GE
Grid Solutions

Kelman TAPTRANS

On-line DGA & moisture for transformer with on-load tap changer

Dissolved Gas Analysis (DGA) of the insulating oil is recognized as the most important tests for the condition assessment of transformers. Multi-gas DGA has traditionally been confined to infrequent off-line manual sampling. As the average age of transformers globally continues to rise, the possibility of rapid ageing, unplanned outages and even catastrophic failure between off-line tests also increases, leading many asset owners to adopt on-line DGA monitoring of equipment to increase network reliability.

The Kelman™ TAPTRANS is designed for transformers with an On-Load Tap Changer (OLTC), which is recognised as one of the most vulnerable parts of the transformer and which accounts for a large portion of unplanned outages. It offers discrete multigas on-line DGA and moisture monitoring, separating the main and selector tanks from the diverter tank to avoid any risk of contamination. Utilizing photo-acoustic spectroscopy (PAS) measurement technology, well suited to field application, it provides laboratory challenging levels of precision and repeatability. Full 9 gas oil sampling and analysis can be performed as often as every hour on a single tank and up to once every three hours if all three possible oil tanks are connected.

Through close integration with GE's powerful Perception™ software suite and/or user's own software, historian and SCADA systems, the TAPTRANS offers full gas-in-oil trending, analysis and diagnostic capabilities including various diagnostic methods prescribed by international standards.

Key Benefits

- Discrete measurement of all fault gases facilitates full remote diagnostic without having to go to site and take an oil sample
- Additional DGA analysis of separate OLTC oil tank(s) enables more cost effective condition based OLTC maintenance
- Faults can be detected in their infancy and outage scheduled when less inconvenient and less costly (normal working hours)
- Aids condition based and predictive maintenance strategies
- Compatible with mineral insulating oils or ester based oils (natural and synthetic)

Applications

Knowledge of the condition of transformers is essential for all electrical networks and on-line monitoring of transformers is an increasingly vital component of successful asset management programs. The information provided by multi-gas on-line DGA allows valuable asset capabilities to be maximized and expensive failures to be avoided.

TAPTRANS is best suited for monitoring transformers where frequent operation of their OLTC is grid or process critical, with a view to extending asset life, preventing unexpected failure and operating on a condition based maintenance schedule.

Cutting Edge Technology

- Nine 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 calibration gases required
- Long service life with minimal maintenance

Ease of Use

- Easy installation: no outages required reducing expense and inconvenience for user
- No consumables and minimal maintenance reduces running costs and site visits
- Extensive remote communications options and protocols available (including IEC® 61850)
- Sampling frequency is user-configurable, up to once per hour
- Can be connected to normal AC power or protected DC supply
- Supports new lower flammability ester based oils as well as mineral insulation oils

Configurable Alerts

- Two alarm levels (one for Caution and one for Alarm) can be set to show increasing severity
- Sunlight visible front panel LED arrays
- Six user configurable alarm relay contacts
- Caution and alarm modes can be used to automatically increase sampling frequency

Integrated Solution

- Partners Intellix™ MO 150 and BMT 300 products and combines well with some of the GE Industrial Communication products
- Can be configured by and data downloaded to GE's Perception software which provides graphical gas level trending and diagnostic methods based on International standards
- Also integrates to Perception Fleet to provide health/risk ranking of the monitored transformers compared to other fleet assets

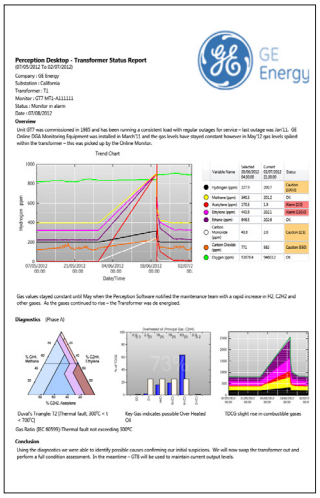
imagination at work

Perception Software

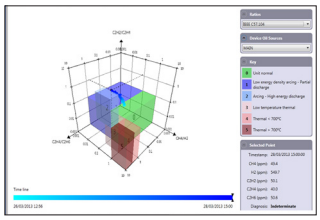
TAPTRANS comes as standard with Perception Desktop to help you configure the unit but also download the stored data in order to view gas level trends and analyse the data using diagnostic methods based on International standards.

For asset managers with a large number of monitored transformers, Perception Fleet takes it one step further and automatically performs the data analysis to assign a health/risk index to every transformer in your fleet. It then ranks all assets to give an overview of your transformers' condition/risk and highlight the worst ones requiring urgent attention or replacement.

Perception Fleet further offers customisable overview reports, wallboard fleet visualization, alarm email notification and data import and export facility. The notification and support for smart phone/tablet connection ensures that the right person can access critical data easily should a transformers condition change.



Transformer overview report



IEEE® C57.104 DGA diagnostic

Transformer health/risk overview

Technical Specifications

MEASUREMENTS

Technology

Uses photo-acoustic spectroscopy (PAS) for field proven highly repeatable results

Eight target gases plus Total Dissolved Combustible Gas (TDCG) value. Estimation of Nitrogen content for free breathing transformers

Suitable for transformers using mineral insulating oil and also ester based oils (natural or synthetic)

Range (LDL - UDL)

Hydrogen (H_2)	5 - 5,000 ppm
Carbon Monoxide (CO)	2 - 50,000 ppm
Carbon Dioxide (CO_2)	20 - 50,000 ppm
Methane (CH_4)	2 - 50,000 ppm
Acetylene (C_2H_2)	0.5 - 50,000 ppm
Ethane (C_2H_6)	2 - 50,000 ppm
Ethylene (C_2H_4)	2 - 50,000 ppm
Oxygen (O_2)	100 - 50,000 ppm
Nitrogen (N_2) *	10,000 - 100,000 ppm
Moisture (H_20)	0 - 100% RS (given in ppm)

Accuracy **

Oxygen (O_2)	±10%
Nitrogen (N_2)	±15%
All other gases	±5% or ±LDL (whichever is greater)
Moisture (H_20)	±3%

**N^2 available on free-breathing transformers only.*

***Accuracy quoted is the accuracy of the detectors during calibration. Gas -in oil measurement accuracy may also be affected by sampling and/or oil type.*

Frequency

Configurable from once per hour to once every 4 weeks. Factory default; every eight hours

Faster sampling automatically triggered upon caution alarm level reached

FEATURES

Display

4x sunlight visible LED arrays

Internal backlit LCD, 4 lines x 20 characters

Communication

Two separate channels for remote communications plus local USB connection

Ethernet connection (RJ45) on one channel using Modbus® is standard

Communication protocols supported include Modbus, DNP3.0, IEC 61850

Modules available for communication via RS485, Ethernet, Fiber optic, PSTN and cellular GSM/GPRS modems

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

Alarms

Two sunlight visible front panel LED arrays (Red & Yellow)

All alarms can be set or changed locally or remotely using Perception software

Six alarm setting scenarios are available for setting alarms based on the level of any of the nine gases, TDCG and moisture, and rates of change for each gas

Each alarm setting scenario can activate one of six alarm relays, the red or yellow front panel indicator or send an SMS message if equipped with the optional cellular GSM modem

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

Caution mode and alarm mode can be used to increase sampling frequency

Others

10 internal data storage for 10,000 records - over ten years of data at default sampling rates

Non-volatile memory storage to prevent loss of data

Supplied load CT allows to perform DGA analysis against transformer load

ENVIRONMENT

Conditions

Operating ambient temperature	-40°C to +55°C (-40°F to +131°F) AC version -17°C to +55°C (0°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)

****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 recommends the use of heat trace cabling on piping*

Enclosure Rating

IP55 certified

304 Stainless Steel (316 Stainless Steel Option)

Power Requirements

Available with either AC or AC/DC power supply

AC Version	Nom: 115-230 Vac, Range: 103–126/207-253 Vac, 47–63 Hz, 8A max
AC/DC version	Nom: 100-230 Vac, Range: 90-253 Vac, 45-65Hz, 5A max Nom: 100-220 Vdc, Range: 90-242 Vdc, 5A max

Mechanical

Dimensions	900mm x 600mm x 389mm 35.4" x 23.6" x 15.3"
Weight	Installed weight 88Kg (194lb) Shipping weight 126Kg (278lb)

OPTIONS

Mounting stand

Cradle mount (for mounting on transformer)

Sun canopy

Inputs to connect other analogue sensors (e.g. top and bottom oil temperature)

Option for monitoring fibre optic probes already embedded inside the transformer windings

GE Grid Solutions
Lissue Industrial Estate East
Unit 1, 7 Lissue Walk
Lisburn BT28 2LU
United Kingdom
Tel: +44 (0) 2892 622915

GEGridSolutions.com

GE, the GE monogram, Kelman, and Perception are trademarks of the General Electric Company.

Modbus is a registered trademark of Schneider Automation, Inc. IEC is a registered trademark of Commission Electrotechnique Internationale. VOLTESSO is a registered trademark of Exxon Mobil Corporation. IEEE is a registered trademark of the Institute of Electrical and Electronics Engineers Inc.

GE reserves the right to make changes to specifications of products described at any time without notice and without obligation to notify any person of such changes.

Copyright 2019, General Electric Company. All Rights Reserved.

GEA-17282D(E)
English
190610

imagination at work