

Micro-Inverters

Advantages and Functions for the use in PV-Systems

The AEconversion Micro-Inverter is individually connected to one or two PV-modules and converts the direct current into grid compliant alternating current. Through the individual connection in PV-systems using micro-inverters, the PV-modules are able to work independently at their maximum capability. In addition, by performing maximum power point tracking (MPPT) on a modular level, the inverter is able to harvest the highest possible output from each module and bring shading and module mismatching effects to a minimum.

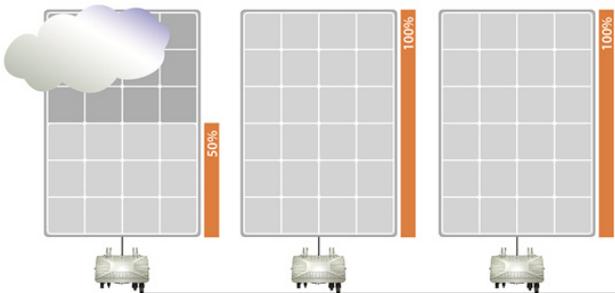
Modular MPPT

MPP-Tracking works on modular level in Micro-Inverters. The operating point (MPP) is determined for each module individually, therefore letting the module work most efficiently and maximizing the available power from each module.

In conventional systems, the central- or string-inverter perform MPPT for the whole array, leaving some modules operating below their MPP. This occurs because different modules have different Maximum Power Points caused by module tolerances and lighting conditions.

Partial Shading

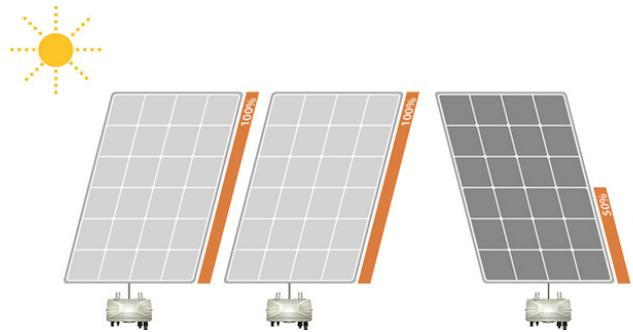
The Micro-Inverter will increase the energy harvested, by eliminating sources causing high energy losses. In case of a shadow, snow, dirt, leaves or other obstructions on a PV-module in a system using central- or string inverters, the energy harvest of the entire string drops dramatically. Due to the individual connection in micro-inverter based systems, a shadow on one module does not affect others and therefore has only a minimal effect on the systems energy yield. In addition, in systems using micro-inverters, the PV-modules are not affected by the tolerances of other modules, letting each operate at its maximum.



In conventional systems, the central- or string-inverter perform MPPT for the whole array, leaving some modules working below their Maximum Power Point. Micro-Inverters vary the electrical operating point of each module individually, maximizing the available power from each module.

Module Orientation

With Micro-Inverters, a PV-system is an efficient system even with different module orientations.



Because of the individual connection of the Micro-Inverters with the PV-modules, the highest possible performance (individual MPPT) can be achieved.

The modules operate independently from one another. Thus, the total return is much higher compared to systems using string-inverters because there, the module performing the worst limits the performance of other modules.

System Adaptability

Micro-inverter based systems can be installed on any available space, regardless of shading, orientation to the sun, or module tolerances.

Because the PV-modules are not wired in series to strings, they do not need to be installed side by side, oriented in the same direction or completely free of shading to be effective. With little effort, each system can be transformed and expanded with additional modules.

Infinite Scalability

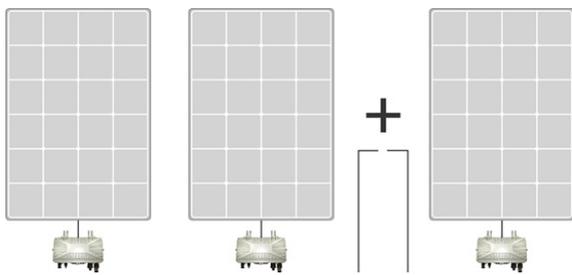
Micro-Inverter based systems can be arranged as the building's architecture requires and rearranged or expanded with more modules when needed (e.g. system expansion). Where String-Inverters are limited to specific module-array

Micro-Inverters

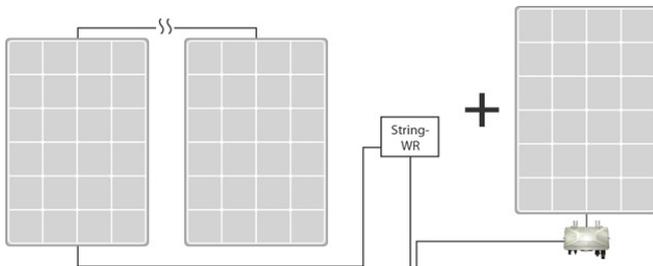
Advantages and Functions for the use in PV-Systems

configurations, Micro-Inverters can not only be added to an existing system of Micro-Inverters but also to a string-based system.

With little effort, each system can be transformed and expanded with additional modules depending on needs and available capital.



It does not matter whether the current PV-system consists solely of Micro-Inverters or the new PV-module is added to a string-based system.



With the Micro-Inverter, you have all the freedom to easily expand your system at any time.

Reduced System Cost

In PV systems equipped with micro-inverters, the components and installation costs can be reduced by up to 15%. DC components such as DC-connection boxes or DC circuit breakers as well as skilled workers for handling high DC voltages become unnecessary.

Detailed System and shadow planning needed for string systems are eliminated and the quick and easy installation through "plug-and-play" connectors further reduce the investment costs.

Easy Installation and Increased Safety

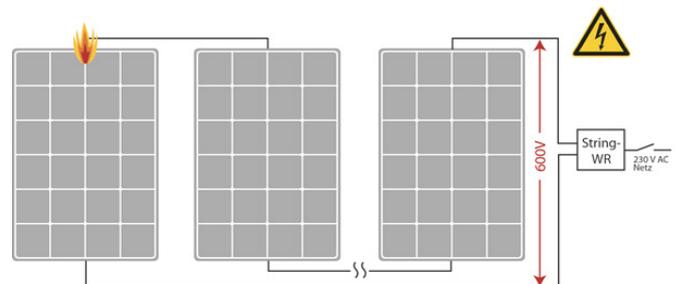
The installation of a micro-inverter based photovoltaic system is simple to perform, as no complicated strings or shadow planning is necessary. Module tolerances can be neglected, which allows the installation of mixed modules.

The micro-inverters can be attached directly under each module to the already-mounted PV frame.

When designing the PV-systems with micro-Inverters, the shadow and string planning become unnecessary. The "plug-and-play" connectors allow for convenient and fast installation of the system. Also, in regards to safety, the use of AConversion Micro-inverters is beneficial. Since only one or two modules are installed per inverter, there are no high DC voltages. This will considerably reduce the risks during installation and in case of fire!

Reduced Risk of Fire

Through the individual connection, the Micro-Inverter provides a high level of safety from the dangerous PV voltage. In conventional PV- systems, string voltages of up to 600V can arise. In the event a fire destroys the insulation of the PV cables, the rescue workers are at acute risk.



With the Micro Inverter, the maximum PV-voltage is <math><60\text{V}</math> (safety voltage). If the AC is side separated from the mains, the rescue workers are not exposed to high PV voltages.

