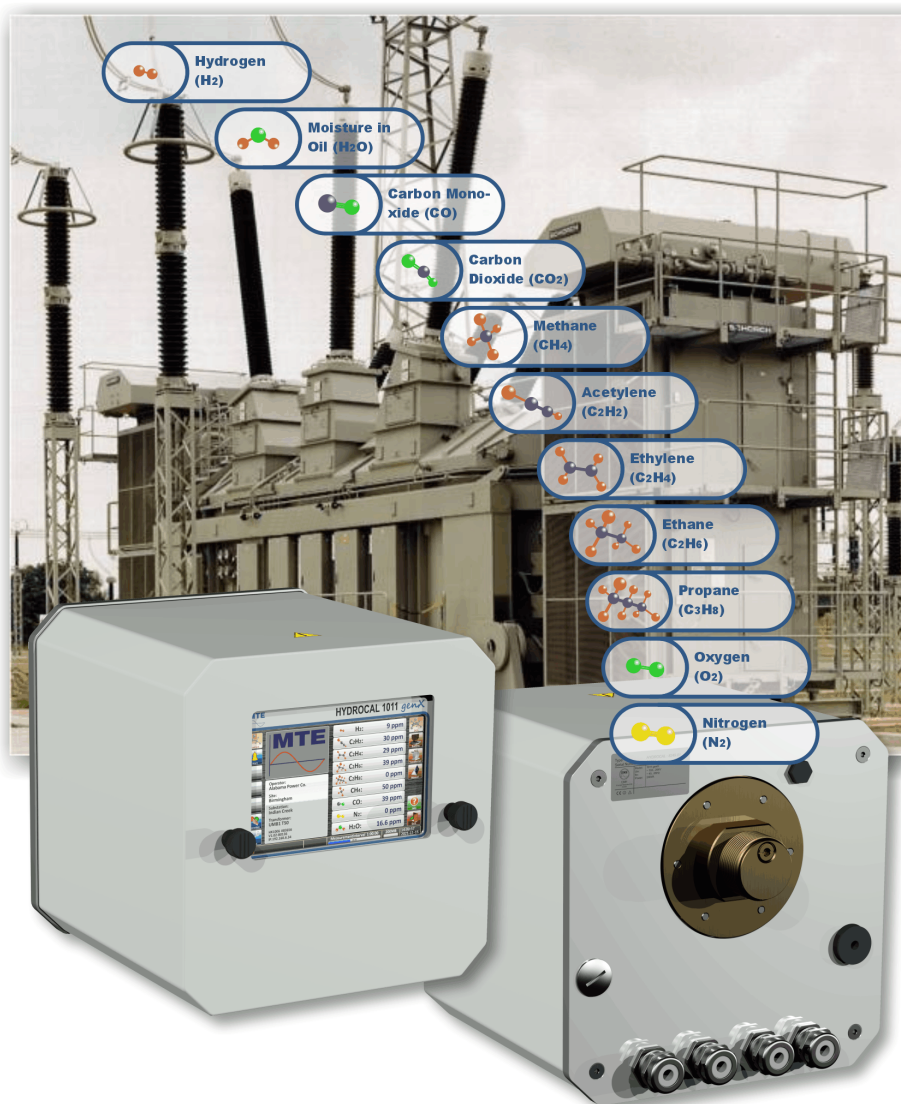


HYDROCAL 1011 *genX*

Online Dissolved Gas Analysis (DGA) and Moisture Analysis System for Power Transformers and oil-filled electrical Equipment



The new HYDROCAL 1011 *genX* is a full-range / maintenance-free multi-gas online DGA solution combining proven near infrared (NIR) measuring technology with miniaturized gas sample production based on headspace principle (no membrane, negative pressure-proofed).

It individually measures Moisture in oil (H₂O) and the key gases Hydrogen (H₂), Carbon Monoxide (CO), Carbon Dioxide (CO₂), Methane (CH₄), Acetylene (C₂H₂), Ethylene (C₂H₄), Ethane (C₂H₆), Oxygen (O₂), Nitrogen (N₂) and Propane (C₃H₈) dissolved in transformer oil.

As Hydrogen (H₂) is involved in nearly every fault of the insulation system of power transformers and Carbon Monoxide (CO) is a sign of an involvement of the cellulosic / paper insulation the presence and increase of the other light-weight hydrocarbon gases further classifies the nature of a fault as overheating, partial discharge or high energy arcing. Oxygen (O₂) can be a sign of excessive ageing or leakages of the sealing of hermetic transformers.

Key Advantages

- Individual measurement of Hydrogen (H₂), Carbon Monoxide (CO), Carbon Dioxide (CO₂), Methane (CH₄), Acetylene (C₂H₂), Ethylene (C₂H₄), Ethane (C₂H₆), Oxygen (O₂), Nitrogen (N₂) and Propane (C₃H₈)
- Moisture in Oil (H₂O) measurement
- Easy to mount on a transformer valve (G 1½" DIN ISO 228-1 or 1½" NPT ANSI B 1.20.1)
- Easy to mount on the operating transformer without any operational interruption
- Maintenance-free near infrared measurement system with head-space gas extraction acc. IEC 60567
- Advanced software (on the unit and via PC) with intuitive operation by 7" color TFT capacitive touchscreen, WLAN and Webserver operation from any smart phone, tablet or notebook PC
- Communication interfaces ETHERNET 10/100 Mbit/s (copper-wired / RJ 45 or fibre-optical / SC Duplex) and RS 485 to support MODBUS® RTU/ASCII, MODBUS®TCP, DNP3, proprietary communication protocols and substation communication protocol IEC 61850

Technical data HYDROCAL 1011 *genX*

General

Optional nominal voltages of auxiliary supply:	120 V -20% +15% AC 50/60 Hz ¹⁾ or 230 V -20% +15% AC/DC 50/60 Hz ¹⁾ or 120 V +15% DC ²⁾
Power consumption:	Max. 400 VA
Housing:	Aluminium
Dimensions:	W 270 x H 270 x D 333.5 mm
Weight:	Approx. 13.5 kg
Operation temperature: (ambient)	-55°C ... +55°C (below -10°C display function locked)
Oil temperature: (inside transformer)	-20°C ... +120°C
Storage temperature: (ambient)	-20°C ... +65°C
Operation Height:	Max. 2000 m
Oil Pressure:	0 ... 800 kPa
Connection to valve:	G 1½" DIN ISO 228-1 or 1½" NPT ANSI B 1.20.1

Safety



Insulation protection:	IEC 61010-1
Degree of protection:	IP-55

Digital outputs (Standard)

3 x Digital outputs	Max. Switching capacity (Free assignment)
Type	
3 x Relay	220V DC / 250V AC / 2A / 60W / 62.5VA

Communication

- 1 x RS 485 (proprietary or MODBUS® RTU/ASCII protocol)
- ETHERNET 10/100 Mbit/s copper-wired / RJ 45 or fibre-optical / SC Duplex, 100Base-FX, 1310nm, Multimode (proprietary or MODBUS® TCP protocol)
- DNP3 software stack modem (Option)
- IEC 61850 software stack modem (Option)
- HTML protocol. WLAN and Webserver operation from any phone, tablet or notebook PC (Option)

Notes

- ¹⁾ 120 V → 120 V -20% = **96 V_{min}** 120 V +15% = **138 V_{max}**
 230 V → 230 V -20% = **184 V_{min}** 230 V +15% = **264 V_{max}**
²⁾ 120 V → 120 V +15% = **138 V**

Operation principle

- Miniaturized gas sample production based on headspace principle (no membrane, negative pressure proofed)
- Near-infrared gas sensor unit for CO, CO₂, C₂H₂, C₂H₄, C₂H₆, CH₄ and C₃H₈
- Micro-electronic gas sensor for H₂, O₂ and N₂
- Thin-film capacitive moisture sensor for H₂O measurement
- Temperature sensors (oil temperature, gas temperature)

Measurement

Dissolved Gas Analysis	Accuracy ^{2,3)}		
Measuring Quantity	Range	Gas Extraction	Gas Measurement
Hydrogen H ₂	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 20 ppm
Carbon Monoxide CO	0 ... 10000 ppm	≤ ± 8% ± 30 ppm	≤ ±10 % ± 5 ppm
Carbon Dioxide CO ₂	0 ... 20000 ppm	≤ ± 8% ± 30 ppm	≤ ±10 % ± 5 ppm
Acetylene C ₂ H ₂	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Ethylene C ₂ H ₄	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Ethane C ₂ H ₆	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Methane CH ₄	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Propane C ₃ H ₈	0 ... 5000 ppm	≤ ± 8% ± 4 ppm	≤ ±15 % ± 20 ppm
Oxygen O ₂	0 ... 50000 ppm	≤ ± 8% ± 500 ppm	≤ ±10 % ± 500 ppm
Nitrogen N ₂	0 ... 150000 ppm	≤ ± 8% ± 1500 ppm	≤ ±10 % ± 1500 ppm
Dissolved Moisture Analysis			
Measuring Quantity	Range	Accuracy	
Moisture in Oil (H ₂ O) – relative [%]	0 ... 100 %	≤ ± 3 %	
in Mineral Oil – absolute [ppm]	0 ... 150 ppm	≤ ± 3% ± 3 ppm	
in Ester Oil – absolute [ppm] ⁴⁾	0 ... 2000 ppm	≤ ± 3 % of MSC ⁵⁾	

²⁾ Related to temperatures ambient +20°C and oil +55°C | ³⁾ Accuracy for moisture in oil for mineral oil types | ⁴⁾ Option | ⁵⁾ Moisture Saturation Content

Connections

