HITACHI ABB POWER GRIDS

TXpert™ Enabled Distribution Transformers

Intelligent digital technology to maximize
transformer's return on investment

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- Reduce unplanned outage
- Optimize routine maintenance
- Maximize transformer utilization
- Long-term solution for complete
  peace of mind

The world's first digital distribution transformer

The first of its kind, TXpert™ Enabled Distribution Transformer utilizes intelligent, digital technology that reduces unplanned outages, optimizes operations and increases transformer utilization. It is a unique combination of smart, sensor-based technology and powerful analytics that delivers actionable intelligence to make better business decisions.

The TXpert™ Enabled Distribution Transformer is available for new and existing, dry-type and liquid-filled transformers.

Changing dynamics of industrial power systems

With the changing dynamics and increasing complexity of today's power-distribution grid, industrial power systems too are becoming increasingly dynamic. Yet, asset management strategies have not evolved accordingly and still rely on the same time-based maintenance strategies that have been used for decades.

These strategies are insufficient for today's power systems and lead to uninformed investments and operational decision by businesses. Over time, these misguided decisions become more expensive to correct. Thus, increasing the risk of unplanned outages and resulting losses. This challenge is most serious for transformers that are in mission-critical applications or where there is large loading variability as seen in the chemical, oil and gas, renewables, semi-conductor, data centers, marine and mining industries.

Need for data-driven decisions
Without the right kind of data, only a small percentage of transformer issues can be proactively addressed.

Availability of accurate and timely data about a transformer's performance helps in making informed operations and maintenance decisions that not only help in avoiding unplanned downtime but also increase the return on investment in transformers.

The TXpert™ Ecosystem
As the world leaders in transformers, Hitachi ABB Power Grids has responded to these challenges by introducing the TXpert™ Ecosystem of digital transformer technology.

TXpert™ is an open, scalable, manufacturer agnostic ecosystem for digitalization of transformers. It encompasses a complete suite of products, software, services and solutions that work together and have the capability to integrate with new and existing digital equipment from other manufacturers. The ecosystem complies to stringent cyber-security standards.

TXpert™ is based on deep domain knowledge of Hitachi ABB Power Grids and it provides data driven intelligence for optimization of transformer and grid operations and maintenance.

TXpert™ Enabled Distribution Transformer

A TXpert™ Enabled Distribution Transformer is equipped with an array of TXpert™ Ready sensors that collate data which is then utilized by the TXpert™ Hub to deliver actionable intelligence by providing valuable information on how the transformer and grid are operating.

Operations and asset management teams can use this intelligence to perform actions needed to achieve business results such as:
• Avoiding unplanned outages
• Reducing or eliminating the need of routine
• maintenance
• Improving the utilization of transformers before decommissioning to maximize the power management investments

Reduce unplanned outage

The TXpert™ Enabled Distribution Transformer (TEDT) reduces unplanned outages by tracking transformer performance and delivering advance warning of potential threats.

Existing practice of visual Inspection and DGA analysis only addresses a limited percentage of all possible failure cases. (TEDT) address other important failure cases which can't be addressed by existing practices. Here's how:

• **Always-on monitoring to identify potential failures**
  - Always-on and real time monitoring identifies potential failure cases that could also occur between inspections. TEDT instantly generates and sends notifications of these and helps avoid unplanned outages

• **Delivers actionable intelligence**
  - TEDT captures historical data of transformer operation and converts it into actionable intelligence which can easily be used to identify and resolve otherwise difficult to diagnose transformer and power issues

• **Advance indication about transformers end-of-life**
  - Existing parameters of calculating the end-of-life for transformers are not foolproof. TEDT bridges this gap by using specific data of transformer condition to scientifically evaluate its 'end-of-life' in a more reliable and consistent way. It guides in timely replacement of transformer before it could fail and cause an unplanned outage

Optimize routine maintenance

The TXpert™ Enabled Distribution Transformer (TEDT) helps businesses utilize a data-driven approach to move from a time-based to condition-based maintenance strategy and optimize operations by focusing only on the transformers that need attention.

How TEDT increases efficiency and improves effectiveness of operations and maintenance:

• **Maximizes operational efficiency**
  - With a data-backed, scientific approach of measuring transformer aging, maintenance can be scheduled based on actual aging condition rather than a time-based method. So, operational efforts can be better streamlined to examine the right transformers at the right time

• **Enables more effective inspections**
  - Always-on monitoring by TEDT provides additional valuable information which is not available through traditional inspections that are dependent on the skills of the inspection team

Maximize transformer utilization

The TXpert™ Enabled Distribution Transformer (TEDT) reliably delivers insightful 'spent-life' analysis to make an informed business decision whether to extend the life of or early retire a transformer.

- **Maximize transformer utilization**
  - Superior 'end of life' assessment by TEDT avoids replacing a well-performing transformer before its useful life has been reached. Thus, extending its utilization and improving returns

- **Intelligent transformer replacement**
  - Without data, the process of deciding specifications and ratings of the replacement transformer is based on past, possibly inaccurate, experience. TEDT provides actual, data driven insights of the transformer's past load, temperature and THD to better determine what ratings would be best for the new replacement transformer

Long-term solution for complete peace of mind

- **Future proof**
  - The data for a TXpert™ Enabled Distribution Transformer (TEDT) can be easily exported and integrated with existing analytic systems or future analytic products to broaden its insight and improve the accuracy of future decisions to better evaluate risk-of-failure vs cost of operation trade-offs

- **Flexible and durable**
  - As an open system, TXpert™ Ecosystem is compatible with a wide range of distribution transformers from Hitachi ABB Power Grids as well as other manufacturers. It is compatible with liquid-filled and dry-type transformers. A TXpert™ Enabled Distribution Transformer (TEDT) is built to withstand extreme climate conditions and is certified by third parties. It can therefore be installed indoors as well as outdoors. The on-board TXpert™ Ready sensors from Hitachi ABB Power Grids have a 20-year lifespan and do not affect the transformer operation should they fail

- **Safe and secure**
  - The on-board data stored on the TEDT is secured with multi-layer cyber-security and accessed by authorized personnel only

The TXpert™ Enabled Distribution Transformer is therefore an intelligent digital transformer technology that reduces unplanned outages, optimizes operations and increases transformer utilization to maximize returns on transformer investments.

Technical Specifications

Key details

- UL and CSA compliant
- IEC and IEEE Transformer Consumed Life Calculations
- Power 24 VDC attached to low voltage secondary (delta and Y)
- Alarm relay (dry transformers only)
- Trip relay (dry transformers only)
- Interface support:
  - Ethernet:
    - Port: 10/100 Mbps RJ45
    - IP address: Static/D HCP support
    - Encryption type: AES
  - Wi-Fi: IEEE 802.11a/b/g/n

Sensor details

- Data record stored every 10 seconds
- THD readings recording:
  - Current and Voltage THD
  - Current and Voltage root mean squared values
- Oil level indicator:
  - Measurement range:
    - Oil pressure: 0 to 87 PSI
    - Humidity: 0 to 100% (liquid-filled transformers only)

Response times

- Hydrogen: <60 minutes (50% of step range)
- Moisture: 1.3 s
- Oil temperature dynamic response: 1/3 s
- Oil level: 0.5 Seconds
- Pressure: 1 mS

Data captured

- Manual data download: Excel format
- Automated data push: MQTT (data points and transmission frequency is configurable)

Telemetry includes

Telemetry	Transformer type
Ambient temperature	Both
Loads	Both
Power	Both
Oil pressure	Liquid-filled
Oil humidity	Liquid-filled
Oil hydrogen concentration	Liquid-filled
Consumed life	Liquid-filled
Top oil temperature	Liquid-filled
Hotspot temperature	Liquid-filled
Coil temperature	Dry-type
Coil life hotspot temperature	Dry-type
Consumed coil life	Dry-type
Fan current	Dry-type

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Hitachi ABB Power Grids Limited

For more details, contact our local representative
or contact us on
www.hitachiabb-powergrids.com/contact-us