Transformer Service

OnlineDGA
System for On-Line Dissolved Gas Analysis

Introduction

ABB's latest development in online monitoring is the On-line Dissolved Gas Analysis system (ABB OnlineDGA) for power transformers. An automatic on-line analysis of 11 gases is done in the two steps identically with the laboratory procedure ensuring a high preciseness and reliability:

– Degassing of the oil sample through vacuum extraction (according DIN/IEC 60567/567)
– DGA trough gas chromatography with Thermal Conductivity Detector (TCD), Flame Ionization Detector (FID) and Methanizer.

The new method of vacuum gas extraction works without Mercury use, thus there is no risk of a environmental contamination but it is still fully compatible to existing methods of vacuum degassing.

Why should ABB OnlineDGA be installed?

The transformer internal condition can be detected through oil analysis. For some power transformers the development of critical faults which could cause its damage left undetected. There is high probability of capturing these changes with ABB OnlineDGA, thus critical breakdowns might be avoided.

What kind of gases can be detected?

For the separation of the different components a capillary column is used. Detection is carried out with a Thermal Conductivity Detector (TCD), Flame Ionization Detector (FID) and Methanizer.

The following gases can be detected automatically:

ABB OnlineDGA	ASTM 3612	IEC 567
Oxygen (O_2)	✓	✓
Nitrogen (N_2)	✓	✓
Hydrogen (H_2)	✓	✓
Carbon Monoxide (CO)	✓	✓
Carbon Dioxide (CO_2)	✓	✓
Methane (CH_4)	✓	✓
Ethane (C_2H_6)	✓	✓
Ethen (C_2H_4)	✓	✓
Ethin (C_2H_2)	✓	✓
Propane (C_3H_8)	✓	✓
Propen (C_3H_6)	✓	✓

Which preparations are necessary?

For securing a smooth workflow we kindly ask you to prepare the following:

– the transformer needs to be switched off and grounded
– the storing position of the ABB OnlineDGA must be prepared
– a stable power supply 230V is needed to operate the ABB OnlineDGA

How long does it take?

One day for the connection and the commissioning of the online monitoring system. One day for training.

What does ABB need to prepare an offer?

We need:

– Rating plate
– outline drawings
– location
– photos of the object

Operation and Updates

The whole system is controlled by a micro-processor. The intervals of the analysis can be defined by the operator. The ABB OnlineDGA can be also integrated with the ABB TEC system using the Can-Bus interface. The connection between transformer and the OnlineDGA will be ensure via Swagelok piping. All results are displayed in ppm and the sensitivity is as low as 0,1 ppm (for certain hydro-carbons). Additionally all other operating condition are stored in a data-base. The data can be transmitted to a remote computer or control room. The alarm function is integrated like exceeding of the specified gas level, interruption of power supply and an effective traffic light system can provide status indication. The whole system is installed in air conditioned housing. The system hardware and software is based on well-proven ABB industrial technology.

Conclusion

Power transformers are the most expensive single elements of the high-voltage transmission system. Due to using the ABB OnlineDGA it is possible to increase operating safety while simultaneously reducing costs. ABB OnlineDGA can be used for maintenance and asset life management, for early fault detection, to enhance or monitor performance. OnlineDGA can monitor two transformers in parallel.

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