GE
Grid Solutions

Kelman DGA 900

Next generation on-line multi-gas DGA

Dissolved Gas Analysis (DGA) and moisture measurement of insulating fluids are recognized as the most important tests for condition assessment of transformers. In previous years, multi-gas DGA was traditionally confined to a laboratory environment, with infrequent off-line manual sampling forming part of time-based maintenance strategies. However, as the global average age of transformers continued to rise, the possibility of rapid ageing, unplanned outages and even catastrophic failure between off-line tests also increased, leading many asset owners to adopt on-line DGA monitoring strategies to increase network reliability.

In the early 2000's, GE's Kelman™ range of analysers brought consumable-free on-line multi-gas DGA to the market and GE is now proud to introduce the Kelman DGA 900, our next generation multi-gas on-line DGA and moisture analyser. At its heart lies an evolved implementation of GE's proven Photo-Acoustic Spectroscopy (PAS) measurement technology, providing laboratory challenging levels of precision and repeatability with no consumables and no need for frequent re-calibration. Benefiting from over 40 years of global DGA vendor experience, the Kelman DGA 900 encapsulates learnings and improvements derived from its predecessors to bring improved performance, innovative new features, enhanced user experience and increased robustness.

Key Benefits

- Provides remote alert and multi-gas diagnostic of deteriorating transformer condition
- Expedites operational decisions without needing to go to site for manual oil sampling
- Issues can be detected in their infancy, avoiding unexpected failures and facilitating planned outages
- Anchors condition based maintenance and asset replacement strategies on hard data
- No need for consumables or frequent recalibration to operate at optimum performance
- New "Rapid Mode" provides near real time insight on fast developing faults
- Enhanced computing power and scalable I/Os for a flexible transformer monitoring solution
- Compatible with mineral insulating oils and newer ester based fluids (natural and synthetic)

Applications

The Kelman DGA 900 is an invaluable foundational tool for implementing Asset Performance Management (APM) across electrical generation, transmission and industry, enabling a condition based asset replacement strategy and delivering improvements in system reliability and availability.

A DS-Agile™ and PREDIX™ Grid APM ready device, the DGA 900's wide range of communication methods and protocols enables connection to those platforms and integration with GE's Perception™ transformer fleet management software as well as other software, historian and SCADA systems.

Proven Technology

- 4th generation of GE's PAS technology delivering improved accuracy with lower detection limits
- From the only vendor with 15 years PAS experience and installed base of >13,000 units
- No carrier or calibration gas consumables
- Laboratory challenging field measurement of nine gases plus moisture
- Complete DGA analysis up to once per hour and new "Rapid Mode" for critical gases in ~30 min

Reliable and Available

- First Kelman device designed by GE leveraging our quality and continuous improvement ethos
- Enhanced reliability and easier field servicing
- 5-year warranty as standard †
- Factory calibration benchmarked against industry standard laboratory assessment

Intuitive and Flexible

- Integrated 7" colour LCD screen for simplified local user interaction and visualisation of data
- Lightweight innovative two-enclosure design enables adjacent or separated installation
- Can connect to AC or sub-station DC power

Scalable and Connected

- Expandable analogue/digital I/Os
- Future proof computing platform ready for feature enhancements
- Designed for cyber security, with a range of comms options and protocols

imagination at work

Technical Specifications

MEASUREMENTS

Technology

Automated headspace gas extraction

Photo-acoustic spectroscopy (PAS) gas measurement

Thin film capacitive moisture sensor

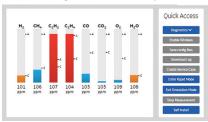Immersed Fiber Optic Oxygen sensor

Frequency

Configurable from once per hour to once every 4 weeks

Faster sampling automatically triggered upon alert level reached

"Rapid Mode" provides a rapid indication of the evolution of the gasses indicated below in ~30 minutes

Range

	LDL	UDL	Accuracy*	Repeatability	Available in Rapid Mode
Hydrogen (H_2)	5 -	5,000 ppm	± LDL or ±5%	< 3%	●
Carb. Monox. (CO)	1 -	50,000 ppm	± LDL or ±3%	< 2%	
Methane (CH_4)	2 -	50,000 ppm	± LDL or ±3%	< 2%	●
Acetylene (C_2H_2)	0.5 -	50,000 ppm	± LDL or ±3%	< 2%	●
Ethylene (C_2H_4)	1 -	50,000 ppm	± LDL or ±3%	< 2%	●
Carb. Diox. (CO_2)	20 -	50,000 ppm	± LDL or ±3%	< 3%	
Ethane (C_2H_6)	1 -	50,000 ppm	± LDL or ±3%	< 2%	
Oxygen (O_2)	100 -	50,000 ppm	± LDL or ±5%	< 2%	
Nitrogen (N_2) **	10,000 -	100,000 ppm	± LDL or ±15%		
Moisture (H_2O)	0 -	100% RS (in ppm)	± 3% RH	< 3%	●

*whichever is greater. Accuracy quoted is the accuracy of the detectors during calibration. Gas-in-oil measurement may be affected by oil type and condition. Repeatability as measured from final production test data.

** N_2 value is calculated and available on free-breathing transformers only.

DGA 900 being tested in the factory

DGA 900 gas levels displayed on the local LCD screen

FEATURES

Display

4x sunlight visible LED arrays

Backlit 7" inch color resistive touch LCD screen (800 × 480)

Integrated embedded secure webserver (https)

Analogue Inputs

Up to 15x optional analogue inputs for load CTs, PT100 inputs or 4–20mA sensors

Digital Output

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

Wi-Fi (802.11b/g/n)

Serial output (RS-485)

1Gb Ethernet (RJ45) standard with fiber-optic options

GSM/GPRS or CDMA/LTE modem options

Digital Protocols

Modbus® as standard

DNP3 or IEC 61850 (Ed 1 or 2) options

Alarms

Alarm setting screens/scenarios, based on gas level, gas rate of change and moisture level, assignable to relays

6x standard and up to 18x dry contact relays (type C, SPDT), NO/NC, 10A at 250Vac resistive load, 10A at 30Vdc resistive load

Separate Service Alarm with own relay

ENVIRONMENT

Conditions

Operating ambient temperature	-40°C to +55°C (-40°F to +131°F)
Operating ambient humidity	0-95% RH, non-condensing
Oil temperature at valve***	-20°C to +120°C (-4°F to +248°F)
Oil pressure at valve	0-700KPa (0-100psi)

***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 -20ºC GE recommends the use of heat trace cabling on piping

Enclosure

IP56 certified

Powder coated aluminium (RAL9002)

Unpainted 316 Stainless Steel option

Power Requirements

AC	Nominal 100-240 Vac, Range 85-264 Vac, 4A
DC	Nominal 100-250 Vdc, Range 90-300 Vdc

Mechanical

	Analysis Unit	Hub Unit
Dimensions	600 × 484 × 330 mm 23.6 × 19.1 × 13.0 in	600 × 380 × 330 mm 23.6 × 15.0 × 13.0 in
Weight	33.4Kg 73.6 lb	18.5Kg 40.8 lb

OPTIONS

Mounting stand

Sun canopy

Umbilical cable between units

Analogue output of gas values

† Terms and conditions apply

Kelman DGA900	E0	P0	M0	U0	S0	C0	CO	X0	X0	X0	X0	X0	Base Unit	9 Gas DGA, Powder coated enclosure, 2m umbilical, Modbus TCP over Ethernet, Load CT, install kit, and Perception desktop.
Protocol Options		P1											COMM90022	DNP3 over RS485
		P2											COMM90012	DNP3 over Ethernet
		P3											COMM90013	IEC 61850 Edition 1 over Ethernet
		P4											COMM90014	IEC 61850 Edition 2 over Ethernet
Mounting Stand			M1										24-0822-01	Mounting Stand
Umbilical Cable				U1									CABL01054	5 Meter
				U2									CABL01055	10 Meter
Sun Canopy					S1								24-0973-01	Sun Canopy
Communication Options						C1							COMM90016	Ethernet Converter - RJ45 to 10/100Mbps Multimode Fibre ST Connector
						C2							COMM90017	Ethernet Converter - RJ45 to 10/100Mbps Multimode Fibre SC Connector
						C3							COMM90018	Ethernet Converter - RJ45 to 10/100Mbps Multimode Fibre LC Connector
						C4							COMM90019	Ethernet switch, 2 x 100BaseF - ST Multimode Fiber (2 Km max) + 4 x RJ45 10/100Mbps copper
						C5							COMM90020	Ethernet switch, 2 x 100BaseF - SC Multimode Fiber (2 Km max) + 4 x RJ45 10/100Mbps copper
						C6							COMM90021	Ethernet switch, 2 x 100BaseF - SC Singlemode Fiber (20 km max) + 4 x RJ45 10/100Mbps copper
							C7						COMM90005	GSM / GPRS Modem
							C10						COMM90015	Wireless Cell Modem for USA - internal
Analogue I/O Card (5 slots available)								X1	X1	X1	X1	X1	13-0263-01	Analogue Input Card, 4-20mA
								X2	X2	X2	X2	X2	13-0256-02	Analogue Input Card, for PT100 Temp Sensor (4 wire)
								X3	X3	X3	X3	X3	13-0256-02-OPT1	Analogue Input Card, for PT100 Temp Sensor (3 wire)

Additional modules and configurations available. Please contact your sales representative or visit our online store

GEGridSolutions.com

Grid-GA-L3-DGA_900-1599-2017_05-EN

imagination at work