CUSTOMIZED

Industry: Solar industry

Safety test system for solar inverters

Task

Various solar test systems were to be implemented with which the inverters are initially tested and adjusted fully automatically. Following this an running in of the inverters should occur before the finished inverters are stored. Before delivery the customizing is carried out on another system by installing a customer-specific firmware and by attaching a custom-specific cover. Finally the connection of the ground bond conductor to the cover and the display integrated in the cover should be tested.

Solution

The three tests (high voltage test, function test, including adjustment and running in) carried out directly after production are realized in a high rack into which the inverters are inserted with a storage and retrieval system realized by the manufacturer of the conveying system. The inverters are already wired on especially adapted workpiece carriers so that the contacting in the individual test cabins can be carried out fully automatically by means of numerous contact pins directly on the workpiece carrier. The inverters are then stored on this workpiece carrier until delivery. The separation from the workpiece carrier is only made after the last test directly before the packaging. The workpiece carriers are recognized by the test stations and in each case the appropriate test program is selected via a database system. Therefore it is sufficient to scan the DUT once during assembly and thus to link it to the workpiece carrier.

High voltage test system
Test between input and output as well as between the individual strings of the input with up to 6 kV DC.

Function test system with DUT adjustment
Installation of the currently valid firmware and fully automatic adjustment of input and output (voltage, current and power measurement) by measuring the real values with power measuring devices and comparison with the data read by the inverter. Test of the various connections and functions.

Running in station
Each inverter is operated for approximately 1 hour under load. In this case the power is supplied from the power supply via DC sources and the converted voltage is then fed back into the mains again. The resulting waste heat is stored in the water tank for the sprinkler system to heat the production buildings in winter with it. During the test various data are regularly read out and stored from the inverters. Since only a relatively small computing effort is required, up to 8 running in stations are controlled by one PC. All test systems are implemented several times as the partial steps take rather long in some cases. Furthermore the failure of a single test system does not lead to a stop in production. There are 2 high voltage test systems, 10 function test systems and 43 stations for the run in.

Customizing system
Before delivery the current version of the firmware is installed once again. For OEM devices a customer adapted version is installed here.

Ground bond conductor test system
Since it is only determined directly before delivery whether the respective inverter is delivered under its proper name or as an OEM device with adapted firmware and design, the cover can only be integrated at that time. The ground bond conductor connection of this cover can therefore only take place at the very end. In addition, the display of the inverter integrated into the cover is checked in a visual test. A system for customizing and for the ground bond conductor test is available in front of each station for the packaging of the inverters.

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Advantages

+ Low contacting effort: After a one-time manual connection to the workpiece carrier further contacting in all sub-systems takes place fully automatically.
+ Fully automatic adjustment
+ High availability due to multiple execution of all sub-systems
+ Automatic test program selection via database
+ No set-up time due to workpiece carriers adapted to the DUT variants
+ Low personnel costs for the test
+ Easy, intuitive operation for trained personnel

Specifications

- 2 pieces of high voltage test stations with high voltage test up to 6 kV DC
- 10 pieces of function test stations
- 43 pieces of run in stations
- 2 pieces of customizing stations
- 2 pieces of ground bond conductor test stations

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