SIMMS 2.2

Solid Insulation Moisture Measurement System

Portable Online & InSitu Transformer Diagnostic System

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Solid Insulation

The accurate recording and managing of the water content in the transformer solid insulants Qp (%), the tracking and limiting of the impact on the aging rate of the paper, and the maintaining the desired dielectric strength of oil Ud (kV/2.5mm) at maximum process temperatures, have never been cost-effective and easy to achieve.

However, it is one of the most pro-active, pro-safety, life-extending, and cost-reducing preventative strategies available to a transformer manager.

One oil sample a year does not provide the degree of data and accuracy necessary for the competent failure risk management and for managing the transformer's appropriate insulation treatment program.

SIMMS 2.2 is a portable oil sample and temperature diagnostic system, without the sampling contamination and variance risk.

Connect SIMMS to the oil sampling points of a transformer, connect the two temperature sensors, plug in, and start.

From this moment on the sampled oil is by no means exposed to the atmosphere. Oil will flow from the transformer through SIMMS and return to the transformer.

SIMMS gives us then the all desired time-related profile - water content in oil Qw = Qw (t) and both temperature Tu = Tu (t), Tb = Tb (t) – upper / bottom transformer temperatures and TTS as main (averaged) transformer temperature. Both averaged Qw value and TTS value can be accurately used for calculating the water content in the cellulose Qp = Qp (Qw, TTS).

SIMMS is basically used for two diagnostic procedures of transformer :

- **moisture problem** – the standard reading based on the Karl Fisher method only shows very often the deep inconsistency between the predicted and real amount of removed water
- **dielectric problem** – the lab reading of the dielectric strength of aged oils is very often inconsistent with the water content in the oil acquired by the Karl-Fisher method.

Both problems solve the direct online reading of the relative humidity of the oil, the reading of the transformer's operational temperatures, and their proper evaluation.

The **ARS-Altmann** has therefore released the **SIMMS 2.2**, version 2020**,** a miniaturized portable oil sampler & evaluation system which enables the **in situ** of the correct samplings and corresponding relevant readings and evaluations of all values as mentioned earlier.

The SIMMS 2.2 can be easily used for the reading of any kind of a transformer.

The primary readings and diagnostic results achieved by the **SIMMS 2.2** system covers the following diagnostic areas:

- water content in oil
- water content in cellulose + ***determination of the amount of water to be removed to meet norm-required water content in oil at the transformer's requested temperature***.
- TLC relation, the prediction of actual (theoretical) dielectric strength of oil (Ud-value) as the function of the temperature of the transformer + ***determination of the amount of water to be removed to meet the norm-required value of dielectric strength in oil at a requested temperature of the transformer***

The major advantages of **SIMMS 2.2** are:

- **easy installation and commissioning**

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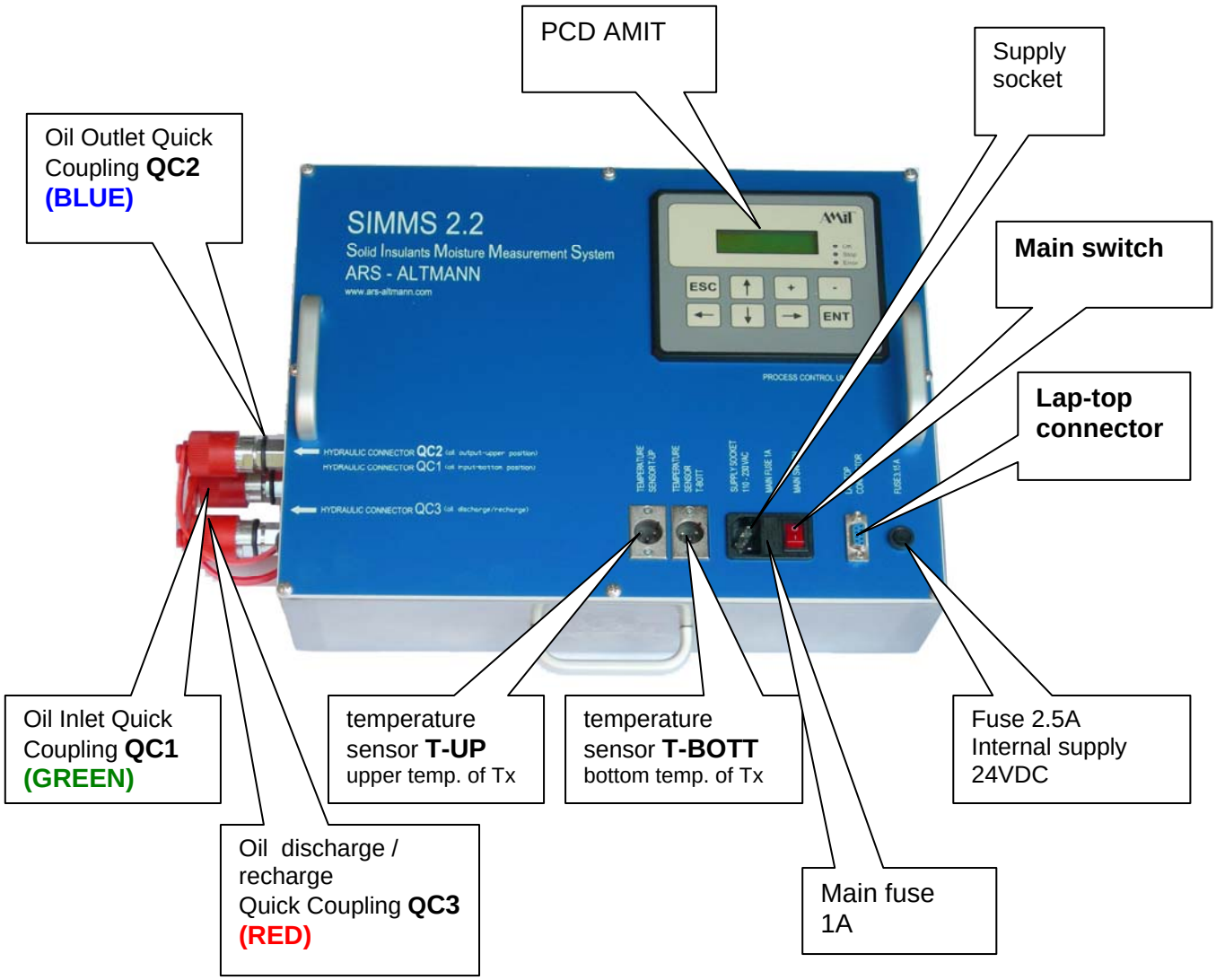
- **on-line reading** – under normal operational conditions of a transformer
- **no contamination of oil within sampling & reading**
- **no loss of oil due to sampling**
- **first results are available in situ, in hours**

The **SIMMS 2.2 ,** consists of :

- **Service Unit** (**SU**), the hydraulical system which samples the oil from the oil filling of a transfrormer, then reads the basic data giving the relative moisture of the oil and transformer temperatures, analyses and evaluates them and forces the oil back into the transformer.

The SU can be used separately, but only for acquiring of elementary data of a transformer.

- **lap-top** interconnected to the **SU** via a data and control cable, then reads the information preprocessed by the **SU**, evaluates them in more detailed manner and offers their time-related visualization and interpretation.

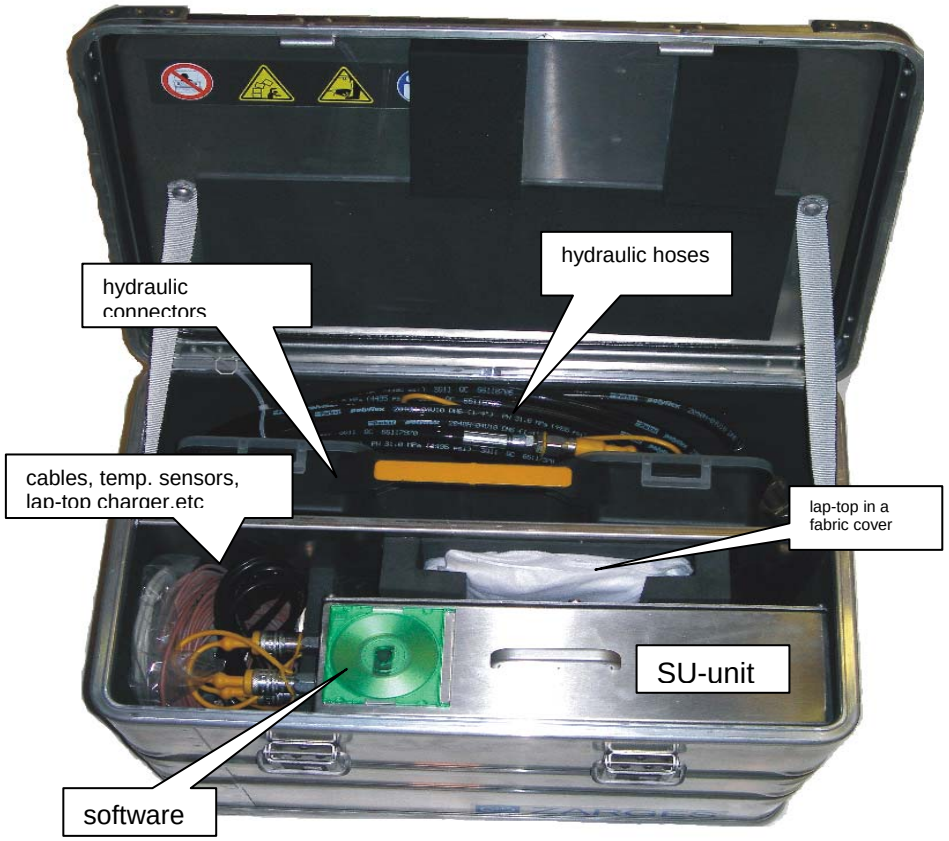


Service Unit (SU)

Specification

Power supply voltage	80 – 250 VAC
Power supply frequency	50 - 60 Hz
Power consumption:	max 80W
Oil throughflow	max 100l per hour
Measuring range	
Water content in the oil	5 – 100 ppm (diluted water)
Temperature	0 – 100 C
Outlet /inlet filtering grade of preliminary filter	40 µm
Weight – inclusive lap-top, alu transport box and accessories	22 kg
Dry weight of the measuring unit only (without oil)	5 kg
Hydraulical connection	2 x flexible hose
Communication:	lap-top connector

Transportations



SIMMS 2.2 Service Unit is always transported, inclusively the lap-top and all accessories in high resistant alu box intended for all-day operations under very heavy conditions

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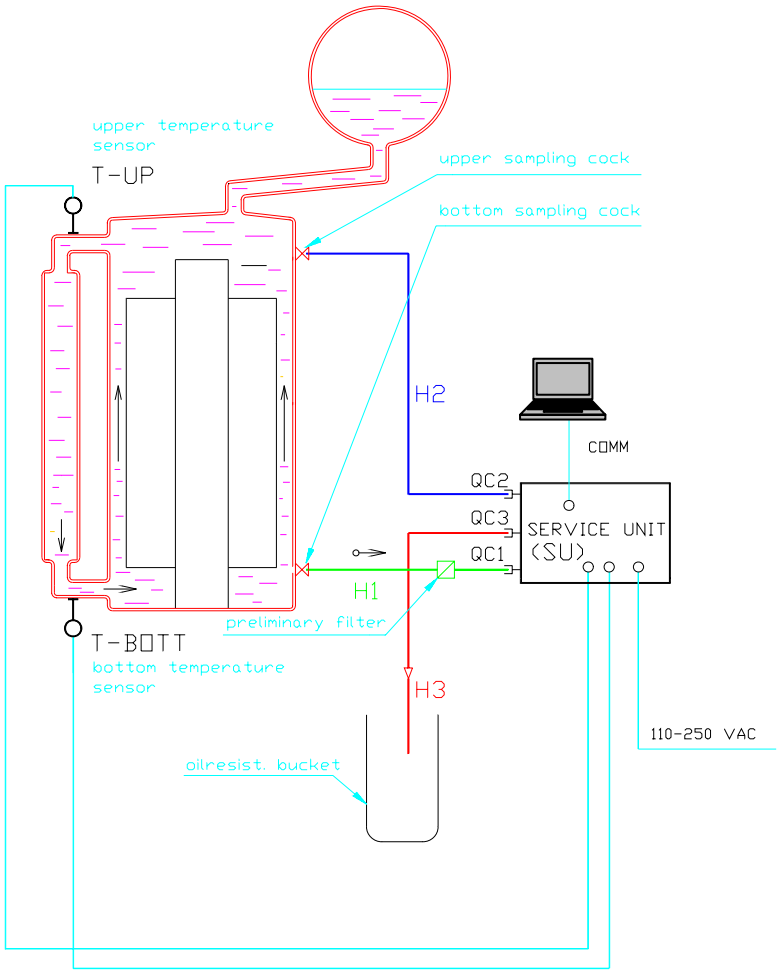
4. Installation & Commissioning

SIMMS is connected to two oil sample taps, one at the top one at the bottom. Then, both connecting hoses are evacuated to avoid contamination by air-moisture and a potential Buchholz trip. The oil is then drawn continuously through the SIMMS unit and passed back to the transformer. The temperature sensors are fitted to the designated top and bottom positions. Once SIMMS is installed, connected and started (ca 10 minutes), the transformer´s top (T-UP) and bottom temperatures (T-BOTT) and water content in the oil Qw (ppm) are recorded in a time-based log.



Within 40 minutes an accurate snapshot decision info - if the adequate equilibrium is reached or not is obtained.
That allows precise accuracy in determining water content in the solid insulation, and the temperature related movement and time lag of the water movement between the paper and the oil. The dielectric strength and load risk at peak load can be determined more accurately. While online, the data can be accessed directly by lap-top, the graphs of trends produced, and saved as a file.
To meet plug & play features of SIMMS 2.2, the inherent part of the delivery is pre-programmed lap-top to avoid any communication and evaluation problems.

For the desired precision reading of the water content in the oil, the precise evaluation of the water content in oil (the Qw-value), the relevant evaluation of the water content in cellulose (the Qp-value), and the theoretical dielectric strength of oil (the Ud-value.

The average temperature of a transformer during a reading should always be over 30 C.

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