

HYDROCAL 1011 *genX* Offshore

Online Dissolved Gas Analysis (DGA) and Moisture Analysis System for Offshore Applications



The new HYDROCAL 1011 *genX* Offshore 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.

The HYDROCAL 1011 *genX* Offshore is specially designed for the harsh conditions (salt water, corrosion) on offshore platforms (e.g. offshore windmill parks). A special painted housing with no window and the application of chrome nickel and stainless steel ensures the reliability and the persistence of the device.

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
- Special design for offshore applications:
 - Housing without window painted in CX
 - Back plate with cable glands (chrome-nickel steel, IP 68, corrosion-free and acid-resistant)
 - Back plate, oil entrance and housing screws made of stainless steel V4A
- 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 Webservice 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* Offshore

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 with painting CX / stainless steel V4A
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 $\Rightarrow$ 120 V -20% = **96 V_{min}** 120 V +15% = **138 V_{max}**
 230 V $\Rightarrow$ 230 V -20% = **184 V_{min}** 230 V +15% = **264 V_{max}**
²⁾ 120 V $\Rightarrow$ 120 V +15% = **138 V**

Operation principle

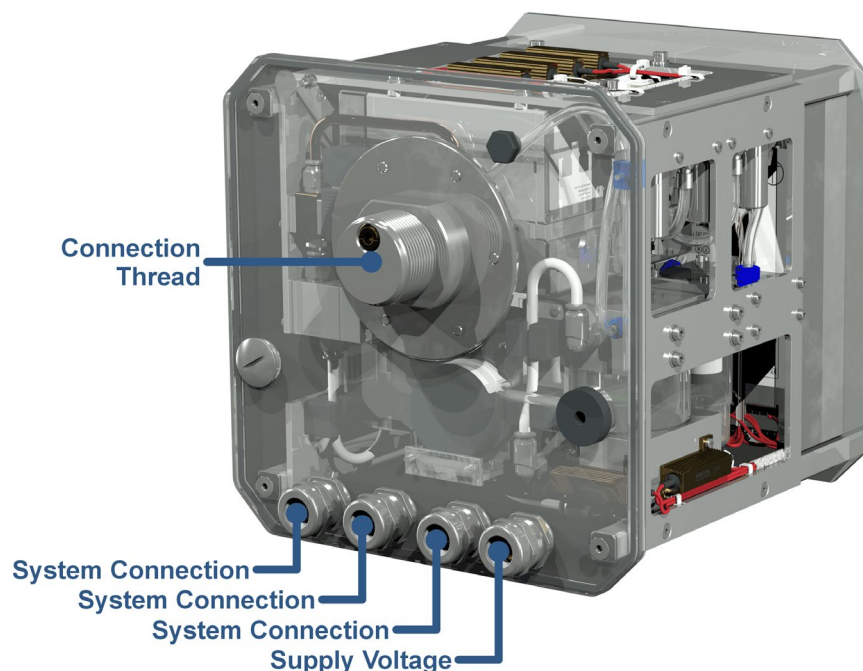
- Miniaturized gas sample production based on headspace principle (no membrane, negative pressure proofed)
- Near-infrared gas sensor unit for CO, CO₂, C₂H₂, C₂H₄, C₂H₆, CH₄ and C₃H₈
- Micro-electronic gas sensor for H₂, O₂ and N₂
- Thin-film capacitive moisture sensor for H₂O measurement
- Temperature 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	$\leq \pm 8\% \pm 4$ ppm	$\leq \pm 10\% \pm 20$ ppm
Carbon Monoxide CO	0 ... 10000 ppm	$\leq \pm 8\% \pm 30$ ppm	$\leq \pm 10\% \pm 5$ ppm
Carbon Dioxide CO ₂	0 ... 20000 ppm	$\leq \pm 8\% \pm 30$ ppm	$\leq \pm 10\% \pm 5$ ppm
Acetylene C ₂ H ₂	0 ... 10000 ppm	$\leq \pm 8\% \pm 4$ ppm	$\leq \pm 10\% \pm 5$ ppm
Ethylene C ₂ H ₄	0 ... 10000 ppm	$\leq \pm 8\% \pm 4$ ppm	$\leq \pm 10\% \pm 5$ ppm
Ethane C ₂ H ₆	0 ... 10000 ppm	$\leq \pm 8\% \pm 4$ ppm	$\leq \pm 10\% \pm 5$ ppm
Methane CH ₄	0 ... 10000 ppm	$\leq \pm 8\% \pm 4$ ppm	$\leq \pm 10\% \pm 5$ ppm
Propane C ₃ H ₈	0 ... 5000 ppm	$\leq \pm 8\% \pm 4$ ppm	$\leq \pm 15\% \pm 20$ ppm
Oxygen O ₂	0 ... 50000 ppm	$\leq \pm 8\% \pm 500$ ppm	$\leq \pm 10\% \pm 500$ ppm
Nitrogen N ₂	0 ... 150000 ppm	$\leq \pm 8\% \pm 1500$ ppm	$\leq \pm 10\% \pm 1500$ ppm
Dissolved Moisture Analysis			
Measuring Quantity	Range	Accuracy	
Moisture in Oil (H ₂ O) – relative [%]	0 ... 100 %	$\leq \pm 3\%$	
in Mineral Oil – absolute [ppm]	0 ... 150 ppm	$\leq \pm 3\% \pm 3$ ppm	
in Ester Oil – absolute [ppm] ⁴⁾	0 ... 2000 ppm	$\leq \pm 3\%$ 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



MTE Meter Test Equipment AG

Subject to alterations



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