

Sensformer Advanced & Sensformer Edge

Digitalize your transformer to improve operation



Sensformer™ Advanced & Sensformer™ Edge

Be ready for the future

Digitization is playing an increasingly important role in energy transmission and distribution - for good reasons: the structure of the grids is becoming increasingly complex and environmental compatibility is becoming more and more important. At the same time, reliable power supply to consumers must be ensured, and the costs of power transmission and distribution must be kept as low as possible. The digitally connected transformers Sensformer Advanced and Sensformer Edge offer the perfect solution here: Transformer downtimes can be reduced, operation of the transformers can be made more flexible, and at the same time, costs can be reduced and environmental protection improved.

Digital: Increase operational transparency

Sensformer Advanced and Sensformer Edge facilitate your digital journey. They provide real-time information such as oil level, top oil temperature, and LV winding current any-time to increase operational transparency. Using Sensformer Advanced you can even access the data from anywhere via browser application.

Load indications and future trending of Sensformer Advanced and Sensformer Edge will help you as an operator to optimize load management and increase energy efficiency. Sensformer Advanced takes weather conditions, including humidity and predictive weather analytics into account to make even more precise predictions.

Sensformer Advanced also provides a fleet overview, including technical data, loading, and GPS of every Sensformer. The units can be localized remotely to optimize service crew management and identify failures.

Reliable: Avoid outages and minimize outage times

The information Sensformer Advanced and Sensformer Edge provide helps you to identify anomalies at any early stage. Often outages can be avoided by early intervention before extensive failures occur.

Should a failure nevertheless emerge, Sensformer Edge can send the information directly to your local IT system. Using Sensformer Advanced the failure notification is sent to the cloud and the affected transformer can be quickly identified thanks to GPS localization. In both cases, errors can be rectified as quickly as possible, and the current flow can be restored immediately.

Flexible: Increase flexibility and optimize performance

Sensformer Advanced and Sensformer Edge allow load scenarios to be simulated and evaluated in advance. Based on a digital twin, a virtual replication of each single transformer, established on the basis of its design data, load and ambient temperature cycles can be simulated 24 hours into the future.

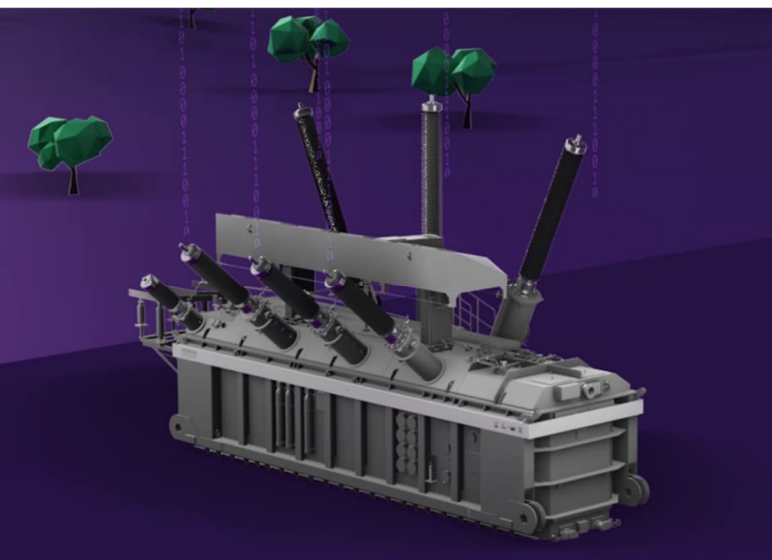
As an operator you can operate the transformer within design specifications, with higher loading based on real-time dynamic load management and generate additional profit.

It is even possible to operate Sensformers under overload conditions for a limited period of time. The maximum overload capability can be simulated 30 to 60 minutes in advance, taking boundary conditions such as aging values (loss of life) or temperature limits into account.

Finally, automatic calculation of the relative transformer aging is also available. This gives you an indication of the Sensformers lifetime expectancy and helps to improve investment decisions. For example, the calculation may confirm that it is possible to extend the asset lifetime if it indicates less aging than expected.

Cost efficient: Decrease operational costs

Sensformer Advanced and Sensformer Edge provide a very accurate view of transformer health based on oil quality, temperature profiles, and incidents. As an operator you can use this information to save maintenance cost by increasing service intervals and implementing condition-based maintenance. You can also implement efficiency optimized load management based on load indications and future trending to minimize power losses and consequently decrease operational costs.



Sustainable: Protect the environment

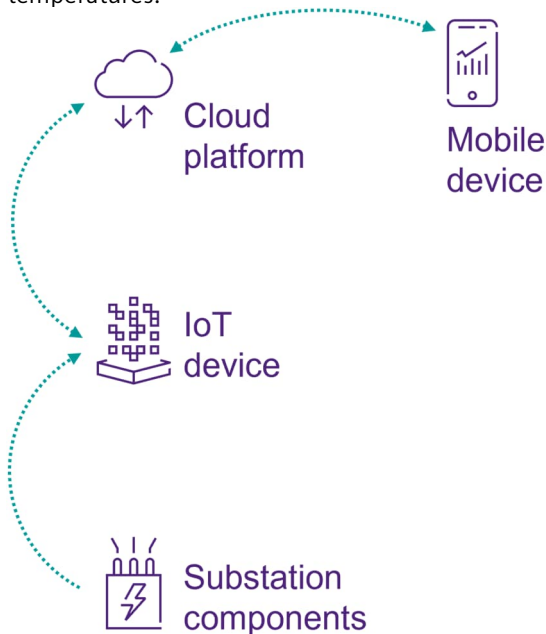
Sensformer Advanced and Sensformer Edge use sensor data and load indications to calculate the stress level of the Sensformer. Additionally, oil level alarm warnings are issued in case of oil leakages or energy drains. This not only protects the environment, but also improves the health and safety of your employees.

Sensformer Advanced will send the warnings directly to your mobile device.

Sensformer Advanced and Sensformer Edge offer very similar features and benefits, but both versions differ greatly in their technical structure. The biggest difference lies in data storage and analysis. While Sensformer Advanced saves the data in a cloud and processes it further, Sensformer Edge does this directly in the substation on a local computer.

Sensformer Advanced: Structure, advantages, and cybersecurity

At the product level, Sensformer Advanced is equipped with physical sensors that collect data in real time and send it via an IoT device to the cloud platform. The Sensformer Advanced dataset includes information such as GPS, oil level, top oil temperature, and winding current information, as well as information on cooling inlet, outlet, and ambient temperatures.



Technical structure Sensformer Advanced

All data is stored together with the digital twin, the design-data-based virtual replication of the transformer on the cloud. The data is analyzed on the cloud platform using various applications to improve operational performance. As an operator you can access the platform via browser application.

Customer benefits:

- **Digital** – increases operational transparency
- **Reliable** – minimizes outages
- **Flexible** – allows performance optimization and enhances flexibility
- **Cost efficient** – decreases operational costs
- **Sustainable** – reduces risk of any environmental harm

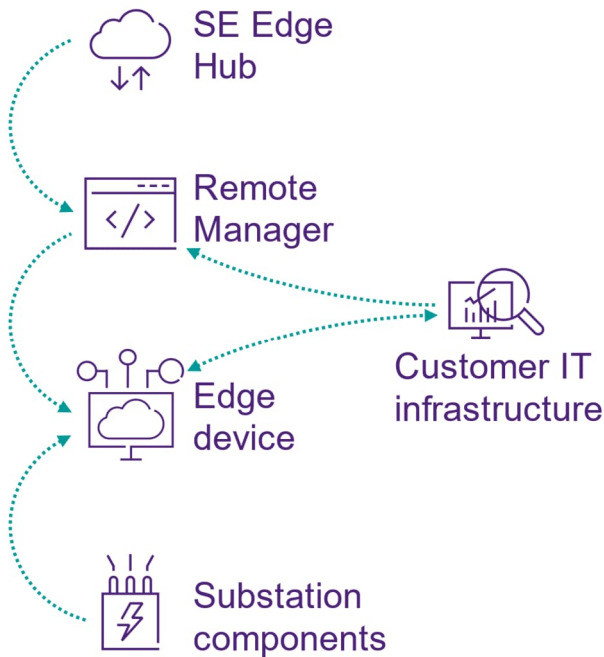
The greatest advantage of Sensformer Advanced is the permanent availability of the information - the cloud platform can be accessed at any time and from anywhere also using a mobile phone. In addition, the applications on the cloud platform are always up to date, as updates and quality improvements are automatically installed as soon as they are available. Data storage, including backup and recovery features, is of course automatically implemented via the cloud.

Because of the ever-increasing cybersecurity requirements, we ensure that we comply with state-of-the-art security and encryption technologies. Customer data which is stored in the cloud platform is encrypted, and end-to-end encryption is used for data transmission to the cloud. Each Sensformer Advanced has a unique identifier for authentication, which is backed by strong cryptographic material. This also used for encryption of data at rest and in transit. The transmission protocols are protected with mTLS1.2 encryption. In addition, we follow the best-in-class data handling and management guidelines to ensure that data from different customers is strictly protected against unauthorized access and secured on the cloud.



Sensformer Edge: Structure, advantages, and cybersecurity

With the Sensformer Edge, too, the data is collected at the product level by physical sensors. The dataset includes information such as oil level, top oil temperature, and winding current information, as well as information on cooling inlet, outlet, and ambient temperatures. All data is stored together with the digital twin on the Edge device. You can easily analyze it on any PC in your local IT infrastructure.



Technical structure Sensformer Edge

The greatest advantages of Sensformer Edge are data privacy and processing times. As the data is stored and analyzed locally and offline, high data security and privacy rules and demands are met. There is no transfer of the measured and calculated customer data to any cloud. The required connection to the cloud platform is only used to push functional and cybersecurity updates to the Sensformer Edge infrastructure. The application response times are extremely short due to local data processing.

Despite offline data storage and analysis, we naturally offer updates, backup functions and data recovery functions on demand. Via a Remote Manager you can decide to update your applications and get quality improvements whenever this is convenient for you from the Siemens Energy Edge Hub.



Frost & Sullivan recognized Sensproducts™ in the smart grid equipment industry with the 2021 Global Product Leadership Award

Both infrastructures with specific advantages

Sensformer Advanced

Operational performance increase

Cloud-based data analytics

- App-based data analytics and asset management
- Real-time status information available anywhere & anytime

Continuous updates, backup & recovery

- Always latest updates and continuous quality improvements
- Longtime data storage with backup and recovery feature

Highest security standards

- End-to-end encryption for data transmission
- Use of state-of-the-art security and encryption technologies

Sensformer Edge

Operational performance increase

Local data analytics

- Data analytics & asset management on local IT infrastructure
- Fast application response time due to local data processing

Updates, backup & recovery on demand

- Inbuild update manager for system updates on demand
- Integrated backup and recovery feature

Offline data - secure and private

- Seamless and secure integration into customer IT
- Customer data security and privacy rules met per default

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