The Model TM3 measures key fault gases using a single Gas Chromatography (GC) measurement system. Gas Chromatography is the accepted measurement science for DGA and is the only DGA measurement technology specified in IEEE, ASTM, CIGRE and IEC standards.

• Defer capital expenditures
• Extend transformer life and maintenance
• Enable condition based monitoring
• Avoid transformer failures

Low Total Cost of Ownership (TCO)

• Field-proven reliability combined with low lifetime maintenance requirements offers superior value.
• Economical maintenance costs compared to other multi-gas monitors.
• All scheduled maintenance can be performed on-site for minimal disruption to monitor uptime.

Avoid transformer failures

• Continuous trending of key fault gases gives early and immediate notification of incipient faults that can lead to transformer failure.
• Many transformer failures can be prevented through the correlation of DGA data to real events.
• Acetylene, ethylene and methane fault gases, oil temperature, ambient temperature, transformer load and moisture-in-oil are correlated by the Model TM3.
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Enable condition based maintenance

• Only comprehensive on-line monitoring can provide the information that enables continuous transformer condition assessment.

Extend transformer life and defer capital expenditures

• Comprehensive analysis of key fault gases, moisture and other key parameters enables intelligent management of transformers, extending their useful life and deferring capital expenditures.

On-line DGA Analysis Across Your Power Transformer Fleet

Leading utilities around the globe deploy the Serveron line of transformer monitors to provide superior asset protection for their transformer fleets across generation, transmission and distribution. With a low total cost of ownership, reliable field-proven performance and global customer service, Serveron transformer monitors set the standard for on-line DGA monitoring. Our transformer monitors can be deployed stand-alone or as part of the Qualitrol SmartSUB condition based monitoring system for transformers and other critical substations.

About Serveron

Serveron transformer condition assessment and management tools are critical to utilities in improving grid reliability while optimizing the management and economics of their asset base. We are a leader in on-line DGA monitoring of power transformers with solutions across the entire power transformer fleet. Serveron is QUALITROL Company.

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All trademarks are properties of their respective companies, as noted herein. AP-024-OA-03E.
Comprehensive Data Requires Powerful Tools

- Serveron TM3™ software and services offer simple yet powerful analytical tools for transformer monitor management, data visualization and analysis.
- Seamlessly move from single user software to enterprise capability for large deployments of monitors in your fleet with our SmartSUB solution.
- SmartSUB includes the DGA analysis features of TM View and adds the ability of combining data from additional transformer condition based monitoring devices (tank pressure, cooling bank current, winding current & temperature, bushing monitor, partial discharge and others).

Gas-in-Oil Trend Chart

- On-line correlation of 3 duval triangle gases
- Rate of Change alarms triggered by exceeding rate of change limits allow for early detection of incipient faults.

Duval Triangles

- Provides a quick assessment of fault gas level relative to alarm set point.

DGA Method

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All specifications are independent of oil temperature and gas pressure levels.

Duval Triangle Gas-in-Oil Trend Chart

- Traditional Duval Triangles
- Gas-in-Oil Trend Chart
- Rate of Change
- Alarms

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The Model TM3 is the only transformer condition alert system in its class that offers legitimate identification of the most critical transformer fault types. These critical fault types—partial discharge, arcing and thermal—indicate of a transformer’s overall condition. Continuous trending of key fault gases gives early and immediate notification of incipient faults that can lead to transformer failure.

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On-board automated calibration verification ensures performance to specification throughout the entire operating life of the monitor.

• Perform accurate DGA analysis on mineral and ester-based insulating fluids.

Serve as part of the Qualitrol SmartSUB condition based monitoring system for transformers and other critical substations.

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Gas-in-Oil Trend Chart

- On-line correlation of 3 duval triangle gases identifies the most critical transformer fault types.
- Automatically triggered by exceeding rate of change limits allow for early detection of incipient faults.
- Provides a quick assessment of fault gas level relative to alarm set point.

Duval Triangles

- Multiple Duval Triangles provide diagnostic outcomes for various combinations of the fault gases (IEC 60599-2007-05).
- Rate of change limits relative to alarm set point.

Percent of Alarms

- Provides a quick assessment of fault gas level relative to alarm set point.

Table: TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Management</td>
<td>System performs periodic automated calibration verification to National Institute of Standards and Technology (NIST) traceable gas standard.</td>
</tr>
<tr>
<td>Accuracy¹</td>
<td>±5% or ±3 ppm</td>
</tr>
<tr>
<td>Repeatability²</td>
<td>±5% or ±1 ppm</td>
</tr>
<tr>
<td>Calibration Outputs</td>
<td>Oil sampling is continuous and gas analysis intervals are user-selectable from 3 hours to 172 hours (Default: 4 hours). Automatic schedule acceleration when rate of change alarm limit is exceeded (Default: 1 hr).</td>
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<td>Oil Sampling Rate</td>
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<tr>
<td>Immunity</td>
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<tr>
<td>Communications</td>
<td>External Sensor Inputs</td>
</tr>
<tr>
<td>Physical Specifications</td>
<td>Product Dimensions: 22.0 in x 24 in x 11.0 in (559 cm x 508 cm x 284 cm).</td>
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<td>Input Power Requirements</td>
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<td>Voltage Fluctuations</td>
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<td>Safety</td>
<td>IEC 61010-1.</td>
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<tr>
<td>Specifications</td>
<td>IEC 61010-2-41.</td>
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<tr>
<td>End Equipment Specification</td>
<td>CSA-C22.2 No. 61010-1-44.</td>
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Gas-in-Oil Trend Chart

- On-line correlation of 3 Duval triangle gases identifies the most critical transformer fault types.
- Additional monitoring options provide diagnostic outcomes for various combinations of the fault gases (IEC 60599-2007-05).

DGA Methods

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Duval Triangles

- Multiple Duval Triangles provide diagnostic outcomes for various combinations of the fault gases (IEC 60599-2007-05).

Serveron TM View

- Provides a quick assessment of fault gas level relative to alarm set point.

External Sensor Inputs

- Three (3) analog inputs, 4 to 20 mA range, ambient temperature sensor included.
- Optional sensors include transformer load guide and transducer on winding temperature probe (case 2 inputs).

Environmental Specifications

- Operating Temperature: -50°C to +60°C
- Cold Start Temperature: -27°C
- Operating Humidity: 5% to 95% RH, non-condensing
- Oil Temperature: 0°C to 40°C (50°F to 95°F)
- Storage Temperature: -40°C to +75°C
- Storage Humidity: 5% to 95% RH, non-condensing

Physical Specifications

- Dimensions: 26.4 in x 26.4 in x 15.9 in (67 cm x 67 cm x 40.3 cm)
- Weight: 65 lb (29.5 kg)
- Enclosure Rating: NEMA 4X, IP66

Input Power Requirements

- Voltage: 115 VAC or 230 VAC ±15%
- Frequency: 50/60 Hz
- Current: 6 A maximum @ 115 V, 3 A maximum @ 230 V

Radiated and Conducted Emissions

- Specification: Test Method
- Current Harmonics: EN 50082-1:2006 AENOR 62055-3-3:2006 A1:2009 Class A
- Voltage Fluctuations: EN 61000-3-2:2006 EN 61000-3-3:2008 A1:2009 Class A

Radiated and Conducted Immunity

- Specification: Test Method
- ESD: EN 55024-2:2009
- EFT: EN 55024-3:2009
- Magnetic Field Immunity: EN 55022-3-3:2006
- Voltage Dips & Interruptions: EN 55020-1:2007

Safety

- Specification: Test Method
- EN 61010-1
- UL 61010-1 (Third Edition)
- CSA-C22.2 No. 61010-1-04

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Identify the most critical transformer fault types

Avoid transformer failures
- Continuous trending of key fault gases gives early and immediate notification of incipient faults that can lead to transformer failure.
- Many transformer failures can be prevented through the correlation of DGA data with real events.
- Acetylene, ethylene and methane fault gases, oil temperature, ambient temperature, transformer load and moisture in-oil are correlated by the Model TM3.
- The Model TM3 is the only transformer condition alert system in its class that offers legitimate identification of the most critical transformer fault types. These critical fault types—partial discharge, arcing and thermal faults—can develop in a short period of time and lead to transformer failure.

Enable condition based maintenance
- Only comprehensive on-line monitoring can provide the information that enables continuous transformer condition assessment.
- Data from the Model TM3 supports IEEE and IEC diagnostic tools for analysis of transformer oil is the single best indicator of a transformer’s overall condition.
- Perform accurate DGA analysis on mineral and ester-based insulating fluids.
- Perform continuous trending of key fault gases to identify incipient faults that can lead to transformer failure.
- On-board automated calibration verification ensures performance to specification throughout the entire operating life of the monitor.

Extend transformer life and defer capital expenditures
- On-line DGA monitoring with low Total Cost of Ownership (TCO) provides the information needed to defer capital expenditures that would be required to replace transformers.
- Economical maintenance costs compared to other multi-gas monitors.
- Extend transformer life.
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- On-line monitoring of key fault gases is the only comprehensive on-line monitoring system for transformers.

Low Total Cost of Ownership (TCO)
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