

SIMMS

Solid Insulation Moisture Measurement System



Portable Online Transformer Diagnostic System

Copyright: Ing. Altmann 2011

Solid Insulation

The accurate recording and managing of the water content in the transformer's solid insulation C_p (%), the tracking and limiting of the impact on the aging rate of the paper, and the maintaining the desired dielectrical strength of oil U_d (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, life extending, and cost reducing preventative strategies available to a transformer manager.

One oil sample a year collected in a glass bottle or syringe, processed in a lab, with a high degree of variability due to the process and lack of controls, does not provide the degree of data and accuracy necessary for the competent failure risk management and for managing the appropriate insulation treatment program of the transformer.

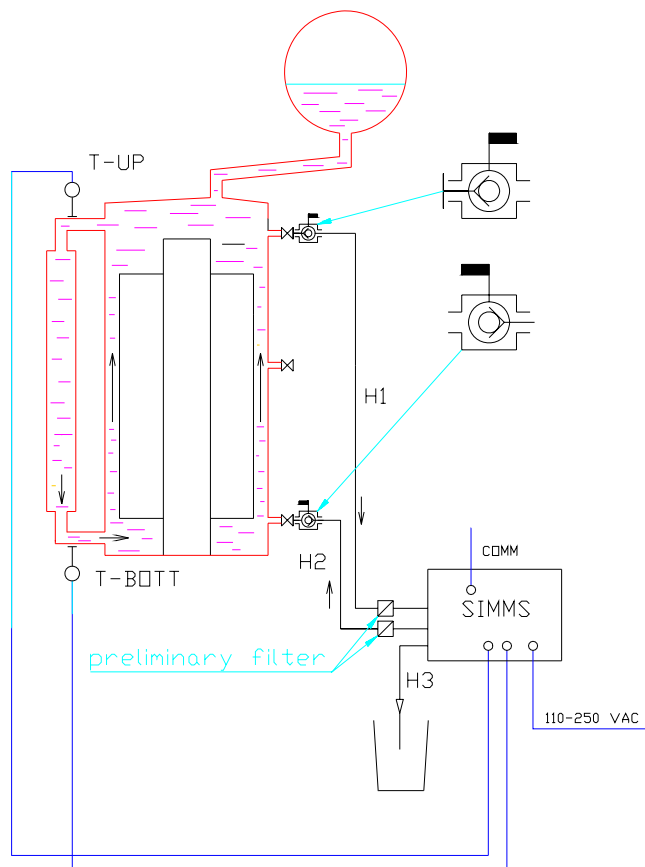
With the release of the SIMMS portable online oil and solid insulation water diagnostic system, ARS Altmann Systems has produced and sent out this key transformer information.

SIMMS is a portable oil sample and temperature diagnostic system, without the sampling contamination and variance risk. Simply 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 $C_w = C_w(t)$ and both temperature $T_u = T_u(t)$, $T_b = T_b(t)$ - upper / bottom transformer temperatures and TTS as main (averaged) transformer temperature. Both averaged C_w value and TTS value can be accurately used for calculating the water content in the cellulose $C_p = C_p(C_w, TTS)$.

SIMMS is basically used for two diagnostic procedures of transformer :

SIMMS – 2P (two point connection)

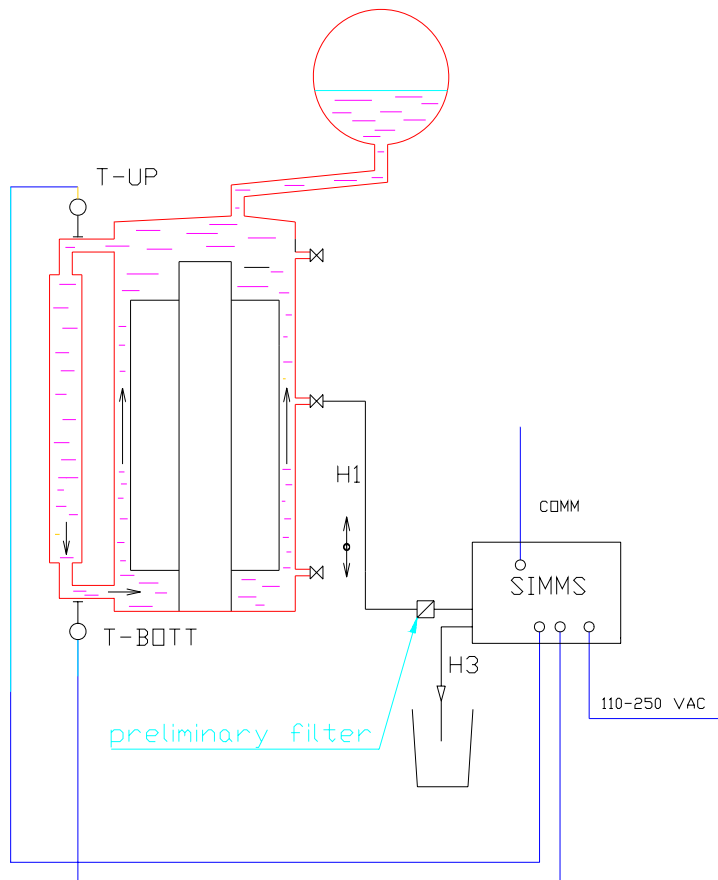


SIMMS –2P is connected to two oil sample taps, one at the top one at the bottom. Then, both connecting hoses are evacuated to avoid contamination by air-moisture. The oil is then drawn continuously through the SIMMS unit and passed back to the transformer. Independent temperature sensors are fitted to the designated top and bottom positions. Once SIMMS–2P is installed, connected and started (30 minutes), the transformer's top (T-UP) and bottom temperatures (T-BOTT) and water content in the oil C_w (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 (See Transformer equilibrium check)..

That allows precise accuracy in determining water levels 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.

SIMMS – 1P (single point oil connection)



SIMMS - 1P is connected to one central oil access point, midway up the main tank. Having evacuated the hose H1, SIMMS periodically draws the oil sample down, analyses it and returns it to the transformer. These steps clear the lines and ensure that the sample always represents the pattern of oil inventory. It is highly convenient for smaller transformers, or larger transformers with the oil sample access is directly connected to the oil in the main tank without internal piping. Temperature sensors are connected to the bottom and top sleeves connecting the main tank with radiators allowing an average temperature to be established. Alternatively it can be connected to the top or bottom oil points, with care taken of the analysis on the “average” level of the water content in the oil inventory.

SIMMS -1P can be used for quick online snapshots of water in the oil and temperature profiles.

Transformer Equilibrium Check

The first and basic question to be asked after the measurement is : are the adequate equilibrium conditions (approximately constant temperature TTS and water content in oil C_w) in the transformer reached or not .

This evaluation is made (after the measurement by SIMMS is finished) by a lap-top connected by cable to the SIMMS.

If **yes** – all necessary calculations (water content C_p , Temperature Loading Curve - TLC ...) can be made immediately by means of this lap-top (and TRACONAL Program – See www.ars-altmann.com /Product Range/TRACONAL).

If **not** – the on-line measurement for a twenty-four hour period (or a complete load cycle period) is usually necessary. That allows to reach the desired accuracy in determining water levels 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 immediately and accurately estimated and/or determined.

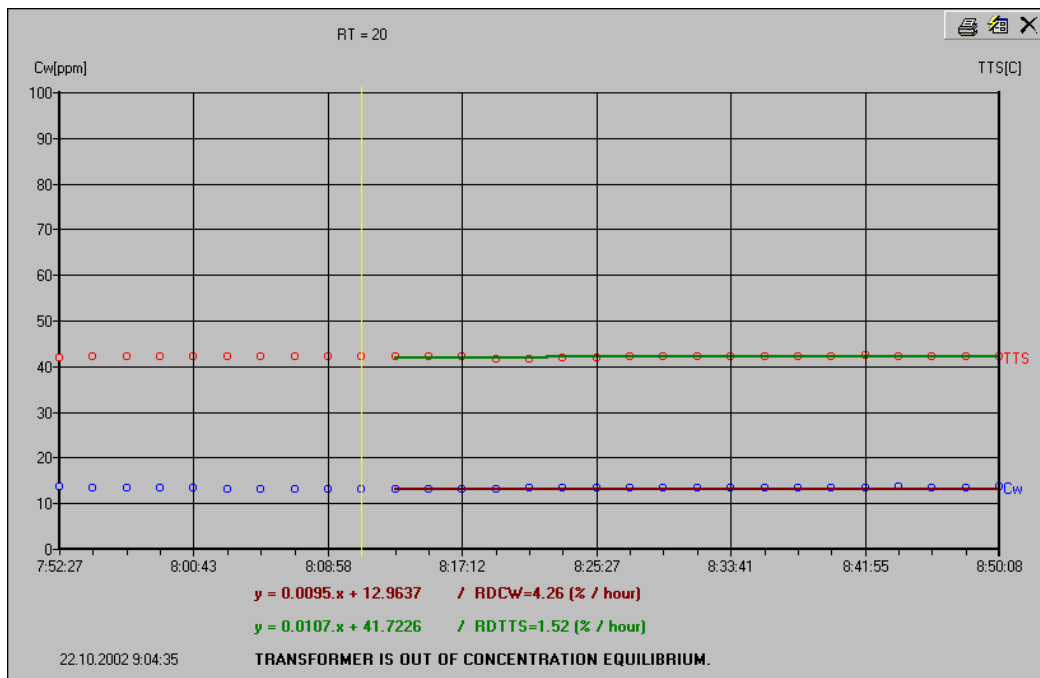
The SIMMS data can be basically accessed :

- directly and immediately by lap-top
- remotely on your PC via an analogue phone connection (on special request)

In both cases the graphs of trends and results are saved as a file in the lap-top.

Yet, for a proper and precise quantitative time-log analysis - is this technique is clearly unsuitable. Thus, the linear regression for both time trends $C_w = C_w(t)$ and $TTS = TTS(t)$ constitutes the best effective method.

The procedure is started by clicking on the icon 



and at the same time we get Transformer Equilibrium Check

ADCW (Actual absolute drift of Cw):	0.57	(ppm / hour)	RT	20	(min)
ADTTS (Actual absolute drift of TTS):	0.64	(C / hour)	MADCW:	5.00	(%/hour)
RDCW (Actual relative drift of Cw):	4.26	(% / hour)	MADTTS:	5.00	(%/hour)
RDTTS (Actual relative drift of TTS):	1.52	(% / hour)			
ACW (Averaged water content in the oil)	13.36	(ppm)			
ATTS (Averaged temperature of transformer)	42.16	(C)			


TRANSFORMER EQUILIBRIUM OK.

Recount

Close

All measured data can be properly named and sent to Archive by clicking on 

or sent to the clipboard for reprocessing 

or can be re-opened by clicking on  and evaluated under different MAD (Maximal Actual Drift) -limits.

From **ACW (ppm)** and **ATTS (C)** value an accurate water removal treatment plans can be established using Altmann **TRACONAL** analysis System – See www.ars-althmann.com

For more informations concerning the relevancy of measured data See: www.ars-althmann.com / News/ Papers/ Water problem of aged transformers.

Contacts

Producer:

ARS - ALTMANN RECOVERY SYSTEMS
 Machova 142, 344 01 Domazlice, Czech Republic
 tel.: + 420 379 788 391, + 420 379 738 778
 fax.: + 420 379 738 775
 handy: + 420 602 362 157
 e-mail: altmann@iol.cz
www.ars-altmann.com

OUR PARTNERS

Fa. Andreas Henghuber
 ARS - Altmann Systems
 Oberhausbach 2
 D-84 332 Hebertsfelden
 Germany
 Tel. +49(0) 8727 7180
 Fax.. +49(0) 8727 96 9827
 mob: +49(0) 171 547 5391
 e-mail: Ahenghuber@aol.com

**Wuhan HengCheng
 Eletricpower Tech. Co.Ltd.**
 802 Room 5 Building
 Wuhan, Hubei 430074
 P.R.of China
 Responsible person: Yan Jie
 Tel.:+86-27-87496061
 Fax.:+86-27-59715145
 Handy:+86-13909241723
 Web site:www.hchco.cn
 E-mail:
hcqiye_wh_yj01@163.com.cn

MTC Power Technology Ltd.
 Kallipoleos and Ifigenias I,
 Office 501, Amaral 30
 Nicosia 1055, CYPRUS, EU
 Email: sales@mtcpowertec.eu
 Fax: +357 (22) 752009

**HOLDEN ELECTRONICS
 INDUSTRIES Ltd., GUINEA**
 ODUBENA AVENUE,
 IJESHATEDO 101015,
 SURULERE, LAGOS NIGERIA.
 Contact person: Julius Ogunsanya
 TEL: +234 1 723 7447
 MOBILES: +234 805 784 8434;
 708 255 4255; 702 962 4520
 e-mail:
julius_holden38@yahoo.com

Haris Al Afaq LLC.
 P.O. Box No. 8141
 Dubai , U.A.E.
 Contact person : R.Chakravorty
 Tel No : 009714-2719624/625
 Fax No : 009714-2719285
 handy No : 0097150-5259448
 e-mail: ranadhir@haris.com

VH Ingeniería
 Ing. Luiggi 719- Bahia Blanca
 Bahia Blanca – Buenos Aires
 CPA (B8000JUO)
 Argentina
 Contact person:
 Victor Vercellino
 tel.: 54-291-4525662
 handy: 54-291-154622310
 E-mail:
victor.vercellino@gmail.com

**Boston Home Inc.
 Industrial Supply**
 168 Apo St., Sta. Mesa Heights
 Quezon City, Philippines
 Tel +632 4123726
 Fax +632 4150130
 Responsible person: Bernard
 Tiongson

STEVO Electric BVBA
 Hamssesteenweg 22/6
 3971 Leopoldsburg Heppen
 Contact person: Stefaan
 VOLKAERT
 Tel.: +32 11 341001
 Fax.: +32 11 347977
 Mob.: +32475823954
Stefaan.volkaert@stevoelectric.be
www.stevoelectric.be

**LABMETRIK ELECTRICAL
 SDN.BHD. (465906-V)**
 26-G,BLOCK E, JALAN MAJU
 3/3, TAMAN LEMBAH MAJU,
 KUALA LUMPUR
 MALAYSIA
 Tel.: 603-4297 5555
 Fax.: 603-4297 7733
 e-mail:labmetrik@gmail.com

**CTR Manufacturing
 Industries Limited**
 403B, Turf Estate, Shakti Mills
 Lane, Mahalaxmi (West)
 MUMBAI 400011, INDIA
 Contact person:
 Mr. D.S.Jain
 e-mail: powerquality@ctr.in
 TEL : 91.22.24920454