



ZIMMERMANN PV-Stahlbau



Planning Datasheet



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1 General Information's

The Zimmermann PV-Steel Group is a supplier of various substructures for ground-mounted PV-systems.

The system for the south-facing fixed tilt can be designed in table or endless row construction. Both variants have their specific advantages which depend on the terrain and the given topography.

The use of rows is usually more resource-efficient while table construction makes it possible to build on more difficult terrain.

Furthermore, the planning of a row construction is only possible in 2D now. This means that Zimmermann cannot create a file for a GPS ramming machine.

This document is intended to help the user decide which system is more suitable for a specific application.

To be able to make a reliable statement about the following points, a detailed topography is necessary.

Zimmermann recommends surveying the topography in a 5x5m grid.

Further requirements for the topography can be found on page six.

2 Frame Design

Placement of PV- Modules:

- Vertical: max. 6 Landscape, max. 4 Portrait
- Horizontal: Client specific.
depending on string length and topography

Space between modules for clamps: (1) Standard 20mm (optional 11mm)

Module inclination: (2) 5° - 35°

Distance between tables O/W direction: (3) 300mm (attention while planning in 3D)

Distance between tables N/S direction: Client specific.

Average ground clearance front module: (4) approx. 800mm

Maximum length for row planning: 150m

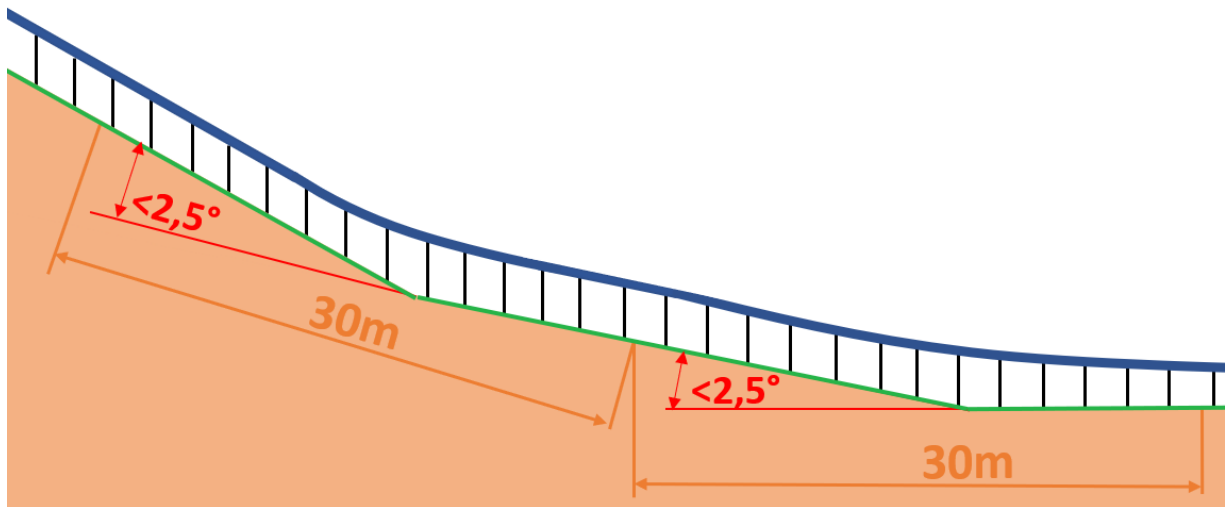


3 Technical Limitation

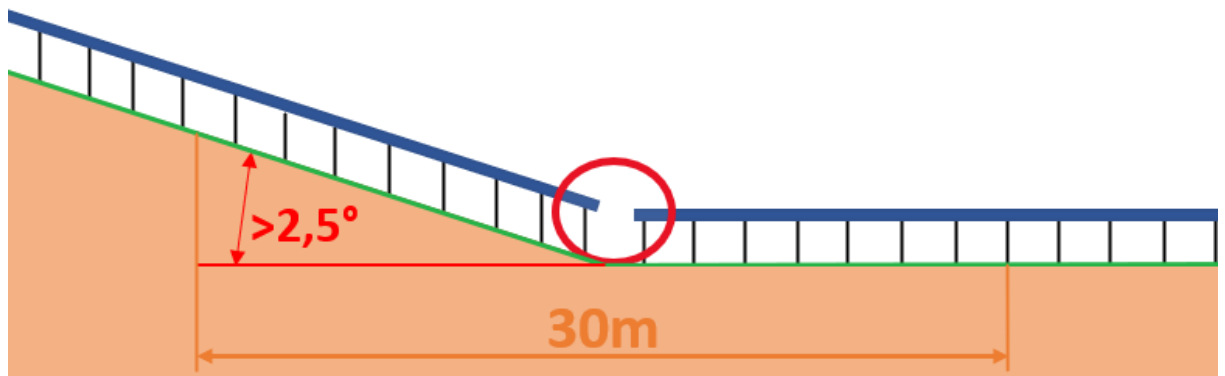
3.1 Decision on Row or Table design:

When building endless rows with changes in slope, forces arise that the system can only withstand to a certain value.

For this reason, Zimmermann allows a maximum change of inclination in the east-west direction of 2.5 degrees per 30 m for row planning.



If the 2.5 degree only occurs in some parts of the area to be built on, it is possible to separate the rows at these points



If you have several inclination changes of > 2.5 degrees on a length of 30 m, we recommend planning in tables.



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3.1.1 How to perform an analysis for Row vs Table decision.

For this in order to be able to make a statement about which Zimmermann system is better suited for the given topography, a test setup with a length of about 30 meters must be created in PVcase.

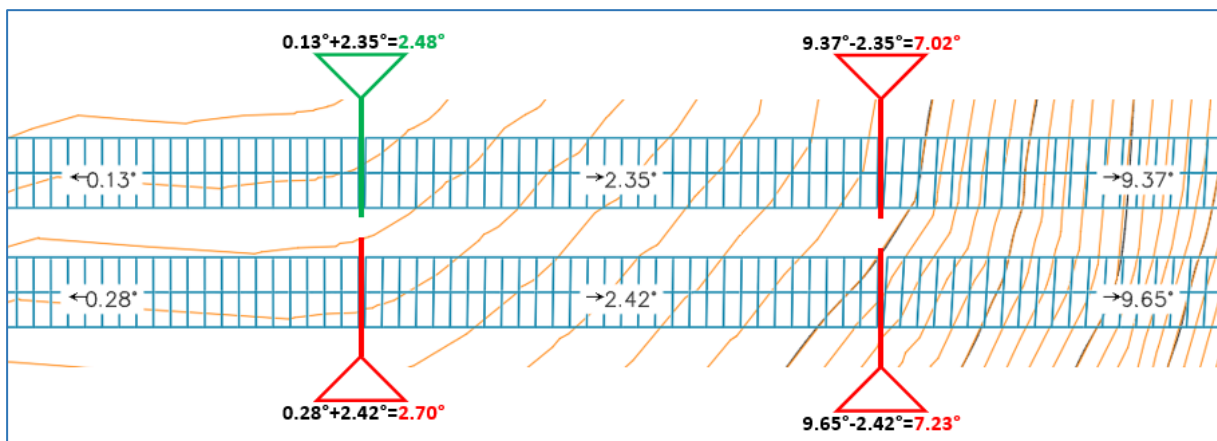
This test setup does not have to correspond to the final dimensions and is for analysis purposes only.

A possible test structure can be seen on the right-hand side.

Cover the area to be built on completely with the test structure. Here, too, the values such as pitch do not have to match the final values exactly. Also display contour lines with intervals of 0.1 m and the details of the slope analysis of PVcase.

Current preset	Test Setup	
Module parameters		
Length, m	2.172	
Width, m	1.000	
Thickness, m	0.035	
Power, Wp	600	
Frame parameters		
Framing type	Fixed-tilt	
Module orientation	Portrait	
Rows	2	
Columns	30	
Tilt angle, °	20.00	
Horizontal gap between modules, m	0.0000	
Vertical gap between modules, m	0.0000	
Frame power, kWp	36.000	
<input type="button" value="Custom piling"/>		

Now look for areas in the layout where the distances between the contour lines change significantly. Here, changes in slope are to be expected. Check the inclination values of the individual tables if the difference is greater than 2.5°, tables must be built here or row separation must be planned.

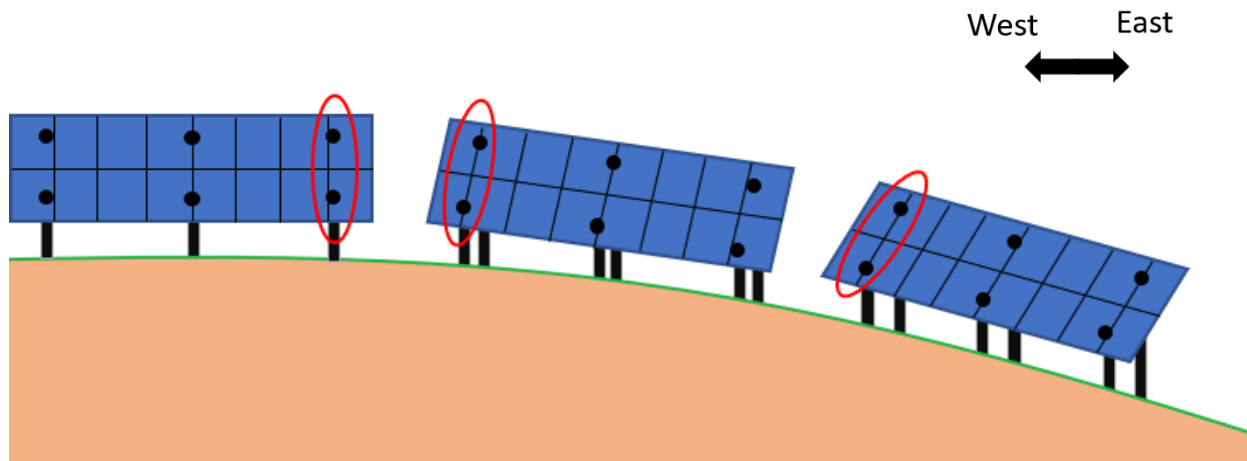




3.2 Slopes in East – West direction:

When planning the ZIM with pole pairs, the following facts must be taken into account. The position of the pole pairs moves in relation to each other as the side slope increases.

For this reason, 3D planning in tables with increasing side inclination is useful. We recommend ramming with a GPS machine when 3D planning has been carried out. From a side slope of more than 5 degrees, we strongly recommend pile driving with a GPS ramming machine, or to determine the position of the posts with the help of GPS.



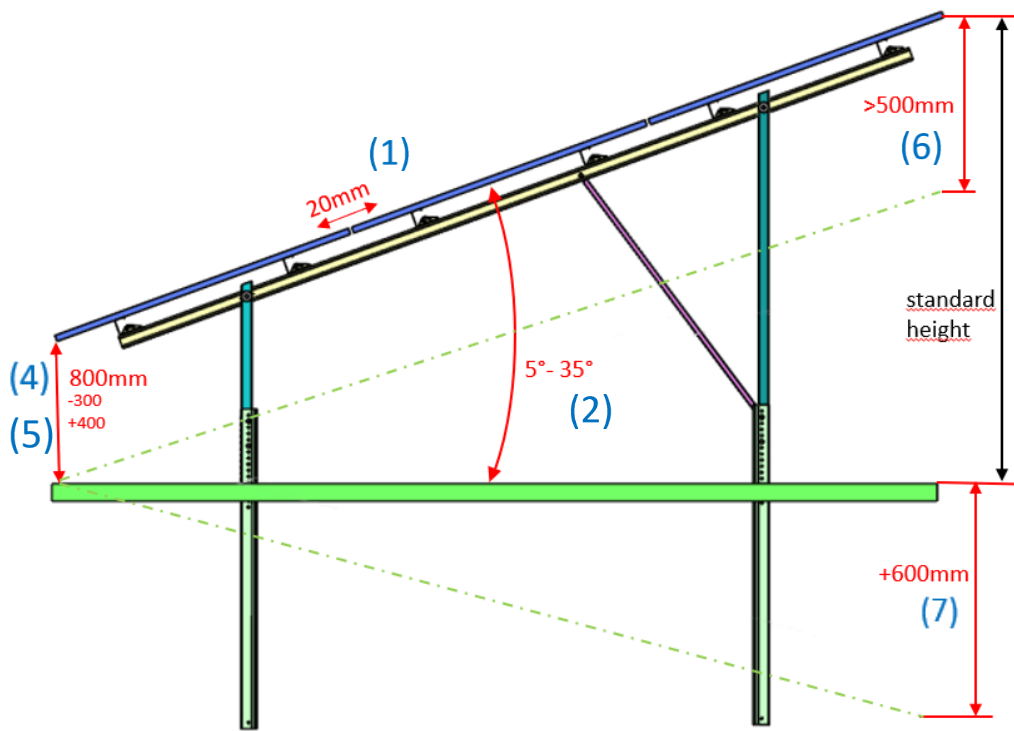
For tables, please group your tables according to their inclination in east - west direction in 5-degree steps (0° - 5° ; 5° - 10° ; 10° - 15° ; 15° +). These must be considered statically different.

3.3 Tolerances depending on the topography

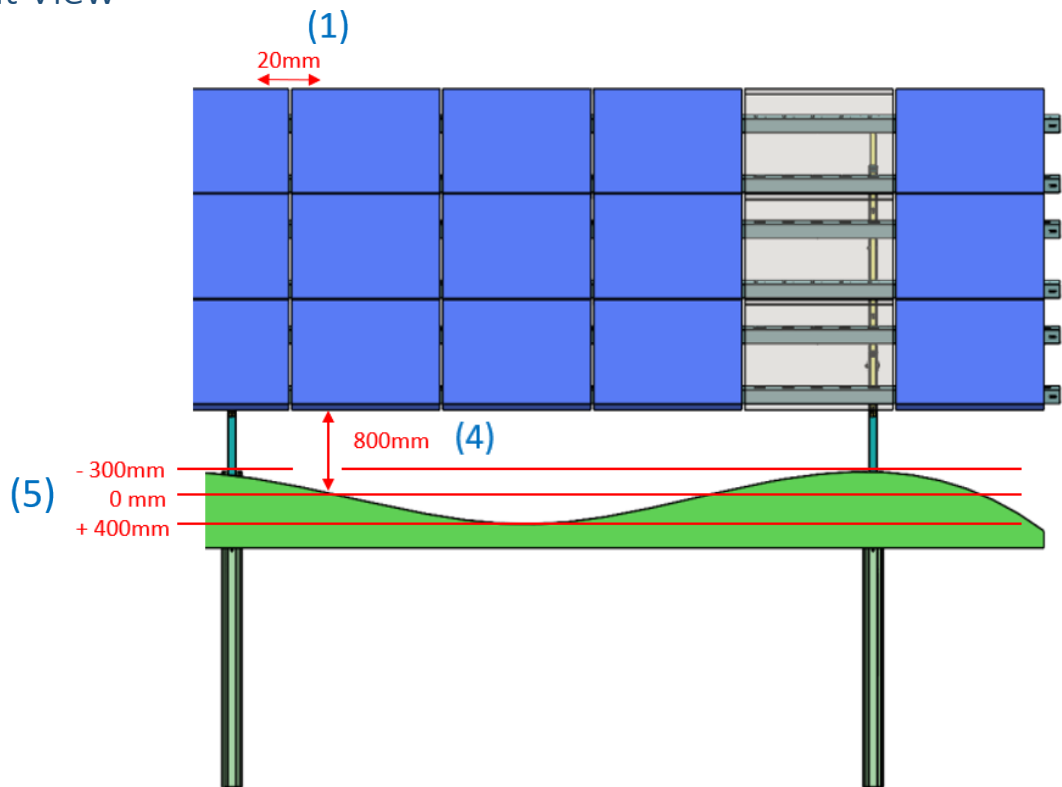
- Tolerance for the ground clearance at front edge of module is -300mm and +400mm. (5)
- The ground clearance at the rear edge of the last module must be min. 500mm at every position. (6)
- The standard height at the back corner of the last module can be extended by 600mm. (7)



Side View



Front View





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3.3.1 How to perform the Collision Analyse by PVcase

Create the tables in the desired sizes. Please note the values given in section 2.

For **Custom Piling** please use the following settings regarding your frame:

- Pole groups per frame: columns of frame +1 (3x27module frame for example)
- Other settings can be taken from picture below

Preset: ZIM_Example_27modules

Horizontal distances

Pole groups per frame

Pole distribution type

Equal margins

Margin, m

Middle distribution value, m

- Vertical distances please use: **Side to A = 0** and **B to Side = 0**
(Value for A-B must calculated by project engineer)

Vertical distances

Poles per group	<input type="text" value="2"/>
Side - A	0.000
A - B	6.485
B - side	0.000

After all tables have been placed, please use the following values for your civil analysis:

Collision analysis

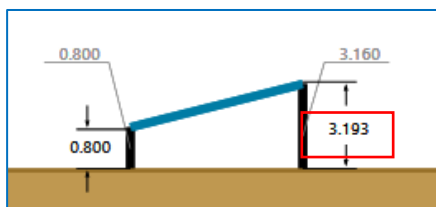
Analysis type Terrain limit Piling range

First pole length, m

Last pole length, m

Frame coloring Orange Purple

Preset for generation



Value for upper limit last pole must be calculated:

Standard height (given in the picture at park settings) + 600mm = Upper limit last pole

Invalid Tables will be marked in orange or purple.

The pile positions are adjusted by Zimmermann when all frames fit the topography.

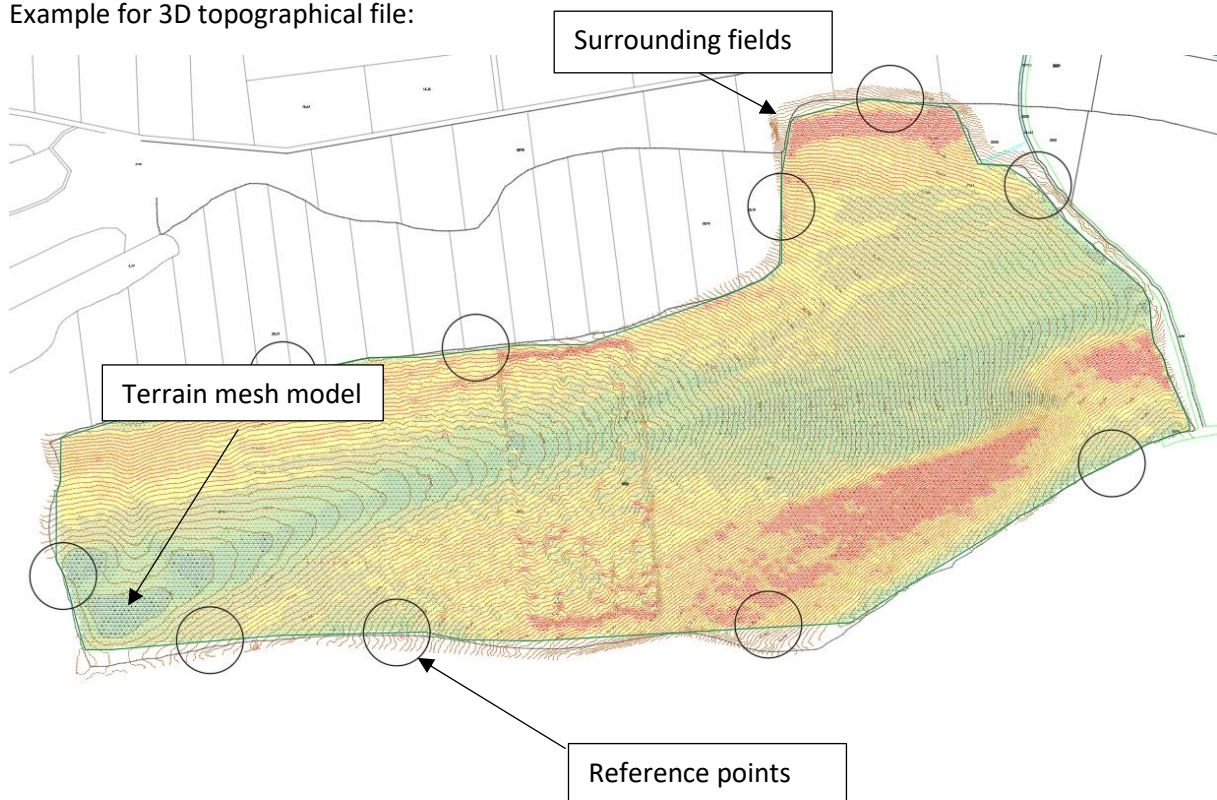


4 Survey Requirements

To provide a proper topographical check of the pv site with Zimmermann PV-systems certain requirements shall be followed when performing a survey to install ZIM system. The height data will be used to perform a static check of the project, perform ZIM 3D-planning.

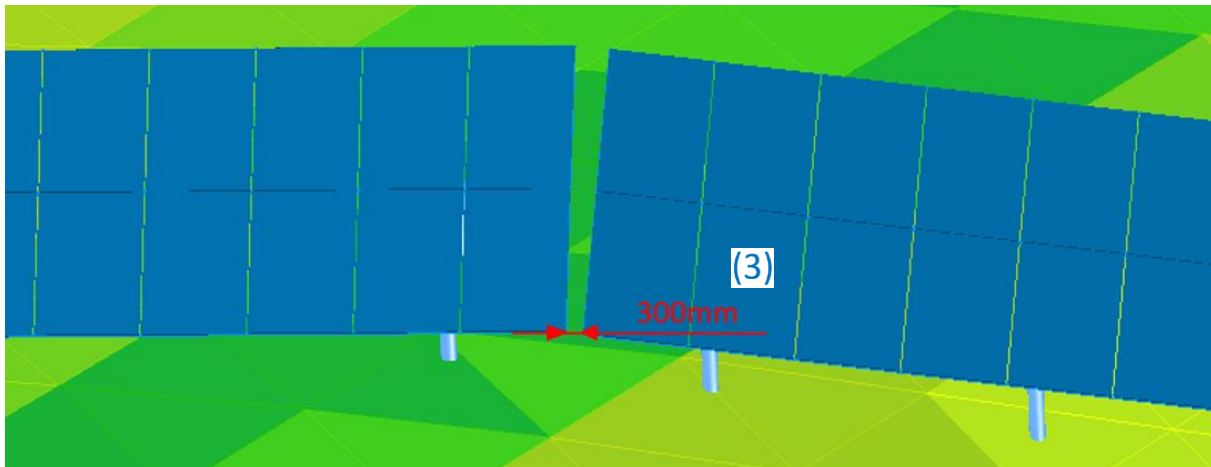
- Drone or quad measurement with a minimum resolution of 5x5m.
- In field areas with more difficult terrain please perform a more precise measurement
- Deliver data package in AutoCAD Civil 3D file as topo-points or heights lines
- Use a local coordinate system and reference AutoCAD file in this coordinate system
- Define a reference point which is still being available during construction (tree, fence, building) in order to enable 3D-gps ramming
- Integrate surrounding fields (approx. 5 metres outside of the construction site)
- Mark outer boundaries of the relevant areas

Example for 3D topographical file:





The tables move towards or away from each other when adapted to the topography. See in the picture below. The smallest distance should not be less than 300mm from module to module.



5 Guidance Note

Zimmermann offers highest quality products for project design lifetimes of 25 years. Therefore, it will always be provided a project specific static based on local environmental influences, such as wind, snow & earthquakes. The stated technical planning limits are highly dependent on the project specific static and might not always be attained.

The stated limits are individual limits and can not overlapped. In exceptional cases these limits might be exceeded, for example with shorter tables or special foundation using concrete.

Zimmermann recommend to always plan the project based on recent topographical surveys and can support for any layout relevant questions.