Transformer DGA Monitoring

Immersed tank sensor

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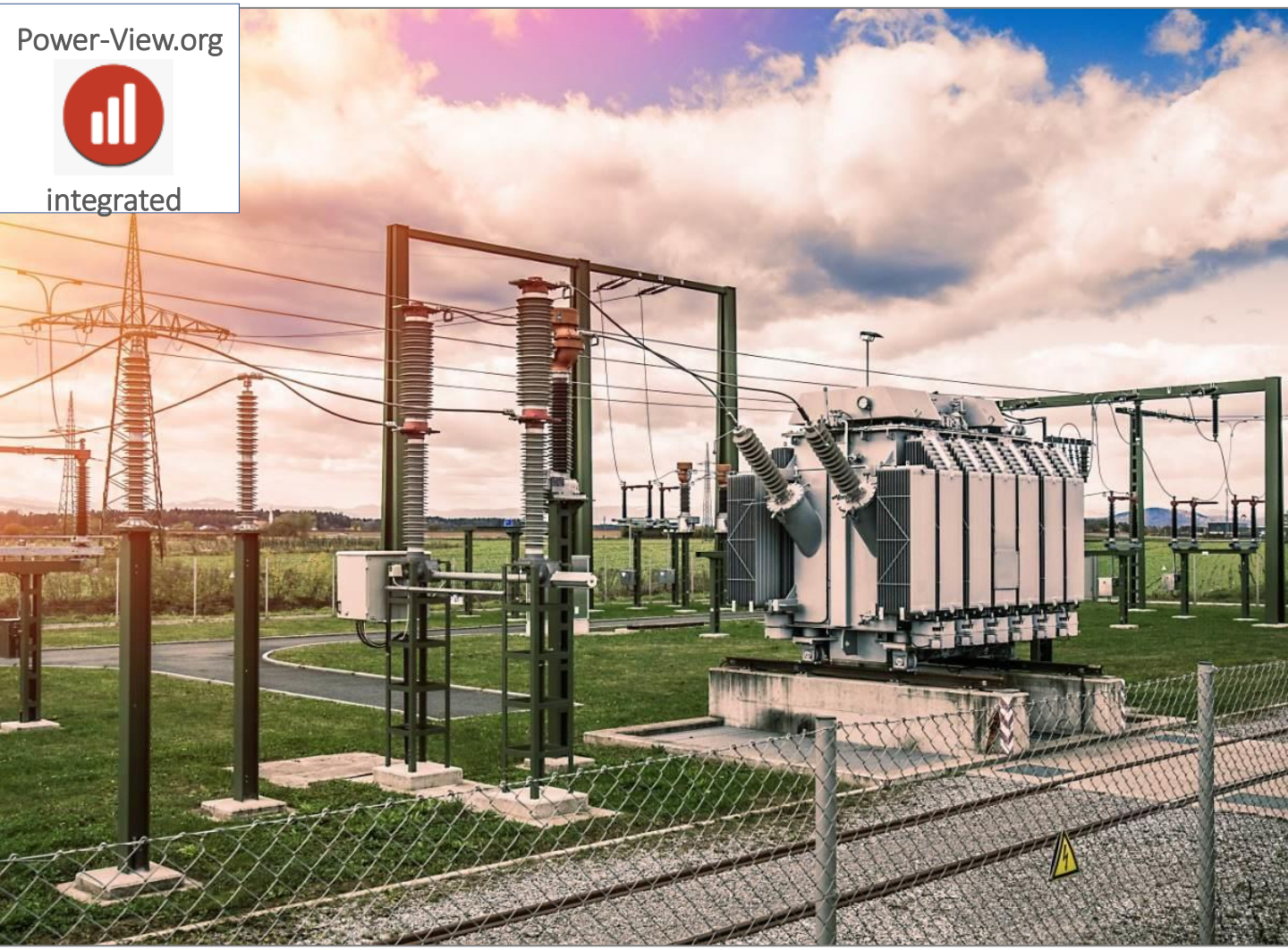
integrated



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PowerView
Testing & Monitoring Equipment

Pioneering the future of power testing and monitoring

Immersed Tank Hydrogen DGA Sensor

World's fastest response time to fault

Immersed Tank DGA Sensor gives world's fastest fault reaction on key fault gas H2

Proven Hydrogen monitoring sensor and technology

ABB , SIEMENS, use the identical sensors and measurement technology.

Description

The Immersed Tank Sensor is a DGA monitoring unit. It is capable of monitoring hydrogen, temperature , moisture and oil degradation directly from the transformer tank by permanently mounting on a flange . It has no moving parts (like pumps membranes gears etc. and uses solid state nickel palladium sensor for H2 measurement . No spare parts maintenance or recalibration are required in the min 15-year lifetime.

Different sensors and technologies

Various types of sensors have been used for Hydrogen monitoring.
Some had very limited lifetime (about 5 years due to gel saturation, some had very large cross sensitivity to other gases and drifting results.
Our solid-state Nickel palladium sensor is most widely used today for hydrogen monitoring as it has no requirements for recalibration, no maintenance and spare parts and minimum lifetime of 15 years

The importance of probe type and installation

There are absolutely no limitations and no moving parts (such as membranes and pumps) needed for Immersed Tank Sensor installation. It can be installed on a flange on any transformer valve, and it measures the dissolved hydrogen directly in the transformer tank.

This is the key advantage as the sensor technology requires moderate oil movement for better measurement and fast response . That is why the Power View ITS Monitor has the fastest response to fault development.

No spare parts consumables or recalibration

Absolutely no consumables or spare parts are needed for Immersed tank sensor and diagnostic (all fault gas) DGA.

Fully configurable and field upgradable

This online monitoring system is fully configurable onsite upgradable. Users can start as hydrogen + temperature monitoring as a fault indication unit only

Not all transformers fail. No need for expensive all fault gas DGA on all transformers . Start with key parameters and upgrade only if necessary .

This onsite upgrade is extremely valuable and money saver as Customers can start from fault indication unit and if fault is detected upgrade just the faulty transformer monitoring with fully fault diagnostic (according Cigre TB783 recommendation)

This monitoring system has no consumable, moving parts, spare parts, parts with a limited-service life (less than 15 years), no need for recalibration.

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Immersed Tank DGA Sensor

Oil Humidity Sensor

•Continual condition monitoring of transformer oils
• relative moisture and temperature
•High pressure rating
•Quick installation via process connection

Application: mineral oils; synthetic esters; biodegradable oils
Tank pressure [bar] 50
Oil Medium temperature [°C] -40...105
Operating voltage [V] 9...33 DC
Current consumption [mA] < 25
Measuring range 0-100% relative saturation

DGA background

Dissolved gas analysis for transformer has been used for decades as a reliable tool for indication and prevention serious damage caused by transformer faults. According to international standards for maintenance of transformers- this analysis is mandatory.
Dissolved gas analysis (DGA) monitoring is the most powerful tool for transformer early phase fault detection and trending. Proven diagnostic tools (such as Douval triangle and Roger's ration) help determine nature of the fault by analyzing different gas presence.

Gasses formation

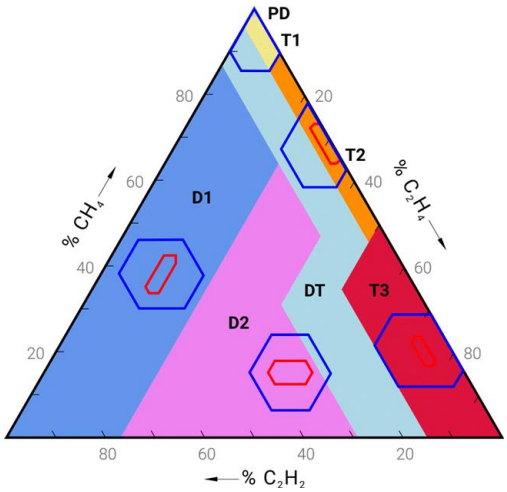
Gases in oil are created by breaking the molecular bonds of oil molecules caused by electrical stress, partial discharges, hot spots, oxidation, decomposition of insulation, etc.). Molecules of insulating oil in high voltage equipment break down under the influence of the thermal and electrical stresses to produce hydro-carbon gases, hydrogen and carbon oxides. According all diagnostic tools and standards there are 7 known fault gasses Hydrogen, Carbon monoxide, Carbon dioxide, Methane, Acetylene ,Ethane Ethylene + nitrogen and oxygen (which are formed due to pour sealing)

Water formation and importance

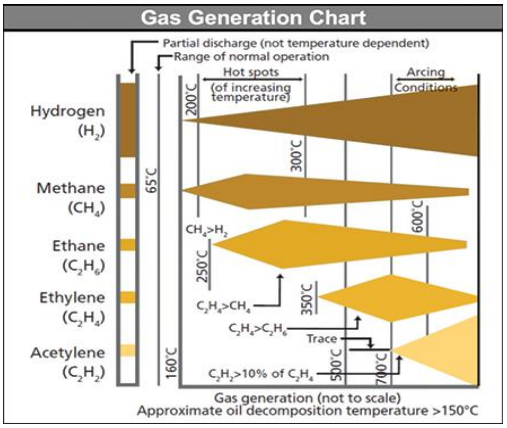
Water can be present in transformers due to pour dehydration in production, inappropriate handling, por sealing (water ingress) , chemical water (which comes as a by product from various chemical reactions of materials.

Oil degradation

Transformer Oils are prone to degradation from electrical stress and various chemical reactions between coper , oxygen , water and particles released from insulation decomposition and different molecular re-bonding .
Transformer oil quality is generally assessed by oil laboratory testing .Breakdown voltage which is critically connected to water content tan delta, particles and acidity gives most valuable information in this regard to oil contamination and degradation .
Oil degradation is a catalytic process which speeds up snowball effect which leads to sludge formation



Duval triangle



Gases formation at different temperature

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Immersed Tank DGA Sensor

World's first DGA + Oil quality

Be fully protected by both transformer faults and oil degradation. The first Monitoring systems which covers oil quality and degradation. (also available as field upgradable option

Worlds first Field upgradable from single gas to full DGA

Not all transformers fail. No need for expensive all fault gas DGA on all transformers . Start with key parameters and upgrade only if necessary .

Advanced reporting and communication

Most advanced reporting and communication protocols

Technical specification

Measurement range (in oil)	**0 ... 5000 ppm_v**
Accuracy (in oil temperature range -20 ... +60 °C (-4 ... +140 °F))	±10 % of reading or ±25 ppm_v (whichever is greater)
Repeatability	±10 % of reading or ±15 ppm_v (whichever is greater)
Minimum detection limit	25 ppm_v
Typical long-term stability	3 % of reading / year
Cross sensitivity to other gases	< 2 % (CO_2, C_2H_2, C_2H_4, CO)
Response time	63 % of full response: 2.5 h (when sensor is not in reference cycle) 90 % of full response: 17 h
Warm-up time	2 h, 12 h for full specification
Sensor	Catalytic palladium-nickel alloy film solid-state sensor

Oil type	**Mineral oil / Natural ester oil /Synthetic, ester oil**
Operating temperature (electronics)	-40 ... +60 °C (-40 ... +140 °F)
Storage temperature	-40 ... +60 °C (-40 ... +140 °F)
Operating humidity	0 ... 100 %RH, condensing
Pressure tolerance (probe, short-term)	Max. 10 bara
Pressure tolerance (probe, continuous)	Max. 4 bara
Temperature tolerance, sensor head	-40 ... +120 °C (-40 ... +248 °F)
Integrated protection for short power outages	> 3 s
EMC standard EN61326-1, Industrial environment; CISPR22 class B emission limits when DC powered	Fulfills the requirements of IEC 61000-6-5 in the following tests: IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, IEC 61000-4-12, IEC 61000-4-16, IEC 61000-4-17.

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