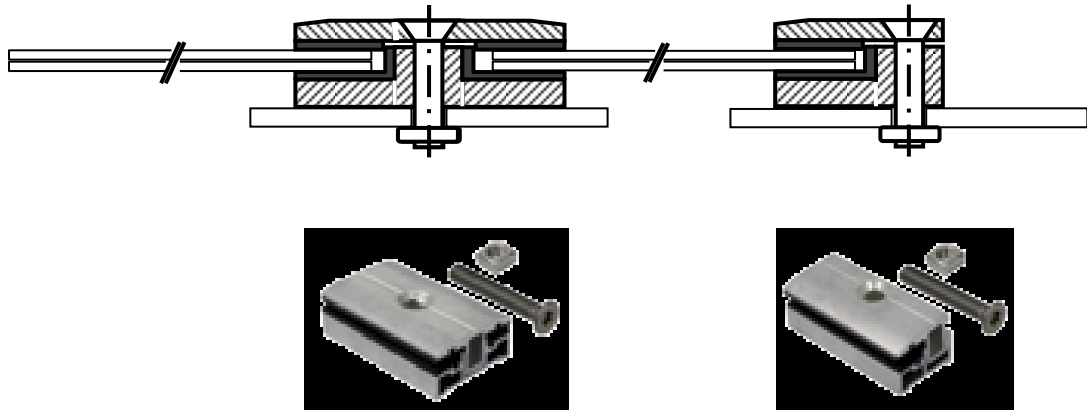
*Final clamp*

Laminate SANKA





### Glass-Glass module BIVA



### **3.5 MOUNTING WITH BRACKETS (OR CLAMPS AND CLIPS)**

This type of installation is recommended only for low loads. Observe positions clamps shown in the table on page 6 above:

Minimum three fixations on each long side of the module, placed in accordance with the dimensions L and K and one in the middle. Fixations and fastening screws must have a section and a length in relation to the efforts to support (wind, snow) depending on the location.

### **3.6 ASSEMBLY OPERATIONS**

For mounting operations on site, predict all the safety measures to avoid slipping or falling of a panel, mounting accessories or tools in order to avoid any injury or damage to persons and goods.

Signalize the risk area in order to deny access to persons outside the site. Work zone delimitation to prevent risks related to falling objects.

Implement appropriate safety measure, responding to the regulations, for workers and personal working at height.

Use of appropriate materials (sliding scale scaffolding ...).

Construction of access for the movement of people without direct support on photovoltaic modules (roof ladders, platform ...).

Use of material for collective security (bodyguard, net, scaffolding, ...) and individual (safety harness, lanyard, headphones, ...).

## 4. ELECTRICAL INSTALLATION

Safety class is in accordance with IEC 61140.

Only authorized and formed people should have access to PV modules. The system involves electricity, and can be dangerous if the employees are not familiar with the appropriate safety procedures.

Completion of the installation shall be made in accordance with the right applicable electrical standard in each country (in France NF C 15-100, guide UTE C 15-712-1).

### 41. GROUNDING

#### 411. FRAMED MODULE: TARKA ET TARKA CLASSIC

All module frames must be properly grounded using the grounding holes diameter 4 mm provided on the frame (long side: see drawing above) and yellow green section 10 mm<sup>2</sup> cables with cable lugs or grounding straps. Specific parts for grounding can replace cables or braids, saving time for implementation and making good contact such as claws Terragrif patented and licensed by the company Mobasolar.

Observe all local electric codes and regulations.

A bonding or toothed washer is required to make proper and reliable electrical grounding connection with the anodized aluminum frame. Use well known and agreed devices for grounding the metallic frames of PV modules to the mounting structure.

Ground the module properly as appropriate for the conditions of the installation site.

Use the accessories and components approved for the electrical connections: spring washers, toothed washer, washers bimetal or stainless steel screws, stainless steel lug necessary to prevent galvanic corrosion. Ensure good electrical continuity between the module frame and between frames and mounting structure.

Connecting all of the metallic structure to earth after verification of its compliance.

During a maintenance procedure that requires removal of a module, make sure the earth continuity of the system.

#### **412. LAMINATES AND GLASS-GLASS MODULE:**

*Laminated and Glass-Glass module do not contain metal and therefore are not grounded.*

*Observe the grounding instructions of the mounting system's manufacturer used to install the Laminated or Glass-Glass module (must conform to guide C 15 712-1).*

#### **42. CONNECTING MODULES TOGETHER**

Do not cut or short the cables coming out of the junction box.

The PV module has a pair of male and female waterproof connectors. For a series electrical connection, connect the positive connector of the first PV module to the negative connector of the following module. Wire the output cable connectors so that they do not exert any force or pressure on the PV module's junction box. Connect the panels together using the connectors which they are equipped. Do not replace them. Replacement could void the warranty.

Make sure connectors are fully engaged without a gap between the insulators and strong locked. In case there is a gap, a fire or an electrical shock may occur. Connect the output cable to the other equipment in the system using a similar connector. Male and female connectors, connected together, have to be from the same manufacturer. To use compatible connectors is forbidden.

Make sure to use a properly sized cable section. Connect the required number of PV modules to meet the voltage specification for equipment used in the PV system. (DC protection, inverter, ...).

Attach the cable to the mounting frame using approved fasteners. The connectors should be placed behind the mounting frame so that the connectors can't be directly exposed to sunlight, wind and rain.

To extend the cable, use proper commercial cables and connectors that can withstand outdoor use for long periods. Select the appropriate cable size according to its length to avoid voltage drop.

Unmated plug connectors must be protected from moisture and dirt with a sealing gap.

#### **43. ELECTRICAL RATINGS OF THE CONCERNED MODULES**

**Consult technical data of each module on the datasheets range by range**

## 5. MAINTENANCE

VOLTEC Solar recommends checking periodically the photovoltaic system by a qualified personal. This inspection may take place annually.

VOLTEC Solar recommends the following maintenance items to ensure optimum performance of the modules. This inspection may take place annually.

Be sure the circuit breaker is off, if it is applicable. Always use appropriate safety equipment (insulated tools, insulated gloves, etc.). Do not touch live parts of wires, cables, connectors and junction boxes.

Before installing and repairing, cover the front surface of the PV module with an opaque cloth or other material to avoid DC production.

In the case of it will be not possible to cut off DC part, it is advised to clean the panel soon in the morning or late in the afternoon when the solar irradiance is low and modules are cold. It will allow reductions of risks due to electric or thermal choc.

Active surface of the modules: glass

- Clean the glass surface of the modules as necessary. There is no general rule: depending on geographic location of the installation, the presence of vegetation, sources of dust, air pollution,... cleaning may be necessary or not. The panels review and the finding of potential contamination will dictate what to do. To clean the glass surface use deionized water, optionally mixed with 20% maximum of glass cleaning product from the market or alcohol, and a sponge or soft cloth.
- Do not use dishwasher detergent. Do not exceed the proportion of 20% of glass cleaning product or alcohol.
- Do not use brushes or other abrasive or sharp material
- The use of products dedicated to the solar panel cleaning is highly recommended
- Do not try to clean a PV module having a broken glass or signs showing degraded wires.
- VOLTEC Solar modules are manufactured to resist to a high load of snow. But it is possible to remove this snow by using a brush only. Do not try to remove ice formed on solar panels.

Mounting structures and electrical connections

- Check if nuts, bolts of mounting frame are secure and not loose. Tighten all loose components.
- Electrical and mechanical connections should be checked periodically by qualified personal to verify that they are clean, secure and undamaged.
- Check connections of cables, grounding cables and connectors.
- Check all electrical and mechanical connections for freedom from corrosion.

- Check the grounding resistance of metal parts such as the module frame and the mounting frame.

## 5. RECYCLING



Instructions for disposal :

VOLTEC Solar is a PVCycle partner and contributes to develop the recycling sector.

This is why we ask you to bring back your deficient modules or the panels at end of life to one of the PVCYCLE collecting points.



Instructions for disposal: Please dispose of Waste Electrical and Electronic Equipment (WEEE) at designated collection points for the recycling of such equipment.

Figure 1

### **For private households:**

Information on Disposal for Users of WEEE This symbol ( figure 1 ) on the product(s) and / or accompanying documents means that used electrical and electronic equipment ( WEEE) should not be mixed with general household waste.

For proper treatment, recovery and recycling, please take this product(s) to designated collection points where it will be accepted free of charge.

Alternatively, in some countries, you may be able to return your products to your local retailer upon purchase of an equivalent new product.

Disposing of this product correctly will help save valuable resources and prevent any Potential negative effects on human health and the environment, which could otherwise a rise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point.

Penalties may be applicable for incorrect disposal of this waste, in accordance with you national legislation.

### **For professional users in the European Union**

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.

### **For disposal in countries outside of the European Union**

This symbol is only valid in the European Union (EU).

If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.

## WARNING

Failure to perform the checks and minimum maintenance operations established in this instruction manual will lead to the withdrawal of all guarantees of VOLTEC Solar for any responsibilities which may be derived from such failure.

**VOLTEC Solar – SAS**  
R.C.S. Saverne B 518 706 965  
N°TVA FR56518706965

1, rue des Prés  
67190 Dinsheim-sur-Bruche  
France  
[www.voltec-solar.com](http://www.voltec-solar.com)

Tel. +33 (0) 3 88 49 49 84  
Fax + 33 (0) 3 88 49 49 85  
[info@voltec-solar.com](mailto:info@voltec-solar.com)