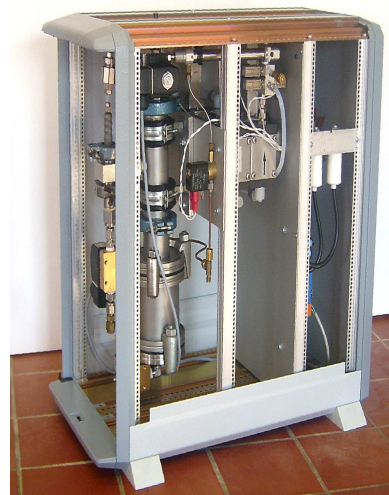


## **Total Dissolved Gas Content ( TDGC ) for Insulation Liquids accord. To IEC 567 and IEEE C57.104-1991**



### **Automatic analysis of the dissolved gases in oil-filled transformers**

The analysis is done in 2 steps which guarantee a very high selectivity and sensitivity of the determination of dissolved gases:

1. Gas separation by means of fully vacuum degassing ( accord. to DIN EN 60567, DIN IEC 599 and IEEE C57.104-1991) and display of results
2. Option: Subsequently to the determination of the total gas content a gas chromatographic analysis can be made.

Both steps are synchronized via a micro-processor control thus a fast and reliable measurement procedure is guaranteed

### Vacuum Degassing

A new invented vacuum degassing method (Patent pend. DE 102 52 652 4) degasses the oil sample multi-periodical. After extraction through a 4 step vacuum pump the gases are dosed into vacuum chamber and separated. The gases are evacuated from the vacuum chamber with a vacuum pump; therefore a very high sensitivity can be reached. The measuring principle is shown in fig, 1.

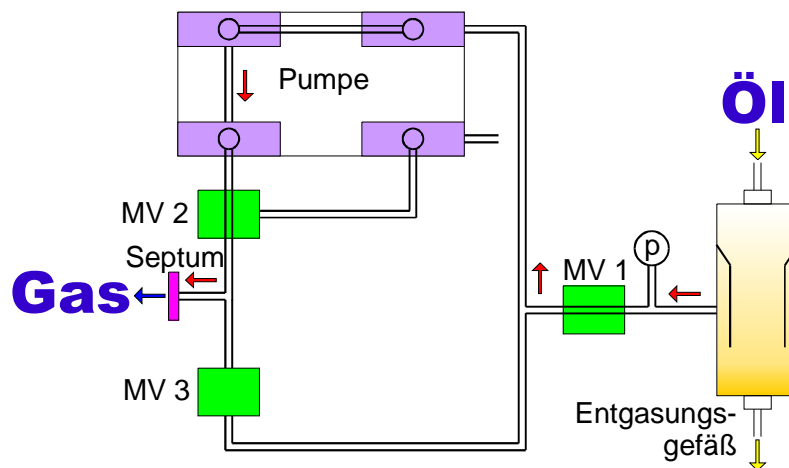


Fig. 1: Gas separation principle

In and outlet of the oil sample as well as the switching valve are micro-processor controlled, a feedback of the oil into the transformer is possible. A linear pressure sensor measures the total gas content online which is a very important quality parameter for the characterization of the transformer load.

The injection of the gas sample into the gas chromatograph is via a fixed mounted and heated transfer pipe. An additional port for withdrawal of gas samples is installed.

### **Control and Evaluation**

The system is controlled by a micro-processor; a serial interface (RS 232) allows transferring the data to a remote computer.

The intervals of the analysis cycle can be freely defined by the operator (number of analysis/day or hour).

The system has 8 additional analog inputs (0 -1 V) for the measurement of other transformer parameters (Oil temperature, winding temperature, ambient conditions etc.) The connection of these external sensors is through relay contacts (N/C or N/O, to be specified by the customer).

### **Display of results**

All results of the total gas content are displayed in Vol% and are stored in a databank.

The results are displayed on the monitor, in a spreadsheet and in a printed report. All these data can also be transferred and displayed on a remote computer. All data are continuously stored in a measurement file.

The results are stored together with all measurement parameters in a log.file. The history of the stored data starts with the day of commissioning and covers several years.

**Specification of vacuum degassing equipment:**

Type:	vacuum degassing procedure, oil- and mercury-free
Vacuum connections:	DN 16 KF
Vacuum Pump:	diaphragm pump chemically resistant tree-stage compact modular design Pumping speed: 2,0 m <sup>3</sup> /h
Vacuum sensor:	measuring range: 0,1 – 200 mbar read-out: 5 per sec independent of type of gas accuracy / hysteresis: +/- 1 digit
Starting vacuum:	2 - 3 mbar
Degassing range:	2 - 200 mbar
Resolution:	0,1 mbar
Sample volume:	50-100 ml
Preconditioning time:	< 5 min
Degassing time:	< 2 min
Gas transfer to GC:	manually or automatically
Power supply:	230 V, 50/60 Hz; 115 V, 50/60 Hz