

# Gas Analyses for Transformer Diagnostics (GTD)



Norm-compliant transformer diagnostics (IEC 60599) is subject to the risk of false diagnoses. For a high diagnostic certainty, the risk factors must be eliminated through quality assurance and description. This is the aim of the GTD concept which includes the quality assurance of the DGA results (hermetic sampling, optimal temporal resolution) as well as the application of correction methods for transformer openness and changes in Buchholz gas. The GTD concept can be implemented in the form of the products of GATRON GmbH.

A new method of quality assurance of DGA on the basis of innovative sampling/analysis equipment is of fundamental importance. It must allow to identify both hermetic sampling techniques and the correctness of DGA results:

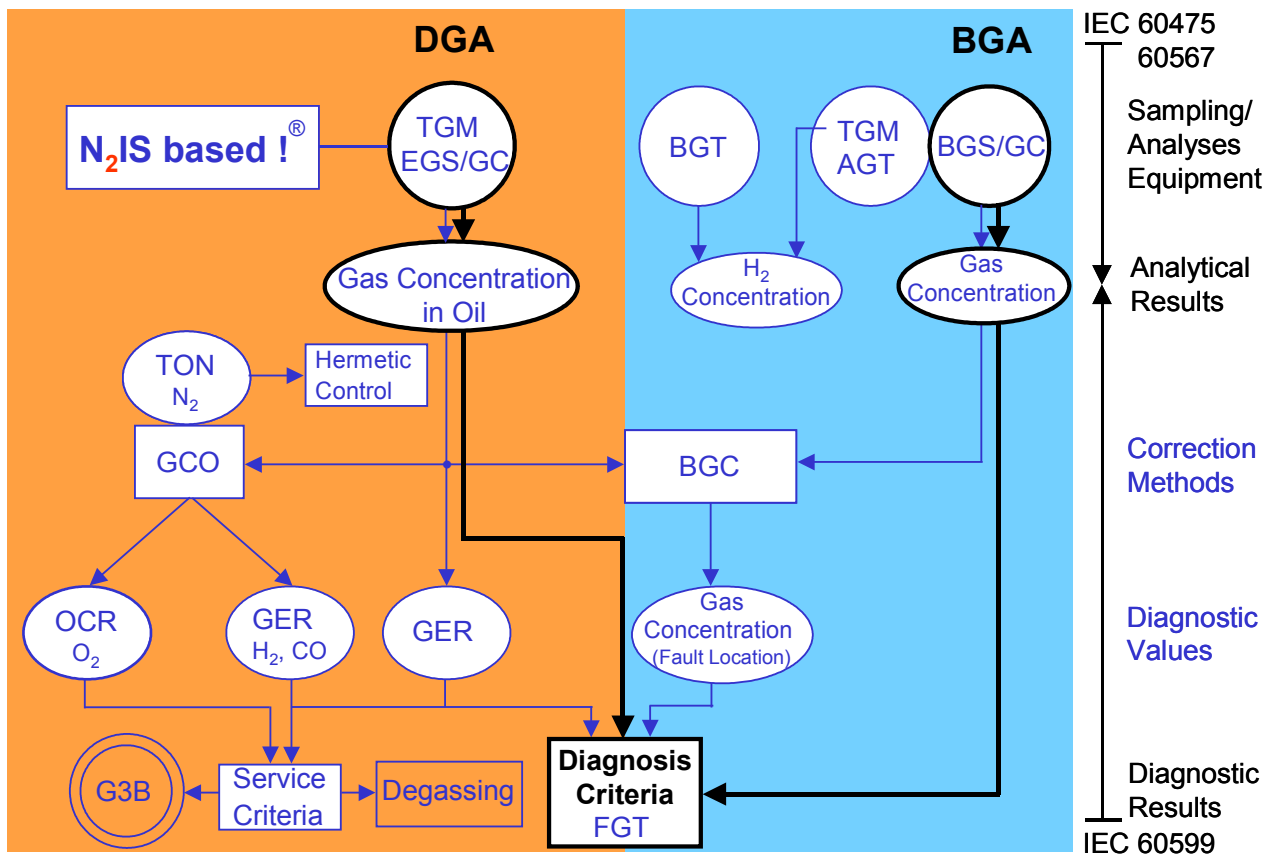
The correction method for the gas concentration in vessel oil is applied to the small oil soluble gases ( $H_2$ ,  $CO$ ,  $O_2$ ) in open type transformers. The correction method for the Buchholz gas analysis uses all fault gases and is also useable for closed transformers.

The openness of transformers can be characterised with the transformer openness number (TON). The TON is determined with the help of  $N_2$  resaturation measurements and should be recorded in the life file of the transformer. With the help of the correction method, in which the TON is integrated, the oxygen consumption rate (OCR) as well as the gas emission rate (GER) for  $H_2$  and  $CO$  can be determined. The current formation of rates from the concentrations guarantees the reliability of diagnosis. For closed transformers, hermetic control is possible.

Gas concentrations on the fault location can be determined from Buchholz gas analyses using the correction method if the Buchholz gas is directly separated from the oil at the moment of signalisation and there is a DGA at the same time.














As a diagnostic result, the fault type and intensity can be determined more reliably than before. Additionally, it is possible to check if the service criteria are reached. In special fault stages, a time limited stabilisation of the transformer operation through degassing and monitoring can be performed. For substance conservation by post installation hermetic sealing, breathing buffer boxes G3B can be installed and monitored.

## GTD Concept



# Product Range of GATRON GmbH

(as per 01.11.2012)

Product	Features
 <b>BCS</b> GATRON	Buchholzgas-Sampler for sampling/transport to laboratory in alarm situations
 <b>BCT</b> GATRON	Buchholzgas-Tester for quick analysis in alarm situations
 <b>TCM-1</b> GATRON	Trasformator-Gasmonitor quality controlled online gas monitoring
<b>-1D</b>	Diagnostic Variant expanded gas sensor for diagnostics
 <b>TCM-2</b> GATRON	Multiple for two Transformers, also as D switching between two neighbouring oil systems
 <b>TCM-3</b> GATRON	Multiple for three Transformers, also as D switching between three neighbouring oil systems
 <b>TCM<sub>mobile</sub></b> GATRON	Mobile Variant, also as D convertible, simplified installation
 <b>ECS</b> GATRON	Extracting Gas/Oil-Sampler for external analysis sampling and extraction for reliable gas-in-oil / oil-analysis
 <b>ECS-100</b> GATRON	Extracting Gas/Oil-Sampler 100 ml for small Oilsysteme
 <b>ACT</b> GATRON	Automatic gas transporter diagnostic accessory to the Buchholz Relay
 <b>C3B</b> GATRON	Breathing Buffer Box post installation hermetic sealing of open type transformers
 <b>FCT</b> GATRON	Fault Gas Triangle (Software) visualisation of fault gases for diagnostics
 <b>CCO</b> GATRON	Gas correction of openness (Software) gas emission rate and oxygen consumption rate
 <b>BCC</b> GATRON	Buchholzgas Correction (Software) calculation of original fault gases