Rising heat places heavier demands on central inverters used to produce clean power for millions of people in the hotter areas of the globe. They not only work at the highest efficiency possible but are also expected to function reliably and faultlessly for the duration of operation. Here, cooling systems play an important role.

There is a high risk – due to overheating – that sensitive components within the inverter will begin to behave differently leading to their eventual break-down. Anything from short-term failures to a complete system standstill bringing about high losses in yield are only some of the consequences faced by PV power plant operators and investors in photovoltaic projects. For this reason an intelligent cooling concept is the key to optimal central inverter operation. This requires, apart from the optimal spatial organization of all components, an efficient and properly dimensioned cooling system.
Sensitive Temperature Management

SMA inverters function at temperatures of up to 50 °C at nominal power – and full energy yield – based on the innovative cooling concept OptiCool® and clever spatial design. At temperatures of between 50 °C and 62 °C Sunny Central inverters continue to feed in but at the same time reduce the feed-in capacity according to temperature for self-protection. Above 55 °C a Sunny Central will still feed in at 50 % nominal power. Cooling requirements can be adjusted at any time through well-planned temperature management which reacts quickly and sensitively to temperature changes using numerous temperature sensors on the inside of the central inverter. This prevents the occurrence of failures and losses in yield. The inverter’s temperature management is therefore important for smooth operation. Even at an efficiency of 98 % some waste heat is still incurred. For a central inverter with 900 kWp nominal power, a two percent loss in heat is equal to a considerable 18 000 watts.

Separate ventilation circuits
The innovative cooling system OptiCool® actively cools the inverter, meaning that the rpm-regulated fan motor is activated when the sensors installed in various places on the device measure temperature increases. OptiCool® is made up of two separate ventilation circuits. As fresh air from outside is drawn in to cool heat-producing components, circulating warm air is cooled down in an internal ventilation circuit on the inside of the inverter. The heat exchanger used in this process is operated by fresh-air supply.

Low maintenance grid filter
The outside air is cooled in an air duct through an influx of cooling air drawn in through the ventilation grids on the roof of the inverter. Here, a maintenance-free inertial separator prevents dust particles from entering the air duct. The sine wave filter choke and the heat sinks on the inverter bridge jut out into the air duct to be cooled optimally by the fresh outside air. The air is blown out again through openings on the back of the inverter after having traveled through the air duct. Here a low-maintenance grid filter also ensures that no particles get into the inside of the inverter. Thanks to this innovative cooling concept, Sunny Central inverters can also be set up in chemically active environments. A robust enclosure makes them perfect for use outdoors in any and all ambient conditions.
OptiCool® Prevents Dust Build-up

OptiCool®, an integral component in all Sunny Central inverters, cancels the risk of functional impairments caused by invasive dust particles from the start. This is the result of sand and dust tests carried out by SMA on central inverters by exposing them to extremely fine dust over an extended period of time. The brick dust used for testing does not get into the inside of the inverter. Deposits are only found on the exterior of the device and on the seals.

Dust deposits present on seals only