1. Overview
The condition monitoring of power lines aims at the optimization of the capacity utilization of energy transport while guarantee hazard free operation.

Therefore real-time data is collected by online monitoring of
• temperature,
• inclination angle (sag) of the power line,
• electric current and
• oscillation.

2. Features
Sensor node positioned on the power lines collect the data, send it to the neighboring sensor node until reaching the next transformer station. There, the data is provided in an internet-based remote maintenance system. The sensor nodes form a self organizing network structure.

The housing is made of PUR (Polyurethane) and contains the electronics, sensors, antennas and antenna filter. It is internally coated with copper and collects the current from the stray field to power the sensor node.

A capacitive MEMS inclination sensor detects the sag of the power line and its oscillation caused by wind motion.

3. Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal distance</td>
<td>500 meters (max. 1,000 m)</td>
</tr>
<tr>
<td>Suitable for</td>
<td>380 kV power lines</td>
</tr>
<tr>
<td></td>
<td>110 kV… 50 Hz or 60 Hz</td>
</tr>
<tr>
<td>Data transmission frequency</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>Full scale range of</td>
<td>±10° with 0.01° accuracy</td>
</tr>
<tr>
<td>inclination sensor</td>
<td></td>
</tr>
</tbody>
</table>

4. Project Partners
The project is a cooperation between Fraunhofer ENAS, Fraunhofer IZM, Chemnitz University of Technology, enviaM Mitteldeutsche Energie AG, ampron GmbH, ELMOS Semiconductor AG, audacia, Microelectronic Packaging Dresden GmbH, and unilab Systemhaus GmbH. It is supported by Federal Ministry of Education and Research, contract no. 16SV3771.

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