

Application Note – How to Design an Enphase Systems using PV*SOL Premium

PV*SOL can be used to simulate the performance of microinverter installations, if some considerations are taken into account.

Inverter Selection

Go to [Enphase Compatibility Calculator](#) to determine the PV module compatibility and select the right Enphase Microinverter.

Compatibility Calculator EU

Use this calculator to help determine the electrical compatibility of PV modules with the Enphase microinverter family. Refer to the PV module manufacturer's datasheet for correct values. All fields are required.

Voc (Voltage at Open Circuit)

[What is this?](#)

 V

Vmp (Voltage at Maximum Power)

[What is this?](#)

 V

Temperature Coefficient of Voc

[What is this?](#)

 %/°C

Isc (Short Circuit Current)

[What is this?](#)

 A

Expected temperature range

[What is this?](#)

record low average high
 -10 35 °C

Compatibility Results

M215



M250



Detailed Results		
Voc - min temp		
Voc - max temp		
Vmp - min temp		
Vmp - max temp		
Isc		

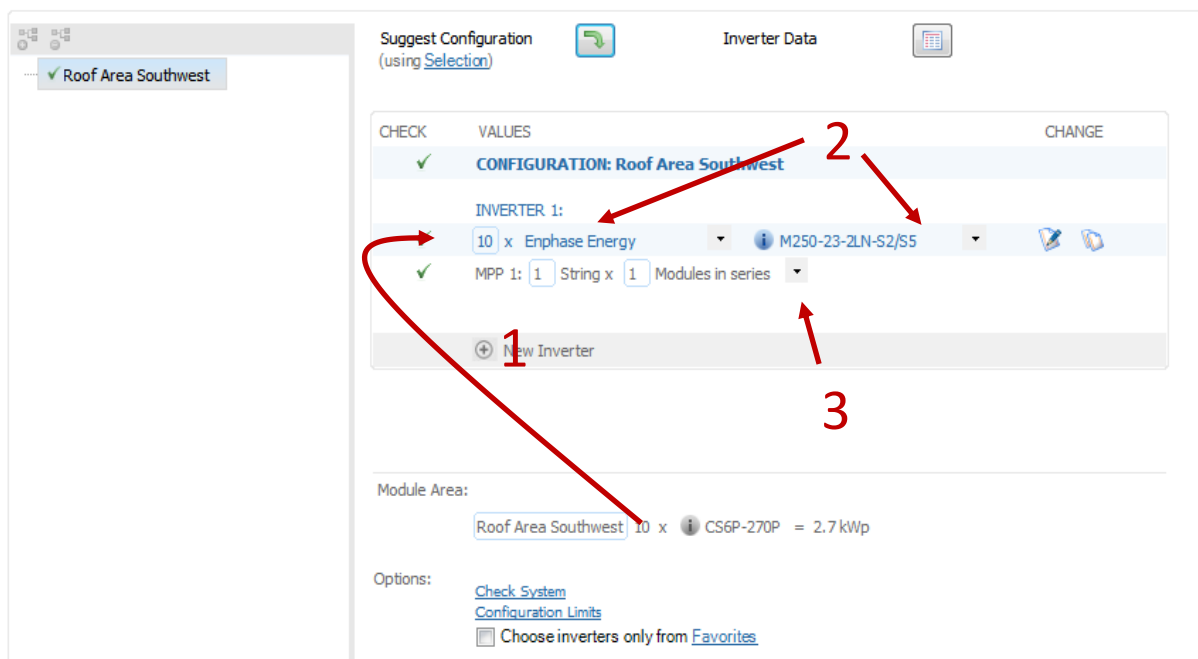
Once module compatibility is confirmed select the chosen module type from the PV*SOL library.

Then select the appropriate Enphase Microinverter, please take into account that Enphase Energy Microinverters available for European are:

- **M215-60-230-S22 –E/S25-E**
- **M250-60-230-S22**
- **M250-72-2LN-S2/S5**

For microinverter, it is easiest to select the configuration manually.

Inverter



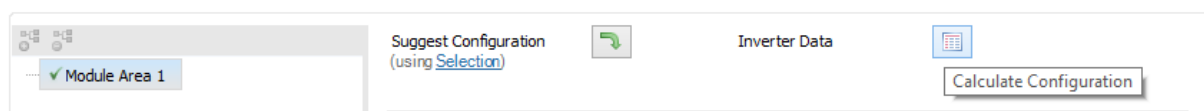
Step 1: Enter the module number of the module area.

Step 2: Select the desired Enphase inverter,

Step 3: Choose the configuration from the drop-down list, note that only matching configurations are available for selection.

In addition to manual configuration PV*SOL can also calculate a suitable configuration automatically.

Inverters

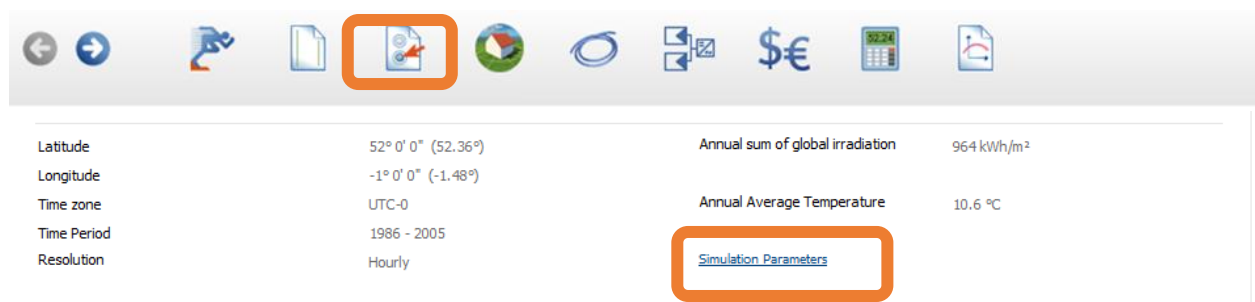


This option is designed for string inverters and therefore preferred configurations with string inverters. Make sure that only the desired module inverters are in the selection.

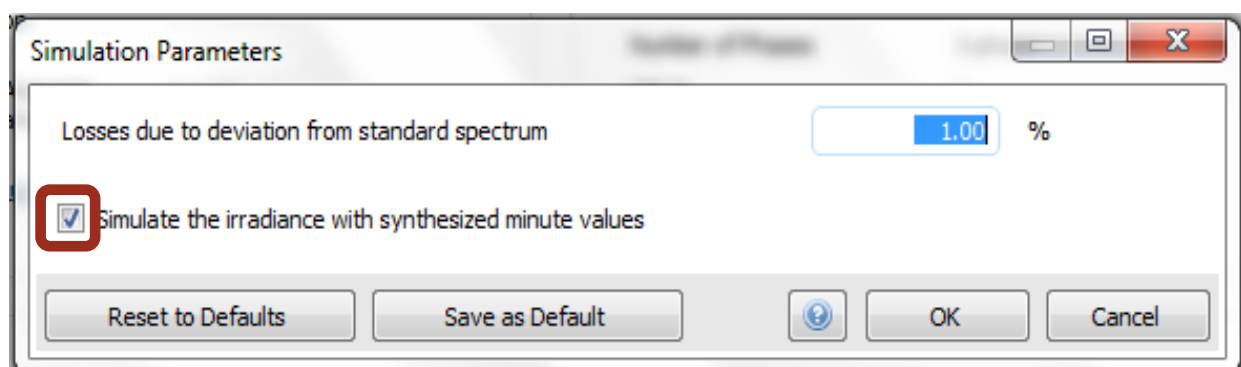
Sele	Model	Company	No. of MPP	AC Power R	Nom. DC Vo	MPP1: Min. M	MPP1: Ma
<input checked="" type="checkbox"/>	M215-60-230-S22/S25	Enphase...	1	0.23	22	16	48
<input checked="" type="checkbox"/>	M250-23-2LN-S2/S5	Enphase...	1	0.25	27	16	60
<input checked="" type="checkbox"/>	M250-60-230-S22/S25	Enphase...	1	0.25	27	16	48

For more information see [APPENDIX 1](#).

When the dimensioning factor exceeds 115% (DC/AC) simulation with minute values is recommended. This function can be activated in the "Simulation Parameters" dialog under "Climate, Grid and System Type".



Latitude	52° 0' 0" (52.36°)	Annual sum of global irradiation	964 kWh/m ²
Longitude	-1° 0' 0" (-1.48°)	Annual Average Temperature	10.6 °C
Time zone	UTC-0		
Time Period	1986 - 2005		
Resolution	Hourly		



Simulation Parameters

Losses due to deviation from standard spectrum %

Simulate the irradiance with synthesized minute values

Reset to Defaults Save as Default ? OK Cancel

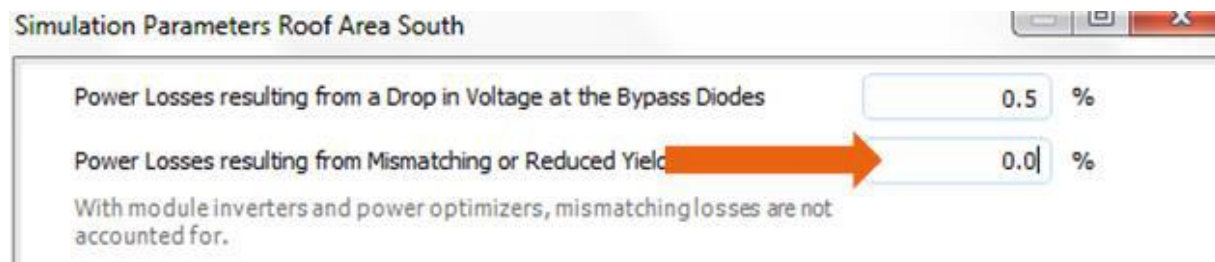
Check the option: **Simulate the irradiance with synthesized minute values**

Before the simulation, irradiance in minute values are synthesized from the hourly values. This provides more accurate simulation results. The use of minute values is especially important in inverter sizing factors of more than 115% or with inverter limitation.

The synthesis of the minute values is performed only once per site.

Mismatch losses

PV*SOL should adjust this value by default when an Enphase microinverter is selected. To check this select **Additional Parameters** and confirm the value is set to **0.0**.



Cable

Here, you can enter cable lengths and cross sections, the software will calculate the resulting total loss from the array output (under STC conditions).

Select "In detail" option. On the left hand side, the tree diagram allocate the cabling to the module surfaces and inverters that were defined on the Inverters page.

Cable

Enter Cable Losses

- In detail
 Total Loss

AC Cable

Here you can define the cable lengths, cross-sections and the material (copper, aluminum) of the AC-side cable.

The suggested dimensions are calculated from the smallest possible cable cross sections that ensure a voltage drop of less than **1 %** in the respective cable section.

For more instructions about Enphase Microinverters Voltage Drop/Rise, please consult the Technical Brief: [Voltage Drop for M215 \(50Hz, line-to-neutral\)](#).

String Cable

String Cable is the DC-side cable between the General Combiner Box (GCB) and string, lengths to and from.

In this section is possible to define the cable length (total length of all string lines), cable cross-sections and the material (copper, aluminum) of the string lines. For Enphase use the value **0 m**.



APPENDIX 1

An optimised configuration based on the inverter selection will be calculated and the number of inverters, strings configured PV modules will be displayed

Number of Inverters		Configuration Quality		
Inverter Model	Configuration	Number of PV Modules	Sizing Factor	
10	62.33 %			
M250-23-2LN-S2/S5	MPP 1: 1 x 1	1	108.00	10x
10	62.33 %			
M250-60-230-S22/S25	MPP 1: 1 x 1	1	108.00	10x
10	56.33 %			
M215-60-230-S22/S25	MPP 1: 1 x 1	1	117.39	10x

The matching of inverter input voltage and current together with the sizing factor is shown. Before selecting a configuration PV*Sol qualitatively evaluates an inverter configuration. The evaluation is based on a weighting system, which reflects a string inverter structure:

The following criteria form the basis of configuration quality:*

1. Number of Inverters (as few as possible)	0.00 %
2. Number of Inverter Models (as few as possible)	100.00 %
3. Number of Configurations (as few as possible)	100.00 %
4. Dimensioning factors (as close to 105 % as possible)	83.64 %
5. Difference in Sizing Factors (as little as possible)	100.00 %
6. Inverter Efficiency Loss (as low as possible)	99.88 %

PV*SOL Configuration Quality is based on String Inverter structure on using string inverters where having the lowest possible number of inverters is preferable. Therefore you can expect Enphase will be shown with poor %. This is not representative of Enphase Energy performance and we invite you do not base your decision on it.