

# KELMAN DGA 900 TAPTRANS



## 9 Gas Online DGA covering Main, OLTC Selector / Diverter Tanks

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 comprehensive information provided by the Kelman™ DGA 900 TAPTRANS not only allows expensive failures to be avoided but enables asset capabilities to be maximized.

The Kelman DGA 900 TAPTRANS is a patented designed specifically 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.

### Key Benefits

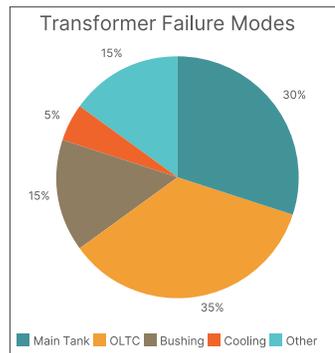
- Provides extensive remote insight into transformer condition and safe operation
- Enables correlation of data for validation and in-depth fault analysis
- Full integration with GE Vernova's acclaimed Perception™ Fleet asset management software
- From the only vendor with 15 years PAS experience and installed base of >15,000 units

### Applications

Online DGA is a highly effective method for assessing transformer health but does not cover all potential issues, such as problems in tap changers, cooling systems, or bushings. It is best suited for critical or compromised transformers to extend their lifespan and prevent failures.

This monitoring is crucial in industrial processes relying on uninterrupted power and in renewable energy systems where fluctuating output must be managed. Preventing unplanned outages helps maintain productivity and avoid costly downtime.

Additionally, OLTC transformers are often used in industrial settings where voltage regulation is necessary to accommodate fluctuations in power demand. Effective monitoring ensures that these transformers operate reliably, supporting smooth production workflows and minimizing disruptions.



### Cutting Edge DGA

- Laboratory challenging field measurement of nine gases plus moisture on 3 oil sources
- Individual oil manifolds for the main and OLTC Diverter tank
- 4th generation of GE Vernova's PAS technology delivering improved measurement accuracy with lower detection limits
- No carrier or calibration gas consumables
- Complete analysis up to once per hour and new "Rapid Mode" for critical gases in ~30 min

### Applications

- Industrial OLTC applications such as arc furnaces, foundry's, and paper mills
- Power transmission networks
- Renewable applications such as windfarms and solar plants

### Bushing & PD Monitoring

- Measures the change in Capacitance C1 and Power Factor (Tan delta) caused by the deterioration of the bushing
- Avoid widespread collateral damage and even total loss of transformer
- Detects electrical PD events inside the transformer using the same bushing adaptors
- Multiple noise rejection methods and graphical PRPD analysis

### OLTC Monitoring

- Monitor key fault gases in selector / diverter tanks
- Standard diagnostic methods built in
- Advance alarm settings

# Technical Specifications

## MEASUREMENTS

### Technology

Automated head-space 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	Response Time***	Rapid Mode
Hydrogen (H <sub>2</sub> )	5	5,000 ppm	± LDL or ±5 %	< 3 %	> 90 %	•
Carb. Monox. (CO)	1	50,000 ppm	± LDL or ±3 %	< 2 %	> 95 %	•
Methane (CH <sub>4</sub> )	2	50,000 ppm	± LDL or ±3 %	< 2 %	> 95 %	•
Acetylene (C <sub>2</sub> H <sub>2</sub> )	0.5	50,000 ppm	± LDL or ±3 %	< 2 %	> 95 %	•
Ethylene (C <sub>2</sub> H <sub>4</sub> )	1	50,000 ppm	± LDL or ±3 %	< 2 %	> 95 %	•
Carb. Diox. (CO <sub>2</sub> )	20	50,000 ppm	± LDL or ±3 %	< 3 %	> 95 %	•
Ethane (C <sub>2</sub> H <sub>6</sub> )	1	50,000 ppm	± LDL or ±3 %	< 2 %	> 95 %	•
Oxygen (O <sub>2</sub> )	100	50,000 ppm	± LDL or ±5 %	< 3 %	> 95 %	•
Nitrogen (N <sub>2</sub> ) **	10,000	100,000 ppm	± LDL or ±15 %	< 3 %	> 95 %	•
Moisture (H <sub>2</sub> O)	0	100% RS (in ppm)	± 3.5%RH (RS) or ± 3ppm	< 3 %	> 95 %	•

\*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<sub>2</sub> value is calculated and available on free-breathing transformers only.

Time Response (typical): 1 measurement cycle ; >95 %: C<sub>2</sub>H<sub>2</sub>, CO, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub>, CH<sub>4</sub>, CO<sub>2</sub> ; >90 %: H<sub>2</sub>

\*\*\* Time Response (typical): % of value after 1 measurement cycle.

## FEATURES

### Display

4 x sunlight visible LED arrays  
Backlit 7" inch color resistive touch screen (800 x 480)  
Embedded secure webserver (https)

### Analogue Input

1 x Standard for split core load CT sensor

### Digital Output

6 x Standard customer programmable dry contact relays (type C, SPDT), NO/NC, 10A @250Vac resistive load, 8A @30Vdc resistive load

1 x standard service alarm relay

1 x standard watchdog relay

### Digital Communications / Protocols

1 x Modbus® over RS485 / TCP/IP as standard

1 x Standard 1Gb Ethernet (RJ45)

Option: DNP3.0 over RS485 or TCP/IP

Option: IEC 61850 Edition 2

Option: ST/SC Multi-mode fiber converters

Option: GPRS/UMTS/HSPA+ modem

## ADD-ONS †

### Option – OLTC Monitoring †

Standard: Motor torque sensor  
Standard: 2 x Magnetic mounted temperature sensor  
Standard: 4 – 20mA or Resistive OLTC position input (sensor not supplied)

### Option – Bushing Monitoring 3 Phase Transformers

Up to 6 x Bushing adaptors ordered separately

Standard: Bushing HV (3 Bushings)

Option: Bushings HV & LV (6 Bushings)

All sensors supplied unless noted

## ENVIRONMENT

### Operating Conditions

**Ambient Temperature** -40 °C to +55 °C (-40 °F to +131 °F)

**Ambient Humidity** 0-95 % RH, non-condensing

**Oil Temperature at Valve††** -20 °C to +120 °C (-4 °F to +248 °F)

### Enclosure

IP56 certified

Standard: Powder coated marine grade aluminium (RAL9002)

Option: Unpainted 316 Stainless Steel



Location of maximum 3 x add-on cards

## 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
<b>Dimensions</b>	600 x 484 x 330 mm 23.6 x 19.1 x 13.0 in	600 x 380 x 330 mm 23.6 x 15.0 x 13.0 in
<b>Weight</b>	37 Kg 81.6 lb	18.5 Kg 40.8 lb

## OPTIONS

Mounting stand and Sun canopy

Longer umbilical cable between units

†OLTC and Transformer models will be available in future releases

††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 200 ml or less. For oil temperatures colder than -20 °C GE Vernova recommends the use of heat trace cabling on piping

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