



# Extreme Conditions for PV

The Ultimate Stress Tests for Inverters



Heat records, desert storms and tropical rainfall. PV power plants around the globe are exposed to particular weather conditions which the inverters must also be able to withstand. Therefore, SMA regularly subjects the inverters of the Sunny Central family to special stress tests demonstrating impressively that they are capable of producing maximum performance even under extreme climatic conditions. This is borne out by the SMA stress tests which provide impressive proof of the high quality of the inverters.

## 1 000 Hours' Record Heat

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In the SMA climate chamber encompassing a DC voltage range of 1 200 V in a test space volume of 48 square meters, each inverter is subjected to a climate stress test prior to serial production launch. The inverters remain in the climate chamber for up to 1 000 hours. The test simulates extreme climatic conditions within a temperature range of  $-40\text{ }^{\circ}\text{C}$  to  $+90\text{ }^{\circ}\text{C}$  in conjunction with humidity of up to 95 percent. It yields precise values on power output, efficiency levels and the electrical endurance of the components used in the inverters.

## SMA Design for High Altitudes

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PV power stations located at high altitudes also have to cope with extreme conditions. True, the reduced inverter cooling capacity resulting from the lower air pressure is compensated by the sinking temperatures at higher altitudes, but at the same time the dielectric strength of the air is also diminished. At heights over 2 000m above sea level, a reduction in maximum voltage and output power must be allowed for. The dimensioning and maximum voltage of the Sunny Central CP devices are adjusted to compensate for this. All control voltage circuits of the Sunny Central inverters are designed for altitudes up to 4 000 m above sea level, and they are also operated with a modified DC window.



## Resistant to Sandstorms

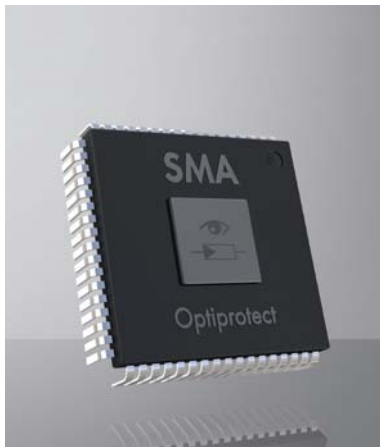
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The extremely fine dust and sand which penetrates the smallest cracks and openings during sandstorms can settle everywhere. This poses a threat to the operation and longevity of the entire PV plant. Particularly in desert locations with a maximum of guaranteed solar irradiation and thus with greatest potential for the future, this is a problem which could put yields at risk. For this reason, SMA has tested the desert-worthiness of the outdoor-compatible inverters of its Sunny Central CP series. At wind speeds of 1.5 m/s to 20 m/s, brick dust was blown horizontally straight at the inverter. With positive results – the OptiCool cooling system integrated in the Sunny Central CP prevented dust from settling in the interior of the inverter. Dust deposits were only found on the exterior of the device and on the seals.



## Optiprotect

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Maximum PV plant yields are guaranteed by the new, integrated string monitoring concept OptiProtect. By means of a central monitoring function with automatic error detection and plant failures are avoided when faults occur on the modules, thus preventing disconnection of the PV plant.

Both the outdoor devices of the Sunny Central CP family and the inverters of the Sunny Central HE series for indoor installation have demonstrated clearly in the stress tests that they meet highest quality demands and that they deliver maximum power even under extreme ambient conditions. At an ambient temperature of up to 25 °C, the maximum power supplied by the inverters of both series is even 10 percent higher. High-tech features such as comprehensive grid management and intelligent power management provide even more benefits for the PV power station operators.

## About SMA

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The SMA Group generated sales of €1.7 billion in 2011 and is the global market leader for solar inverters, a key component of all PV plants. It is headquartered in Niestetal, near Kassel, Germany, and is represented in 19 countries on four continents. The Group employs more than 5 500 people worldwide, plus a number of temporary employees that varies on a seasonal basis. SMA's broad product portfolio includes a compatible inverter for every type of module on the market and for all plant sizes. The product range includes both inverters for PV plants connected to the grid as well as inverters for off-grid systems. SMA can therefore provide an ideal inverter solution for all plant sizes and types. Since 2008, the Group's parent company, SMA Solar Technology AG, has been listed on the Prime Standard of the Frankfurt Stock Exchange (S92) and also in the TecDAX index. In recent years, SMA has received numerous awards for excellence as an employer and in 2011 and 2012 achieved first place in the nationwide Great Place to Work® competition.