

# SIMULATING REALITY

GMP232 grid measurement module in operation at the Fraunhofer IWES

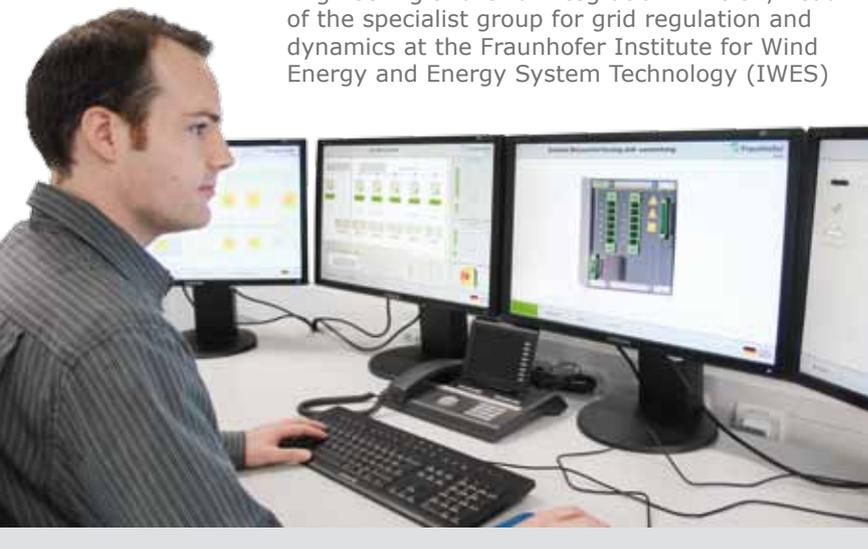


▲ The activities of the research and testing laboratory for grid integration (PNI) include the testing of grid components and equipment.

**The energy transition has put the spotlight on renewable energies as key sources of energy supply. In this process, the redesign of the power supply grid is of critical importance: After all, a wide range of different energy producers have to be integrated. The fact that the energy from the sun, wind and other sources cannot be supplied at a constant rate poses a major challenge. The PNI testing laboratory for grid integration at the Fraunhofer Institute for Wind Energy and Energy System Technology (IWES) in Kassel, Germany, provides the facilities for testing the necessary innovations on grid components and for testing grid operation in practice. It is here that Bachmann's GMP232 grid measurement module is making an important contribution.**

» ***The GMP can be adapted to our requirements and that is exactly what we need here.***

Dipl.-Ing. Dominik Geibel of the Systems Engineering and Grid Integration Division, head of the specialist group for grid regulation and dynamics at the Fraunhofer Institute for Wind Energy and Energy System Technology (IWES)



**A**t the PNI laboratory, grid components and equipment can be developed and tested in realistic conditions in terms of new system functions. The main focus of the laboratory is the investigation and testing of the grid interface of storage facilities, generators and combined heat and power generation plants. The PNI also focuses on adjustable load appliances, electric vehicles and transformers. Tests in the low-voltage grid up to 1.25 MVA and in the medium-voltage range up to 6 MVA are carried out here.

## TECHNICAL INFRASTRUCTURE

The test facility and the test sequence is controlled from a central control room. All relevant electrical data, in particular power quality parameters, can be acquired, recorded and analyzed here: This is where the GMP232 grid measurement and protection module from Bachmann electronic is used. "The GMP is integrated in the central controller and provides for a wide range of functions that are very important for the flexibility of our measurements," explains Dipl.-Ing. Dominik Geibel, head of the specialist group for grid control and grid dynamics in the Systems Engineering and Grid Integration Division. The module can measure up to 690 volts. "We haven't been able to find this anywhere else," the graduate engineer sums up. "As we don't have to incorporate any external module, it offers us a considerable degree of freedom."

## ADAPTABLE AND EASY TO INTEGRATE

The GMP232 enables a grid point to be monitored completely. In all, 17 of these modules are installed in the PNI. "The GMP can be adapted to our requirements and that is exactly what we need here," Dominik Geibel explains. Applications developed in Matlab™ and simulated



## Fraunhofer IWES

The research activities of the Fraunhofer Institute for Wind Energy and Energy System Technology (IWES) founded in 2009 cover all aspects of wind energy and the integration of renewable energies into energy supply structures. The IWES in Kassel currently employs around 240 scientists, staff and students. The annual budget for the institute section was around 15 million euros in 2011.

in Simulink™ can be loaded directly onto the controller without any intermediate steps. This is important for future projects: Online simulations can be carried out without any training in special programs required.

“The GMP was one of the key factors in our decision to work with Bachmann,” the expert explains. What’s more, compliance with IEC 61850 was also a persuasive argument. This protocol is used in the PNI to activate the switch panels and the decentralized generators in the grid. We also received very good support from Bachmann for the initial training. All entry obstacles have been as good as overcome. “We were greatly impressed by the overall concept of Bachmann electronic,” Dominik Geibel sums up.

### **VISUALIZATION WITH ENHANCED MONITORS**

The controller is configured via the visualization of the Bachmann SolutionCenter – both for the web terminal displays in the laboratory itself as well as for the computers in the control room. “Here we use enhanced monitors for the GMP,” the engineer explains, “the Scope function and the grid diagram in particular are very helpful for our work.” Measurement information, such as the actual grid status or the power flows are clearly displayed. The data is synchronized using the Precision Time Protocol (PTP).

The static and dynamic behavior of all kinds of decentralized generators can be tested on the grid interface in the PNI. Simulators for emulating

PV installations are available for creating the all weather test conditions for PV power inverters. The benefits are obvious: For example, configurable distribution sections for low and medium voltage not only enable the testing of individual components, but also the testing of their behavior as part of a system. Mobile test apparatus also enable onsite testing, for example in large wind farms and solar farms. The IWES also offers these services to companies. However, the key interest of the PNI is the development of reliable new system components for the supply of power from renewable energies.

Bachmann is actively engaged in the renewable energy field: The company is helping with its products to use these energies efficiently, safely and reliably. With the implementation of the GMP232 in the laboratory of one of Europe's leading research organizations, the company is helping to further advance this development. ■

▼ The main building of the Fraunhofer Test Center for Smart Grids and Electromobility in Fuldatal-Rothwesten near Kassel, Germany, is the site of the PNI research and testing laboratory for grid integration. With this facility, the institute has further developed its unique position in Europe.

