

AI and IoT Based Touchless™ Transformer Monitoring



Improve Availability, Reliability and Asset Life Expectancy. Minimize Risk and Repair Costs.



ONLINE CONDITION MONITORING SOLUTIONS FOR CRITICAL ASSETS

Monthly inspections and risk assessments may not be sufficient or cost-effective when an asset is critical. Enertics online condition monitoring devices strengthens asset lifecycle. They allow for continuous condition assessments, pre-emptive fault detection, and alert mechanisms for critical assets, reducing unplanned downtime and avoiding substantial maintenance costs and collateral damage.

PREDICTIVE MAINTENANCE FOR CRITICAL ASSETS

The innovative Enertics solution performs an automatic evaluation of multi-variate sensor data to detect anomalies before they turn into significant issues. These solutions use advanced ML and AI algorithms to predict asset health. With advanced sensors, not only it is possible to forecast individual sensor data, but it is also possible to predict specific machine fault conditions. The advanced devices feature an intuitive web dashboard and mobile phone interface to provide actual and predicted trends and asset behaviors

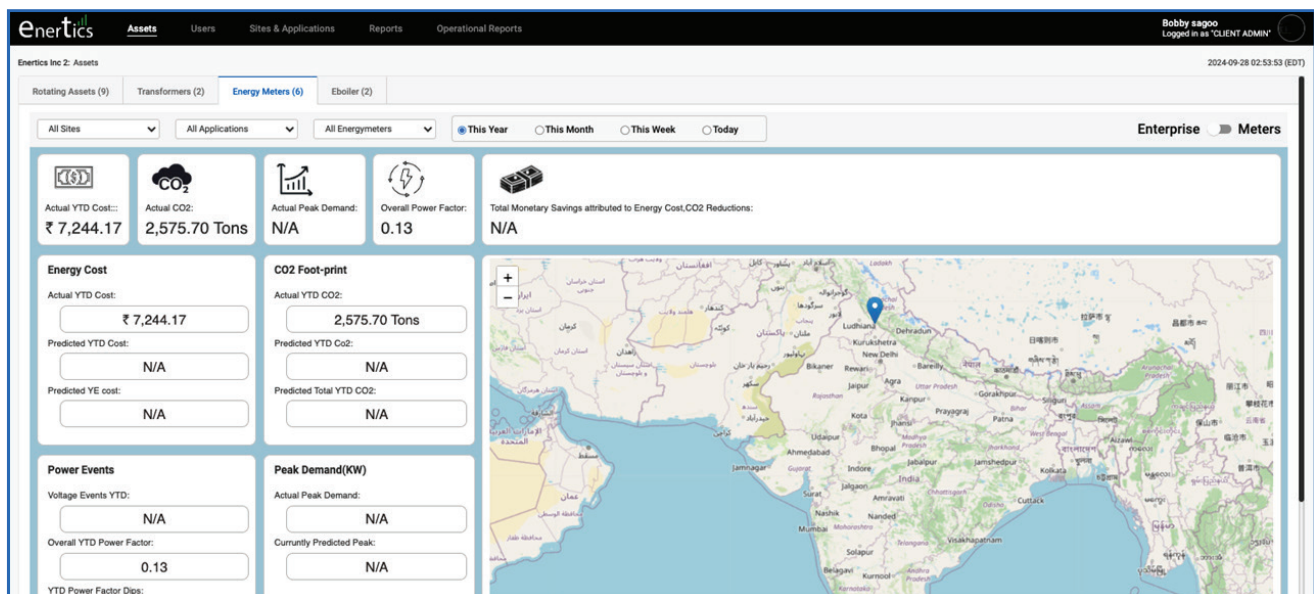
KEY FEATURES

- 3-phase LT-side voltage, Voltage Unbalance
- 3-phase load current, Current Unbalance
- Active (KW), Reactive (KVAR) and Apparent power (KVA)
- Power Factor, Frequency, Harmonics (THD)
- Physical parameters - Transformer oil level, oil and winding temperature
- GPS positioning on a digital map
- Optional – LT Feeder Panel Busbar Lugs Temperature
- Secure GSM Communication, IP 66 Design
- OPTION to integrate Protection features

ANALYTICS & REAL-TIME ALERTS

- Transformer anomaly Alerts - Transformer oil level, oil and winding temperature
- Power off Alerts
- Voltage / Load Unbalance, Power Quality Alerts
- Real time Loading (KW) and KWh Usage Alerts
- Online Dashboard Portal for Remote Access
- Real time data, Trend Analysis
- Android & iOS App, Reporting

ENTERPRISE LEVEL VIEW – AGGREGATE DASHBOARD





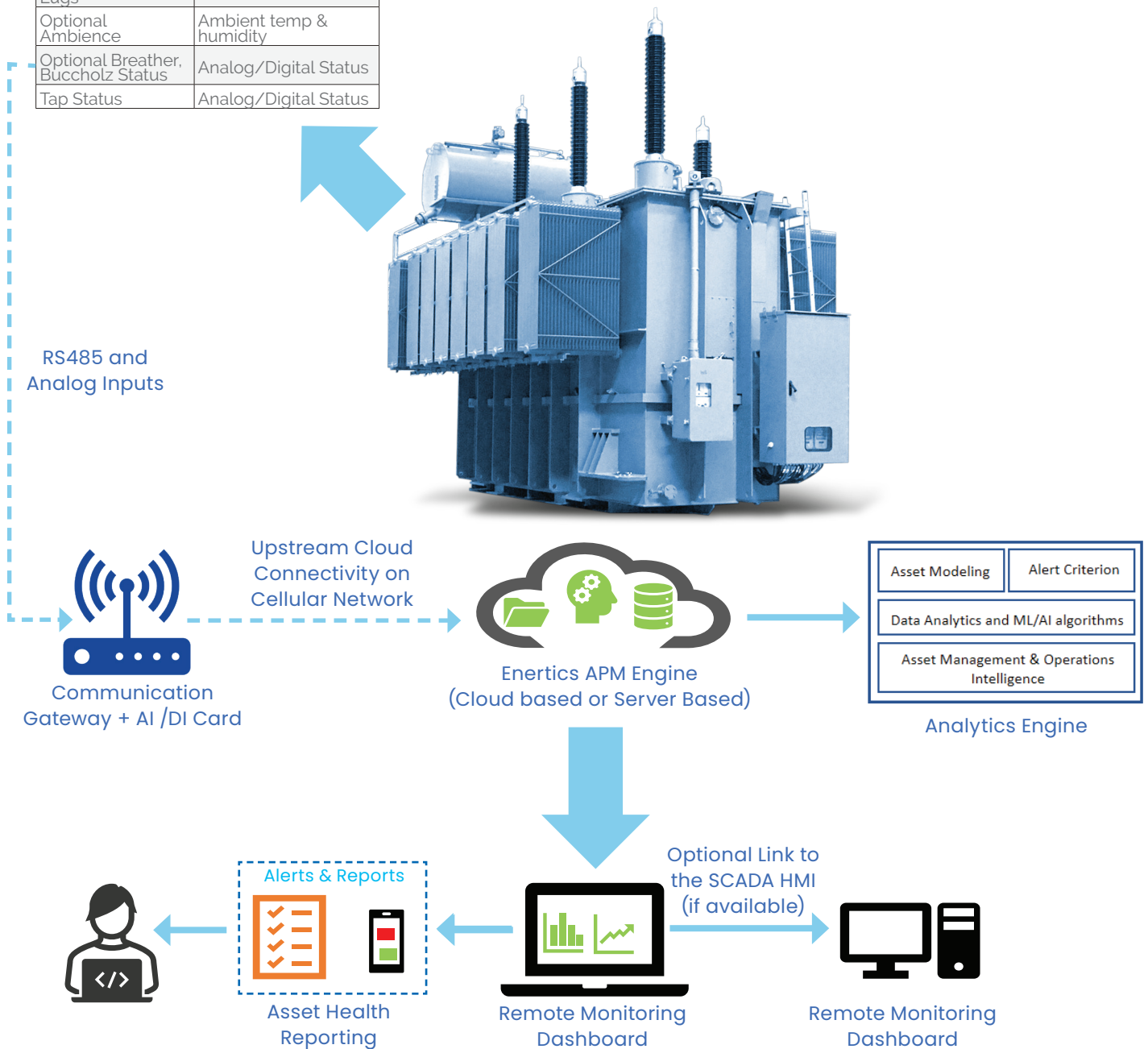
Smart Transformer – Solution Architecture

MONITORED PARAMETERS

Conservator - Transformer Oil	Oil Temp, Level
Windings	Winding Temp.
LT side	V, I, PF, KW, KVA, kWh
Optional Busbar Lugs	Lug Temp.
Optional Ambience	Ambient temp & humidity
Optional Breather, Buchholz Status	Analog/Digital Status
Tap Status	Analog/Digital Status

KEY FUNCTIONALITY

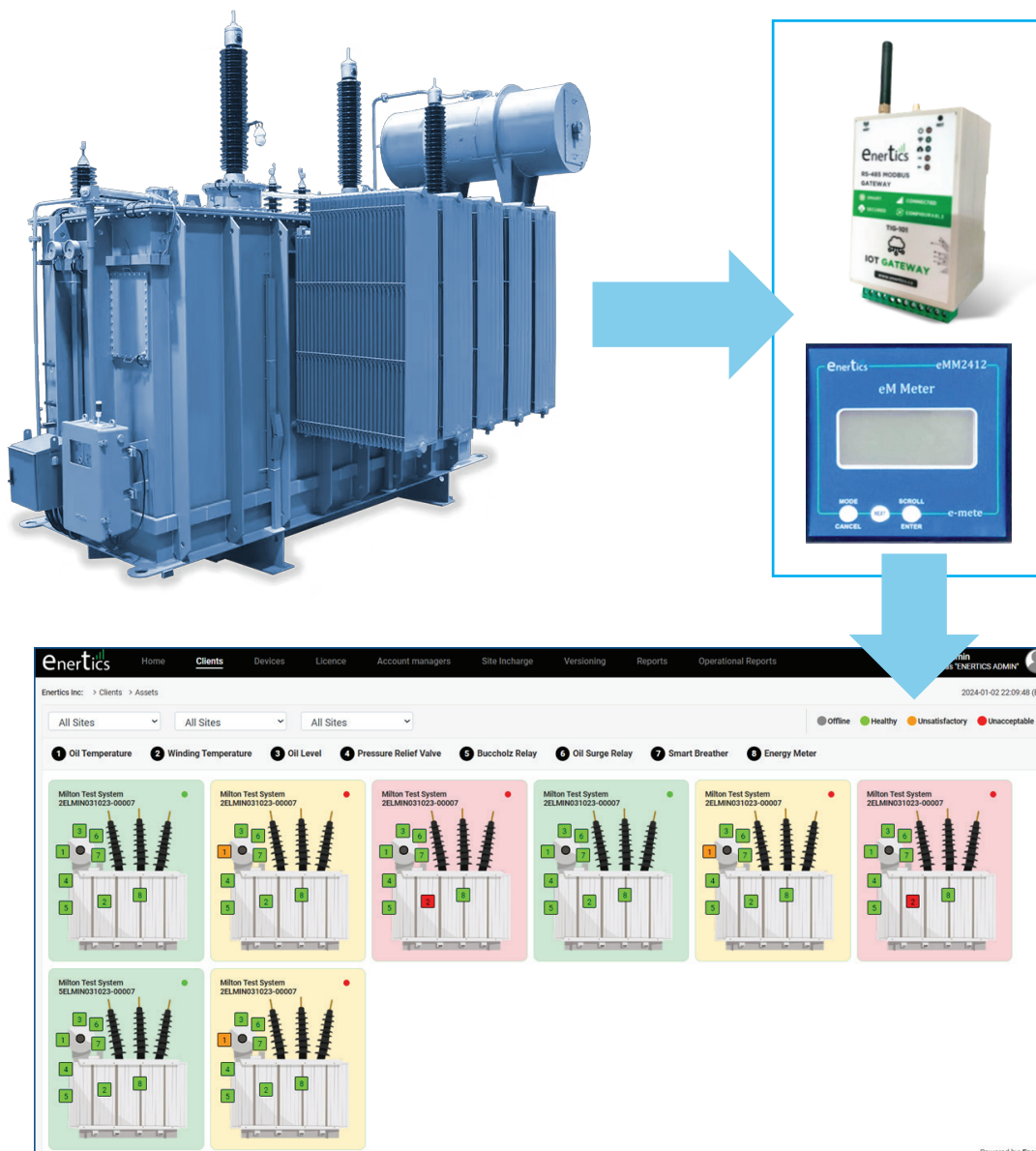
- Transformer health analytics from measured parameters
- Energy Analytics to analyze voltage issues, predict demand, and power quality issues





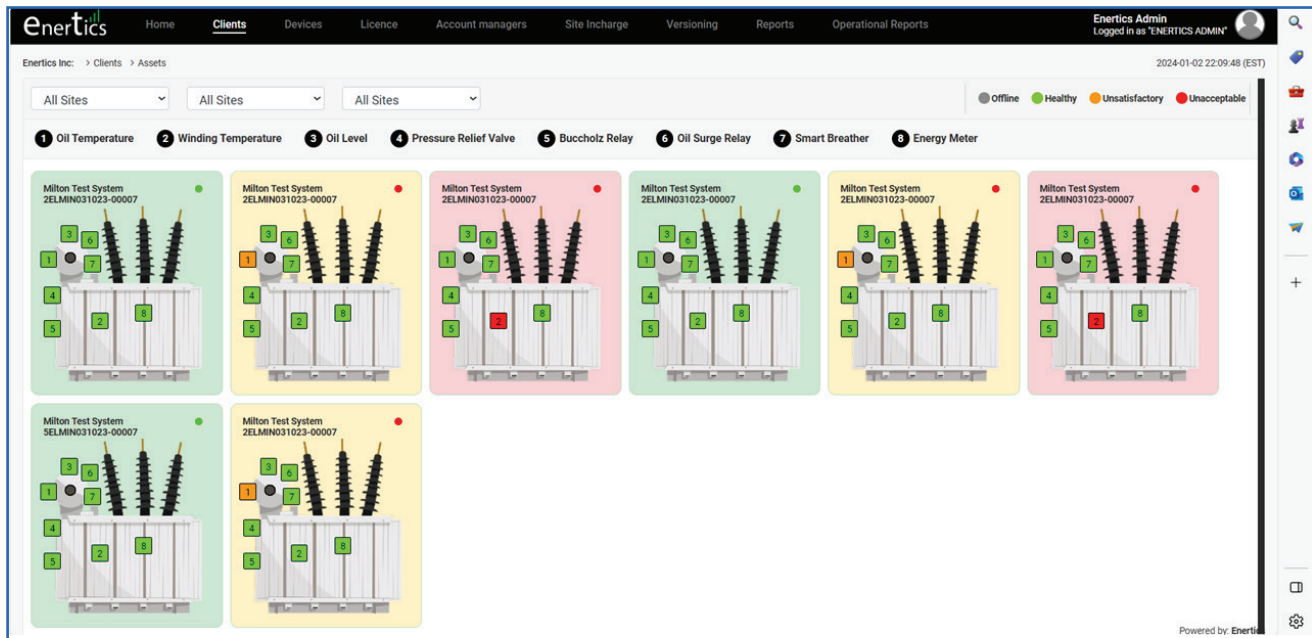
Principle of Operation

- Implementation of Correlation Algorithm on Physical and Electrical Parameters of the Transformer to help identify early-stage issues. Typical issues related to Oil Seepage, T/F Loading, Voltage Unbalance, Loose Connections, Electrical health and Power Quality are identified by respective algorithms
- Threshold values for Physical and Electrical parameters are pre-defined based on relevant standards and/or the OEM defined "Potential Health Concern" criteria
- An alert (email or SMS) is issued as soon as an Anomaly is detected.
- CbM Software records an automated Transformer Health report indicating real time status at the time of event, Diagnostics Analysis and Trends are also recorded.

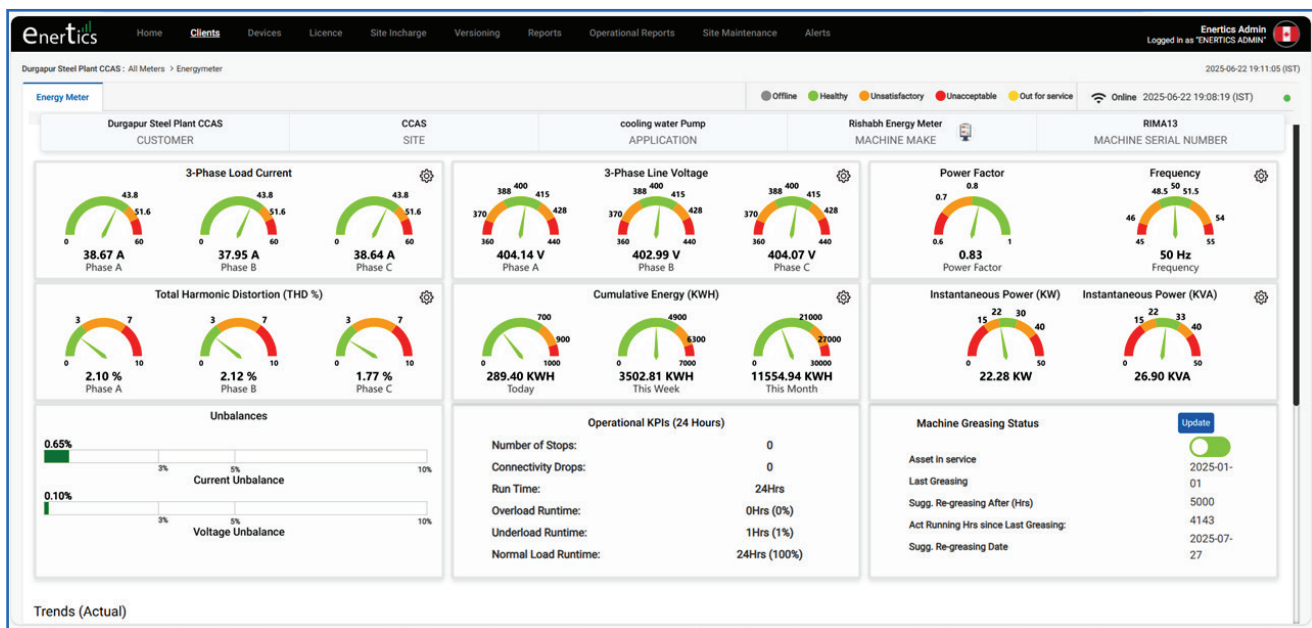




MULTIPLE TRANSFORMERS – SITE LEVEL VIEW

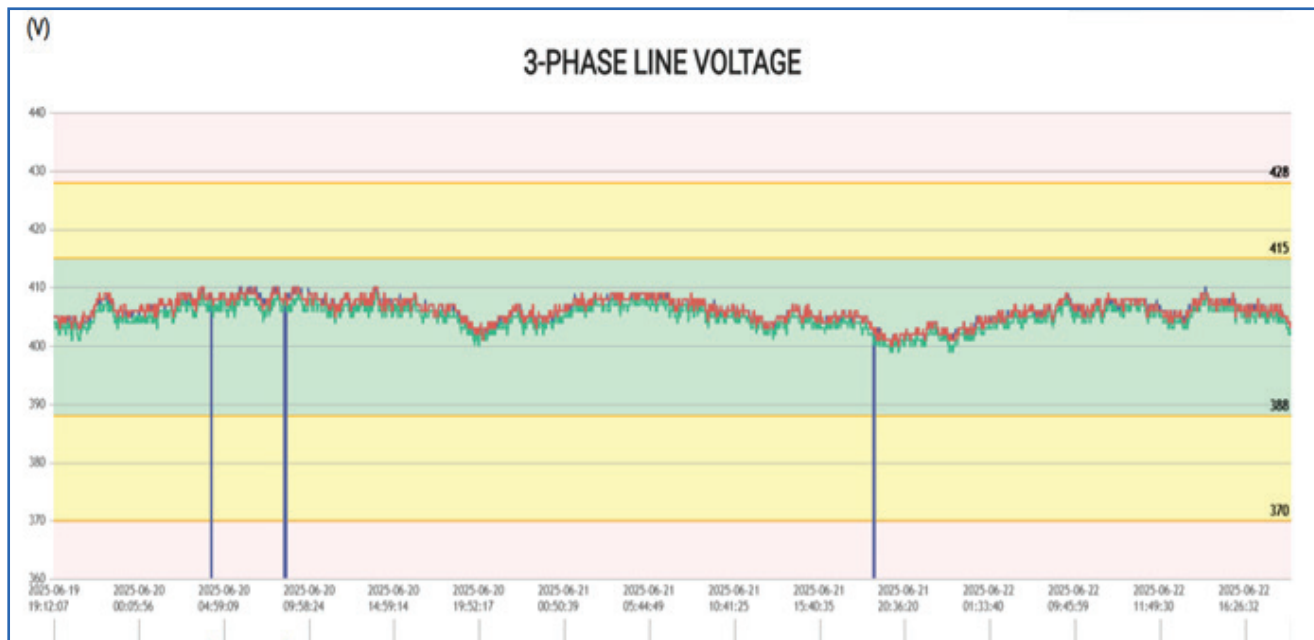


LT SIDE METERING – ELECTRICAL PARAMETERS AND ANALYTICS





REALTIME DATA TRENDS . . . (ELECTRICAL AND PHYSICAL PARAMETERS)



TRANSFORMER HEALTH ALERTS

Transformer Health Alert

Hello NITESH GUPTA!

We have detected an Anomaly with the 345kVA Transformer on the Durgapur Township Feeder 1:

Motor serial no:	ELMIN093021-00248
Application name:	Feeder 1 Transformer
Status:	Unacceptable condition
Event time:	Saturday, February 18, 2023 4:22 AM
Machine status:	Oil Level Anomaly Information: Low oil level detected at 4:22AM on Saturday, February 2023
Action required:	Review status

Thanks
Enerctics team

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