

**SIEMENS**  
energy

# Sensformer<sup>®</sup> Advanced

Scale up your digital power transformer



[siemens-energy.com/sensproducts](https://www.siemens-energy.com/sensproducts)

# New level of digitalization

Based on the digital twin technology

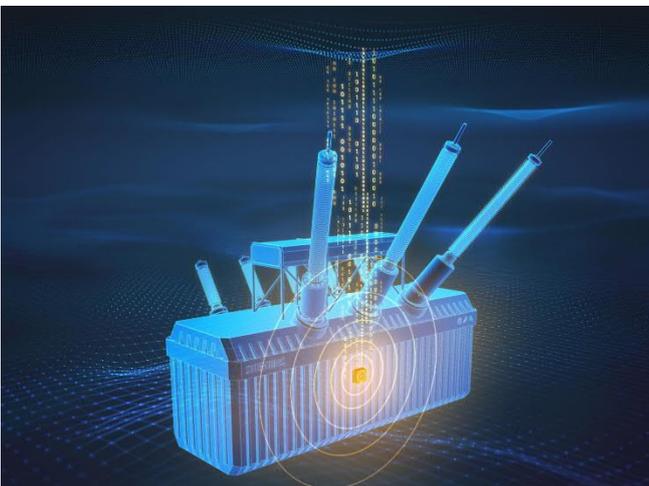
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## In 2018, Siemens introduced Sensformer®, Siemens Energy's digital transformers

Since then, every Siemens Energy transformer comes with the connectivity feature per default. Transformer operators get real time status information, via a robust IoT gateway, anytime and anywhere.

The concept has already been upgraded: Sensformer® Advanced, based on digital twin technology, offers further important information and features to the operator to help improve the asset utilization, while minimizing operational risks.

Sensformer® Advanced is available for the complete power transformer portfolio, including Auto-, Net-Transformer, phase shifters, reactors and HVDC transformers.



## Scalable hardware platform

The hardware platform is an integral part of Sensformer® and Sensformer® Advanced. All connectivity levels are based on the same platform, so that a fleet can consist of basic Sensformers, as well as transformers with enhanced productivity or advanced intelligence features.

## Comprehensive set of data for a know-it-all status

The Sensformer® dataset includes GPS, oil level, top oil temperature and winding current information. Sensformer® Advanced additionally provides real time information on cooling inlet, outlet and ambient temperatures.

All this data is transmitted via the existing Sensformer® IoT gateway. Additionally, Sensformer® Advanced comes with a new technology based on a digital twin model of the asset: As the status of transformer is known at all times, from the moment of energizing on, the digital twin provides a complete real time thermal image of the transformer, enabling accurate lifetime consumption simulation and performance prediction. The result is the enhanced productivity of the asset.

For example, load prediction for the transformer over the next few hours is determined by the targeted loss of life considered for a specified period of time. I.e. the operator defines whether the equipment operates with reduced, enhanced or nominal velocity loss-of-life consumption in the next load period that is determined. This enables condition-based equipment operation, optimized to the operator's needs.

## Expand the performance range with tailor-made apps

### Added transparency, enhanced productivity, advanced intelligence

The basic Sensformers provide added transparency for every transformer operator. Sensformer® Advanced upgrades this concept to enhance productivity by using a digital twin. Moreover, the upgrade offers the chance to benefit from advanced intelligence even more.

### Enhanced productivity: Opportunities and benefits

#### Virtual sensors

Virtual sensors save costs and time, while enabling more insights into the transformer's inner life and condition. This includes an extended temperature information with advanced 3D visualization, selectable signals of different values and components as well as a virtual sensor notifier.

## Advanced intelligence Opportunities and benefits

Many more use cases are possible with Sensformer® Advanced: moisture indication and trends; integration of a dissolved gas analysis sensor for more insights. Additionally, we are expanding the functionality by adding new sensors for bushing value indications. We are looking forward to getting into the co-creation mode to expand our advanced intelligence options to fit them to your specific needs.

This notifier can be parametrized to inform the operator about the status of the asset anywhere and anytime.

Hence, operators gain greater insight about their assets, for example a clear picture about the status of single components. The evaluation is simplified to be easily understandable at first glance, by correlating signals and events out of historical data.



## Active overload prediction

Overload prediction is based on real time thermal profiling of the transformer, obtained using the historical operational data of the unit.

With the help of the digital twin, the real time thermal image of the transformer can be simulated at any time during operation and stored to have a sound base for load prediction.

Different load scenarios can be simulated before stressing the physical asset, so the level and duration of overloading that the transformer can withstand is known to the operator at any time.

The operating parameters are adjustable according to the operator's requirements, and overload prediction is possible up to two hours into the future.

Thus, transmission capacity can be increased based on a very accurate forecast. At the same time, operating flexibility is maximized to match the operator's business needs

## Lifetime prediction

The calculation of actual lifetime losses for a predefined period is possible based on a retrospective evaluation of the operating mode of an asset. This enables absolute and relative lifetime loss forecasts. Continuous lifetime evaluation for a longer period based on IEC loading guidelines is also possible.

A pre-condition for load prediction is flexible parametrization for aging. With lifetime prediction based on estimation of the insulation aging, operators can evaluate the age profile of their transformers at any time. They get full transparency about the actual aging of the transformer – information that is also useful for future CAPEX planning.



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