



Technical Preliminary Notes

General Introductory Remarks

These installation instructions are for the certified roofer or electrician working for a certified installation contractor. They list all the procedures for installing and commissioning a photovoltaic system. It is important, therefore, that they be carefully read.

The installation process must be carried out according to these and no other instructions.

Failure to comply with these instructions will lead to guarantees or warranties being void.

Where a number of different tradesmen are involved (e.g. roofer, electrician, etc.) then a cooperative approach to the work is required.

These installation instructions should remain with the customer for later reference.

All the components for the PV installation should be checked for damaged, faulty or missing parts. Defects should be registered with CENTROSOLAR immediately.

Warranty claims to do with deficiencies in the delivered components will only be accepted before the installation work starts.

All the components must be inspected before the installation is commissioned.

In the interests of continuous improvements to our technical documentation we always welcome suggestions of any kind.

The use of photovoltaic technology under polluted environmental conditions (air pollutants, corrosive media) must be avoided due to the possible material damage / destruction.

Please contact the CENTROSOLAR AG Technical Hotline in the event of any queries at Tel: +49 (0)5251 500 500

General Safety Advice

The installation work must be carried out according to country specific, regional regulations and engineering standards.

The installation and commissioning of photovoltaic equipment must be carried out by a certified installer.

Note that when illuminated, photovoltaic modules generate electricity. Hence they must be worked on with care at all times.

High voltages and currents are generated by PV modules and in the case of faulty devices (e.g. faulty module insulation) there is a danger of electrocution due to contact with live leads.

Un-plugging the connectors while they are live can cause electric shock, burning or arc blindness.

Protective electrical implements and devices must always be freely available.

Technical Preliminary Notes

The Health and Safety at Work Act

Country specific regulations for accident prevention apply.

Detailed advice about the importance of safety at work and how to ensure a secure and safe work-place is available from a government department responsible for Health and Safety

UK www.hse.gov.uk.

USA www.osha.org

Without being a comprehensive list, the following includes some of the more important themes.

- General Regulations
- Electrical Installation
- Building Work
- Erecting and Securing Ladders
- Protection against falling objects
- Guard rails and safety barriers
- Personal safety equipment
- Tools for working on roofs.

and others

We recommend that the modules are protected by light-tight covers during the installation.

Roof

The stability of the roof and the underlying framework is taken for granted i.e. that the resulting loads and stresses (from module weight plus wind and/or snow load) are taken up by the framework (rafters, battens and ties) and redistributed.

The condition of both the site and the building should be thoroughly checked before the installation starts and the services of a surveyor are to be recommended.

If the roofing battens will be used to support the photovoltaic modules then their condition plus the stability of their connection to the rafters should be thoroughly checked.

If necessary fasten the roof battens to the rafters, beams or stringers with screws or roofing (annular or fluted) nails.

If the PV modules are to be integrated into the roof then a waterproof under felt is a prerequisite and its water tightness should be confirmed before starting the installation.

A certified roofing contractor should undertake the above work.

Technical Preliminary Notes

Photovoltaic Modules

The modules should be handled in the same way as glass and should not be stepped on!

There is an increased risk of injury in the case of defect modules.

The modules should be fastened tension free onto the framework and any unevenness in the support skeleton should be made good before the final fastening.

Take care with the interconnection of the strings and polarity of the connecting leads otherwise considerable damage could occur later.

When interconnecting modules and strings use exclusively connectors (plugs/male and sockets/female) of the same type and from the same manufacturer. Mixing plug/socket types or manufacturers will invalidate guarantees and warranties.

Module sockets or plugs must be protected from tensions by supporting them with cable ties. Confirm that the connector is locked correctly per the manufacturer's instructions.

Differences in cell colour are due to manufacturing processes and do not influence the performance of the modules. Hence these differences are not classified as defects.

Modules with thin-film technology (UniSolar) may only be connected to inverters with galvanic isolation (transformer).

When working on PV generators on roofs, they must be disconnected from the inverter.

When working on modules, static charges, which can cause an electric shock on contact and lead to secondary damage, can result.

Notes on photovoltaic modules – UNI-SOLAR

Modules with thin-film technology (UNI-SOLAR) may only be connected to inverters with galvanic isolation (transformer).

If more than 3 strings are connected in parallel, the strings must be decoupled to avoid reverse current > 8 A. A string fuse of 8 A is recommended for protecting the module. If the fuses are not monitored, string diodes must be used instead.

The PV generator does not have to be earthed to protect the solar cells against corrosion, as the solar cells have a substrate structure. The cell material is not corroded by a negative electrical field against the ground.

When working on modules, static charges, which can cause an electric shock on contact and lead to secondary damage, can result.

Inverters

Take note of the inverter manufacturer's specifications and instructions.

Under no circumstances should the connectors be unplugged while the generator is live and under load.

Technical Preliminary Notes

Always first disconnect the inverter from the mains, afterwards the DC plug can be safely removed.

Exceeding its rated voltage will destroy the inverter!

Transformerless inverters must be earthed.

Lightning Protection

It is recommended that you seek the advice of a specialist in lightning protection.

Essentially the following apply:

Photovoltaic installations

- do not generally increase the chances of a building being struck by lightning
- should be integrated in an existing lightning arrestor system
- should have a lightning arrestor system installed when located in exposed positions
- must be earthed and must be bound to the equipotential bonding system (not necessary for protection class II PV modules or with galvanic separation and low voltage protection concept) if a lightning arrestor is not available

Legal and commercial guarantee services

Claims against a legal and commercial guarantee will generally only be considered when a certified electrician has confirmed the proper installation and commissioning of the photovoltaic equipment.

Guarantee claims are null and void when:

- the PV equipment was installed incorrectly
- inappropriate application or unapproved modification of the components as delivered
- incorrect utilisation of individual components in a system
- failure to follow the instructions in the instruction manual
- failure to comply with the static requirements resulting from snow or wind loads.
- installation of defective components

Liability Exclusion

A photovoltaic installation is made up of electrical and mechanical components that are integrated on site

CENTROSOLAR AG cannot oversee the correct execution of the instructions in this installation manual.

Thus CENTROSOLAR AG cannot be held responsible for any damage caused by improper installation, operation which does not comply with the intended use, operation in difficult environment (e.g. pig-sty), or incorrect application of the photovoltaic system or the individual components.

We must draw your attention to the fact that failure to comply with the instructions for individual components can lead to the disqualification of warranty and/or product accountability claims.

Technical Preliminary Notes

Commissioning

Commissioning is just one part of the proper, professional construction of photovoltaic installation. This can only be carried out after a visual inspection and a professional electrical test. A commissioning journal must be produced.

Visual Inspection:

- assemblies correctly fastened to the roof
- modules correctly fastened to the support frame
- cables correctly connected to modules, generator isolator boxes, DC isolators, inverters
- equipotential bonding

Electrical Test:

- string open circuit voltage
- string short circuit current
- PV generator-open circuit voltage
- voltage drop across safety fuses (in installations with string fuses)
- insulation resistance of the PV Generator
- insulation resistance of the main DC leads
- insulation resistance of the inverter leads
- loop impedance of the AC circuit.
- earthing system resistance to ground

Journal:

- details of the operator
- location
- technical details about the photovoltaic installation
- results of the visual inspection
- results of the electrical test
- certified signature of the installer

The previous list is in no way exhaustive and is only provided as advice.

Maintenance

Although a low maintenance item, the installation should be regularly inspected:

- inspect the solar modules (broken glass, optical changes, staining)
- inspect the mountings (stability, loose screws)
- inspect the cabling (connectors, anchoring, mechanical damage)
- check the watertightness & leaks through the PV generator
- correct functioning

Technical Preliminary Notes

- checking the safety of the electrical components

The previous list is in no way exhaustive and is only provided as advice.

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