

Electrical distribution

SmartGrid power sensor

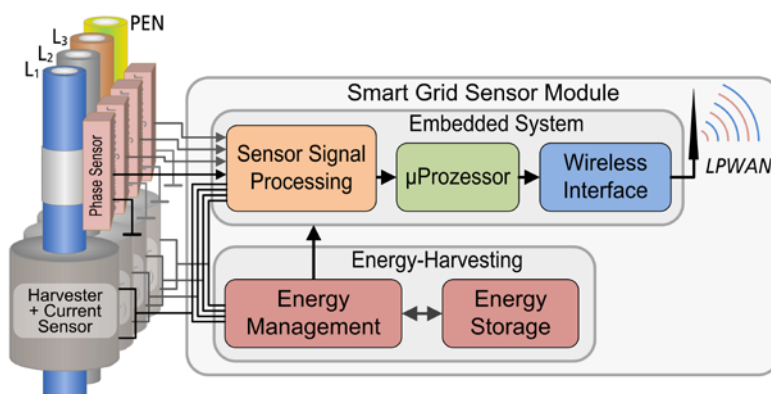
Solutions for future-proof power supply management

The energy transition creates new challenges for our electrical distribution grids. While it was previously sufficient to simply estimate energy flows, the higher grid load caused by an increasing number of photovoltaic systems, storage systems and electric vehicles requires more precise data to ensure stable grid operation. Otherwise, there is a risk of unexpected overloads that could lead to outages. Comprehensive grid expansion is not feasible in terms of time or money. It is more expedient to digitalise the low-voltage distribution grids in order to make better use of the existing structures. This requires up-to-date information about the individual grid sections.

The Fraunhofer IMS is working on making the distribution grids fit for the energy transition. The aim is to continuously monitor energy flows in heavily utilised low-voltage sections of the distribution grids in real time. Not only the current is measured, but also the voltage and the phase angle, which can be used to derive further parameters of the grid status. Important information is recorded and passed on using sensors and modern IT infrastructure. This makes it possible to optimise the control and integration of generators and consumers. In view of the large number of transformer stations and cable distribution cabinets in cities, the costs and effort involved in installation and maintenance also play an important role.



Installation of sensors in the distribution network



How the status analysis works: Current sensors operated with inductive energy harvesting measure the load and send the processed values to the central control system of the grid operator.

The network status is specifically recorded using wireless sensor systems that utilise the possibilities of the Internet of Things (IoT). As a result, it is no longer necessary to set up a separate infrastructure for networking the sensors, which reduces costs. The sensors are cost-effective in production and can be easily installed during operation.

The data collected by the sensor systems is used for grid and market oriented regulation in accordance with the new Energy Industry Act (EnWG). Together with IT components that have also been developed, the data is analysed, visualized and used for automated grid control. This enables grid operators to constantly receive comprehensive and detailed information about the grid and its components. This enables them to react to fluctuating energy flows in real time and utilise the available resources efficiently. Overloads or outages in critical situations can be prevented at an early stage.

Advantages of the technology

- **Real-time monitoring:** Continuous recording of energy flows enables a rapid response to fluctuations.
- **Cost-effective:** Wireless sensor systems do not require their own infrastructure, which reduces investment costs.
- **Simple installation:** Sensors are inexpensive and can be installed during operation with little effort.
- **Efficient use of resources:** Grid operators receive detailed information to optimise the use of available resources and avoid overloads.
- **Future-proof:** Technologies remain operational even in the event of power outages, which increases the stability of the grid.

Contact and further information

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