How is the Vaisala Optimus™ DGA Monitor Different?

**Better Measurement Performance**
- Optical IR sensors designed and manufactured in Vaisala cleanrooms
- Spectral scanning provides selective gas measurement
- Vacuum gas extraction independent of oil temperature, pressure, and type
- Unique auto-calibration eliminates long-term drifts - no need to recalibrate

**More Robust Design**
- Hermetically sealed structure tolerates vacuum and pressure variation
- Stainless steel and aluminum components and piping in contact with oil
- No consumables means no regular maintenance
- Magnetic pump and valves for durability

**Simplified Installation and Operation**
- Installation and commissioning in as little as two hours
- Continuous operation with one-hour output interval – no data averaging needed
- Browser-based user interface to easily view and share data, and change settings
- Self-diagnostics with self-recovery after disturbances
Prevent Power Transformer Failure
There’s nothing worse than an unplanned outage, in terms of both lost revenue and the incalculable costs to your reputation and brand. The good news is that over 50 percent of power transformer faults can be detected with the right online monitoring tools, meaning that severe failures can be prevented. But monitors that give false alarms or require regular maintenance can end up wasting considerable amounts of your time and money.

That’s why we created the Vaisala Optimus™ DGA Monitor. It provides real-time, trouble free fault gas monitoring for your power transformers – with no false alarms or maintenance.

The two key design drivers have been safety and reliability in demanding operating environments. This is the culmination of decades of listening to customers’ needs and researching existing devices, as well as leveraging our 80 years of experience making sensors and measuring equipment for safety-critical industries and harsh environments.

Dependable Data with No False Alarms
The IR sensor is based on Vaisala core measurement technology and components manufactured in our own cleanroom. Vacuum gas extraction means no data fluctuation due to oil temperature, pressure, or type, while hermetically sealed and protected optics prevent sensor contamination. Moisture is measured directly in the oil with our capacitive thin-film polymer HUMICAP® sensor, which has been used for transformer monitoring for 20 years. Hydrogen is also measured directly in the oil with the same solid-state sensor technology used in the Vaisala MHT410.

Robust Construction
Stainless steel pipes, IP66-rated and temperature-controlled housing, as well as a magnetic pump and valves mean superb performance and durability – from the arctic to the tropics. What’s more, there are no consumables to service or replace.

Smart Design
The Vaisala Optimus DGA Monitor has a web-based user interface that completely eliminates the need for additional software. The device is designed to be installed in less than two hours – just connect the oil and power, and it’s ready to go. It can be connected to an existing control and monitoring system via digital communication and relays, or used as standalone monitoring device. And in case of a disturbance like a power outage, self-diagnostics allow for self-recovery.

The Optimus DGA Monitor is the right solution for safe guarding critical transformers in harsh environments.
Technical Data

**Measured Parameters in Oil**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>RANGE</th>
<th>ACCURACY(^2), (^3)</th>
<th>REPEATABILITY(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane (CH(_4))</td>
<td>0 ... 10000 ppm</td>
<td>10 ppm or 10% of reading</td>
<td>10 ppm or 5% of reading</td>
</tr>
<tr>
<td>Ethane (C(_2)H(_6))</td>
<td>0 ... 10000 ppm</td>
<td>10 ppm or 10% of reading</td>
<td>10 ppm or 5% of reading</td>
</tr>
<tr>
<td>Ethylene (C(_2)H(_4))</td>
<td>0 ... 10000 ppm</td>
<td>10 ppm or 10% of reading</td>
<td>10 ppm or 5% of reading</td>
</tr>
<tr>
<td>Acetylene (C(_2)H(_2))</td>
<td>0 ... 5000 ppm</td>
<td>2 ppm or 10% of reading</td>
<td>1 ppm or 10% of reading</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>0 ... 10000 ppm</td>
<td>10 ppm or 10% of reading</td>
<td>10 ppm or 5% of reading</td>
</tr>
<tr>
<td>Carbon dioxide (CO(_2))</td>
<td>0 ... 10000 ppm</td>
<td>10 ppm or 10% of reading</td>
<td>10 ppm or 5% of reading</td>
</tr>
<tr>
<td>Hydrogen (H(_2))</td>
<td>0 ... 10000 ppm</td>
<td>25 ppm or 20% of reading</td>
<td>15 ppm or 10% of reading</td>
</tr>
<tr>
<td>Moisture(^5) (H(_2)O)</td>
<td>0 ... 100 ppm</td>
<td>± 2 ppm(^6) or ± 10% of reading</td>
<td>Included in accuracy</td>
</tr>
</tbody>
</table>

\(^{1}\) Accuracy specified is the accuracy of the sensors during calibration, \(^{2}\) Whichever is greater, \(^{3}\) Repeatability of ethane measurement is specified with averaging of five measurements, \(^{4}\) Measured as relative saturation (%RS), \(^{5}\) Upper range limited to saturation, \(^{6}\) Calculated ppm value is based on average solubility of mineral oils.

**Performance**

- **Measurement cycle length**: 1 hour (typical)
- **Response time (T63)**: One measurement cycle\(^{1}\)
- **Warm-up time to full specification**: Three measurement cycles
- **Data storage**: At least 10 years
- **Expected operating life**: >15 years

\(^{1}\) Three cycles for ethane

**Calculated Parameters**

- **Total dissolved combustible gases (TDCG)**: Combined total of H\(_2\), CO, CH\(_4\), C\(_2\)H\(_6\), and C\(_2\)H\(_4\)
- **Rate of change (ROC)**: Available for single gases and TDCG for 24 hour, 7 day, and 30 day periods
- **Gas ratios\(^1\)**: Available ratios: CH\(_4\)/H\(_2\), C\(_2\)H\(_2\)/C\(_2\)H\(_4\), C\(_2\)H\(_4\)/C\(_2\)H\(_6\), C\(_2\)H\(_6\)/C\(_2\)H\(_2\), and CO\(_2\)/CO

\(^{1}\) Calculated from 24 h average values. See standard IEC 60599

**Power Supply**

- **Operating voltage**: 100 ... 240 VAC, 50/60 Hz, ±10%
- **Overvoltage category**: III
- **Maximum current consumption**: 10 A
- **Maximum power consumption**: 500 W
- **Typical power consumption at 25 °C (77 °F)**: <50 W

**Mechanical**

- **Oil connections at DGA monitor**: Swagelok\(^{®}\) fitting SS-10M0-61 (2 pcs) for 10 mm (0.393 in) outer diameter pipe. For 3/8 inch pipe, use adapter SS-600-R-10M.
- **Max length of oil pipe to transformer**: Max. 10 m (33 ft) for 6 mm (0.24 in) inner diameter pipe. Max. 5 m (16 ft) for 4 mm (0.154 in) inner diameter pipe.
- **Material**: Marine aluminum (EN AW-5754), stainless steel AISI 316

**Operating Environment**

- **Oil type**: Mineral oil
- **Required minimum flash point of oil**: +110 °C (+230 °F)
- **Oil pressure at oil inlet**: Max. 2 bar\(_{\text{abs}}\) continuous Burst pressure 20 bar\(_{\text{abs}}\)
- **Oil temperature at oil inlet**: Max. +100 °C (+212 °F)
- **Ambient humidity range**: 0 ... 100% RH, condensing
- **Ambient temperature range in operation**: -50 ... +55 °C (-58 ... +131 °F)
- **Storage and installation temperature range**: -40 ... +60 °C (-40 ... +140 °F)
- **Operating altitude**: -1000 ... +2000 m (-3280 ... +6562 ft) relative to sea level

**Outputs**

- **RS-485 INTERFACE**
  - Supported protocols: Modbus RTU
  - Galvanic isolation
  - ETHERNET INTERFACE
  - Supported protocols: Modbus RTU, TCP, HTTP
  - Galvanic isolation
  - RELAY OUTPUTS
  - Number of relays: 3 pcs, NO or NC user selectable
  - User selectable: gas level, rate of change, or device status
  - Max. switching voltage: 250 VAC, continuous
  - Max. switching current: 10 A, continuous
  - USER INTERFACE
  - Interface type: Web-based user interface, can be operated with standard web browsers
Power Transformer Monitoring That Works

The Vaisala Optimus™ DGA Monitor delivers out-of-the-box performance, eliminates false alarms, and gives you the best long-term stable measurements for the key fault gases used in transformer diagnostics.

Dimensions

![Dimensions Diagram]

Safety Information

Tests

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>STANDARD</th>
<th>CLASS/LEVEL</th>
<th>TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC (electromagnetic compatibility)</td>
<td>IEC61000-6-5</td>
<td></td>
<td>Immunity for Power Station</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and Substation Environments</td>
</tr>
<tr>
<td>Environmental</td>
<td>IEC60529</td>
<td>IP66 (equivalent to NEMA 4 rating)</td>
<td>Ingress protection</td>
</tr>
<tr>
<td>Safety</td>
<td>IEC/EN61010-1:2010</td>
<td></td>
<td>Product safety</td>
</tr>
</tbody>
</table>

Compliance

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE marking</td>
<td>EMC directive, Low voltage directive, RoHS directive, WEEE directive</td>
</tr>
</tbody>
</table>

You Can Count on Vaisala

Vaisala has been creating measurement devices for 80 years. Our instruments and systems are used in over 150 countries in industries where failure is not an option, including airports, pharmaceuticals, and power generation. In fact, over 10,000 companies in safety and quality-critical sectors already rely on Vaisala.

Vaisala sensors are so reliable they’re used in the harshest places on earth – like arctic, maritime, and tropical environments – and even on Mars.