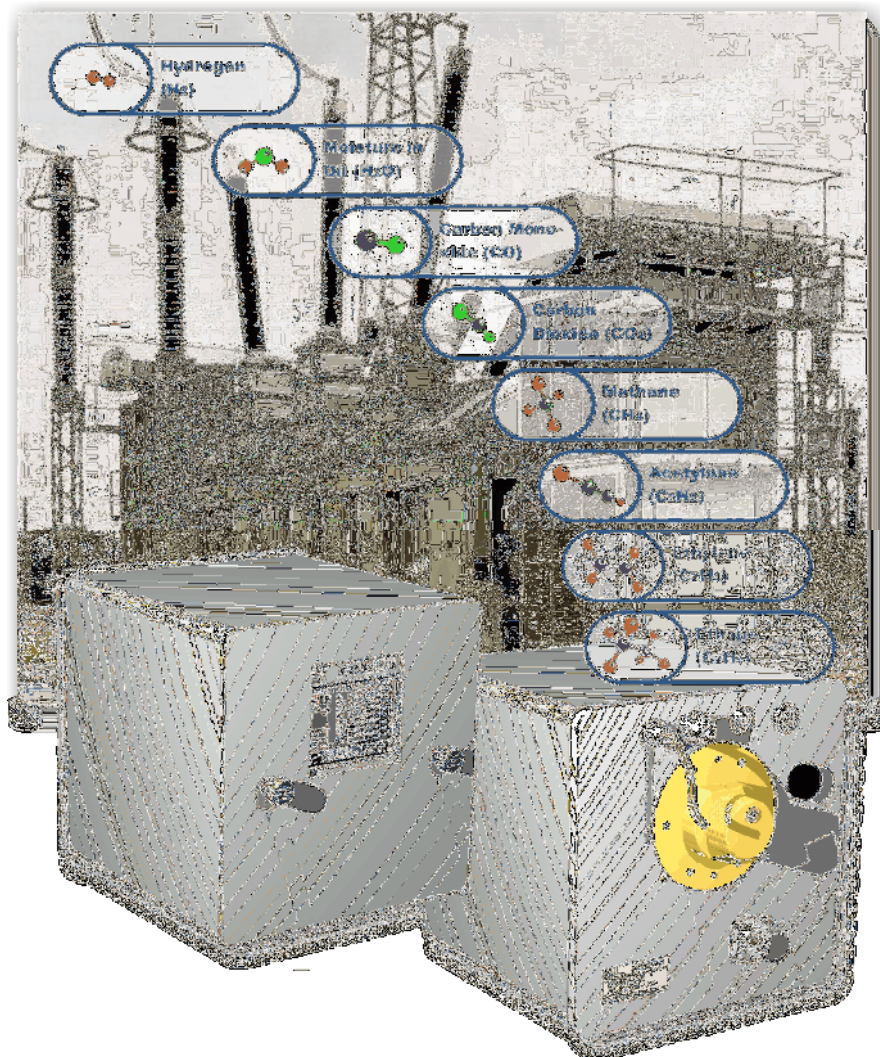


HYDROCAL 1008

Multi-Gas-in-Oil Analysis System with Transformer Monitoring Functions



The HYDROCAL 1008 is a permanently-installed multi-gas-in-oil analysis system with transformer monitoring functions. It allows for the individual measurement of moisture 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) and ethane (C_2H_6) dissolved in transformer oil.

As hydrogen (H_2) is involved in nearly every fault of the isolation system of power transformers and carbon monoxide (CO) is a sign of an involvement of the cellulosic / paper isolation the presence and increase of acetylene (C_2H_2) and ethylene (C_2H_4) further classifies the nature of a fault as overheating, partial discharge or high energy arcing.

The device can serve as a compact transformer monitoring system by the integration / connection of other sensors present on a transformer via its analog inputs:

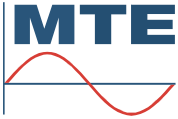
- 4 analog inputs 0/4-20mADC
- 6 analog inputs 0/4-20mADC / 0-100VAC configurable by jumpers

It is further equipped with digital outputs for the transmission of alarms or the execution of control functions (e. g. control of a cooling system of a transformer):

- 8 digital relay outputs
- 5 digital opto-coupler outputs

Key Advantages

- Hydrogen (H_2), carbon monoxide (CO), carbon dioxide (CO_2), methane (CH_4), acetylene (C_2H_2), ethylene (C_2H_4) and ethane (C_2H_6) measurement
- Moisture-in-oil measurement
- Communication interfaces ETHERNET 10/100 Mbit/s (both copper-wired/fibre-optical) and RS 485 to support proprietary communication protocols and to be open / prepared for substation communication protocols IEC 61850, MODBUS, DNP 3 etc.
- Optional on-board GSM and analog modems for remote communication
- 6 analog AC voltage inputs for the connection of capacitive HV bushing sensors for HV bushing monitoring applications



Transformer monitoring functions

Voltages and Currents

(via voltage and current transformers / transducer)

Temperature Monitoring

Bottom and oil temperature
(via additional temperatures sensors)

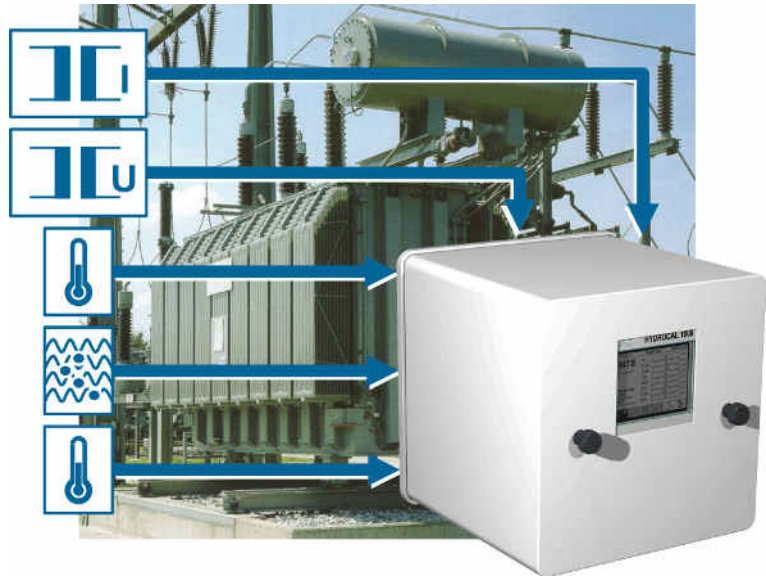
Free configuration

Analogue inputs can be free allocated to any additional sensor

Further Calculations:

Hot-Spot (according IEC 60076)
Loss-of-Life
Ageing Rate
Cooling Stage / Tap Changer Position (e.g. via current transducer)

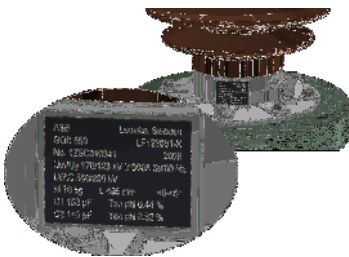
Joint development with power transformer manufacturer PAUWELS



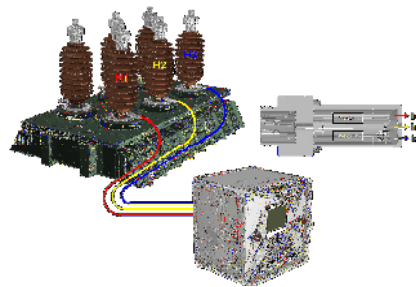
HV Bushing Monitoring

HV Bushing / Test tap / Name plate

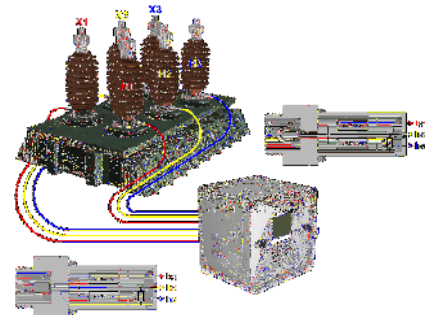
Test methods: Leakage current
Sum of currents



Capacity C1 and $\tan\delta$ / PF under factory testing are documented on name plate of bushing



Configuration 1:
Monitoring of high voltage side



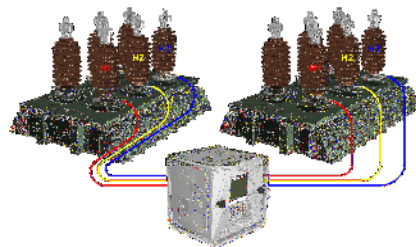
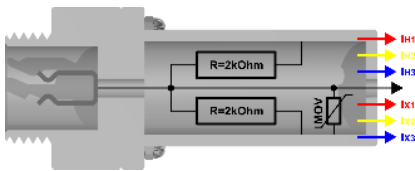
Configuration 2:
Monitoring of high voltage and low voltage side

Bushing sensor

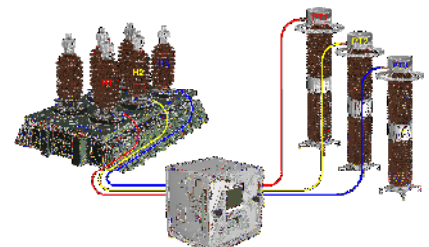
(joint development with ZTZ Services International, USA)



Test method: $\tan\delta$ (dissipation factor)
PF (power factor)



Configuration 1:
Reference HV bushing
(from other transformer)



Configuration 2:
Reference CCVT/CCPT

Operation principle

Voltage range

Resistive Bridge

69 kV – 765 kV AC
(Bushing / Primary)

Max. 2.5 kV AC
(Sensor / Secondary)

Current range

0 – 140 mA AC

Thread

0.75" / 1.25" / 2.25"

(other configurations available upon request)