

REDFOX TCU

Transformer Care Unit



REDFOX TCU is a system with integrated monitoring, degassing, dehydration and filtration functions. The system has easy methods for oil sampling, production gas sampling and top up of oil or inhibitors.

Key advantages

- Reduces the degradation rate of oil and cellulose.
- Enables measurement of fault gas production flow.
- Alarms if gas content overruns preset values.
- Maintains good operational conditions with high dielectric strength by keeping the oil at low moisture and particle levels.



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REDFOX reduces your transformer risk and puts you in control

Redfox manages your transformer by maintaining low moisture and gas levels, keeping the insulation properties at their maximum and significantly reducing the ageing rate of the transformer oil and cellulose insulation. Whilst the risk of malfunction or trip is dramatically reduced, a built-in gas monitor will alert you of any gassing activities at any time. This small one- off investment will provide you with safety and security for decades.



The main component is the hydraulically driven Redfox vacuum unit, designed for many years of problem-free operation.

The system is connected to the transformer via two hoses and is separated from the transformer by an automatic shut-off valve which closes in case of failure or stops.

REDFOX operates in cycles and since the vacuum chamber is transparent you can actually watch gas and moisture being driven out of your oil. As water and gas levels in the oil decrease, water and gasses will begin to migrate from the cellulose insulation due to the natural law of equilibrium.

The level of vacuum in the chamber can be monitored on a digital display. This enables you to make a daily estimation of the condition of your transformer since the vacuum level in the REDFOX unit is related to the content of gas in your oil.

REDFOX TCU is CE-marked which means that it complies with the EEC guidelines.

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Early warning!

The built-in monitoring function of the REDFOX equipment provides an early warning if the production of gasses in your transformer increases above your preset level. This provides you with plenty of time to decide what steps and measures you need to take and, importantly, when they should be taken. The internal monitoring system will also alert you to electric motor overload or oil leakage.



Improve remaining lifetime!

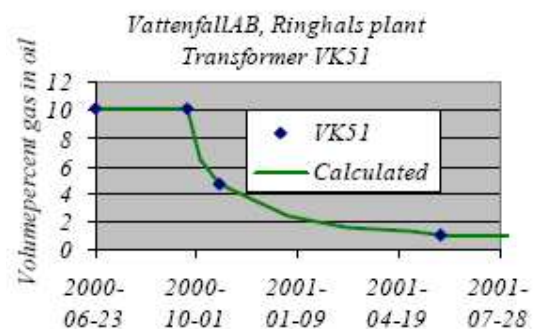
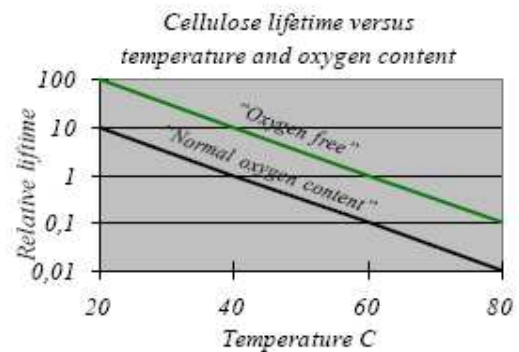
The lifetime of a transformer is governed by its insulation media, the oil and cellulose. These are chemically degraded with the dominant factor being oxygen content. This has been proven in tests as well as in theory. The diagram to the right shows test results where gas production has been controlled at different levels of oxygen content in transformer oil. The lower the content of oxygen the lower the degradation rate of the oil and the cellulose.

Transformer oil in contact with atmosphere will dissolve approximately 10% by volume of air. One third out of this amount is oxygen.

Continuous degassing with REDFOX TCU will reduce the gas content down to 1-2 %. This represents by a rough calculation a 300% (often even more) increase in the remaining life of the transformer provided that the inhibitor and the peroxide level is kept within acceptable values.

Minimize risk!

The risk of unplanned stoppages is reduced due to the fact that degassed oil becomes 'gas hungry'. In this situation it is almost impossible to form gas bubbles which lead to the risk of a transformer trip. The continuous oil treatment also maintains good operation conditions with high dielectric strength by keeping the oil at low moisture and particle levels.



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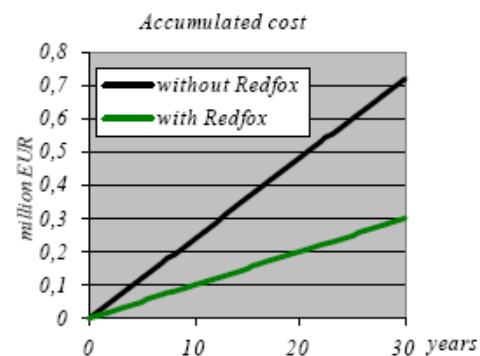
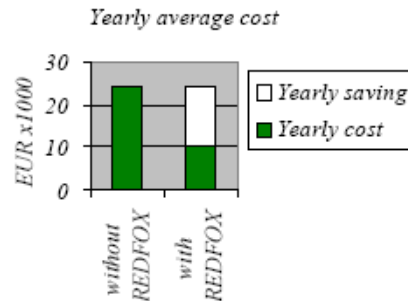
Improve remaining lifetime!

The REDFOX TCU equipment will normally pay for itself in a year, as demonstrated in the following example.

A transformer with a new purchase price of EUR 400 000 has a yearly average capital cost of EUR 24 000 at 30 years depreciation and 5% interest rate. Accumulated cost during these 15 years is $15 \times 24\ 000 = 355\ 000$ EUR.

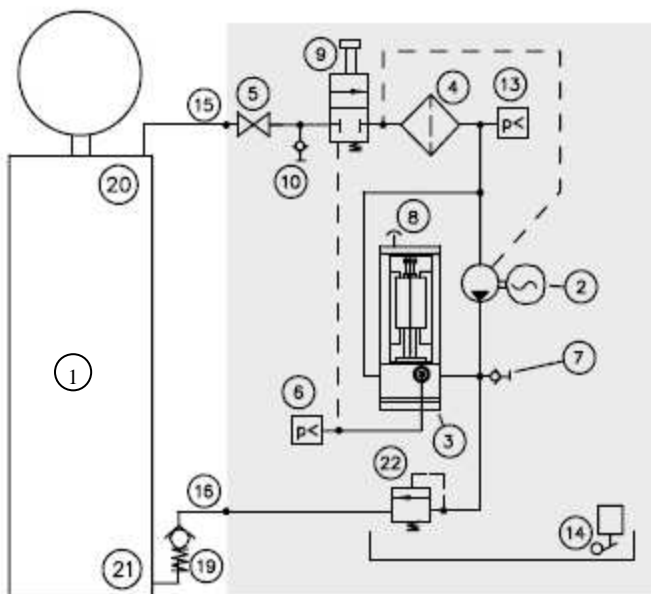
The average capital cost to use a transformer with a REDFOX is during these 15 years at a 3 times increase in the remaining life $355\ 000 / 3 = 120\ 000$ EUR. Add to this a cost of 2 000 EUR yearly for the REDFOX. Total accumulated cost is in this case only $120\ 000 + 2\ 000 \times 15 = 150\ 000$ EUR.

After 15 years of REDFOX use you will have saved in excess of $EUR\ 355\ 000 - 150\ 000 = EUR\ 205\ 000$ or at average $205\ 000 / 15 = EUR\ 13\ 700$ on a yearly basis.



Technical specifications

Design specification



1. Transformer
2. Electric motor and pump
3. Redfox C
4. Particle filter
5. Manual shut – off valve
6. Vacuum gauge
7. Test point
8. Air evacuation plug
9. Automatic shut – off valve
10. Test point
13. Filter pressure switch
14. Level switch
15. Inlet
16. Outlet
19. Check valve 0.5 bar
20. Top connection
21. Bottom connection
22. Pressure limiter

Weight	Approximately 60 kg (empty), weather protection hood included
Dimensions W x H x D	785 x 750 x 395 mm
Mounting B x H	700 x 600 mm, 4 holes for 8 mm
Power consumption	Ca 550 W
Electrical connection	Single phase 230 V, 10 A
Hydraulic connection	2 hoses, with diameter 3/4" for suction and 3/8" for return If suction line is longer than 15 m a 1" hose should be used instead
Degassing capacity	15 m ³ of oil degassed weekly at continuous operation
Dehydration capacity	Determined by temperature conditions and the type of Redfox unit. (Standard C-type or LC- type with optional water cooling)
Particle filtering	$\beta_3 = 100$
Cooling	The equipment is normally sufficient cooled by surrounding air but is prepared for water cooling.
Working temperature	-35 till + 50° C.
Oil temperature	+ 90° C

The equipment should be installed in the coolest possible environment. Special attention to electrical safety aspects as well as actions to prevent inlet of air bubbles into the transformer must be considered.

Contact Hydac for more information!