QUALITROL
Defining Reliability

QualConnex

REMOTE TRANSFORMER MONITORING PLATFORM

Connecting transformers across your fleet to real-time condition monitoring and data analytics

Statistics

Average industrial losses by transformer failure*

$3.1M

Including property damage and business interruption

*Source - The Hartford Steam Boiler Inspection & Insurance Co.

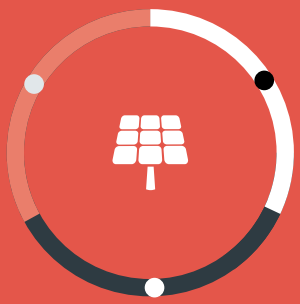
Wind Farm Failure Causes*

60% Pad Mount Transformers

40% Substation & Collection Systems

*With regards to electrical components.
Source AWEA - American Wind Energy Association.

Energy Losses by Failure Causes in Solar Farms*



33% Electrical Grid

32% Inverters & Solar Field

32% Transformers

*Source MDPI, Basel, Switzerland.

An Industry First

An industry leading technology-as-a-service platform that provides you both the wireless sensor network and analytic platform required to monitor the condition of transformers across your fleet so you can be alerted to failure and personnel safety risks requiring your attention.

QualConnex

Qualitrol QualConnex is a remote monitoring platform that collects and analyzes asset condition data of your distributed assets.

Operations and maintenance teams can now receive alerts on asset failure and safety risks before they occur.

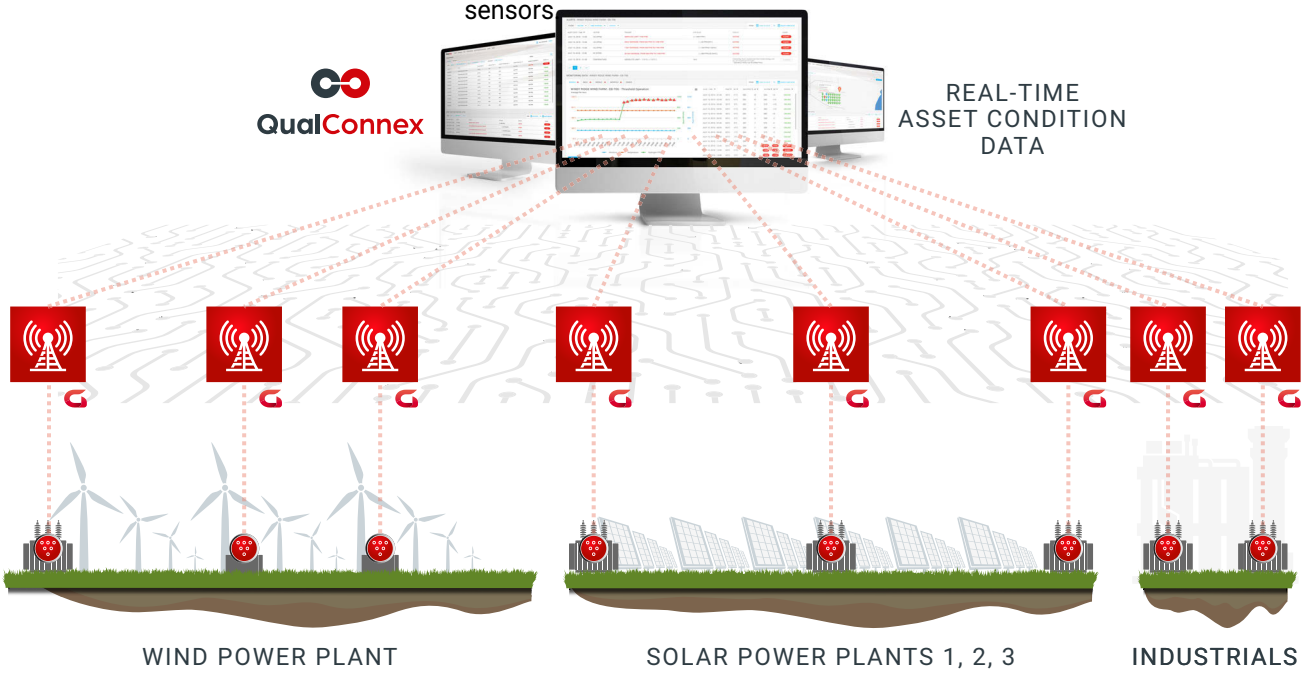
QGateway

The QGateway is a wireless and self powered gateway that transmits asset condition data from site to centralized storage databases securely with end to end encryption.

Depending on distance for trans-mission only one Gateway per site required to transmit from multiple sensors.

DGA LT1

The DGA LT1 is the newest Qualitrol dissolved gas analyzer designed as a wireless sensor to measure dissolved hydrogen in transformer oil as well as transformer oil temperature and moisture concentration. It collects data without the need for additional power or communications infrastructure.



QualConnex

QualConnex provides a cost effective and scalable remote condition monitoring platform for distributed assets.

Operations and maintenance teams can now have real time asset condition data and automated alerts so more time can be spent on maintaining assets ahead of failures.

Data Management Compliance

Best practices ensure data privacy, security, confidentiality, processing integrity align with your compliance requirements. Includes end-to-end encryption, two factor authentication, firewalls and process monitoring.

Data Visualization Dashboards

Interactive data visualizations that clearly and efficiently display condition data. Dashboards including asset ranking, active alerts and condition trending provide information needed to plan maintenance and operations activities.

Failure & Safety Risk Notifications

Automated algorithms analyze data to provide configurable alert notifications on failure symptoms to avoid asset downtime and personnel safety risks.

Automated Reporting

QualConnex can generate automated reports on your fleet asset condition. These can be generated for use with operation and management maintenance systems or for reporting to insurance underwriters.

QGateway

The Qualitrol QGateway is the centralized gateway for a set of wireless condition monitoring sensors.

Each node in the wireless networks communicates through encrypted radio signals to the QGateway where data is bridged into encrypted TCP/IP protocol for storage in the secure and encrypted QualConnex database.

Reliable Data Transfer

The QGateway sends small encrypted data packets using bandpass filters to avoid interference with adjacent frequency bands. The QGateway can be deployed in global ISM bands including 433 / 868 / 915 MHz.

Scalable Deployment

Each QGateway is capable of transmitting condition data from up to 500 sensors within the reception area and requires no additional setup when compatible wireless sensors are added to the network.

Rapidly Deployed

QGateway can be mounted in minutes almost anywhere and is battery powered including fully integrated power harvesting to avoid the need for power and communications cables.

Self Powered

QGateway is battery powerd with solar power harvesting and can be magnetically affixed to trans-formers, nearby poles or structures to simplify site installation.

DGA LT1

Hydrogen in transformer oil, above all other gases, is a key indicator of transformer failure risks, safety concerns and unplanned expenditures.

Distribution grid infrastructure and operating methods are evolving to accommodate load growth, lower system losses and improve reliability, while adding renewable energy sources.

This has increased stresses on distribution grid transformers through voltage fluctuations, load fluctuations, frequent switching and harmonics.

These conditions can expedite the degradation of the dielectric oil and insulating paper in transformers, which can cause the generation of quantities of combustible gases.

It is important to monitor the condition of transformers by means of dissolved gas analysis and to adjust operational practices and plan maintenance in a means that extends asset life, reduces downtime, avoids safety risks and minimizes overall asset life cycle costs.

Dissolved gas analyzers to date have been infeasible for smaller electrical assets such as transformers due the high capital cost of the sensors combined with cost of installing these sensors on transformers without power sources or nearby communication networks.

Qualitrol's DGA LT1 is a wireless, self-powered dissolved gas analyzer that monitors hydrogen, moisture and temperature in the dielectric insulating oil. Installation takes minutes because there is no need to install power or communications cables.

Secure & Scalable Deployment

Each DGA LT1 is equipped with a radio frequency transceiver that transmits encrypted transformer condition data through a wireless network to the QGateway. No power cables or communications cables required.

Rapid & Unobtrusive Installation

The DGA LT1 is unobtrusively installed to the existing drain valve of the transformer and is equipped with a bleed valve / sample port to prevent air intrusion into the transformer and allow for undisrupted manual oil sampling.

Technical Overview

DGA LT1 - DISSOLVED GAS ANALYZER	
Hydrogen measurement	250 ppm - 10,000 ppm. Repeatability ± 5%. Accuracy ± 20%
Moisture measurement	±1.7 % RH accuracy. ±1.0 % RH hysteresis
Temperature measurement	-40°C to +125°C oil temperature range. ±0.3°C accuracy.
Oil sampling	Continuous monitor with adjustable sampling frequency (6,12 24hr). All samples are time and date stamped
Communication mechanisms	Encrypted RF signal containing transformer identity, time stamp, temperature, humidity and hydrogen levels. Converted at gateway to encrypted TCP/IP and stored in encrypted SQL database

QUALCONNEX - ASSOCIATED FEATURES	
Trend displays	Hydrogen, moisture and temperature concentration trends
Tabulated display	Last measurement for hydrogen concentration, temperature, moisture. 7 / 30 / 90 / 365 day rate of change for hydrogen and moisture alarms
Alarm acknowledged / adjusted:	Alert - no data for defined period Alert - High hydrogen / moisture / temperature Alert - High hydrogen rate of increase Alert - High moisture rate of increase Alert - High temperature rate of increase

ENVIRONMENTAL	
Operating ambient air temperature	-40°C to +65°C
Oil exposure temperature	-40°C to +120°C
Solar loading	Unaffected operation with direct exposure to maximum solar loading under all other valid environmental conditions
Operating humidity	5% to 95%, non-condensing
Applicable transformer oils	Mineral oil, ester oil, natural ester oil, sylicone and synthetic ester oil
Oil pressure	Suitable to 25 psi max oil pressure in transformer
IEC Shock, bump and seismic	Meets IEC 60255-21-1

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