THORNE & DERRICK INTERNATIONAL
Thorne & Derrick
+44 (0) 191 410 4292
www.powerandcables.com

GE
Grid Solutions

TRANSFIX DGA 500

Transformer Health Monitoring & Diagnostics

Product Overview

The TRANSFIX™ DGA 500 is an on-line monitoring unit that measures individual dissolved gas and moisture and provides both on-line monitoring and key exploratory diagnostics. It uses the now well known PAS technology (Photo Acoustic Spectroscopy) made popular due to its accuracy, repeatability and lack of consumable through its bigger brother the Kelman™ DGA 900.

When a transformer's insulation system is overstressed, gases are produced that dissolve in the transformer's insulating oil. Dissolved Gas-in-oil Analysis (DGA) and moisture measurements are recognized as the most important tests for condition assessment of transformers and the best early indicators of developing faults.

All types of incipient faults are covered by the monitoring of hydrogen gas levels. Slowly eroding paper faults can be exposed through the monitoring of carbon monoxide. Various degrees of thermal faults, including arcing, can be detected and identified, often leading to a transformer repair rather then a much more costly transformer rebuild.

In particular, the TRANSFIX DGA 500 enables the well known Duval's triangle DGA diagnostic described in Appendix B of IEC Standard 60599. It uses the value of 3 gases (Acetylene, Ethylene and Methane) and is suitable for identifying various degrees/temperature of thermal faults as well as the presence of high-energy electrical discharge faults.

Key Benefits

- Ability to perform Duval's triangle DGA diagnostic
- Easily replaceable with a full nine gas unit
- Communicates data to allow remote diagnostic
- No carrier or calibration consumable gases required
- Available with AC or AC/DC power supply

Applications

Power Utilities
- Middle of the road solution for medium-criticality transformers
- Monitoring together with remote exploratory diagnostic

Industrial Plants
- Reduces the risk of process interruption due to power failure
- Minimizes costly production downtime

Cutting Edge Technology

- Five gases plus moisture in a single monitor
- Automated headspace gas extraction and state of the art photo-acoustic spectroscopy (PAS) measurement technology
- No carrier or consumable calibration gases required
- Capable of sampling frequency up to once per hour or user defined sample rates

Ease Of Use

- Easy installation: no outages required, reducing expense and inconvenience for user
- Easily swapable for a high end Kelman DGA 900 nine gas monitor, once serious issues are detected
- Over two year's worth of data stored internally at six-hourly sampling rate

Configurable Alerts

- Six user configurable alarm relay contacts
- Alarms can be set on gas or moisture ppm levels or on rate of change (ROC)
- Alarms can be set or changed locally or remotely using Perception™ software
- Caution and alarm modes can be used to automatically increase sampling frequency

Integrated Solution

- Integrated load CT allows DGA results to be analysed against the loading of the transformer
- Extensive remote communications options
- Integrates into GE's Perception software

Imagination at work

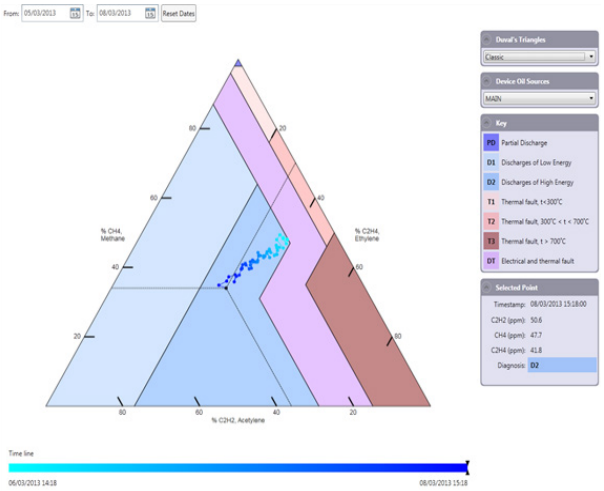
Duval's Triangle & Perception Software

The Duval Triangle diagnostic method for transformer DGA results was developed by Michel Duval, and is described in IEC standard 60599.

Concentrations (ppm) of methane (CH_4), ethylene (C_2H_4), and acetylene (C_2H_2) are expressed as percentages of the total ($CH_4 + C_2H_4 + C_2H_2$) and plotted as a point ($\%CH_4$, $\%C_2H_4$, $\%C_2H_2$) in a triangular coordinate system on a triangular chart which has been subdivided into fault zones. The fault zone in which the point is located designates the most likely fault type which produced that combination of gas concentrations.

The Duval Triangle method, like any other DGA diagnostic method, should be applied only when there is some suspicion of a fault, based on an abnormal increase in dissolved gases and H_2 in particular. It is part of the list of diagnostic methods available in GE's Perception software, depending on the various gas concentration data that are available.

The Transfix DGA 500 integrates seamlessly with Perception to provide not only dashboard and risk information for the transformer monitored but also to compare that transformer's health with that of other similar assets and showcase its priority as part of the fleet management tool.



Technical Specifications

MEASUREMENTS

Sensor

Automated headspace gas extraction

Photo-acoustic spectroscopy (PAS) gas measurement

Thin film capacitive moisture sensor

Measurements

Hydrogen (H_2): 5-5,000 ppm

Carbon Monoxide (CO): 2-50,000 ppm

Acetylene (C_2H_2): 0.5-50,000 ppm

Ethylene (C_2H_4): 2-50,000 ppm

Methane (CH_4): 2-50,000 ppm

Moisture (H_2O): 0-100% RS (given in ppm)

Accuracy

Gases*: ±5 % or ±LDL (Lower Detection Limit), whichever is greater

Moisture: ±3 % RH

Frequency

Configurable from once per hour to once every 4 weeks

Faster sampling automatically triggered upon alert level reached

FEATURES

Display

3x sunlight visible LED arrays

Internal backlit LCD, 4 lines x 20 characters

Digital Output

USB port (type B connector) for local connection to laptop computer for configuring the system

Ethernet (RJ45) is standard

Serial output (RS-485) and fibre-optic LAN options

PSTN Analogue or GSM/GPRS or CDMA/LTE modem options

Digital Protocols

Modbus® is standard

DNP3 or IEC 61850 options

Analogue Outputs

8 channel configurable analogue output, 4-20mA, available as an option

Alarms

6 alarm setting screens/scenarios available which can set alarms based on gas level, gas rate of change and moisture level

6 dry contact relays (type C, SPDT), NO/NC, 3A @250Vac, 3A @ 30Vdc, 200mA @ 125Vdc, 150mA@ 300Vdc

Separate Service Alarm

OTHER OPTIONS

Mounting stand

Cradle mount (for mounting on transformer)

Sun canopy

Optional external sampling port for glass syringe with Luer stop cock

ENVIRONMENT

Conditions

Operating ambient temperature**	-40°C to +55°C (-40°F to +131°F): AC version -25°C to +55°C (-13°F to +131°F): AC/DC version
Operating ambient humidity	0-95% RH, non-condensing
Oil temperature at valve***	-20°C to +120°C (-4°F to +248°F)

Enclosure

IP55 certified

304 Stainless Steel, Powder Coated (RAL9002)

Power Requirements AC Version

Nom: 115–230 Vac Range: 103–126/207-253 Vac, 47–63 Hz, 8A max

Power Requirements AC/DC Version**

Nom: 100-230 Vac, Range: 90-253 Vac, 45-65Hz, 5A max

Nom: 100-220 Vdc, Range: 90-242 Vdc, 45-65Hz, 5A max

Mechanical

760mm (30") x 560mm (22") x 352mm (14")

760mm (30") x 560mm (22") x 352mm (14")

Shipping weight 78Kg (172lb)

* Gas accuracy quoted is accuracy of the sensor during calibration

** Operating temperature range reduced at -25oC to +55oC when using AC/DC version - PSU is type tested to -40 for startup

*** Based on testing carried out using VOLTESSO™ 35 mineral oil, over a ¼" pipe run of 10 metres or less from oil supply or return valve to monitor connection point and on transformer oil supply valve volumes of 200ml or less. For oil temperatures colder than -20°C GE recommend the use of heat trace cabling on piping

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Imagination at work