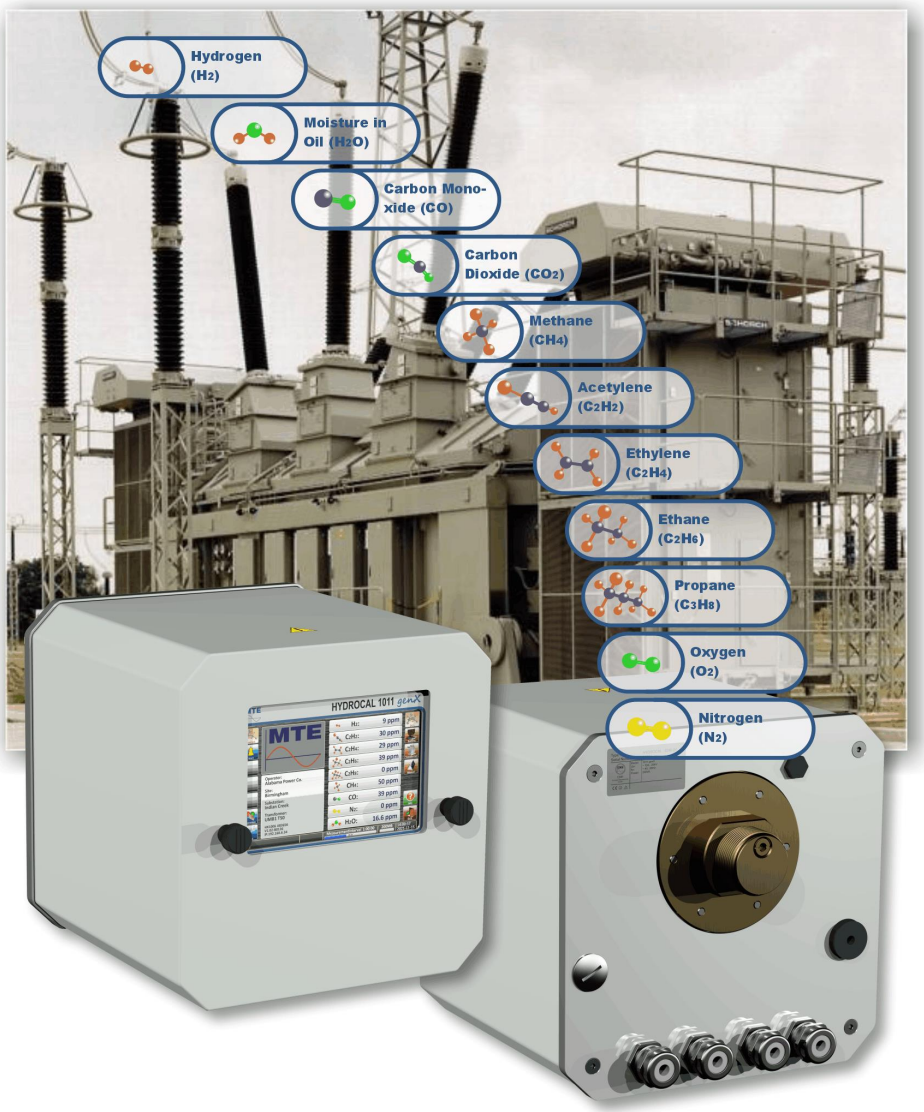
MTE Meter Test Equipment

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 (H_2O) and the key gases Hydrogen (H_2), Carbon Monoxide (CO), Carbon Dioxide (CO_2), Methane (CH_4), Acetylene (C_2H_2), Ethylene (C_2H_4), Ethane (C_2H_6), Oxygen (O_2), Nitrogen (N_2) and Propane (C_3H_8) dissolved in transformer oil.

As Hydrogen (H_2) 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 (O_2) can be a sign of excessive ageing or leakages of the sealing of hermetic transformers.

Key Advantages

- Individual measurement of hydrogen (H_2), carbon monoxide (CO), carbon dioxide (CO_2), methane (CH_4), acetylene (C_2H_2), ethylene (C_2H_4), ethane (C_2H_6), oxygen (O_2), nitrogen (N_2) and propane (C_3H_8)
- Moisture in Oil (H_2O) 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 [1]
Power consumption:	320 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
Oil Pressure:	0 … 800 kPa
Connection to valve:	G 1½" DIN ISO 228-1 or 1½" NPT ANSI B 1.20.1

Safety

CE

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)
- IEC 61850 (Option)
- DNP3 (Option)
- GPRS/UMTS 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}**

Operation principle

- Miniaturized gas sample production based on headspace principle (no membrane, negative pressure proofed)
- Near-infrared gas sensor unit for CO, CO_2, C_2H_2, C_2H_4, C_2H_6, CH_4 and C_3H_8
- Micro-electronic gas sensor for H_2, O_2 and N_2
- Thin-film capacitive moisture sensor for H_2O 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_2H_2	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Ethylene C_2H_4	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Ethane C_2H_6	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Methane CH_4	0 ... 10000 ppm	≤ ± 8% ± 4 ppm	≤ ±10 % ± 5 ppm
Propane C_3H_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_2O) – 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