

ADT

ON-POWER DEHYDRATION OF TRANSFORMERS

FOR VERY HEAVY WORKING CONDITIONS
ON POWER RECOVERY OF DIELECTRIC STRENGTH



LIFE EXTENSION OF TRANSFORMER
REMOTE PROCESS CONTROL AND MONITORING
EASY CHECK OF FUNCTION VIA YOUR HANDY
ON-LINE DIELECTRIC SCREENING
EASY VERIFICATION BY LAB RESULTS
PLUG & PLAY INSTALLATION
MINIMUM SUPERVISION AND/OR MAINTENANCE

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Drying of transformers

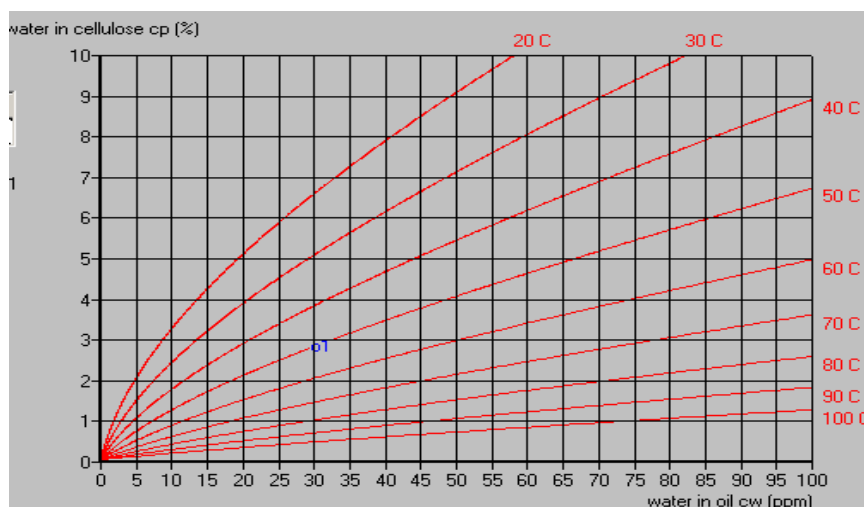
The presence of moisture in the transformer, to whatever degree, actually harms the insulation which will be permanently damaged. Drying methods can substantially reduce that deterioration.

The **ADT** is suitable for mobile and preventative use on transformers with more than 2 - 2.5% water content in the cellulose and with particle contamination. The **quick restoration of safe dielectric conditions, life-extending features, and remote control** also form part of this concept.

Main features

- ❑ **Easy and safe installation and commissioning:** all procedures are computer-controlled to avoid any human lapses and errors
- ❑ **No disconnection of the transformer under treatment, not even during the installation of the dehydrator (Plug & Play design)**
- ❑ **No air venting after installation:** hydraulical interconnections to a transformer oil filling are set under vacuum and subsequently rinsed by oil
- ❑ **Moisture and particles content is reduced to the level of a new transformer**
- ❑ **Quick restoration of dielectric strength of oil**
- ❑ **No impact on the insulating oil properties and DGA**
- ❑ **Direct check of dehydration efficiency based on the amount of removed water:** calculated as the product of difference input-output water content in oil (2 x humidity sensors) x precise volumetric reading of oil throughflow
- ❑ **Easy and safely replacement of adsorbent cartridges and filters without a potential oil spill:** the oil is removed before replacement and forced back to the oil filling of transformer
- ❑ **Easy control of function by SMS via your handy**
- ❑ **Remote monitoring & control of drying process: all relevant data are recorded and displayed (printed) as easy comprehensive diagrams**
- ❑ **Calculation of actual value of dielectric strength (Ud-value) of oil during the whole dehydration**
- ❑ **Easy verification of simulated Ud-values by lab reading(s) by means of Verification diagram**
- ❑ **DOG (Dynamic Overdrying Guard) procedure inhibits the overdrying of hard insulants**

HOW MUCH MOISTURE IS “TOO MUCH MOISTURE” ?



Moisture enters the transformer either through external contamination, or is generated internally by the oxidation (aging) of insulants. In either case, practically all the water present in the transformer (over 98%) is contained in solid insulants because the cellulose is very hygroscopic.

The figure shows the equilibrium relationship between the water content in the oil Q_w (ppm) and cellulose Q_p (weight %) at different operational temperatures.

Example: **10MVA Transformer, 700 kg cellulose, 6000 kg oil**

Sampling temperature 50C, $Q_w = 30$ ppm of water in the oil $\rightarrow Q_p = 2.9\%$ weight percent of water in the cellulose

Total amount of water in the cellulose: $700 \times 0.029 = 20.3$ kg

Total amount of water in the oil : $6000 \times 0.000030 = 0.18$ kg

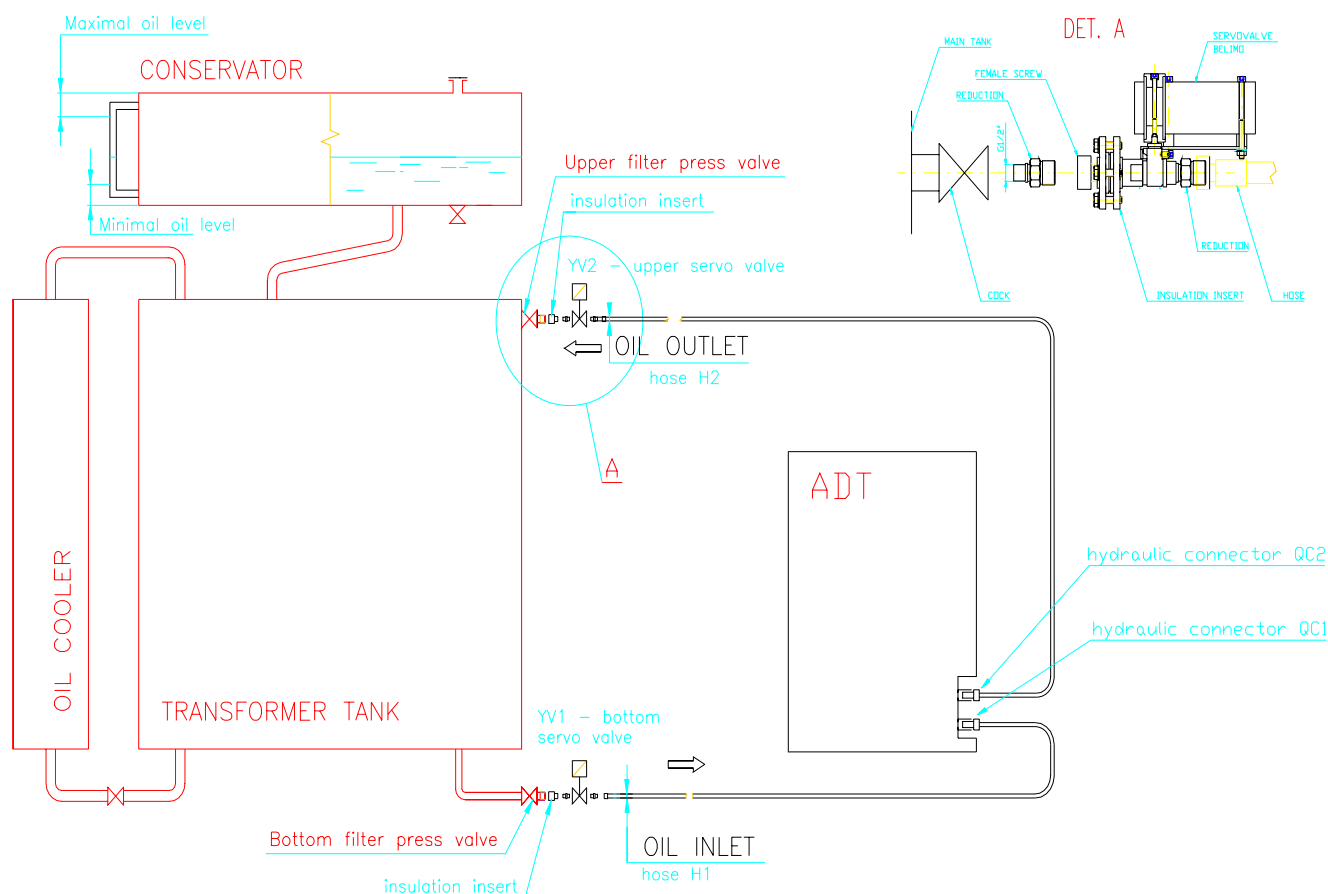
If one wishes to reduce the moisture to an acceptable 2% boundary, then: $700 \times (0.029 - 0.02) = 6.3$ kg of water must be removed from the transformer.

The effect of moisture on the transformer shows Table 1.

Q_p (weight % in paper)	Transformer condition
0.5	new or highly dried
2.0	acceptable condition
3.3	paper starts to deteriorate
4.5	flashover possible at 90C
7.0	flashover possible at 50C
8.0	who knows ?

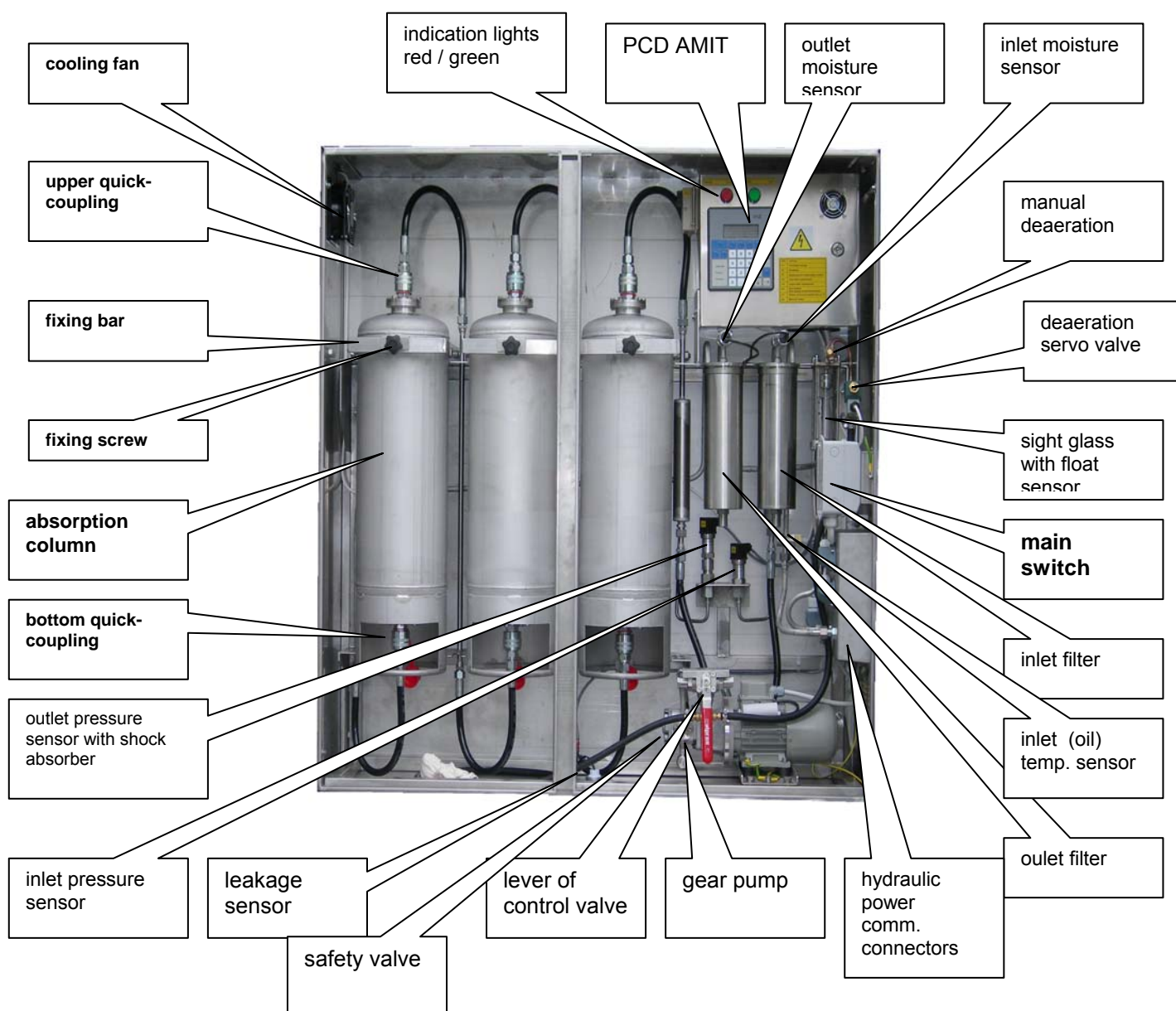
The moisture content in hard insulants should be kept under 2% to avoid their deterioration. If the moisture level exceeds 2%, the transformer must be dried as a matter of preventive maintenance.

INSTALLATION



Specification

Power supply voltage	1 phase 230 VAC (or on demand)
Power supply frequency	50 (60) Hz
Power consumption:	200 W
Oil throughput	7.5 m ³ per day maximum
Outlet water content	5 ppm nominal , 1 ppm minimum
Outlet filtering grade	1 μm
Absorption capacity	8.2 kg of water
Installation options	mobile unit or permanently installed
Dry weight (without oil)	260 kg
Operating weight (oil filled)	272 kg
Dimensions	1200 x 850 x 1490 (mm)
Hydraulical connection	2 x flexible 1/2" hose
Communication:	GSM modem, LAN link, SMS, Internet



Internal layout of main components in ADT (open front doors)

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