

SolarEdge - Single string design guidelines -

Application Note – Europe and ROW

This application note establishes guidelines for implementing the single string design topology for Europe and ROW. It applies to residential P-series and S-series Power Optimizers.

Revision history

- Version 1.0, April 2024 – Initial release.



NOTES:

- In case of a conflict between these guidelines and local regulations, local regulations shall prevail.
- When utilizing single string design on multi-facet roofs, yield losses of greater than 2% may be recovered by installing higher output voltage optimizers, or multiple strings if possible.

When the inverter AC nameplate is lower or equal to the maximum continuous power per string for the connected inverter (mentioned in the Power Optimizer's datasheet), all Power Optimizers can be connected in a single string if the following conditions are met:

- The connected string power does not exceed the total allowed inverter DC/AC oversizing ratio as mentioned in the inverter's datasheet.
- The maximum allowed number of Power Optimizers per string does not exceed:
 - 25 Power Optimizers for a single-phase inverter
 - 50 Power Optimizers for a three-phase inverter when used in a residential installation

Systems that include batteries

Inverters rated less than 5700W (single-phase) or less than 11250W (three-phase)

If a single string is connected and its power is above the inverter rating, the battery is charged from clipped PV power. Clipped string PV power occurs at 5700W for single-phase inverters, and 11250W for three-phase inverters.

Inverters rated above 5700W (single-phase) or above 11250W (three-phase)

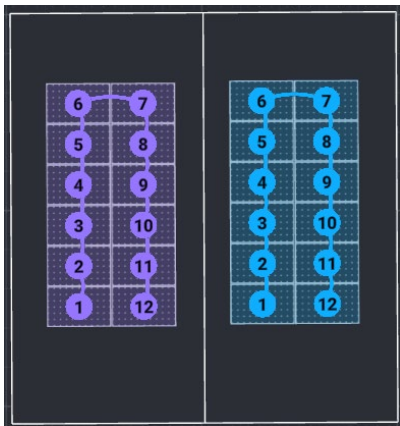
It is recommended to avoid string oversizing to reduce the potential for string-level clipping. Clipped string PV power occurs at 5700W for single-phase inverters, and at 11250W for three-phase inverters. For example, it is better to install two strings even if all the rules are met. This allows for maximizing battery charging and inverter production.

Example one – single-phase inverters – valid use

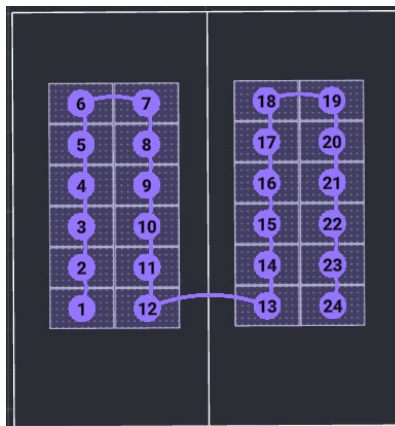
The AC nameplate for a single-phase SE5000H Home Hub inverter is 5kW_{AC} . This rating is equal to the maximum continuous power per string of 5.7kW ($15\text{A} \times 380\text{V}$) for S440 Power Optimizers with a single-phase Home Hub inverter. Installing 24 x 415W modules connected to S440 Power Optimizers provides an installed DC capacity of 9.96kW (STC).

This is possible since 200% DC/AC oversizing (up to 10kW in this case) is allowed. In addition, 24 Power Optimizers is permissible according to the maximum number of Power Optimizers allowed per string with a single-phase inverter. The inverter nameplate limit ensures that the maximum continuous power per string is not exceeded.

Regular Design



Single String Design

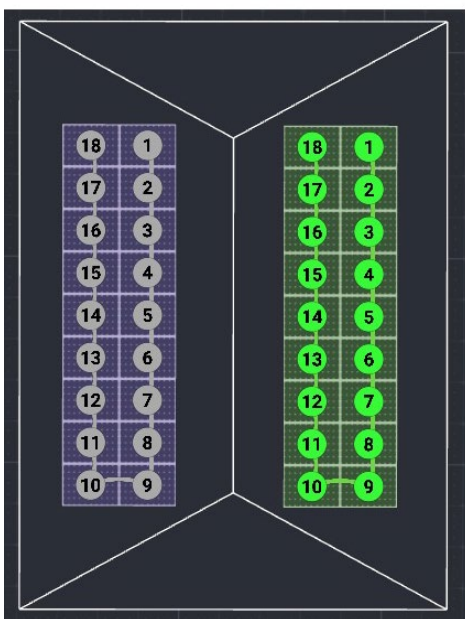


Example two – three-phase inverters – valid use

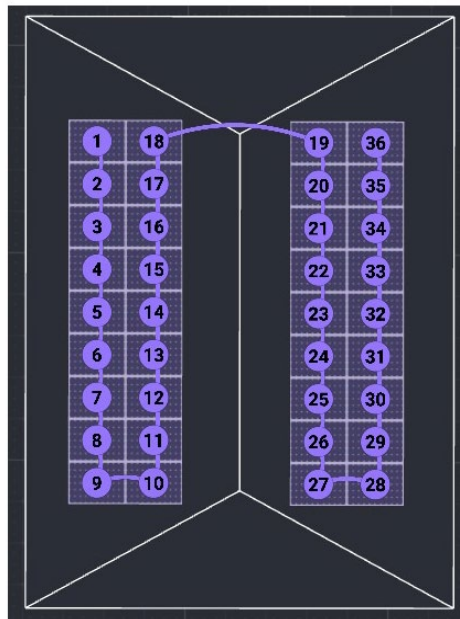
The AC nameplate for a three-phase Home Hub SE10K inverter is 10kW_{AC}. This rating is lower than the maximum continuous power per string of 11.25kW (15A x 750V) for S500 Power Optimizers with a three-phase inverter. Installing 36 x 450W modules connected to S500 Power Optimizers provides an installed DC capacity of 16.2kW (STC).

This is possible since 200% DC/AC oversizing (up to 20kW in this case) is allowed. In addition, 36 Power Optimizers is permissible according to the maximum number of Power Optimizers allowed per string with a three-phase inverter. The inverter nameplate limit ensures that the maximum continuous power per string is not exceeded.

Regular Design



Single String Design



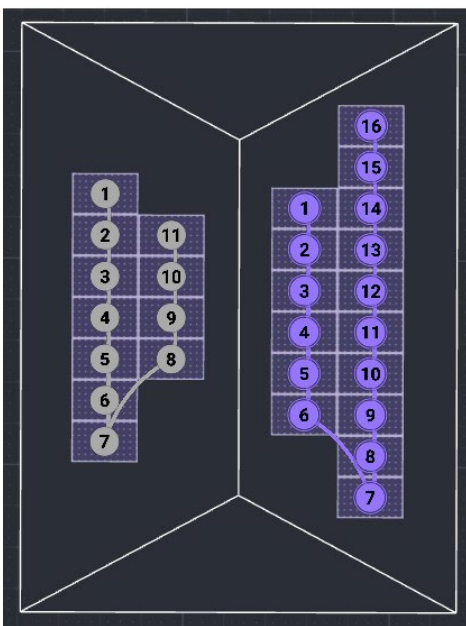
Example three – single-phase inverters – invalid use

In a system with a single-phase SE5000H Home Hub inverter installed, the inverter AC nameplate is 5.0kW_{AC}. This rating is equal to the maximum continuous power per string of 5.7kW (15A x 380V) for S440 Power Optimizers with a single-phase Home Hub inverter.

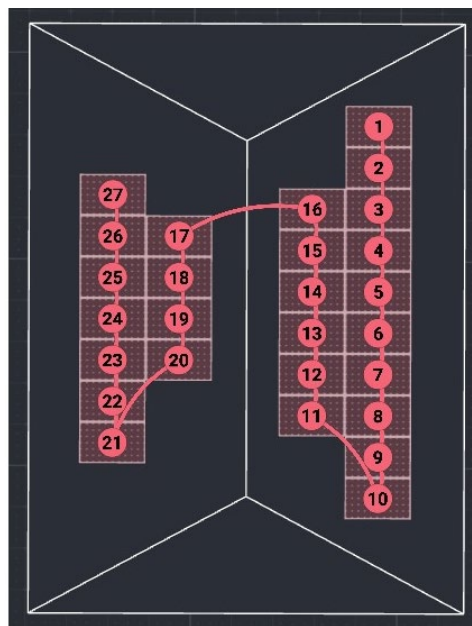
Installing 27 x 370W modules connected to S440 Power Optimizers provides an installed DC capacity of 9.99kW (STC). This is possible since 200% DC/AC oversizing (up to 10kW in this case) is allowed.

However, the number of Power Optimizers (27) exceeds the maximum number of Power Optimizers allowed per string with a single-phase inverter (25) and therefore the DC capacity of 9.99kW STC must be installed in two strings.

Regular Design - Valid



Single String Design - Invalid



Applicable inverters

These guidelines apply to the following SolarEdge inverters:

- Single-phase Home Hub and Home Wave inverters SE5500 and lower.
- Three-phase inverters SE10K and lower (not applicable when connected to a Delta grid).