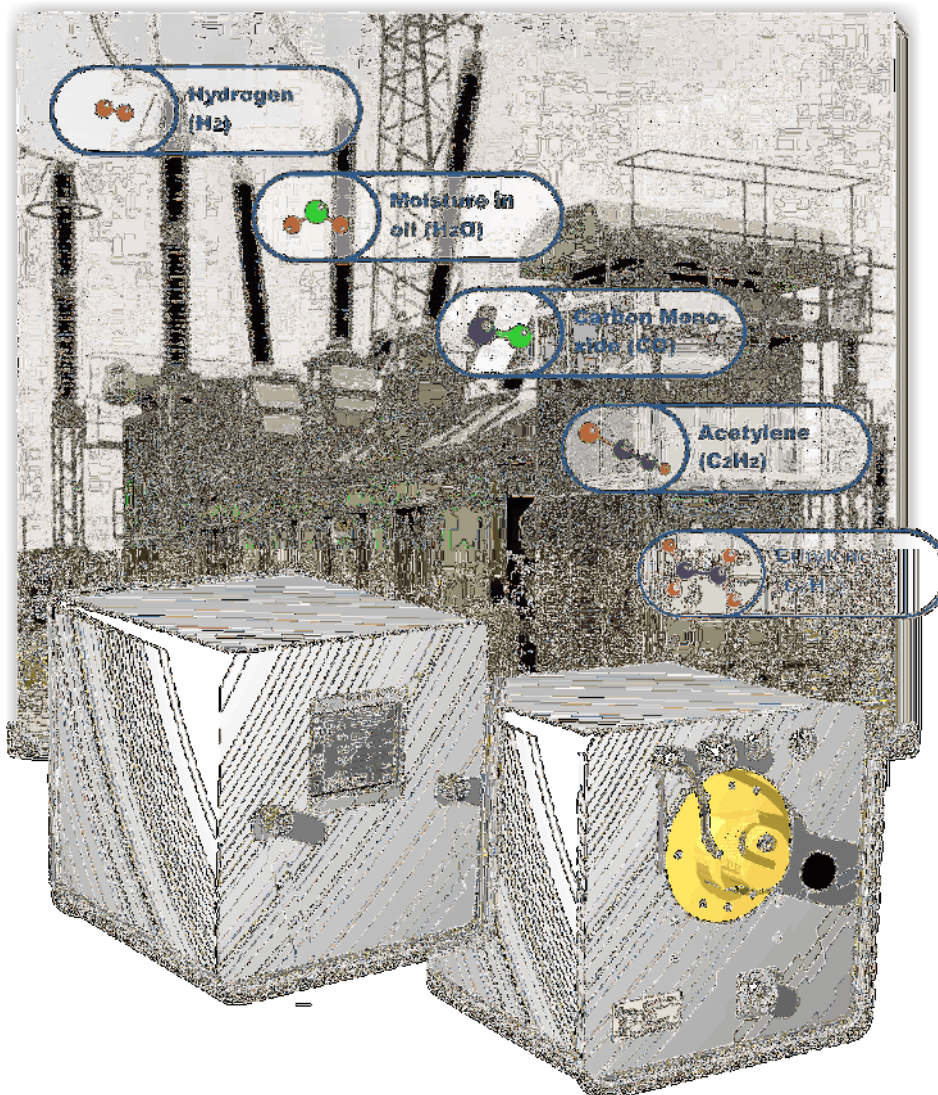


HYDROCAL 1005

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



The HYDROCAL 1005 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), acetylene (C_2H_2) and ethylene (C_2H_4) 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 0/4-20 mA DC
- 6 analog inputs 0/4-20 mA DC +20% / 0-80 VAC +20% 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):

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

Key Advantages

- Hydrogen (H_2), Carbon monoxide (CO), acetylene (C_2H_2) and ethylene (C_2H_4) measurement
- Moisture-in-oil measurement
- Communication interfaces ETHERNET 10/100 Mbit/s (copper-wired or fibre-optical) and RS 485 to support proprietary communication protocols and to be open / prepared for sub-station communication protocols IEC 61850, MODBUS, DNP 3 etc.
- Optional on-board Ethernet, GSM and analog modems for remote communication
- 6 analog AC current 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:

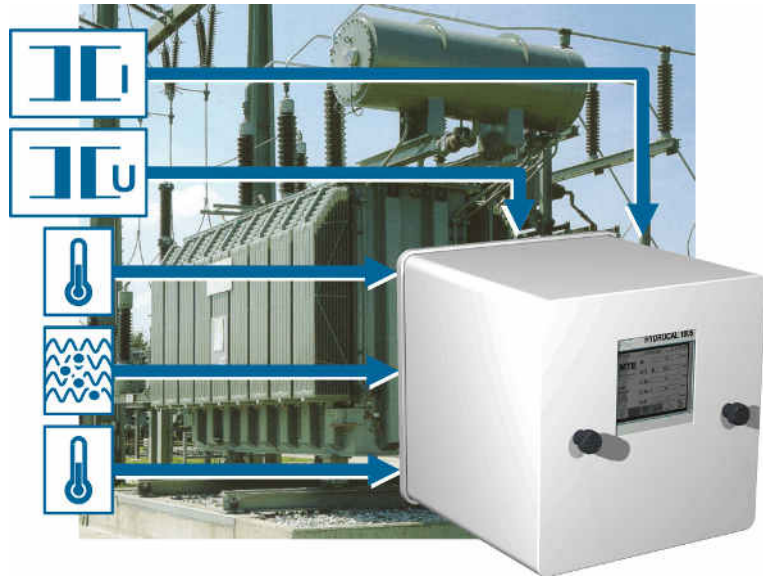
Hot-Spot (acc. IEC 60076)

Loss-of-Life

Ageing Rate

Cooling Stage / Tap Changer Position (e.g. via current transducer)

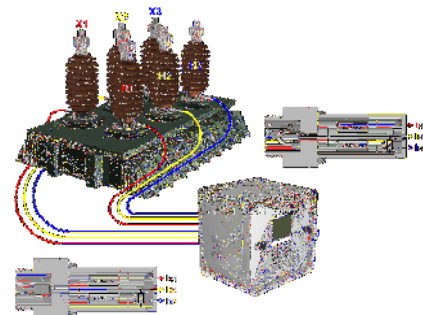
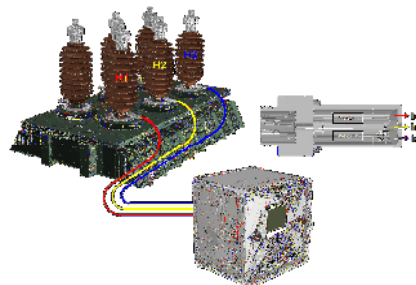
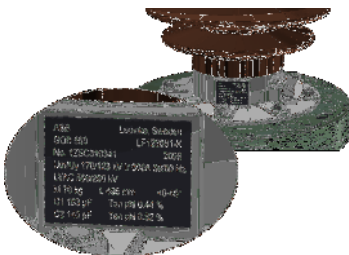
joint R&D design together with power transformer manufacturer PAUWELS



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

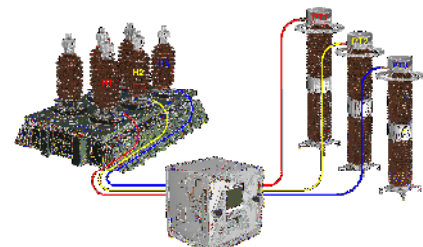
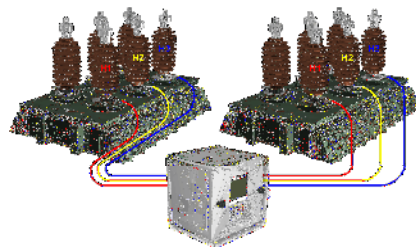
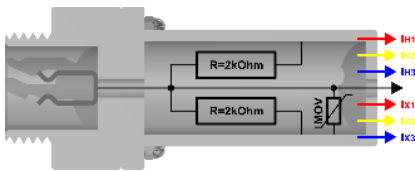
Configuration 2:
Monitoring of high voltage and low voltage side

Bushing sensor

(joint development with ZTZ Services International, USA)



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



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)

Configuration 1:
Reference HV bushing
(from other transformer)

Configuration 2:
Reference CCVT/CCPT