

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):

 $\begin{tabular}{lll} \hline \textbf{Fault gas} & & \hline \textbf{TDCG contribution} \\ \hline \textbf{Hydrogen (H$_2$)} & & approx. & 20 \% \\ \hline \textbf{Carbon Monoxide (CO)} & & approx. & 30 \% \\ \hline \textbf{Methane (CH$_4$)} & & <5 \% \\ \hline \textbf{Acetylene (C$_2$H$_2$)} & & 100 \% \\ \hline \textbf{Ethylene (C$_2$H$_4$)} & & approx. & 32 \% \\ \hline \textbf{Ethane (C$_2$H$_6$)} & & <5 \% \\ \hline \end{tabular}$

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) and CAN bus to support proprietary communication protocols and to be prepared for sub-station communication protocols MODBUS®TCP and CANopen

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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 Operation temperature (ambient): -55° C ... $+55^{\circ}$ C Oil temperature (inside Transformer): -20° C ... $+90^{\circ}$ C Storage temperature (ambient): -20° C ... $+65^{\circ}$ C

Oil pressure: Up to 800 kpa (no negative pressure allowed)
Connection to valve: G 1½" DIN ISO 228-1 or 1½" NPT ANSI B 1.20.1

SafetyCE certifiedIsolation protection:IEC 61010-1:2002Degree of protection:IP-55

Measurements

Gas-in-oil measurement				
Measuring Quantity	Range	Accuracy 2) 3)	TDCG-Contribution	
TDCG	0 5.000 ppm	± 15 % ± 20 ppm		
Hydrogen H₂		± 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 C ₂ H ₄		± 20 % ± 25 ppm	approx. 32 %	
Ethane C₂H ₆		± 20 % ± 25 ppm	< 5 %	
Moisture in oil H ₂ O	0 100 ppm	±3% ± 3 ppm		
Measurement cycle	20 min			

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 Relay 4)	12 VDC	220 VDC/VAC / 2 A / 60 W

Communication

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

Operation principle

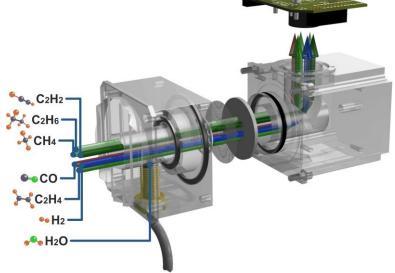
- Diffusion principle with gas-permeable TEFLON membrane
- Thin-film capacitive moisture sensor for H₂O measurement

■ Fuel cell-gas sensor for H₂, CO, CH₄, C₂H₂, C₂H₄ and C₂H₆

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) Related to temperatures ambient +20°C and oil +55°C
- 3) Accuracy for moisture in oil for mineral oil types
- 4) Relay 1: Hi alarm / Relay 2: Hi-Hi alarm / Relay 3: Moisture alarm / Relay 4: System alarm



MTE Meter Test Equipment AG

Subject to alterations

