

ON-LINE DEHYDRATION, DEGASSING AND FILTRATION OF TRANSFORMERS FOR VERY HEAVY WORKING CONDITIONS



VACUUM SEPARATOR VS-06

ON POWER Recovery of dielectric strength

LIFE EXTENSION OF TRANSFORMER

REMOTE PROCESS CONTROL AND MONITORING

MINIMUM SUPERVISION AND/OR MAINTENANCE

EFFECTIVE REMOVAL OF GASES

DIELECTRIC REMOTE SCREENING

Easy SMS Monitoring of function

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Drying of transformers

The presence of moisture in the transformer, to whatever degree, inevitably and permanently harms its insulation system. Drying & degassing & filtration can substantially reduce that deterioration.

The Vacuum Separator VS-06 serves for mobile and preventative use on transformers with more than 2 - 2.5% water content in the cellulose, with particle contamination and excess gases.

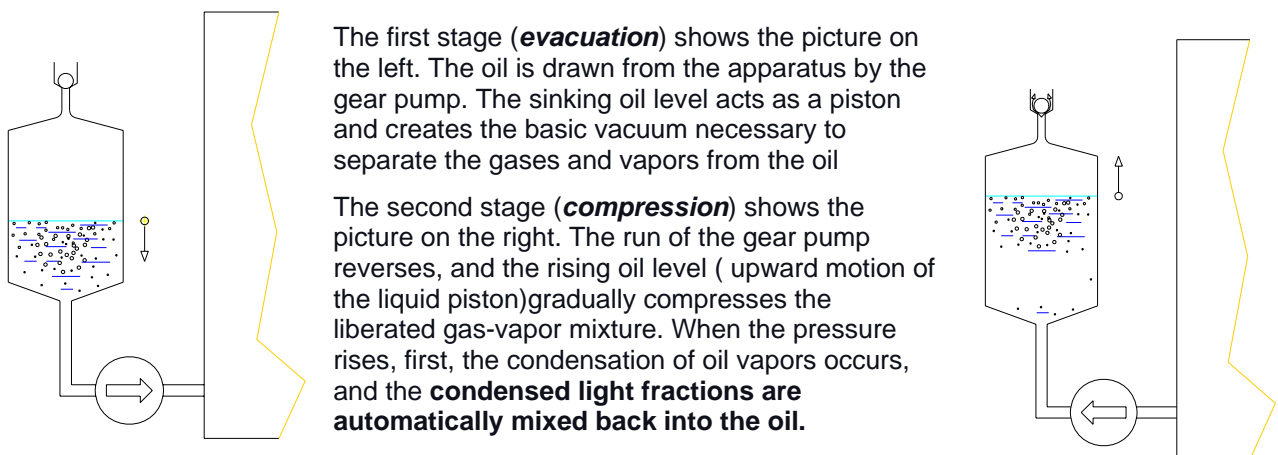
The **quick restoration of safe dielectric conditions, life-extending features, and remote control** also form part of this concept. The system is suitable for the treatment of transformers regardless of their size.

Main features of VS-06

- ❑ **Moisture, gas, and particles content are reduced to the level of a new transformer**
- ❑ **Quick restoration of dielectric strength of oil**
- ❑ **No impact on the insulating oil properties, no over-drying of the transformer**
- ❑ **No disconnection of the transformer under treatment, not even during the installation of the separator**
- ❑ **Installation and servicing with the minimum manpower**
- ❑ **Direct check of the dehydration efficiency by the volumetric measurement of separated water**
- ❑ **Remote monitoring & control of the drying & degassing processes and the permanent screening of the dielectric behavior of a transformer**
- ❑ **Application of advanced and patented technologies like “hydraulic piston” for vacuum building and “bubble bed” for moisture separation**
- ❑ **Effective removal of fault gases via stripping procedure**

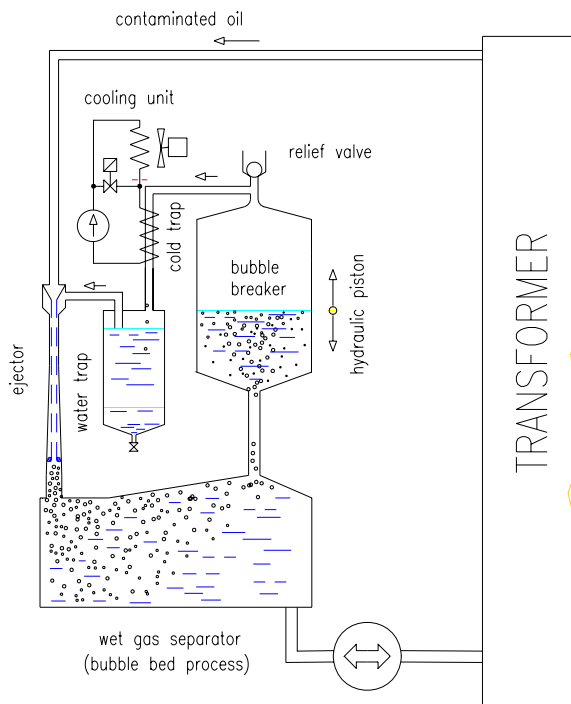
WHAT IS A LIQUID PISTON?

The Liquid Piston principle, which substitutes the vacuum pump, is created by the rising and falling of oil caused by the cyclic operation of the robust gear pump.



In contrast to standard vacuum driers removing the light fraction of the oil, the VS-06 fulfills the „iron rule“ of any treatment of transformer oil inventory: “no-impact on oil properties”.

Subsequently, the gases are released via the non-return valve into the atmosphere. This process continues until the whole apparatus is filled with oil, then the gear pump is switched on into the direct run again, and the next vacuum stage begins.



HOW ARE VAPOURS AND GASES SEPARATED FROM OIL?

Vacuum, appropriate temperature, and large interfacial area are essential for efficient separation.

Contaminated oil from the transformer is adjusted to an optimum temperature, and the hot oil and the gas (previously separated from the oil) are mixed in a vacuum by the ejector to produce bubbles with a large interfacial area (bubble bed).

The freezing-out of moisture from the gas before its mixing with the contaminated oil minimizes the partial pressure of the water vapor.

This process enables an intense removal of the moisture from the oil.

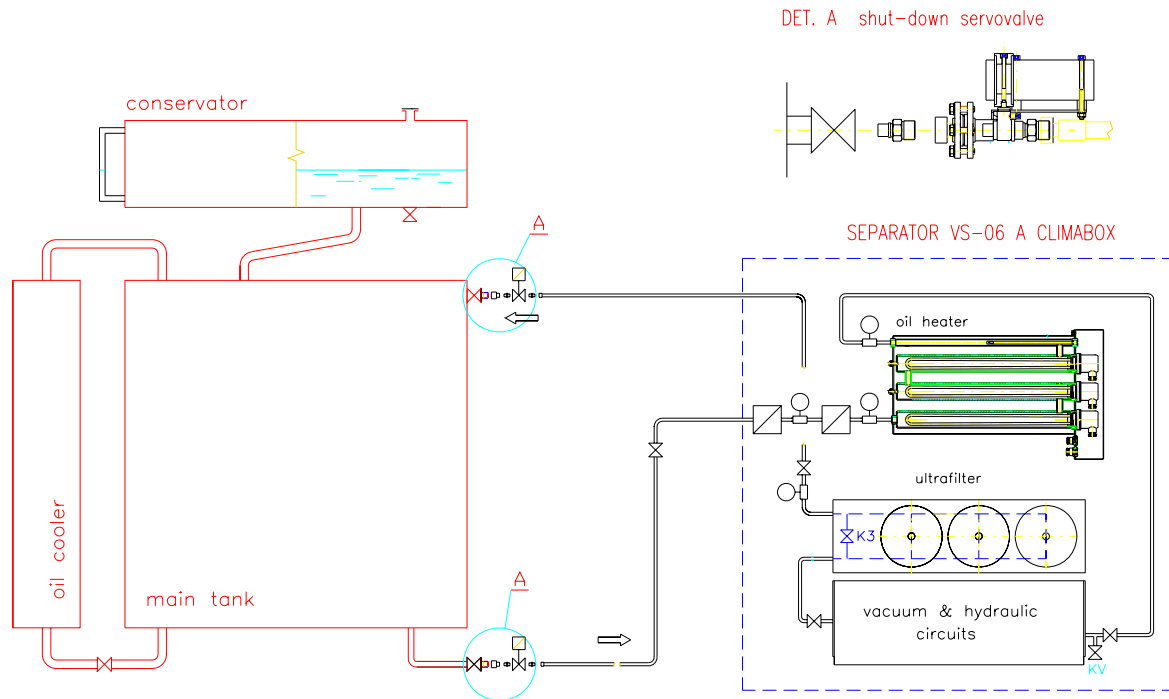
Dissolved gases and vapors diffuse into bubbles, which are then agglomerated, collected, and broken. The released water vapor is then collected as ice in the freezing trap and periodically defrosted and collected as a liquid in the water trap.

Note that only a simplified scheme is shown here for clarity.



The internal layout of main components in separator VS-06 (front door open)

INSTALLATION



The separator is suitable for online treating all types of transformers (i.e., open and sealed units).

Its installation & commissioning in situ by a single person takes ca one hour.; See www.ars-altmann.com / Product Range / VS-06 / Video.

To withstand very hard operation conditions, all parts of the VS-06 (vacuum chambers, hydraulic circuits, preheater, ultrafilter, control circuits, etc.) are in the moisture-tight, stainless CLIMABOX.

For detailed information, See VS-06 CLIMABOX Operational Manual 2021.

SPECIFICATION

Power supply voltage	400 V (or on request)
Power supply frequency	50 Hz (or on request)
Power consumption:	
without oil heater	850 W
with oil heater PO-01	6200 W maximum

Oil throughput	10 m ³ per day maximum
Outlet water content	10 ppm nominal , 4 ppm minimum
Outlet gas content	1% nominal, 0.3 % minimum
Outlet filtering grade	1 µm

Dimensions:	1600 x 1500 x 1000 (mm)
Weight – CLIMABOX version (separator, heater ultrafilter, external water trap etc.)	
Dry weight (without oil)	520 kg (+ autotransformer)
Operating weight (oil filled)	580 kg

Hydraulical connection	2 x flexible 1/2" hose
Communication:	faxmodem, GSM modem, LAN link, Internet, SMS
Moisture reading :	Vaisala humidity sensor

Typical applications of the VS-06 Climabox

Indonesia:

Installation of VS-06 at the block transformer
Improvement of Tx dielectric



Germany: 250 MVA Transformer



VS06 Climabox (and Online DGA)controlled life-extension of aged transformer