

# Panels, inverter and electrical

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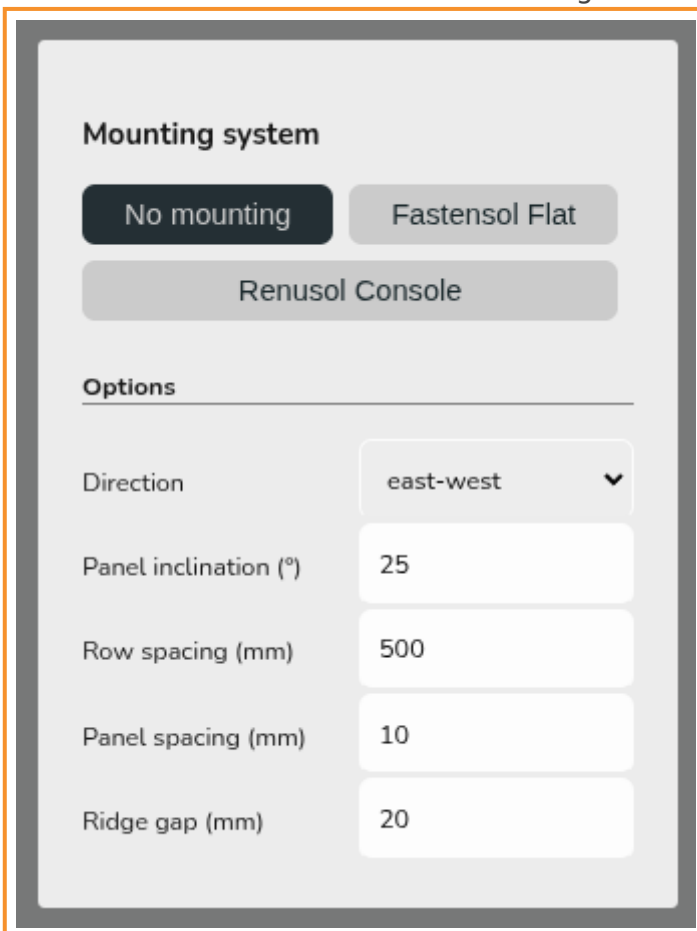
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# How can I model an east-west panel layout?

To model an east-west panel layout, create a flat roof or ground mount area in [any design mode](#).

In the panels task follow these steps:

1. **Add panels** to the roof/area and then **select 'No mounting'**
2. Set the direction to **east-west** and configure the spacing as needed



**Mounting system**

No mounting Fastensol Flat

Renusol Console

**Options**

Direction east-west ▼

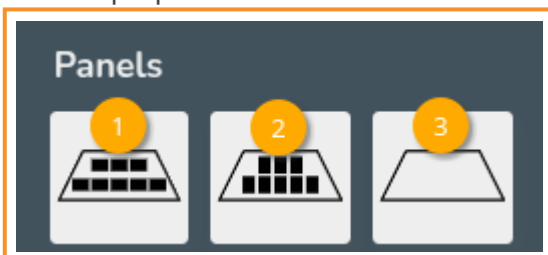
Panel inclination (°) 25

Row spacing (mm) 500

Panel spacing (mm) 10

Ridge gap (mm) 20

3. Select option 1 to fill the roof/area with portrait panels, option 2 to fill the roof with landscape panels and 3 to clear the roof



Or drag and drop portrait (right) or landscape (left) panels to build panel layout

Or drag from below:

Trina Vertex S+ 445W Dual Glass N-Type Bifacial with Clear Backsheet



change

This will not spec the mounting components but will mean the pitch and orientation of the panels is correctly modelled in performance calculations. Get in touch with [Midsummer \(UK\)](#) / [\(IE\)](#) for guidance on mounting components.

# The mounting system I want to use isn't an option in the panels task, what can I do?

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If the mounting system you'd like to use is not listed in the panels task, select *No mounting*. Then in the [financial task](#), you can manually your mounting system so it's still included in the quote.

If the mounting system you want to use is stocked by Midsummer (this includes [Van der Valk](#) and [K2 flat](#)), you can get in touch with your account handler for help with building the kit list.

# I can't allocate my panels to an inverter - all the options are red.

When all of the allocation options are red, Easy PV has determined the panel/inverter combination is not electrically viable. This means that the technical specifications of either the panels or the inverter are out of the range of the other.

When panels have been allocated to an input, Easy PV will outline any electrical issues in red text to make you aware of why it is not compatible. For a custom component this could mean one of the values you have input is incorrect

1. Select the option you think should be possible with the inverter and panel
2. See which option appears in red

**Input 1: Trina Vertex S+ 445W Dual Glass Full Black N-Type Mono solar panels**

1 string	1 × 1	1 × 2	1 × 3	1 × 4	1 × 5	1 × 6	1 × 7	1 × 8	1 × 9	1 × 10	1 × 11
2 strings	2 × 1	2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11
3 strings	3 × 1	3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11

**✓ Power**  
The rated AC output power of the inverter is **5000W**.  
The maximum DC input power is **3560W**.

**✗ Current**  
The maximum DC input current of the inverter input is **14A**.  
The highest input current expected for this array at 40°C is **20A**.

**✓ Max voltage**  
The maximum input voltage of the inverter input is **550V**.  
The open circuit voltage for a string of 4 panels at -10°C is **229V**.

**✓ Operating range**  
The MPPT voltage range of the inverter input is **70V to 550V**.  
The MPPT voltage of the array will be approximately **171V** at 40°C and **193V** at -10°C.

3. Check that value against the datasheet, it may be helpful to reference our [component upload guide](#).

# The max voltage calculated in the inverter task doesn't match the Voc from the panel datasheet, why is this?

The max voltage factors in both the **open circuit voltage** ( $V_{oc}$ ) and the **temperature coefficient** ( $\Delta V_{oc}/^{\circ}C$ ) of the panel. The value on the datasheet is measured at standard test conditions (STC) but the actual  $V_{oc}$  of the panels will depend on the ambient temperature. As the temperature decreases, the  $V_{oc}$  increases, so it is important to factor this into sizing the inverter.

In Easy PV, we do a calculation at  $-10^{\circ}C$ , since the voltage increases at lower temperatures, the max voltage given in Easy PV will be **higher** than the number of panels multiplied by the open circuit voltage of the panels.

## Example calculation

### ✓ Max voltage

The maximum input voltage of the inverter input is **1000V**.

The open circuit voltage for a string of 8 panels at  $-10^{\circ}C$  is **330V**.

In the above case, the  $V_{oc}$  is 37.45V and the temperature coefficient is  $-0.276\%$ . This means for every increase in  $^{\circ}C$ , the  $V_{oc}$  decreases by 0.276%.

For standard test conditions (STC), the panel temperature is  $25^{\circ}C$  so the change in temperature to  $-10^{\circ}C$  is  $35^{\circ}C$ , meaning we have

$$37.45 * (1 + (|-0.00276| * 35)) * 8 = 328.5 \text{ V}$$

Easy PV does a slightly more conservative calculation:

$$37.45 * (1 - (-0.00276))^{35} * 8 = 329.94 \text{ V}$$

where in each case 0.276% is divided by 100 to convert it 0.00276 per  $^{\circ}C$ . This is then rounded to give 330V.



# How is DC cable sizing and voltage drop calculated?

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Easy PV returns the smallest cable cross-sectional area that achieves a voltage drop less than 1% of the voltage across the cable (or the largest cable if none do).

The voltage drop along a cable is the product of the current and resistance. The current is calculated in the inverter task and we calculate cable resistances from the IEC 60228/BS 6360 stranding chart.