

Press Release

Freiburg
September 1, 2010
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Megawatt Laboratory for PV Inverters Starts Operation at Fraunhofer ISE

The Fraunhofer Institute for Solar Energy Systems ISE in Freiburg has taken its megawatt laboratory for PV inverters into operation. It is the first and currently the only laboratory in Europe where manufacturers can commission certification, in accordance with the medium-voltage grid codes that have applied since July 1st 2010, of inverters with a power rating of up to one megawatt. Further information can be found [here](#).

Manufacturers can have their products characterized and tested in full compliance with the certification specifications in the megawatt laboratory. "With a so-called 'Low-Voltage Ride-Through' test unit, we can investigate the performance of inverters with regard to voltage dips in the medium-voltage grid, as is required by the new regulations", stated Sönke Rogalla, the laboratory manager.

The megawatt laboratory is equipped with three medium-voltage transformers, each with a power rating of 1.25 MW, which are connected to the 20 kV grid. One transformer supplies power to the solar array simulators, which supply the inverters to be tested with a voltage of up to 1000 V and a current of up to 1000 A. The other two transformers are used to feed the electricity into the medium-voltage grid. Their voltage can be adjusted between 255 and 790 V. This range covers all voltages that are commonly used internationally.

"Power is drawn and fed in via two separate medium-voltage transformers", explained Prof. Bruno Burger, in charge of power electronics development at Fraunhofer ISE. "This prevents the solar simulators and inverters from mutually affecting each other, and avoids measurement errors."

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The control unit for the megawatt laboratory resembles the control room of a power station. The scientists can connect and disconnect 20 kV transformers by remote control and create voltage dips of varying depth and duration.

In addition to the tests required by regulations, the spacious megawatt laboratory (with 250 m² floor area) offers comprehensive analytical facilities to optimize inverters. For example, the Fraunhofer researchers measure not only the conversion efficiency but also the MPP tracking efficiency. This often neglected quantity quantifies the ability of a PV inverter to extract the maximum power from the connected solar cells at all times.

Background: The proportion of PV electricity in public grids has increased so strongly that solar power plants have to be included in the stabilization and control of the electricity grid. The new German medium-voltage grid codes have similar specifications for large PV power plants to those for conventional power stations. For example, since July 2010 the inverters for large photovoltaic systems are required on demand to supply reactive power, reduce the feed-in power and support the grid if the voltage drops.

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Text of the PR and photos can be downloaded from our web page : www.ise.fraunhofer.de



Photo 1: View into the new megawatt laboratory at Fraunhofer ISE for testing inverters in the power range up to 1 MW. ©Fraunhofer ISE

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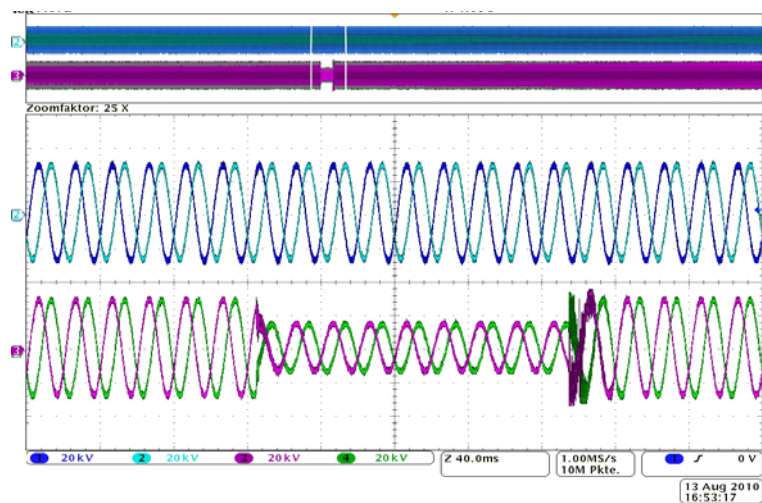
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Photo 2: Control panel for the "Low-Voltage Ride-Through" test facility for testing inverters according to the new medium-voltage grid codes. ©Fraunhofer ISE

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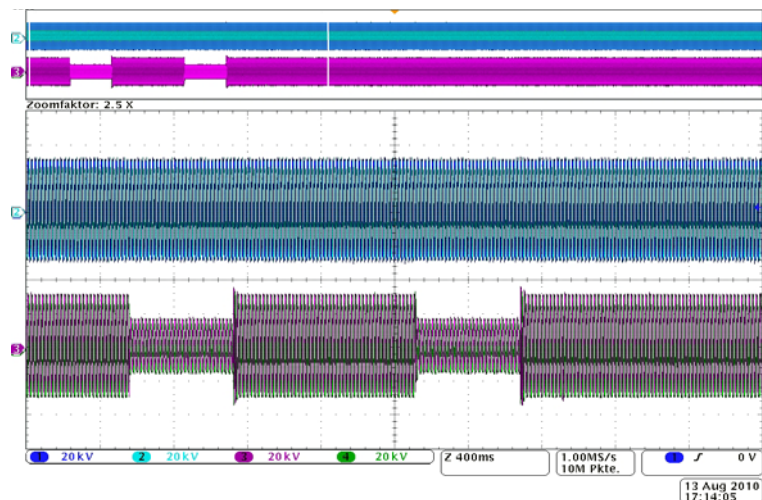
Graphic 1: With the help of the “Low-Voltage Ride-Through” test facility, voltage dips of variable duration and depth can be imposed on the medium voltage side. The figure illustrates a brief single dip in the voltage from 20 kV to 10 kV with a duration of 150 ms. ©Fraunhofer ISE

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Graphic 2: Double dip from 20 kV to 10 kV, each dip with a duration of 550 ms. ©Fraunhofer ISE