

# Vacuum Separator VS-07



## **ON-POWER DEGASSING OF TRANSFORMERS**

**FOR VERY HEAVY WORKING CONDITIONS**

**LIFE EXTENSION OF TRANSFORMER**

**STRIPPING KIT FOR EFFECTIVE REMOVAL OF FAULT GASES**

**REMOTE PROCESS CONTROL AND MONITORING**

**EASY CHECK OF FUNCTION VIA YOUR HANDY**

**PLUG & PLAY INSTALLATION**

**MINIMUM SUPERVISION AND/OR MAINTENANCE**

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## Online degassing of transformers

The presence of gases in the transformer harms its immediate reliability (Buchholz trip) and inevitably invokes the aging of oil and its hard insulants. Online degassing methods can substantially reduce that deterioration.

Regardless of how efficient any method of oil degassing might be - the first law for the long-term degassing of a transformer is always :

### no negative impact on oil properties

The standard degassing process & method using high vacuum pumps :

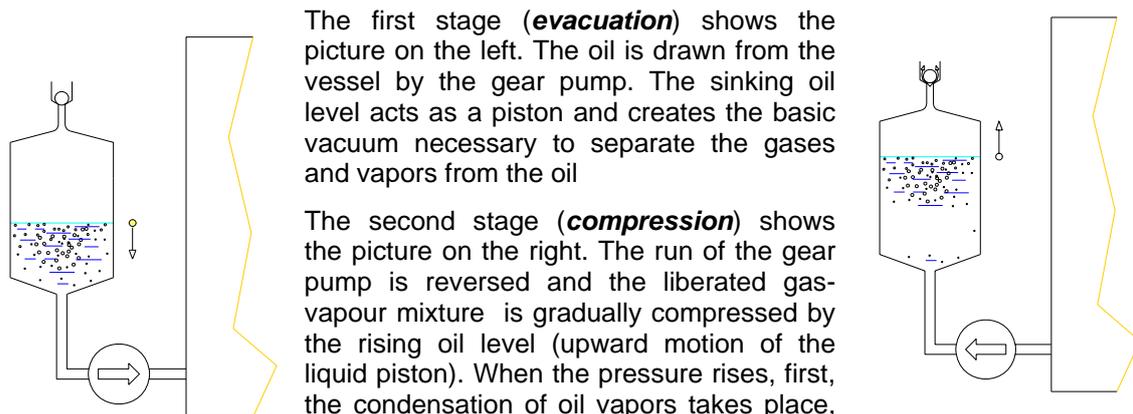
- removes the light fractions from the oil
- inevitably and negatively changes the oil properties
- produces aging of the oil filling and the subsequent aging of all hard insulants.

The VS-07 works without these drawbacks, thanks to the "Liquid Piston principle":

- no degradation of oil properties guaranteed
- only the gases are expelled into the surroundings

## WHAT IS A LIQUID PISTON PRINCIPLE ?

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



The first stage (**evacuation**) shows the picture on the left. The oil is drawn from the vessel by the gear pump. The sinking oil level acts as a piston and creates the basic vacuum necessary to separate the gases and vapors from the oil

The second stage (**compression**) shows the picture on the right. The run of the gear pump is reversed and the liberated gas-vapour mixture is gradually compressed by the rising oil level (upward motion of the liquid piston). When the pressure rises, first, the condensation of oil vapors takes place, and the **condensed light fractions are automatically mixed back**

**into the oil. Only this way can it be guaranteed that under on-line long-term degassing of a transformer that there is "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.

The Vacuum Separator VS-07 is suitable for mobile and preventative use on transformers with more than 2 - 2.5% of gases in the oil and the reduction of their particle contamination. The **quick restoration of safe operational conditions, life-extending features, and remote control** also form part of this concept. The system is especially suitable for the degassing of transformers situated in narrow, hardly accessible spaces or for permanent installation on the main tank of a transformer.

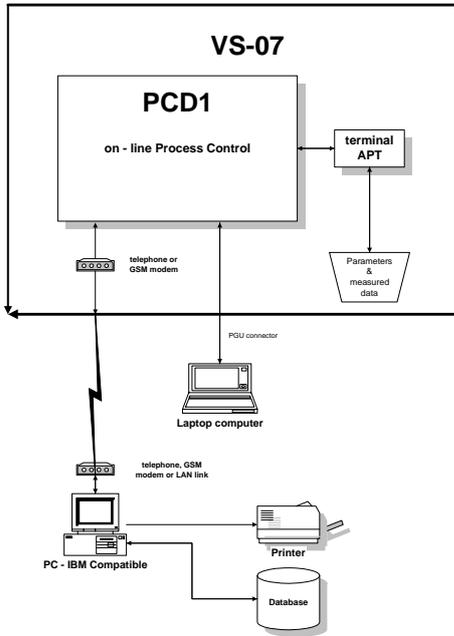
## Main features of VS-07

- 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, usually not even during installation ( Plug & Play design)
- No air venting after installation: hydraulic interconnections to a transformer oil filling are set under vacuum and subsequently rinsed by oil
- Gas contents and particles content can be reduced to the level of a new transformer
- Quick restoration of safe operation conditions

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- ❑ Minimum moving parts, the gear pump works like an oil pump or a vacuum pump
- ❑ No impact on the insulating oil properties
- ❑ Direct check of degassing efficiency based on the amount of removed gases
- ❑ Easy control of function by SMS via your handy
- ❑ Remote monitoring & control of the degassing process: all relevant data are recorded and displayed (printed) as comprehensive time-related diagrams

### PARAMETRIC REMOTE CONTROL



Generally, to keep the content of gases in the oil as low as possible always represents the primary claim to maintain the immediate reliability of a transformer and to stop the aging of its oil filling and its hard insulants..

To achieve this target, the VS-07 can be programmed directly (manually) via the terminal of PCD or by the PC or laptop.

The remote monitoring offers the optimization of the degassing process via the reading of the volume of removed gases and the pressure level in the vacuum chamber.

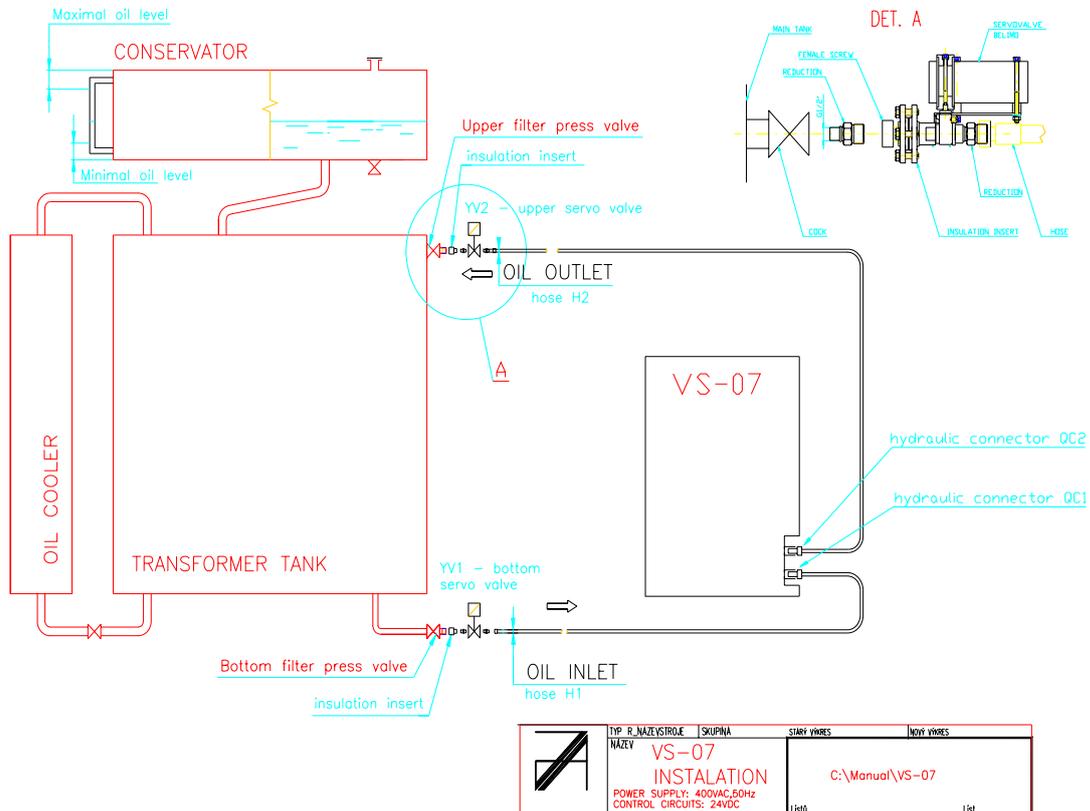
The figure on the left shows the structure of VS-07 control systems and both connections between PCD1 and laptop or remote PC.

ARS provides the OPTIM DG software for communication between the PCD1, and remote user PC or laptop.

The easy check of the VS-07 function can be performed

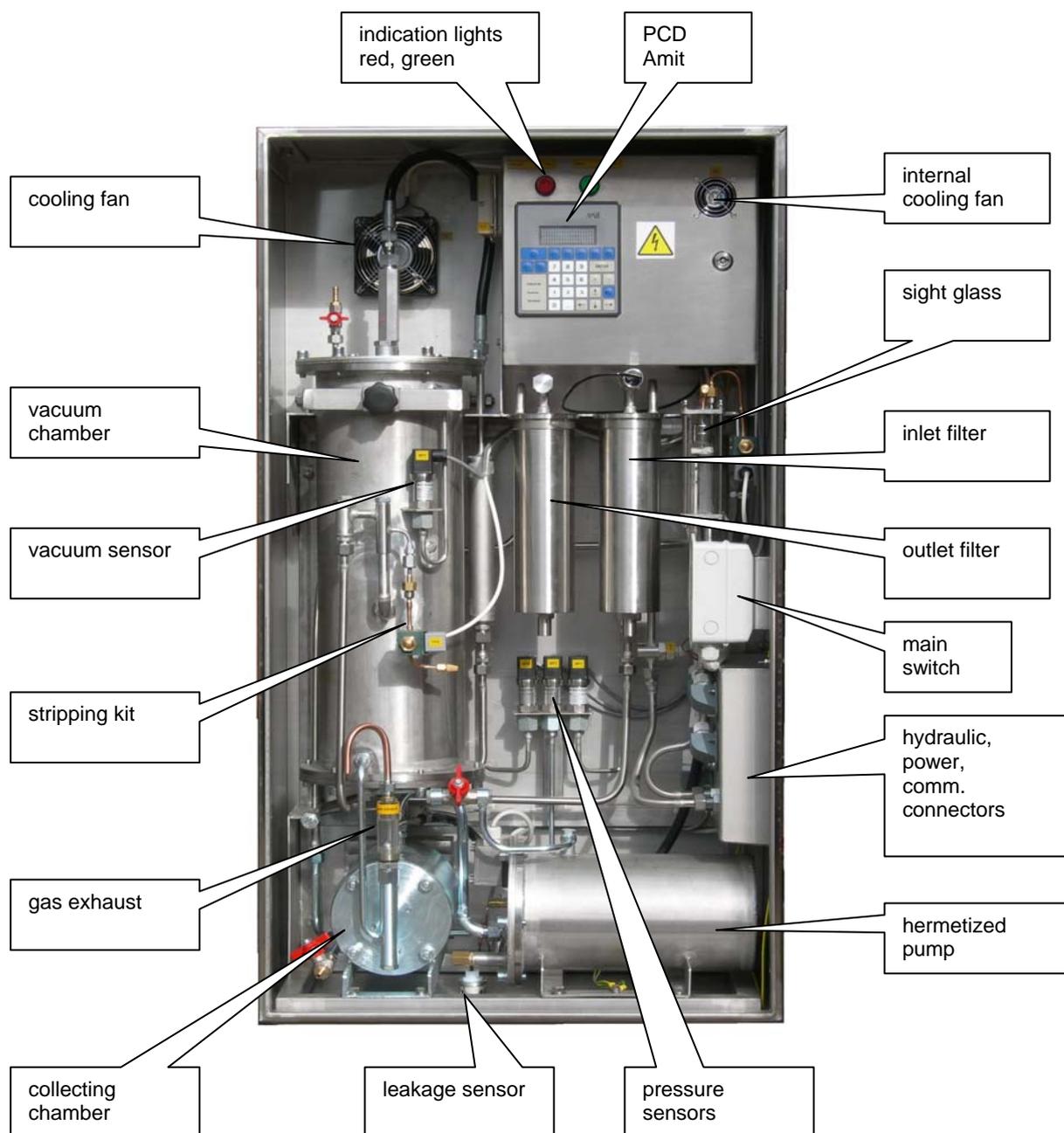
by your handy anywhere and anytime: via SMS.

### Installation



## Specification

Power supply voltage	400 VAC (or on request)
Power supply frequency	50 or 60 Hz
Power consumption:	300W
Oil throughput	10 m <sup>3</sup> per day, maximum
Outlet gas content	1% nominal, 0.3 % minimum
Outlet filtering grade	1 µm
Weight	165 kg
Dimensions:	650 x 700 x 1400 (mm)
Hydraulical connection	2 x flexible 1/2" hose
Communication:	faxmodem, GSM modem LAN, SMS , Internet



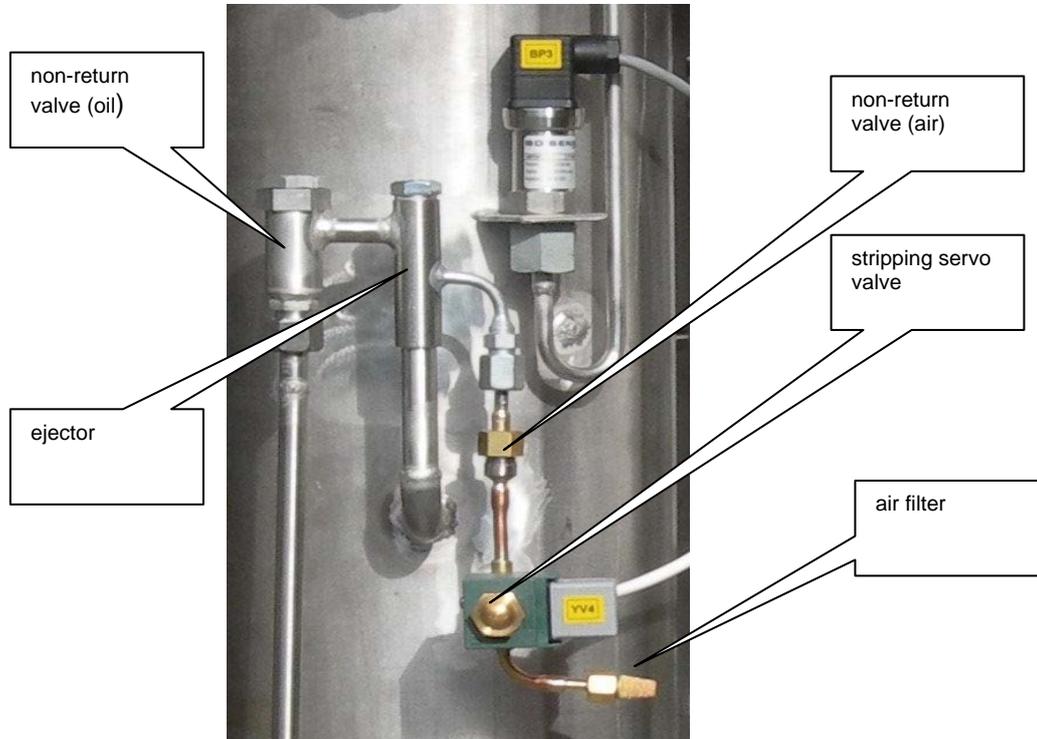
**Internal layout of main components in VS-07 (open door)**

### Stripping procedure: Effective removal of fault gases from the oil

The standard separation of gases under relatively low temperature and vacuum fully satisfies the basic rule of any on-line transformer treatment „ **no-impact on oil properties**“.

Unfortunately, this specific process cannot effectively remove fault gases from a transformer oil inventory, especially by the treatment of hermetically sealed transformers.

The stripping kit situated on the vacuum chamber See picture bellow, elegantly solves the problem.



The stripping valve repeatedly injects under a vacuum a small amount of air into the separator to boost its separation capability.

The air then:

- boosts the diffusion of fault gases from the oil
- simultaneously works here as a “carrier” of fault gases outside of the VS-07.

The stripping process automatically starts :

- If the absolute pressure inside of the vacuum chamber decreases under a predefined pressure level.
- The stripping valve opens for predefined time.
- The PCD evaluates the impact of air injection on the pressure in the vacuum chamber.
- If the absolute pressure decreases under the predefined level again, the PCD starts the next air injection

The process continues until the cavitation control stops the vacuum regime, and the gases are compressed and expelled into the surroundings.

The setting of parameters of the stripping procedure:

- in situ via PCD keyboard
- from remote via software OPTIM DG ( Parameter Table)

If the DGA reading shows that the content of fault gases in oil is lower than the levels requested by the norm, the user usually terminates the stripping procedure (via the change of one parameter), and the VS-07 goes automatically back into the previous, simple degassing process.