

E Meter Test Equipment

HYDROCAL 1001+

Composite Gas-in-Oil Sensor with Moisture in Oil Measurement



The HYDROCAL 1001+ is a permanently installed composite gas-in-oil sensor for the analysis of the following dissolved key fault gases (TDCG = $\underline{\mathbf{T}}$ otal $\underline{\mathbf{D}}$ issolved $\underline{\mathbf{C}}$ ombustible $\underline{\mathbf{G}}$ ases):

 $\begin{array}{lll} \textbf{Fault gas} & \textbf{TDCG contribution} \\ \textbf{Hydrogen (H_2)} & \textbf{approx. } 20 \ \% \\ \textbf{Carbon Monoxide (CO)} & \textbf{approx. } 30 \ \% \\ \textbf{Methane (CH_4)} & <5 \ \% \\ \textbf{Acetylene (C_2H_2)} & 100 \ \% \\ \textbf{Ethylene (C_2H_6)} & \textbf{approx. } 32 \ \% \\ \textbf{Ethane (C_2H_6)} & <5 \ \% \\ \end{array}$

To provide an even more comprehensive transformer monitoring solution, the HYDROCAL 1001+ analyses additionally the content of Moisture (H_2O) in the transformer oil.

The integration of 6 relevant key gases into a total weighted gas concentration and the measurement of Moisture in oil enables the HYDROCAL 1001+ to react to most transformer faults and makes the device to a compact and cost effective tool used in particular for early transformer fault detection and preventative maintenance.

The HYDROCAL 1001+ is equipped with 2 analog 0/4 ... 20 mA outputs for the dissolved composite gas-in-oil and moisture in oil analysis results and 4 digital relay outputs (Hi-alarm, Hi-Hi-alarm, Moisture-alarm and system function alarm)

Key advantages:

- Composite measurement of Hydrogen (H₂), Carbon Monoxide (CO), Methane (CH₄), Acetylene (C₂H₂), Ethylene (C₂H₄), Ethane (C₂H₆) and dissolved Moisture (H₂O) in the transformer oil
- Relay outputs with light indicators showing potential alerts
- Easy and fast installation without any operational interruption of the transformer
- Compact and resistant design for long lasting usage
- Communication interfaces ETHERNET 10/100Mbit/s (copperwired or fibre-optical (Option)) and RS 485 to support proprietary communication protocols and sub-station communication protocols MODBUS®TCP

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General

Optional nominal voltages of auxiliary supply: 120 V -20% +15% AC 50/60 Hz 1) or

230 V -20% +15% AC 50/60 Hz 1) or

120 V -20% +15% DC ¹⁾ or 230 V -20% +15% DC ¹⁾

Other nominal voltages on request!

Power consumption: max. 250 VA Housing: Aluminium

Dimensions: W 224 x H 195 x D 218 mm

Weight: approx. 4 kg -55°C ... +55°C Operation temperature (ambient): Oil temperature (inside Transformer): -20°C ... +90°C Storage temperature (ambient): -20°C ... +65°C

Oil pressure: Up to 800 kpa (no negative pressure allowed) G 11/2" DIN ISO 228-1 or 11/2" NPT ANSI B 1.20.1 Connection to valve:

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

Measurements

Gas-in-oil measurement			
Measuring Quantity	Range	Accuracy 2) 3)	TDCG-Contribution
TDCG	0 5.000 ppm	± 15 % ± 20 ppm	
Hydrogen H ₂		± 10 % ± 15 ppm	approx. 20 %
Carbon Monoxide CO		± 20 % ± 25 ppm	approx. 30 %
Methane CH₄		± 20 % ± 25 ppm	< 5 %
Acetylene C ₂ H ₂		± 20 % ± 25 ppm	100 %
Ethylene C₂H₄		± 20 % ± 25 ppm	approx. 32 %
Ethane C ₂ H ₆		± 20 % ± 25 ppm	< 5 %
Moisture H₂O (aw)	0 100 %	± 3 %	
Moisture in Mineral Oil	0 100 ppm	± 3 % ± 3 ppm	
Moisture in synt. Ester ⁵⁾	0 2.000 ppm	± 3 % of MSC ⁶⁾	
Measurement cycle	20 min		

⁵⁾Option ⁶⁾Moisture Saturation Content

Analog and digital outputs

2 x Analog DC output		
Туре	Control range	Default function (Free assignment)
1 x Current DC	0/4 20 mADC	TDCG Concentration
1 x Current DC	0/4 20 mADC	Moisture in oil H ₂ O Concentration

4 x Digital outputs		
Type	Control voltage	Max. Switching capacity
4 x Relav 4)	12 VDC	220 VDC/VAC / 2 A / 60 W

Notes

1) **120 V** ⇒ 120 V -20% = **96 V**_{min}

Relay 4: System alarm

230 V ⇒ 230 V -20% = 184 V_{min}

 $^{2)}$ Related to temperatures ambient +20°C and oil +55°C $\,$

4) Relay 1: Hi alarm / Relay 2: Hi-Hi alarm / Relay 3: Moisture alarm /

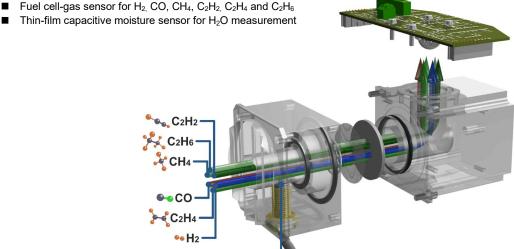
3) Accuracy for moisture in oil for mineral oil types

Communication

- ETHERNET 10/100 Mbit/s modem copper-wired / RJ 45 (proprietary or MODBUS® TCP protocol)
- ETHERNET 10/100 Mbit/s modem fibre-optical / SC Duplex (proprietary or MODBUS® TCP protocol) (Option)
- RS 485

Operation principle

Diffusion principle with gas-permeable TEFLON membrane



MTE Meter Test Equipment AG

№ H₂O

Subject to alterations

120 V +15% = **138 V**_{max}

230 V +15% = 264 V_{max}

