



Comparative test for photovoltaic modules Test winner: ANTARIS SOLAR

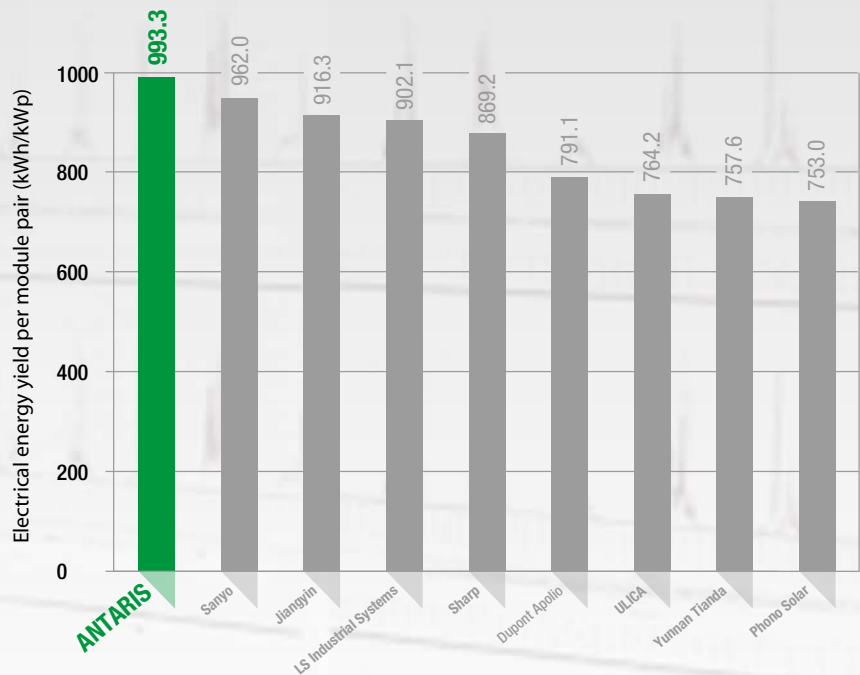
ANTARIS AS M Series – The module Series with the highest energy output

In the photovoltaic market, the range of products and services on offer from a wide variety of module vendors is booming. To keep track and separate the wheat from the chaff, you need the relevant information.

Just as in the year 2014, the TEC Institute has again tested nine modules from reputable photovoltaic system manufacturers, this time from 2014-01-01 to 2014-12-31 in order to investigate the performance of the individual modules. The test was once again conducted under real conditions on the roof because a laboratory test under artificial lighting conditions would be of only limited value in attempting to establish an objective verdict. The basic requirements for a realistic measurement were met:

The TEC Institute runs its own weather station with temperature, air pressure, wind, rain and humidity sensing as well as a pyranometer for measuring global irradiance (the total amount of sunlight or solar irradiance that reaches the earth's surface within a horizontal "reception area"). Hence the weather situations in the test phase could be precisely recorded parallel to the detected yield values, making it possible to reach an objective verdict about the real energy output of the various modules. In the comparative test, the ANTARIS scored the top yield with respect to the highest energy output per individual module and therefore emerged as the winner.

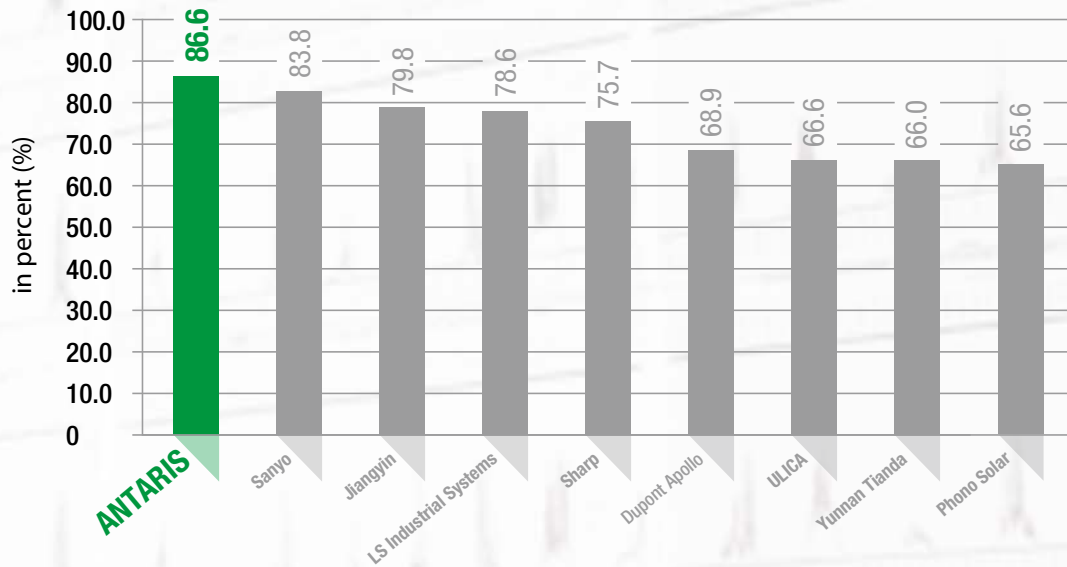
Test system, electrical energy delivered per module type from 01.01.2014 to 31.12.2014



TEST WINNER
TESTED: 9 PV MODULES
06/2015

ANTARIS AS M
VERY GOOD

Test system, electrical energy delivered per module type from 01.01.2014 to 31.12.2014



ANTARIS AS M Series:

The module Series with the highest energy output



Measurements were carried out on the nine modules from various reputable manufacturers from 01.01.2014 to 31.12.2014. All module types were wired up in separate strings of either two or three modules of the same type depending on the level of the module voltage and the MPP voltage of the inverter. Each string fed into the electricity grid via its own "Mastervolt Soladin 600" inverter. The voltage and current were recorded for the modules. Measuring cycle: 1 minute. These measurements were used to calculate the DC power and the electrical energy supplied by the modules. With respect to the alternating current, one feed meter per module pair recorded the power they fed into the electricity grid. During the test, all modules were free of shadows and were aligned precisely to the south and tilted at an angle of 30 degrees. Another important criteria was that, as far as was possible, the cable length had to be exactly same for all the test strings. As already mentioned, the working ranges of all strings were within the MPP range of the inverter.

The ASM module from ANTARIS SOLAR with a monocrystalline type of cell yielded an energy output of 963.3 kWh/kWp