

## 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<sub>2</sub>), Methane (CH<sub>4</sub>), Acetylene ( $C_2H_2$ ), Ethylene ( $C_2H_4$ ), Ethane ( $C_2H_6$ ), Oxygen ( $O_2$ ), Nitrogen ( $O_2$ ) and Propane ( $O_3H_8$ ) dissolved in transformer oil.

As Hydrogen (H<sub>2</sub>) 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<sub>2</sub>) can be a sign of excessive ageing or leakages of the sealing of hermetic transformers.

#### **Key Advantages**

- Individual measurement of hydrogen (H<sub>2</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), acetylene (C<sub>2</sub>H<sub>2</sub>), ethylene (C<sub>2</sub>H<sub>4</sub>), ethane (C<sub>2</sub>H<sub>6</sub>), oxygen (O<sub>2</sub>), nitrogen (N<sub>2</sub>) and propane (C<sub>3</sub>H<sub>8</sub>)
- Moisture in Oil (H<sub>2</sub>O) 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 120 V -20% +15% AC 50/60 Hz 1) or of auxiliary supply: 230 V -20% +15% AC/DC 50/60 Hz 1) or

120 V +15% DC 2)

Power consumption: 340 VA Housing: Aluminium

Dimensions: W 270 x H 270 x D 333.5 mm

Weight: Approx. 13.5 kg -55°C ... +55°C Operation temperature:

(below -10°C display function locked) (ambient)

Oil temperature: -20°C ... +120°C (inside transformer)

Storage temperature: -20°C ... +65°C

(ambient)

Operation Height: Max. 2000 m Oil Pressure: 0 ... 800 kPa

Connection to valve: G 11/2" DIN ISO 228-1 or

11/2" NPT ANSI B 1.20.1

Safety CE

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

#### Digital outputs (Standard)

| 3 x Digital outputs | Max. Switching capacity (Free assignment) |  |
|---------------------|---|--|
| Туре                |   |  |
| 3 x Relay           | 220V DC / 250V AC / 2A /<br>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**

120 V +15% = **138 V**<sub>max</sub> 120 V ⇒ 120 V -20% = 96 V<sub>min</sub> 230 V +15% = **264 V**<sub>max</sub> 230 V ⇒ 230 V -20% = 184 V<sub>min</sub> 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, CO<sub>2</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, CH<sub>4</sub> and C<sub>3</sub>H<sub>8</sub>
- Micro-electronic gas sensor for  $H_2$ ,  $O_2$  and  $N_2$
- Thin-film capacitive moisture sensor for H<sub>2</sub>O measurement
- Temperature sensors
- (oil temperature, gas temperature)

#### Measurement

| Dissolved Gas Analysis                  |              | Accuracy <sup>2,3)</sup>     |                              |  |  |
|---|--------------|------------------------------|------------------------------|--|--|
| Measuring Quantity                      | Range        | Gas Extraction               | Gas Measurement              |  |  |
| Hydrogen H₂                             | 0 10000 ppm  | ≤ ± 8% ± 4 ppm               | ≤ ±10 % ± 20 ppm             |  |  |
| Carbon Monoxide CO                      | 0 10000 ppm  | ≤ ± 8% ± 30 ppm              | ≤ ±10 % ± 5 ppm              |  |  |
| Carbon Dioxide CO₂                      | 0 20000 ppm  | ≤ ± 8% ± 30 ppm              | ≤ ±10 % ± 5 ppm              |  |  |
| Acetylene C <sub>2</sub> H <sub>2</sub> | 0 10000 ppm  | ≤ ± 8% ± 4 ppm               | ≤ ±10 % ± 5 ppm              |  |  |
| Ethylene C₂H₄                           | 0 10000 ppm  | ≤ ± 8% ± 4 ppm               | ≤ ±10 % ± 5 ppm              |  |  |
| Ethane C₂H <sub>6</sub>                 | 0 10000 ppm  | ≤ ± 8% ± 4 ppm               | ≤ ±10 % ± 5 ppm              |  |  |
| Methane CH <sub>4</sub>                 | 0 10000 ppm  | ≤ ± 8% ± 4 ppm               | ≤ ±10 % ± 5 ppm              |  |  |
| Propane C₃H <sub>8</sub>                | 0 5000 ppm   | ≤ ± 8% ± 4 ppm               | ≤ ±15 % ± 20 ppm             |  |  |
| Oxygen O₂                               | 0 50000 ppm  | ≤ ± 8% ± 500 ppm             | ≤ ±10 % ± 500 ppm            |  |  |
| Nitrogen N₂                             | 0 150000 ppm | ≤ ± 8% ± 1500 ppm            | ≤ ±10 % ± 1500 ppm           |  |  |
| Dissolved Moisture Analysis             |              |                              |                              |  |  |
| Measuring Quantity                      | Range        | Accuracy                     | Accuracy                     |  |  |
| Moisture in Oil (H₂O) – relative [%]    | 0 100 %      | ≤ ± 3 %                      | ≤±3%                         |  |  |
| in Mineral Oil – absolute [ppm]         | 0 150 ppm    | ≤ ± 3% ± 3 ppm               | ≤ ± 3% ± 3 ppm               |  |  |
| in Ester Oil – absolute [ppm] 4)        | 0 2000 ppm   | ≤ ± 3 % of MSC <sup>5)</sup> | ≤ ± 3 % of MSC <sup>5)</sup> |  |  |

<sup>2)</sup> 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

